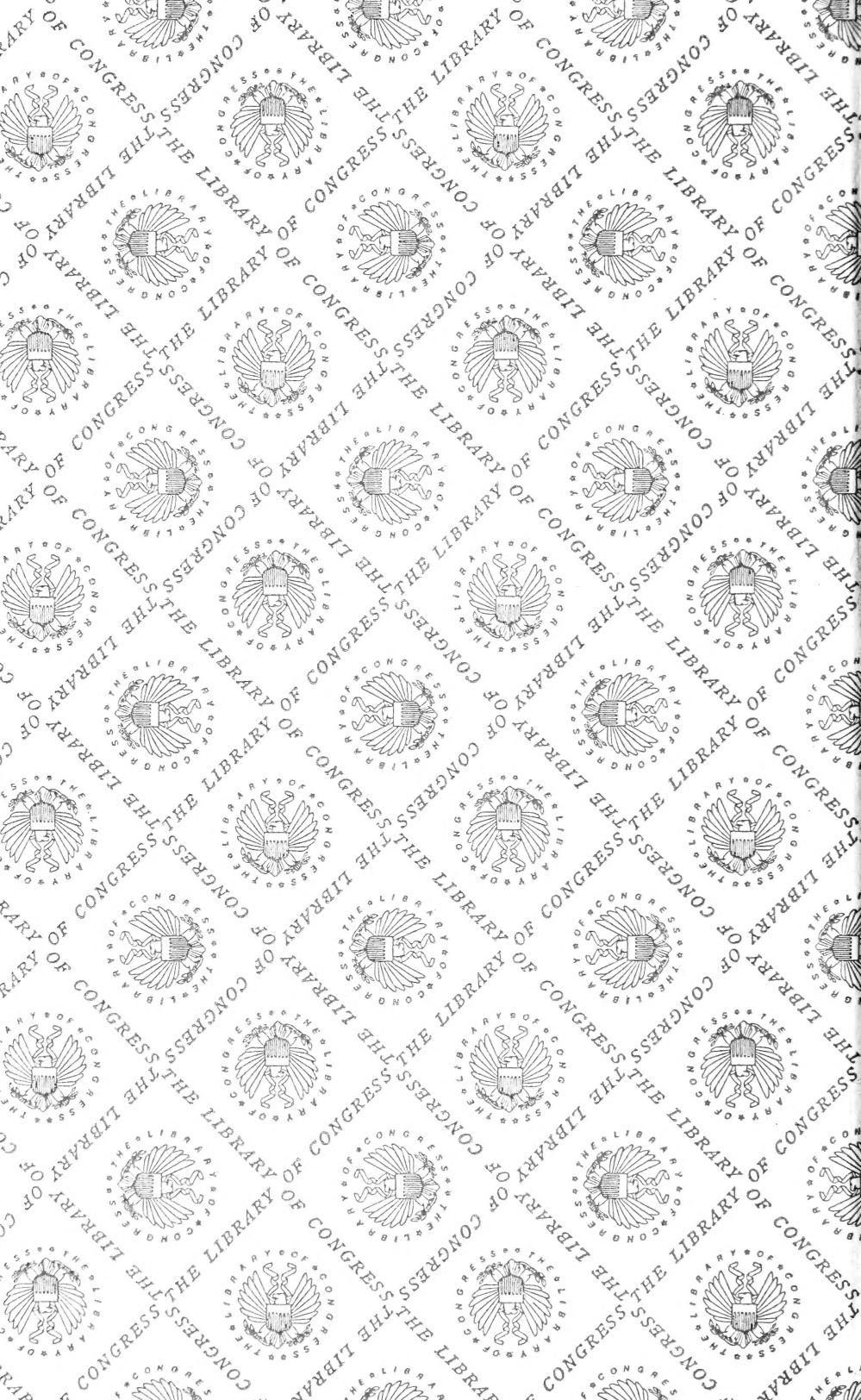
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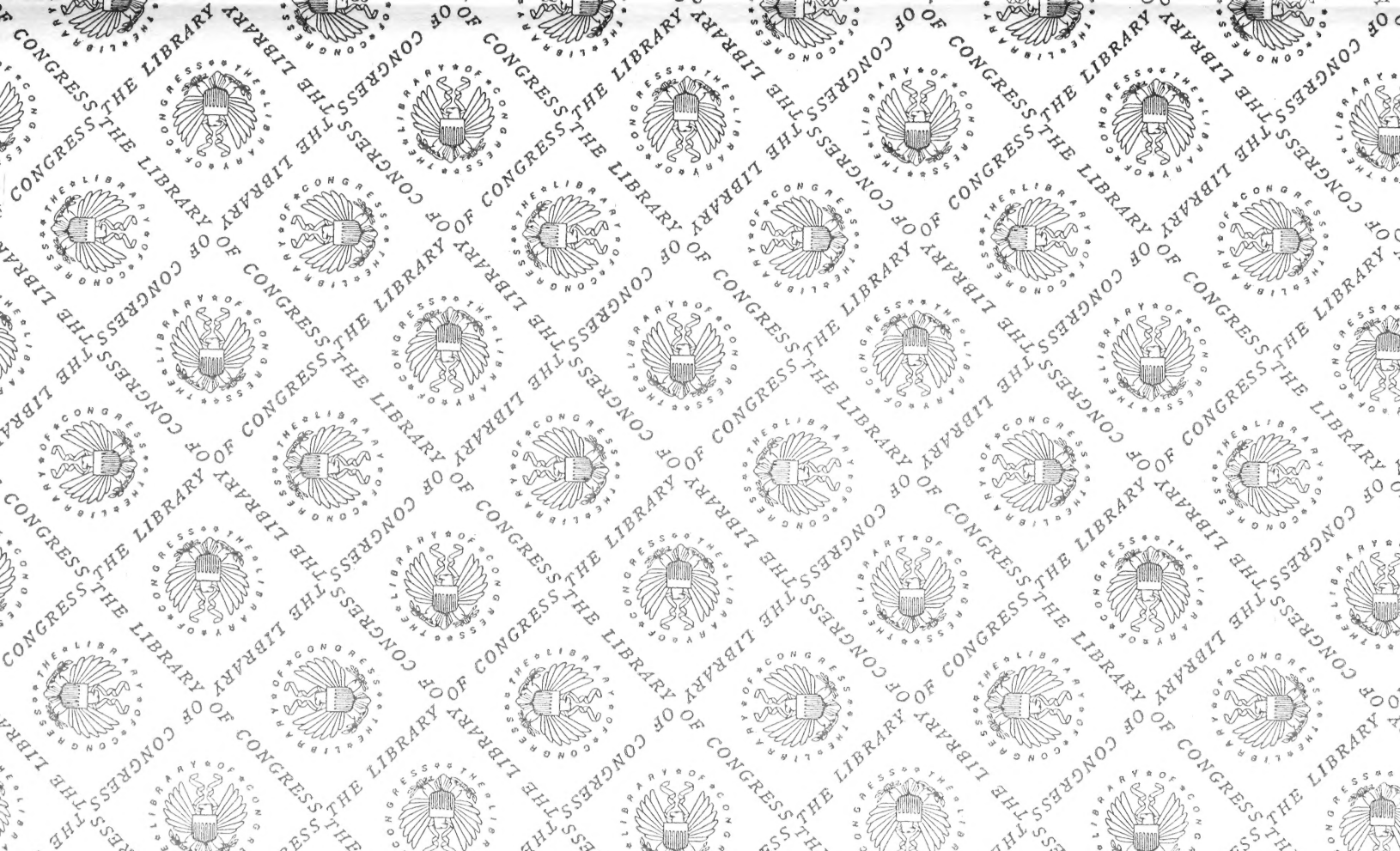
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The New York State Vegetable Growers' Association

Report for

1911-12

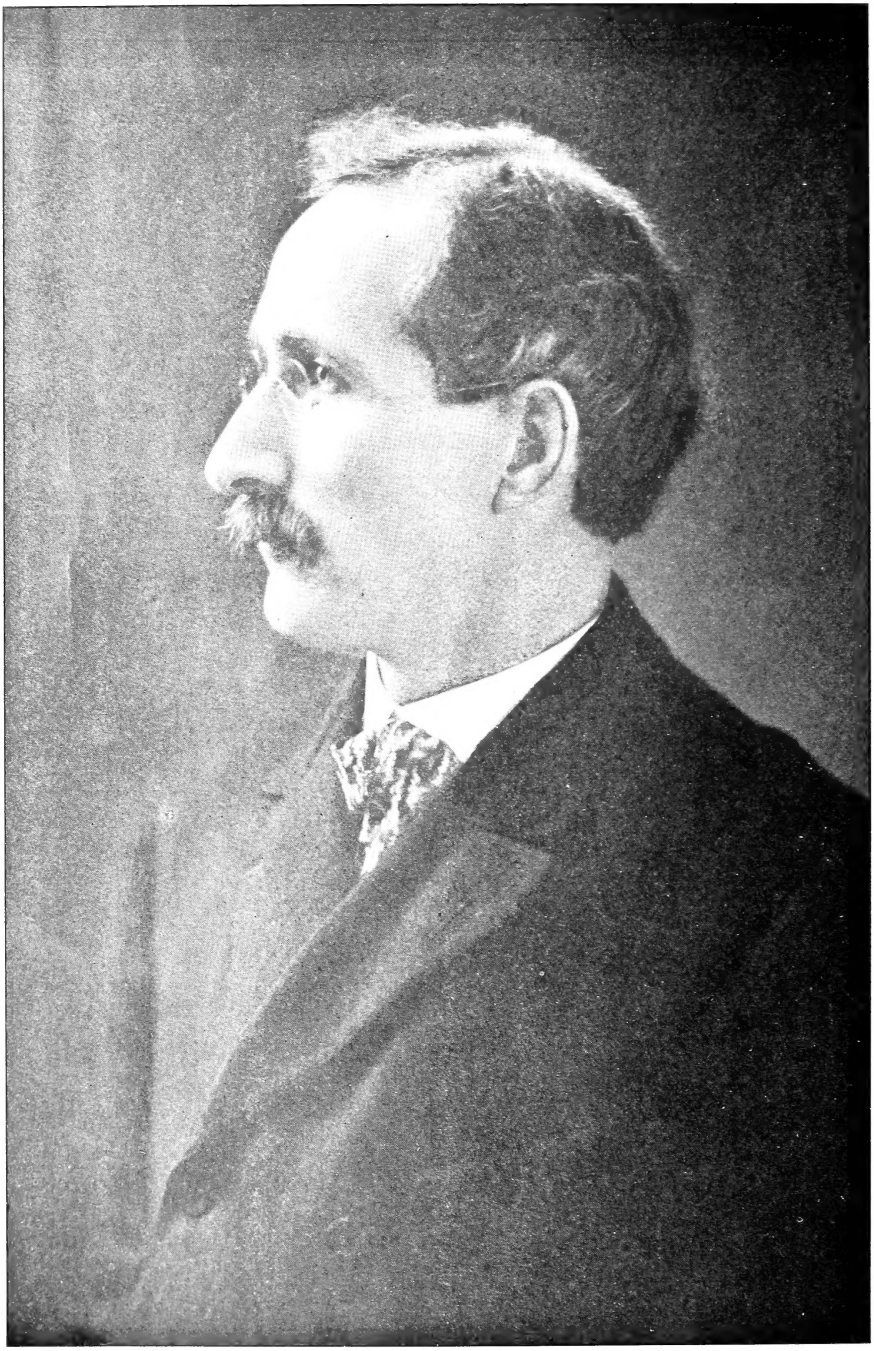
1912-13

The New York State Vegetable Growers' Association

Report for 1911-12 1912-13

"The object of this Association shall be to organize and federate the interests of those engaged in vegetable growing to the end that larger crops of constantly improving quality may be grown and marketed with increased profit."

W. F. HUMPHREY, PRINTER
GENEVA, N. Y.



JOHN CRAIG

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EDITORIAL NOTE

By action of the executive committee, the secretary has been instructed to compile and publish a report of the work of the New York State Vegetable Growers' Association from its organization to the close of the 1913 meeting.

The program of the 1911 session was prepared and in large measure carried out before our Association was formed, and the papers and discussions are not now available for publication.

The record of the 1912 program consists of reports and papers contributed by speakers, summaries of addresses delivered without manuscript, and notes on a few discussions.

The usefulness of the 1913 program has been extended immeasurably by the recording of all reports, addresses, and discussions in stenographic notes. These notes, together with manuscripts of the speakers, are herein preserved.

The high standard of excellence of the programs of our meetings has been made possible by the co-operation of the Department of Horticulture of the New York State College of Agriculture, which has entertained our Association each year.

The value of this report will be comparatively slight if it is not used as a reference work. It is full of practical notes representing actual experience under New York conditions. It has been the aim to render this fund of information readily accessible by the insertion of many subheads and by including a full table of contents and an exhaustive index with many cross references.

THE STORY OF THE ASSOCIATION

BEGINNINGS

In September, 1910, a little group of New York vegetable growers who were attending a meeting of the Vegetable Growers' Association of America stood together in the lobby of the Livingston Hotel in Grand Rapids, Michigan. One of the growers wondered why just such a meeting might not be held within the bounds of the home state, thus bringing to the many the advantages which were then available to but a few who were willing to make the long journey to another state. Others in the group spoke favorably of the idea, and as a result of this conversation, letters were addressed to a number of prominent vegetable men in different sections, asking their opinions as to the desirability and the feasibility of undertaking a movement looking toward the organization of an association which might hold such meetings and in other ways advance the interests of the producers of the state. Replies were in practically every instance favorable, and in many cases highly enthusiastic, and the following call was formulated and signed:

A CALL TO ORGANIZE THE VEGETABLE GROWING INDUSTRY OF NEW YORK

Realizing that the vegetable growing interests of New York State are rapidly increasing in importance with the growth of our cities and the development of our lands;

Realizing that the fruit and dairy interests of our state and the vegetable interests of other sections have gained much through organizations; and

Realizing that the vegetable growers are neglecting an opportunity to interchange ideas on their own line of work, to hear the ideas of the best growers from without the state, to exercise a helpful influence over legislation, to make known their needs as to instruction and investigation, to bring united pressure to bear upon the carrying companies for better transportation service, and to undertake many other activities that the future would show to be of value,

We, the undersigned, hereby request the vegetable growers of New York State to meet at the College of Agriculture, Cornell University, Ithaca, New York, on Wednesday, February 22, at 2 P. M.,

to take steps to organize an association which shall have for its aim the furtherance of the interests of its members in such of the ways mentioned above as may seem best.

(Signed)

C. H. Aldrich, Mattituck, N. Y.
Edward Arnts, Syracuse, N. Y.
W. L. Bonney, Batavia, N. Y.
W. R. Conkling, Mattituck, N. Y.
Anson P. Fisher, Canastota, N. Y.
H. B. Fullerton, Medford, N. Y.
T. Greiner, LaSalle, N. Y.
N. J. Gould, Albion, N. Y.
W. J. House, Arkport, N. Y.
Jennings Bros., Canastota, N. Y.
F. & H. P. Langdon, Constable, N. Y.
C. D. LeVan, Sanborn, N. Y.
John R. Spears, Northwood, N. Y.
Geo. B. Tyler, East Aurora, N. Y.
H. R. Talmage, Riverhead, N. Y.
Chauncey West, Irondequoit, N. Y.
Wm. H. Woodward, Latham, N. Y.
Vegetable Growers

L. H. Bailey,
Dean of New York State College of Agriculture

John Craig,
Professor of Horticulture,
New York State College of Agriculture

This call was given wide publicity, and in response thereto, a goodly number of growers assembled at Ithaca on February 21 to 23, 1911, to hear the speakers who had been engaged by the Department of Horticulture of the College of Agriculture to address them, and to consider the feasibility of organizing a state vegetable growers' association.

THE FIRST MEETING

The proposal was considered at an informal meeting on Wednesday, February twenty-second. The late Professor John Craig called the meeting to order, and Mr. E. A. Tuttle of Eastport, Long Island, was nominated and unanimously elected chairman of the meeting. After a full discussion, Mr. C. R. White moved that, "It is the sense of this meeting that the New York State Vegetable Growers' Association be organized." This was seconded, and after brief discussion, was carried. The following committee was appointed to draw up a plan of organization: C. R. White, W. L.

Bonney, Chauncey West, C. H. Aldrich, and Paul Work. These gentlemen met with Chairman Tuttle and Professor Craig, and after three sessions, formulated a simple constitution and set of by-laws, under which the work might go forward. Organization was effected by the adoption of this constitution, which is still in force unchanged, and by the election of the following officers: President, C. R. White, Ionia; vice-president, M. H. Holmwood, Orchard Park; secretary, Paul Work, Ithaca; treasurer, C. H. Aldrich, Mattituck. Executive committee, President and secretary, *ex-officio*, Ezra A. Tuttle, *chairman*, Eastport; G. M. Keller, Brighton; W. L. Bonney, Batavia.

A list of growers who became members at this time and of others who were unable to be present, but who immediately gave their support to the movement, is included in this report. The officers at once began laying plans for the work of the Association, and since that time progress, though sometimes slow, has been uninterrupted.

It was felt at this time that it would be unwise for a state wide organization to undertake the work of co-operative selling, concerning which much was said, but that the work of the organization should be primarily educational. Reference was made to the two great horticultural societies of the state, and the hope was expressed that the new society might hold a relation to vegetable growers somewhat similar to that which these two organizations bear to the fruit men.

ASSOCIATION WORK IN 1911

The first year was devoted to building up a membership representing all the widely scattered producing sections of the state and all the widely diverse interests of market gardeners, greenhouse men, truckers, muck land growers, and in fact, of all vegetable producers.

Under an appropriation from the New York State Fair Commission, an exhibit of vegetables packed for market was made at the State Fair at Syracuse. The wide variety of packages shown offered a splendid opportunity for comparison of the methods of different sections of the state and of the country. It was a display of distinct educational value, and it was at the same time most useful in attracting attention to the newly organized association and to its work.

ASSOCIATION WORK IN 1912

The details of Association progress since the beginning of 1912 are best brought out in the proceedings of the meetings. Suffice it

to say that our organization has made its influence felt in the legislative halls, has been instrumental in the formation of local vegetable producers' societies, and has continued the exhibition work, making displays in 1912 in connection with the meeting of the Vegetable Growers' Association of America at Rochester and at the State Fair.

SEED SERVICE

Perhaps the most promising of the Association activities from the financial standpoint is the establishment of the Seed Service. Through this agency, a beginning has been made in bringing the man in the field into touch with producers of reliable seeds. The work offers opportunity for almost indefinite expansion, and it appears that it will be possible not only to offer great advantages in better crops, but also to effect material savings in the actual cost of the seed. While low prices do not represent the primary object of the work, it seems that reasonable figures and high quality are not incompatible.

PUBLICATION LIST

To Mr. T. Greiner, chairman of the Committee on Investigation, the members of the Association are indebted for the very complete and comprehensive list of vegetable publications which he has compiled, and which appears in this Report. With this work done, it has been possible to secure for our members many bulletins which would not otherwise have been available. Other fields of work are being considered, and the active aid of an increasing number of our members is hastening our progress, at the same time attesting the real interest which is felt in the success of our organization.

THE OUTLOOK

That the importance of the vegetable industry in New York is little realized is indicated by a glance at the table that is shown on page 172. Very few suspect that the crops of vegetables exceed in value the crops of all other horticultural products, including fruit, flowers, and nursery crops. The fruit industry for many years has enjoyed the advantages of splendidly organized and highly useful societies of state wide influence. The vegetable producer is coming into his own, and at no very distant day his organization will stand beside the other horticultural bodies in membership, in influence, and in usefulness.

1911 EXHIBIT AT STATE FAIR

OUR PACKAGE EXHIBIT AT NEW YORK STATE FAIR 1912

PROGRAM

FIRST ANNUAL MEETING, FEBRUARY 20–25, 1911

In Co-operation With the Department of Horticulture, New York State College of Agriculture

MONDAY

3–5 P. M.	Growing Vegetable Plants	Paul Work, G. M. Cosh

TUESDAY

9 A. M.	A Co-operative Selling Association in Action,	C. R. White
10 A. M.	Winter Cabbage	F. E. Gott
11 A. M. } 12 A. M. }	New York State Drainage Association. Topics of interest to vegetable growers.	
3–5 P. M.	Round Table. Marketing Methods	Prof. John Craig
8 P. M.	Trucking in the East (illustrated)	H. F. Hall
	Trucking in Atlantic States (illustrated).	Prof. L. C. Corbett

WEDNESDAY

9 A. M.	Greenhouse Construction (illustrated)	R. O. King
10 A. M.	Special Vegetable Crops Under Glass	H. F. Hall
12 A. M.	Growing Vegetables for Local Markets,	Chauncey West
3–5 P. M.	Vegetable Growers' Association Meeting for Organization.	

THURSDAY

9 A. M.	Greenhouse Construction (illustrated)	W. R. Cobb
10 A. M.	Greenhouse Management	Chauncey West
11 A. M.	Development of Muck Lands in New York,	Prof. E. O. Fippin
12 A. M.	Growing Celery on Muck	W. L. Bonney
3–5 P. M.	Horticultural Union.	

FRIDAY

9 A. M.	Growing Lettuce on Muck	W. L. Bonney
12 M.	Growing Early Vegetable Plants	C. D. Le Van
3–5 P. M.	Vegetable Growers' Association.	

The New York State Vegetable Growers' Association

Second Annual Meeting

College of Agriculture, Ithaca, N. Y.

February 20th, 21st and 22d, 1912

PROGRAM

TUESDAY, FEBRUARY 20

9 A. M.	Transportation Conditions in New York. Report of Committee on Transportation -	W. F. Hallauer
10 A. M.	Asparagus - - - -	Prof. R. L. Watts
11 A. M.	Cauliflower. Round Table.	Leaders, C. H. Aldrich, M. H. Holmwood
12 M.	Reclaiming Muck Lands - - -	W. W. Ware
2 P. M.	Good Seed. Round Table -	Leader, Prof. R. L. Watts
3:30 P. M.	Report of Committee on Co-operation	M. H. Holmwood

WEDNESDAY, FEBRUARY 21

9 A. M.	Legislation Affecting the Vegetable Grower. Report of Committee on Legislation - -	E. A. Tuttle
10 A. M.	Celery - - - -	R. H. Garrahan
11 A. M.	Plant Breeding for the Vegetable Grower. Illustrated.	Prof. H. J. Webber
12 M.	Vegetable Crops for the Greenhouse -	C. W. Waid

2 P. M. Association Afternoon.

1. The Work of the Association, Past and Future. Dean L. H. Bailey, President C. R. White, and others.
2. Business Session.

8 P. M. Fundamental Principles Underlying Successful Co-operation - - - - - - C. R. White

THURSDAY, FEBRUARY 22

9 A. M. What are the Experiment Stations Doing for the Vegetable Grower? Report of the Committee on Investigation - - - - - - T. Greiner

10 A. M. Early Cabbage - - - - - R. H. Garrahan

11 A. M. Onions on Muck Land - - Prof. E. O. Fippin

12 M. Greenhouse Building for the Vegetable Grower, Chauncey West

2 P. M. Vegetable Growing for the Fruit Grower. Lecture and Round Table. - - - - - C. W. Waid

3:30 P. M. Report of the Committee on Marketing H. W. Baxter

ASPARAGUS

R. L. Watts, State College, Pennsylvania

It affords me great pleasure to discuss the culture of a crop which ranks so high in the esteem of both grower and consumer. No vegetable is more appreciated in its season, and few, if any, offer greater possibilities for field culture. There is a tremendous demand for this crop on our city markets, and the demand is increasing annually. Very few of our markets, however, are well supplied with asparagus, and it is hoped that our vegetable growers in various parts of the state will take a keener interest in the growing of the crop for commercial purposes. The most wonderful truckers of New Jersey are obtaining a gross income of from $300 to $500 to the acre, and there is no reason why other progressive farmers should not realize just as large returns. This vegetable should also be much more generally grown for the home table. Every village garden should have a plot cultivated by the most intensive methods. It is ready for the table early in the spring, long before onions and other early vegetables in the open ground are large enough, and

cuttings may be made daily until about the first of July. No other vegetable will take its place at this season of the year.

VARIETIES

While many varieties are cultivated, only a few are grown extensively. Palmetto is by far the most important variety. It is grown most extensively in all of the large producing districts. The shoots are of good size and of fine quality. This variety seems to be more resistant to rust than any other and this is perhaps the main reason for its popularity.

Argenteuil, a French variety, has attracted considerable attention in recent years. There are two strains of this variety, known as Early and Late Argenteuil. The varieties are not apparently well adapted to clay soil, but they have been at least fairly successful in the sandy types of New Jersey and elsewhere.

Conover's Colossal is an old variety which has been grown extensively in Pennsylvania and other states in the Union. Because of the smaller shoots, the variety should not be recommended for general cultivation.

Barr's Mammoth, Reading Mammoth, Dreer's Eclipse and California Mammoth White are excellent varieties for either the home garden or commercial plantation.

SOIL

While a sandy loam is unquestionably the ideal soil for the growing of asparagus, this crop is grown successfully on a great variety of soil types. A sandy soil is especially desirable for growing white or blanched asparagus, because the sandy soils offer no resistance to the stems and they make perfectly straight shoots. It is possible then, to reach several inches under the surface of the ground with a knife in cutting, thus securing long, white shoots. The largest plantations in the East are upon soils of this type, although there are many profitable fields on the heavier types of soils. Our markets are demanding green asparagus more and more every year, and this may be grown with great success upon any moist, fertile soil. It has been said that any soil that will produce a good crop of corn will also grow good asparagus. While a field of average fertility will not produce maximum profits, it will return as large profits as any other garden crop which may be cultivated with a horse. As previously

indicated, the most important factors in soil selection are the constant and abundant supply of moisture and the never failing supply of available plant food.

SEED SELECTION

The selection of good seed is just as important in growing asparagus as any other garden or farm crop. This matter is too frequently neglected with the result that growers are realizing from twenty-five to seventy-five dollars less an acre than would be possible were seed selection practiced. Amateurs or beginners should procure the very best stock from specialists who have practiced seed selection for a number of years. Then, after the plantation is established, seed should be selected at home for any further planting that may be contemplated. The individual plants of the field should be carefully studied, marking those which are the largest and most vigorous and free from rust. It is exceedingly important to select plants that produce several large shoots rather than many small shoots. Our markets are demanding and paying for large shoots and this matter can be controlled to a great extent by intelligent selection of seed. The propagator should bear in mind that there are both male and female plants, and that it is just as important to select strong male plants as the very best female plants. These must also be in close proximity to each other, so that the pollination of flowers will be perfect. After locating plants, most growers prefer to lift them from the plot and remove them to a special breeding plot at some distance from other plants. This is an excellent idea; for the same plants may then be kept for many years to produce the seed required, and there will be no interference with tillage operations in the commercial plantation. The seeds are ripe when the berries have turned red. The berries are then picked and the seed washed and dried. The seed may be preserved for several years under conditions such as found in ordinary living rooms.

GROWING THE YOUNG PLANTS

Young plants are so easily raised that every commercial grower should produce his own. Ground for this purpose should be highly manured and plowed in the fall. It should then receive a top dressing of a complete fertilizer as early as possible in the spring, be harrowed thoroughly, and the seeds drilled in rows not less than eighteen inches apart, if to be worked with a hand wheel hoe, or thirty

inches if to be worked with a horse. If the seed is very choice and the grower is anxious to obtain the best plants, the seed should be dropped three inches apart. If a large number of plants are desired, the seed may be sown with a drill, although the hand method is preferred by some because it secures equal space for the development of the roots and tops. Do not cover the seeds with more than one and a half inches of soil. As the asparagus seed is very slow to germinate, it is desirable to sow a few radish seeds with the asparagus, so that the young radish plants will mark the rows and cultivation may be begun a few days after sowing. If a radish plant grows every four or five feet in the row, they will be sufficient to enable the cultivator to keep between the rows, and thus avoid disturbing the asparagus seeds or young plants which may be coming up. The asparagus nursery should receive thorough tillage until late in the fall. If the plants do not grow rapidly, nitrate of soda should be applied at intervals of about three weeks at the rate of one hundred pounds to the acre. In small nurseries, an excellent plan is to top dress with fresh horse manure about the twenty-fifth of July. The mulch of manure should be heavy enough to prevent weed growth and conserve soil moisture.

PLANT SELECTION

Experiments at the Pennsylvania State College have shown that the strongest roots are very much the most profitable. In an experiment which has been in progress for several years, No. 1 roots have produced $100 more to the acre than No. 3 roots. Practical growers in many sections have had the same experience, and this information shows how important it is for the commercial grower to produce probably twice as many plants as will be needed to plant his fields, and then to select and plant only the strongest. No information can be given in this talk which will count for larger profits than the proper selection of plants.

SOIL PREPARATION

A heavy clover sod provides the best conditions for the growing of a good crop of asparagus. The field should be heavily manured in the fall and also plowed in the fall, so that the vegetable matter will be partly decayed at planting time the following spring. It is necessary to plant at the earliest possible date in order to secure the greatest growth the first season. There should be no delay in harrow-

ing the land and preparing it for setting the young roots. The grower should not lose sight of the fact that the field is to remain in this crop for not less than ten years, and probably for twenty, and that too great care cannot be exercised in plowing and harrowing.

PLANTING

Most commercial growers in New Jersey and elsewhere allow not less than five and a half feet of space between rows. The most successful and intensive growers in Pennsylvania are making the rows only four feet apart and setting the plants about two feet apart in the row. This is ample space to grow green asparagus, and the returns per acre at these distances will be greater than when more liberal spacing is provided. The universal practice of the most successful growers is to plant one year roots. It has been clearly demonstrated by experiment stations and hundreds of practical growers that one year roots are more satisfactory than older roots. If two year plants could be lifted from the nursery row and transplanted to their new home with no interference with the roots, they would produce just as good results. This, however, cannot be done, so that the universal practice is to plant strong, vigorous, one year roots.

The grower should bear in mind that the buds of the crowns come closer to the surface every year. This is due to the fact that the new buds form slightly higher each year, and it is, therefore, an advantage to plant as deeply as the soil will permit. Under no circumstances, however, is it desirable to set the crowns or roots in the sub-soil, because this will invariably interfere with root development; for the roots grow laterally rather than downward. A safe rule is never to plant deeper than the land is plowed, unless shallower plowing is practiced than is expedient considering the character of the land. Under conditions as found in most fields where this crop is grown, it is preferable to plant from six to eight inches deep. Because of the tendency of the crowns to get nearer the surface of the land every year, it is an advantage to plant ten or twelve inches deep, providing the soil will permit planting at this depth.

CARE OF PLANTATION

There has been much dispute upon methods of fertilizing asparagus, although some points have been well established. There is no

question about the importance of maintaining the supply of vegetable matter. It is highly probable that not less than twelve tons of stable manure annually is necessary to provide the soil with the proper amount of humus. A common practice is to apply the manure any time after the tops are cut in the fall and before the first tillage operation in the spring. This is a safe practice in light soils, but on heavy soils the better plan is probably to apply the manure about the first of July or immediately after the cutting season. Heavy applications in the fall or winter may make it almost impossible to harrow the plantation early in the spring, because heavy mulches of manure retain the moisture in the spring and thus prevent early tillage. Heavy applications of commercial fertilizer are undoubtedly essential to the best results. The most successful growers of the country are using from one-half to one ton of a complete fertilizer to the acre. It is possible that the largest returns cannot be realized with less than a ton to the acre of a fertilizer carrying four to six per cent of nitrogen and eight to ten per cent of potash and phosphoric acid. A safe practice is to apply one-half the commercial fertilizer early in the spring and the other half immediately after the cutting season. Some growers contend that it is better to apply all of the fertilizer after the cutting season. This plan is entirely satisfactory, provided there is abundant rainfall after the first of July, otherwise it is better to apply the mineral elements early in the spring, so that they will be well distributed through the soil in case there is a light rainfall after the first of July. Nitrate of soda can often be applied to advantage as a top dressing, using from seventy-five to one hundred fifty pounds at each application. It is often profitable to use as much as four or five hundred pounds of nitrate of soda to the acre. The asparagus plantation should be kept free from weeds throughout the season. Rust is the only disease that gives very much trouble in growing asparagus. Although some spray materials have been more or less valuable in controlling the disease, it is generally conceded that the most practical means of control is to cut the tops in the fall as soon as the leaves begin to turn yellow and burn them. With good treatment, an asparagus plantation will last for twenty-five or more years, but it is not considered desirable to retain the plantations more than fifteen years, and many growers destroy them when they are ten or twelve years of age. The shoots get smaller as the plantation becomes older, and this is the reason for making new plantations at short intervals.

MARKETING

With soil of high fertility, careful seed and plant selection, and the very best treatment, it is possible to cut $50 worth of asparagus to the acre the second season from planting. The grower should be very careful to avoid heavy cutting the second season, as this will cripple the plants during the following years. Even the third year the cuttings should not be too heavy, but the fourth and succeeding years it is permissible to cut until about the first of July. Asparagus is still regarded as a luxury by many city consumers, and it pays to place the product on the market in the most attractive form. Many growers have found it an advantage to tie the bunches with red tape. The tape can be secured at a very low cost, and it certainly pays to use it. The bunches of asparagus are eight to ten inches in length, and the average weight is two to two and a half pounds. In warm growing weather, it is necessary to look over the plantation every other day, and sometimes every day, in order to catch the shoots before they break or become too long for marketing. In order to avoid cutting on Sunday, some growers remove the marketable shoots Saturday afternoon, and after washing and bunching, they are stood in trays with the butts standing in about one-half inch of water. This will keep the asparagus perfectly fresh until Monday morning, when it may be sent to market.

DISCUSSION FOLLOWING ADDRESS ON

GOOD SEED

Led by R. L. Watts, State College, Pennsylvania.

A Member: Do you think it would be practicable to grow Golden Self-blanching seed in this country, or spinach?

Professor Watts: I have never heard of a grower who has produced his own seed of the Golden Self-blanching successfully. Of course, there are other varieties that have been produced. But it is, at least, very difficult to grow Golden Self-blanching in this country. With spinach, I doubt the practicability.

A Member: How can you prevent the celery growing up to seed? Last year was the driest year, and never a head of my crop went to seed.

PROFESSOR WATTS: I would like someone to tell me that. I know of all sorts of theories, but whether they are facts or not, I couldn't say. Some claim that if a plant is checked in growth at any time, that will cause it to send out seed shoots. One man had a lot of plants growing in a cold frame in boxes, and he didn't think he would have any use for them. He neglected them, sometimes letting them go for days without being watered. He told me that happened over and over. Those plants lived and revived, and when they were put out in the field, not one made a seed shoot.

A MEMBER: I have a theory, and is it the only one that is satisfactory. It is a check, but a check from a drop in temperature.

PROFESSOR WATTS: Will it always hold?

A MEMBER: In our experience.

A MEMBER: In '97 I set four rows across the field. They got a pretty fair frost. Of the plants out of the same hotbeds, over seventy-five per cent went to seed,—of the plants in the field, hardly one per cent.

PROFESSOR WATTS: I think I could parallel that with a drop on plants in the cold frame. One lot of plants I had taken from the greenhouse to the cold frame. They were fine plants, but we had some snow flying after that. A large per cent went to seed. It was a check in growth. That is additional information. When growth is checked by a drop in temperature, it causes the plants to send out seed shoots.

A MEMBER: In selecting tomato plants, have you ever tried to isolate a particularly good plant?

PROFESSOR WATTS: Yes, that should be done. One good plant would probably make all the seed you would need, unless you were growing a great many. Do you mean to move the plant?

A MEMBER: No, to put something around it.

PROFESSOR WATTS: That would be worth while, I should think, because there is more or less cross-pollination, although the flowers don't pollinate so well with a cloth over them.

A MEMBER: Could you judge your plant till some had already pollinated?

PROFESSOR WATTS: No, you couldn't.

A MEMBER: They would be formed in the center of the plant and further from other hills.

A MEMBER: Do you know anything about California celery seed? I have never had any experience with it that I know of.

PROFESSOR WATTS: I think it is generally conceded that the French grown Self-blanching is superior. With the green varieties, California is growing good seed. But a large part of the so-called California seed is purchased through Philadelphia houses.

PROFESSOR WATTS: I would like to inquire how many produce their own seed of anything.

MR. FULLERTON: We have produced practically every seed we have grown, and that is more than all the rest of you put together have grown, with one exception, cauliflower. The only reason we haven't grown that is that our neighbors say it cannot be grown. I believe we can grow it as well as cabbage. The trouble is to keep it. The average man won't take the pains necessary to keep it. If you could only throw it out in a corner somewhere, leave it till next year, and pick the seed, many would grow their own seed. We have never had any trouble growing seed at all, and have always found much better results when we have grown our own seed. I think I will drop in and help you out. Only I am inclined to mention names. I carry no advertising, I haven't a political job, and I can talk out! When we started on the experimental station, it was the object to show how much Long Island could grow, how many varieties. Consequently, we planted things that had never been grown in this country, that people thought wouldn't grow. They all grew. We planted three hundred eighty varieties, and harvested three hundred eighty crops. We planted alfalfa. I bought seed from everybody and paid all sorts of prices for it. Some came up, some didn't. Some was clover, some was ragweed, some was something else. I imported pretty nearly every weed that is known and paid big money for it. Then I bought seed from all those fellows again and from some other fellows. We tested them out, had them tested at Ithaca, Geneva, and Washington. I published a report in full after having written to these seedsmen, saying, "You sold us on such a date alfalfa seed. We purchased from you several different kinds of weeds. What have you to say?—because we are going to publish a full report." Some answered the letter, some didn't. We published a report. We headed it with the name of the firm, and full

address, then told how much we paid for it, the day we purchased it, and what happened. I think it was as much as thirty-six hours after that was published before I had the first libel suit started. The head of my corporation called me, and asked what I was going to do about it. I told him, "Nothing." He said, "You had better be mighty careful." I said, "This is the finest advertising in the world. The best thing for the farmer is for these fellows to sue me for libel." A libel is telling something that isn't true, or injuring somebody's business when he hasn't done anything to warrant it. We were never sued.

I believe the Professor is right. The Vegetable Growers' Association is going to do a whole lot if it is going to take up good seed work. I know of a man who buys two varieties of potatoes, Irish Cobbler and Green Mountain, and he gets out one of the most beautiful catalogues I ever saw of potatoes, in which he listed last year forty-seven varieties. His prices were $1.35 a bushel to $7.00. It would pay to raise your own potatoes. I don't think any man can afford to let next year go by without raising his own seed. Wherever a person raises his own seed, the next year the crop has been double, treble, ten times as great and one hundred times as good. It is then naturalized in your own climate. I do not believe that the California seed is going to hold up. It isn't the place to grow seed of cold country vegetables. It is entirely too tropical.

MR. WORK: I would like to ask again how many are growing their own seed of anything? Ten.

A MEMBER: We select the best bulbs of onions, twenty-five bushels out of about a thousand, and plant them, the same as potatoes. That is the seed we use.

PRESIDENT WHITE: I grow my own seed corn.

PROFESSOR WATTS: How do you do it?

PRESIDENT WHITE: The plan I have is hill selection, as far as possible.

MR. HUNTER: I grow my own tomato seed. I select my hills, also select my tomatoes from the hills. It pays. I save my sweet corn seed, and that pays.

MR. WAID: I grow seed for lettuce in the greenhouse. Has Professor Watts known of holding over an individual plant by taking cuttings from it?

Professor Watts: No, I haven't. There is no reason why it shouldn't be done to perpetuate it. That is a splendid idea. That idea is worth a thousand dollars to this audience.

Mr. Tuttle: Isn't it true that a great many seeds in certain localities deteriorate, the plants deteriorate? With farm seeds, for instance with buckwheat,—I never have succeeded in raising buckwheat that would give as good seed as I could buy of Japanese buckwheat. And I have found the same thing with oats. I think peas would come under the same head. Long Island believes that that is true of potatoes, notwithstanding that Brother Fullerton has proven the contrary. There is a variety of our farm and garden vegetables and grains that seem to deteriorate some after the first year, and more as you go along. Can that be remedied in a practical way by the practical working farmer? Or is it the safest thing to follow your advice and buy those seeds from the most reliable houses, specialists?

Professor Watts: I think the question you have brought up is important, but you must bear this in mind. With your buckwheat, you are not selecting the choice seed, or with your corn. I suppose a corn grower would simply reach in his crib and pull out enough to plant his field. There is no selection in this. Under these conditions, I presume the crop would deteriorate. With these we have been discussing, you have power to pick out certain plants with special characteristics. Here is another point. You may have ten plants that all look alike, are equally valuable. But in all probability, one of the ten has the power to perpetuate its good qualities to a much greater extent than any of the other nine. This brings up the important point Mr. White made of having your breeding plot. With the farm seeds, there is no selection. Under these conditions, it often deteriorates.

Mr. Tuttle: Corn is the one thing that doesn't deteriorate with us. We need not select.

President White: There is one case of selecting cabbage seed. I was doing considerable business with a man in Hartford, New Jersey. He had a strain of cabbage carrying the local name Hartford. This man said for over thirty years they had selected heads from the fields in which they grow an average of ten acres of cabbage. He would go over the field, putting a flat stone on every head of cabbage he

wanted, later taking these and putting them in an outdoor cellar. They had for a great length of time carried on careful selection. I bought some, and carried them to this part of the country. One year only I made much of a success of it. One year I did succeed. You could go all over this field of his, and you couldn't find a single poor head of cabbage. They were uniform. This gentleman lived in that section where there is considerable seed business carried on. He told me how at that time one of the seed houses in Philadelphia grew cabbage seed. They planted their stock, and late in the season they mulched it over with straw, leaving it right in the field. The next season that cabbage came up and went to seed, and seed was taken from that to sell. In regard to onion seed. Mr. C. H. Vick told me that they selected their onions for seed, and grew their own each year. Mr. Vick told me the difference between California onion seed and eastern selected onion seed. The California seed sells at less than half. California seed is put out to Chinamen principally to grow on contract. There is no selection whatever.

PROFESSOR WATTS: We can put this down as a fact, that good breeding counts for more than locality in the production of seed. I believe certain sections are favorable for the growing of seed. I think Long Island conditions are unusually favorable for growing cabbage, and therefore, good for growing seed. But good breeding counts for more than anything else.

A MEMBER: Can you tell why Maine potatoes planted on Long Island this year did better than home grown seed?

PROFESSOR WATTS: Was the Long Island seed as plump and firm as the Maine seed?

A MEMBER: I suppose it was.

PROFESSOR WATTS: Had it been as well preserved?

A MEMBER: What I planted myself was, and didn't do as well.

MR. FULLERTON: The Long Island potatoes do much better than any seed you get from Maine, New York, Ohio, or Minnesota. I have planted them all. I would like to ask this last grower how he knows his seed was Maine seed. Lots of the potatoes that are called Maine potatoes never saw Maine. Grow your own seed.

PROFESSOR WATTS: About forty farmers in New Jersey, potato growers, almost without exception told me that New Jersey seed

potatoes, if as well preserved and in as good condition, were just as good as Maine seed potatoes.

A MEMBER: I think there is a difference in keeping potatoes or raising our own seed. Principally we spray for two reasons, for long life and for the blight. I don't think myself that a mature potato is as good as a green potato for seed.

MR. FULLERTON: I would hate to plant a green one. I haven't time. If you haven't maturity, you are likely to get nothing from it.

MR. ALDRICH: We had people who bought their seed in Maine, came down, and delivered them. We saw those potatoes planted. We know that they are Maine seed. I bought two carloads in Maine and saw them loaded. I know that invariably we buy lots of Maine seed, and as a rule it does better than our own. Sometimes our own will do better. Of late years it has been a little more of a lottery in getting Maine seed than it used to be. We don't stand quite so good a show of getting good stock now as several years ago. I grow cabbage seed. I know something about how it is managed down on Long Island. I know that the seedsman I grow for selected stock seed out of my field. Out of five acres he bought about one hundred heads. That stock seed was kept separate. I raised that stock seed, and that was what he used. When it comes to roguing, he does it. I don't. If there is anything that doesn't suit, he cuts it off. I have nothing to say about it. That is the way cabbage is grown on Long Island. The seedsman goes through and looks over the field, and picks out a few heads that just suit him. That is what we call stock seed. There is another item,—the varieties of Early Wakefield.

PROFESSOR WATTS: There is no question about there being different types of Jersey Wakefield.

MR. ALDRICH: A great many times cabbage is set late for seed, and if the seed is dry, it won't head. It will not form hard heads. Of course, if they start out true to name, they don't open up. Whether that deteriorates cabbage or not, I don't know.

PROFESSOR WATTS: I didn't want anyone to get the idea I was knocking at Long Island. It is simply a lack of care. If you sow a pound of cabbage seed and it does not come true to type, there has been poor breeding somewhere.

MR. FULLERTON: You weren't talking territory. You were talking men's methods of roguing. They are liable not to rogue carefully.

PROFESSOR WATTS: When you sift this down, the whole question is—we must have good seed to make good crops. I wish we could buy all our seed from seedsmen and always get it good. I believe the seedsmen are doing the best they can, most of them.

MR. WORK: I think it is clear in our minds that we do have difficulty in getting good seed. Ever since this New York State Vegetable Growers' Association was organized, it has been working first along educational lines; but all the while it has been trying to inaugurate certain lines of work that will be of definite, tangible, dollars-and-cents value to its members. We have done two or three small things, that perhaps have been of a little value. This seed question has been attracting a great deal of attention. A great many are of the opinion that we can work out some kind of an arrangement so that this Association will be of definite value in getting hold of good seeds. There are some members that are in a position to get good cabbage seed for us, there are others who are able to get good onion seed, or good tomato seed. Can't we work out some scheme by which that can be done? Tomorrow afternoon is our business afternoon, and that will be the time at which the whole work of the Association will be up for discussion. Those that aren't familiar with the work will have an opportunity to find out what the past work has been, and the ideals of the future for the Association. I hope you will keep this good seed question in your mind. Be ready with your ideas.

As to varieties of seed potatoes out of one lot. I have handled a good many thousand bushels of seed potatoes. One reason I gave up was that I could not compete and do an honest business. I couldn't sell. I couldn't get the orders, for other men were underselling me. One potato seed house bought from a carload of potatoes I got in Michigan. They were a Rose potato, and very nice stock. I sold the firm sixty-five barrels of potatoes. They were put up in the car, and he sent his man to see to the shipping. My man told me there were nine different varieties that went out of the sixty-five barrels.

PRESIDENT WHITE: We want the seed, and we want to go at it right to get it.

A MEMBER: Could the gentleman tell me where to get some good Timothy seed?

PRESIDENT WHITE: Professor Webber could tell you.

A MEMBER: I would like to know what is thought of the Charleston Wakefield cabbage.

MR. FULLERTON: It is bigger and later.

PROFESSOR WATTS: Charleston Wakefield is a week or ten days later, and somewhat larger.

A MEMBER: We have found it larger, but not much later. Five days or a week. Do you think it is more profitable in consideration of the fact that we so soon come in competition with the large stock from the South?

A MEMBER: I think it depends how you are selling. If you have a market that is buying by the hundred heads, Jersey Wakefield would be worth much more than Charleston. If selling by the crate, the Charleston would be worth more to you.

PRESIDENT WHITE: For our great commercial crops up here, we pay no attention to pointed head varieties. After ten days or so we intend to get to the larger.

MR. WAID: The kraut trade is our great domestic trade up here.

REPORT OF COMMITTEE ON CO-OPERATION

M. H. HOLMWOOD, Chairman, Orchard Park, New York

Let us look in Webster's and find out what the word co-operation means. We find that it means, "The act of working jointly together." Now let us search for the meaning of the word co-operator. We find that it means, "One who acts or labors conjointly with others."

Gentlemen, we cannot have co-operation without the co-operator, and that in the truest sense the word implies.

A grower before joining an association should ask himself this question: Can I act and labor jointly with others? If not, it is best for both grower and association that he remains a non-member.

A great many growers need to be educated to the fact that "in union there is strength." But this union cannot be attained or

maintained, if, after thorough discussion and careful deliberation of a question, members refuse to be guided in their action by the rulings of the majority.

Growers of vegetables, fruits, and farm produce, have formed many kinds of associations. Some involve whole states, some a county or several townships, others only a small neighborhood. Some are social in their function, others take up the educational side; while others buy farm supplies in carload lots, thereby securing the lowest available prices. Some take up the sale and distribution of produce, but leave the returns to be made direct to the growers, while others carry out the actual sale of the produce, pooling the proceeds.

Pooling is the technical name applied to treating every grower alike. Pooling means only that the price returned to each grower for every package shipped on any one day is exactly alike, no matter where the grower lives, what car he shipped in, where the car was sold or what price it brought.

The fact that a car was sold particularly fortunately for a high price, or unfortunately at a low price, does not affect the net returns in cash to the grower who happened to ship in that car, except as it affects by the smallest kind of a fraction the net result of that day's total sales. The day's total sales are pro-rated among those who shipped that day, in proportion to the quantity of each grade and variety shipped, and this average price is what each receives. This is the essence of pure cooperation, the sharing of the losses as well as of profits.

In this great Empire State we have several small and a few large vegetable associations. Among the latter, are the Long Island Cauliflower Association and the Long Island Potato Exchange. The Long Island Cauliflower Association is an incorporated association, capital $10,000.00, with president, vice-president, secretary, treasurer, and board of directors. The object is, as the name implies, the handling of cauliflower. They do not have an inspector or central packing house, neither do they contract with their members; their goods are not pooled, but sold to the Association at the New York City quotations each morning, or the members have the privilege of selling to any other buyer. They handle seeds for members, also empty barrels that are used for packing cauliflower. Their members are well pleased, also satisfied that they get better prices now than before the Association was formed.

The Long Island Potato Exchange is an incorporated association, capital $20,000.00, divided into four thousand shares of $5.00 each. The minimum amount any one member can hold is one share, the maximum, five per cent of the total capital stock, which would be two hundred shares.

The objects of the Association are:

To establish conditions whereby anyone desiring may buy Long Island produce true to name.

To develop present markets and find new ones for all their produce. To ascertain the conditions of the crops throughout the season and furnish this information to the stockholders.

To secure pure seed at as low a price as is consistent with the best quality.

To buy and sell or manufacture all kinds of supplies.

To buy and sell and consign all kinds of farm produce, and to establish uniform grades of the same.

To arrange for the transportation and handling of all produce in the best possible manner.

To own or lease and operate storage warehouses and packing houses for produce.

The officers are president, vice-president, secretary, treasurer, general manager, general inspector and a board of directors. They have two packing houses. The assistant manager acts as inspector. They do not make contracts with their growers, neither do they pool their shipments, but buy outright from their members. They handle fertilizers and seeds extensively. The members, as a general rule, are satisfied that the association is a good thing for them. A few, however, are dissatisfied, because greater results have not been accomplished, and the main reason that greater benefits have not been secured is because these same members have not been as loyal as they should have been to the association.

The Ionia Growers' Association is another association with president, vice-president, secretary, manager, also treasurer and board of directors. So far this Association has handled nothing but the cucumber crop of its members, but it has made a great success in handling this crop and prices realized have been very satisfactory. They have a central packing house where all goods are graded and inspected, handling over one hundred cars each season. In most cases, a satisfactory agent has been selected from among the commission houses in each city shipped to, and this firm handles the

Association's line exclusively in that city. The net returns of each day's shipment are pooled daily. The members, as a general rule, are well satisfied that the Association is a good thing for them, and another year they expect to handle other lines of farm produce.

Another association is the Market Gardeners' Association of Monroe County. This is not an incorporated association, but has president, vice-president, secretary, treasurer, and three trustees. This association has done a great deal of good for its members in the betterment of its local market conditions, securing better prices on farm implements, fertilizer, baskets, etc. At their meetings, they have talks on plants, destructive insects, etc. The members of this Association are all growers of greenhouse and early outdoor produce, and are well satisfied that it is beneficial to them, and that they have accomplished a great deal by being organized.

At South Lima an association was formed called South Lima Growers' and Shippers' Association. This has been a success as far as purchasing supplies, fertilizers, etc., is concerned, but a failure along the selling line, because each member wanted to dictate where his produce should be sold, and the members could not agree upon anyone as manager; but they hope to come to some understanding another year whereby they will be able to market their produce as an association.

Another association that has just been formed is in Chautauqua County, the South Shore Growers' and Shippers' Association. This association was formed to better conditions on the canning factory contracts, which for the past five years has been about the worst proposition that the farmer of that vicinity has had to contend with. They propose to make a single contract with the canning companies, in place of each grower making his own, as heretofore, to find a better market for the growers of small fruits and vegetables, and to encourage the growers to plant more of the same. It is also the aim of this Association to purchase all farm supplies in large quantities.

Another vegetable association that we have in Western New York is the Erie County Growers' and Shippers' Association, of which your humble servant is president and manager. This association is an incorporated company with capital stock of $5,000.00, divided into one thousand shares of $5.00 each. We have a board of nine directors, one elected from each of the seven towns that comprise this Association, one elected from the town having or holding the larger number of shares, and one director at large, who may come from any one of the seven towns.

We ship from three points. Our large warehouse and head office are located at Orchard Park. We have 384 members and have issued 561 shares. The largest number of shares any one member can hold is ten, and we have only one member holding this number. We handle all kinds of vegetables and fruits, but there are four kinds that make up the bulk of our shipments—namely, peas, beans, cucumbers, and cauliflower. The two former are packed and inspected at our central packing houses, and are pooled every day. The other two, cucumbers and cauliflower, are packed by the growers, hauled to our packing house, there inspected and loaded on cars, and are pooled every three days. These poolings are all made as I indicated a few moments ago. All goods are inspected and graded by a competent man and the grade marked on the package. At the beginning of the season, we make contracts with any member wishing to contract; and if he does not contract, we refuse to ship his produce, although he be a member. If he does contract, this contract calls for his entire crop of the particular kinds of produce for which he contracts. This form of contract has caused some contention among our members but we cannot see any other way to do, owing to our close proximity to Buffalo market; for when this market was good, everything would be taken there, and when it was glutted, our Association would be used as a dumping ground. This, of course, does not apply to all members, as there are some that are loyal to the last degree. Without a contract how can a manager know what business to expect? Also, if you as a member are permitted to sell outside, you are really selling to your own competitor. One of the methods employed by buyers to break down our Associations has been to try and buy produce from our members, paying them as much as ten cents per package more than they would to a grower that did not belong to our Association.

We have now been in existence four years, shipping from 250 to 300 cars of produce each year, aggregating in dollars and cents over one hundred thousand dollars each year. Out of this we have lost only one car of cabbage amounting to $350.00, and that we expect to get some day if the party stays on this side of the river long enough.

We have some members that are dissatisfied and will not contract with us; on the other hand, we have a great many that are satisfied and loyal to our Association. If you have ever been manager or had anything to do with an organization of this kind, you will find you can satisfy all of the members part of the time, and part of the

members all of the time; but you cannot satisfy all of the members all of the time. Even the Power above that doeth all things well cannot satisfy a small neighborhood all at the same time,—some will want rain, others sunshine.

Let me say right here, there are many growers who do not know what good vegetables are, or how to pack properly. Such members and growers must first learn what good vegetables are and then learn to pack them; also members must learn to trust each other. It is a strange thing that some growers will trust everybody but their neighbors. A man comes along selling nursery stock, and although they have never seen him before or never heard of the firm he represents, they will trust him; also they will sign a contract with a stranger for some thing or other, and in six months it will turn up at their bank as a note for $50 or $100. They will trust everybody but the men engaged in the same line of business, in the same community.

No good co-operative association can be maintained unlesse very member of it will guard the reputation of the association, as he guards his own. The members must trust each other and they must be worthy of trust. I would like to quote here from Mr. Tenny's paper read at Rochester:

"The four principles which lie at the base of successful co-operation are: *First*, there must be a common need, or at least some common ground between farmers or growers.

"*Second.* The organization must be an incorporated body. A loosely formed agreement will do as long as everything goes smoothly, but will not hold together when trouble arises.

"*Third.* The money for the capital stock must be put in on a non-profit-sharing basis. The organization should not be run, in other words, to make money on the money actually invested. The purpose of the organization is primarily to sell produce, to reach other markets, to make more money growing produce. The capital stock is necessary to bring about that end, but is only a means to another end.

"*Fourth.* In the last place, there must be a signed contract between the central organization and the individuals shipping through it. A single promise on the part of the individuals that they will ship is not sufficient." I will say that this contract should be *iron clad* with a penalty attached for violation. Some may disagree with me on this, saying it would keep members from contracting. It would not keep a loyal member from contracting; but it would make a

member loyal that was disposed to be otherwise, or keep him from making a contract with the association, which in my estimation would not hurt the association one iota.

Just a word regarding common need. I would make that imperative need, and just so long as that need exists, just so long will your association flourish; but after your association has corrected some of the wrongs that existed at the time it was founded, then you will begin to have members drop out, and you will find who are loyal and who are not. Your association at this time will get down to a good working membership.

Gentlemen, our business of growing farm produce is the greatest of all businesses, the most indispensable, the most closely related to the every day needs of every human being; and our investments in total are the greatest asset of the country. And I hope to live to see the day when we will be so organized in all lines of farming that we can go to the buyer and say, "I have so many baskets of peas, so many boxes of apples, so many crates of cauliflower and my price is so and so," in place of going up to him, as we do now, with fear and trembling and saying—"What will you give? make me an offer!"

I thank you.

REPORT OF COMMITTEE ON LEGISLATION

E. A. TUTTLE, Chairman, Eastport, New York

Your committee on legislation submits the following report:

First. We recommend that an effort be made to secure from this session of the Legislature the necessary legislation and appropriation for the establishment at the State College of Agriculture at Cornell University of suitable buildings and equipment to carry on investigations, experiments, and demonstrations under glass and in the field in the interest of vegetable growing and the control of diseases and insect pests.

Second. We recommend that support be given in the Legislature and elsewhere to all efforts to secure proper and effective supervision over marketing and particularly over sales by commission men.

Third. We recommend that a "Markets Commission" be established to investigate conditions, hear complaints, and apply remedies, with powers similar to those possessed by the Public Service Commission.

Fourth. We recommend that necessary legislation be secured for the establishment of Producers' and Consumers' Markets, with State aid, where conditions are such that private capital cannot, or will not, give adequate facilities and a "square deal."

Fifth. We recommend the establishment of a general parcel post to aid producers to deal directly with consumers.

Respectfully submitted,

EZRA A. TUTTLE, Chairman.

CELERY CULTURE

R. H. Garrahan, Kingston, Pennsylvania

In speaking on the subject assigned me, it is not my intention to give you a scientific treatise on celery culture—we will leave that to the professors. I will try and tell you, in as few words as possible, our method of growing the crop.

Our acreage is small in comparison with some of the great celery plantations found in favored locations. We have out this year about sixteen acres, between early and late. We make no claim for originality, nor do we claim that the method used by us is better than that used in other sections of the country.

VARIETIES

For the early crop we plant White Plume; it is a strong growing, vigorous variety, much less subject to blight than the Golden Self-blanching. For second early, or mid-season, we plant White Plume, Golden Self-blanching, Magnificent, Winter King, and Giant Pascal from field-grown plants. We try to have the early crop disposed of by the time we commence trenching about October twentieth. We are then ready to work on the later planted White Plume and Golden Self-blanching. By the time that is sold the Magnificent, Winter King, or Giant Pascal is sufficiently blanched. These varieties will run us through the holidays. By the first of the year, the late varieties are ready. For the late crop we have practically abandoned Winter Queen, Shumacher, Perfection Hartwell, and all the rest, for French's Success—a variety of rather recent origin, introduced by the Joseph Harris Seed Company. It is one of the most uniform varieties of celery we have ever handled. It is a slow growing, compact variety, and should be planted earlier than some of the taller growing kinds. It is a long keeper and full-hearted. I have counted as high as fourteen shoots starting in the heart, where in the Giant Pascal only one or two would be visible. The quality is good, but not equal to Giant Pascal.

EARLY PLANTS

The seed for the early crop is sowed in the greenhouse March first; we have found that, if sowed much earlier, the plants are liable to run to seed. The soil for the seed-bed is composed of well-rotted manure and dirt, about half and half. The seed-bed is sterilized by saturating

the soil with a solution of formaldehyde, two pounds to fifty gallons of water. When the soil is dry enough, screen it through a sieve of one-quarter inch mesh. Press the soil down firmly and mark off rows two inches apart and not more than one-quarter inch deep. The day before sowing, sterilize the seed by washing it in a solution of two ounces copper sulphate and one-half gallon of water. The seed is then placed over hot water pipes to dry. Sow thinly in the drills, and cover lightly with fine sand. The bed is then covered with burlap and given a thorough watering, using water from the hot water system. Water occasionally as needed, and when the seed germinates remove burlap covering, and give the bed a thorough watering. Keep the soil slightly loosened between the rows, and if more water is required before plants are large enough to transplant, pour the water between the rows. Avoid wetting the leaves. When the rough leaves appear we commence transplanting. The plants are set one and one-quarter inches apart in flats, and are kept in the greenhouse until well established. Before removing to the cold-frames, the plants are sprayed with Bordeaux Mixture. Unless the frames are steam-heated, we place one-half foot of fresh horse manure in bottom of frame, tramp down firmly, and place the flats upon the manure.

The plants are kept growing nicely, but are not hardened by exposure to severe weather, as in the case of cabbage. They are treated more like tomato plants; the frames are well ventilated, and sash removed during warm days. Considerable care is exercised in watering the plants. The soil in the flats should never be allowed to become so dry that the plants will wilt, nor enough water applied to saturate the soil. The plants are transplanted to the field about the middle of May.

SOIL

Stony land or land with a loose, gravelly sub-soil should be avoided, otherwise almost any kind of soil will grow good celery. Muck land is undoubtedly the ideal soil for celery, but few of us are so favorably situated—hence we will have to use such soil as we happen to have. The important thing is to have the land well filled with humus, and in good, friable condition. It has been our custom to apply forty or fifty tons of well rotted manure per acre during the winter. As soon as dry enough in the spring, we go on the field with a four-horse cut-a-way harrow, and cut the ground over three or four

times. The cut-a-way is then followed by the smoother, Acme harrow and roller, and the ground worked until the manure is well mixed with the soil and the ground free from lumps, and in fine mechanical condition. The field is then plowed, and the other side worked the same way. The finishing touches are then put on with a Meeker smoothing harrow. Rows are marked off two feet nine inches apart and the plants set five or six inches apart in the row.

PLANTING AND CARE

The plants are pulled and most of the dirt shaken from the roots. The roots are then well puddled in rather thick mud, placed in boxes, and hauled to the field. Dibbers are used in setting, care being taken to see that the soil is well firmed around the roots, and the plants set no deeper than they grew in the flats. Under favorable conditions an experienced man will set from one thousand to fifteen hundred per hour.

After the plants have started to grow, we go over the rows with a Planet Jr., two wheel hand-cultivator, having on the disks or small plows, set to throw away from the rows. The crust is then broken up between the plants with hand weeders, or narrow hoes, at the same time uncovering those plants which were set too deep. The field is then cultivated with a riding cultivator, which is kept going often enough during the season to maintain a fine soil mulch two or three inches deep. No dirt is thrown against the celery during warm weather, as it is liable to cause the celery to rust. After the first cultivation a ton of high grade fertilizer is applied along the rows, with a McWhorter Distributer.

The plants are sprayed with Bordeaux Mixture two or three times before setting in the field, and about every two weeks thereafter.

BLANCHING

The celery should be large enough to commence blanching by the middle of July. For this purpose we use straight grained hemlock sixteen feet long, twelve inches wide, and one inch thick. A cleat is nailed on each end of the board to prevent splitting. In boarding up the celery, we put up boards to two rows, then skip four or six rows, put up two more rows, and so proceed. The boards are held in place by wide clamps made of galvanized wire. When the celery is blanched the boards are taken down and put up on the adjacent rows.

HARVESTING AND MARKETING

The celery is dug with a spade, the dirt shaken from the roots, and the outside leaves stripped off, leaving nothing but the blanched stalks. The roots are then trimmed off with a knife, four-sided, and to a blunt point. The celery is hauled to the bunching shanty, where it is tied in flat bunches of three or four stalks, washed and packed in crates.

LATE PLANTS

The seed for the second early and late varieties is sowed in the field as early in the spring as the ground can be worked.

The soil is put in the best possible condition. The seed is then sowed rather thickly in drills fourteen inches apart. Set the drill to cover the seed very lightly. After the rough leaves appear, the plants should be thinned out to stand one-quarter to one-half inch apart. They are kept well cultivated and no weeds are allowed to grow. When the plants are about half a foot high, they should be cut back a couple of inches with a scythe in order to keep them stocky.

THE LAST CROP AND ITS CARE

Set in the field as soon as large enough, or as soon as the land is available. The late celery usually follows an early crop, such as spinach, peas, early beets, cabbage, etc. As much care is exercised in preparing the soil for the late as for the early varieties.

The plants are set six inches apart in the rows, and the rows are three and one-half feet apart to allow room for banking up.

The late varieties are worked in the same manner as the early crop, until the latter part of September, when the handling process begins. Before handling, a cultivator is run between the rows to make the ground fine and loose. Another cultivator immediately follows with the side shovels on, set to throw the dirt towards the rows. The men then get on their knees between the rows, and, holding up the leaves with one hand, with the other shove up a handful of dirt around the bottom of the plants to hold the leaves in an upright position.

Immediately after the handling, a Planet Jr. celery hiller is run between the rows, and the dirt thrown up at least six inches high around the plant. Later on we go through again with the hiller, when the dirt is thrown up as high as possible. Nothing more is done to the celery until trenching time.

TRENCHING

We commence trenching White Plume about October twentieth. The process consists simply in digging a trench about a foot wide and deep enough that, when the celery is placed in the trench, the tops will stick out about two inches.

For digging the celery, we have an attachment made at the blacksmith's similar to our onion-set harvester, which is fastened to a two horse riding cultivator. The celery is then pulled up by hand, most of the dirt shaken from the roots, and the broken or decayed leaves and suckers pulled off. It is then carried to the trench, where a man in the trench packs it tightly in an upright position. No dirt is placed around the roots.

The boards used in blanching the early crop are nailed together V-shape, and placed over the trenches to keep off rain and prevent the sun and wind from wilting the celery. One of the secrets of keeping celery is to keep the tops dry. Manure is then placed in piles along the trenches. On the approach of cold weather, a little manure is placed along the bottom of the boards, and when the weather becomes very severe, more manure is added. We seldom put more than two inches of manure over the boards.

IRRIGATION

For a number of years, we have been irrigating part of our celery. For this purpose we use a Knowles No. 6 pump and a twenty horse power boiler. The pump has a three inch suction, and a two and one-half inch discharge. It will throw under our conditions from one hundred to one hundred fifty gallons per minute.

A two and one-half inch discharge pipe is run along one side of the field. From this pipe two inch laterals are run one hundred twenty feet apart. Two inch valves are placed one hundred feet apart on the laterals. A fifty foot length of mill hose is fastened to the valve, and the water allowed to run between the rows. This season we tried two acres with the Skinner system, and are so well pleased with the result that we will use this method altogether in the future.

NEW YORK STATE VEGETABLE GROWERS' ASSOCIATION SECOND ANNUAL MEETING

ITHACA, N. Y., FEBRUARY 20–22, 1912

PROCEEDINGS OF BUSINESS SESSIONS

The New York State Vegetable Growers' Association assembled in business session on Wednesday afternoon, February 21st, 1912, at 2 P. M.

President C. R. White presented his annual report, summarizing the activities of the year, and pointing out the various lines of work in which progress had been made.

Secretary Paul Work, in his report, supplemented the statements of the President, regarding lines of work which were carried forward through his office.

The Treasurer presented his report of the financial condition of the Association. This document appears herewith.

The acceptance of reports hitherto presented, namely, the reports of the Committees on Transportation, on Co-operation, and Legislation, and the reports of the officers, was moved, seconded, and carried.

The Report of the Committee on Resolutions was received and adopted as follows:

Resolved, That we favor the enactment of a general law under which demonstration farms and winter schools for practical farmers may be established and conducted under the control of the New York State College of Agriculture at Cornell University in localities where they are manifestly needed.

Resolved, That the Thompson bill in the Assembly, No. 186, is hereby approved and its enactment urged.

Resolved, That a committee of three, of whom the President of this Association shall be one, be appointed to represent this Association in any conference or meeting called under the resolution adopted at the last meeting of the State Agricultural Society to consider the subject of co-operation.

Resolved, That we favor a law requiring commission men to give bonds of fidelity and surety with provision for effective supervision over all sales in this state of farm produce on commission.

We recommend that support be given to any measure or movement that will extend practical instruction in agriculture to every

locality in the state where the demand is urgent and the need manifest.

Resolved, That we favor the appropriation of fifty thousand dollars by the Legislature for the purpose of building greenhouses at the New York State College of Agriculture, in which to carry on investigations in vegetable and flower culture, and that we hereby instruct our legislative committee to work jointly with the florists' associations in procuring such appropriation.

Under the head of new business, the following actions were taken:

We, the members of the New York State Vegetable Growers' Association, respectfully call the attention of the Honorable Secretary of Agriculture of the United States to the great need of additional statistical information regarding the acreage and condition of the following important vegetable crops, namely, cabbage, celery and onions, in order that destructive competition between producing sections may be avoided. *Be it resolved*, that the Honorable Secretary of Agriculture be requested to add these crops to the list now reported upon in the *Crop Reporter* published by the United States Department of Agriculture.

Resolved, That it is the sense of this meeting that the third annual meeting of the New York State Vegetable Growers' Association be held at the New York State College of Agriculture during Farmers' Week, 1913.

It was moved, seconded, and carried, that the Secretary be instructed to endeavor to hold several meetings of the New York State Vegetable Growers' Association in different sections of the state.

The following officers were nominated and elected to serve for the ensuing year: President, C. R. White; vice-president, M. H. Holmwood; secretary, Paul Work; treasurer, C. H. Aldrich.

REPORT OF THE TREASURER

1911–12

DISBURSEMENTS

1911			
Mar.	24	H. W. Norton, rubber stamps	$ 0.75
	24	Andrus & Church, stationery and printing	15.63
Apr.	20	Office expenses, stationery, postage, etc.	6.50
Aug.	7	Office expenses, stationery and postage for circulars	23.80
	7	Mailing circulars	7.42
	7	Norton Printing Co., circulars, etc.	22.50
Sept.	15	C. S. Wright, acct. State Fair Exhibit	31.40
	15	American Express Co., acct. State Fair exhibit	11.53
	15	U. S. Express Co., acct. State Fair exhibit	1.80
	15	Wells Fargo Express Co., acct. State Fair exhibit	.80
	15	J. W. Doust, photos, acct. State Fair exhibit	3.00
	15	Tools, acct. State Fair exhibit	1.35
	15	Tomatoes, acct. State Fair exhibit	.80
	15	Cards, etc., acct. State Fair exhibit	.65
	23	H. F. Hall, vegetables, acct. State Fair exhibit	2.50
	25	Troy & Keith, photos, acct. State Fair exhibit	4.80
	25	National Express Co., acct. State Fair exhibit	2.96
	25	E. W. Edwards & Son, decorations, acct. State Fair exhibit	4.85
	25	J. & G. Lipmann, tomatoes, acct. State Fair exhibit	2.00
Oct.	4	G. F. Morgan, photos	3.50
Nov.	13	Andrus & Church, stationery	5.98
	13	Office expenses, postage, etc.	6.10
	13	American Express Co., acct. State Fair exhibit	.54
Dec.	1	L. M. Westcott, signs, acct. State Fair exhibit	7.00
1912			
Feb.	5	Norton Printing Co., programs	59.75
	5	Office expenses, postage, etc.	39.83
			$267.74

RECEIPTS

1911			
Feb.	23	27 membership fees	$ 54.00
Mar.	20	Affiliation fee Growers' and Shippers' Exchange	5.00
	27	3 membership fees	6.00
	31	2 " "	4.00
Apr.	13	4 " "	8.00
May	5	1 " "	2.00
July	21	8 " "	16.00
Aug.	14	2 " "	4.00
	26	3 " "	6.00

Sept.	2	3 Membership Fees	$ 6.00
	27	6 " "	12.00
Dec.	16	State Fair exhibit appropriation	100.00
	16	Vegetables sold	6.00
1912			
Jan.	8	A. W. Gilman, advt. in program	8.00
	30	Kroeschell Bros. Co., advt.	15.00
	30	2 membership fees	4.00
Feb.	2	N. Y. State Sewer Pipe Co., advt.	15.00
	2	F. & H. P. Langdon, advt.	15.00
	2	W. L. Bonney, advt	8.00
	15	Coe-Mortimer Co., advt.	15.00
	15	Kentucky Tobacco Product Co., advt.	15.00
	15	Joseph Harris Co., advt.	8.00
	15	Buffalo Fertilizer Co., advt.	8.00
	15	2 membership fees	4.00
			$344.00
			267.74
			$ 76.26

AN OUTLOOK ON VEGETABLE GARDENING

L. H. Bailey, Ithaca, New York

I am glad to welcome the New York State Vegetable Growers' Association to the College of Agriculture. This college offers its facilities and forces to any organization that unselfishly works for the advancement of rural life.

Agriculture is not one thing. It represents a congeries of occupations. There are many kinds of farmers and there are hundreds of kinds of farm products. Not all these farmers are represented in organizations. The most effective work may be accomplished for any interest when it has the benefit of combined organized effort.

I felt a year ago that the organization of this vegetable growers' association marked an epoch in the development of the business in this state. This is not because I expect an organization of this kind to overturn any industry or business, but merely because the best results are secured when people work together; and whenever they begin to work together they estabish an epoch of progress. Market gardeners have not been as strong co-operators as have some other kinds of farmers. These vegetable growers usually live in special regions and mostly in very close relation with some large city or with special direct means of communication. Their lines of work have determined their lines of thought, and they have been more or less isolated from the general large body of farmers. Even living close together and in special areas, they have tended to maintain their individualistic method of work, possibly largely because they are such strong personal competitors.

It is necessary not only that vegetable growers should organize in their own special interest, but also that they should relate themselves to the general agricultural movement. On all the large questions of policy their interests are identified with farmers in general. All the technical and scientific problems, relating to soils, fertilizers, crops, insects and plant diseases, farm management, and the like are purely agricultural questions in which every man who grows his living from the land is necessarily directly interested. I think that the vegetable growers have not sufficiently realized how much they may gain by close association with general agricultural interests, partaking in the general movement for rural welfare. On the other hand, I am convinced that the general agricultural

interests do not appreciate the help that they may receive from the market gardeners in the way of good instruction in intensive tillage and high cropping. The vegetable grower and the florist are people who derive the greatest produce from a given area of land. They are persons who have developed a high degree of special skill. On all accounts, therefore, it is important that the vegetable growers identify themselves with the rising agricultural movement, and I shall be very glad if the State College of Agriculture can help to bring about this relationship.

The colleges of agriculture have not yet organized the vegetable garden work strongly either on the educational or experimental sides. We are, therefore, glad to have this association meet with us in order that we may secure its advice in the development of this phase of our work. The vegetable gardeners will contribute their skill to the development of college work in their field and also their point of view on the general situation that is involved.

The vegetable gardeners need to organize themselves educationally. They have not had close enough relation with the agricultural educational institutions. One reason for this, as I have indicated, is that the institutions themselves have not been prepared to meet the needs of the vegetable gardeners. This situation, however, is now beginning rather rapidly to change. The institutions will meet the situation as rapidly as vegetable growers demand that it be met. I am well aware that no educational institution can train one to be a good vegetable gardener without actual practice in the business itself; but the progress of any business or occupation must be expressed in the end in the institutions and organizations that represent it.

I desire that you understand some of the limitations of college training in vegetable gardening. It is not to be expected that an educational institution can employ the highest class practical experts in the growing of all the different kinds of crops. If I wanted to acquire the actual skill in the growing of cauliflowers I should go to Long Island and learn from the successful cauliflower growers. If I wanted to perfect myself in the growing of peaches I should want to go into western New York and learn from an actual peach grower. I should want this knowledge in addition to the training that I could secure in a college. It would be better for me if I had much of this practical skill before I entered college; but sooner or later I would be obliged to get it from men who are actually in the business, the

same as the graduate of a medical college takes his hospital practice, or the graduate of a college of architecture goes into an architect's office, or the graduate of a college of law reads law. The college can give instruction in the underlying principles and the reasons. It can teach principles of soil fertility, of plant-breeding, of farm management and of a great number of other matters that cannot be directly taught on a farm. The farm and the college supplement each other; one does not take the place of the other. The college is engaged in education.

There is the greatest misapprehension as to what a college can teach. It is commonly supposed that every college of agriculture should teach a man to plow. Now there are more than fifteen hundred students in this College of Agriculture. Probably not one of them knows how to plow as well as he ought. Let us suppose that not more than half of these students should have instruction in plowing. No man really knows how to plow unless he has plowed more than one acre of land. If, however, we should set aside one acre of land for each of these students to plow, we should need to have more than seven hundred acres for this purpose alone. It would require more than seven hundred days in which to do this work. Of course, more than one field might be plowed at the same time, but it is hardly conceivable that all these students could be given instruction in plowing within the days of one year. In the meantime, about all that would be happening on a good part of the area would be plowing, and very few crops could be grown. In other words, it is a physical impossibility for a college of agriculture to teach all its students how to plow or how to milk a cow or how to build a fence. Certain students will be taught these things and certain other students will be taught other things. The fact is that these practical manipulations ought to be learned on a farm. A college can teach a man the reasons for plowing, why the operation is necessary, what are the physical, chemical and biological results, and the like. It can also teach him the physics of the plow. The special manual skill is a matter of practice.

You can readily see from these remarks that it is not possible for a college of agriculture to make skilled vegetable gardeners of its students; but it is perfectly feasible for it to educate young men and young women by means of vegetable gardening subjects.

It has been my privilege to welcome many organizations to the College of Agriculture. I am particularly gratified to welcome this

one, for the reason that the vegetable growers heretofore have not been associated on a similar basis in this state. The progress of your business will depend in the long run on the special education that the sons and daughters of the business receive, and on the scientific information at the disposal of those who are engaged in it. The educational outlook on the business of market gardening will be of more service to it than any other outlook or movement touching its public relations. I am glad to welcome this new unit in rural progress.

FUNDAMENTAL PRINCIPLES UNDERLYING SUCCESSFUL CO-OPERATION

C. R. White, Ionia, New York

At this time when there is so much need of successful co-operation, and when a great amount of organization is being done along that line, it certainly is fitting to consider the principles underlying co-operation and the several factors which it is necessary to observe in order to make the effort successful.

Many seem to think that co-operation is simply taking advantage of some sort of organized effort in which all the benefits are to be shared by them, but that they are under no obligation to do their share toward the support of the organization. Nothing could be farther from the fact. True co-operation is where all pool their interests of similar nature, each contributing his share toward the support of the effort and each in turn sharing its benefits.

There are a great many ways where an individual either cannot accomplish a certain result or, if at all, only with great difficulty, yet through co-operative effort it becomes easy of accomplishment.

The future of co-operative effort depends upon the extent to which the American people are willing to abrogate their own personality in order to gain the much greater efficiency and economy made possible by working jointly with others. There are few communities where co-operation can not be made very beneficial if properly worked, but it is not possible to make it a success, no matter how untiring the efforts of the organizers, unless the membership shall fully recognize the following requirements. First, when they enter into the undertaking they should go into it with a full determination to support it with the same energy and loyalty that they would, were it their own individual enterprise. Second, they must be absolutely honest with

the organization and demand that the organization shall deal in the same way not only with its members, but with the public in general. Third, they must not use the organization as a club to make buyers pay more or to get sellers to sell for less. Use it to buy, sell and to transact whatever business it was intended should be transacted. It needs the profits on your business in order to succeed. Remember, you are a part of the organization. If you make it a success by your support, you will receive the benefit; if you do not give it your loyal and undivided support, you have no right to the benefits nor will you receive them.

Co-operation does not in any way imply that some shall receive special benefits, and one of the great dangers in cooperative development is from the professional promoter who is organizing to get himself a position. Have none in the organization except those whose interests are mutual and who will stand on the same level.

Successful co-operation may be summed up in a few words. It is the strengthening of effort by uniting many individual efforts in a common cause. Its strength is illustrated by the bundle of sticks. A single one offers little resistance, but when there are many firmly bound together, they will stand great pressure. Every individual stick which becomes weak weakens the whole, so when a member fails to give his best the strength of the organization is reduced just in the ratio which his power bears to the power of the whole organization.

When enemies of the institution assail it, stand by it without fail. Then is when it needs your loyalty more than at any other time. A fair weather friend is not worth much to any man or organization of men.

If every member will pledge himself to loyalty and honesty, good common sense and business methods will insure success. Failing in either, there is no chance for success.

REPORT OF COMMITTEE ON INVESTIGATION

Information Available for the Vegetable Grower the Gardener and the Experiment Station

T. Greiner, Chairman, La Salle, New York

The impression seems to prevail in some quarters that the production of field and garden crops is a simple matter of preparing the soil, planting, tilling, and harvesting, and that anybody can safely engage in it without special preparation or training. Before a person can establish himself as a blacksmith, as a grocer, as a barber, or as any other tradesman, he must go through a course of apprenticeship. The man who wants to be a successful soil tiller needs this apprenticeship even more than tradespeople or professionals. This is especially true of the producer of garden crops. The culture of cereals and tree fruits has been more and more approaching the status of an exact science. The factors are mostly known, and the requirements are comparatively simple. In gardening, however, we meet with a great many unknown factors. Our crops are far more varied, and of great difference in character and requirements. They are vastly more exacting as regards environment, and far more easily influenced by conditions of soil, climate, season, and others. Last year we had a world-wide shortage of the potato crop, especially the earlies, likewise of the pea crop, and yet we can only guess what was the real cause or causes of these partial failures or what we could have done to head them off.

The first thing, then, for anyone who wishes to engage, or has already engaged in the production of vegetables as a source of income, is to hunt up and study all the information available to him on his special branch of business, and this even if he, being a young man, takes a course of apprenticeship by hiring out to a professional gardener. And when we look the field over, we will find a vast amount of literature available. There are books and treatises, and bulletins, without number, both on general market gardening and on special crops, or special phases of the business.

It may be interesting, but hardly practical or necessary in this connection, to take notice of the many earlier works now out of print. Of more importance to us, practically, is a list of garden books, pamphlets, treatises, and bulletins now in the trade or obtainable otherwise.

In the following I will attempt to give a list, not now complete by any means, but to be completed by additions as omissions come to our notice. I have had no data direct from about a dozen states, some of which have issued quite a number of bulletins on subjects of the same character. We have often found fault that the state experiment stations are not doing much for the vegetable grower. The data here given do not seem to bear out this contention, and the list, respectable as it is, does not represent all that the stations have been doing in that line, or are doing. A large number, perhaps the majority, of station bulletins on vegetable topics are not mentioned here, simply because they are now out of print. A good share of the station work represents long and painstaking labors, and research that does not make much showing in print. (The list, revised, appears later in this book.)

WHAT THE STATIONS ARE DOING

Most of the stations are also now working on problems connected with the vegetable industry, or planning such work. Sometimes it requires years of study and research before results can be given to the general public.

The Alabama Station has arranged variety and fertilizer tests with fourteen growers in different localities of the state.

The Colorado Station is working on the problems of cauliflower, celery, and strawberry growing in high altitudes, of cabbage and onion growing in lower altitudes, and others.

The Connecticut Agricultural College Station (Storrs) has under preparation a bulletin on the subject of spraying cucumbers and melons, the experiments having covered a period of nine years, and also has under way some experiments on the breeding of beans. At the *State Station* some tests of melon varieties are under way.

The Iowa Station is paying particular attention to the potato, and has for several years been running spraying experiments, cultivation experiments, variety testing, treatment for scab, time of planting and cutting, seed tests, etc. Results not yet ready for reporting.

The Illinois Station reports the following work in progress: Melon investigations, tomato experiments, onion experiments, the use of nitrate of soda on root and foliage crops, the culture of head lettuce, egg plant culture, fertilizer experiments with sweet potatoes, spraying beans for anthracnose.

The Idaho Station is now conducting experiments with onions, tomatoes, and melons under Idaho conditions.

The Maryland Station likewise has a number of experiments on this line under way.

The Massachusetts Station is continuing its experiments with the various garden vegetables, and at the *sub-station at Concord*, it is endeavoring, in conection with the Bureau of Plant Industry, to breed a rust-proof type of asparagus. An investigation is being conducted as to the conditions affecting the marketing of crops, such as pre-cooling, different methods of packing, ventilation, cold storage, etc.

The Missouri Station is doing some work in asparagus breeding, in experiments with home canning of the different vegetables, in methods of transplanting, etc.

The New Hampshire Station is also doing some work along investigations with vegetables.

The New Jersey Station is carrying on investigations on plant breeding.

The Ohio Station reports work in progress with vegetables both under glass and in the garden; in the greenhouse, such as variety tests and breeding of tomato, lettuce, cucumber, and radish, also soil treatments and systems of watering; in the garden, variety test and breeding work with tomato, potato, cabbage, beet, sweet corn, cucumber, etc., also fertilizer tests with potatoes, and systems of irrigation.

The Nevada Station is working with plant diseases, irrigation, and other problems, giving also particular attention to sugar beet culture.

The New York Station at Geneva does not specialize in vegetable work but carries on trials in the greenhouse.

Cornell University Station has established an experiment to determine the best method of meeting the nitrogen requirements of crops on muck soils. A simple system of crop accounting has been devised, and records are being accumulated which will be of great value in the future. Trials with tomatoes and squash are carried on, as well as miscellaneous variety tests.

The Pennsylvania Station has in progress a long list of investigations in relation to vegetables, especially asparagus, early cabbage, late cabbage, tomatoes, and is also making a study of the inheritance in the various vegetables commonly grown.

The Oregon Station has been and is working on problems in growing broccoli, brussels sprouts, cabbage, early tomatoes, etc., and gives particular attention to the problem of improving the potato crop, and the methods of its culture.

The Rhode Island Station is now especially studying the effect of the composition of potato tubers, as concerns nitrogen, upon the ultimate yield, and also the effect of various methods of fertilization upon the nitrogen content. An experiment is in progress designed to show the effect of given crops, among them vegetables, upon those which follow. Thus far the effect upon onions has been ascertained, but it will take thirty-five years' work to complete the experiment.

The Virginia Truck Experiment Station is devoting its entire efforts to vegetable problems, and is now working on methods of controlling insects and fungous diseases, crop rotations, commercial fertilizer problems, methods of irrigation, plant breeding, and market problems.

In view of the extensive list of bulletins issued, and the account of work in progress at the stations, we would hardly be justified in claiming that the stations are doing but little for the vegetable grower. Some of the stations, such as Massachusetts, New Jersey, New York, Maryland, etc., all states in which market gardening is carried on extensively and has become a most important industry, have made great and persistent efforts to help the grower of garden crops.

In "The New Onion Culture" I gave, some years ago, a list of bulletins issued by the stations on matters relating to onions and onion culture. At that time the Department in Washington and sixteen of the stations had already issued bulletins on the general culture of the onion; fourteen stations, bulletins or reports on "the new onion culture;" twenty-eight had reported variety tests; eight, tests of seed germination; eight, matters pertaining to onion diseases; and eleven, matters pertaining to insects injurious to the onion. This does not show that there is much reason for the onion grower to complain. Yet I only mention this as an example, as I have not in like manner compiled the work of the stations with respect to other special vegetable crops.

FRUIT GROWERS USE THE STATIONS

On the other hand, we can not deny that the stations have done even better by the fruit grower. Commercial fruit growing is of far less economic importance, and probably affects deeply a far smaller number of people than does commercial vegetable growing. As already pointed out, the production of garden crops is also a far more complicated matter, and involves many more problems as to soil, fertilization, tillage, rotation, insects, diseases, etc., than the production of tree fruits. (I count small fruits as belonging under the head of garden crops). For these reasons, it would seem only fair that the stations should do even more work for the grower of vegetables than of tree fruits.

ARE THE VEGETABLE GROWERS USING THE STATIONS?

If they do not, however, it must surely be the fault of the vegetable grower himself, your fault and mine. The stations, like shopkeepers, are trying to meet the demand. When a dozen or a hundred tree-fruit growers get together, and they find a weak spot somewhere in their business, they at once begin to cry for station aid, and they do cry loud. Vegetable growers either do not get together, or if they do, act on the principle that "silence is golden." The body of the vegetable grower is a slow-moving mass. We have been content to let things drift, rather than cry out loud, or make some vigorous efforts to find remedies for our ills. And we have not been in the habit of going to the stations with our troubles as freely as we should. Our stations are only too willing to help us if they can, and investigate problems that we shove up to them as troubling us. As a proof that the spirit of progress is not as strongly developed in the vegetable grower as it is in the fruit grower, I would call attention to the fact that a paper exclusively or even mainly devoted to vegetable growing has not yet found the support necessary to make it a glaring success for the publisher. Most of our better agricultural papers print a lot of matter on fruit growing, because this information meets the demand, and they know that the fruit grower will respond with subscriptions. But they are as a rule very weak in their matter relating to vegetable growing. The publishers have felt the pulse of the reading and subscribing and advertising public, and felt but a weak response on the part of the gardening public. Fruit growers have their trade papers, we have none. If we desire to make progress, we must change our tactics.

HOW CAN THE STATIONS FURTHER SERVE US?

Next comes the inquiry: "What more can the stations do for us?" Let us see first what are the proper functions of the stations. Their legitimate business, surely, is not the promulgation or diffusion of information already available to the general public. The Washington Department and the stations have frequently published treatises on the culture of garden crops, something on the line of our general garden books, or of treatises on special vegetable crops, already in the book trade. It is not their business to compete in this way with publishers, nor can it be their true function to write individual letters answering questions that the inquirer can have answered by looking up the ordinary garden books himself. The station was not established to save its constituents the fifty cents, or the dollar that it would cost him to buy one of the books on general gardening or special garden crops.

Investigation and research work is the real business for which the stations were established. Their true function is to help find a solution for the many problems as they come up in the farming business, and there are a good many problems the solution of which would be very desirable, or becomes necessary, and new additions from day to day.

A number of the members of this organization have kindly responded to my request for suggestions as to the work along our lines which they would like the stations to take up. Some of the suggestions received make reference to best methods of cultivation of our leading garden vegetables, best manures or fertilizers for them, variety tests, best varieties for market, etc.

I have already pointed out the fact that the station is not the proper place to look for information on old, established lines. Its function is not to educate, agriculturally, the individual, but to bring out new facts, new information, new cultural methods, the solution of new or old and still unsolved problems, and making this new knowledge available for the general public.

Variety tests, and in some measure fertilizer experiments, at the stations are probably of doubtful value for the general public unless made in co-operation with a large number of growers scattered over a wide range, and under different soil and other local conditions.

Where the stations can be of great help to us is in the discovery and improvement of means for the control of our insect, fungus, and

weed enemies. Much has already been accomplished in that line, and more is expected.

It would not be advisable to add still further to the length of this paper by giving a list of all the subjects suggested by my correspondents as a proper field for work at the stations. This must be left for a later occasion. I will mention one or two, however.

A very proper subject for investigation is the potato. Why is the average yield so low? What can be done to increase it? Also, if on acid soils, what can be done, by liming or otherwise, to correct soil acidity without increasing tendency to scab? What about making efforts toward breeding a blight-resistant type of potatoes? What are the true facts in regard to the value of southern second crop and northern grown seed potatoes?

A comparatively new development is the utilization of muck lands for raising garden crops, especially lettuce, celery, onions, cauliflower, and similar crops. There are in this state thousands of acres of land that are now a worthless tangle of wild growths, and not even good for pasture except for water fowls and muskrats, but amenable to drainage. These lands, properly handled, can be transformed into blooming gardens. They constitute our best garden soils. The soil in these swamps contains a large amount of nitrogen. Yet the growers who have already lands of this kind under cultivation feel still obliged to apply available nitrogen in large doses, at great expense. Can the stations find no way to utilize the nitrogen already in the soil, so as to avoid further and costly applications of the available form of this element?

And finally, if I were to continue in this way, and give you the full list of all the work that my correspondents have outlined in their letters for the stations to take up, it would show that there is a lot of work ahead for these stations, enough to keep them busy for many years. But that is what they want, and what they like. The station officers are willing to earn their salaries, and willing to serve our interests to the best of their ability. Don't hesitate, and don't be afraid to call on them for their assistance when you need them.

EARLY CABBAGE

R. H. Garrahan, Kingston, Pennsylvania

In order to produce a good crop of early cabbage, there are a few conditions with which the grower must comply:

1st. *We must use good seed.* And here the grower does not have to take any chances. He has no one to blame but himself if he uses poor seed.

2d. *We must have a supply of well-grown plants.* Here again the grower takes absolutely no chances. It is his own fault if he does not raise good plants.

3d. *We must have the soil in the best possible condition* in regard to fertility and mechanical condition. As a rule it is up to the grower to have his land in suitable condition.

4th. *We should have freedom from disease and insect pests.* Here we have to take our chances. We haven't yet been furnished with any sure panacea for all the ills that plant life is heir to.

5th. *We must receive a good price for the finished product.* The fixing of prices is usually beyond the grower and here he surely does take a long chance.

I said that we had absolutely no excuse for using poor seed. You say there is lots of poor seed on the market and that the seedman is liable to sell you some worthless stuff. I will agree with you, but don't buy such trash.

I was talking with a gentleman during the National Convention at Boston last fall. He said he had a contract to furnish a quantity of cabbage seed for a large dealer. I asked him if the dealer ever visited his farm and inspected the cabbages he had saved for seed purposes. He said he had never seen the dealer. His plan, he said, was to produce as much seed as possible per acre, and as cheaply as possible.

We don't want such seed as that and there is no occasion for using it. In order to be dead sure of the strain of seed you are using, the best plan is to grow your own.

Many of our agricultural writers have given us to understand that seed raising should be done by experts—that the ordinary run of market gardeners do not know enough to raise their own seed. We have had this drilled into us so often that many of us have come to accept it as the truth. With the exception of the Livingston's, I cannot recall any really first class varieties which have been developed

by the so-called professional seed growers. Practically all of our improved varieties have been developed by careful selections by the practical gardeners. We have also been given to understand that seeds can be grown in certain favored locations. There may be some truth to this statement but I know that just as good cabbage seed can be produced in Pennsylvania or any of the northern states as can be grown in Europe, California, Puget Sound, Long Island or any other out-of-the-way place.

Our plan of raising is to sow seed about the middle of July in hills where we want the plant to grow, thus avoiding transplanting. When a few inches high they are thinned out to one in a hill. The development of these plants is watched during the fall and only those are marked for seed purposes which show a tendency to head early, a uniformity of type, and which have a vigorous constitution,—about one in one hundred. The health and vigor of a plant is one of the most important considerations. It is just as important to have strong, vigorous plants from which to raise seed as to use vigorous animals for stock breeding. On the approach of cold weather these selected cabbages are taken up carefully, placed in a trench, roots downward, and covered to protect from severe freezing. The following spring they are planted in a well prepared piece of ground and fertilized heavily with potash and phosphoric acid. When the seeds begin to ripen, the seed stems are cut off, placed on sheets, and if weather is favorable, left in the field for a few days. They are then hauled in and spread out on a tight floor; and when thoroughly dried, the seeds are pounded out and cleaned up with a fanning mill. The seeds are then screened and all small and immature seeds taken out.

Peter Henderson in his book, "Gardening for Profit," tells of an old German gardener who was always first on New York market with early cabbage. His neighbors could not understand how he managed to beat them out, year after year. One day he confided his secret to a friend. His plan was to mark the stumps of the earliest cabbages which he cut—the suckers forming on these stumps were removed and rooted in sand, as florists do soft cuttings. They were then wintered over in cold frames and the following spring set out for seed purposes.

If one does not care to go to the trouble of raising his own seed, he should at least purchase a supply a year in advance and test in a small way before planting extensively. Cabbage seed is good for several years.

RAISING THE PLANTS

There are several methods by which we may obtain a supply of early plants. The old-fashioned way was to sow seed in the open on the fifteenth of September. When the plants were two or three inches high, they were transplanted into well-drained cold frames, about two hundred plants per sash. When the weather became cold, sash were placed on the frames and careful attention paid to ventilation. If the weather became very severe, the plants were still further protected by covering the sash with mats or boards. The plan was to let the plant make the necessary development in the fall and keep them in a dormant condition during the winter. This method, however, is rather unsatisfactory in many respects. The plants need looking after almost every day during the winter, and often a considerable number of the plants run to seed on being planted in the field. This was especially true if the seed was sown prior to September fifteen. If sown much later, the plants did not have time enough to make the proper development before cold weather.

Spring-sown plants have almost entirely taken the place of the wintered-over ones. They can be produced cheaper and if properly grown are much superior. If a green-house is not available, the seed may be sown in hot-beds, and when a few inches high the plants are set in cold frames, just as with wintered-over plants. A somewhat better plan is to sow the seed in flats, placing the flats in the hot bed. When the rough leaf appears, the seedlings are transplanted into similar flats one and one-half by one and one-half inches apart. These flats are then watered, placed in cold-frames and, if necessary, shaded a few days until the plants have struck root.

A greenhouse is much more desirable in every way. It need not necessarily be an expensive affair. A house twelve by sixty feet need not cost over $200, if one is handy with tools. Having a sufficient number of sash, one could run through such a house one hundred thousand cabbages and the same amount of celery and tomato plants.

In our section we make the first sowing of cabbage seed early in January, using Early Jersey, Charleston, Glory of Enkhuizen, Succession, etc. We sow in flats rather than in solid beds, as the moisture conditions are under better control. The seed is sown in drills one-quarter inch deep and covered with sand. We prefer to transplant before the rough leaf appears, as we get a more even stand of plants by using them when quite young. They are set in the flats one and one-half inches apart, but for the very earliest it pays to plant them

two inches apart. In order to get all the plants a uniform distance apart, we use a spacing board. This consists of a one-half inch board large enough to cover the entire flat, with one-half inch holes bored the desired distance apart. The board is placed over the flat and a handy boy punches the holes with three-eighths inch iron dibber. With a little practice, the kid becomes mighty expert at the business. Other children then place plants in the holes, and a careful man shoves a little dirt with a pointed peg around the roots to fasten them. They are then watered and placed in the greenhouse. When the room is needed, the first lot is shifted to cold frames.

A little practical experience is necessary in order to grow good plants. It is hard to say, without being on the job, just when to ventilate, or how much water to apply, and watering and ventilating are the two most important points in plant raising. As a rule, the beginner is liable to coddle his plants too much, and, as a result, his plants are liable to damp off on account of insufficient ventilation or too much water. The soil used should be of a loose, porous nature to allow perfect drainage. If the soil is inclined to be too heavy, it will be greatly improved by the addition of fine ashes (anthracite). The soil should be rather dry and not packed very tightly in the flats. The temperature in the house should not go above fifty degrees at night.

The greatest loss in plant raising is due to the "damping off" fungus. This disease usually attacks the young plants in the seedling box, causing the stem of the plant to turn black and rot off. It is due to too much heat, lack of ventilation, to heavy watering, cloudy weather, or the use of old soil. This trouble can be almost entirely eliminated by careful attention to watering and ventilation. Loosening the soil slightly between the rows of seedlings is also very beneficial. We have had practically no trouble in this regard since using sterilized soil. The soil can be sterilized either with steam or with a solution of formaline, two pounds to fifty gallons of water. It will take about two gallons of the solution to sterilize a cubic foot of soil.

The plants in the cold frames should be ventilated every day, the amount of ventilation depending upon the age of the plants and the condition of the weather. During warm days the sash are removed and the plants gradually hardened, to stand a temperature of at least twenty degrees. A well developed plant will be short and stocky, having five or six leaves of a reddish hue and an abundance of fibrous roots. The soil for greenhouse purposes should be prepared at least a year in advance. Where sods are obtainable it is a good plan

to pile up a layer of sods, say a foot deep, then add a foot of rotten manure, then another layer of sods, and so proceed. Where sod is not obtainable, select a good piece of land, manure it heavily, plow and harrow until ground is fine, then add another coat of manure, plow, harrow and roll again, continuing this process until sufficient manure has been worked into the soil and the ground is in fine mechanical condition. Then screen the dirt and haul to greenhouse or store in protected place until needed.

The flats used are made by sawing in sections tomato cases or other second-hand canned goods boxes. We try to buy all tomato cases, as this gives us a uniform sized flat and one which fits in nicely in the greenhouse, cold frame, and wagon. Years ago we used the old "Armstrong" method for sawing the boxes, but now we hitch a gasoline engine to a circular saw, which makes short work of the box business. Large sized shoe cases are purchased, taken apart, and used for bottoming the inner sections. For cabbage plants, the flats are made two and one-half inches deep; for tomato plants and especially for re-transplanted plants, we prefer to have the flats an inch deeper.

We use double cold frames in preference to the single frame. They are made deep enough to allow one-half foot fresh horse manure in the bottom, furnishing some bottom heat which is very desirable while the plants are young and the weather severe.

Instead of using mats to protect plants on cold nights, we use steam-heated cold frames. These frames are built so as to pitch four inches in one hundred feet. A three-inch main feed pipe runs from the boiler across the ends of the frames and a two-inch pipe carries the condensation back to the boiler. At the centre and lower end of the frame, a one and one-half inch raiser is taken off the main flow pipe and runs directly around the frame, connecting with the main return pipe. Valves are placed on the flow and also on the return pipe, and a pet cock placed on lower end of return pipe to allow escape of air. We first tried the automatic air cocks, but found them to be unsatisfactory. Steam-heated frames have proven entirely satisfactory and much more economical than the use of mats.

Cabbage is not at all particular in regard to soil. It will do well on almost any kind of land, providing it is not wet and soggy. The ground should be well drained either naturally or artificially. Land with a loose gravelly sub-soil, however, is not desirable. Cabbage is a rank feeder, and the main thing is to have the soil filled with available plant food. If sod land is used, plow it early in the fall and

during the winter apply thirty or forty tons of manure per acre. It is a good plan to harrow the ground with a "cut away" disk early in the spring. This allows the sun and air to dry the land, and we are thus enabled to plow much earlier than we otherwise could. Most of us vegetable growers know the value of getting our crops in early, and very often we get in too much of a hurry, and as a consequence, set out plants without first getting the soil in the proper condition. This is one of the worst mistakes we can make. If the land is not properly fitted before planting, it never can be after the field is planted. Plow the ground just as soon as it is dry enough, then cut-a-way, harrow and roll, if necessary, until the land is in the best possible condition.

We then apply the following fertilizer, per acre, six hundred pounds tankage, six hundred pounds acid phosphate, four hundred pounds potash; this is applied broadcast and worked into the soil with an Acme harrow. The ground is then smoothed and marked out two and one-half by one and one-half feet. The plants are dumped from the flats and separated very carefully, so as to retain as many of the fibrous roots as possible. They are puddled in thin mud, stood upright in boxes and hauled to the field, Children are used to drop the plants, and men and women armed with dibbers fasten them, care being taken to get the soil tight around the roots. The plants are set as deep as possible without covering the hearts; which is a great protection if the weather should turn cold before the plants have been established. The cabbages are cultivated and hoed as soon as they have struck root. A small handful of nitrate of soda is then applied around the plant, usually from two hundred to five hundred pounds per acre. All that is necessary from now on is to keep the cultivators going and hoe occasionally to keep the soil loose around the plants.

Some growers, where land is very valuable, will intercrop their cabbage. The usual combination is to set lettuce between the plants and sow one or two rows of radishes between the rows of cabbage. To my mind, this is a very questionable practice, it sounds fine to say you are producing four or five fine crops per year on the same land, but we prefer one or two good crops to half a dozen poor ones. The constant tramping over the ground in order to pull the radishes or cut the lettuce is very detrimental to the cabbage, and does not allow the necessary cultivation for the best development of the plant.

The market gardener may not have a monopoly on all the bugs, blights and other diseases which attack plant life, but he has enough at least to make the job interesting.

(I am reminded of that famous quotation:

"The Chinch-Bug eats the farmer's grain
The Bee-Bug spoils his honey,
The Bed-Bug fills his nights with pain,
And the Hum-Bug gets his money.")

After the cabbage plants are set in the field they have to take their chances with the maggots, wire-worms, cut-worms, and the like. Our experiment stations have experimented considerably along this line, and have advocated the use of a number of different mixtures for the eradication of these pests. But, as a rule, the remedies so far advanced cost too much to apply—the game is hardly worth the powder. The supply of cut-worms can be somewhat diminished by the use of poisoned mashes.

Plowing as late in the fall as possible is often of some benefit, as the worms or their larvæ are thrown up and killed by freezing. Anything that will promote growth will lessen the effect of those insects. Early planting, an application of nitrate of soda, plenty of cultivation and hoeing are about the best remedies. Club root often causes considerable loss, especially on poorly drained land. A heavy application of lime the fall previous to planting often proves very beneficial. Little or no trouble is to be feared from this disease if cabbage or any plants of the same family are not grown oftener than once in three or four years in the same piece of land.

Many growers imagine that, when they have grown a good crop of cabbage, they have done about all they can do. If cabbage is scarce and the price high, they are lucky; and if the market is overstocked, they are unfortunate. There is some truth to it, but the same principles which apply to packing apples are also true in regard to cabbage. There is such a thing as having a reputation even for growing cabbage, and a good reputation is worth money. Nine times out of ten, the man who is condemning the commission man the loudest is the one who is not familiar with the market requirement or who is not putting up an honest package. Most commission men are desirous of getting consignments from growers upon whom they can rely, not only for an honest pack, but for a supply year after year. It is to their advantage to give such a grower a square deal. For my part, I cannot see how we could do business without the commission men. What we want is a strong organization which will weed out the unreliable ones.

ONIONS ON MUCK SOIL

ELMER O. FIPPIN, Ithaca, New York

Truck crops which are used for their vegetative parts require that their growth take place under the most favorable conditions if they are to have good quality and give satisfactory yield. The onion crop is no exception to this rule, and in order that we may understand the requirements of the crop as to soil and fertilizers, it is important to consider the characteristics of the plant. The onion is an enlarged stem. Its root system is small in extent, fibrous in character, and usually shallow in distribution. It is particularly sensitive to unfavorable soil conditions, which develop a strong and undesirable quality. Plants in general use for the production of their stems and leaves require nitrogen and potash in much larger quantities than phosphoric acid, while those which produce seed make a heavy draft upon the phosphorus. Chemical analyses indicate that five hundred bushels of onions contain approximately sixty pounds of nitrogen, thirty pounds of phosphorus, and seventy-five pounds of potash.

Muck soil is a special or abnormal soil as compared with the average upland soil. It is formed from the accumulated remains of plants which have undergone decay to a greater or less extent. The primary condition for the growth and accumulation of this material is defective drainage. Such land is naturally saturated with water and the presence of this water has reduced decay processes. Depending upon the extent to which decay has taken place, these deposits may be divided into several classes, which differ decidedly in their agricultural value.

The first stage of removal from the fresh material, where the substance is coarse, fibrous, and usually of a light brown color, is known as the peat stage. It has such a poor relation to moisture that it is generally unproductive, especially for delicate crops. When the decay has reached a more advanced stage, so that the materials take on a black or very dark brown color, and assumes a fine pulverized material, it is known as muck. This is coincident with the increase of the soluble or humus substances, a brown liquid which may often be seen leaching from swampy lands. It is the muck stage of such lands which is agriculturally valuable, because this material has a much more satisfactory relation to moisture.

It will take up large quantities, ranging from eighty or ninety per cent to two or three hundred per cent, according to the proportion of humus present. The term humus should not be thought of as a definite compound. Rather it is a very complex mixture of organic products of decay. It frequently happens that the surface layer of soil is a good quality of muck, but that the subsoil is peaty; and to that extent that this condition exists, the value of the soil for intensive tillage purposes is reduced. Such land differs from the upland soil in that under proper conditions the peat will decay and change to muck.

The general character of organic swamp land is usually indicated by the type of native vegetation. Land which bears little or no vegetation or only that of a shrubby, stunted character can not be expected to be productive for a good many years after cultivation. On the other hand, if a heavy growth of trees and herbaceous plants is produced, this is very good evidence that the land is capable of producing tilled crops. The best kind of timber is a thrifty growth of elm, black ash, and soft maple. Land which bears almost exclusively cedar has been generally considered as of very inferior productive capacity. However, a few cedars and an occasional tamarack seem not to indicate any unproductive quality, if they are associated with the other species. Whatever the character of the land, it is generally best to farm it to more gross feeding crops like potatoes, hay, or corn for the first one to four or five years, until it becomes settled and active decay processes have been set up. By many growers, potatoes are considered to be the best preparatory crop for onions, which should not be put on the land until one is assured that its moisture relations are good.

In the matter of water supply, muck areas may be divided into two classes: First, those frequently known as sheet muck, where the material spreads over large areas and is relatively shallow, ranging from two to four or five feet in depth on the average. These have usually been formed during a previous lake condition of the area, and after clearing they are likely to have a deficient moisture supply during the late summer, and thereby to greatly reduce crop yields. The other class of muck lands generally occur in small areas, are relatively deep, and are likely to have their water-table maintained by springs around the margin of the area or in its interior. Such areas are to that extent insured against any lack of water, even tho drained for all ordinary operations. Muck of the usual

type generally has a low capillary capacity, and, therefore, should not be drained excessively. The water-table should not be lowered more than is necessary to permit cultivation reasonably early in the spring. This generally means lowering the water-table to a depth of about twenty inches, varying somewhat with the character of the soil. Open ditches are the best medium for first drainage operations. They may be cut considerably lower than the water-table is to be maintained, so that the flood water will be quickly removed, but it is a good plan to insert some sort of a check in the course of the ditch when the water-table has been sufficiently lowered to hold it to that level.

Areas which have not a natural water supply will generally justify irrigation if they are devoted to truck crops. One of the great factors in cutting down yields of truck crops on many areas of muck soil is deficient water supply. When muck dries out, it shrinks excessively and large checks are formed. If these are not kept filled by pulverized muck, or by frequent tillage, the loss of water will go on to considerable depths. The dry muck is a very effective mulch so that this condition can be readily controlled. These facts have a special relation to the tillage of the onion crop, which, owing to its limited root system, is very quickly subject to a deficient moisture supply in the surface foot.

Composition of Muck Soil. Muck soils are made up chiefly of organic material. They are characterized by being very rich in nitrogen, moderately well supplied with phosphoric acid, and relatively low in potash. The following analyses of a number of areas in the state are sufficiently representative:

	Organic matter	Nitrogen	Phosphoric acid	Potash	Calcium oxide
Redwood	88.7	2.42	.27	.15	6.2
Red Creek	85.5	2.6	.26	.18	4.2
Oak Orchard	65.5	1.8	.28	.26	4.4
Florida	——	2.2	.32	.36	2.6
South Lima, virgin	83.4	2.4	1.9	.09	6.3
South Lima, cultivated	82.5	2.4	.48	.44	5.9

It will be readily recognized that muck soil requires fertilization with potash, and this practice has been very generally followed. The presence of large quantities of nitrogen would suggest that nitrogen fertilizers may not be beneficial. But in practice, it has frequently been found that a small amount of nitrogen, especially in the early stages of tillage, is helpful. This is due to the fact that

the nitrogen, while large in amount, occurs in rather inert conditions, which requires some time to be made available, but with good drainage and thoro tillage, this process gradually increases in activity, and it may frequently be increased by light dressings of well rotted stable manure. Four or five tons are sufficient. Phosphoric acid, while not especially low in percentage, seems frequently to improve the crop yields. The New York mucks in common with those of adjacent regions in Canada seem to be very rich in lime, and it is questionable whether lime is needed in this region.

The Department of Soil Technology carried on three years' investigation with fertilizers in the Florida swamp at Breeze Hill, Orange County. The average yield of onions for three years on the different plots is as follows:

	Yields
1. Check	11,000 lbs.
2. Sulfate of potash, 600 lbs.	19,918 "
3. Acid phosphate, 1000 lbs.	19,086 "
4. Nitrate of soda, 500 lbs.	18,201 "
5. Check	17,612 "
6. Sulfate of potash, 600 lbs. Acid phosphate, 1000 lbs.	26,317 "
7. Sulfate of potash, 600 lbs. Nitrate of soda, 1000 lbs.	21,131 "
8. Acid phosphate, 600 lbs. Nitrate of soda, 1000 lbs.	19,056 "
9. Check	13,207 "
10. Check	14,302 "
11. Sulfate of potash, 200 lbs. Acid phosphate, 500 lbs. Nitrate of soda, 500 lbs.	22,371 "
12. Sulfate of potash, 800 lbs. Acid phosphate, 500 lbs. Nitrate of soda, 500 lbs.	24,517 "
13. Sulfate of potash, 200 lbs. Acid phosphate, 1500 lbs. Nitrate of soda, 500 lbs.	24,852 "
14. Check	19,824 "
15. Sulfate of potash, 1200 lbs.	
16. Raw ground rock phosphate, 1000 lbs.	16,211 "
17. Raw ground rock phosphate, 2000 lbs.	14,435 "
18. Check	15,818 "

Across the fertilizer treatments, lime and manure were distributed on part of the plots. The average result of this cross treatment was as follows:

A. Check	15,100
B. Lime, 1500 lbs. CaO	16,900
C. Manure, 8 tons per A	19,300

It will be observed that the largest yields were identified with the complete fertilizer rich in phosphorus and medium in nitrogen and potash; also from the plot receiving a double application of potash. Nitrogen has given very little increase on this land. Phosphoric acid and potash appear to be the elements which produce the crop. It was very evident thruout each season that the phosphoric acid promoted early maturity. Nitrogen seemed to prolong the development of the plants so that often there was a larger proportion of seconds due to immaturity at the time they were caught by frost. Probably the best policy would include the use of two or three per cent of nitrogen for the first few years that fresh muck is cultivated. The character of the product should be carefully watched for any indication that it is being excessively supplied with nitrogen thru the decay of the soil, and when this decay is observed, the supply of nitrogen should be reduced or eliminated. The quantity of fertilizer to be used on muck soil for onions is large, and probably applications of a ton or more will be thoroly justified. Lime is of uncertain value, but the effect of manure is clearly evident.

One of the most important practical phases of the management of muck soil is the maintenance of a proper water supply. This requires, first, thoro drainage, and it is believed that tile may often be substituted for open ditches which are objectionable in many ways. Second, there must be thoro surface tillage. Third, on those areas which do not have a natural underground water supply, irrigation should be practiced.

REPORT OF COMMITTEE ON MARKETING

H. W. Baxter, Chairman, Rochester, New York

In order to get the best possible results in packing and marketing, the growers of farm products should get together co-operatively, and stand together; establish sorting, grading, and packing stations, and sort their products carefully into grades found profitable to market, pack them in small enough registered trademark packages to reach the consumer without the package being broken and its identity lost, and name the price to the consumer on different products and packages by advertising in the daily papers. When this is done, arrange to get the products to the consumer with the least possible expense.

There have been many unnecessary profits and middlemen. For instance, the dealer at the growing end consigns to the jobbing receiver in the large market centers who makes his sales on the dock or in the railroad yards, even selling to his own wholesale house a few blocks away, taking his commission for so doing. Trace this method of distribution, and you will find that the product will pass through not less than four and probably five hands going from the producer to the consumer.

Last year Dean Bailey told us that the law of economics showed that we could not do without a middle expense, which is surely true. However, we have found by putting up products in small registered trademark packages, and advertising in the daily papers, the producer can have a great deal to say about the middleman's charges; and when he becomes too much of a burden, we can make other arrangements.

The plan of distribution that has proven the most attractive to us is to sell in the large cities to the chain grocer (a corporation or individual owning several groceries) and large department store, who can the most economically deliver our products to the consumer. The demands of the consumer on his grocer, such as four to nine deliveries a day, prove a big expense item in the cost of high living (not the high cost of living). For instance, a lady called up her grocer and said to him, "I feel I must stop trading with you, for I cannot get the things I order when I want them." She being a good customer, the grocer turned to his telephone order department, and learned that the complaining lady had ordered nine times that

morning. It was not quite twelve o'clock and there had been six special deliveries made to her house besides the regular ones. Grocery men in many places claim that sixty to seventy per cent of their gross expense is the cost of delivery. It seems that the smaller the grocer, the greater his expense; for he has to go several blocks to make one delivery, while the large department store makes several deliveries in one block. We also find the small grocer does not want to handle our products on as small a percentage of profit as the large retailer.

It has been proven that the producer of grapes, by packing in a labeled, registered trademark, four pound basket, has successfully set the price to the consumer by advertising in the daily papers.

It has also been proven that the producer of New York State potatoes has set the price to the consumer by putting up his potatoes in peck burlap sacks under a registered trademark brand, and advertising in the daily papers. In order to do this economically, the farmers must get together co-operatively and stand together,—in fact, follow in the footsteps of the producers of the West.

Last year the irregular shipping of potatoes caused the glutting of first one market, then another, potatoes often selling in carlots for forty cents in large markets that were overstocked. All potatoes should have brought the producer ninety cents per bushel, for the season closed at over a dollar.

There are as many potatoes consumed in the large cities when they are a dollar per bushel at loading station as there are when thirty cents. One reason is they are still the cheapest standard article of food, and another is that the consumer pays practically the same price when the producer receives thirty cents as he does when the producer gets a dollar.

We find that the bushel box for apples is an improvement over the barrel, but it is not a small enough package to reach the consumer without being broken eighty-three to eighty-seven times out of a hundred; while the four pound basket of grapes and the peck sack of potatoes reaches the consumer without being broken or its identity lost ninety-nine times out of a hundred. We also find that eighty-five per cent of the potatoes consumed in the large market centers reach the consumer in peck and less than peck lots.

Cucumbers should probably be packed in bushel baskets. However, we believe it would be a good plan to use a sticker label on each

cucumber, copying the most successful price getter of oranges in California, who pastes a little paper elephant on every orange of his better grade.

Lettuce should be pre-cooled before being packed, and if properly pre-cooled will carry in a good refrigerator car under ice for fifteen days. We are informed that Mr. Freer of East Williamson this year held lettuce in chemical cold storage for twenty-one days, or thereabouts, and then successfully put it on the market, carrying his lettuce over a glutted spell with pleasing results.

If lettuce was properly pre-cooled, it could be wrapped in a treated, labeled paper wrapper, and priced to the consumer by advertising in the daily papers. Probably cauliflower, celery, etc., could be handled in the same manner.

The despicable practice now generally in vogue in New York State of facing to deceive should be stopped. The Western grower has proven to us that we are only fooling ourselves in so doing. How can we expect to please if we use deception in our packing?

The consumer is the only true friend of the producer,—the only one handling the farmer's produce who does not wish to destroy the producer's identity with a good article, and put his own in place. We often see the dealer erase our brand on a good article, and put on his own.

We must get together co-operatively, and stand together, build up our brands, and get as close to the consumer as possible.

The New York State Vegetable Growers' Association

Third Annual Meeting

College of Agriculture, Ithaca, N. Y.

February 11th, 12th and 13th, 1913

TUESDAY MORNING, FEBRUARY 11

CONFERENCE ON CO-OPERATION

PRESIDENT WHITE: Will the meeting please come to order? The first subject on our program is a discussion of co-operation. So far as popular sentiment is concerned and the desire for co-operative work in the marketing of products, there has been more accomplished in the last year than there had been in the preceding ten. About a year ago, at the State Agricultural Society meeting, a resolution was introduced calling for a meeting of producers and consumers to be held in April of last year at the Board of Trade rooms in New York. There were present a good many different representatives of the agricultural interests—the officers of the grange, of the horticultural societies, of the Vegetable Growers' Association, and of the Long Island interests, and also of the Consumers' League and other organizations of similar character. A committee of one hundred was made up, of which John J. Dillon, manager of *The Rural New-Yorker*, was chairman, to be continued as a permanent organization. Mr. Dillon went to Europe to study the methods of co-operation in the old countries, and called a meeting following that on December fifth. This meeting was very well attended, that is, different interests were well represented. As a result, a definite move was made towards bringing about a combined organization which should have its headquarters in New York. A committee was appointed for the purpose, of which Mr. Dillon was chairman, and William J. Osborne of Auburn, Ex-Mayor Seth Low of Brooklyn, and Mrs. Julian Heath, President of the

Housewives' League, were members. They started such organization work. They found, however, that there was no law in the State of New York for incorporating co-operative organizations that just fitted. By the advice of attorneys, they discontinued the active organization, and they had introduced in the Legislature a bill which should provide proper methods of organization. I think that bill will pass. A hearing was held recently, and there was no opposition.

Wherever we go, we find this same feeling of unrest so far as the marketing end of our industry is concerned, and when I say "our industry," I mean horticulture in general. No matter how large the crop, the price for the consumer is maintained at the same level. You can readily see the result. If you double the crop, that crop becomes congested as it is shipped to the consuming centers, and the price is lowered accordingly, but the advantage that is gained from that lowering of the price is felt only by the people who are purchasing at wholesale. Instead of lowering the retail price to the same proportionate level and giving the consumer the benefit, and opening up a larger channel, the same outlet is maintained because the same price is maintained. That is the reason why we see no difference. When you get a large crop, there is no easier outlet. Hundreds of thousands of people in our large centers never taste of the products that you grow. It seems strange that in our large centers women and children and others who are created so that they really require those things for their health and their best development are denied them because of the avarice of the middleman who steps in, and says, "I must have this price!" The statement was made at the Board of Trade rooms that sixty carloads of melons perished in the big Pennsylvania yards last year because there could be no disposition made of them—yet watermelons sold on the same level in New York right through the season.

In Boston I found this condition prevailing. This is in one of the great greenhouse sections of the United States. Their glass houses were full of beautiful head lettuce. They had hard work to dispose of it, and lettuce was selling in Boston for eight to ten cents a head. Those people are just as anxious for something to relieve this situation as any of us are. I want to hear what others have to say for their respective localities.

THE LONG ISLAND ASSOCIATIONS

MR. TALMAGE: We have been working along the line of co-operation down on Long Island for quite a good many years, in particular with the Cauliflower Association. It has been in operation eleven years, and as our President, Mr. Aldrich, is here, he will probably have something to say on that.

I am interested in the Long Island Potato Exchange. It is located in the center of the potato growing section of Suffolk County, and Suffolk County is, I believe, the fourth county in the State of New York in the amount of potatoes produced. We feel encouraged with the progress of our exchange during the past year. We have a good many difficulties to contend with in marketing potatoes in a co-operative way that don't apply to a great many other co-operative marketing organizations. But we have made progress in the past year, and we have plans under way which we hope will work out to market our potatoes in an individual package with the brand and a guarantee of the weight and quality, and we hope to be able to market them in such a way that the retailer or distributor will not get two-thirds of the price they bring, as they have been doing. The point made by Mr. White is very evident to me, that the reason why we don't get more when we have a big crop is because the people who retail our products in Greater New York and other cities never reduce their prices, or very little. We know that from our cauliflower business. There were weeks at a time last fall when we were getting forty cents a barrel, and they still were retailed in New York at twenty cents a head, with twenty to twenty-five heads in a barrel. If those could have been put before the public at a lower price, so the consumption would have increased, there would still have been a profit for the retailer and a profit for the grower, as well.

In last Sunday's *Brooklyn Eagle*, there was a statement as to what the farmer received for various crops and what the consumer paid. For the correctness of these figures I can't vouch. I understand the growers have been receiving very little for their cabbage this winter. The article says cabbages to the value of $1,825,000 were sold in New York, that being the figure the farmer got, and what the consumer paid was $9,125,000. It is a very burning question—how we can get our product before the consumer with smaller profit to the distributor. But I believe progress has been made in educating not only the producers, but the consumers, and I believe that in time—I hope in the not far distant future—we will solve this problem.

PRESIDENT WHITE: The grange has been very backward about taking any action in the way of co-operative selling. The New York State Vegetable Growers' Association was pretty well represented at its meeting this year. Mr. Tuttle and myself had a conference with the executive committee and officers of the state grange, and got them to agree to an idea something along this line, that a committee should be appointed to work up a general plan of co-operation. We took the ground that if they didn't do it, co-operative work was going on anyway. It would be more or less disastrous. Organizations would be formed without any real data to work from and upon principles that would be disastrous to them; and we appealed to them in this way, that it was the duty of the New York State Grange to direct that work. They agreed to it. Mr. Tuttle introduced a resolution that passed, by which the executive committee is not only authorized but instructed to appoint a committee, and there is to be a supervisor. We have the New York State Grange working with us. The State Fruit Growers' Association, which has also been backward, is getting in line, also the Western New York Horticultural Society; and the Agricultural Society is, as I said, taking a very active part. We are gradually bringing all these forces to center in a common effort. It isn't a little proposition. Before we get done with marketing the products, it will involve millions of dollars. Yet it can be accomplished if we all pull together. I am going to ask Mr. Aldrich to take the chair of this meeting, as I have to speak elsewhere.

MR. ALDRICH: Mr. Work, whom shall I call on to discuss co-operation?

MR. WORK: It depends upon what the members wish. If the members would like to hear about some of the things that are being done in co-operative work in different sections of the state, there are a number of men here who have been active in this work. Mr. Talmage, Mr. Cook, and Mr. Aldrich himself are among them.

MR. ALDRICH: Will Mr. Cook give us some light along this line?

SOUTH SHORE GROWERS' AND SHIPPERS' ASSOCIATION

MR. COOK: I would say that the South Shore Growers' and Shippers' Association of Silver Creek, New York, was incorporated a year ago the 28th day of December. A few men got together, thinking that they would be greatly benefited by joining hands

and forming a co-operative association, which we did. We think that we have accomplished a good deal along that line for the first year that we have been in business. We took up the canning factory end of it—growing tomatoes for canneries. By forming the association, we were able to get an advance of one dollar per ton on tomatoes the very first thing, and very much better treatment also. The old contracts which the factory men had always offered to us as individuals were considered very unfair. At times it was almost impossible to grow a crop for the canners under the contract which they offered the individual grower and make any money. We brought about a good change there. One thing we have done besides getting a better contract is in receiving earlier payment. The factories never paid before the fourth of December, and we are now able to get payment the fifteenth of September. We have better treatment also with reference to packages and the delivery of goods. Formerly, many of our growers were held up for hours waiting to unload their tomatoes.

Our Association is growing very fast. We have taken in one hundred and fifty new members within the last thirty days. They have come to realize that it is a good thing. They can see the benefits. We have also been of great help to them in buying, as well as selling. On mixed fertilizers we were able to save from four to seven dollars a ton, and from three to four on chemicals.

One thing we did last summer was in the red raspberry deal. As handled in our country, it is every man for himself, shipping haphazard to nearby markets, which become glutted, and the growers have to take little or nothing for their berries. Upon my becoming Secretary and Treasurer of the Association, I got in touch with some of the larger markets of the country, and also with a goodly number of our best retailers in nearby markets. Also, I was able to get hold of men who would buy those berries in carload lots for fruit juice purposes. I will say that we got the highest price that was ever paid for red raspberries in carload lots, as high as thirteen cents a quart, and we sold one car at fourteen, f. o. b. our loading stations, the buyer paying for icing and other expenses and returning crates. That made us a very good outlet, and I was able to sell all the berries I could get hold of. It also made the price for the retailer, for the home market, and for the nearby markets. Our markets within a hundred miles would wire for berries. Back would go a wire, "Selling today thirteen cents," and while there was a

good deal of kicking at paying the high price, every man ordered his berries and paid the price. We held the price straight through the season because we had the outlet. This is something that cannot be done with all fruits and vegetables. We happened to have a good year perhaps, berries being scarce. I can safely say that we made an advance of two to three cents a quart on carloads over what had been obtained in previous years.

On the cherry deal,—our cherries had always been sold to the nearby cannery. It was brought to my attention that it was my duty to offer those there. It is not our object as an association to put local canneries out of business. Our crop was somewhat short. I proceeded to offer it to the nearby canneries, and was offered five cents a pound. I considered that we could do better than that. I had looked into the market problem a little, and had been keeping in touch with one or two brokers and buyers. I informed the canner that we would be pleased to sell to him at five and one-half cents. He said he couldn't pay that, but thought he should have the cherries. I got a broker to pay five and one-half cents, and I saved the growers just one thousand dollars on three cars of cherries. That is getting results, that is what made our growers feel good. They are with us to a man.

There is one thing I want to say—that some growers want to use the Association as a club. They become members of the Association, and instead of coming in and contracting their produce to be sold with the Association, they will notify you, "I think I am going to have this or that." They don't come and sign our contracts, so the manager will know just what he has to sell. I consider this a great handicap. When he has a buyer come to him, and he has to canvass to find out how many of his growers are going to stand back of him, it makes it very hard.

I may say that I have already been busy this year. I have a prospect of a buyer who will take one hundred tons of cherries. This is known to our growers, but we have very few that have signed up for the Association.

I would say that shipping to small markets is one of our greatest problems. We ship so that we conflict with one another. If everything could be handled by an association, we could better distribute the produce and get better prices. Last year in shipping to nearby markets, I did very well on the red raspberries, because we made the price; but on some of the black raspberries and other fruits,

I didn't do quite so well, because the other fellow shipped so many to that market. This is the greatest trouble we have in marketing. One way to handle that is to have your man on the spot to look after your cars when they get there. He could see that you are treated fairly. He might be able to work out a better price. It seems to me, gentlemen, that we should have a small association covering part of one county or one county, and we should try to keep one another informed as to what we are growing, and at what times our crops are ready to market, and when we expect to ship. I think that would be a splendid idea in working out a system so that we might all act intelligently.

I would say that we have hopes of perfecting very shortly a system of grading and packing, which we hope will work out well, having each man stamp his basket with his number. In that way, we will be able to tell who is putting up the good produce and who is putting up the poor. Some growers are a little careless in packing. We hope to work out a plan which will at least distinguish the No. 1 pack from the poor in shipping mixed cars. Last year we shipped cars with five or six commodities in the same car. We helped to market plums that it would have been an impossibility for the growers to market to advantage. There was a heavy crop, and there was no nearby market. It was impossible for a man to ship a few baskets by express or freight, but by shipping in mixed cars we took almost everything from small green plums up to large Green Gages, and of course, had no way of telling who was the best packer. That was the reason we conceived this idea.

THE CHAUTAUQUA GRAPE SITUATION

QUESTION: There is a great deal of trouble about marketing stuff in the Chautauqua grape belt. There is a growing uneasiness among grape growers. The buyers take every possible advantage. Is there anything on that subject?

MR. COOK: I would say that there is a great dissatisfaction in the Chautauqua grape belt in the way that marketing is being handled. The Grape Union does not handle over sixty per cent of all the grapes that are marketed in the Chautauqua belt. This has come about mostly through the growers themselves. There was a time when the Union handled seventy-five or eighty per cent of the grapes, but the independent buyer has been in the foreground a great deal. The problem the Union has had was this. They would

be confronted with a grower whose grapes were a little off, but he was a large grower, and instead of standing right up and telling this man that his grapes would have to go into wine or he would have to pack them in No. 1 baskets and put the majority into the seconds, they allowed them to go into the cars. There is no grade and pack any more. It has been known that they put poor grapes and good grapes into the same car. It hasn't given encouragement to the good grower. That has been one of the greatest drawbacks that the Union has had to contend with—the growers breaking away and going to the independent buyer. When the Union management would reject a load, the independent buyer would snap them right up. They were perhaps sold in the same markets as the Union's grapes, perhaps at the same price or a cent less. They were all known as Chautauqua grapes, but the Union's label is not much better than no label. Where we can establish a brand that has a reputation in any market and maintain a pack that can be guaranteed, then we are doing something to build up a trade-mark that is going to be known. A good brand of fruit, as long as it is kept to the high standard, will sell itself.

A MEMBER: Good graded packing could soon be brought about. There is a tremendous uneasiness among those outside. Oftentimes the market would be glutted with good stock, and the independent buyer would pay what he thought best, usually below the market.

MR. COOK: I spoke about different shipping sections conflicting. In shipping grapes, there is a large Michigan belt that ships right into our nearby markets. I have known as many as thirty or forty cars of grapes from Michigan to go into the Pittsburgh market in one day.

A MEMBER: They will get better prices than we do because they are systematic.

MR. COOK: They are not getting better prices. I have seen their grapes sell low. The idea of those fellows shipping right into our markets, as you may say, looks wrong to me. It seems that that western fruit belt should find a market further west. Our Association is able to handle a goodly output of almost anything, provided some other association doesn't ship into the same market and break it. That is along the lines we will have to follow to bring about changes that will be of great benefit.

MR. ALDRICH: We are grateful to Mr. Cook for what he has told us.

STATE AID IN CO-OPERATION

MR. TUTTLE: What are we trying to do in the matter of organization? At the annual meeting of the State Agricultural Society in Albany, as chairman of the Committee on Co-operation, I made a report which was unanimously adopted and followed by a resolution coming from the Committee on Resolutions recommending that a special deputy in the Department of Agriculture should be employed whose sole duty it should be to attend to the organization of co-operative societies among producers, I mean to handle the subject as a general supervisor of that work, to see that aid is given where it is needed. There is a bill now in the Legislature to accomplish that purpose, and there was a hearing on it week before last in Albany, at which people from all over the state were present and all were in favor of it. The bill carried no appropriation, but the appropriation would come through the general supply bill for the Department of Agriculture. It provided, however, for the employment of a special deputy at the salary of $3,000. I said I was afraid we couldn't get a very competent man for $3,000. I would say $10,000. We want a great big man to handle this great big problem. We want the very best talent there is. I presume that bill will become a law. At Buffalo last week, after a conference with the executive committee and officers of the State Grange, the Committee on Co-operation, of which I was a member, prepared a report which provides for a special committee of three to be appointed by the executive committee of the State Grange. This committee of three is to devise a general plan for co-operative organization, so that the plan may be harmonious, and the same general fundamental principles will run all the way through the organizations from one end of the state to the other. That will probably prevent the organization of granges in different localities on different lines that might result in antagonism. When that committee of three makes its report on a general plan of organization, this report comes before the executive committee of the State Grange. Upon their approval of the plan, that executive committee is then required by the report and resolution to employ a supervisor of organization work, substantially covering the same ground that I mentioned

with reference to the bill now in Albany under the Department of Agriculture. I don't think there is much likelihood of any conflict between the two supervisors, if we get the two; but we may fall down on one or the other, and it was worth while to try to have two strings to our bow. It does look as though we were taking some step in advance. I think with this plan of working either through the Department of Agriculture with a certain fund—they estimate $20,000—or through the grange by a supervisor, we can, before another year comes round, make substantial progress in organization.

MR. ALDRICH: Co-operation is coming, but it wants lots of wisdom and lots of money to bring it about. It is a subject that we ought to take days in discussing.

MR. BONNEY: I am glad to see so many here who are interested in muck land crops. At this hour Mr. Greffrath of South Lima will speak on "Marketing Muck Land Crops." I do not think there is a man in the business who knows as much about the proposition as Mr. Greffrath.

MR. ALDRICH: First will you appoint a committee to audit my books? I want you to appoint Mr. Work amongst others.

MR. BONNEY: I appoint Mr. Work, Mr. Locke, and Mr. Hay.

MARKETING MUCK LAND CROPS

HENRY GREFFRATH, South Lima, New York

I am not here to present to you some new plan of marketing muck land crops in small packages, by parcel post, freight, or express. This plan of selling our product of farm or garden to the consumer in our city will probably work out well on any place where a variety of crops is grown. When we confine our plantings to three or four crops, I question this method of marketing. I am going to talk of the kind of marketing I have found best suited to the muck land grower where celery, onions, and lettuce are the main money crops grown. I will deal chiefly with the preparation, packing, and shipping, as I consider them the most important under our present method.

CELERY

First of all, be sure that you have a good strain of the particular kind of celery your market wants. Keep it in a good, healthy condition. Do not permit it to become blighted. If your celery is badly blighted, it will not stand up. By the time it arrives at destination, brown spots will be all over it. That is not the way to tempt the consumer's eye. It should be the aim of every celery grower to grow celery as nearly perfect as possible and to put it up as neatly as possible. The taste of blighted celery is worse than the looks. The person who buys this says, "I will buy no more."

Never bleach your celery with dirt in warm weather. For every time it comes out in good shape, it is going wrong about twenty-five times. You cannot afford to take such chances. Bleach with boards or paper.

I might say one word about close culture. The method of growing celery under close culture has taken quite a hold with a large number of growers. I use double row system on the early. I have discarded it on the late entirely, because it is impossible to grow late celery of good keeping quality under the double row system, the inside of the stalk becoming blanched too much before the outside is fit to harvest, and it will not stand up. If you market while small, the celery is good. Don't let it become over-blanched before you ship it, as the stalk becomes watery and rots.

Don't permit the celery to lie in the sun till it becomes wilted. I have known growers to take great care and pride in growing a good crop of celery and then almost ruin it in harvesting by permitting it to wilt, thus spoiling its appearance. It will never tempt the consumer thus. If every grower would think more about keeping his celery in perfect condition up to the time it is placed in the hands of the consumer, instead of only keeping it in fair shape till it goes out of his own hands, how much better it would be. It would be the means of increasing the output of celery thirty per cent or more.

Celery washed in cold water will stand up for twenty-four hours longer than if washed in warm water, to say nothing of its better sanitary condition.

If your customer can use a standard crate at a shipment, then use this. The height should be adjusted according to the height of the celery. Stand your celery upright. If you wash and bunch it, line the inside of the crate with paper, never using paper with coloring. Don't trim your celery down to the white core. It will make

it look at its best while you are putting it up, but there is nothing you can do that will make celery appear stale any quicker than this close trimming of roots. Trim reasonably close and wash clean. Try this and see what your customers say.

If you are shipping celery in carload lots, take the same care against wilting in the field. If you are loading for cold storage, do not cut unless the man is right there in the field. If you are loading for yourself, don't select celery very far advanced in blanching,—that with the heart just nicely started is at the proper stage. Well blanched celery turns soft and pithy. Never harvest celery for storage when it is wet.

I don't believe we have adopted the proper crate for cold storage. It is too wide. Everybody that has made this a study finds the outside of the crate nice and fresh, but when putting the hand into the center of the crate, a handful of tops can be pulled off. They have separated where the foliage begins because of heating. The cold doesn't penetrate quickly enough.

In regard to loading cars, by poor loading, we can spoil all our labor of growing and preparing our crop in three or four days. The average width of a refrigerator car is about eight feet two inches or a little over. A crate twenty-four inches square is too wide when loaded against the bunkers,—loaded four wide and three high, the crates would fill the entire space, leaving no opportunity for air circulation in the center of the cars. Every crate should be made so that it will load to leave at least three air spaces not less than two inches wide the entire length of the cars. We could realize more money out of our celery if every grower took more pains in this. I believe every grower should make his pack and grade perfect and always have the same grade. Celery is known as 1x, 2x, and 3x. 1x pack from seven to eight dozen to the crate when properly trimmed.

We are all talking about cutting out the middleman. It is a splendid idea. I hope to see it work some day. But until that time arrives when growers will trust one another and unite in one grand organization that will have distributing stations in our cities where goods will be put up in proper shape, give the man who comes into your field to buy your celery a square deal. Put your celery up in the best shape you can and try to get it delivered to his place of business in the best possible condition.

Early celery as a rule is very low in price through August and September. Why? Hot weather alone cannot be the excuse. I think you will agree with me that the following causes have much to do with this, and that the grower is largely responsible for these conditions.

First of all, we know that we generally have hot, dry weather through August and September, and we don't guard against this. When those hot days come, we watch our celery closely. We see traces of black heart appear. The same conditions of weather exist all over the state, and black heart makes its appearance in most sections at the same time. In most cases growers are looking for it, and all discover it about the same time. Everybody makes a rush for the lumber pile and says, "I will get it on the market before it spoils." In a very short time, our markets are so full of celery you could not put more anywhere, and it is of the poorest quality you could imagine. If this were left right in the field and taken good care of, as soon as cooler weather and rain came, fully ninety per cent of the diseased celery would produce an excellent crop of celery. Early celery can be made to grow and grow to perfection and can be marketed in good condition all through the hot weather, if you will do two things—supply it with plenty of water and this in the right form. If you can't do this, then, as soon as you discover the black heart, cultivate and leave till cooler weather. I don't believe we are growing more celery than could be properly marketed at a profit, but we can't put it all in one place. We have got to place some in every town in this country. How are we going to do that? Organized distribution is the only outlet, and I believe if the celery growers don't adopt it freehanded, they will be forced to it. If all would unite in one organization, one system of distribution, it could be done. There is no other line of business that is carried on in such a slack way as the farmer's.

LETTUCE

We will take up the lettuce deal. First of all, I want to say this about lettuce. If you are not already in the game and are subject to heart trouble, get your heart put in perfect condition or keep out of it. I don't know of another crop that is so hard to dispose of at fair prices during the summer months as lettuce on account of the variation in markets. You can work up a good lettuce trade in the smaller towns if you are sure of having lettuce at all times. Unless

you have a cold storage, it is practically impossible to have lettuce on hand at all times of the season. I know a dealer who grows lettuce on about forty acres every year. His plans are to make two to three sowings per week, yet I have known that man to be out of lettuce two weeks at a time. Weather conditions may bring sowings two weeks apart to maturity at the same time. However, if you can store ahead, a splendid trade can be worked up in small orders.

The changes in prices usually are brought on in this way. Our market generally opens on lettuce in July. The early part of this month we get fair returns. As August advances, our large lettuce is scalded. Moisture getting into the head and the hot sun beating on it rot it. We set it aside and wait for the next sowing. That, perhaps, is in the same condition, but everybody is calling for lettuce. We look over our field and think it not fit. A neighbor gets good money, then we all make a rush and cut stuff we know is not fit to ship. In a short time, every market is filled with goods that ought not to have left our fields. Here is where the growers fall down. They will not market diseased lettuce as diseased lettuce. Every grower of lettuce should make it his aim to grade his lettuce. Never market lettuce as fancy unless it is strictly fancy. As to the kind of package, I like the box better than the hamper. It carries better and can be loaded better.

Grading. Get familiar with what the first grade of lettuce means. It is the best that the trade wants, 24 to a large box or 22 to 24 in a half barrel hamper, and of excellent quality. Whenever I have extra fancy lettuce, I use a label, and with that I also guarantee the contents, agreeing to replace it if not found as represented. I have not been able to use it the past two years. Whenever that label does appear, I know that I can realize good results on it.

Whenever you ship to a commission man or dealer, wire him just how many you ship, and the grades. If you do that, nine times out of ten he is able to sell the goods long before they arrive, and at better prices than otherwise. In loading lettuce, ventilation must be given lengthwise of the car, in order to get cold air from the ice box into the center of the car. Load as you cut, unless you have a place to precool. If you can precool, I think there is the secret of success.

In shipping, many growers say, "I am going to scatter my shipments." It is a good thing to get posted on all markets, and it is well to be in touch with some firm in each of the large consuming

A MUCK LAND LETTUCE CROP

centers, but don't make a practice of shipping to every Tom, Dick, and Harry who wires high quotations. Pick out two or three men and to them only ship. In a very short time, they will work up a good trade for you.

ONIONS

Last year we learned a lesson. We know now that if we plant every inch of ground in this country that will produce onions to onions with our present methods of distribution, we shall get more than we know what to do with. But we are not going to drop this crop just because of last year's experience. The man that sticks year after year is the man who is going to win out on onions. If onions were placed before the consumer at a price that would be somewhere in line with that which the grower gets, there would be many more used. In Rochester the other day they were selling for five cents a pound, but we can't get twenty cents a bushel at loading stations. How are we going to get at this? How are we going to cut out that enormous profit? Organized distribution. How to go about it I am not able to present. There are men that could steer us.

A few words in regard to the curing and preparing of the onion for market. To keep an onion in proper condition for storage, one should not allow it to remain in the ground long after the tops have all dried. Why? If you do that, it is going to do one of two things. It is going to take root, or the two outside layers next the root are going to rot. In the latter case, it is just as good, but its appearance is not as attractive. Don't let the onion lie in the sun until it becomes burned.

Red onions when properly harvested are one of the prettiest onions we can produce. There are some markets that demand the red onion, but the majority favor the yellow. If you are going to store it, get it in a perfectly dry condition before you put it in the storage. One of the best methods of storing is in the crates. This year at South Lima, many of the onions were blighted at the wind-up. It cut our crop about two hundred bushels to the acre. The onions were not thoroughly cured in the center, and when the wet season came, we had a large per cent of rot, which is hard to detect. If you have that condition, do all you can to get those poor ones out, and place those that are to be sold on the market in the best possible condition. Every onion grower producing in carload lots should

cut out the middleman. The dealers will trust you and will deal with you. You will get more for your crop. If you can't sell to the same dealers year after year, investigate. Something is wrong with your grading.

A MEMBER: What kind of lettuce do you raise?

MR. GREFFRATH: Big Boston.

A MEMBER: Does it pay to raise Grand Rapids?

MR. GREFFRATH: Not in this country. It is a leaf lettuce. A lettuce has been introduced which they claim will not turn red with frost. Big Boston is tinged. I could not get the other name, but I found a disease did attack it.

A MEMBER: I think they call that a French Big Boston. It is not as good as the other.

A MEMBER: What is the objection to color?

MR. GREFFRATH: The trade doesn't like it. It doesn't look so crisp.

A MEMBER: What kind of fertilizer do you use?

MR. GREFFRATH: That is a hard question. Perhaps a 2–8–10, perhaps a 4–8–7. Some use bone meal and blood. Some get best results with potash only. I have never used anything but the complete fertilizer on lettuce.

A MEMBER: What size crates do you recommend for cold storage celery?

MR. GREFFRATH: Six inches longer and three inches narrower.

A MEMBER: The Experiment Station people took some celery out of a patch of mine this year and put a partition right through the center, nailing slats each side of the post, and put up a Florida crate with twelve inch head. That was put in storage the fore part of October and came out the eighth of January nearly as good as the day it went in.

MR. GREFFRATH: Three years ago I selected eight cars of celery to be put in cold storage at Elmira, and when taken out in June, was in good condition. This was packed in eight inch crates. Same was shipped in the month of February from Sanford, Florida.

A MEMBER: What about spraying?

MR. GREFFRATH: You can't cure blight, but you can prevent it. Spray with Bordeaux mixture at least once in ten days, applying under high pressure to get it over the entire plant.

A MEMBER: What kind of celery do you grow?

MR. GREFFRATH: Golden Self-blanching.

CABBAGE

ALBERT E. WILKINSON, Ithaca, N. Y.

As a general thing, a year of low prices and high production is caused by low production and high prices the preceding year. Such was the case during the past season.

I have a few figures which would be of great interest. The value of cabbage in the United States, according to the latest census figures, is $9,000,000, while in New York more than $2,000,000 is raised. If you will compare those figures, you will find the crop in New York amounts to one-quarter of the total crop of the United States. There are forty-three thousand farms in the United States which report cabbage growing, and in New York more than eleven thousand. Comparing yields, New York had a little more than one-quarter. The area of cabbage grown in the United States is one hundred twenty-six thousand acres, of which New York has thirty-five thousand. These figures represent a very big fact—one-quarter of the acreage, one-quarter of the number of farms and one-quarter of the valuation. If we wish to go a little further, we can use these figures to find a little about the value of this cabbage. First, we might take the average acreage per farm. The average acreage on each farm is three plus. The average return gross from these three acres is $200.00, or $66.14 gross for each acre.

VARIETIES

We have this cabbage divided into two very large groups. The first is that grown by the market gardener. The market gardener is a man in vegetable raising very near to the source of demand. He is generally on high-priced land, and must use intensive methods. The other great group is the truck farmers. They differ from the market gardeners only in raising their products away from the source of demand. They may be fifty miles away or five hundred or five

thousand. The crop may be grown in rotation with farm crops, or not. It may be potatoes, it may be cabbage, it may be any vegetable. The work of these two divisions is somewhat different. One man supplies a certain amount of cabbage or a certain kind. The other supplies a different kind to his market.

Cabbage has been classed into seven groups. These theoretically are correct. It is correct to say the first group embraces cabbage rather pointed, as the Early Jersey Wakefield or Charleston Wakefield. The second is Flat Dutch, greater in breadth than length. In the third class is Savoy. This may be of the type of the latter or the former, but generally is between these, and the leaves are wrinkled. This is a delicate cabbage. Fourth, Red Dutch. As far as I see, this is not different in form from Flat Dutch. Fifth, Danish Ball Head, which is supposed to be quite rounding, but as grown here is rounded with a rather slanting base, and a solid type of head. Sixth, Alpha group, including the St. Johnsday, a very small cabbage, earlier than the Early Jersey Wakefield, and rather rounding in type. It is one that twenty years ago was used a great deal in England and on the continent. Seventh, Volga, grown somewhat more in certain sections, but as I see the Volga, it could very readily fall into one of the other types. The Volga I have raised has been of the Flat Dutch type.

For all practical purposes, these seven groups may fall into three classes. Of these three classes, I will name, first, a cabbage greater from base to top than in width. That would embrace Early Jersey Wakefield, Charleston Wakefield, and cabbages of like nature. The second is wider than it is deep, which is typified by Flat Dutch, Succession, All Seasons, and many of like type. Last would be the storage type with solid round head. For practical purposes, these are the only three types we grow. The Savoy would fit into the first or second group. The others would fit into one or the other, leaving out differences of color and variations in leaf construction.

SEED QUESTIONS

The next question is the source of seed. I have some interesting figures which give relative value of cabbage seed of some varieties from various sources. I would like to discuss them.

In a test, thirty-one strains of Early Jersey Wakefield cabbage, the weight of heads ranged from .95 to 1.72 pounds. This would be rather a small cabbage. In Early Jersey Wakefield this is very

important, because this depends on the first cutting for its profits. Some of the thirty-one produce only seven tons and some eleven to the acre. The next variety is Charleston Wakefield, twenty-four strains. We find that the heads were fairly uniform, weighing about one and three-quarters pounds to each head. At the first cutting the average heads were larger than the Early Jersey Wakefield. They are shorter and broader, and weighed a trifle more. We find the total yield greater, eight tons to eleven and one-half tons. The next strains tested were Succession or All Seasons or All Head. There was a difference in head weight running from three and a fraction to four and a fraction for each head. This is a summer cabbage. Therefore, the first cutting is not important, but the total yield per acre is very important. The results showed fifteen and one-half to twenty tons. The next group is the Flat Dutch type. We find twenty-two strains were used, and the difference in the heads was more marked, two and eight-tenths to four and one-half pounds for each head, and the difference in total yield about eight tons. The next type, Volga, was the highest, from three pounds to four and one-half pounds weight of head, with a range in yield from eighteen to twenty-five and one-half tons. Danish Ball Head varied even more than Volga, from less than two pounds to three and one-half pounds per head, and six to twenty and one-half tons per acre.

The average difference in strains of seed was about seven tons to the acre. That is a very important factor. If we have an average difference of seven tons to the acre in seed from different sources and sell cabbage at say three dollars a ton, that is a very considerable difference. As we want that difference to mean profit, we must have strains of seed which will produce the high and not the low yields.

About the seed. Quite a few years ago the tendency was to buy all seed from Long Island. But today we are not buying so much from there—we are buying from South Jersey, from Virginia, from Michigan, and from the West, where we can obtain quite a pure article. Two things must be secured. One is selection of the type which is fairly constant for the whole field, in other terms, roguing. We must pick our cabbage which represents absolutely the type we wish to propagate. If we choose from a Michigan strain anything upon the field, we do not obtain the high quality we wish. Long Island has difficulty in growing seed, that is, the seed produced there is sometimes mixed with Brussels sprouts seed, and a plant is pro-

duced which is not a cabbage nor Brussels sprouts. That seems to be beyond the control of the operators. In the next generation, the grower may do away with this one characteristic.

MR. WHITE: There is some cabbage seed grown about Rochester. Do you know anything about the relative merits?

MR. WILKINSON: I have not come across the men who are growing it. If they grow in this part, there are no reasons why they cannot grow here as well. Danish Ball Head comes from across the water practically altogether. I see no reason why New York cannot raise the same class of seed as Michigan.

MR. WHITE: In large cabbage growing sections, I do not see why seed cannot be grown locally.

MR. WILKINSON: There are certain sections particularly adapted to the growing of cabbage, cauliflower, and Brussels sprouts seeds. We have yet to find whether there are other sections that will not be better for the production of seed than Long Island. If we can raise such good cabbage, we may be able to preserve it for seed.

ADAPTATION

I would like to give a few reasons why cabbage is cultivated more in the North than the South. The only time the South cultivates cabbage is very early in the summer. The reason is that the requirements of the cabbage are moisture in air and soil and a relatively cool season. This is obtained in the South only early in the spring or in the winter. To give an illustration, in speaking of Danish Ball Head, in certain parts of Pennsylvania it is impossible to grow that cabbage, also farther south. In New York and New England and parts of the North further west, it can be grown quite successfully on certain classes of soil. That is only one cabbage. We find other cabbages that are more cosmopolitan, but still they require moisture in soil and air and a relatively cool season for best growth. That may account for the fact that we have a lot of southern cabbage coming into the market from now through the early spring.

SOILS

The general considerations for the preparation of soil for cabbage vary slightly in different sections. There are some men that claim that for the best production of cabbage, they should have a certain

kind of soil. I think it can be taken down as a rule that the early cabbage will do much better on a sandy loam for quick results than on a heavy soil. The former is a little warmer in the spring, retains quite a little moisture, is benefitted greatly by manure, and in it fertilizers with moisture act very quickly.

For the midseason crop, a soil a trifle heavy will give best results. Sandy soils have a tendency to dry out too much.

For the late crop we need a soil even heavier. The general tendency is to put late cabbage on soil approaching clay or muck. Both have power to retain great quantities of moisture, and they are relatively cool soils and give conditions for the best growth of late cabbage.

Incidentally, in remarking on muck soils—I know from my own experience that a very excellent strain of cabbage can be grown on this class of soil. It is one of the crops that can be produced in the muck sections if you desire. The great drawback is that the cabbage heads are not tight enough for late storage. Sell by the fifteenth of January for best results. On the clay soils and on soils which produce slower growth, cabbage heads are tighter and will store longer.

FERTILIZERS

The question of fertilizer is often brought up. You will find in the majority of cases stable manure is the fertilizer advised more than any other. In all lines of vegetable growing, if men will stick to that idea, they will win out more times than if they depend on artificial fertilizer. If you have a soil supplied with a small quantity of manure, you can give more food elements by adding artificial fertilizer to supplement the small amount of stable manure. If you have ten tons, you may supplement this with an application of a thousand pounds to the acre of a fertilizer which is known as a complete fertilizer. Such a fertilizer of high grade analyzes four per cent nitrogen, eight per cent phosphoric acid, and ten per cent potash. That is not the exact proportions I use. I use high grade fertilizer giving three and six-tenths per cent nitrogen, nine and a fraction of phosphoric acid, and eleven and a fraction of potash. Why is this amount applied? What does the normal crop of cabbage take from the soil? If you fertilize for what crops take from the soil, you will be out of proportion. A crop of eight thousand heads, fourteen tons, would take from the soil twenty-three pounds

of phosphoric acid, one hundred fourteen pounds of potash, and sixty-seven pounds of nitrogen. What does that mean? It means that, to balance this, you would need these amounts: 165 pounds acid phosphate of a 14% grade; 228 pounds of muriate of potash of 50% grade; 447 pounds of nitrate of soda of 15% grade. You have then a fertilizer which would give eight per cent nitrogen, three per cent phosphoric acid, and fourteen of potash. There is hardly a man in the country that uses a fertilizer of that form, because more soils lack phosphoric acid than any other element.

RETURNS

I have some figures that would be of great interest in the way of prices, the average returns per ton for eleven years, strictly for storage cabbage, of the Danish Ball Head type. For November the average price per ton was $7 to $9; December $9 to $11.70; January $13.10 to $15.70; February $16.40 to $18.70; March $20.30 to $23. Those are interesting because, with the figures for this year and these figures, you can arrive at some conclusions as to just exactly what the average is in a series of years.

THE LATE CROP

Perhaps it would be better for me to emphasize the late growing cabbage than the early. The first thing is the manuring of the land. My general advice is to apply twenty-five to forty tons of manure. If this is not practicable, use ten tons and one thousand pounds fertilizer. I should plow under the manure, and apply the fertilizer when the crop is set and cultivate it in. I would want all the manure covered. Plow a little less narrow furrow slice and a little deeper, so the furrow slice will not turn flat down. Following this plowing, I should use some fining tool as a disk-harrow and fine the field as much as possible. Then I would employ some smoothing tool, such as a spike tooth, and perhaps go one step farther and use a Meeker. It would depend a great deal, in using this Meeker, just what process of planting was to be employed and what crop raised. In raising a late type, it might not pay to use a Meeker. The Meeker fines the soil even more than a garden rake. This is a tool that should be more familiar to gardeners throughout the United States.

The next step would be planting just as soon as possible. On a small acreage, there is nothing better than the hand planter, a dibble, or trowel, having the field marked out. If you have only

yourself and the boy, the quickest way is to furrow it and put the cabbage on the side of the furrow that is straight. With more helpers, you can have one man to drop the plants and four men to follow. If you are on a large acreage, none of these methods would appeal to you—only a machine. This is all right if you have two men on the low seats who know what they are doing. The rows might be straight, but the plants not straight in the row. If labor is very unskilled, I should advise leaving the machine in the barn and coming out with the trowel or dibble. It is a question in some cases where labor is plentiful if one could not do better and quicker work by hand. Where this crop is the last in a rotation with other farm crops, the machine is very handy. A machine in some cases will plant three acres a day, sometimes as high as six, though sometimes in planting half an acre you are doing well.

There are great advantages in this machine over hand work. In hand work, you generally draw down some of the top soil in transplanting. With the machine work, the machine pushes through the soil and has a tendency to push the soil out and place the plant in cool soil below, which is just what the plants need for continued growth. The machine will do the best work for that reason. It brings the soil to where it is cool, places water around the roots of the plant, presses the roots against the soil to give good contact, and the actual growth of the seedling is continued at once.

The average distance apart for these plants varies with individuals. In growing small varieties, I should place as close as fifteen inches in the row and eighteen inches between rows. As we come towards the later type, we have a larger cabbage. They need to be placed further apart in the row and between rows. If you cultivate by horse power and wish to cultivate the whole season, you must give room. Never cultivate cabbage before nine o'clock in the morning nor after four in the afternoon. Cabbage leaves are very brittle. They are full of water before nine o'clock and they begin to "stock up" in the afternoon. If you go through at those times, you have a tendency to break those very easily. Cabbages are bent more easily between these times, and may be pushed out of the way.

In harvesting cabbage, the tendency is to have a knife in the right hand and grasp the head with the left hand, putting the knife as near the head as possible. The closer one gets the knife, the less time it takes to cut it. If the cabbage is not collected right away, turn it upside down. They can be collected by individual heads in

bushel baskets, or by teams. If cabbage head becomes bruised, the head will have a spot where it will spoil. If the cabbage is thrown into the wagon, it is likely to be injured.

Marketing the late crop is a problem. Some are immediately harvested and sold, but a large amount is kept in storage. The old method used to be with cabbage heads upside down, covered with straw. In a large way, this is not good. The next method would be to take the manure out of the hotbed pits and place the cabbage there, giving ventilation. A good storage plant would be the next method, the walls with two dead air spaces being of wood, concrete, or brick. Have some ventilating apparatus for taking in the cool air in the night time, also seeing that it can be shut in the day time. There should be some moisture in the houses. A house of that type can be built for two or three thousand dollars. There is such a house near Rochester.

The best cabbage for storage is Danish Ball Head. The greatest factor we have to recommend that variety is its keeping quality. As far as actual eating quality is concerned, I would rather eat almost any other.

QUESTION: Where can you obtain pure strains?

MR. WILKINSON: I have a list of fifteen exporters and growers of seed in Denmark.

QUESTION: How much will cabbage shrink?

MR. WILKINSON: That is a very hard question. It is according to moisture, ventilation, and form of cabbage when placed in the store house.

QUESTION: Do you advise fall or spring plowing?

MR. WILKINSON: For early cabbage, fall plowing; for late, spring plowing. I would like to have some crop like clover or rye to plow down.

QUESTION: What is Danish Round Head?

MR. WILKINSON: Danish Round Head is an improvement on Danish Ball Head. It is supposed to be several days earlier. I should not prefer this.

QUESTION: Is there value in the refuse of the cabbage?

MR. WILKINSON: I don't approve of leaving cabbage, celery, or onion tops in the field.

Mr. White: At Cortland they are growing old cabbage seed they had had about five years. They are growing from careful selection. The dealer said they had the best cabbage that was sent in. The Association is trying to find sources of good seed, and those who join the Association will be able to get information as to where to get seed of superior quality.

President White: The next number on our program is "Tomatoes for Market and Canning." We have a gentleman here from the Erie and Chautauqua district, where considerable business is carried on with tomatoes, who can give you some information. It gives me pleasure to introduce to you Mr. S. J. Cook, manager of the South Shore Growers' and Shippers' Association.

TOMATOES FOR MARKET AND CANNING

S. J. Cook, Dunkirk, New York

The growing of tomatoes for market and canning in the past twenty years has so increased that some sections of our country now produce them in enormous quantities.

GROWING PLANTS

For an early crop, I sow seed of selected Earliana in flats, about February twentieth, and after they show the first true leaves, I transplant them one and a half inches apart each way in the greenhouse bench. For growing the plants I prefer soil more or less sandy, and not too rich.

As soon as plants show signs of crowding, they are again transplanted to four inch paper pots, which are filled half full with well rotted manure, this being firmed down well, then fill the balance with any good garden soil, within half an inch from the top of pot. This is left to catch water.

They are then placed in cold frames using good tight sash, and kept shaded by canvas. No ventilation given for two or three days. In ventilating, use good judgment, and never expose them too much to cold wind. If the sun is quite warm, ventilate sparingly, and shade with canvas the warmer part of the day.

Frames should be well matted up at night to protect from frost. Several years ago, I lost a fine frame of plants by neglecting to do this, when a little extra covering would have saved them. At this time of the year, water sparingly. I water just often enough to keep them growing nicely. The less water you give, and still keep them growing, the better, but do not withhold water until they are yellow and stunted, for such plants are slow to start in the field.

As the season advances, we shift the sash to other frames and cover with a heavy grade of cotton cloth, stripping this off during the day, and finally leaving off entirely for a few nights before setting plants in the field, to finish hardening them. If they have been properly grown as to water and ventilation, they will have a blue cast, and at this time they should show bud and blossom. Some growers try to advance them so far as to have small green fruit. This is not practicable with this size pot, and where this is practiced, they should be started somewhat earlier in a larger pot; for in this size pot they would have to be held too long and become stunted. It has been my experience to have them at the bud and blossom stage, rather than farther advanced.

SETTING IN THE FIELD

Pot plants never wilt when being set in the field, therefore, we save the first buds and blossoms, which are very essential in making an early crop. We mark ground four feet apart each way and furrow out long ways of the field. The soil best adapted for an early crop is gravel or light sandy loam that contains a good supply of humus, and I might say it could hardly be too rich. If not good strong soil, it should be enriched with well rotted manure in the furrow, also applying a handful of fertilizer, analyzing 4–8–7. Mix both thoroughly with the soil before setting plant.

We give plants a good wetting down, and then they are placed on a flat rack and drawn to the field. They are distributed at the crossmarks, and the plant setters follow, using garden trowels. If paper has not already rotted from the bottom of the pot, it is torn off, the sides being used to wrap around the stem of the plant, just above the ground to protect from cut worms. This has been found quite effective.

CULTIVATION

As soon as the field is set, cross cultivation is given with a large cultivator, to fill in the furrows. A few days after, we apply a tablespoonful of nitrate of soda, scattered around the plant. Care sho

be taken in applying this to keep it two or three inches from the plant. I have seen plants badly burnt where this was applied carelessly.

Cultivation should start at once, giving at least two or three hoeings, and we generally get over the field once or twice a week, with horse and cultivator. Cultivation is kept up until there is danger of knocking the fruit off the vines.

PREPARING FOR MARKET

In picking tomatoes for market, one should handle them very carefully, never dropping or throwing them into the baskets. The Earliana cracks very badly at times, being a thin-skinned tomato, and for this reason we keep them picked very closely. We use twenty pound Climax baskets for shipping. These are taken to the field, and are used only once for picking. When filled, they are drawn to the packing house, where the packers sit at benches, which are constructed for this purpose. Then the tomatoes are wiped, stemmed, and packed three layers in a basket. All cracked and inferior ones are thrown out. The baskets should be well filled, and when properly packed are level full—the top being faced. Where several packers are at work, an attendant places the unpacked baskets on the benches, removing and covering the packed ones.

For shipping they should be picked before getting very ripe, and when going to distant markets in warm weather, half green stock is what we want. They should be properly graded, the ripest ones being packed separately, and shipped to nearby markets. Our first ones are shipped in July to nearby markets, and good prices are usually obtained, until they become quite plentiful in August, when we commence to load cars for distant markets. Weather being very warm at this time of the year, and tomatoes ripening very fast, your car should be iced at least ten hours before loading, and re-iced before leaving; and if market is quite a distant one, the railroad company should be instructed to "Keep car well iced." We have shipped them a thousand miles or more, having them arrive in fine condition for market, and selling for double the price our nearby markets were getting at that time. The business is somewhat speculative, and it is almost impossible to ship them at certain times at a fair profit. When the gluts occur, they are generally sold to nearby canners. As with everything else in the produce line, the market is better at some times, than at others; and taking the average price for the season, shipping has proven quite profitable.

VARIETIES

As to varieties, our markets prefer bright red tomatoes. The Earliana is not considered a good shipper, but being very early, it has been more profitable than others. Bonny Best is also very early, round, smooth, and bright red tomatoes, being of much better quality, and a good yielder. Some growers are planting their acreage largely to this variety. For a late tomato for shipping, the Matchless, as grown in our section, is one of the best. This tomato is bright red, smooth, solid, and meaty. It has a thick skin, and does not crack easily. This plant is very thrifty and just about blight proof.

GROWING FOR CANNING

In growing tomatoes for canning, almost any good, strong soil that has good drainage, and is well fertilized, will do. Many acres are grown on heavy soil, which is not suitable for an early crop. Sandy muck has been found very good, and some of our heaviest crops are raised on clay loam. Good seed is just as important with this crop, as well as the early, and all plant growers should get the best seed that money can buy, or grow their own. In saving seed, it is very important to select strong, healthy plants that are true to name, show a tendency to fruit heavily, and are smooth and solid. If earliness is wanted, the first ones to ripen are saved. It is a good plan to stake the plants and save all the tomatoes that are of marketable size. Tomato seed possesses great vitality, and I have sowed it after four or five years and obtained a good stand of plants. Our growers have commenced to realize that good plants go a long way in making a good crop. I might add that not one grower out of ten gives enough space for the growth of good stock plants, when transplanting in flats, and I had rather pay a long price for good plants, than be obliged to plant the small, spindling things which would not make one good meal for the average potato bug.

We mark ground for late tomatoes 4 x 4, which will take 2,722 plants to the acre. Most growers use a fertilizer for the late crop analyzing 2–8–10. This has given good results. Plants are taken to the fields in flats, and we use a spade in setting them. The one carrying the spade makes the opening by spading at the cross-mark, pressing the dirt forward. The man or boy carrying the plants places one directly back of the spade, holding it until the spade is withdrawn, and the one carrying the spade presses the soil firmly

over the roots of the plant with his foot. Plants are set very fast this way, are firmed better in the soil, and they straighten up very quickly.

All canners demand red, ripe tomatoes. The varieties grown for this purpose are Bonny Best and Chalk's Early Jewel, which we have found to be early and sure to ripen before frost. I might add that seventy-five per cent of all the canning tomatoes grown in our section are the Jewel, although I think the Stone and Matchless would make a heavier crop, if plants were started earlier.

Picking commences as soon as there is enough for a load. The canner furnishes crates and baskets, which must be returned after the season, or they will be charged to the grower's account.

Tomatoes should never be drawn to the factory or car on a wagon without springs, or they will be badly cracked. Most of our growers have good springs and large flat racks, which enable them to draw from two to three tons to a load. Canners will object if tomatoes are not ripe at the stem end, also if too many smaller than two inches are put in. Our Association sold 436 cars of tomatoes last year to one catsup manufacturer. As they were to be shipped some distance, they took them somewhat greener than the home canner. There was no objection to small ones.

Our average yield was almost twelve tons to the acre. The average cost of growing and delivering to the canner was estimated to be about fifty dollars per acre.

ENEMIES

We have never been bothered much with blight, except sometimes with early varieties on poor soil. We believe high fertilizing, good culture, and rotation of crop are very important and are good preventatives. I think it advisable to spray plants before setting in the field, as this helps largely to keep off flea beetles and potato bugs. I use the 5–5–50 formula, and one pound of arsenate of lead. This sticks better than Paris green, and does not burn the foliage. The cut-worm seems to be our worst enemy. At times we have found them as bad on old ground as on sod. I use poisoned bran mash, putting a teaspoonful beside each plant and slightly covering it with dirt. In making this use one gallon of black molasses and two gallons of warm water. Mix molasses and water with one-half pound of Paris green, and add all the bran that can be stirred in, mixing thoroughly.

VARIETIES

QUESTION: Don't you think the Stone will outyield Chalk's Early Jewel?

MR. COOK: Yes, I do. We are coming back to the growing of plants. As I said, if people would take proper pains to grow good plants and start them earlier, I think we would have heavier yields.

QUESTION: Have you ever tried the Red Rock?

MR. COOK: I grew a few some two years ago. It is a nice tomato, but is classed with the Stone for ripening.

QUESTION: Does it make a good late market tomato?

MR. COOK: Very fine.

QUESTION: Have you ever tried a tomato called Canner's Early?

MR. COOK: I never have grown this. I might say there are a great many different tomatoes catalogued by different seedsmen. There are too many. I know of one seedsman who catalogued thirty-seven varieties.

QUESTION: What price did your Association get?

MR. COOK: We get nine dollars. Our average yield was almost twelve tons on five hundred acres. There were some of our growers who made as high as twenty tons to the acre. We have never been bothered much with blight. Sometimes the early varieties have blighted badly on poor soil.

QUESTION: Did you find the Bonny Best as early as the Earliana?

MR. COOK: We have found a few of the Bonny Best will ripen at the same time as the Earliana ripens its first, but not so many.

MR. BRONSON: Does the canner furnish you with plants?

MR. COOK: No, the canner has furnished a goodly number of growers with plants, but a great many growers prefer to contract their own plants. Last year our Association handled this plant deal very nicely. We contracted with greenhouse growers for plants, and the grower went to the greenhouse when the plants were ready and got his plants.

MR. BRONSON: Suppose a canner went to the trouble of raising his own plants, breeding up better seeds. Wouldn't your Association pay more for the plants?

MR. COOK: I think they would. Good seed is very essential. At this time last year, there were seven thousand pounds of tomato seeds shipped into the United States from France that were sold at six cents a pound in France—the refuse of canneries. The same firm has twenty-two thousand pounds more of the same seed for which they hope to get seven cents a pound this year.

SAVING SEED

QUESTION: When you collect your own seed, what method do you use?

MR. COOK: We collect the seed and put them in a barrel and smash them right up with a two by four, having a little water in the barrel. Then we wash them right out. You can let them stand if the water is warm, wash them through two or three waters, and you will be able to get most of the pulp out. Then take your seed and re-dry it in flats, stirring once or twice.

QUESTION: Do you select a particularly good quality of tomatoes?

MR. COOK: Select only good tomatoes for this purpose. It is not advisable for a man to pick them haphazard. A man can save enough seed in one year to last four or five years if properly cared for.

EARLY PLANTS

QUESTION: What is the price paid for greenhouse plants?

MR. COOK: Last year we made a contract with one grower to grow so many hundred thousand at four dollars and three and one-half dollars per thousand. This year we are going to pay more for the growing of tomato plants. We expect to pay four dollars, four dollars and a half, and five dollars. The growers have come to realize that good plants count for a great deal in making a good crop of tomatoes. A grower who wishes good, strong, early plants expects to pay five dollars.

QUESTION: What size paper pots are the plants set from into the field?

MR. COOK: Four inch. The bottom is torn out and paper taken away from the side.

QUESTION: Have the plants you buy been transplanted?

MR. COOK: The average greenhouse grower in growing for the cannery transplants only once. They do not ordinarily set over one and three-quarters to two inches apart, many thousand not being over one and one-half inches apart. This is much too close for the growing of good plants. There is not one grower out of ten who gives enough space. This, I think, is very important in making a good crop of tomatoes.

QUESTION: What is the maximum length of plants?

MR. COOK: I like them about six inches high and stocky.

MR. WORK: Would it be safe to say this about depth of planting: Set to within two inches of the lowest leaves?

MR. COOK: I think so. For early plants, do not set so deep. The further down they are set, the more roots they will get.

QUESTION: Do you supply your own customers with plants this year?

MR. COOK: Some ask us to furnish them plants and we do so. In contracting their tomatoes with us, they order the plants at the same time, and we notify the greenhouses. I have eight hundred fifty acres under contract at the present time. It is going to take some three million plants.

QUESTION: Are you troubled with potato bugs? If so, what do you do for them?

MR. COOK: About all we have done is to spray for them. Where they are quite bad, we think it is the best idea to send boys through the field to pick them. If this is done, we are never bothered with the younger slugs.

MR. BRONSON: In raising tomato plants which are transplanted only once, what price does the greenhouse man have to get to make a paying proposition?

MR. COOK: I should think four dollars would be very good. Some growers have a device that will make openings when pressed into the soil. With this, they work very fast.

QUESTION: Would it be a paying proposition at three dollars? That is the price for which the canning concerns have been furnishing farmers plants in Orleans County.

MR. COOK: It would depend on what else you could grow in your frames. If you had a market for lettuce, for instance, you would have to take that into consideration. If you had no market for any such crop, perhaps growing tomato plants might be one of the most profitable things you could go into.

NITRATE

QUESTION: Is nitrate of soda commercially profitable for canning tomatoes?

MR. COOK: I don't think much nitrate of soda is used for the canning tomatoes. I think perhaps it would pay, however. They usually depend on a good, strong soil, well fertlized with 2–8–10, or if the soil is a little deficient in humus, 4–7–8. Barnyard manure is very good, but I would rather use it on the light, sandy soils, and on the clay loam use fertilizers. I think better results would be obtained by the use of fertilizers on strong soils.

MR. BRONSON: What is the rotation in general farming?

MR. COOK: We sometimes use after tomatoes field beans, or you can grow green beans for the canner. A great many canning crops are grown there, and as a rotation, they follow with beans, or some growers will seed down to clover. Sod ground with good drainage has been found to be the very best when plowed in the fall for the growing of late tomatoes.

TRIMMING

QUESTION: Do you trim the tomato vines?

MR. COOK: We have never practiced staking and trimming. I have never found any advantage. We get a much heavier crop by allowing the vines to fall on the ground, especially for the late crop.

A MEMBER: I would not grow a tomato unless it was on a stake.

MR. COOK: I have staked tomatoes and had them turn yellow. We have tomatoes in our section on which I do not think the stake man could beat us on earliness.

EARLINESS

QUESTION: How early do you set in spring?

MR. COOK: About the fifteenth of May many times, but with some risk. We never consider we are safe till after the twentieth.

MR. WORK: Do you have much encouragement in trying for extreme early production for shipping, or do you find that Marietta and other southern sections can compete more successfully on the markets?

MR. COOK: Our extreme early shipments go to nearby markets. We don't compete for earliness with our southern sections. Marietta is perhaps one of the best tomato growing sections in this country as to price. I understand now they are badly affected with disease, but as to price, they hold the market for a certain time and make a great deal of money. Our early tomatoes commence to move when their shipments are quite heavy, and it doesn't pay us to ship into their markets. We supply a radius of one hundred miles at good prices—as high as a dollar and a quarter for a twenty-pound basket for two or three weeks at a time. It is very speculative when shipping in carlots. It is the average market through the season that you must count on.

QUESTION: How early in July do you usually get your first fruits?

MR. COOK: Some years we have had fruits about the twenty-fifth. It is well towards the first of August before there is any heavy movement.

QUESTION: Are you troubled with black rot?

MR. COOK: Only at times. It is caused by dry weather for one thing. I know irrigation would help in preventing this.

QUESTION: What form of irrigation?

MR. COOK: I would recommend the Skinner irrigation.

Tuesday Afternoon, February 11

President White: Gentlemen, will you come to order? Mr. Work will take up the question of irrigation.

IRRIGATION—ROUND TABLE

Led by Paul Work, Ithaca, New York.

Mr. Work: We are scheduled this afternoon for a round table discussion of the subject of irrigation. I know there are some men here that have had experience along this line. There are some here who are interested in the development of this feature of vegetable production, and I think if we go into the subject with the idea of comparing notes, of trading ideas, that we will get something out of it—but don't expect much from this direction. My task is to keep the rest stirred up.

It might be well in beginning to say a word or two about the general nature of the subject. All of us realize the necessity of making certain conditions right, if we are to grow crops well. We think that we must have an abundance of plant food in the ground if our crops are to be successful; we think that we must have our ground well prepared; we think that there must be an abundance of humus. We feel very sure that we must have good seed, and if we are to transplant young plants, we are very sure that we ought to have, as Mr. Cook said this morning, good plants. And so it goes through the list. There is an almost indefinite number of these conditions. Now, there is a doctrine, we might call it, that ought to be borne in mind in the discussion of any of these factors. It may be stated thus: If a single growth factor is deficient to such an extent as to limit the progress of the plant the amendment of other factors is of little if any value. I think the best way I can present it is by illustration.

Suppose a man is starving. It does not make much difference how much water you give him, and it doesn't make much difference how much you preach to him the value of fresh air. He isn't going to take much interest, and until you give him food, these others will not do him much good. It is just the same with crops. Suppose we do make all these conditions I have mentioned right; sup-

pose we use manure and fertilizer freely; suppose we exercise every precaution to get good seed, perhaps raising our own; suppose we bring all these factors under control. They are all of no avail unless the last one is brought under control, and that last one may be and frequently is the one we are going to talk about this afternoon, or it may be another one. Before we get through, we will have to emphasize the fact that irrigation is of little value unless we make right the other factors that I have mentioned.

But for the present, let us emphasize the fact that all our outlay, or a very large proportion of it, is wasted unless the water is there. A plant cannot live and carry on its work without water any more than can a man, and it isn't any better satisfied with an abundance of food without water than is a man who lines up to a banquet but who hasn't had a drink for a month.

We have heard a great deal about irrigation; we have heard about it in the West. We think about it in the arid regions where they have only eight or ten inches of rainfall a year. We hear about regions where they have twenty inches a year, and where they are growing good crops without irrigation. We look at the weather map of our own State, and we find that our rainfall runs from thirty to thirty-five or forty inches. We would naturally conclude from this that we have an abundance of rainfall; but the problem is not based upon the amount of rainfall we have, but rather upon the distribution. If we make a map or chart showing the rainfall by months for a given year, we will not find that the rainfall gradually increases as the growing season opens, comes to some satisfactory point and stays there until crops are mature. A rainfall tracing runs away up some single months. We have had as much as eight or nine inches in one month here at Ithaca, and have suffered from drought in other months of the same year. Perhaps during the months following or preceding you will find the rainfall below an inch. Thus it is a question of distribution.

How are we going to meet this situation? Our investment is placed. It is placed permanently. We have put a great deal of money into our preparation for a crop. This one factor stands between us and the returns that we think ought to be ours. The question before us this afternoon is: Can we apply water to our crops in such a way as to bring us increased returns without unduly increasing the cost? We must keep this point in mind. It makes no difference how nice a gasoline engine we have, and how perfectly

our pump works, and what a beautiful spray our irrigation pipes throw upon the crop, if the thing isn't paying. The additional returns due to artifical watering must be greater than the outlay.

There are many methods. We can irrigate by the furrow system. This is done in the West, and to some extent in the East. I know of one or two farms that have had pretty fair success with surface irrigation. Another possible method is by the use of sub-irrigation systems. A third is by overhead systems.

The overhead systems are of two or three sorts. Around Boston they use a hose to a great extent. They consider they can put an inch of water on an acre economically and with better distribution according to the needs of the plant with an inch and a quarter hose than with one of the other systems. This is also practiced in some western sections.

As another overhead system, we hear a great deal said about the Skinner system. It has come into quite wide use, and has a great many advantages, but I think it will be better for us to bring out these advantages in the light of experience than to go into them now.

Sub-irrigation is practiced in Florida on the celery grounds, and some who have been there will perhaps be able to tell us something about that.

Let us consider some of the factors in irrigation work. What equipment is necessary? What equipment is best? What will good equipment cost? The equipment can be classified under two or three heads. First, the water supply and the power—the pumping system—, and the distribution system. Then there are questions that come up in connection with the management. When are we to water? Are we to water this crop at night and that one in the morning, or are we to water all when we feel like it, or are we to apply our water only at certain specified times? Much has been learned by experience, but there is a great deal that is not known about it.

Finally, I must again mention the cost. If we can find out something about what it costs to pump water, what it costs to distribute it, then we are ready to consider whether the increase in returns is sufficient to justify the outlay. Shall we begin with the different systems and take them up one by one? I know there are a good many men who have had experience. Will Mr. Bonney give us a very brief statement of his scheme?

SUB-IRRIGATION ON MUCK SOILS

MR. BONNEY: I don't feel that I ought to say anything here about sub-irrigation, because our experience hasn't extended over a long enough time to give definite results. We have a piece of muck we are draining, or preparing to drain, amounting to somewhere in the neighborhood of sixty to seventy-five acres. We have been using open ditches and find them expensive, and not satisfactory. We are putting tile in those ditches, main tile 12 inches and laterals 4 inches in diameter. The laterals are probably on the average ten rods apart. I realize that this is a little too far, but we are getting fairly good results. We are putting these in, in the first place, for draining, and we use the same for irrigation. Our water supply is on the far side of the muck. The main line of tile is provided at the junctions with cement boxes and gates to shut off the water. When we wish to irrigate, we can close the gates and let the water into the distant ends of the laterals. When we have too much water, we pump it out. We have no natural drainage. We have perhaps half the acreage under this system, and it has worked well for us so far.

MR. WORK: Are there any questions about Mr. Bonney's operations?

QUESTION: Are there any figures on the first cost of construction?

MR. BONNEY: I couldn't give you any definite figures on this, for the reason that the labor part of it has been done at odd times.

QUESTION: With the laterals so far apart, would you get enough water on?

MR. BONNEY: Year before last when the season was very dry at the time for setting celery, we irrigated eight acres in this way, so that the top of the soil was moist, and we lost no plants.

MR. WORK: As I remember the situation on the place, the stream is higher than the muck land. Under ordinary conditions, the water flows right by Mr. Bonney's fields. When you go there in the spring, you will find that the whole area is a most delightful little ocean. It doesn't look any more like growing lettuce than the deep blue sea. But you will find the gasoline engine pumping away, and they manage to get the water out in time to grow crops.

MR. BONNEY: We have a twenty horse power gasoline engine. Last year we had an unusual amount of water, and called into service a six horse power engine and an extra pump, so that we were pump-

ing 4,000 gallons a minute. We were pumping continuously for ten days. We had about sixty acres under water last spring. There were about ten rods between laterals.

MR. WORK: What does it cost you while you are pumping?

MR. BONNEY: In the neighborhood of thirty-five cents an hour for the two machines. I think we can do that much more cheaply. We are going to use natural gas. After the water is once off, that is practically all the pumping we have to do in the season. The evaporation and the water taken up by the plants take care of the water ordinarily.

MR. WHITE: How low do you reduce that water level?

MR. BONNEY: I don't like to keep the water level more than two feet below the surface.

MR. WHITE: The reason I ask is that some of the owners of muck lands drain so that they are going to get things too dry. The question arose how far we could reduce the water level without making it too dry. The muck to which I refer is older than yours.

MR. BONNEY: I don't believe it would do any harm to drain it down to three feet.

MR. WORK: I think I am right in saying that it is better not to have your water level too high, because you will inhibit the development of the root systems, with the results that when you have enforced drouth you are more likely to suffer.

QUESTION: Would you have to put your laterals close together under dry conditions?

MR. BONNEY: We expect eventually to make the spacing about five rods.

MR. WORK: That would give you much quicker distribution.

MR. BONNEY: A man can divide up the distance as many times as he likes if he doesn't increase the cost too much, but when the system is once installed, there is not much more cost. In our main tile we have a wire extending the whole length, united to a brush, so if one of the sections becomes clogged, we draw it through.

TILE ON MUCK

MR. WORK: What is the longest that tile have been in use on your farm?

MR. BONNEY: Five years.

MR. WORK: How much fall have you on this old line?

MR. BONNEY: I think there is about three feet in one hundred ninety rods. We aim to make it about one-fifth inch to a rod on the main line. Some of the laterals are practically level.

MR. WORK: I think this is a thing that ought to be brought home pretty clearly to muck land men, that there is not nearly as much difficulty as is ordinarily apprehended with the filling of tiles. Most muck men think that because the muck is light and because it flows around easily with water, it is going to fill up the tile. Tiles are in successful operation in a good many places. Mr. Bonney has given us a very clear cut case. At Canastota, there are tile that have been in successful use for many years. When we consider the great disadvantages that come with the use of ditch banks, in waste of land, in inconvenience in working the blocks of ground, and in affording a place for diseases, weeds, and other pests to harbor over winter, we must conclude that tile is by all means to be recommended. If there is experience to the contrary, let us hear it.

MR. BONNEY: I don't want to be understood as laying down rules for anyone else. If you have muck land, try it out for yourself.

MR. WORK: We have to remember that all the way through. We make statements as to what has worked here and there, but where you are there may be some conditions that we don't know about.

MR. LOCKE: We have never used tiling, for the reason that we supposed they would fill up; but our water level comes up and covers over the outlet of this tiling and our idea was it would fill up the tiling, at the foot, at least.

MR. BONNEY: About that, I couldn't say positively, but we have found that we have let the water into the lower end and pushed it up in, but as soon as we start our pump, it rinses them right out. If in three years' time those tile become clogged, we are still ahead of the game. We had in our fifty acres we were cultivating about five

acres of ditch bank. A ditch and banks would occupy practically a rod of ground. In one year we filled in those and grew celery the same year.

QUESTION: What kind of tile does Mr. Bonney use and how does he lay it?

MR. BONNEY: We bought from two or three different companies. We use 4 inch tile and lay it on a board in the muck. We have not used the horse-shoe shape. We have used six-sided and round, but I would not advise laying round on boards.

MR. WORK: Do you consider the wire scheme thoroughly practical? I mean laying a wire in the tile when you put it down, and then whenever you fear difficulty, hooking on a brush and dragging it through, drawing another wire behind to take its place. A man could well afford to do that frequently to avoid the possibility of clogging.

MR. BONNEY: I would advise running it through once in a while to be sure the opening is large enough.

SUB-IRRIGATION ON SANDY SOILS

QUESTION: Has anyone had experience in sub-irrigating a soil similar to that in Irondequoit—a deep sand with very little subsoil? Wouldn't you have to put the tile so close that the expense would be too great? Or wouldn't you lose all the water there?

MR. WORK: I think there is no question but what in a very porous soil you would lose water and lose it very seriously.

A MEMBER: Some of the growers there claim there is no use in trying sub-irrigation. It looks reasonable to suppose it would not be very successful.

QUESTION: What kind of irrigation do they use?

MR. WORK: The Skinner system. In the case of the muck, the whole body of soil underneath is full of water, so that it amounts practically to raising the water level.

MR. LOCKE: That system is carried on a good deal in Florida, but it is not successful where the soil is not underlain with clay.

MR. WORK: On the muck, although we are not resting our tile on clay, the whole space below is filled. If you have a clay subsoil,

you can get satisfactory distribution. If the drainage is deep and perfect, sub-irrigation seems hardly practicable.

QUESTION: Has anyone had experience with sub-irrigation in heavier soils? I have been considering irrigating a rather heavy loam with a clay subsoil.

MR. WORK: I am wondering if it would not be better than to use a surface system. Might that not give you a method of applying water without hurting the physical condition of the soil?

A MEMBER: I don't know how far apart the laterals would have to be.

MR. WORK: If you have a pretty substantial subsoil, I should think the thing would work, and it would certainly be worth trying. You will want to know how deep to put the tile, and how far apart, and there will be all the questions about how much water to use and how often. At present, we lack the data necessary for conclusive answers to these questions.

MR. BONNEY: It isn't as difficult a matter as with the overhead irrigation. You can tell by the growth of the plant whether it is getting too much.

MR. WORK: I think the system in Sanford, Florida, involves openings at both ends, does it not, Mr. Locke?

MR. LOCKE: Yes.

MR. PRIEST: I have conditions that are very similar to Mr. Bonney's, as regards location. I have a gravity system of bringing water on to my muck, and with the exception of the spring season, I have sufficient outlet to carry off the water. The great difficulty is that the creek is four and one-half feet below the ditches in the muck. But the creek rises to such a degree we are apt to flood in the early spring, and I have thought seriously of opening ditches this year, and placing tile gradually. I have been trying to get information as to a machine method of opening these ditches. Is there someone present who could give me some information as to experience with a ditching machine on muck?

PRESIDENT WHITE: We know nothing that would do for tile drains. The Buckeye machine and the St. Paul machine are both machines constructed for large work. The St. Paul lays the tile as it goes along. There is a sort of run that follows the machine, and the

tile are fed back through. But that isn't intended for smaller than six inch tile. That machine would go through a couple of feet of water. It has a caterpillar tread.

MR. WORK: Will your own machine work on muck satisfactorily?

PRESIDENT WHITE: Our machine wouldn't work on muck. I think it is doubtful whether anything but the caterpillar tread would work.

OVERHEAD IRRIGATION

MR. WORK: Perhaps we are ready to turn to another phase of irrigation. Who has used the Skinner system? Maybe we had better just say what the Skinner system is. The Skinner system is an overhead system. To equip an acre for the Skinner system you set posts in lines from fifty to sixty feet apart. On top of those posts you place pipes horizontally in such a way that they can be turned. In those pipes are set nozzles. A special machine is used for drilling the holes. You can do it with any drill, but the machine that is devised for the purpose has the advantage of enabling you to set the holes in perfect line. At the end of each of these pipe lines, there is a special joint with a strainer in it, and it is so built that it permits the line to be turned, throwing the streams horizontally or at an angle, as desired. A single line can cover a strip fifty feet wide with forty pounds pressure. These nozzles are set three or four feet apart on the pipe line. If your pipe line is, say, three hundred feet long, you would start with one hundred feet of one inch pipe, then one hundred of one and one-half, then one hundred of one and three-quarters. At the greenhouse we have the essential parts of it set up where you can look it over. We have one line that we are using in the greenhouse. The greenhouse nozzle is a little different from the outdoor. Instead of having an opening straight through, the nozzle is notched to give a fan-shaped stream.

QUESTION: What is the size of that center hole?

MR. WORK: About one thirty-second inch. They are sold for five cents apiece.

PRESIDENT WHITE: Mr. Ben Titus told me he had them made in Rochester, and they cost him about half that.

MR. WORK: There is nothing complex about them. It is just a little brass plug bored and threaded. You leave it in your line permanently, but you are not using it all the time, and over winter there is danger of rust if the nozzle were of iron.

MR. PRIEST: Have they patents on that system?

MR. WORK: Yes. I am not posted on the situation regarding the patent rights. I think likely the Skinner people are opposing the making of these devices in local machine shops. It would be worth looking into. Are there any here that have been using the Skinner system?

MR. WRIGLEY: We are using it on market garden crops, last year being the first year we had it. Early it did well. We are on gravelly soil. In the early spring, it saved tomatoes, beans, and so forth, from freezing, and beans did very well under it. We had no trouble with it. I have it in my greenhouse. I got everything at Skinner's, and the bill was only one hundred twenty dollars or so.

MR. WORK: That does not include pipe, does it?

MR. WRIGLEY: No.

MR. WORK: How far apart are your pipes?

MR. WRIGLEY: Fifty feet.

MR. BONNEY: I think Mr. Bell uses it at our place. He told us it would cost one hundred fifty dollars an acre for equipment complete.

MR. WORK: The water supply is somewhat a separate question. Did you use it on lettuce, Mr. Wrigley?

MR. WRIGLEY: No, only in the greenhouse.

QUESTION: Did you reduce your pipes?

MR. WRIGLEY: For seventy feet we used one inch, and for one hundred thirty feet, three-quarters inch. For three hundred feet you would begin with larger pipe.

MR. WORK: The three-quarter inch is about as small a size as you will want to use. This is for the extreme end, changing to one inch for the second hundred feet, and one and one-quarter for the next hundred feet.

QUESTION: Does the amount of water pressure make any difference with the size of pipe?

MR. WORK: I do not believe so. Forty to fifty pounds is recommended.

MR. ROGERS: On the farm where I worked they used seventy-five pounds.

MR. WORK: What was the difference in the working?

MR. ROGERS: No difference, except that the spray was finer with the higher pressure.

MR. WORK: If the pressure is reduced, it does not throw quite so far.

PRESIDENT WHITE: A pressure of eighty pounds will throw thirty feet.

MR. LOCKE: With the Skinner system they advocate forty pounds pressure.

MR. WORK: The Skinner Company has very full literature on pressures and capacities. What about water supply, Mr. Wrigley?

MR. WRIGLEY: We pump it from a drilled well. I can get about three barrels a minute, and can water three-quarters of an acre a day with an inch of water.

MR. WORK: Do you regard an inch as about the right amount of an ordinary application?

MR. WRIGLEY: Yes.

MR. WORK: That seems to be more or less standard among the different discussions of irrigation. That means about twenty-seven thousand gallons on an acre. The frequency of watering depends altogether upon the weather. But do you not believe, Mr. Wrigley, that it is better to water thoroughly and less frequently than a little at a time?

MR. WRIGLEY: I recommend an inch every ten days, and cultivating well twice or three times.

MR. WORK: Irrigation does not let us out of cultivation. To get the full value of irrigation, it is necessary to cultivate, and it is not best to use more water than is necessary.

QUESTION: What time of day is watering done?

MR. WRIGLEY: Any time.

MR. ROGERS: Any time. Some say it burns the plants, but Mr. Seabrook, the man for whom I worked, has not found it so. He has about twenty-five acres under the Skinner system, and he is increasing it all the time. The profits from the farm last year were $20,000 clear, about ninety per cent of which was from the twenty-five acres. It is a sandy loam soil, a typical South Jersey soil. Sixty tons of Newark manure were used.

QUESTION: What does he grow?

MR. ROGERS: He raised chiefly lettuce. He has not been very successful with celery. During summer he raises a good many beets and a few carrots, potatoes, and onions.

MR. WORK: What is his source of water supply?

MR. ROGERS: A brook on one side of the farm.

MR. WORK: Did he use a strainer?

MR. ROGERS: He lets it run through a box. Occasionally when the nozzle fills, he uses a straw to get the dirt out.

MR. WORK: Does he grow lettuce in the summer?

MR. ROGERS: His chief lettuce crops are in the fall and spring. He grows three crops on all his land, with chiefly beets in the summer. He shipped one thousand hampers of lettuce every day for about thirty days last fall. This went to the New York and Philadelphia markets.

MR. WORK: And he used the water at any time?

MR. ROGERS: Yes. He had an engine of perhaps fourteen horse power, and had a well from which he got water to wash the plants with. He intends to make the system much larger, and has incorporated and capitalized the farm for $150,000. This is four miles from Bridgeton.

MR. WORK: Most men seem to use the direct system nowadays for irrigation. The modern pumps are good. The triplex and duplex pumps give a very steady flow, and are economical.

QUESTION: How far can the water be pumped?

MR. ROGERS: Mr. Seabrook pumps it about one-quarter mile.

QUESTION: Do you have to have the engine and pump pretty close to the supply?

MR. ROGERS: Yes.

MR. WORK: Twenty-eight feet of elevation is the limit for suction. Does he ever move pipe lines?

MR. ROGERS: Yes, last fall we had a lot of lettuce so dry that we put a few temporary lines in on trestles or on the ground. We watered five acres with two lines by moving.

MR. WORK: The question comes up, which is cheaper, to move the lines or increase the investment? Mr. Wrigley, have you tried moving?

MR. WRIGLEY: Yes. It is necessary to use a number of men and be very careful.

MR. WORK: Do you lose a good deal of time?

MR. WRIGLEY: We only move it once a day.

MR. WORK: Would your policy be to put it in permanently?

MR. WRIGLEY: Yes.

MR. WORK: Mr. Talmage, are you familiar with the Hallock farm?

MR. TALMAGE: I have been there. Mr. Hallock is located to very good advantage for market garden business. His farm is naturally very low, and he owns a steamer with which he brings large quantities of manure from New York. He started two or three years ago to use the Skinner system, and has increased up to sixty acres. He is a very conservative man, and when I asked him for results, he said he wasn't prepared to say. He said in his case he had found it more valuable for starting the second crop than for producing the first. Someone asked Mr. Hallock if he would advise his neighbors to go into it, and he said no, to use more horse manure. The idea was to save the moisture with the humus rather than to put in a system which means an enormous expense. Where you carry water in large quantities, you have got to have a very big main.

MR. WORK: Where does he get his water?

MR. TALMAGE: He has dug a well not more than eight or ten feet above the level of the sea.

WELL-DIGGING AT ROCHESTER

MR. WORK: Rochester growers have a scheme of digging large wells that I think is an unusually good one. The problem is this. There may be underneath the soil abundant streams of water. Certain layers of the subsoil are charged with water. But if you are running a rather extensive irrigation plant, and drive an ordinary small sized well, there is not sufficient gathering surface. The well will not gather water rapidly enough for the pump. To remedy this the idea of using large wells, all the way from ten or twelve feet up to twenty or twenty-five feet in diameter has been worked out. It is very difficult to dig wells there on account of caving. So they dig a circular trench perhaps four feet deep and as wide as convenient, say two feet. In that trench they build a reinforced concrete ring, perhaps four feet high, twenty feet in diameter and about a foot thick. In it are set quite frequently inch pipes. The ring is a unit and is substantial. They begin to remove the soil from the inside, taking it evenly all the way around. As they remove the earth, the ring gradually sinks, and they begin building upon it specially made concrete blocks. They go on until they have reached a depth of twenty feet. They cut through layers of quicksand and gravel, and some tough layers of clay. With so large a gathering surface, they have been able to get all the water they need.

QUESTION: Would it pay to irrigate for such a crop as potatoes, cauliflower, beans, or anything of that kind?

MR. WORK: I am told that Mr. Seabrook raised about six hundred sixty bushels per acre.

MR. ROGERS: On one acre a little more than that, and of potatoes over a thousand baskets an acre.

QUESTION: You used sixty tons of stable manure?

MR. ROGERS: Yes, and grew lettuce after potatoes. We used one thousand pounds commercial fertilizer besides.

QUESTION: What is the yield without irrigation?

MR. ROGERS: Two hundred eighteen bushels.

QUESTION: How much did you get with it?

MR. ROGERS: Six hundred twenty bushels, with other conditions almost exactly alike. Mr. Seabrook thinks he did not give

enough water last year. He thinks he can raise over seven hundred bushels.

QUESTION: It would be especially favorable on that type of soil, would it not—irrigation would show up better?

MR. WORK: I wouldn't want to say about that. I don't know. I don't think there is any use irrigating potatoes unless you make all other conditions right for a good yield.

MR. KILBOURN: Has anyone tried drilling or driving wells and coupling them up together?

MR. PARCELL: I have five wells with two inch pipe eighteen feet below the surface, but I find when the water table gets low a little, I can't pump as much as I like. Ordinarily in the spring I can get sixty to seventy-five gallons a minute with a two and one-half inch rotary pump, two hundred feet from the spring. Putting in a two-inch suction pipe and coupling it to the well, I get about forty gallons a minute. This is for strawberries.

QUESTION: Does the rotary pump work well?

MR. PARCELL: Pretty well. It wears a little. The connection is much above the surface. There is a pipe line which goes down for each well, then they are coupled together, and one pump draws from the center of the system. The wells are eighteen feet below the surface.

PRESIDENT WHITE: What is the objection to putting the pump at the stream?

MR. PARCELL: It is quite a distance away, and if I want to pump a certain amount of water three hundred feet, I have to carry it six hundred feet from the stream, and by using the suction pipe, that would take off half of the stream, and one can just as well pump it. That removes the strain.

MR. WHITE: Certain conditions are necessary in order to make irrigation successful. You want a well drained condition of your soil to begin with. If your soil is impervious, you might get a saturated condition for your crop.

MR. WORK: Your soil must be receptive of moisture, and in such condition as to drain well. Suppose you give a heavy application of water and then have a big rain. There is a possibility that you will have done harm by giving that extra water if your soil does not drain well.

COST OF WATER

QUESTION: I would like to ask about cost.

MR. WORK: I have come across a number of instances where water can be pumped at three, four, five, or six cents a thousand gallons. Mr. Bonney, what did you give as your cost?

MR. BONNEY: I have said thirty to thirty-five cents an hour, four thousand gallons a minute.

A MEMBER: Mr. Ritterskamp of Princeton, Indiana, gets water for from twenty-five cents down to six cents a thousand gallons according to the quantity he uses. He can well afford to waste water sometimes to get his rate. We have a good pumping system, and it does not cost very much to handle water.

MR. STRAHAN: In irrigation experiments carried on in the summer, we pumped an acre inch of water for forty-nine cents. That includes depreciation on plant and all incidental expenses.

MR. WORK: Those were experiments in the Departments of Farm Mechanics and Pomology. Would it cost more to put it under pressure?

MR. STRAHAN: That was thirteen feet actual head, and twenty-two feet through loss of head in pipes. That is thirty-five feet head. We delivered one hundred seventy gallons a minute.

MR. WORK: That is less than two cents a thousand gallons.

MR. BONNEY: We are using too much power for the water we have handled. In the spring we are going to install an elevator instead of a pump.

QUESTION: Has anyone had experience applying water with furrows?

MR. PARCELL: I used second-hand fire hose and pumped through the hose directly on the ground, compressing the hose to make a spray. It works all right on strawberries, mulching with straw. With a cultivated piece, it will puddle at the surface.

WATERING WITH HOSE

MR. WORK: Can Mr. Wilkinson tell us of the Boston method of using hose?

MR. WILKINSON: The Boston scheme is going out of date. The men there have gardens arranged so they are a great deal like

a hotbed or cold frame on a large scale. They have had spigots placed through the vineyards, applying water for irrigation purposes through the hose. Some men apply water through the hose between rows, and others spray it on. The question of labor being so high is one of the factors that has caused them to change. Besides, the hose lasts only four or five years. Most of the changes there are towards the Skinner system, because all these men have city water, with city pressure, and are able to get their water very cheaply. W. W. Rawson said he could pump water from lakes at five cents a thousand gallons. That is a type that is not advised now, owing to the expense and to the fact that it requires one man's services ten hours a day to water two acres.

MR. WORK: I wish Mr. Van Der Meid were here to tell us about the surface system on the muck at South Lima. They have a supply of water on the upland, and let it run on the muck, carrying it in ditches along the roadway at right angles to the rows. They let water flow through the rows. By the time it gets to the far end, they are ready to cut it off and turn it into the next row. There is one serious objection. By the time the water gets to the far end, the near end will have had a larger supply than is necessary. There may not be real harm, but if water is costly, the loss is serious.

MR. STRAHAN: With light soil we have found difficulty with keeping the water on the hillsides. The system we used first was to run furrows up and down the hill, thinking the soil was so light the water would sink in rapidly; but it ran down the hill quickly, and we had to devise other methods. The second scheme was to run the furrows at right angles, that is, according to the contour, and we had better results.

MR. WORK: Most people who use that form of irrigation say it ought to be practiced on land almost level.

MR. STRAHAN: That grade was only three per cent.

A MEMBER: I have seen it applied to a pear orchard in Oregon. They plowed right around outside the branches, going both ways, and it produced wonderful results. The grower, in checking up with an orchard next to his, found his own fruit was much larger and of better quality.

QUESTION: What is the distribution of the rainfall there?

A MEMBER: During the summer months, when the fruit is maturing, it is pretty dry.

PRESIDENT WHITE: We will take up the question in an informal way. Mr. Locke, will you give us your experience along this line?

MR. LOCKE: My experience has not been very satisfactory. In a great many instances, we have met with loss as a result of delays. It has been almost impossible to get anything from the companies, and we have merely given up any such idea. We have quite a good deal of difficulty in getting cars. This last fall we had in orders for cars for quite a few days. I know an instance where strawberry growers failed to get cars after a company had agreed to furnish them, and the latter paid voluntarily for their negligence some six thousand dollars. I think we are to blame quite a good deal when we do not get cars.

PRESIDENT WHITE: I think there is no question but, if we had some system by which we could get together, we could get after these railroad claims. But we are working singlehanded. A gentleman in the Erie Railroad Claims Department made the statement that every claim was first put in a pigeon hole. If it was pushed, they tried to get out of it. The gross injustice to shippers, for instance, along the peach belt, will be seen when it is known that cars have been taken from one siding, removed a couple of stations, and put on a siding again. In some cases cars were two days in going sixty miles. That is altogether unnecessary. The courts have decided that a common carrier, regardless of your directions as to icing, must keep cars iced. The car situation is just as hard to contend with, but there is a way out of it. I was told of an instance where shippers became much incensed, and actually began to draw produce in packages and place it on the railroad company's grounds. The railroad sent an engine a long distance to place cars on the siding for them.

MR. ALDRICH: Up to within two years, the Long Island Cauliflower Association has been shut down on sometime during every season. As some of you know, it is absolutely necessary that a shipment reach its destination on time, or there will be a glut. We have said to the railroad, "You start your train early enough to get shipments there. We would like to have you wait as long as you can, but do not wait so long that you cannot get there on time." They realize that we mean it. For the past two years we have not had any

trouble. We go to them and tell them they have done well, and it makes them smile all over. This year they have inaugurated another plan. They run the train on schedule time almost to the minute. There is another train on the Pennsylvania Railroad which takes refrigerator cars and carries them west. My impression is that they have not failed once to make connections with that train on the Pennsylvania. I think it is due to a large extent to our keeping after them and showing them that they must do it.

A MEMBER: You mentioned putting produce on the platform on the railroad company's property. I had heard of that before and this fall I took occasion to find out about it. A lawyer told me I could not do it. I had given two weeks' notice. He said that is not an unreasonable length of time. The best thing you can do is to write the Superintendent of the Division, and see if you can get him to send you cars.

MR. WHITE: My opinion is that the local lawyer was giving his opinion as based upon law rather than upon a decision of the Interstate Commerce Commission. This body has gone so far as to rule that the railroad company is obliged to load and unload package freight. There is no reason why they should compel you to load a car of freight and become liable yourself for any discrepancy that may occur there, if you take a billing and have to be subject to shipper's tally.

A MEMBER: If you deliver a load of celery on the railroad company's platform, and they do not load it until three or four days afterward, can you oblige them to load it and take care of it?

PRESIDENT WHITE: You can with reasonable notice, which would depend upon the distance it had to come from and the usual necessary time. In our section, we are supposed to get a refrigerator car the next day after ordering.

MR. LOCKE: We have been in the habit of getting cars the next day, but what the law would specify in regard to reasonable time, I don't know.

PRESIDENT WHITE: The law doesn't state. It depends on circumstances. Railroads are liable for damage in frost-proof cars. The law states that the carrier shall furnish cars suitable for the transportation of the product which is to be shipped.

A MEMBER: Did you ever have a car that wouldn't freeze?

PRESIDENT WHITE: No, but I believe cars could be made that wouldn't freeze. I understand there are cars made in the Northwest that will stand those very low temperatures. It simply means insulating the car more thoroughly.

Adjournment.

Wednesday Morning, February 12

GREENHOUSE CONSTRUCTION

A. C. Beal, Ithaca, New York

I doubt very much if there is as much investment in any other line of agricultural enterprise where there has been so little done in an experimental way as in the construction of greenhouses. The time has arrived when the national government or some leading states should take up this subject and make a thorough study of it. When we realize that the value of the glass in the United States must be something like fifty million dollars, and in New York State six million, it seems to me it is a subject of sufficient importance to justify some experimental work.

This morning I intend to point out to you what some of the leading types are. We may divide greenhouses into two general types, the uneven span and the even span types. In the uneven span, we have the lean-to type, the three-quarter span, the short span of the South, and the various modifications. With the even span, we have various forms of construction. We may subdivide them into the straight roof type and curvilinear roof type. If we take the style of construction, we have still other subdivisions. We have the wooden rafter house, the iron frame house, in which the frame work is iron; we have the sash bar type, in which no rafters are used; we have the semi-iron type, in which a smaller amount of iron is used; and we have the truss type of greenhouse. Then, there is the new type which has just been offered by Hitchings & Company, where the rafter itself is trussed.

I might say that the greenhouse has been developed from two types of structure. We have the conservatories, those large, fine, glass structures used for the housing of exotic plants. Those have had a separate origin from the forcing type of structure. The forcing house has been developed from the system of growing fruits upon walls. (Professor Beal then showed a series of slides tracing the evolutionof the various styles of greenhouse construction and pointed out the advantages and disadvantages of the different types of modern construction.)

Question: What size of glass is used most?

Professor Beal: Sixteen by twenty-four is used more than any other size, not that it is necessarily better, but greenhouse men have a preference for that size.

A MEMBER: I should think there would be more breakage with a large size.

PROFESSOR BEAL: I should think there would be.

A MEMBER: We find it so. We have houses side by side, and last season we laid out double the amount in repairing the large size that we did with the other. The small size will hang right there if you put it on right.

PROFESSOR BEAL: The usual way of putting in sixteen by twenty-four is the sixteen inch way. The whole tendency now is to get just as light a house as you can consistent with strength. The question is, in some cases, whether we have not overstepped the bounds. A great deal depends, however, on the character of the glass itself. I think there is no question but that glass manufacturers are imposing upon the florists at the present time. Glass varies very much in a box as to thickness and weight of panes. Of course, there are differences in annealing the glass that are difficult to detect, but it is possible to grade the glass better than they do. Even though panes are all the same thickness, they are not necessarily the same strength.

QUESTION: You would always want to use the double thickness, would you not?

PROFESSOR BEAL: Yes, very little single thickness is used.

QUESTON: What is the actual cost of a one hundred foot house thirty feet wide?

PROFESSOR BEAL: That is difficult to answer as so many different factors enter. Builders rate the prices of greenhouses anywhere from forty to eighty cents per square foot of ground covered. Houses are of such different types, the different builders including different features, that it is difficult to make a comparison. Western builders that build wooden houses mostly figure the price of greenhouses at from ten to fifteen dollars per running foot, according to the width of the house, having reference to houses twenty to thirty feet in width.

QUESTION: Would you care to go into the system best suited for heating at this time?

PROFESSOR BEAL: We have not time to go into that, but I think that in practically all cases hot water is the best system for the small

grower. It requires less attention and is therefore desirable when a night fireman is not employed. Steam is suitable for large ranges.

QUESTION: Do you recommend the elimination of all support as a very important matter?

PROFESSOR BEAL: I do not think you can eliminate the posts altogether. I think with any type of construction you use there comes a point in widening the house where you must use the posts. A truss house above thirty feet in width needs some pipe supports.

In conclusion, it may be said that the whole tendency in greenhouse building is towards an increase in the amount of iron. In the earlier forms of houses, wood was the usual material. The first step in the change was the use of pipe posts in place of the ordinary wooden side posts. The wooden purlins were supplanted by pipes, a pipe or angle iron purlin being used for the support of the house. This addition of iron has brought about the semi-iron type of house. Iron greenhouses have been used for a long time. Lord & Burnham built the first in 1881, and they have been developing that style of construction. At the start it was too expensive for florists to use and it was employed on private places for the construction of ornamental greenhouses. The rise in the price of wood has made it possible to use more iron. In addition the desire for a maximum amount of light has led builders to employ iron because of the greater strength. The increased amount of iron used has brought the iron houses and semi-iron houses and all these forms practically together, so the significant fact today is that the growers are building iron houses.

LOCAL GROWERS' ORGANIZATIONS AND THEIR POSSIBILITIES

Paul Work, Ithaca, New York

There is probably no single phase of the development of rural life that has attracted more persistent attention for the last twenty-five years than co-operation. Our periodicals have published articles about it, books have been written about it,—we have an abundance of material dealing both with the theoretical side and with the practical side, both with suggested plans and with actual experience. Hardly a horticultural meeting occurs but gives a place on its program to co-operation. The Sunday papers have taken it up, and we find their lurid headlines telling of the work of organizations, and sad to say, these organizations have in too many cases been exploited by men whose motives are entirely selfish.

SUCCESSFUL SELLING ORGANIZATIONS

We have many large, successful selling associations. The citrus organizations of California, the apple societies of the Northwest, and the produce exchanges of the South and East are all examples. In New Jersey, the Monmouth County Farmers' Exchange did over a million and a half dollars worth of business last year, the Burlington County Exchange $650,000, one in Canada a quarter of a million, and in our own state the South Shore Growers' and Shippers' Association last year handled $116,000. These organizations are certainly doing splendid work. They are pioneers. They are pointing out the way that the growers of all agricultural commodities will be following within the next two or three decades. They are trying out methods and building up for us a body of knowledge that will be of inestimable value in the future.

We might well take up such organizations, study their methods, see what they are doing and how they are doing it; but a glance at the now extensive literature of co-operation indicates that a great deal of attention has been given to these, and a wealth of information is already available.

OBSTACLES

But there are many circumstances which, in different sections, prevent the development of these enterprises. In many places co-operative selling has been tried and has failed. There are some here that know what that means. These failures have been sometimes due to fundamental mistakes, and sometimes due to difficulties that seem insurmountable. Among these are, first and most important of all, the lack of the true co-operative spirit—and that means nothing more nor less than the work-together spirit. Selfishness of a narrow sort is another. Far-seeing selfishness favors co-operation. Lack of confidence in leaders has occasioned many a downfall. Sometimes that lack of confidence has been justified, sometimes it has not. Half-hearted interest is another obstacle. Then, some downfalls have been brought about by true-hearted, honest difference of opinion. Still another difficulty is of the kind that has hindered the progress of one Erie County organization. As soon as the association was in action, the dealers of the neighborhood began to make good offers. Before that association was formed the difficulties were of the gravest sort. Even though prices are on a par, the growers seem willing to sell to the dealer, neglecting the organization that was making possible these high competitive prices.

In one of the counties of Ontario, an organization undertook to buy fence wire, and secured exceedingly low prices. As soon as these prices were known, dealers in the neighborhood met the quotations and were rapidly undermining the business of the society, until it was learned that the competing product was of a much lower quality. This serves to illustrate the willingness of growers to desert the agency that is responsible for the favorable prices which they enjoy.

There are some fields that are not suitable for large co-operative enterprises—where the growers are not ready. It is doubtful whether, as conditions now exist about most of our ordinary sized city markets, co-operative selling is practical. We are coming to it. There is no question about that. In the course of the next ten or fifteen years, we are going to be selling in a co-operative way in places that are unthought of now. Obstacles that have wrought ruin in some sections are being overcome in others and will be overcome in still others.

BEGINNING AT THE BOTTOM

In glancing over the experience of the larger enterprises, some of which have been successful and some of which have not, we are led to wonder whether we are not in too many cases either beginning at the top or doing nothing. Are there not many simpler activities that would be full of usefulness and which would, at the same time, prepare the community for successful co-operation in larger things? For with communities, as with individuals, practice makes perfect. Should not such undertakings grow as does the oak, rather than as the mushroom? A wide correspondence carried on within the last few months has brought to hand a great fund of information regarding the experiences of organizations in different sections of the East. Some of these are located in our own state, and some in Canada, where the association idea has developed to a wonderful extent. Perhaps by means of illustrations selected from this material, we can best support the idea that has just been advanced.

GETTING ACQUAINTED

The first thing to be gained is mutual acquaintanceship. In most market garden sections and in many shipping sections, there is a feeling of competition. Smith has a little notion that perhaps Jones would just as soon undermine his business as not. As a result of this feeling, Smith avoids Jones to a greater or less extent. They pass on the street and speak, but they don't seem to care much about falling into conversation. But when Smith and Jones get acquainted, Smith finds that Jones isn't such a bad fellow after all. One of the best agencies for bringing men into acquaintanceship is local meetings. If a meeting is to he held, there must be an object. If a little group in a locality can get together, perhaps only four or five, to talk the thing over and call a meeting and arrange for a speaker, then the object of that meeting is settled. It is to hear so and so from so and so talk about some problem that is affecting the neighborhood, perhaps a general soil question. Perhaps a man from the agricultural college will come and give you the fundamental principles of soil fertility, or perhaps you can get a grower from some neighboring city to come to you and tell what they have been doing. Just as soon as you have a meeting like that, you will have discussions. The round table idea is prevalent. After the meeting is over, you will find little circles of men all over the room getting acquainted with each other, and pretty soon they will be talking over common difficulties.

The following paragraph from a correspondent in Gardenville, New York, will illustrate the point:

"The most beneficial part of the organization was not the talks, but the small round circles which always lasted until twelve, during which topics of common interest were discussed. There was always some one in the circle who knew what the other fellow did not know."

PURCHASE OF SUPPLIES

Soon neighborhood problems arise. One of the first that comes up is the purchase of supplies. Fertilizers is a pretty good example. Some sections save as much as eight dollars per ton on standard brands.

STANDARDIZING PACKAGES

There are other problems. At Boston they have been able to standardize their market boxes. They have a size that is now established, and they are able to secure either the return of the package or the price of it. I think likely the Arkport growers do not feel that they have had a very great deal of benefit from their organization. It has done one thing that is worth while. They have standardized their celery crate. Here is the way the thing has worked out in Cleveland:

"Our organization has done something along the line of standardization of packages. Since organization we can get better prices on packages, etc., because the manufacturers know that changes in pattern and sizes are not so frequent, and they are more easily standardized through the Association."

MARKET PROBLEMS

Market problems come up. At Rochester the management of the city market was handling the thing in such a way that it was becoming almost impossible for the growers to patronize that market under anything like favorable conditions. They put their influence together, and they now control the situation. The market gardeners have one shed there together. The Troy Market Gardeners' Association does not do a thing except get together once a year when the stalls on the market are drawn, and they have secured an equable allotment of those stalls that was impossible before.

Perhaps you would be interested in a Stratford, Ontario, experience along this line:

"A new market shelter was built in our city this past year, and I think our Association saved us five to ten dollars each on our market table or stall. Our tables are twelve feet long, and the Hall and Market committee, after meeting with the members of our Association, fixed the minimum price of our tables at fifteen to twenty dollars per year. Butchers without an organization and with an eight foot table were charged a minimum of forty dollars."

Market facilities can be modified. At Cleveland they were unable to get the market they wanted, but they couldn't quite agree on a general market enterprise. They did agree, however, to hire a building. This they did, and they placed in it a man in whom they have confidence, and that man handles their produce individually at ten per cent commission.

LEGISLATION

The Boston growers had great difficulty with boards of health about hauling manure through the streets. They observed proper precautions, but some of the boards said, "You shall not haul manure through our streets, except at night." They objected, and they got what they wanted. They soon had a reputation for "hard fighting" and they were usually able to control the situation. A letter puts it thus:

"These are a few sample cases of what we have to contend with here, and our Association is gaining a reputation for hard fighting, so that the authorities are beginning to think twice before they trouble the farmers about here now. As one clerk of the Board of Health said in speaking to the clerk of the State Board about a regulation they wanted them to pass, 'If you touch one farmer, you touch the whole Association and they fight.' "

Near Chicago a group of growers has been able to secure legislation to prevent the flooding of their lands with water that was coming from outside. In another place the taxes were reduced by eight or ten dollars per acre.

EXPERIMENTATION

The Massachusetts Asparagus Growers' Association was organized for the purpose of finding out how to avoid trouble with asparagus rust. Their difficulties have been reduced very materially, although many a man would go there and say, "These experimenters have been working for years. What have they done?" The following quotation states the case concisely:

"Although no method of preventing rust has yet been discovered, there are two things to do which may delay its attack upon the beds. One is thorough cultivation before and during the cutting season, the soil being stirred at least once in ten days to turn undeveloped rust spores up to the sun, so that they may come to life and die for lack of a plant to feed upon; and the other is the cutting of everything in the shape of asparagus that comes up on or around the cutting beds in order that no shoot of asparagus may attain the age of ten days during the cutting season, whether marketable or not."

The attitude which this organization takes toward growth and expansion is most interesting:

"This Association is peculiar. Its meetings are entirely informal and more interesting on that account. It has never struggled for a large membership, because it has no expense to speak of, and therefore, the incentive of financial necessity is lacking. There has never been a time since the Association came into existence when the treasury was not in easy circumstances. If those who are growing asparagus would rather stay on the outside, we have no quarrel with them. We venture to state, however, that there is not a member who attended the field day exercises without feeling that he got several times his money's worth in actual information."

Is it not true that many an association would enjoy better success if they had more of this spirit? In too many cases, the struggle for large membership brings in men whose support is half-hearted and whose loyalty is readily undermined.

TRANSPORTATION

Local organizations are frequently of great value in securing improvements in transportation service. The story of South Lima, New York, is best told in the following extract from a letter:

"Our train service was very bad; in fact, express goods were refused at our station, and not enough switch room was available to load our produce. We tried many times to get the Erie Railroad to provide more room to place cars for loading, but the only results were promises with no intention of fulfilment. We urged our Growers' and Shippers' Association secretary to make the appeal to the Public Service Commission, with the result of an expenditure of about five thousand dollars in improvements, with all the switch room requested at that time, but far short of our present needs from our much increased acreage."

This is an organization that many growers in the neighborhood think has been pretty nearly a failure, but it did that thing, and that thing alone would be sufficient to justify its existence. Practically the same story might be told of Ionia.

AID IN SELLING

The next step in organization progress is the establishment of simple selling arrangements. Last year the market gardeners of Newburgh, New York, joined together in an association. They did not attempt to control prices absolutely, or to make agreements binding upon their members. This, of course, would be exceedingly difficult, as it is frequently necessary to cut prices to sell the last of a load. They did, however, agree to keep in close touch with each other, and to confer directly on prices. The result has been that returns have been very much more satisfactory.

This from Newburgh:

"I think we are deriving quite a benefit from the Association, as it brings us into closer touch with one another, thereby creating a friendship which we never had before. In that way, it has given us better prices, as by knowing what our neighbors were getting, we would try harder for ourselves, as well as keeping us better posted as to what was in the field ready for market."

The Long Island Potato Exchange does not attempt to control the whole potato crop of its constituency. No scheme of grading and selling and pooling of proceeds has been worked out. They are, however, doing most effective work in price control. Mr. Talmage, the activity of your association consists chiefly in buying up the surplus and holding up prices in that way, does it not?

MR. TALMAGE: We don't try to get them all nor to pool our crops at all. When the other fellow puts the price down or attempts to, we are right there to offer a price.

MR. WORK: That does not involve nearly the difficulties that would be met if you tried to get the grower to bring you the whole crop to be graded and pooled. But you will come after a while to such a system.

Thus we find that there are in actual operation throughout the East a great number of co-operative associations which seem able to carry on comparatively simple enterprises to the great advantage of their communities. Many of these organizations are belittled by

some of the growers of the neighborhood as accomplishing nothing, but they are really doing much. It is the almost universal experience that success in these smaller affairs leads to expansion, and the societies of which we seldom hear today will in the future take their places beside the great associations and exchanges of the far West and of New Jersey and the South.

BEGIN WITH A FEW MEMBERS

It is well to emphasize the advantage of beginning with a comparatively small number of growers. It is much easier for a few to agree than a large number. After the plan is established, any in the neighborhood who care to join hands under the scheme that has been adopted may well be invited to do so. Others who, if they were on the inside, would only make trouble are thus kept on the outside, where they are comparatively harmless.

SOCIAL ADVANTAGES

May we not return to the most important of all the advantages to be derived from united effort exerted in any direction, namely, the social advantage? The emphasis that is placed upon this feature in the letters that were received is truly surprising. You may say that growers are a hard headed, practical lot, that they are looking out for dollars and cents and nothing more. If, however, you would go through the letters, you would be thoroughly convinced of their appreciation of what one might call humanity. Vegetable men like to be acquainted with one another just as well as anybody. Those who attend meetings of societies in different sections are greatly impressed with this fact. Few societies have accomplished so much for the advantage of the membership as the Boston Market Gardeners' Association. After reciting a number of these advantages, a letter concludes:

"I believe, however, that one of the best features of our Association is the social side, the getting together of the gardeners every two weeks through the winter to discuss all matters of interest to them, to talk crops, seeds, fertilizers, and methods. Three or four times a season we have our outdoor meetings held at some of the larger greenhouse plants. These are usually all day meetings. A good lunch is served at noon, and after a business meeting at about 2 P. M. we have some good speakers to discuss some question of

interest to us, and then we ask him questions, so that much information is gained. The gardeners have become well acquainted through these meetings, and a spirit of good fellowship and a desire to help one another have resulted. Our annual banquet held at some good hotel, to which the ladies are invited, good speakers and entertainers being provided, is one of our best social features."

Such meetings, field trips, and banquets are becoming regular features in many producing sections.

THE STATE ASSOCIATION AND LOCAL SOCIETIES

Now, we have been talking about local organizations. The question is, how are we going to carry these forward? One of the objects in the organization of the New York State Vegetable Growers' Association has been to encourage the development of these local associations. The question of securing speakers for meetings has been suggested. You want two kinds of speakers. You want some men from the college, men who have given these special subjects lifelong study, men who can come to you and present scientific principles in *workable* form. Such men you can get from the College of Agriculture at almost any time. All you have to do is to arrange for a meeting, and write to the Extension Office or our office in this College. The other class of speakers that you want are men who are in the field, growing crops. These men are not employed by the College. The State Association has undertaken to make it possible for organizations to have these men. You might call it a sort of little lyceum bureau. We have planned for circuits. We would like to engage practical growers that are good talkers to spend, say, a week in the field. Mr. White visited the Newburgh and the Syracuse organizations under this plan. We have help from the Extension Department of the College of Agriculture in this work. As a result, these two organizations shared the traveling expenses. It amounted in this case to about $7.50 apiece. Where there is a six-day stretch, the figures will be a little lower, and the per diem is divided between the Association and the Agricultural College. We hope to put out one or two more men this spring, and get that thing thoroughly established; and if there is a possibility of holding meetings in your neighborhood, let us hear from you.

I think I am not premature in mentioning work that was done last night by the Executive Committee. As I said, one of the prime

objects in the organization of the State Association was to further local organizations. From the very first, we have had a provision in our constitution for affiliation of these bodies with the state society. That side of the work has not been very markedly developed as yet, because the way did not seem quite clear. A plan has now been devised by which it seems that affiliation with the state society can be made worth while to the local society. That plan will be presented this afternoon. The idea is that there shall be a stronger bond of unity among these societies for the interchange of ideas, for guiding the state society in its work, and enabling it to go after the things that the local societies need. This work is not only for associations that are organized primarily for educational purposes. A group of men who have joined together for co-operative selling and incorporated can take advantage of these things just as well as the type of society that we have in Newburgh and in Syracuse.

Are there questions? There are a number of men here from such organizations as I am talking about.

QUESTION: How practical do you think the idea of one man's selling a product on the ten per cent basis? How can it be worked out?

MR. WORK: That has been successful in Cleveland. The growers bring their produce in pretty much the same way they would bring it to a commission man, and he handles their accounts in about the way a commission man would. That market becomes known, and they are sure they are not being swindled. And if they have a good salesman, they do well.

COMMISSION LEGISLATION

MR. POMEROY: If the Roosevelt bill becomes a law, how would that affect it?

MR. WORK: The Roosevelt bill is certainly good in most respects, I don't know, however, whether that is going to cure the propensities of the commission man or not.

QUESTION: Do you think it is going to be a benefit to shippers?

MR. WORK: I think it will. I think it is going to give us machinery that will help to control a man who is at a long distance from us.

A MEMBER: It will eliminate a lot of irresponsible commission men.

MR. WORK: But it is going to delay the sale of goods to a great extent.

MR. POMEROY: What will the commission men do when that becomes a law?

PRESIDENT WHITE: It is a general opinion that the feature in relation to inspection is not in the interests of the grower. The difficulty will be that when stuff lands down there and is rejected, it will take some time to get that inspector. If you have a corps of inspectors, the next difficulty will be to keep those inspectors straight. When you take into consideration the volume of business, the amount of rejections, the question arises, what will be the attitude if that inspector proposition is worked out? Can one purposely reject stuff?

A MEMBER: A good firm will be a little careful about getting that reputation.

PRESIDENT WHITE: I think the state grange is in opposition to the inspection. There is one other provision in the Roosevelt bill that should be stricken out, that is, in regard to compelling commission men to send sales slips for each sale. All it was deemed wise to ask ior in that respect was that they should be obliged to keep the sales slips on file, so that, in case an action was brought, they could have access to the full records of the sales. Here is an instance. A firm was buying pears and shipping to one of the largest and best Buffalo houses, but they couldn't make any money. If they divided their purchases each time and shipped to another house with a lower commercial rating and slow pay, in every instance they lost money on the goods sent to the first house and made money on those sent to the other. But the first house was in the cold storage business, and they were evidently buying these pears and putting them into cold storage on their own account.

I want you to more seriously consider the New York State Vegetable Growers' Association. The purpose is to try in a state-wide way to improve the condition of vegetable growers, to assist in the organization of local vegetable associations. But we cannot do it without the support of the vegetable growers themselves. You are asking why not much is done by vegetable men here at the College of Agriculture. The fruit interests of the state have been organized a good many years. They have made their demands upon this institution for help with their troubles. They are getting what they want. You are not receiving attention because you are not asking for things. Your state organization wants to bring those things about. We must do it by your support. I feel that you people who are interested in vegetables ought to support the association by your membership. I want to appeal to you to become members of this organization, to take an interest in it, and to see to it that the interests of vegetable growers are carried forward in every locality.

LOCAL SELLING OF MARKET GARDEN PRODUCTS

E. H. Hallett, St. Johnsbury Center, Vermont

I was very much surprised when I received an invitation to come to New York to speak to you upon any subject whatever. I always understood that this part of the state of New York was an ideal place for growing fruit and vegetables, and as I came along the line of railroad and saw the vast acreage which had been in vegetables and fruit, I thought that you were well up in your business. Further, I was being called from a state of which it has been said that we have nine months winter and three months very late in the fall. Now, surely this is not absolutely correct. While our climate is somewhat shorter than yours, we have during the summer months a more rapid growth in nearly every instance, which allows us to ripen nearly all crops each season. We can produce nearly all fruits and vegetables that our market calls for, and of course, as you must know, it is mostly the local trade that we are looking for. What we do raise we believe is of the very best quality. Our products are known the world over as superior to many others, in flavor especially. We know not why this is so.

In the past more attention has been given to the growing than the marketing of the crops, but the time has arrived that we as producers must study this problem and receive our share of the proceeds from our products. Until a very few years ago, very little attention was paid to the attractive manner of marketing our goods, and in many instances not enough is given now. I am to speak to you about "Local Selling of Market Garden Products." We will suppose this to be at retail, for seldom do we find local wholesale markets any better than city commission houses.

SELLING ON COMMISSION

Possibly there may be several commission merchants in the audience, and we do not feel that we should score them too hard. Two years ago our association in Vermont called from Boston a commission man to speak to us, feeling that we were not close enough together in our work, and that he might suggest some ways we could send our products there in a manner so that they would command the highest prices. Certainly we had a very nice speaker, and he emphasized different lines. The gist of his remarks was this. He thought that we had not received as much for many of our products as we should, but it was largely a fact that they were not shipped there in good condition. He held that the commission men of Boston were not dishonest, but that the goods were not in proper shape; and he urged that we as producers take more pains in our packages and in the packing, and send all first-class products, or at least send what they were branded to be.

Notwithstanding what he said in this matter, I am not quite convinced that this is always the case. A friend of mine was in Boston two years ago in a market, and they were selling shell beans at a very high price. He asked a commission man in regard to the matter, and the latter said there never was a time he knew of but good shell beans sold at a very high price in that market, and he advised my friend to plant a large acreage to shell beans. He thought he would venture. When the beans were nearly ready to pick, he received this from the commission man. "I wish your beans were here today. They were selling at three dollars per bushel. Pick and ship immediately if good." He picked that day twenty-five bushels and shipped. The next day he shipped twenty-five bushels more, not having heard from the other shipment. In a few days he received returns from

the first twenty-five bushels. It read like this: "Beans in very poor condition, sold at thirty cents a bushel. Total, $7.50." The balance due the grower after deducting commission, cartage, and freight expenses, was eighty-five cents.

One other instance. A man shipped apples to a commission man and received returns saying that the apples were nothing like what he should have had, and sold very low. The man shipped another lot and went to market with these apples unbeknown to the commission man. After they had reached his stand, he went there and inquired for apples. After looking them all over, he found a barrel that suited him well and bought them at a pretty good price, but they were his own apples. He said to the commission man, "How is this?" and gave him the letter he had received from the other apples. He said, "These apples are exactly like the others, and there must be something done about it." The matter was settled very satisfactorily.

These things are not pleasant. We are sorry that they have existed, and while we do not wish to charge the commission men with being dishonest, we think that sometimes they have erred in judgment.

LOADING THE WAGON

Returning to the subject of local selling, I wish to call your attention to the neatness, arrangement, and attractive manner of the vegetables upon the market wagon. All products should be strictly fresh, well washed, and bunched in sizes that will be most called for by your local market, and further should be so arranged as to attract the eye of the customer. While time will not allow a full explanation, you should aim to have a variety from the garden at all times of the year, and at the earliest possible date that the produce will be full grown, with never any but the best varieties of each kind. You should have regular days for going to market and never fail. Your customer should have a right to expect you there and at about the same time each day. There is nothing like promptness for success in business. If you agree to do a thing, do it. If they expect that on a certain day at a certain time you will arrive with your vegetables, it is best that you are there, because many a lady and possibly your best customers have company coming and are waiting for your goods. Always have enough if possible to carry you

through the trip and disappoint none. Be courteous, honest, give good weight and measure and always stand back of what you sell; and should mistakes occur, rectify them to the satisfaction of all.

CONTINUOUS SUPPLY

The first crops to appear in the early spring are lettuce, spinach, and asparagus. Lettuce when grown properly, by sowing the seed moderately thick and taking up plants with the earth attached, and placing in strawberry baskets, will keep fresh and give a very attractive appearance to your load. These boxes retail at ten cents. It has been my method for the last few years to sow moderately deep with the Planet Junior drill, and as the plants grow, I have become satisfied that two or three plants will grow much faster if they are huddled together than they will if they are at a distance of five inches. They seem to protect each other, and for this reason, I prefer them planted thickly. As they grow until the size of the leaf may be three inches across, take up the entire row for four inches and place in one side of the strawberry basket, then another, getting the four inches and crowding it down beside the other. This will make a large box of very nice looking lettuce. If this is done late in the afternoon, the plants will not wilt in the least during the next forenoon. If the ground is dry, it is very little work to drop these boxes into water to the top of the box, till moistened.

A succession of spinach should be kept until the first of November, at least. Old spinach is not good and no one wants it. For this reason, I sow spinach every ten days. I usually sell this in bunches from three to four pounds at twenty cents per bunch.

Asparagus, the most profitable crop grown, is put up in one and one-quarter pound bunches, and readily sells at twenty cents. The only trouble with asparagus is that it takes too long. Many people can't wait till it becomes old enough to be ready for cutting. In the asparagus business, we must wait until the crowns have come to the right age for cutting. Then we never need fear not having a crop that will be profitable. As soon as the asparagus is cut, I stand it in water. Asparagus grows rapidly in water, both in weight and length. I never sell under fifteen cents a bunch.

QUESTION: How large are the bunches around?

MR. HALLETT: Probably three and one-half inches in diameter.

QUESTION: Do you use a buncher?

MR. HALLETT: No, sir, I do not. I always weigh them. I am not particular about their being just such a length.

MR. WILKINSON: Do you use tape?

MR. HALLETT: No, I use soft twine.

Beet greens follow next, put up in bunches of four to five pounds, and sell at ten cents. Small beets, a good seller, are in bunches made up of eight to twelve, according to size, selling at ten cents. I sow my beets in the same way that I do the lettuce, and I don't thin for the small beets in early season. I take from these rows the beet greens as carefully as possible, and have found that I have received as early small beets from these rows as I ever did by thinning.

MR. WILKINSON: Do you grow those crops in hotbeds?

MR. HALLETT: All outdoors. I have tried the growing of beets and transplanting, but never found it successful. I can grow many more in the open ground.

QUESTION: You handle spinach entirely by weight?

MR. HALLETT: I don't weigh the bunches. I usually like to make a package that looks as though there was something there, and a package that I would be glad to buy myself at the same money.

QUESTION: What variety of spinach do you sow?

MR. HALLETT: The Thick Leaf. Turnips, onions, and carrots put up in the same manner sell at the same price. As soon as the onion tops are large enough to eat, these seem to go fully as well. Carrots and turnips also I take very early. I have sold more carrots at the size of a lead pencil for the last two or three years than in previous years I would sell in a whole season. They are very tender and are largely used.

QUESTION: What variety is the best for early planting?

MR. HALLETT: The Danvers is the best variety I know of to grow from seed.

QUESTION: Do you transplant your onions?

MR. HALLETT: I use onion sets. The transplanting of onions in my section has never been quite satisfactory.

MR. LOCKE: Do you use the potato onion?

Mr. Hallett: I never have. I use the white Portugal onion sets. Peas, the next to appear, is a crop that is called for more than any other, but not as much clear profit is derived from it, on account of increased labor; but if good varieties are raised and well filled in early season, and not too hard in later season, they will readily sell in most markets for sixty cents per peck in early season and never lower than forty cents. We seldom have enough peas. I never for the last few years have grown any of the hard varieties. It discourages your patrons—they feel that possibly you are not careful enough in the variety. Give them a good pea and as early as possible. I use the Gregory Surprise for the earliest, and the Gradus or Thomas Laxton to follow, and have several sowings through the season of both of these varieties. I believe that there is no part of the work that one can receive better pay for in the growing of peas than he can in staking or brushing to keep them from the ground. We have been talking about giving our patrons the best that we can, and if we sell them peas with only two or three in a pod, we are not doing the best that we can. We want to give them a pod that is of good length and well filled. If a pea falls upon the ground so that the end is doubled in the least, it seldom fills. Customers are ready to pay more for the full podded peas than they would for other peas. I never sell for more than sixty to sixty-five cents per peck early, and seldom lower than forty in the late season.

STRAWBERRIES

Later, strawberries, a very valuable product, should be raised by all market gardeners, and will command a good price if perfect and well graded before being placed on the market. Two grades of berries should be made, at least. No. 1 should be all perfect, good size, and baskets well filled. These will never want for customers at twenty cents per basket. No. 2, at a lower price according to quality, consists of small and imperfect berries, but should be sound. Always fill your baskets full, and of the kind of berry that you agree to sell. Some have practiced sorting the berries in the house or shed, and this, I presume, in many instances is what most have to do on account of not having pickers that are careful enough. I have never done this, because every time that a berry is handled, it must be bruised. Further, I always use a basket of the best quality I can buy, a close-cornered basket. While this will not allow as much air

to circulate, the box will not warp to rub the berries together. I never have trouble in selling these berries for eighteen or twenty cents per basket at retail.

QUESTION: Have you grown fall bearing berries?

MR. HALLETT: I have never tried them myself. I might say that I grow my berries in rows, not in the hill system. I allow them to mat some, but do not allow them to mat too thickly.

QUESTION: How often do you cultivate?

MR. HALLETT: Every day, or every three or four days, as time will allow. You can't keep a cultivator going too much with any crop.

QUESTION: What variety of strawberry do you grow?

MR. HALLETT: The Glen Mary, the Warfield, and Senator Dunlap have done the best with me. The bean is valuable because it takes so little time to care for it. String or snap beans have been the varieties our market calls for. These sell never less than thirty cents a peck, and from that to fifty. The shell bean is another crop which sells well, and when the corn comes, people use a great many bushels of these beans in connection with the corn. The cranberry bean in our section is all we can raise. Cucumbers, a good seller, if evenly sized and strictly fresh will sell for sixty cents per dozen at first, and gradually drop to about fifteen cents per dozen. The squash should be grown by all market gardeners, and I believe it is a very profitable crop. Of the summer squash, a limited supply is called for, but the winter squash, if you have the best varieties, will sell well. One great trouble with growing squash is we grow too many plants per acre. If you will all next year cut down the number of your plants per acre to one-half what you have been growing, I think you will raise double the squash and a great deal better. They will mature quickly, and will be of better quality. The greatest yield of squash I ever raised was when I planted half to three-quarters of an acre and had a good many hills. Seed did not germinate well and on this piece there were ninety plants. I owed the large yield to the fact that the plants had plenty of feeding space. No records kept, but a very heavy crop was harvested.

QUESTION: What distance would you advocate planting?

MR. HALLETT: I imagine twelve feet each way would be as good as any.

QUESTION: How many would you leave in a hill?

MR. HALLETT: If I were to make a record, I would have but one.

QUESTION: Do you trim the vines at all?

MR. HALLETT: Not necessarily. It has not been shown that it is practical work.

QUESTION: Do you have any trouble with the borers?

MR. HALLETT: No trouble. I suppose our climate has something to do with that.

Tomatoes are a crop that seems to be put upon the market in poorer condition than any other. We find it pays better to raise all tomatoes upon the stake, using only smooth varieties, well ripened and free from cracks or bruises. These retail in boxes from two to three pounds, from eight to twelve cents per pound, until later in the season, when they may be sold at reduced prices for canning. The tomato plant is abused, in my opinion, more than all of the other plants we raise. Nearly everyone thinks he must buy at least a dozen and set them out. People will set the plant, and if they can find a shingle, they will drive it down and tie the plant. In a short time, the plant will fall down across the string, cutting off the sap. So I grow all my tomatoes on stakes, really posts. Nearly all of mine are cut five to five and one-half feet in length of hard wood. Tie the plant immediately and see that it is kept tied. My idea in growing tomatoes is to produce the very best tomato possible. Upon a stake you can produce tomatoes nearly every one of which is perfect and well colored and well ripened.

In picking, we do not take enough care. Every tomato should be picked and the stem removed, so it will not pierce any other tomato. These I put in boxes of from one and one-half to one and three-quarters pounds, selling at early season for twenty-five cents per box, and later dropping to ten. I have another size box, holding three and one-half pounds, which will take just twelve tomatoes of a certain size, a nice size for the table. I do not advocate growing a very large tomato.

QUESTION: Do you prune your vines?

MR. HALLETT: I keep them trimmed.

QUESTION: What are your varieties?

MR. HALLETT: I grow the Stone for the late ones, Earlibell for the earlier, and some Champions. The Earlibell is nearly as early as Earliana, and is a fruit which will not become watery, as Earliana does.

QUESTION: Do you trim to the main vine?

MR. HALLETT: Nearly always. Sometimes I will allow two to go.

QUESTION: How close do you set?

MR. HALLETT: Three feet four inches each way. It causes a great deal of work to keep them trimmed, but certainly it pays.

QUESTION: Is this Earlibell grown by Isbell?

MR. HALLETT: Yes, sir.

Climatic conditions have more to do with cabbage and cauliflower than any other thing. In growing cabbage and cauliflower, grow only the hard heading varieties, as these sell readily from ten to twenty cents each. I have had very poor luck with some varieties of cabbage, for the reason that they would be soft. The Volga I have found fully as profitable as any other. They grow so large you can cut them, and a half cabbage sells readily.

QUESTION: What is the cause of splitting of heads?

MR. HALLETT: It is the growing of cabbage too fast. After it is well rooted and is feeding very heavily, you must pull the cabbage a very little to break the small roots. Of the many varieties of celery for fall use, only such varieties as will blanch well and be crisp should be grown. The flavor may be much improved by using nitrate of soda freely. Good sized plants will retail at five or eight cents each. Corn is a much called for product, but many varieties are not what we wish, especially the earlier ones; but the market gardener should improve, if possible, the sweetness and tenderness of varieties raised. If this is accomplished, there will be an increased demand for his output. I have had a great deal of trouble with corn for the reason that it was not sweet. Some of the later varieties are all right, but the earlier ones are not what they should be. Corn should never sell lower than twelve cents per dozen, and may go as high as thirty cents.

QUESTION: How does Black Mexican sell?

MR. HALLETT: It sells very well.

QUESTION: Can you sell the yellow sweet corn?

MR. HALLETT: Yellow sweet corn has been called for more the last two years than ever before.

QUESTION: What is your experience with Golden Bantam?

MR. HALLETT: The Golden Bantam is a little too small.

QUESTION: How do you store celery?

MR. HALLETT: Celery may be taken up from the trench and placed in hotbeds, when it will keep till the last of December.

QUESTION: How about the labor question?

MR. HALLETT: I have largely Americans. I have never had any trouble whatever with the labor problem. I pay $1.50 a day and $1.25. Some I board. In a rush of season, if I wanted help badly I might have to pay $1.75 to $2.00. I have had ladies for pickers when I had to, but I am not just in favor of them. I would rather have small boys.

MR. LOCKE: With us there are a good deal higher wages, $2.00 a day.

MR. HALLETT: Many things from the garden have not been spoken of, as there is such a limited demand for them, but such as are called for should be raised to fill even small orders. Winter storage is of great importance. Should one have an abundance, this can be sold during the winter at good prices at wholesale. A root cellar is valuable when kept at a very low temperature, thus avoiding the shrivelling of beets, turnips, carrots, and so forth. All these can be sold at prices equal to the highest quotation of your nearest city. We noticed this last season that cabbages were sold as low as three or four dollars per ton, but we failed to find where the consumer was at all benefitted by this low market. This should be a lesson to the producer to so arrange to hold rather than sell at such low prices. Let us co-operate, and if necessary, establish through associations selling places where we may sell at a small profit rather than a loss.

WAYS OF TELLING WHICH CROPS PAY

G. F. Warren, Ithaca, N. Y.

(Professor Warren addressed the Association on this subject. The material of the address is being compiled in fuller form, and will appear as a Cornell Reading Course Bulletin.)

WEDNESDAY AFTERNOON, FEBRUARY 12

BUSINESS PROCEEDINGS

PRESIDENT'S ADDRESS

PRESIDENT WHITE: Please come to order. The last year has certainly been gratifying in some respects. While we haven't increased our membership materially, yet we can see that the work of the organization is progressing, particularly so far as the interest of vegetable growers is concerned in connection with the College. At the time we organized two years ago, Dean Bailey made the statement that if the vegetable growers of the state wanted to be recognized as an industry the same as the other interests, we must organize and press our wants home, so that they would be understood. That, I suppose, really meant that there was a suggestion from him that we could have the things to which we were entitled as coming from the College of Agriculture, provided the demand was made by an organized institution, representing the vegetable interests. I can say the College of Agriculture has met us half way. They have assisted in extension work as far as the funds which were available could be used, though not so much as some, because the fruit growing interests are older, and there is much more demand from the field on the part of the fruit growers and other interests. We have progressed so far that the vegetable growing interests have almost reached the same stage as other interests. We have taken active part through our legislative committee, and in one or two instances I myself have taken part, in trying to bring about legislation in co-operation with other interests for the benefit not only of the vegetable growing interests, but also of the fruit growing interests. There are bills now before the Legislature which are intended to aid us in co-operation, and also a bill for the building of greenhouses for experimental work for our vegetable interests where they are in the greenhouse line. We are being recognized by other organizations of similar character. The State Fruit Growers' Association, the Horticultural Society, the State Agricultural Society, and other organizations have been very courteous to us, recognizing the vegetable growing interests through our organization. Along that line, we have met with gratifying success. As I say, I feel on the whole that, while our membership hasn't grown as it should grow—the average vegetable grower doesn't seem to rise to the situation and

see the necessity of bringing his organization to the front and strengthening it—yet we have accomplished a great deal that is desirable. I hope every member will go back home and impress upon the vegetable growers the necessity of supporting the organization. I will call for the report of the Secretary.

REPORT OF THE SECRETARY

MEMBERSHIP

MR. WORK: Perhaps the members of the society would be interested in a statement as to our membership progress. At the beginning of last year's meeting, which was at the close of the first year of our existence, our membership numbered sixty-two. During last year's meeting we secured twenty-three new members. At the beginning of the present meeting, the number had risen to one hundred three, but of that number some fourteen had failed to pay up. We are pursuing the policy of dropping all names of members whose fees have lapsed. That means that fourteen out of sixty-two members failed to pay their dues for the second year. During this meeting so far we have taken twenty-two new names. As Mr. White says, our numbers are not running into the hundreds very fast, but we are making progress because our members are well distributed. We have members all the way from Chautauqua to Suffolk—a goodly distribution throughout the state.

EXHIBITS

As to the different lines of work that have been carried forward during the year through the Secretary's office, the first one I will mention is the exhibition work, and I hope you will, as we mention these things, consider them carefully, make up your minds as to whether they are worth while or not, as to whether we are carrying them forward in the best possible way, and make yourselves heard.

We made exhibits this last year at Rochester in connection with the Vegetable Growers' Association of America at their annual meeting in September. We made a second exhibit at Syracuse at the State Fair. These displays were planned to show as wide a range of marketing methods and of packages for marketing as possible. We had shipments from a great many different sources. We were not quite satisfied with results at Syracuse. We did not have

very many more packages than we had the year before. There were a number of reasons for this, the most important probably being the fact that in a good many sections at that time suitable produce was not available. But we think that the exhibit was worth while in teaching, in promulgating some ideas about marketing, and in calling attention to our organization. I would like to know what you think about that. Do you think those exhibits are worth the effort? Financially, we have come out even or better. This year we had quite a little surplus for the treasury.

MR. PRIEST: May I ask what your source of income is from those exhibits?

MR. WORK: An appropriation from the State Fair Commission—$250 this last year.

MR. PRIEST: And what do your expense items consist in?

MR. WORK: The expenses of attendance, materials for fixing up the booth, and express. We think it is about as much as we can ask of a man to supply the material, and we pay the express, so altogether it came to about $150 this year.

MR. PRIEST: The more we can learn by those exhibits, the more we are all going to benefit by them.

PUBLICATION SERVICE

MR. WORK: The next line of activity I will mention is the work we have done in putting our members in touch with sources of information on vegetable subjects. Mr. Greiner, the chairman of our Committee on Investigation, went to a great deal of trouble to prepare a full list of bulletins that are available from the different colleges. The list has been multigraphed and was sent to all of our members. Those of our new members who have not received copies can get them at the desk. We have had a number of responses from those lists. Our office agreed to write to the experiment stations for different bulletins that were wanted, the advantage of this being that we would get lists from our different members, would sort them, and would write to the experiment stations for the bulletins desired. We have felt that the work has been worth while.

(The complete list appears on page 215 of this report.)

MARKET GROWERS JOURNAL

Another point in this connection. The Market Growers Journal was last year adopted as our official organ. The management of this paper has agreed to allow our members subscription at half price, provided it comes through the Secretary's office. This is undoubtedly the leading commercial vegetable paper of the country.

SEED SERVICE

We have perhaps put more energy into and given more thought to work with reference to good seed than any other phase of our activities. It has been the feeling from the time the Association was organized that, although our work was primarily educational and the place we were to fill was similar to the place filled by the Western New York Horticultural Society for the fruit growing interests, yet the need has been felt for some actual dollars-and-cents benefit to members. This is a phase of the work in which we must proceed with considerable caution. We are looking into our offerings very carefully. All of the old members have received letters offering certain strains of seed. Among these were two splendid strains of onions, one grown in this state, and one strain grown in Ohio, $2.00 a pound in both cases; but many growers are glad to pay the price for such strains as these, and they feel that the results come when they gather the crop. It does not take very much difference in an acre of onions to change the returns to the extent of $6.00. However, I hope that as soon as we can handle larger quantities of seed, we will be able to get considerably better prices. In fact we are already negotiating for the growing of a quantity of high grade seed under contract for 1914 planting.

(Upon presentation of the details of the plan, members present agreed to take a total of 72 pounds of this seed.)

Mr. Work: Here is another proposition. Last year quite a little was said about the high price of seed peas. We have exerted some effort to find a source of good seed peas. We must always face this difficulty, that wholesale dealers do not want to handle small quantities, but we are getting in touch with growers and dealers here and there who are willing to do this. We are investigating, and corresponding with one or two Canadian firms. We are offering this year seed of several varieties from one of them at a very low figure as compared with seedsmen's prices.

We have a few very small samples of celery seed from Vilmorin. It goes under the name "plein blanc doré," which is equivalent to our Golden Self-blanching. If some members will take an interest in this, we will try to arrange for delivery of some of that seed for 1914 planting.

(After discussion members present agreed to take four and one-quarter pounds for trial in 1914 or in 1913 if possible.)

CABBAGE SEED

PRESIDENT WHITE: I would like to ask if there was any correspondence relating to cabbage seed.

MR. WORK: I am in correspondence with a man in this state who is working along that line. I haven't heard from him lately, and don't know how far he has gone. I think that is a mighty important line, and if we could get good sources of Danish Ball Head and Charleston Wakefield, it would be of value.

A MEMBER: I would like to know if anyone could suggest a good early market cabbage?

A MEMBER: Copenhagen Market.

A MEMBER: This is fully as early as Charleston Wakefield.

MR. WORK: Those who are interested in cabbage seed ought to get Pennsylvania Bulletin 119. It has some very enlightening figures as to strains.

MR. COOK: We grew about four acres of the Glory and three of the Copenhagen Market. It was a very satisfactory cabbage, heading up hard. We planted it out as soon as the ground could be worked, and our object was to make a summer crop of cabbage. We sold our cabbage at ten to twelve dollars a ton, harvesting along in the summer.

PRESIDENT WHITE: What was the average weight?

MR. COOK: I think they weighed from three to five or six pounds. They headed up good and hard, and very few of them broke down.

MR. WORK: For purposes of comparison, it would not be out of place to say that the Copenhagen is practically an early Danish Ball Head.

A MEMBER: I think you will find several days' difference between Copenhagen Market and Glory set out very early in the spring, transplanted plants.

MR. WORK: Does anyone here know of anyone who is growing cabbage seed?

MR. ALDRICH: I live in the midst of it and am growing it myself. There is a lot of cabbage seed grown around us, but it is all grown in a wholesale way. There are two growers who contract it, and two wholesale men. I don't know but they are a little shy about handling it in a small way. They have their trade to protect. It would be possible I presume, to get farmers to grow the seed.

MR. COOK: What is the matter with your growing it for us?

MR. ALDRICH: I could, I suppose, but the people I am already growing for might put up a kick. And whether you would take all I would want to grow would be a question. And if a person grows more than one kind, he is up against a difficulty.

MR. COOK: What kind do you grow?

MR. ALDRICH: I am growing the Wakefield. I think it is the Early Jersey. I have raised two varieties of Wakefield, one with a little bigger head than the other.

MR. WORK: Perhaps we can get the work started elsewhere. There are a number in the Association who are interested, so we will take the thing up. I would like to say about this seed business that we are encouraged, and it not only offers a chance for advantage to our members, but it ought to help us greatly in the development of our Association.

CAULIFLOWER SEED

MR. WORK: We are offering to our members over the state a strain of Early Dwarf Erfurt cauliflower which is bought by the Long Island Cauliflower Association. I suppose that is as good a strain of early cauliflower as is grown in this country. Cauliflower is ordinarily catalogued at $2.00 to $2.50 an ounce. This is offered to our members at $1.00 an ounce. Thus we are successful in securing not only the very best, but at low prices. As this work goes along, we are going to have to add just a small per cent for handling. Also we have a strain of Earliana tomato that we think exceptionally good.

MR. ALDRICH: I would like to say a word on that cauliflower seed. We have tested out many seeds very carefully, because that is one of our strong points. We have now three kinds, two kinds of Erfurt and one we call a Snowball. We consider them A1 in every respect. The Snowball is different from the Erfurt in this—it won't start to head any earlier, but when it does, it does it up in a hurry. Perhaps in two or three weeks all will be headed. The Association will have on hand seed of the three kinds, and they are all good. We consider them as good as there is in the world. We think we can raise as good cauliflower down there as anywhere, and we have gone into this seed question because it was a matter of life and death to us.

LETTUCE SEED

MR. HAY: Have you any correspondence in regard to Big Boston lettuce?

MR. WORK: We have not. There are a number of sources of Big Boston lettuce, I think, that are pretty good. We could take that up any time if a number were interested, and I think likely we could do business this year. I would be glad to consult with some lettuce men regarding what would be the best one of several places to deal with, or if several are of equal value, I might correspond with all and find which will make the best terms.

I have two other offerings: tomatoes, Langdon strain of Earliana. This is ordinarily sold at $6.00 a pound. Ordinary tomato seed is sold at $1.50, $2.00, and $2.50. The Langdon people seem to have no trouble selling their seed at $6.00. They are offering it to us for less. They offer three different grades. This is the lowest of their three, grade No. 1. As we go along, and as tomato seed is demanded, shouldn't we be able to contract for seed just as good as that at more nearly ordinary prices? The Ontario Vegetable Growers' Association has been having potatoes grown in New Ontario, and they offer this seed at $2.00 per sack of 90 pounds, f. o. b. Toronto. When I had a letter quite a while ago, 100 bags were available. One or two trials were made last year, but on account of seasonal conditions, results were not thoroughly satisfactory. However, Mr. White, who tried one sample, says this strain gave indications of considerably higher quality than ordinary home grown seed. This is Early Ohio. What are seed potatoes worth now?

MR. ALDRICH: I think $3.00 for 156 pounds.

MR. WORK: That would be about the same. If some are interested in that, we would be glad to hear from them. If any of you are interested in those Gradus peas, I will take that up further. I don't know that I have anything else to offer.

There is no limit to the possibilities of development in this work. We want to hear two things from you: what you need—what you are having the most trouble with; and if you know of some good sources of seed, let us know about it. Information of this sort will be handled in a confidential way. So if you know of good strains of seed, and are willing to let the Association have the benefit of the information, but do not want it to go further, then it will not go further. These things can be handled in whatever way seems expedient at the time. Are there any questions or experiences in regard to the handling of these matters?

MR. TUTTLE: Mr. White has asked me to occupy the chair during his absence. I want to present a memorial minute in relation to the death of Professor Craig, who was so helpful in the organization of this society. I was asked by the executive committee to formulate that minute.

MEMORIAL MINUTE

It is with deep regret that the New York State Vegetable Growers' Association records the death of Professor John Craig, who was the inspiration and guiding spirit in the organization of the Association.

His wise counsel and genial presence will be greatly missed, and we feel that his place cannot be easily filled in the wide field of usefulness he occupied.

This Association wishes to extend to the bereaved family its sincere sympathy.

A motion to place this minute on our records would be in order.

MR. BONNEY: I move that this resolution be placed on the minutes of this Association. (Carried.)

REPORT OF THE TREASURER

MR. TUTTLE: I will call for the Treasurer's report.

MR. ALDRICH: We had left from last year $76.26. This year the accounts are as follows:

1912		DISBURSEMENTS	
Feb.	23	C. R. White, trip to Albany, legislation	$ 17.57
	26	Norton Printing Co., programs	6.75
Mar.	18	Merrill Bros., signs	3.00
July	25	G. W. Hallock, expressage	1.25
	25	Andrus & Church, letterheads	8.13
Aug.	29	Photos	7.60
Sept.	5	Expressage	1.65
	12	Signs, State Fair acct.	3.00
	20	Norton Ptg. Co.	2.00
	25	Premiums, State Fair acct.	64.00
	25	Personal acct., A. E. Wilkinson, State Fair acct.	30.82
	25	Personal acct., Paul Work, State Fair acct	16.04
	25	Expenditures, A. E. Wilkinson, State Fair acct.	11.94
	25	Expenditures, Paul Work, State Fair acct.	12.15
	25	Vegetables, State Fair acct	3.50
	25	7 boxes letters, state Fair acct	1.17
Oct.	4	William Hill, tomatoes, State Fair acct	1.20
	4	Norton Ptg. Co., cards, State Fair acct.	4.50
	4	J. & G. Lipmann, tomatoes, State Fair acct.	2.70
	4	Multigraph work	.90
	4	Cornell Co-op, office supplies	2.50
	4	Rochester exhibit	25.71
	4	Postage, telephoning, etc.	13.65
Dec.	14	C. R. White, expenses to N. Y. Meeting	22.61
1913			
Jan.	13	Norton Ptg. Co., envelopes and folders	$ 12.00
	25	Office expenses, postage and express	31.19
Feb.	7	C. R. White, expenses at Syracuse and Newburgh	25.15
	7	Norton Ptg. Co., envelopes	3.00
	7	Forest City Ptg. Co., programs	124.75
	7	Stanley Engraving Co	2.00
	7	Expenses of mailing programs	6.60
	7	Cornell Co-op, office supplies	1.00
	7	T. E. Miller, office supplies	1.00
	7	Mailing room expenses	16.20
	7	Reed, Taylert & Barker, binding	1.25
	27	Norton Ptg. Co., cards	2.50
			$490.98
	7	Balance on hand	$ 35.73
			$526.71

RECEIPTS

1912			
Feb.	15	Balance on hand	$ 76.26
	22	Membership fees	20.00
Mar.	11	Membership fee	2.00
	11	Membership fees	34.00
	11	J. P. Watts and membership fees	20.00
	11	C. R. White, membership fees	6.00
	11	Membership fee	2.00
Apr.	2	Membership fees	4.00
	14	King Construction Co., advt.	18.00
May	4	Membership fees	14.00
June	20	" "	12.00
July	5	" "	14.00
Aug.	20	" "	6.00
Sept.		" "	8.00
	11	Appropriation, State Fair Commission	250.00
	14	Sale of vegetables	2.45
Nov.	22	Membership fees	6.00
1913			
Jan.	13	Montgomery Bros. Co., advt.	25.00
Feb.	7	Returned from Norton Ptg. Co	3.00
Feb.	7	Membership fees	4.00
			$526.71

Approved:

E. R. HAY,
C. G. LOCKE,
PAUL WORK,
Auditing Committee.

MR. TUTTLE: Gentlemen, you have heard the report of your Treasurer. Do I understand that the requirement of having these books audited has been complied with?

MR. HAY: Mr. Work and myself, not being able to find Mr. Locke, the third member of the Auditing Committee, went over the books of Mr. Aldrich and found them correct in every respect, except that vouchers were not present for some expenditures made recently, the receipts not yet being returned. I have a list of those items. (The missing receipts have since been received and the whole account has been examined and approved by the full auditing committee.)

MR. BONNEY: I move that the Treasurer's report be accepted and adopted.

MR. COOK: I support that motion. (Carried.)

PROGRAM

MR. WORK: One other thing that you will perhaps be interested in is our program. We printed 5000 copies of the program that has been put in your hands, the special program of our organization. The expense has been met by the advertisements. The printing, the mailing, and the handling of that program has cost us somewhere in the neighborhood of $175. We have advertisements in the program to the extent of $190, but this also carries with it the insertion of advertisements in our annual report. Last year we came out just a little ahead on our program, so that our printing work is going far towards paying for itself.

FEDERATION COUNCIL

MR. WORK: Ever since this Association was organized, it has been the feeling that some special work ought to be done by way of connecting local organizations over the state with the central body. A provision was entered in the constitution that gives us the foundation for this: "Article VIII. Federation. Any local or district organization representing vegetable growers may become affiliated with this Association by the appointment of an official representative, and the payment of an annual fee of five dollars. It shall be the duty of the Committee on Federation to promote the formation of such local organizations, and secure the affiliation of these and existing organizations with the State Association." Comparatively little has been done in this direction in the way of a definite form of affiliation, and we have been searching all the while for a plan under which this could logically be done and under which something definite could be offered to those associations. Last night the Executive Committee met and the deliberations were formulated in this way: "The official representatives of local organizations, together with the Executive Committee's hall constitute the Federation Council of this Association. The Federation Council shall meet each year to recommend to the Association such action as shall be deemed best for the furtherance of the interests of their local organizations, of the State Association, and of the vegetable producers as a whole."

I hardly know how to state the possible usefulness of such a council, and I hope I will be corrected if my statements are not in full accord with the deliberations last night. It has been the feeling that our organization is likely to become rather large for a deliberative body, and yet there ought to be some closer connection between

this body and the actual problems of the field than is secured through a small executive committee. If a body consisting of one man from each of these affiliated associations should meet each year, that body would be able to bring to the attention of the main body the needs of those local associations, and to point out ways in which the general Association could be useful, either to those organizations or to the industry as a whole. Furthermore, in this council, methods of work, ideas that have been carried out here and there, and experiences could be compared, to the mutual advantages of all the associations represented.

I might say that our circuit work is right along this line. I spoke of that this morning. We have already sent one speaker to two places under a plan of co-operation between the local organization, our Association, and the Extension Department of this College. We hope to carry the plan further. We had thought of making the affiliation fee a requisite to the enjoyment of this benefit by local associations. The feeling was, however, that that privilege ought to be open to all associations. That will be one of the benefits to local organizations, and that five dollar fee will go toward the support of this, with the other Association work. The question is, is there sufficient merit in the scheme of affiliation to draw organizations to us?

Mr. Tuttle: I think that the thought of the members of the Executive Committee was that this Association ought to do all that it could to project itself into all quarters of the state, and while it doesn't seem that we are going to receive large accessions to our membership, we might extend our influence by interesting local organizations, not merely vegetable growers' organizations under that name, but organizations of farmers in all sections of the state, to appoint representatives of their bodies to meet with this body and to become members of a council which should have particularly in charge the local requirements of their own organizations, and in that way report those requirements to this body and receive such benefits as they could through this organization. I want to say that, in my judgment, the one benefit of this organization that is worth more to us and to all affiliated organizations than it costs is its influence upon legislation and in any deliberative body or conference in which it may take part. Last April, we held a conference in New York City on the subjct of co-operation. Some thirty or forty different organi-

zations were represented by delegations. Your President was there. Then again, Mr. White was at Albany representing this organization before the Committees on Legislation. Ours is the organization which represents this interest. We are the only mouthpiece of that interest, and it is worth a great deal to have a mouthpicee for an interest of as great moment as vegetable growing. The only way we will ever come to our own is by organization, bringing to bear our consolidated influence upon the subject we have in mind. I don't think there is any necessity for action on this matter that has been brought before the Association. It is in accord with our constitution. I think it is the duty of our Secretary to carry out as far as he can by correspondence the purposes of that recommendation, to get official representatives of all the organizations throughout the state as far as possible.

A MEMBER: I would like to ask what would be the status of members of these affiliated societies with regard to seeds and other interests.

In the succeeding discussion it was agreed that the affiliation plan should not undermine individual membership. The accredited representative should have full privileges, but the annual report and other advantages should not be extended to all the members of the body which he represents. It was moved, seconded, and carried that the privilege of seed purchase be extended only to members of the State Association.

NOMINATION AND ELECTION OF OFFICERS

MR. TUTTLE: If there is no further business to come before the Association prior to the report of the Committee on Nominations, we will hear that report now.

MR. BONNEY: Representing that Committee, I would say that, after considering the situation, while we realize that we may be establishing a doubtful precedent in extending the office of president to one man longer than two terms, we feel that in the present situation of this organization, we had better retain the man that we now have. Mr. White is an exceptionally able man in this position at this time, and your Committee felt that he was the man to fill the office at least for one more year. He very reluctantly said that if it was the unanimous wish of the organization, he might accept it. We present the name of C. R. White, Ionia, president; Henry Greff-

rath, South Lima, vice-president; Paul Work, Ithaca, secretary; C. H. Aldrich, Long Island, treasurer. The member of the Executive Committee whose term of office expires at this meeting is Mr. Keller of Brighton, and we would suggest to fill his place Chauncey West of Irondequoit for a term of three years.

MR. TUTTLE: You have heard the report of this committee. It is merely to bring candidates before you to save time. Feel free to exercise your individual liberty and judgment in the matter. If there is no division of opinion on the matter, I think it might be well to instruct the Secretary to cast one vote.

MR. GREINER: I make the motion that the Secretary be instructed to cast one ballot for the unanimous election to the various offices of the gentlemen who have been recommended by the Committee on Nominations. (Carried.)

MR. TUTTLE: What other business is there to come before the meeting?

NEXT YEAR'S MEETING

MR. HAY: We have to decide upon the place of meeting for another year. It seems to me that our meetings here have partaken largely of the spirit of the College. They have been very enthusiastic, and we are probably having better meetings here than we could have anywhere else. Some members have suggested, however, that it might be well for the membership of our organization if we could have meetings in some other part of the state at least every other year. I for one would like to hear expressions of opinion in regard to that. I move that it be held here one year from now.

MR. BONNEY: I second it.

MR. TUTTLE: It is now open for discussion.

MR. BONNEY: In the meeting of the Executive Committee last evening, this matter was discussed quite thoroughly. We don't want to feel that we are a parasite on the College; at the same time, we appreciate that during this week there are more men interested in vegetables, and so forth, that can be brought together than at any other time or place in the state at present. But we do believe that the time is coming in the near future when we may have another meeting during the year in another part of the state to draw more interest into the organization from that section.

MR. TUTTLE: Those in favor of holding our next annual meeting here at Farmers' Week next winter, manifest it by saying, "Aye." (Carried unanimously.)

MEETING AT ALBANY

MR. TUTTLE: There is another matter which was discussed last evening. That is the question of holding a meeting in Albany next winter in connection with the annual meeting of the State Agricultural Society. At the meeting in Albany last January, it was pretty clearly determined that it would be advisable to hold a sort of an agricultural week in Albany next winter, two days of which should be devoted to the meetings of the State Agricultural Society, perhaps one day to the Breeders' Association, another day to the Fruit Growers' Association, and another day to any other body of farmers that wanted to have a sort of convention. It was suggested and discussed last evening that we might have a one day session of the Vegetable Growers' Association in Albany during that week. The opportunity would be afforded to go to Albany and spend one week and take in discussions of four or five different organizations in which we are all more or less interested. If we could go to Albany with a certainty that we were going to be able to attend the New York State Agricultural Society meeting for two days—and that meeting is always a very rich meeting—I believe that it would result in a very large attendance at those meetings all around, and I think it would be wise to have a motion made here that the Vegetable Growers' Association of the state endeavor to arrange to have a one-day session of the Vegetable Growers' Association and its affiliated bodies and those interested at Albany during the week of the meeting of the State Agricultural Society. I am going to make that motion myself, and let Mr. White assume the chair. (Carried.)

PRESIDENT WHITE: I will express my appreciation of the faith that you apparently have in my willingness to do the work for you, but appreciating the responsibilities and the work to be done I feel differently about it. It is with a great deal of reluctance that I consented to take the position for another year. I am wondering what will happen when I get home. My people feel that I am giving a whole lot of time to public work, and it is a fact that I have had to sacrifice my own interests quite considerably in the last couple of years. I feel this way, however, that sooner or later we will see some results from our organization work which will make me feel

glad that I have done something even though it does not give me any financial results. It was against my judgment that we should establish the precedent of having one president for more than two years. However, all I ask in assuming this responsibility for the next year is that you help your Secretary. The membership is vital. Get the interest of members in different localities. When legislative matters and such are coming up, have members take hold of it. While I was out, it was for the purpose of conferring with Dean Bailey in regard to some matters of interest to the organization, and one of them was in regard to the advisability of the organization of a potato growers' association. Dean Bailey says he doesn't think it is advisable to have more organizations. We had better concentrate our efforts. I think tomorrow when the question comes up to be discussed, the potato growers of this organization, if they feel that way, will throw their strength into this organization.

EXPERIMENTAL GREENHOUSES

Another thing in relation to the greenhouses. The question is raised whether the apportionment was just exactly right where we get two-fifths and the florists three-fifths. We have come to the conclusion that it is satisfactory. Later if we need more room in the vegetable work, we can get a little more. It will be impossible for me to be with you tomorrow. I shall ask Mr. Greffrath to take charge of the meeting tomorrow. I would like to hear from Mr. Kasting, president of the state florists' association.

Mr. Kasting: We always consider florists and vegetable growers ought to be closer together than they have been. Referring to this bill, your president and I talked over the 'phone and corresponded, and I came down here about three weeks ago and met Dean Bailey, and we went over the matter thoroughly; and he informed me that Mr. Wilson told him we had better double up and ask for a hundred thousand. I thought it wasn't wise at this time to ask for double the amount the florists have asked for the last three years. Dean Bailey said he had asked this year for an appropriation of $60,000 less than they actually got last year. I felt that the florists' business under glass was larger at present than that of the vegetable men. I told Dean Bailey that sixty per cent for floriculture and forty per cent for vegetable culture would be about the right proportion for the two enterprises, and Dean Bailey said I should inform your president. The bill is the same as we asked for except that if this

bill goes through the way it is and becomes a law, we ask the Commissioner of Agriculture to appoint two floriculturists and one vegetable culturist as an advisory committee in considering these houses. We want these sixty thousand absolutely for glass, and we don't want a big show house—we want practical houses—experimental houses. By having this advisory committee, it can be assured that the state architect will spend this money in the right direction. I have talked with Senators and Assemblymen and proposed a plan which Dean Bailey brought up, that they attach this to the annual appropriation bill. We all know how hard it is to get an appropriation. By attaching it, I don't think there will be any trouble. You gentlemen should go to your Senators and Assemblymen and impress this matter on their minds. This must come from the Assembly Ways and Means Committee, in order to be sent over to the Senate. I think there is a good chance to put this bill through this year.

President White: That is one thing I want to help to impress upon your minds—the fact that the results that are obtained from the Legislature must come very largely from your demanding it. If we could have twenty-five per cent, or even less, of the florists and vegetable growers of New York State write letters to the members of the Assembly, there would be no question about it. That should be the case with every measure that is in your interest. There was another question, in regard to horticultural buildings at the State Fair. I am told there is a little rumor that something may be doing before the Legislature is over in relation to that. Whenever that comes up, I think we should stand ready to see that we get our share. We are putting up with a horticultural building that is entirely inadequate.

Mr. Kasting: I am afraid there won't be anything done this year. According to the plan suggested, there would be three separate buildings with connections through the center. We shouldn't give up the idea. I have talked with Commissioner Bristol, and he told me that we should stick to our demand, and it certainly would come.

President White: You have got to get in line for results. There has been a plan spoken of by which bonds are to be issued, and a very comprehensive scheme of putting up all the buildings for the State Fair, and I don't know whether that is going to come

to a climax or not. I want to ask the members to be ready for these things, and see that you push for this horticultural building when the time comes.

Mr. Biggs: While you are dealing with the State Fair proposition, I want to say that the chances are that there will be a permanent bond issue which will take in two or three buildings. The poultry folks perhaps have the upper hand, because they had the appropriation through last year. I believe that the vegetable growers and fruit growers and florists should all get together, and should have a committee of about six men to run a filibuster there. If they get the permanent improvement bond issued this year, it will take all these six men to line the Commission and the Legislature to put up a respectable building.

President White: Mr. Tuttle of Long Island and Mr. West, one of the leading greenhouse men of Irondequoit, are on that Committee, and I have been acting with them. I think perhaps we can get together with your members at any time.

Mr. Kasting: Our committee is composed of Messrs. Pierson, Anderson, and Biggs.

In accordance with resolution passed at the 1912 meeting, letters were addressed to the Congressmen and Senators representing New York, urging them to use their influence for the passage of parcel post. Replies were received from most of these, and in a surprising number of cases the approval of the parcel post project was expressed.

Wednesday Evening, February 12

HORTICULTURAL BANQUET

The Alhambra

Toasts

Samuel Fraser, Toastmaster

Dean L. H. Bailey - "Development of Vegetable Gardening and Floriculture at Cornell."
E. H. Hallett - - - - - - "Neighbors"
Dr. E. M. Mills - - - "The Amateur Horticulturist"
L. S. Tenny - - "The Farm Bureau and the Horticulturist"
W. L. Bonney - - - - - - - - "Muckers"

DEVELOPMENT OF VEGETABLE GARDENING AND FLORICULTURE AT CORNELL

L. H. Bailey, Ithaca, New York

The horticultural work in the colleges of agriculture is now beginning to be separated into its component parts. What these component parts will ultimately be, no one is yet prepared to say; but there are three main lines that are now accepted, these being pomology or fruit-growing, floriculture or flower-growing, and olericulture or vegetable-growing. At this College of Agriculture, we have already segregated the pomology. The floriculture and vegetable-gardening are still in one department, although we have an officer specially representing each one of these sub-groups.

It is our purpose to separate the floriculture and the vegetable-gardening into two departments. If the appropriations that we expect are allowed to us this year, it is my purpose to recommend to the Board of Trustees that the Department of Floriculture and Vegetable-Gardening shall be separated into two coordinate units. Whether the fruit-growing, flower-growing and vegetable-gardening shall be three wholly separate departments so far as administration is concerned is yet an open question. It may be best to have these departments combined under a committee or some other arrangement,

so that there will not be a duplication of tools, teams, apparatus, and class-rooms; but on the educational side, at all events, we want these departments separate so that the officer in charge will be free to carry out his program.

The fruit-growers of the different states have demanded much of the colleges of agriculture. The florists and the vegetable-gardeners have not made so many demands. The result is that these two subjects have not been highly developed at the colleges of agriculture. In fact, the business that these subjects represent is mostly very inadequately organized in these institutions. This is true at least in New York State. Naturally, any institution will give most attention to the demands that are most insistent, although, of course, every institution tries to lay out a rational, independent program. If the floriculture and vegetable-gardening are ever going to be highly developed at the College of Agriculture here, it will be because the people of the state desire it and make their wants known. The institution itself is ready to develop these units. The units cannot be developed without funds, and also without co-operation in many ways from the growers. I want the growers represented at this meeting to understand the situation, and to know that the responsibility for work in these lines does not rest alone with the professors or with the institution. What the people want, within reason, they probably will secure. If the florists and the vegetable-gardeners of New York State feel that they want these subjects to be represented in the College equally with other subjects, then they must say so and must take an active part in bringing the development about. In educational and experiment work that is for the benefit of particular industries, it is necessary that those industries themselves should take an active part in placing the work on its feet. The officers in the College who are now responsible for the floriculture and vegetable-gardening are doing their best. I am sure that there should be a larger organization, however, if the work is to be carried as strongly as other work is carried. How far the work is to be developed will depend very largely on the people who are in the business.

VEGETABLE STATISTICS

The following figures of interest to New York Growers are gleaned from advance bulletins of the 1910 Census:

Value of Horticultural Crops

Vegetables

	U. S.		N. Y.	
	1909	1899	1909	1899
Total	$417,000,000	$237,000,000	$36,000,000	$26,000,000
Potatoes	166,000,000	98,000,000	20,000,000	15,000,000
Other Vegetables	251,000,000	139,000,000	16,000,000	11,000,000
All Other Horticultural Crops				
Total	273,000,000	152,000,000	33,000,000	20,000,000
Tree Fruits	140,000,000	83,000,000	17,988,000	10,542,000
Small Fruits	30,000,000	25,000,000	2,875,000	2,538,000
Grapes	22,000,000	14,000,000	3,961,000	2,763,000
Citrus Fruits	22,000,000			
Nuts	4,000,000	2,000,000	74,000	71,000
Flowers and Plants	34,000,000	18,000,000	5,149,000	2,867,000
Nursery Products	21,000,000	10,000,000	2,750,000	1,642,000

POSSIBILITIES IN CROPS NOT COMMONLY GROWN ON MUCK LAND

HENRY GREFFRATH, South Lima, New York

Every muck land farmer has often had this question asked him, and as often asked himself: How many crops can be grown on muck land and be grown on paying basis? For many years, onions were the only truck crop that could be grown on muck land, or at least this was thought some fifty years ago. Then celery was added to the list and proved to be a winner. Some twenty years ago lettuce was added, and today onions, celery, and lettuce are practically the only crops grown by a large majority of muck land farmers. There are many other crops that can be grown successfully, and on paying basis, on muck land under certain conditions. It is true they will not yield as large cash net income per acre as celery, onions, or lettuce in seasons when such crops sell high, but almost any kind of a crop would have brought the grower more money this year than the onion crop did. Celery seed has been high the last two years, and this probably has been the means of keeping the acreage of that particular crop down to some extent. With increased acreage added, and with failure to increase our marketing facilities, we are going to encounter a hard proposition on the celery crop in a very short time. In organized distribution lies the prosperity of the future of the muck land grower. If all lettuce that is sown each summer could be brought to produce a full crop, we would not be able to dispose of it at living prices. Weather conditions help to regulate that to some extent. Under such conditions, would it not be much better to grow some other crops than to try to grow the same crops—sow the same acreage that we did to onions last year, knowing that we will be forced to the wall if we continue?

Here is a list of crops that I know can be grown on muck land. I have grown part of them, I have seen some grown in other places. There are probably other growers here that have had experience with these same crops, and perhaps some not named here, and we want to hear from them. The list I will name follows: potatoes, corn, both sweet and field, peas, beets, carrots, parsnips, horse-

radish, asparagus, and spinach. These ten crops can be added to the three, making thirteen instead of three, if you care to grow them.

I want this meeting to be very open. I am not going to take up any of these crops in rotation. I don't want to talk on any particular crop, unless I know someone is interested.

MR. COOK: I suggest we talk about spinach.

SPINACH

MR. GREFFRATH: We are told that we can grow a better crop of spinach—that is what the canning people tell us—on muck land soil than any other, for two reasons. It grows very rapidly, and I don't think that the maggot attacks it as much as it does on sand. But one of the great reasons why canneries prefer spinach on muck land soil is that there is absolutely no grit in it when canned. That is something they have got to get rid of. Every canner says, "If I can get it grown on muck, I want it." If a little of the muck does get into the spinach, it is so near the same color you can't detect it, and nobody knows he has it.

The Spinach usually is sold by the hamper in hot weather, at high prices. I have known it to sell at $1.25 for a half barrel hamper that we use for shipping lettuce. There is always a demand for it at canneries, providing you have made arrangements with them beforehand. Last year quite a number of acres were sown, and after it was grown the canners came in and wished to contract it. The first contract was made on the basis of sixteen dollars, then eighteen, and some sold at twenty dollars per ton. This is for spinach as cut from the field.

The quickest way to harvest is to take a Planet Junior or Iron Age cultivator, with which it is possible to cut two rows at once, having one blade run under each row. One man will cut as much as two men can rake. About six rows are raked into a windrow. Then it is forked into a celery crate, and loaded into a car. So the harvesting is very simple and very rapid. About five men will load a car in ten hours in very good order. We pack our crates just as full as we can providing the distance we have to ship is not very far. Into a celery crate we put close to one hundred pounds. A lettuce hamper properly packed for market is supposed to weigh about twenty pounds. We have shipped spinach as far as Adams, New York. The first car shipped there was five days on the road, and it arrived in good condition. But it is not safe to ship to any place that far

away. The only thing that made it possible for this car to arrive in good condition was that the day we harvested this spinach the temperature was thirty-two, and the spinach was chilled. They told me heat hadn't even started in the center of the crate when it arrived. A few days later a similar shipment was made with the temperature at fifty. It made better time, but arrived in bad condition.

We sow from fifteen to twenty-five pounds of seed per acre according to germination qualities. Last year seed was very poor. Some growers had to sow as high as forty pounds per acre. It is very important to know just what per cent of your seed will grow. Seeds should be tested. Why run the risk of not having a good stand? I always make a practice of knowing just what per cent of my seed I have reason to expect will produce a sound, strong, healthy plant. We sow in rows eight, ten and twelve inches apart, which is plenty close enough. Some say we can grow it as close as eight. Some even say sow broadcast, but it does better when cultivated.

There are several kinds of spinach. Some will go to seed much more quickly than others. This year we are going to try to grow two or three crops of spinach. We can grow two crops on the same land. We are going to sow one crop extremely early, and have it come into the market before peas, then follow with one crop which would come late in the fall. For this there is always a wide market. A good many times I have seen good spinach grown after onions.

Last year I produced spinach on a piece of land on which I had harvested early celery about the middle of July, and I sold from that bed one hundred eighty dollars worth of spinach after having received a very fine crop of celery. It made a very nice second crop.

Mr. Work: How large was the bed?

Mr. Greffrath: An acre and one-eighth. That is the size of all my beds. As high as eleven tons per acre have been grown by weight at South Lima. We will say an average yield of spinach would be seven tons on good land. I don't believe it is possible for any man to grow spinach on new muck land. Your land must be well subdued and clean. If you have chickweed, don't try spinach, Several acres of ground at South Lima sown to spinach came up so thick with chickweed that the canneries rejected it. You cannot sort it out. All the labor you can afford to put on it is what you do with a wheeled hoe. It is safe to say that, under ordinary conditions. twenty-five dollars per acre should furnish the seed, prepare the

ground, and harvest the crop. The average yield I should estimate at seven tons. We have contracted for eighteen dollars a ton, and the canner furnishes all packages and pays freight each way.

MR. HALLETT: What varieties do not run to seed as soon as others?

MR. GREFFRATH: The Long Standing we find the best of any variety to sow if we want to carry it along. We are going to sow all our spinach at one time. We told the party we contracted with we would sow Round Thick Leaf, Victory, and Long Standing. There is not much difference in Long Season and Long Standing. Norfolk Savoy is an excellent spinach to sow in the fall, but we don't sow it in the spring. It runs to seed very rapidly. In the fall I think it is one of the best.

MR. BONNEY: Is that the same as Bloomsdale?

MR. GREFFRATH: I believe they are the same.

MR. COOK: What would you recommend as fertilizer for spinach?

MR. GREFFRATH: We don't use any fertilizer at all, but put the spinach on ground highly fertilized for celery. If I were going to start it in the spring, I might give it some amount below five hundred pounds per acre. I believe that we are using as much fertilizer at South Lima as is used in any section where they are growing truck. On my early celery I don't use less than thirty-five hundred pounds per acre. That is for celery grown in double rows three feet apart, center to center, double row system, requiring about sixty thousand plants per acre. I find I can get quicker results by using a large amount of fertilizer. The earlier I can get it, the more money I can get from it. We can grow a crop of late celery with five hundred pounds per acre.

MR. GREINER: What formula do you use?

MR. GREFFRATH: This year I used 5–7–10, and side dressed with fish tankage. I find that fully as good as nitrate of soda. In fact, I like it better.

CAULIFLOWER AND CABBAGE

MR. WILKINSON: Do you grow cauliflower or cabbage on muck?

MR. GREFFRATH: I have never grown cauliflower. I tried to get in touch with a gentleman who had. I tried it myself twice and made a failure.

MR. WILKINSON: I have raised cauliflower and cabbage on muck. The trouble with cabbage is it is not tight headed. It would not be well to keep it after the first of January. Cauliflower is the best on the muck. It is very hard and of very fine quality. It has been grown in Vermont and Massachusetts.

MR. LOCKE: Does it stand shipping well?

MR. WILKINSON: I have always grown it near the market.

MR. BONNEY: We tried some cauliflower one year. I remember one carload we shipped to parties in Buffalo. It happened that we came in contact with our Long Island friends, and found the market glutted. We told the receivers if they knew of any place it could be handled to advantage to send it on. They shipped the car to Cincinnati, and in due course of time we got a check for ten dollars.

MR. LOCKE: I think we should make it a point to get our cauliflower in before Long Island. I know that the best market is along the forepart of September, in the warm weather.

MR. BONNEY: When the first of our cauliflower matured, the heads were very large, and we had some sample crates sent us from Buffalo for shipping cauliflower, and we found we could not get our cauliflower in them. So I made a few crates especially for the purpose. They were quite long, and would just hold one-half dozen heads. Those sold in the Buffalo market for one dollar fifty cents a crate. But the market soon went right down.

MR. GREFFRATH: The weather seemed too hot for my early cauliflower. I believe there are some sections where the atmosphere is tempered by the lake which would be an ideal location for growing cauliflower.

A MEMBER: Would irrigation help in this respect?

CARROTS

MR. GREFFRATH: I couldn't say much about that. Let us consider the carrot crop. Carrots have been grown by a large number of growers on muck land, and in a good many instances they are grown as one of the first crops after the muck is broken, say the second crop. In many sections, when they break new muck, they will plant to some crop that can be cultivated with a horse for a year, though that is not necessary. If you will plow early and put your land in perfect condition, there is no reason why celery cannot be

grown on new land the first year, provided you start to break your land early enough. Plow in fall and level in spring. I have seen excellent crops grown on land that never saw celery before or any other crop. Carrots often follow. Your land must be in pretty good shape for big crops. Of late years we can get the crop but not the quality. The carrots are wormy. There are little maggot. that work through them that look very similar to the onion maggots When we had carrots that were of good quality, our yield would be anywhere from twenty to thirty tons per acre. I bought a man's crop one year and he claimed he had just one acre. I paid him for thirty-five tons, and he had two tons left for feeding purposes. But I believe he stretched his acre. However, I have grown thirty tons myself. About twenty to twenty-five tons is easily possible. I have seen carrots grown on muck that are just as smooth as glass. When washed, they do command high prices. I may speak of the quality for keeping. When I dropped out of the onion deal, I planted carrots quite heavily, and I have stored anywhere from eight to nine thousand bushels in a storage I had erected for onions. I sold my crop one fall at nine dollars a ton in storage. I weighed them in. The market was not very high in the early winter, but in the late spring they moved those carrots—mostly in March—and there was very little shrinkage. The second year I stored them on my own hook. They went down quite badly. The third year, in the same building, it was almost a failure. I think this rot was caused by some disease started by the steam that the carrots gave off. Every spring I would have to wash the entire building and scrape it. There would be a scum over the entire woodwork on the ceiling, as much as one-eighth inch. I believe that was a disease which affected my carrots when stored in the same place the second year. The place had the best ventilation I could give any building, but you must not force too much air through the building, or they will shrivel. You must store them damp. Unless you have a concrete building or something of that kind, I would not store many years in the same place. Something ought to be done to find whether that scum or mold is injurious, and find a remedy. I might say that the average price for carrots when they are good will run from five dollars to nine dollars a ton in the fall. I have sold as high as eighteen dollars a ton through the winter, but it is hard to speculate on what storage carrots are worth. They go as high as two dollars a barrel sometimes in the

late spring. The cost of producing an acre of carrots, including seed and all labor, would be around one hundred ten to one hundred twenty dollars, according to the condition of your ground.

A MEMBER: Our experience in storing carrots has been not to keep them in the cellar, but rather to use a little place in the field on some good dry spot. Make a hole perhaps a foot deep, cover with straw, then throw the dirt back on top, and put manure on as the frost comes. We have kept carrots that way in excellent shape until April.

MR. GREFFRATH: There is no question about the carrots keeping, but the trouble is to get them with the temperature about zero.

MR. COOK: I kept some carrots last year by trenching them. We put them right into a trench such as we dig for celery on a side hill, sloping to the north, which is dry and well drained. I kept them till spring, when they were washed and sold at one dollar twenty-five cents for a bushel basket.

MR. GREFFRATH: Is there anyone who has had experience with worms in carrots?

MR. HALLETT: All I found necessary to avoid them was to plant on a different piece of land.

QUESTION: Have you used lime on this soil?

MR. GREFFRATH: We make a practice of sowing lime about every third year, eighteen hundred pounds per acre. We use marl. We have never used water slaked lime. Would you think the other lime would be better?

A MEMBER: We thought we had better results using water slaked lime. We get the burned lime and slake with water.

EARLY POTATOES

MR. GREINER: Let us take up early potatoes.

MR. GREFFRATH: We don't get very early potatoes on muck. I would not advocate planting anything but early varieties on muck. The main outlet for muck grown potatoes is for seed purposes. It is true that there are some varieties of potatoes of the early type that you can grow on muck land having perfect drainage. You can grow an excellent quality for table use on well drained muck. I am using nothing but muck land potatoes at home. I prefer them to potatoes

grown on the heavy soil in our section. They will boil just as white as you could ask. Last year I planted my potatoes the tenth of May. About the seventh of June we had a very heavy frost. Potatoes were up well, and were cut to the ground. They were planted deep—I like to get down where the moisture is. It looked as though the crop would be a total failure, but they came up very well and set late. It was impossible to find a potato the size of a marble when the vines covered the ground, but we had an excellent crop and the quality was good. I like the Early Ohio and the Irish Cobbler for muck potatoes. In planting those varieties, use plenty of seed and plant them close. If you don't, you will have room enough inside of each of those potatoes to put a small potato.

MR. GREINER: Are the potatoes free from scab?

MR. GREFFRATH: I don't know that I had any scab. They are just as smooth as if you had picked them out of an egg shell.

MR. BONNEY: Don't you think the Early Rose yields more?

MR. GREFFRATH: I have not grown that since I was a boy.

QUESTION: How about keeping quality?

MR. GREFFRATH: They keep well. This year there is a large amount of loss on account of rot, but we had no rot,—I don't believe we threw away a peck out of a hundred bushels. My potatoes were sprayed about every ten days with Bordeaux mixture. You must watch your potatoes on muck. Muck is the home of blight.

QUESTION: How could you get through your potato vines without crushing them?

MR. GREFFRATH: The bed is only about twenty-five feet wide and beside a driveway. We could drive up the road and cover the entire stretch. I figure that if you destroy the vines a little, it is not as bad as letting the entire crop go down by blight.

MR. GREINER: That is the late blight?

MR. GREFFRATH: We had a blight the latter part of August.

MR. GREINER: Then it is the late blight.

MR. GREFFRATH: We have a blight almost from the time we start. Whether it is of a different nature from the late blight I am not prepared to say.

HUBBARD SQUASH

QUESTION: May I ask if anyone has had experience with Hubbard squash on muck land?

MR. GREFFRATH: I can make a little remark on that from something I saw two years ago. While at Syracuse, I leased some land there to some Italians to be sown to onions. There were some ditch banks and waste land at the end. The Italians asked permission to use that land for their own purposes. They planted squash and many other vegetables. They had one plot which was sod in the spring. They turned it over and about the first of July they planted this to Hubbard squash. It was a little plot a third as big as this room, planted very close. They had the finest squash I ever saw, but they didn't mature. They were nice size, but they all froze. I don't know whether it would have been possible to have put them in early enough so that they would have become ripe.

ASPARAGUS

I have had some experience with asparagus. About six years ago I put in six acres on muck. The year before I purchased Palmetto seed, and sowed a seed bed on muck. It grew wonderfully. The second spring, when the plants were one year old, I called them to the attention of men who were familiar with asparagus, and they said they were plenty large enough to plant. I set them at one year old. They were much larger than some two year old roots I bought the following season. The second year from planting some of that grass would measure one inch across the root when cut. The next winter we had a wet season. The next spring fifty per cent of my crowns were rotten. The next year I filled in all I could and the following spring I found about all those I put out the first year were dead. It is my belief that, if you have land where you have perfect control of the water table and can keep your water level down so as never to have it over the crowns any length of time—this bed probably had water above the crowns five months—there is no place where you can grow the quantity of grass you can on muck land.

MR. BONNEY: Did you find the grass was as straight in growing?

MR. GREFFRATH: It was beautiful grass, as nice as could be. I had no rust, no disease. I had some slugs, but I found that with a little care, not permitting rubbish to grow around the asparagus, and by spraying, I could take care of them very well. Mr. West of

Irondequoit put out a bed about the same time I did. He put a chicken yard all around his. He is meeting with excellent results. I think he has tile drainage.

MR. LOCKE: My experience has been pretty much like Mr. Greffrath's and I had thought to take some land that water didn't bother; but I determined from talking with those of my customers that used the grass that it was not advisable for me to do so. They found quite a good deal of fault about the eating quality. It seemed to have rather a strong flavor.

MR. GREFFRATH: I never had any objection on that score. Most of mine was sold to high priced stores in Rochester. They never made any complaint.

MR. LOCKE: The size and quality as far as appearance is concerned are excellent.

PEAS

MR. GREFFRATH: Peas do well on muck. You can grow them in rows or for canning purposes. I would suggest growing them for canning purposes if you are near enough to a cannery so that the expense of drawing is not too great.

MR. BONNEY: Won't they mold?

MR. GREFFRATH: I am told by a man from Wayland they will not. He received forty dollars a ton for shelled peas. These were sown with a grain drill very close. He sowed them quite early and never had to cultivate, then just cut same with mower and delivered to factory.

A MEMBER: Do you not find that they are hard to mow with a machine on account of clogging the knives?

MR. GREFFRATH: I cannot say anything as to that. I have never grown them. What I have said was told me by the party I referred to from Wayland. This party also said never to grow any variety but the dwarf on muck land.

POTATO CULTURE

J. L. Stone, Ithaca, New York

(In connection with Farmers' Week Program of the Department of Farm Crops.)

Many of you have been listening during the past hour to some potato statistics that I am sure you have been interested in. The topic assigned to me on the program is "Potato Culture." I will present to you some factors of potato growing that I think it is well for you to have your attention called to.

CROP FACTORS

There are four factors that I would like to name as chiefly responsible for the potato crop. First, of course, is the potato plant, the possibilities of the potato plant. What is the potato plant capable of producing? The average yield of potatoes in New York for a series of years is less than a hundred bushels. The average the past year was something over a hundred bushels. Must we be satisfied with that yield or may we expect greater things? First of all, the statement I want to make is that we are not limited by the potato plant. That is, we are not anywhere near the limit of production of potatoes. As evidence of this, we come across facts that are current to most of you—that the yield of potatoes in certain countries is much higher than the yields in New York or the United States. The yields of potatoes in Great Britain are two or three times as large as in the United States. The same is true in regard to Germany and several of the European countries. While the potato is a native of America, yet in other lands the potato is producing much greater results than it is in our own land. We may satisfy ourselves that we in America have not reached the ultimate limit of potato production so far as the potato plant is concerned.

Not only is the general average of potato growing in Europe very much above ours, but the maximum yields secured in some of the European countries are very remarkable. I was told by persons right on the ground in Scotland that it is not at all uncommon for them to get ten, twelve, or fifteen hundred bushels per acre on certain of the favored potato producing farms. I saw potatoes that made me believe it. The rows were only twenty-seven inches apart, and the hills only a foot apart. As a matter of fact, on that farm they claimed that their yields frequently average twenty tons per acre.

They pointed out a particular variety of which the best yield had been as much as forty-seven tons per acre. Of course, that is not a thing they are doing all the time.

The point I want to leave with you is this—that they have gone way beyond where we have gone in developing varieties that are adapted to their conditions. Their particular varieties, we find, when grown over here, don't do so well. Under irrigation in Colorado, they are doing very well indeed.

Why do we see such results, and why do we get such results in our own country? Is it farming? I conclude it is not. While average farming there is much above ours, yet we have some farmers just as skilful as some there. Is it soil? While the average soil where they grow potatoes is better suited to the crop, because they have learned better than to plant potatoes on land not adapted to potatoes, nevertheless we have some soils, probably, just as well adapted to potatoes as any they have. I do not believe those are the two factors that dominate the question.

What is the factor? I believe that in a much larger degree than we have yet seen, climate is responsible for the great difference we see in this matter of potato growing. Of course, climate is a factor beyond our control in great measure. The potato requires, first of all, what, from our point of view, would be cool summer climate. The one factor that is working against potato growing in New York State is that almost every year we have a period of very hot weather during the growing season. Whenever during the growing season the temperature goes above ninety degrees, the potato crop is being diminished very rapidly. That is one of the reasons why in Great Britain and in Germany they can grow crops way beyond what we have arrived at yet. I have a little data to substantiate this. I discussed the matter with Dr. Wilson of the United States Weather Bureau, and asked if he could get data. It is not so much the average temperature, but the temperature of the hottest ten days of July, for instance, that affect the potato crop. I have here such data as Dr. Wilson furnished on this subject:

Scotland			Orono, Maine		
Mean temperature		Precipitation	Mean temperature	Mean maximum	Precipitation
June	55°	2–3	June 61.9°	72°	3.43
July	58°	3–4	July 66.9°	78°	3.22
August	58°	3–4	August 65. °	76°	3.50

NEW YORK

Average	Mean maximum	Precipitation
June 65°	72–79°	3.68
July 70°	75–84°	3.99
August 67°	73–81°	3.90

I don't think these average temperatures mean much. That is not the real point. Almost invariably during those two months in New York there is a period when the thermometer registers daily in the nineties. The potato crop is a plant whose home is in the mountain regions of the United States and Mexico. In those mountain regions, the summer temperatures never get very high. When we bring the potato plant into our general agricultural regions, we are bringing it out of its natural habitat, and it suffers accordingly.

In the other hall this morning, we discovered that Maine is way ahead of New York as far as average yields are concerned. You see that the average temperature in Maine in considerably below the average temperature of New York, but the mean maximum temperature—the highest temperature which, in a series of years, we may expect the hottest days to reach—will be represented as above. The fact remains, though we cannot show it in the figures here, that we in New York get a much larger proportion of those blistering hot days than in those localities where potato production is in a much better condition. However, I do not think it wise, if some other locality has natural advantages we can not equal, to ignore that fact, and hold ourselves responsible because we cannot equal the production under the circumstances. So I believe we shall be able to prove with statistics the general proposition that the limiting factor for potato production in New York State is the excessive temperature.

There is another fact that I would call to your attention that I think argues along this same line. You know very well that in the mountain regions of Colorado, Nevada, and the western states where irrigation is in use, they are getting some very good yields of potatoes, comparable to those secured in Europe. Under irrigation, they get perhaps six, seven, or eight hundred bushels per acre, but of course they control the moisture, and see that the crops never lack for moisture. The other factor in those mountain valleys is that the temperature never gets very high.

There is another thing, which is simply an observation. I have been surprised to find in the southern part of the state, in the hilly countries, in talking with individual farmers about the selection of

land for their potato crops, that they say invariably, "We can grow better potatoes on the hills than in the valleys," though it seemed to me the valley land was ideal for potato growing. Everybody will admit that valley land is much richer than the hill land. There must be some other factor than fertility of the soil that accounts for that difference. In the light of the statements I have just been making, I can understand that. I believe it will be found upon test that those hills retain an equable, cool climate much more satisfactorily than the valleys. We observe here in Ithaca a great difference between the valley and the hill, even away from the paved streets. I take it that what you might call the danger line for the potato crop lies right in there between the valley and the hill.

CULTURAL DETAILS

The rest of the period we will devote to the details of growing potatoes. Whether the climate is ideal or not, whether the soil is ideal or not, most people desire to grow some potatoes. I would say this: potatoes are very much affected by soil, as well as by climate. I would count it bad policy to indiscriminately urge an increase of potato acreage, one of the reasons being that, whenever such a campaign is inaugurated, it stimulates people to attempt to grow potatoes on land not well adapted to potatoes. From now on, we must be more particular to adapt our crops to the soils that are suitable for them. One of the things that impressed me most strongly as I studied European agriculture was that these people have been going at it to find the things they can do best, and they don't attempt to do everything everywhere. That is the lesson we have to learn. As regards soil, the potato does not do its best on a very heavy soil or a very light soil. On heavy soil you cannot get satisfactory results chiefly because a very heavy soil is especially subject to weather conditions. It is on heavy soil that the extremes of weather conditions most influence the crop. When it is too wet, the heavy soil suffers most; when it is too dry, the medium soil is less affected by extremes of moisture, and, I think, by extremes of temperature also. As far as quality is concerned, you can grow splendid potatoes on light soil, and very early potatoes. This is desirable, because we get them off the land before the season has advanced far enough for them to suffer from the drought. But light soils are poor soils. They must be heavily fertilized and manured, and they suffer from drought also. A light soil that is

rich enough and is kept moist enough is an ideal place for growing potatoes. But on an average farm the thing to do is to select soil for potato growing that is of medium texture.

Now, as to methods of growing potatoes. There is no best way of growing potatoes. Practices will differ in different localities and with different soils. Nevertheless, there are certain fundamentals that need to be taken into consideration. Different seasons different methods would be recommended. We cannot foresee the seasons. The method of handling the crop best adapted to one season may not be the method best adapted to others, depending on weather conditions.

I don't suppose there is one farmer in a hundred who has the erroneous idea that anybody can most successfully grow potatoes year after year on the same soil. Potatoes should be grown in a rotation. One of the best places I know of for a potato crop is following a clover crop. The ideal preparation for a potato crop, as I have come to see it, would be to mow the clover the season previous, and soon after haying, plow that land and sow it thickly to rye. The following spring, before the rye is very large, say twelve to twenty-four inches high, plow it under. The objection to letting it get large is that plowing under much of the strawy material is apt to create a cushion that will not let the moisture from below pass up.

QUESTION: How early can you sow the rye?

PROFESSOR STONE: The earlier the better, but I would not consider it the work you should give precedence to everything else on the farm. I have spoken about the necessity of having good seed. Having procured that seed, be sure that it is not injured before it is planted. I believe farmers over the State of New York are losing more than they think simply by not taking good care of their potato seed. So many are planting potatoes that are sprouted or that are wilted. We have done some experimental work along that line, and have found very marked differences. In one case where we emphasized it by keeping a seed a very long time in cold storage to hold it dormant, and allowing another lot to wilt in the barn, we got one hundred fifty-nine per cent increase in the dormant seed over the one we allowed to wilt. Another fact is this. Farmers are not planting their potatoes deep enough for best results. When a farmer says he has planted potatoes three or four inches deep, he is fortunate if he finds out in the end that he has planted two or three inches deep.

According to our experiments, potatoes should be planted four or five inches deep. I am talking about a good potato soil. If it is a heavy clay soil, very deep planting would not be advantageous.

GROWING EARLY PLANTS

E. H. Hallett, St. Johnsbury Center, Vermont

The question of growing early plants is a very important one. We all well know that the success of any business depends upon the finished product. Many failures of success are caused by not starting right. We know that the expert dairyman of today, if he wishes to place before the world record-breakers in the production of milk and butter, must be allowed the handling of these cows from the time of birth. The most careful attention must be given in both care, feed, and training. By so doing, the best results can be obtained.

The shepherd, if he wishes to place upon the market at an earlier date than his competitor his choice meat, must have the handling of the young lamb by adding such food and care above that which its mother can give as to make the most rapid growth, not allowing even one day to pass without an increase of weight.

We might further speak of life and animal growth, but it is not necessary. This being true, we must remember that plant life is exactly the same. All young plants must have care and attention, for they also eat, drink and breathe, and if we produce those that will furnish us a bountiful crop, they must be treated correctly.

THE GREENHOUSE

Now then, this work should be especially conducted by those who love plant life, those able to detect in an instant any fungous disease, insect pests, or improper temperature, or other causes that will retard natural growth. In growing early plants in the North, we are somewhat handicapped, being obliged to furnish artificial heat. After having started and grown plants in the dwelling house for several years, and found that the temperature varies more than it should, that many drafts are destructive, that the air is generally too dry, and there is a lack of a sufficient amount of sunlight, I am prepared to state to all gardeners, whether large or small, that a greenhouse is absolutely necessary to obtain the best results. Please do not misunderstand me in saying that a greenhouse is absolutely

necessary. I well know that plants can be grown in the common dwelling house, and possibly very good plants, but they are not the best, and if we enter into this work, we certainly want to produce the best plants possible.

The building of the greenhouse does not necessarily call for a great outlay of money. One can be built by any gardener who is a mechanic enough to do a part of the work himself for about one hundred dollars. This will build a greenhouse eleven by thirty feet, which will answer all purposes for starting about forty thousand plants. Such heating arrangements may be installed as you choose. I prefer hot air, using stoves placed about one-third the distance from one end of the house with pipes running under the beds, which will give sufficient bottom heat. During sunshiny weather, no fire is needed. Have the stoves one-third the distance from the end of the building, running the other two-thirds of the pipe directly under the bed, so that you get the bottom heat from these pipes. One reason why I like stoves is that, during sunshiny weather, you can allow the fires to drop and the temperature will remain right by proper airing of the house.

SOWING SEED

I will first speak of the sowing of the seed. Of course, all understand that soil made up of heavy loam, leaf mold, and fine sand is the best. This should be well fined and sifted before using it to start most plants. I prefer sowing the seed in flats, then when at the proper size removing to other flats, greenhouse beds, or hotbeds, to finish their growth before setting in the field.

Many, when sowing seeds in flats, sow broadcast, which does not give the best results, as this does not give an even growth, and also there is a greater loss of damaged plants at the time of removal. For these reasons and others, I recommend all seeds to be sown in rows, whether in flats or beds, allowing the sunshine to better reach the plants and make them the same size at the same age. I found some difficulty at first in having all good seeds to germinate, owing to uneven depth of covering. This was overcome by using an implement made by nailing small cleats on the bottom of a board, the size of the flats used. Fill the flat full of soil, then press the board upon it firmly. This will leave a firm, square-bottomed trench for seeds to be sown in.

I am well aware that many will differ with me on this point. I have noticed different gardeners who had been in the business for years, and many of them sow broadcast. It has been my privilege to visit some of the large greenhouses in Massachusetts and see the plants that they were about ready to prick out into beds, and surely I have seen many that I have considered absolutely worthless, the condition usually caused by sowing the seed broadcast.

COVERING

Next, the covering of the seed. We have known of many plant growers who have lost a large per cent of the young plants by the disease called damping off. Many articles have been written on this, and suggestions made how to save the plants, but many have failed. I think the most universal remedy is to transplant, using a sharp sand about the plant at the surface of the earth. This being so, we recommend covering the seed in these trenches with sand in the beginning, so as to avoid further trouble. Then press firmly down with another smooth board, the same size as the flat. Now then, when seeds are sown in this way, if given the same temperature on both sides of the flats, all shoots will break the ground at the same time and should all keep about the same size. Great care should be used in watering, and experience only will tell you how.

There is one other matter. I think damping off has tended to give a greater loss where the seeds are sown broadcast; for it does not allow the sun to get at each side of the plant as well as when sown in rows. Some would say that this is too much work. I presume if I were growing millions and millions of plants, I should look at the matter in the same way, but how people can grow plants at the prices they do, I can hardly see.

In sowing the seed, I have tried many methods, and usually at first I started by having a little board which I pressed into the soil of the flats. This would make a sharp bottom in the place to sow the seeds. Unless you are careful, those seeds would be in bunches, and would not germinate properly. More than that, it is almost impossible to place one of these cleats in the soil without going deeper at one end than the other. Then I made the implement mentioned above, and found that with this the seed was distributed evenly.

We believe that in sowing seed in these rows, if your flats are kept turned so that one side or the other does not receive a higher temperature, there will be a more even germination than in any other way;

and in transplanting, there will not be the loss that there will if plants in one part of the flat are large, perhaps over size, and others so small that one can hardly feel justified in transplanting them. If one is smaller than the other, it does not have a chance for life. Light, heat, everything is against it, and it will not grow as it should.

CARE AND TRANSPLANTING

The growing of these small plants is of great importance, and if we want plants that will produce the greatest amount, care must be given them, not allowing anything to stop the growth from now on, but insuring a steady growth which will give good color and good plants. Hotbeds may be used at a good advantage to finish the growth of celery, tomatoes, lettuce, and some others. Cabbage and cauliflower plants may be set in rows placed thickly in the open ground for finishing, if night protection is given them. We feel justified in saying that all plants should be transplanted at least once, to increase the root system.

All plants should be producers. No blanks should appear in the garden and may be avoided by carefully looking at and discarding all ill-shaped plants before setting in the open fields. We might speak of potted plants, but unless very carefully grown, I believe these will seldom produce as much as those that have been re-set and pruned.

The fruit growers of today advocate the pruning of all large roots, which will cause the throwing out of smaller ones, and thus increase the feeding system. If you doubt this, take a strawberry plant with long roots, and cut from one side about one-third of the roots, leaving the remaining ones at the usual length. Set this plant and watch it for three or four weeks. Dig it up as often as you choose. You will find that on the side that has been pruned it is full of very small roots that have been caused by cutting, which makes more feeders than providing the roots were left at their usual length.

PLANTS FOR SALE

We will suppose what plants are grown by this method are to be used by the gardener himself, but a considerable amount of income can be received by adding flowering plants, such as asters, petunias, verbenas, zinnias, pansies, and possibly a few other bedding plants, to sell in addition to the vegetables such as tomatoes, celery, cabbage, and cauliflower, for the local trade. However, we must remem-

ber that such plants should not be sold at the low price of many who raise them by the hundreds of thousands, regardless of their productiveness. Flowering plants that will produce flowers will surely sell at twice the price of those carelessly grown. Possibly at first you may have some difficulty in selling until their superior quality is known. I have no trouble in selling many thousand plants at the following prices:

Tomatoes	$ .50 per dozen plants
Celery	.90 per hundred plants
Cauliflower	1.00 per hundred plants
Cabbage	.50 per hundred plants
Pansies in bloom	.50 per dozen plants
Asters, Petunias, Verbenas, Zinnias	.25 per dozen

Some of these prices may seem too high and possibly some of them too low. However, a progressive gardener should be able to regulate prices that will meet the approval of his customers. We believe now is the golden opportunity for the young people to engage in the growing of fruits and vegetables. With the advanced teaching of agriculture in our public schools, county and state agricultural colleges, we feel sure those who have a desire for such training can receive it at very small cost. Those engaged in this same business today should encourage and aid all by cooperating with them in every way possible.

Let us remember that what we may do for the benefit of the future generation may be of more value than what we are accomplishing today.

REPORT OF COMMITTEE ON LEGISLATION

E. A. Tuttle, Chairman, Eastport, New York

Mr. Tuttle: I have very little to say as chairman of that Committee, but perhaps it is proper to say that there is a good deal of work being done along legislative lines in which I am interested with various organizations which is of interest to the vegetable growers. The State Agricultural Society and the New York State Food Investigating Committee have been working on matters of legislation. There is legislation now pending in Albany which is of very great interest to the vegetable growers of the state. One bill is on the subject of co-operation. Another concerns the subject of easier and freer farm loans, a co-operative system of farm banks. There is also the legislation to regulate the commission men in their business of handling farm produce in New York City, requiring them to give a bond of indemnity and surety, and to make prompt returns of the sales of produce, giving the name and address of the purchaser. This same bill includes a permissive grading of produce from the farm, and then places heavier returns on that graded stuff when it comes to the market. These bills were before the joint Committees on Agriculture in the Legislature two weeks ago. I was there, and the bills were supported by everyone who was there. The commission men, of course, are going to oppose the bill requiring them to take out a license and to give a bond. I want to say and am glad to say that the agricultural committees of both the Senate and Assembly are with us. We have some splendid men in the Assembly this year. We have farmers, all of them big, broad men who know our requirements. When these matters come into the chamber, the work of the other fellow may count for more, and when they come to the Governor, you have another unknown quantity. But something is going to happen. The commission men have beaten us three or four times on the commission bill. I don't think they will beat us this year. There is an effort being made to get an appropriation for a vegetable range in connection with a floral range to be established here at Cornell for experimental work.

THURSDAY AFTERNOON, FEBRUARY 13

VEGETABLE DISEASES—ROUND TABLE

Led by DONALD REDDICK, Ithaca, New York

DR. REDDICK: In order to introduce the subject of vegetable diseases and possibly recall to your mind some of the troubles you had last summer, I desire to present to you a few of the things we have learned about some vegetable diseases during the past year or two.

ONION SMUT

The first disease to which I wish to call your attention today is by no means a new one. It is, however, new to up-state onion fields, or at least has not heretofore been of sufficient importance to have caused particular anxiety or loss to growers. The onion smut has been a serious consideration in Connecticut for over forty years. Professor Thaxter ('90), who was formerly connected with the Connecticut Experiment Station, published the first extensive account of the disease, although Dr. Farlow's ('77) description and illustrations antedate this by more than ten years. In 1895, Messrs. Sirrine and Stewart ('00) began a study of the disease in Orange County. Experiments were continued for five years, and in 1900 Bulletin 182 was published from the Geneva Station. The disease has been destructive in Ohio for a number of years and Professor Selby ('01 and '02) has published two short bulletins on the subject. The disease is also known to occur in some of the southern states. Recently onion smut has been found about Canastota, Williamson, and Fulton, and in some instances has caused considerable damage, and indeed in certain fields has made onion growing unprofitable.

('90) Thaxter, R. The smut of onions. Conn. Agr. Exp. Sta. Rpt., 1889: 129–153. *pls.* 1–3. 1890.

('77) Farlow, W. G. The onion smut. Abstract of returns of the Agricultural societies of Massachusetts 1876: 164–176. *Pl. 1.* 1877. In Rept. Mass. Board Agr. 1876.

('00) Sirrine, F. A. and Stewart, F. C. Experiments on the sulphur-lime treatment for onion smut. N. Y. (Geneva) Agr. Exp. Sta. Bul. 182: 145–172. Figs. 1-2. 1900.

('01) Selby, A. D. Onion Smut. Ohio Agr. Exp. Sta. Bul. 122: 71–84. 1901.

('02) Selby, A. D. The prevention of onion smut. Ohio Agr. Exp. Sta. Bul. 131: 47–51. 1902.

"The smut of onions first appears to the naked eye as a dark area in the leaf, which finally bursts, letting out the black, powdery mass of spores" (Thaxter).

It may be readily recognized by the dwarfed and sickly condition of the plant, and particularly by the presence of black smutted masses in the leaves and on the bulb itself. In extreme cases, the foliage is entirely killed and most of the bulb is converted into a smutty mass.

The disease is caused by a fungous parasite, *Urocystis cepulæ* Frost. The smutty portion of the bulb is composed almost entirely of spore balls of the fungus, a single smutted onion often containing several million spores. The spore balls are exceedingly small, measuring only eighteen to twenty microns (about $\frac{1}{1200}$ of an inch) in diameter. Although seed onions are not affected, the spore balls are very frequently found adhering to the seeds of the onion, according to Chapman ('10) of Massachusetts, and are doubtless commonly carried from place to place in this way. The spores are very resistant bodies, enduring extreme weather conditions and retaining their vitality for many years. Professor Thaxter notes seemingly well authenticated cases where the spores have lived in the soil for twenty-five years. When a smut spore is placed under favorable conditions of heat and moisture, conditions, for example, which are favorable for the sprouting of onion seeds, it germinates by a hair-like tube. This germ tube or thread may possibly penetrate the tender leaf directly. It usually branches and bears at the tips secondary spores, which are short lived, but which germinate readily and thus increase the possibilities of infection. The exact method of infection is a matter now being studied by Mr. Jagger. It is at least certain, as in the case of oats, that infection of the onion occurs while the plant is in the seedling stage. This usually takes place before the first leaf is out of the ground and rarely occurs after the plant is three or four inches high.

Just why all the spores do not germinate at the same time is not quite clear, but it is certain that some lie for several years in the soil and eventually produce infection. It might be thought that nearness to a germinating onion seed would exert an influence on them, but often they may be germinated in a drop of water on a glass slide.

('10) Chapman, Geo. H. Notes on the occurrence of fungous spores on onion seeds. Mass. Agr. Exp. Sta. Rpt. 22: 1910.

There are several methods of control open for consideration, although some of them are not applicable to our most usual system of growing onions. Rotation of crops is said to be a means of reducing the amount of smut, but from what has been stated above, soil can not be freed from the disease in this way. Onions grown from sets and transplants are not subject to the disease. The proposition of transplanting onions has been suggested in Connecticut and urged by Sirrine and Stewart, but so far as the speaker has been able to determine, has not been practiced except in connection with the production of an early crop by the market gardener. The treatment of seed has not been practiced in any place. In view of the fact that the spores of the fungus are carried on the seeds, it would seem highly desirable to treat seed for fields in which the disease has not yet appeared. Some strength of formalin would doubtless prove effective, and if there were a demand for it, the exact strength could be determined easily.

Professor Thaxter tried several soil treatments, and fortunately, the first year of experimentation, found certain substances quite effective in controlling the smut. The combination which seemed to be most effective and the one which has been used most since that time is a mixture of sulphur and lime. Sirrine and Stewart followed up the sulphur and lime treatment in Orange County with excellent results. Various quantities were tried, but after five years' experimentation, they finally recommended the use of one hundred pounds of sulphur and fifty pounds of air slaked lime per acre. This is to be applied in drills by means of a special attachment. Broadcast applications prove ineffective. It should be noted in this connection that the treatment does not give perfect control. In 1898, for example, the treated plats showed by actual count twenty per cent. of smutted plants. The untreated plats, however, gave seventy-two per cent. smutty plants. It should be noted that the treatment is more effective when there is a great amount of smut in the soil. Up to a certain limit, one can overcome the smut difficulty by planting more seed but when ninety per cent. of the plants come smutty, it becomes rather expensive and practically an impossibility to plant so much seed.

The sulphur seed drill devised by Sirrine and Stewart for the Orange County growers was constructed for them by a Mr. Hoffman of Florida, New York. The drill has been slightly improved since then. I exhibit here the drill as made by Mr. Hoffman at the present time.

Following along the same idea of sterilizing a portion of the soil in the immediate vicinity of onion seeds, Professor Selby of the Ohio Experiment Station, in 1901, reports on the use of formalin for this purpose. A drip attachment to the drill was developed by Professor Selby which applies the diluted formalin as desired. I regret that I have not such an outfit for exhibition here today.

The past summer Mr. I. C. Jagger, a fellow in the department of Plant Pathology, has made some comparisons of the various treatments at Williamson, New York, the results of which may be of interest. It should be remembered, however, that these are the results of a single season, and it would be unwise to rely absolutely upon them except in so far as they are a confirmation of results already obtained by others.

ONION SMUT EXPERIMENT AT WILLIAMSON, 1912

Treatment given	Number of rows treated	Computed average yield per acre in bushels
Sulphur 100 lbs. per acre	2	351
Sulphur 100 lbs., lime 50 lbs	4	379
Sulphur 200 lbs., lime 100 lbs	4	423
Sulphur 400 lbs., lime 200 lbs	2	605
Formalin 150 gals., 1% solution per acre	3	392
Formalin 300 gals., 1% solution per acre	3	497
Untreated	6	200

The difference between the yields from plats treated according to the method of Sirrine and Stewart (sulphur 100 lbs. lime 50 lbs.) and that from the plat treated according to Selby's recommendation (150 gallons one per cent. formalin) is practically negligible, and is probably well within the range of experimental error, since the probable error in this experiment is rather high. Either of the treatments gave approximately one hundred eighty-five bushels increase per acre. The cost of treatment per acre is as follows: 100 lbs. sulphur $1.50, 50 lbs. lime $.40, total $1.90; or 12 pints formalin of 40% strength (1% formalin is one pint of formalin in 12½ gallons of water) at 11 cts. per pint (in carboy lots) $1.32. The bother of application is about the same in either case but depends somewhat upon the accessibility of water for the formalin solution.

Doubling the quantities of the fungicide should not receive too serious consideration until after at least another year of experimentation. This work is to be continued by Mr. Jagger, and he is desirous of starting a number of co-operative tests with growers.

So much for the smut treatment of onions. I should be glad to know of other places in the state where the smut occurs. I haven't a

doubt that it gets in through the seed, and I think it is quite possible that the smut is more widespread in the state than we now know. While seed onions are grown entirely separately from field onions, nevertheless, in the seed work inspection in Massachusetts, it was found that there is always a certain amount of smut spores in the onion seed.

MR. GREFFRATH: Could those germs be killed by a treatment of the seed?

DR. REDDICK; They could be killed. I should think it would be a good thing if you have not any smut in the field to treat the seed, though I cannot tell you what strength of formalin to use, nor how long the treatment should continue.

MR. GREFFRATH: Would that be good for maggots?

DR. REDDICK: I do not think so. The one point that ought to be impressed if we are going to use the sulphur treatment or any treatment is that it must be right in the row with the seed.

QUESTION: What form of lime is called for there?

DR. REDDICK: It is air-slaked lime.

CELERY LEAF BLIGHT

Celery is a crop that I presume a number of you are interested in. Practically every year we have the celery leaf blight, both early and late. Celery this year that I saw in storage by the carload from many places in western and northern New York was almost invariably infected with the late blight fungus. We selected two different places in northern New York last year for celery spraying experiments, and I believe that those are the only two places in the state that there was no late blight. I am not recommending this as a method of treatment, but possibly if you could get one of our boys to come to your place, he would keep the blight away for you. Nevertheless, it has been demonstrated satisfactorily that the blight can be handled readily by the use of Bordeaux Mixture. Those growers who have the blight with them seriously every year plan to spray with Bordeaux to keep the new growth covered. The number of sprayings depends upon how fast the plants are growing. If the new leaves are pushing up in the centers and spreading out rapidly, he must spray more frequently. If dry weather is holding the plants back, then the sprayings do not have to be so frequent. It is purely a matter of

judgment. Spraying in every case is protective in nature, that is it is a preventive and has no virtue whatever for curing plants that are already infected. I should point out one thing always to be remembered, namely, that the period intervening from the time of entrance of the germ tube of the spore into the leaf until the time when you can see the spot is a good many days, in some cases as long as three weeks.

STORAGE ROT OF CELERY

The rot of celery in storage has been an important problem the past season. The disease is often referred to as pink rot on account of a characteristic pinkish discoloration which appears at a certain stage in the decay of the stalks. The disease most often starts at the "leaf joints," especially where leaflets are broken, but may appear at any slightly bruised place on the stalk. The affected leaves become soft, turn pinkish, then brown, and finally are a slimy, decayed mass. The fungus responsible for this trouble is a species of *Sclerotinia*, probably *S. libertiana*, a common rot producer.

This past fall I was in a storage house on a Saturday when the manager told me that a certain car of celery looked to him as if it was going down. The next Saturday he called me on the telephone and told me it was in bad shape and sent me a crate, which, when it reached here, was in an advanced stage of decay—all of the outer leaves rotten. The same day that this car of celery was received at storage, another one came from another source. The temperature of the cars was taken and was found to be fifty-six in each case. The two cars were unloaded and placed in the same room on the same day. One went down just before Thanksgiving, the other was held for the Christmas trade. The fact that the disease almost invariably starts at the broken joints and that the fungus works more rapidly during hot weather are points of great importance in control. Then, the matter of precooling of cars seems to me to be of the greatest importance of all. The cars are often delivered with ice. They are cool to be sure; then they are filled with crates of hot celery packed close together. It is known that, in the case of oranges, the cars that are simply iced, then filled and started across the country, do not get down to a temperature of forty-five until they have been five or six days on the road. That being the case, I question very seriously whether, in shipping celery which is to be on the road only twenty-four or thirty-six hours, it is worth while to bother with the ice,—but the question of precooling after the celery is actually in the car is a

different proposition altogether. That, it seems to me, is a matter that needs serious consideration, and where the muck lands are as localized as they are, for the most part, in this state, a precooling plant in the heart of the district would be well worth while, so that the temperature of the stock might be brought down to thirty-five or six before it started. Then the ice would have a chance to keep the temperature down.

THE LETTUCE DROP

We have not had any success in fighting this disease, which is caused by the same *Sclerotinia* that attacks celery, nor the stump rot—stem rot—caused by a fungus by the name of *Rhizoctonia*. A great many different kinds of soil treatments were carried out last summer. The use of sulphur, the use of sulphur-lime mixtures, the use of formalin, and various methods of soil sterilizing were employed, but none of them gave satisfactory results. About ninety per cent of the lettuce in our experimental plats went down with one or the other of these diseases. In the greenhouse, the lettuce drop—either of these fungi may be responsible for drop—can be handled satisfactorily by sterilizing the soil with steam, providing, of course, the seedling plants are free from disease. That can usually be obtained by steaming the soil in the seed bed. Apparently neither of the diseases is carried by means of the seed. In fact, there is little opportunity for that, because neither produce spores except under unusual conditions. I should be glad to explain more about the steaming of greenhouse soil if anyone desires it.

QUESTION: May I ask if the sterilizing is of more benefit to some soils than to others?

DR. REDDICK: I think likely.

A MEMBER: My soil is a clay loam, and the crops did not do well at all after sterilizing.

MR. COOK: Do you think that pink rot is the same that attacks the root of the celery in storage?

DR. REDDICK: No, I believe that is a different disease. I think that is the *Rhizoctonia* disease. Do any of you have mildew on the lettuce leaves?

MR. WRIGLEY: A little. We use the sulphur vapor. I have one house which would drip more or less in wet weather, and it is pretty hard work to keep it down.

MR. GREFFRATH: I have had mildew on outdoor lettuce. It appears in little spots, and in a very short time the entire head will be affected, especially in the fall of the year. Some six or seven years ago was the first time I noticed it on a field. I had a field of very nice lettuce, and I wanted to keep it for a later market. I arranged to cover one-quarter of an acre with a canvas during the frosty nights, and carried it through two or three very heavy frosts—down to twenty-eight—in good condition. Two heads would fill a hamper. I asked a party in New York what he would give at this time. He would give one dollar a basket. I thought it was not enough. A few days after that, I discovered some of these tiny transparent spots, and in a short time I had no lettuce at all.

DR. REDDICK: I think that disease is caused by the same fungus that makes the celery go down.

CUCUMBER DISEASES

DR. REDDICK: What about cucumbers? There was a lot of blight last summer.

PROFESSOR STEWART: What is commonly called blight is the disease in which the leaves at the center of the hill are attacked first, and turn yellow in spots. Those leaves later become dry and die, and the disease gradually works out towards the ends of the vines. There will be a few green leaves at the ends of the vines, and those back of that will be yellow. That we know as the blight or the downy mildew. One of the downy mildew fungi causes it. It may be controlled by spraying with bordeaux mixture. On Long Island in our experiments, we have had very good success in controlling it. We believe the spraying should start just about the time the plants begin to run. At first, we believe, bordeaux mixture should be used at a strength of 3–3–50, later at 5–5–50. If you use the strong solution at first, you are liable to do some injury. I believe the plants should be sprayed at intervals of about ten days through the season.

QUESTION: Would bordeaux mixture be detrimental to the cucumbers?

DR. REDDICK: Not at all. It does not do them any injury, and there is no danger of poison. Where pickled or put into the salting house, what is on them readily disappears.

CLUB ROOT

A MEMBER: I would like to ask if it is considered safe to plant cabbage more than two years on the same land for fear of club root.

DR. REDDICK: I should not think it would be safe.

A MEMBER: We manure very heavily for our early cabbage, and just as we get the land in the condition we want it for a good crop, we have to move off.

DR. REDDICK: The disease could be kept down by the use of lime.

A MEMBER: We did lime heavily a year ago last fall.

DR. REDDICK: Next year you ought to begin to see results from it. How much did you use?

A MEMBER: Close to a ton of ground limestone.

A MEMBER: A ton of burnt lime would be none too much for club root.

DR. REDDICK: Possibly there is the difficulty, you did not use enough.

QUESTION: Would it be safe to use the land again after three years?

DR. REDDICK: Three years is not long for the club root. I would keep off it, if I could.

MR. GREFFRATH: I have had quite a good deal of trouble with maggots in carrots, and I would like to find a remedy for them. I also had that same experience one year with beets. Apparently the same maggot attacked them and ruined my entire crop of three acres. I did not see the trouble the year before or the year after. The maggot in the beet would just work on the crown that was exposed above the surface of the ground, and all the leaves would die right down.

DR. REDDICK: I do not know anything about that. I never saw it.

MR. GREFFRATH: We had an experience in onions last year that we had never seen before. During the early part of August and up to about the fifth, our crop was a magnificent sight. The foliage was very tall. Then little spots of blight appeared here and there, and we had several days of foggy weather. When that fog lifted, our entire onion fields were black, and in a short time the leaves dried down. As the wind passed over the field, it would raise a regular black cloud. I wonder if anybody has had experience with that kind of blight. What is it?

DR. REDDICK: The black cloud was composed of great quantities of fungous spores. If you have an enormous quantity of spores developed there might be enough to make a cloud.

SPRAYING ONIONS

MR. GREFFRATH: Has anybody successfully sprayed onions?

MR. STEWART: I don't know much about that.

DR. REDDICK: Professor Whetzel thought he got some results in onion spraying some years ago. Last summer we used a number of dust mixtures on onions. We put some on so that the leaves were thoroughly coated with the mixture. Yet when the next big rain came, it probably washed the dust off, and we got a tremendous infection. Effective dusting would be the ideal way to handle onion spraying.

MR. GREFFRATH: Do you think it would stick as well as the bordeaux if properly applied?

DR. REDDICK: The difficulty in applying a liquid spray in an onion field almost makes that out of the question.

MR. GREFFRATH: That is a thing I found several years ago. I had been trying to spray onions. I made up my mind I was going to have some way of spraying onions the next year. I took the matter up with spray apparatus manufacturers, and investigated power machines that would run a large number of nozzles. They were all too heavy and clumsy. I am now having a rig made by the E. C. Brown people of Rochester. This will be drawn by two horses and will hold one hundred fifty gallons of mixture. I am having pumps put on it large enough so that it will deliver mixture enough through eighteen nozzles at one hundred fifty pounds pressure. These nozzles will be extended over a boom. This rig is suspended on two wheels. As my beds are in narrow strips seventy-five feet wide, I am going to plant two rows of celery, and divide my onion bed into three sections. The beds will be one hundred twenty rods long. My plan would be to plant a late variety of celery after the onions were well established. I would straddle the row with my machine. There will be onions on each side. Going down and back, everything will be covered except the outside. In order to spray that, I disconnect the pump and attach it on the other side. I believe if I can get a mixture that will make that bordeaux stick on onions, by setting my nozzles right, I ought to cover every part of the onions thoroughly.

DR. REDDICK: I think Mr. Rogers has been planning to do something of that sort.

MR. GREFFRATH: I heard Mr. Rogers said he had tried it and failed.

PROFESSOR WHETZEL: I would like to ask a question: Have you ever had experience in spraying onions?

MR. GREFFRATH: About seven years ago I made a rig that we pumped by hand. I had twelve nozzles. I could not get pressure enough.

PROFESSOR WHETZEL: Did the stuff stick?

MR. GREFFRATH: No.

PROFESSOR WHETZEL: What are you going to make it stick with?

MR. GREFFRATH: I am trying to find some sticker.

PROFESSOR WHETZEL: I sprayed onions all one season, using all kinds of stickers. I was never very well satisfied with the results as far as sticking was concerned. The problem is one of a sticker. If you can make the stuff stick, I think you can control the blight. I believe you will have to begin to spray onions much earlier than has been done in the past.

MR. GREFFRATH: If we examine our onions early in the morning, we find them wet with dew from top to bottom. There is some way of applying moisture so every part is covered. I believe the solution is in getting it on in a fine mist.

DR. REDDICK: Are you going to have a gasoline engine?

MR. GREFFRATH: I have horse power.

PROFESSOR WHETZEL: The dew goes on in a different fashion. The difficulty with the spray is to put on just enough and not a drop more. That is a good deal more difficult than it seems to be. We talk about putting a spray mixture on in a fine mist. That is the ideal condition, but it is mighty seldom any spray mixture is put on in exactly that fashion. I feel satisfied that my failure to control the blight was largely due to the fact that I could not move the nozzle at the right rate to just cover the plants and no more. The other solution is to find some kind of sticker which, even if you do drench the tops, will distribute it over the surface. A resin-sal-soda solution did the best of anything I ever used. However, not only were the onions stuck up, but the man who sprayed and everything else.

DR. REDDICK: I can cover with dust absolutely. The question is to find some way of making this stay on.

MR. GREFFRATH: Is there a machine which will apply that on a large scale?

DR. REDDICK: Yes. With the narrow strips you have, you can straddle the ditch and cover the whole field. It is surprising how that dust will carry.

MR. GREFFRATH: Who makes a dust machine?

DR. REDDICK: There are only two machines that I know of, one made by the Kansas City Dust Sprayer Manufacturing Company, and the other by the Childs Company of Utica.

PROFESSOR WHETZEL: I might say another word about onion mildew. That was one of the first propositions I tackled, and I put in hard work for two years. It always seemed to me that there must be some way of controlling that disease, and if we could control it, we would increase the average yield one-quarter to one-half. My observation satisfied me that the reduction of yield the onion growers complained of was largely due to that disease. Many men did not know they had the disease. It came on rather late, and cut down the growth tremendously. My observation is that every season we have been looking for this disease we have found it. So far as the disease end is concerned, the blight is the biggest.

MR. COOK: Is there anyone here who has been troubled badly with onion thrips?

MR. GREFFRATH: I was informed last fall by an agent that the Alphonso Company, composed of two young men from South Lima who are operating successfully on a large scale at Great Meadows, had sprayed for onion blight with good results. I asked them what they did and how they did it. They said the man that informed me was mistaken. Blight had never bothered them much, but thrips was their great trouble. They said last year they sprayed with kerosene emulsion. They used a soap sticker, and had marvelous success.

DR. REDDICK: I have seen Professor Herrick's onion experimental work. The difficulty was not to kill the thrips, but to hit them. Where the top had broken over, one would always find some left.

THE SPEAKERS

1911, 1912 AND 1913 MEETINGS

C. H. Aldrich, President, Long Island Cauliflower Association, Mattituck, New York.

L. H. Bailey, Dean of the New York State College of Agriculture, Ithaca, New York.

H. W. Baxter, Secretary, Growers' and Shippers' Exchange, Rochester, New York.

A. C. Beal, Acting Head of the Department of Horticulture, New York State College of Agriculture, Ithaca, New York.

W. L. Bonney, of Bonney & Ware, muck land vegetable growers, Batavia, New York.

W. R. Cobb, Lord & Burnham Company, New York City.

S. J. Cook, Secretary of the South Shore Growers' and Shippers' Association, and a successful grower, Dunkirk, New York.

L. C. Corbett, Horticulturist, Bureau of Plant Industry, Washington, D. C.

G. M. Cosh, Gardener, Department of Horticulture, Ithaca, New York.

*John Craig, Professor of Horticulture, Ithaca, New York.

E. O. Fippin, Professor of Soil Technology, Ithaca, New York.

R. H. Garrahan, market gardener, Kingston, Pennsylvania.

F. E. Gott, Lecturer, State Institute force, Spencerport, New York.

Henry Greffrath, grower of muck land vegetables, South Lima, New York.

H. F. Hall, market gardener and greenhouse vegetable grower, Brighton, Massachusetts,

E. H. Hallett, market gardener, president of the Vermont Horticultural Society, St. Johnsbury Center, Vermont.

M. H. Holmwood, president and manager of the Erie County Growers' and Shippers' Association, Orchard Park, New York.

R. O. King, King Construction Company, North Tonawanda, New York.

C. D. Le Van, vegetable and plant grower, Sanborn, New York.

Donald Reddick, Assistant Professor of Plant Pathology, Ithaca, New York.

C. W. Waid, greenhouse vegetable grower, New Carlisle, Ohio.

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*Deceased

*W. W. Ware, of Bonney & Ware, muck land vegetable growers, Batavia, New York.

G. P. Warren, Professor of Farm Management, Ithaca, New York.

R. L. Watts, Professor of Horticulture, Pennsylvania State College, State College, Pennsylvania.

H. J. Webber, Professor of Plant Breeding, Ithaca, New York.

Chauncey West, greenhouse vegetable grower, Irondequoit, New York.

C. R. White, vegetable grower, Ionia, New York.

A. E. Wilkinson, Instructor in charge of extension work in Vegetable Gardening, Ithaca, New York.

Paul Work, Instructor in Vegetable Gardening, Ithaca, New York.

In Memoriam

JOHN CRAIG

Professor John Craig died at his summer home at Siasconset, Massachusetts, August 10th, 1912. He is survived by Mrs. Craig and one son, Arthur. He was born at Lakefield, Quebec, in 1864. Receiving his early training in Montreal, he was graduated in Agriculture from the Iowa State College in 1887, and his master's degree was conferred by Cornell University in 1898. From 1890 to 1897, Professor Craig was Horticulturist of the Dominion Experimental Farms of Canada. He then became Professor of Horticulture at the Iowa State College, where he remained for two years. In 1900 he came to Cornell to take charge of the extension work. He continued in this position until 1903, when he became head of the Department of Horticulture. This position he held until his death. Professor Craig was a horticulturist in the broadest sense of the term. Few, if any, have been better informed than he upon all the varied phases of pomology, vegetable gardening, floriculture, landscape work, and civic improvement, while during the later years of his life he had given much attention to one of the newer fields, the culture of the edible nuts. Professor Craig felt a deep interest in vegetable gardening, and he was much interested in the progress of this line of work, both in the University and in the state as a whole. He maintained his active interest in the work of his Department up to the very end of a heroic fight for the recovery of his health.

Professor Craig was one of the founders of the New York State Vegetable Growers' Association, having signed the original call, and he acted as temporary chairman of the first meeting. It was through him that the co-operation of the Department of Horticulture was extended to the newly formed society, and he will ever be remembered as one of those who took a leading part in the launching of the organization.

BERT HARTRANFT

Mr. Bert Hartranft died at Cortland, September fourteenth, 1912, aged forty-nine years. Mr. Hartranft began market gardening work some fifteen years ago, building a small greenhouse on a little plot of ground. By increasing the working area of his land and by extending his greenhouses, he was just bringing his plant to the point where he could nicely supply his trade. His last and largest greenhouse was not quite completed at the time of his death. Mr. Hartranft was one of those who work at gardening not merely because there is money in it, but just as much because he enjoyed it.

Mr. Hartranft is survived by a widow and two sons. He was a member of the Odd Fellows.

CONSTITUTION OF THE NEW YORK STATE VEGETABLE GROWERS' ASSOCIATION

ORGANIZED 1911

ARTICLE I

NAME

This organization shall be known as the NEW YORK STATE VEGETABLE GROWERS' ASSOCIATION.

ARTICLE II

OBJECT

The object of this Association shall be to organize and federate the interests of those engaged in vegetable growing to the end that larger crops of constantly improving quality may be grown and marketed with increased profit.

ARTICLE III

MEMBERSHIP

Sec. 1. Membership shall be of two kinds, active and sustaining.

Sec. 2. All vegetable growers are eligible to active membership.

Sec. 3. Fees—active membership, two dollars per annum; sustaining membership, one hundred dollars.

ARTICLE IV

OFFICERS

The officers shall consist of a president, a first vice-president, and a vice-president for each county of the state represented in the membership of the Association, a secretary and a treasurer.

ARTICLE V

EXECUTIVE COMMITTEE

The Executive Committee shall consist of the president, the secretary, and three members elected at large who shall represent as far as possible the different phases of the vegetable industry of the state.

ARTICLE VI

COMMITTEES

Sec. 1. The standing committees shall be as follows: Marketing, Transportation, Legislation, Investigation, Federation. They shall consist of three members each, appointed by the president. In appointing these committees for the first time, the president shall designate one member of each committee for one year, one member

for two years and one member for three years. Thereafter the incoming president shall appoint one member of each committee to hold office for three years, or until his successor is appointed.

Sec. 2. Special committees may be appointed by the president from time to time as occasion may arise.

ARTICLE VII

TERMS OF OFFICE AND ELECTIONS

Sec. 1. The president, vice-president, secretary and treasurer shall be elected by ballot at the annual meeting to hold for one year or until successors are elected.

Sec. 2. The members from each county shall elect a vice-president for such county to serve for one year, and shall report his name to the secretary at the annual meeting.

Sec. 3. The members of the first Executive Committee shall be elected by ballot, one for one year, one for two years, and one for three years. Thereafter at each annual meeting one member shall be elected to serve for three years.

ARTICLE VIII

FEDERATION

Any local or district organization representing vegetable growers may become affiliated with this Association by the appointment of an official representative, and the payment of an annual fee of five dollars. It shall be the duty of the Committee on Federation to promote the formation of such local organizations, and secure the affiliation of these and existing organizations, with the State Association.

ARTICLE IX

AMENDMENTS

This Constitution may be amended by a majority vote at any annual meeting, provided such amendment shall have been presented in writing at the last preceding annual meeting.

BY-LAWS

ARTICLE I

MEETINGS

Sec. 1. The annual meeting of this Association shall be held at such time and place as may be designated by the Executive Committee. Notice of the annual meeting shall be mailed to each member not less than thirty days before the date of such meeting.

Sec. 2. Special meetings may be called by the Executive Committee when it is deemed necessary.

ARTICLE II

DUTIES OF EXECUTIVE COMMITTEE

The Executive Committee shall have general charge of the business of the Association, and shall prepare a program for the annual meeting.

ARTICLE III

REPORTS OF OFFICERS AND STANDING COMMITTEES

The president, secretary and treasurer, and each standing committee shall make a report to the annual meeting each year.

ARTICLE IV

FINANCE

The necessary expenses of this society shall be paid by the treasurer on properly submitted vouchers approved by the president. The treasurer shall submit at the annual meeting a detailed statement of such expenditures, which shall be passed upon by an auditing committee appointed by the president.

ARTICLE V

INVESTIGATION

It shall be the duty of the Committee on Investigation to study the problems upon which the vegetable growers of the different sections of the state most need help, and to take measures to secure the investigation of these problems. In its annual report it shall include a review of investigational work of the current year.

ARTICLE VI

VACANCIES

Vacancy in any office or committee shall be filled by the president for the unexpired term.

ARTICLE VII

ORDER OF BUSINESS

The order of business for the annual meeting shall be:

Roll Call
President's Address
Reports of Officers
Reports of Committees
Papers and Discussions
Unfinished Business
New Business
Election of officers
Adjournment

ARTICLE VIII

AMENDMENT

These By-Laws may be amended at any annual meeting by a majority vote.

OFFICERS AND COMMITTEES
1911-1912

Officers

President, - - - - - C. R. White, Ionia
Vice-President, - - - M. H. Holmwood, Orchard Park
Secretary, - - - - - Paul Work, Ithaca
Treasurer, - - - - C. H. Aldrich, Mattituck

Executive Committee

President and *Secretary*, *Ex-officio*,
Ezra A. Tuttle, *Chairman*, Eastport
G. M. Keller, Brighton
W. L. Bonney, Batavia

Committees

Co-operation.—M. H. Holmwood, Orchard Park; C. H. Aldrich, Mattituck; C. G. Locke, Arkport.

Investigation.—T. Greiner, La Salle; H. B. Fullerton, Medford.

Legislation.—Ezra A. Tuttle, Eastport; J. M. Lupton, Mattituck; C. West, Irondequoit.

Marketing.—H. W. Baxter, Rochester; C. H. Moore, Binghamton; H. R. Talmage, Riverhead.

Transportation.—W. F. Hallauer, Irondequoit; C. C. Mowris, South Lima; R. H. Dayton, Northport.

1912-1913

Officers

President, - - - - - C. R. White, Ionia
Vice-President, - - - M. H. Holmwood, Orchard Park
Secretary, - - - - - Paul Work, Ithaca
Treasurer, - - - - C. H. Aldrich, Mattituck

Executive Committee

President and *Secretary*, *Ex-officio*,
G. M. Keller, *Chairman*, Brighton
W. L. Bonney, Batavia
Ezra A. Tuttle, Eastport

Committees

Co-operation.—M. H. Holmwood, Orchard Park; C. H. Aldrich, Mattituck; C. G. Locke, Arkport.

Investigation.—T. Greiner, La Salle; H. B. Fullerton, Medford; E. D. Hunter, Florida.

Legislation.—Ezra A. Tuttle, Eastport; C. West, Irondequoit.

Transportation.—W. P. Rogers, Williamson; C. C. Mowris, South Lima; E. R. Hay, Clyde.

1913-1914

Officers

President,	C. R. White, Ionia
Vice-President,	Henry Greffrath, South Lima
Secretary,	Paul Work, Ithaca
Treasurer,	C. H. Aldrich, Mattituck

Executive Committee

President and Secretary, Ex-officio
W. L. Bonney, *Chairman,* Batavia
Ezra A. Tuttle, Eastport
Chauncey West, Irondequoit

Committees

Co-operation.—M. H. Holmwood, Orchard Park; C. H. Aldrich, Mattituck; S. J. Cook, Dunkirk.

Investigation.—T. Greiner, La Salle; H. B. Fullerton, Medford; E. D. Hunter, Florida.

Legislation.—Ezra A. Tuttle, Eastport; C. O. Warford, Newburgh; J. G. Hills, Newtonville.

Transportation.—W. P. Rogers, Williamson; C. C. Mowris, South Lima; Frank W. Folsom, Orchard Park.

Seed Service.—Henry Greffrath, South Lima; Edward Arnts, Syracuse; Paul Work, Ithaca.

Federation.—S. J. Cook, Dunkirk; Frank T. Tighe, Newburgh; James Simmons, South Lima.

LISTS OF PUBLICATIONS ON VEGETABLE TOPICS

The following lists were prepared by Mr. T. Greiner, Chairman of the Committee on Investigation.

BOOKS

A. B. C. of Potato Culture, *W. B. Terry*, Orange Judd Co	$ .50
Asparagus, *F. M. Hexamer*, Orange Judd Co	.50
Asparagus Culture, *Barnes & Robinson*, David McKay	.50
Bean Culture, *Sevey*, Orange Judd Co	.50
Book of Vegetables and Garden Herbs, *French*, The Macmillan Co	1.75
Cabbage, Cauliflower, and Allied Vegetables, *Allen*, Orange Judd Co	.50
Cabbages: How to Grow Them, *Gregory*, Orange Judd Co	.30
Carrots, Mangold-Wurzels, etc., *Gregory*, Orange Judd Co	.30
Celery Culture, *Beattie*, Orange Judd Co	.50
Celery for Profit, *T. Greiner*, Orange Judd Co	.20
Culinary Herbs, *Kains*, Orange Judd Co	.75
Farm and Garden Rule Book, *Bailey*, The Macmillan Co	2.00
Farm Gardening and Seed Growing, *Brill*, Orange Judd Co	1.00
Forcing Book, *Bailey*, The Macmillan Co	1.25
Garden Farming, *Corbett*, Ginn & Co	
Garden Making, *Bailey*, The Macmillan Co	.75
Garden Yard, *Hall*, David McKay	1.00
Gardening for Profit, *Henderson*, Orange Judd Co	1.50
Gardening for the South, *White*, Orange Judd Co	2.50
Ginseng, *Kains*, Orange Judd Co	.50
Ginseng and Other Medical Herbs, *Harding*, Orange Judd Co	1.00
Greenhouse Construction, *Taft*, Orange Judd Co	1.50
Greenhouse Management, *Taft*, Orange Judd Co	1.50
Home Garden, *Rexford*, J. B. Lippincott Co	1.00
Home Vegetable Gardening, *Rockwell*, McBride, Nast & Co	1.10
Hop, *Myrick*, Orange Judd Co	1.50
How to Grow Melons, Orange Judd Co	.20
How to Make a Vegetable Garden, *Fullerton*, Doubleday, Page & Co	2.00
How to Make the Garden Pay, *Greiner*, Orange Judd Co	1.00
Manual of Gardening, *Bailey*, The Macmillan Co	2.00
Market Gardening and Farm Notes, *Landreth*, Orange Judd Co	1.00
Melon Culture, *Troop*, Orange Judd Co	.50
Money in the Garden, *Quinn*, Orange Judd Co	1.00
Mushrooms: How to Grow Them, *Falconer*, Orange Judd Co	1.00
Mushroom Culture, *Robinson*, David McKay	.50
Mushroom Book, *Marshall*, Doubleday, Page & Co	3.00
New Onion Culture, *Greiner*, Orange Judd Co	.50
New Rhubarb Culture, *Morse & Fiske*, Orange Judd Co	.50
Onions: How to Raise Them Profitably, Orange Judd Co	.20
Onion Raising, *Gregory*, Orange Judd Co	.30
Peas and Pea Culture, *Sevey*, Orange Judd Co	.50
Peanut Culture, *Jones*, Orange Judd Co	.50
Potato, *Fraser*, Orange Judd Co	.75
Potato, *Grubb*, Doubleday, Page & Co	2.00
Principles of Vegetable Gardening, *Bailey*, The Macmillan Co	1.50
Spraying of Plants, *Lodeman*, The Macmillan Co	1.25
Squashes, *Gregory*, Orange Judd Co	.30
Success in Market Gardening, *Rawson*, Doubleday, Page & Co	1.10
Sweet Potato Culture, *Fitz*, Orange Judd Co	.50
Tomato Culture, *Tracy*, Orange Judd Co	.50
Tomato Culture, *Day*, *Cummings*, and *Root*, Orange Judd Co	.35

Truck Farming at the South, *Oemler*..... $1.00
Vegetable Garden, *Bennett*, Doubleday, Page & Co..... 1.10
Vegetable Gardening, *Green*, Webb Publishing Co..... 1.00
Vegetable Gardening, *Vilmorin & Robinson* (Eng. trans.), Orange Judd Co. 5.00
Vegetable Gardening, *Watts*, Orange Judd Co..... 1.75

PUBLICATIONS DEALING WITH SUBJECTS FUNDAMENTAL TO VEGETABLE GROWING

Elements of Agriculture, *McBryde*, B. F. Johnson Pub. Co..... $ .60
Engineering for Land Drainage, *Elliott*, John Wiley & Sons..... 2.00
Farming with Green Manures, *Harlan*, Orange Judd Co..... 1.00
Fertility of the Land, *Roberts*, The Macmillan Co..... 1.50
Fertilizers, *Voorhees*, The Macmillan Co..... 1.25
Fertilizers and Crops, *Van Slyke*, Orange Judd Co..... 2.50
Irrigation and Drainage, *King*, The Macmillan Co..... 1.50
Manures. How to Make and Use Them, *Semper*, Orange Judd Co..... .40
Practical Farm Drainage, *Elliott*, Orange Judd Co..... 1.50
Principles of Soil Management, *Lyon & Fippin*, The Macmillan Co..... 1.75
Soil Fertility and Fertilizer Hints, *Halligan*, The Chemical Pub. Co..... 1.25
Soil Fertility and Permanent Agriculture, *Hopkins*, Ginn Publishing Co... 2.50
Soils, *Burkett*, Orange Judd Co..... 1.25
Soils, *Hilgard*, The Macmillan Co..... 4.00
Soils. How to Handle, *Fletcher*, Doubleday, Page & Co..... 2.00
Soil, The, *King*, Orange Judd Co..... 1.50
Weeds and How to Eradicate Them, *Shaw*, Orange Judd Co..... .50
Weeds of the Farm and Garden, *Pammel*, Orange Judd Co..... 1.50

INSECTS, DISEASES, AND SPRAYING

Diseases of Economic Plants, *Stevens & Hall*, The Macmillan Co..... $2.00
Fungous Diseases of Plants, *Duggar*, Ginn Pub. Co..... 2.00
Insect Pests of Farm, Garden and Orchard, *Sanderson*, John Wiley & Sons 2.00
Insects Injurious to Vegetables, *Chittenden*, Orange Judd Co..... 1.50
Spraying of Plants, *Lodeman*, The Macmillan Co..... 1.25

BOTANY, BREEDING, ETC.

Plant Breeding, *Bailey*, The Macmillan Co..... $1.25
Plant Breeding, *De Vries*, Open Court Pub. Co..... 1.50
Plant Culture, *Goff*, Wisconsin Co-op..... 1.00
Plant Physiology, *Duggar*, The Macmillan Co..... 1.60

CANNING

Canning and Preserving, *Rorer*, Orange Judd Co..... $ .75
Manufacturing of Preserved Foods and Sweetmeats, *Hanson*, Orange Judd Co..... 3.00
Recipes for the Preserving of Vegetables, *Wagner*, Orange Judd Co..... 2.50

PUBLISHERS' ADDRESSES

Chemical Publishing Co., Easton, Pa.
Doubleday, Page & Co., Garden City, N. Y.
Ginn & Co., 70 Fifth Ave., New York.
B. F. Johnson Publishing Co., Richmond, Va.
McBride, Nast & Co., 31 East 17th St., New York.
David McKay, 604 S. Washington Square, Philadelphia, Pa.
The Macmillan Co., 64 Fifth Ave., New York.
Open Court Publishing Co., 623 S. Wabash Ave., Chicago, Ill.
Orange Judd Co., 315 Fourth Ave., New York.
University Co-operative Co., Madison, Wis.
Webb Publishing Co., St. Paul, Minn.
John Wiley & Sons, 43 East 19th St., New York.

BULLETINS

ASPARAGUS

Station or Dept.	Publication	Number	Titles
Cal.	Bul.	165	Asparagus.
Cal.	Bul.	172	Asparagus Rust in California.
Bur. Ent.	Cir.	102	The Asparagus Beetles.
U. S. D. A.	F. B.	61	Asparagus Culture.
Iowa	Bul.	53	The Asparagus Rust in Iowa.
Md.	Bul.	151	Fertilizers for Asparagus.
Mo.	Bul.	34	Asparagus and Rhubarb Culture.
N. Y.	Bul.	188	Spraying for Asparagus Rust.

BEANS

Cal.	Bul.	224	The Production of the Lima Bean.
U. S. D. A.	F. B.	121	Beans, Peas, and Other Legumes as Food.
U. S. D. A.	F. B.	289	Beans.
Mich.	Bul.	259	Bean Production.
Mich.	El. Sci. Bul.	1	Studies of Peas and Beans Before and After Sprouting.
S. D.	Bul.	91	Co-operative Vegetable Tests in 1904: Peas, Beans, Sweet Corn, Cabbage.

BEETS

Bur. Ent.	Bul.	109	Part 1. The Southern Beet Webworm. Part 2. The Hawaiian Beet Webworm.
Mich.	Bul.	179	Sugar Beet Investigations.
Mich.	Bul.	188	Experiments with Sugar Beets.
Mich.	Bul.	197	Sugar Beet Experiments, 1901.
Mich.	Bul.	215	Experiments with Sugar Beets in 1903.
Mich.	Spec. Bul.	8	Planting Sugar Beets.
Mich.	Spec. Bul.	10	Sugar Beets.
Nev.	Bul.	23	On Sugar Beets.
Nev.	Bul.	32	On Sugar Beets.
Nev.	Bul.	43	On Sugar Beets.
Nev.	Bul.	44	On Sugar Beets.
Nev.	Bul.	75	On Sugar Beets.
B. P. I.	Bul.	181	Curly Top of Beets.
S. D.	Bul.	106	Sugar Beets.

BRUSSELS SPROUTS

Cornell	Bul.	292	Cauliflower and Brussels Sprouts on Long Island.

CABBAGE

Ariz.	Timely Hints for Framers	96	Cabbage and Cauliflower.
Bur. Ent.	Cir.	60	The Imported Cabbage Worm.
Bur. Ent.	Cir.	103	The Harlequin Cabbage Bug.
U. S. D. A.	F. B.	433	Cabbage.

U. S. D. A.	F. B.	488	Diseases of Cabbage and Related Crops and Their Control.
Md.	Bul.	133	Cabbage Experiments and Culture.
N. Y.	Bul.	301	Screening Cabbage Seed Beds.
N. Y.	Bul.	334	Screening Cabbage Seed Beds.
N. C. Dept.	Bul.		On Cabbage Snakes.
Pa.	Bul.	96	Cabbage Strain Tests.
Pa.	Bul.	119	Cabbage Strain Tests.
S. D.	Bul.	91	Co-operative Vegetable Tests in 1904: Peas, Beans, Sweet Corn, Cabbage.
Va. Truck	Bul.	2	Some Insects Injurious to Cabbage, Cucumbers and Related Crops.
W. Va.	Bul.	120	Cabbage Worms and Suggestions for their Destruction.

CANNING

U. S. D. A.	F. B.	259	Canning Vegetables in the Home.
Mo. Dept.	Pamphlet	H	How to Can Fruits and Vegetables on the Farm.
N. C. Dept.	Bul.		Canning, Preserving, etc.

CAULIFLOWER

Ariz.	Timely Hints for Farmers	96	Cabbage and Cauliflower.
Cornell	Bul.	292	Cauliflower and Brussels Sprouts on Long Island.
B. P. I.	Bul.	225	Spot Disease of Cauliflower.

CELERY

Cal.	Bul.	208	The Late Celery Blight.
U. S. D. A.	F. B.	282	Celery.
Mo.	Bul.	38	Celery Growing.
N. J.	Spec. Bul.	Q	Some Fungous Diseases of the Celery.
N. C.	Bul.	83	Celery Growing in the South. The Culture of Onions.

CORN

Conn.	Bul.	168	Improvement in Corn.
Conn.	Ann. Rpt.	1911	Pt. VI. Inheritance in Corn.
Maine	Bul.	183	Experiments in Breeding Sweet Corn.
N. J.	Bul.	170	Experiments in Crossing Sweet Corn.
N. Y.	Bul.	130	A Bacterial Disease of Sweet Corn.
N. C. Dept.	Bul.		Many Bulletins on Corn.
S. D.	Bul.	91	Co-operative Vegetable Tests in 1904: Peas, Beans, Sweet Corn, Cabbage.

CRANBERRIES

N. J.	Spec. Bul.	K	Insects Injuriously Affecting Cranberries.

CUCUMBERS

Bur. Ent.	Cir.	31	The Striped Cucumber Beetle.
U. S. D. A.	F. B.	231	Spraying Cucumbers and Melons for Disease.

U. S. D. A.	F. B.	254	Cucumbers.
Mo.	Bul.	36	Growing Cucurbits.
Va. Truck.	Bul.	2	Some Insects Injurious to Cabbage, Cucumbers and Related Crops.

DISEASES

Maine	Bul.	164	Notes on Plant Diseases.
Md.	Bul.	143	Plant Diseases and Spray Calendar.
Pa.	Bul.	110	Control of Insects and Diseases on Horticultural Crops.
Vermont	Bul.	153	Plant Diseases, Potato Spraying.
Vermont	Bul.	159	Plant Diseases, Spraying and the Weather (potatoes).
Va. Truck	Bul.	1	The Control of Malnutrition Diseases.

FERTILIZERS

Conn.	Bul.	170	The Trade in Cotton Seed Meal.
Conn.	Bul.	175	Cost of Agricultural Lime in Connecticut.

GENERAL

Ariz.	Timely Hints for Farmers	27	The Spring Vegetable Garden.
U. S. D. A.	F. B.	256	Preparation of Vegetables for the Table.
Mich.	Buls.	170–1	Vegetable Tests for 1898.
Mo.	Bul.	35	Time of Planting Vegetables.
N. H.	Bul.	125	Vegetable Novelties.
N. C.	Bul.	94	Fruits, Vegetables, etc.
N. C. Dept.	Bul.		Culture of Vegetable Crops.
Okla.	Bul.	56	Garden Vegetables.
Oregon	Bul.	109	Preliminary Report of the Vegetable Growing Industry.
P. R.	Bul.		On Vegetable Growing.

GREENHOUSES, HOTBEDS, AND COLD FRAMES

Cornell	R. C. Bul.	30	Hotbed Construction and Management.
Bur. Ent.	Cir.	37	The Use of Hydrocyanic-acid Gas for Fumigating Greenhouses and Cold-Frames.
Bur. Ent.	Cir.	57	The Greenhouse White Fly.
U. S. D. A.	F. B.	460	Frames as a Factor in Truck Growing.
Md.	Bul.	127	Miscellaneous Greenhouse Notes.
N. H.	Bul.	76	Utilizing the Greenhouse in Summer.
R. I.	Bul.	107	Soil Treatment in Greenhouse Culture.
R. I.	Bul.	128	Soil Treatment in Greenhouse Culture.
W. Va.	Bul.	87	Greenhouses.

THE HOME GARDEN

U. S. D. A.	F. B.	255	The Home Vegetable Garden.
Ill.	Bul.	154	The Home Vegetable Garden.
Neb.	Ext. Bul.	5	Plate III. The Home Garden.
N. C.	Bul.	123	Pests of the Home Vegetable Garden.
N. C.	Bul.	184	Orchard and Garden Fruits.
N. C. Dept.	Bul.		The Home Fruit Garden.
N. C. Dept.	Bul.		The Home Garden.
W. Va.	Bul.	122	Farmers' Home Garden.

INSECTS

Del.	Bul.	4	Injurious Insects.
Bur. Ent.	Bul.	82	Some Insects Injurious to Truck Crops. Pt. 1. The Colorado Potato Beetle in Virginia in 1908. Pt. 2. The Parsnip Leaf-miner. The Parsley Stalk Weevil. The Celery Caterpillar. Pt. 3. The Lima-bean Pod-borer. The Yellow-necked Flea-beetle. Pt. 4. The Life History and Control of the Hop Flea-beetle. Pt. 5. Biologic and Economic Notes on the Yellow-bear Caterpillar. Pt. 6. Notes on the Cucumber Beetles. Biologic Notes on Species of Diabrotica in Southern Texas.
Bur. Ent.	Cir.	63	Root-maggots and How to Control Them.
Bur. Ent.	Cir.	104	The Common Red Spider.
Maine	Bul.	148	Insect Notes.
Maine	Bul.	177	Insect Notes.
Mich.	Bul.	233	Insects of the Garden.
N. Y.	Bul.	139	Plant Lice.
N. C.	Bul.	84	Some Enemies of Truck and Garden Crops.
N. C. Dept.	Bul.		Injurious Insects.
N. C. Dept.	Bul.		Insect Pests and Spraying.
Pa.	Bul.	110	Control of Insects and Diseases on Horticultural Crops.

LETTUCE

N. C.	Bul.	147	A Study of Lettuce.
N. C.	Bul.	217	A Serious Lettuce Disease.

MARKETING

U. S. D. A.	F. B.	62	Marketing Farm Produce.
Pa. Dept.	Bul.	202	Marketing Horticultural Products.
B. P. I.	Yrbk. Separate	546	Co-operation in the Handling and Marketing Fruits.

MELONS

Ariz.	Timely Hints for Farmers	44	Watermelon Growing.
Ariz.	Timely Hints for Farmers	46	The Melon Plant-Louse.
Ariz.	Timely Hints for Farmers	77	Cantaloupe Growing.
Ark.	Cir.	9	Suggestions on Commercial Muskmelon Growing.
Bur. Ent.	Cir.	80	The Melon Aphis.
Ill.	Bul.	124	Marketing the Muskmelon.
Ill.	Bul.	155	Fertilizer Experiments with Muskmelons.
Ill.	Cir.	139	How to Grow Muskmelons.
N. H.	Bul.	86	Growing Watermelons in the North.
N. M.	Bul.	63	Melon Culture.
N. C. Dept.	Bul.		Melons and How to Grow Them.
Vermont	Bul.	169	The Montreal Market Muskmelon Industry
Va. Truck	Bul.	5	Spraying Cucumbers and Cantaloupes.

MUSHROOMS

U. S. D. A.	F. B.	204	The Cultivation of Mushrooms.
N. C.	Bul.	177	Edible Mushrooms of North Carolina.
N. C. Dept.	Bul.		Mushrooms, Edible and Poisonous.
B. P. I.	Bul.	85	Principles of Mushroom Growing and Mushroom Spawn Making.

OKRA

U. S. D. A.	F. B.	232	Okra: Its Culture and Uses.

ONIONS

U. S. D. A.	F. B.	354	Onion Culture.
U. S. D. A.	F. B.	434	The Home Production of Onion Seed and Sets.
Iowa	Bul.	131	Four New Fungous Diseases in Iowa (onion smut).
Mich.	El. Sci. Bul.	6	Potatoes, Rutabagas, and Onions.
N. M.	Bul.	74	Onion Tests.
N. M.	Bul.	82	Growing Denia Onion Seed.
N. Y.	Bul.	206	Commercial Fertliizers for Onions.
N. C.	Bul.	83	Celery Growing in the South. The Culture of Onions.

PEAS

Del.	Bul.	49	The Strawberry Root Louse. The Destructive Pea Louse in Delaware.
Bur. Ent.	Bul.	43	The Pea Aphis.
U. S. D. A.	F. B.	121	Beans, Peas, and Other Legumes as Food.
Mich.	El. Sci. Bul.	1	Studies of Peas and Beans Before and After Sprouting.
S. D.	Bul.	91	Co-operative Vegetable Tests in 1904: Peas, Beans, Sweet Corn, Cabbage.

PEANUTS

U. S. D. A.	F. B.	431	The Peanut.
N. C. Dept.	Bul.		Peanut Culture.

PEPPERS

B. P. I.	Bul.	6	List of American Varieties of Peppers.

POTATOES

Ariz.	Timely Hints for Farmers	51	Potato Culture.
Col.	Bul.	176	Productiveness and Degeneracy of the Irish Potato.
Col.	Cor. Cir.	1	Potato Notes.
Col.	Cor. Cir.	8	Growing Potatoes in Colorado.
Bur. Ent.	Cir.	87	The Colorado Potato Beetle.
U. S. D. A.	F. B.	35	Potato Culture.
U. S. D. A.	F. B.	91	Potato Diseases and Treatment.
U. S. D. A.	F. B.	407	The Potato as a Truck Crop.
U. S. D. A.	F. B.	489	Two Dangerous Imported Plant Diseases (potato wart).
Ill.	Bul.	127	A Study of the Factors Influencing the Improvement of the Potato.

Ill.	Cir.	81	Selection of Seed in Potato Growing.
Maine	Bul.	68	Experiments with Insecticides upon Potatoes.
Maine	Bul.	87	Potato Insecticides and Fungicides.
Maine	Bul.	112	Potato Experiments.
Maine	Bul.	147	Potato Plant Louse.
Maine	Bul.	149	Potato Diseases.
Maine	Bul.	174	Blackleg: A Bacterial Disease of Potatoes.
Maine	Bul.	194	Control of Blackleg Disease of the Potato.
Maine	Misc. Pub.	435	Proper Growing and Handling of Potato "Seed" Stock.
Md.	Bul.	167	Changes in Potatoes During Storage.
Md.	Bul.	172	Irish Potato Investigations.
Mass.	Cir.	26	Fertilizers for Potatoes.
Mich.	Cir. Bul.	15	Potato Culture.
Mich.	El. Sci. Bul.	6	Potatoes, Rutabagas, and Onions.
Mo.	Bul.	13	Irish Potato Growing.
Nevada	Bul.	27	Potatoes.
Nevada	Bul.	76	The Potato Eelworm.
N. H.	Bul.	22	Prevention of Potato Blight.
N. H.	Bul.	111	Potatoes.
N. J.	Spec. Bul.	G	The Potato Rot.
N. J.	Spec. Bul.	P	Experiments with Fertilizers upon White and Sweet Potatoes.
N. Y.	Bul.	137	Commercial Fertilizers for Potatoes.
N. Y.	Bul.	349	Potato Spraying Experiments in 1902–11.
N. C.	Bul.	85	The Late Crop of Irish Potatoes in the South.
N. C. Dept.	Bul.		Irish and Sweet Potatoes.
N. C .Dept.	Bul.		Second Crop Irish Potatoes.
Pa. Dept.	Bul.	190	The Potato.
B. P. I.	Bul.	245	Investigations of the Potato Fungus.
R. I.	Bul.	111	Potatoes.
Vermont	Bul.	115	Disease-resistant Potatoes.
Vermont	Bul.	153	Plant Diseases; Potato Spraying.
Vermont	Bul.	159	Plant Diseases, Spraying and the Weather (potatoes).
Vermont	Bul.	168	The Phytophthora Disease of Potatoes.
Va. Truck	Bul.	3	Some Seed Potato Questions in 1909.
Va. Truck	Bul.	7	Truck Crop Potatoes.
Wyoming	Bul.	86	Potatoes.
			PRECOOLING
Mo.	Bul.	19	Carload Pre-cooling of Fruits and Vegetables.
B. P. I.	Bul.	550	Pre-cooling of Fruits.
			RHUBARB
Mo.	Bul.	34	Asparagus and Rhubarb Culture.
			RUTABAGAS
Mich.	El. Sci. Bul.	6	Potatoes, Rutabagas, and Onions.
			SEEDS
N. C.	Bul.	108	Seed Testing.
B. P. I.	Cir.	101	The Germination of Packeted Vegetable Seeds.
B. P. I.	Bul.	131	Germination of Vegetable Seeds.

SMALL FRUITS

Del.	Bul.	28	Strawberries. Variety Test.
Del.	Bul.	49	The Strawberry Root Louse.
U. S. D. A.	F. B.	198	Strawberries.
U. S. D. A.	F. B.	213	Raspberries.
Md.	Bul.	160	Strawberries.
Mich.	Buls.	170–1	Vegetable Tests for 1898. Bush Fruits for 1898.
Mo.	Bul.	8	The Small Fruit Garden.
Mo.	Bul.	25	Strawberry Congress.
Mo.	Bul.	30	Some Physiological Factors in Strawberry Growing.
Mo.	Bul.	39	Raspberry Culture.
N. H.	Bul.	137	Strawberries for New Hampshire.
N. J.	Spec. Bul.	N	Insects Injurious to Blackberries.
N. Y.	Bul.	124	Anthracnose of the Black Raspberry.
N. C.	Bul.	187	Small Fruits and Grapes.
N. C. Dept.	Bul.		Strawberry Patch.
R. I.	Bul.	91	Bush-fruits.
Va. Truck	Bul.	6	Strawberry Culture.

SPINACH

N. J.	Bul.	70	Some Fungous Diseases of the Spinach.
N. Y.	Bul.	99	The Spinach Leaf Maggot or Miner.
Va. Truck	Bul.	4	Spinach Troubles at Norfolk and the Improvement of Trucking Soils.

SPRAYING

Conn.	Bul.	157	Lead Arsenate and Paris Green.
Iowa	Bul.	127	Spraying Practice for Orchard and Garden.
Md.	Bul.	143	Plant Diseases and Spray Calendar.
N. C. Dept.	Bul.		Insect Pests and Spraying.
Vt.	Bul.	159	Plant Diseases, Spraying and the Weather.

SQUASH

Bur. Ent.	Cir.	38	The Squash-vine Borer.
Bur. Ent.	Cir.	39	The Common Squash Bug.
N. H.	Bul.	89	The Squash Bug.
S. D.	Bul.	42	Squashes.

SWEET POTATOES

Ariz.	Timely Hints for Farmers	86	Sweet Potato Culture.
U. S. D. A.	F. B.	324	Sweet Potatoes.
Mo.	Bul.	37	Sweet Potato Growing.
N. J.	Bul.	229	Insects Injurious to Sweet Potatoes in New Jersey.
N. J.	Spec. Bul.	P	Experiments with Fertilizers upon White and Sweet Potatoes.
N. M.	Bul.	70	Sweet Potato Culture.
N. C. Dept.	Bul.		Irish and Sweet Potatoes.
N. C. Dept.	Bul.		Sweet Potatoes.

TOMATOES

Ariz.	Timely Hints for Farmers	82	Tomato Culture.
U. S. D. A.	F. B.	220	Tomatoes.
Ill.	Bul.	144	Growing Tomatoes for Early Market.

Md.	Bul.	172	Tomatoes.
Mass.	Bul.	138	Tomato Diseases.
Mo. Dept.	Pamphlet	E	Growing Tomatoes for Canning Purposes.
N. H.	Bul.	84	Forcing Dwarf Tomatoes
N. J.	Bul.	228	Structure of Tomato Skins.
N. J.	Spec. Bul.	O	Experiments with Nitrate of Soda upon Tomatoes.
N. Y.	Bul.	346	Crossing Tomatoes to Increase the Yield
Tenn.	Bul.	95	Notes on Tomato Diseases.
Va. Truck	Bul.	8	Preliminary Report on Tomato Culture.
W. Va.	Bul.	117	Tomato Notes.

MISCELLANEOUS

Ala.	Cir.	14	Cultural Notes on 13 of the Important Truck Crops.
Cornell	Bul.	317	Further Experiment on the Economic Value of Root Crops for New York.
U. S. D. A.	F. B.	138	Irrigation in Field and Garden.
Mo. Bd. Hort.	Bul.	49	The Conservation of Soil Fertility.
Pa. Dept.	Bul.	201	Market Gardening.
R. I.	Bul.	133	Weeds: Their Eradication and Control.

ABBREVIATIONS OTHER THAN NAMES OF STATES

Ann. Rpt., Annual Report. *Bul.*, Bulletin. *Bur. Ent.*, Bureau of Entomology. *B. P. I.*, Bureau of Plant Industry. *Cir.*,Circular. *Cir. Bul.*, Circular Bulletin. *Cor. Cir.*, Correspondence Circular. *Dept.*, Department. *El. Sci. Bul.*, Elementary Science Bulletin. *Ext. Bul.*, Extension Bulletin. *F. B.*, Farmers' Bulletin. *Misc. Pub.*, Miscellaneous Publications. *Mo. Bd. Hort.*, Missouri Board of Horticulture. *P. R.*, Porto Rico. *R. C. Bul.*, Reading Course Bulletin. *Spec. Bul.*, Special Bulletin. *U. S. D. A.*, United States Department of Agriculture. *Va. Truck*, Virginia Truck Experiment Station. *Yrbk.*, Yearbook.

ADDRESSES OF EXPERIMENT STATIONS, DEPARTMENTS, AND BUREAUS

Alabama: Auburn.
Arizona: Tucson.
Arkansas: Fayetteville.
California: Berkeley.
Colorado: Fort Collins.
Connecticut: New Haven.
Cornell: Ithaca (New York).
Delaware: Newark.
Illinois: Urbana.
Iowa: Ames.
Kentucky: Lexington.
Maine: Orono.
Maryland: College Park.
Massachusetts: Amherst.
Michigan: East Lansing.
Missouri: Columbia.
Nebraska: Lincoln.
Nevada: Reno.
New Hampshire: Durham.
New Jersey: New Brunswick.
New Mexico: State College.
New York: Geneva.
North Carolina: West Raleigh.
Oklahoma: Stillwater.
Oregon: Corvallis.
Pennsylvania: State College.
Porto Rico: Mayaguez.
Rhode Island: Kingston.
South Carolina: Clemson College.
South Dakota: Brookings.
Tennessee: Knoxville.
Vermont: Burlington.
Virginia Truck: Norfolk.
West Virginia: Morgantown.
Wyoming: Laramie.

Missouri Dept. of Agriculture: Columbia.
North Carolina Department of Agriculture: Raleigh.
Pennsylvania Department of Agriculture: Harrisburg.
Bureau of Entomology: U. S. Department of Agriculture, Washington, D. C.
Bureau of Plant Industry: U. S. Department of Agriculture, Washington, D. C.

PERIODICALS

The Market Growers Journal, biweekly, 508 Walker Building, Louisville, Kentucky. One dollar per year. Official organ of the Vegetable Growers' Association of America, of the New York State Vegetable Growers' Association, and other organizations. A special rate of fifty cents per year has been granted to members of our Association, if subscription is sent through the Secretary.

The Vegetable Grower, monthly, 1208 Boyce Building, Chicago, Illinois.

MEMBERSHIP LIST

Asterisk indicates charter members.

Numerals indicate the years for which membership fee has actually been paid up to the date of this report. On account of the short time intervening between the meeting and our going to press, many renewals have not yet been received.

1 = 1911–12; 2 = 1912–13; 3 = 1913–14.

	2		Alden, John	Dansville
1	2	3	*Aldrich, C. H.	Mattituck
		3	Ameele, J. D	Williamson
1			Anderson, John H	Irondequoit
1	2	3	*Arnts, Edward	Syracuse
	2	3	Ashman, Joseph	Buffalo
	2	3	Avery, L. E	Syracuse
		3	Atwater, C. G	New York
	2		Baker, Chas. H	Mohegan Lake
		3	Batzinger, Chas. L	Schenectady
1			Bean, W. L	McGraw
	2	3	Bender, William	Syracuse
1	2		Benjamin, A. E	South Lima
		3	Bennett, F. L	Arkport
		3	Bennett, Roy C	Arkport
		3	Black, M. Newton	Stanley
1	2		Bogner, Joseph	New Hartford
1	2	3	*Bonney, W. L	Batavia
		3	Brooks, Geo. W	Monroe
1	2	3	*Brooks, J. R	Monroe
	2		Buntin, M. J	East Aurora
	2	3	Butts, Morris F	Sodus
	2		Calyer, Edward T	Newburgh
		3	Carse, David B	New York
	2	3	Case, Frank H	Cutchogue
	2		Chamberlain, E. D	Binghamton
		3	Churchill, John	Fulton
		3	Clum, A. F	Sennett
	2	3	Colburn Brothers	Clyde
		3	Coleman, D. A	Watervliet
	2	3	Cook, S. J	Dunkirk
1			*Craig, John (deceased)	Ithaca
1	2		*Davenport, Walter	Accord
1	2	3	*Davis, E. S	South Lima
1			*Dayton, R. H	East Hampton
		3	Deitz, P. H	Canastota
		3	DeNise, M. G	Fairport
	2		DeVoe, H. L	Accord
	2		Dibble, L. N	Ionia
	2		Dibble, Oliver M	East Bloomfield
		3	Dimon, C. E	Southampton
		3	Dougall, Edward	Syracuse
		3	Dungan, S. L	Arkport
		3	Dungan, E. Root	Arkport
		3	Elliott, Elmer	Albion
		3	Erhardt, P. B	Penfield
		3	Erkenbeck, F. P	Fayetteville
	2	3	Folsom, Frank W	Orchard Park
	2	3	Ford, James	Syracuse
	2		Frederiksen, J. D	Little Falls
	2	3	*Fullerton, Hal B	Medford

		3	Garrett, Walter	Watervliet
1	2	3	*Gesell, August	South Lima
		3	Gill, G. H	Little Neck
1	2		*Gould, Nellis J	Albion
	2	3	Greffrath, Henry	South Lima
	2	3	Greiner, Paul	Canastota
1	2	3	*Greiner, T	La Salle
		3	Griffin, Matt	Arkport
1			Hallauer, E. G	Irondequoit
	2		Hallauer, J. P	Irondequoit
1	2		*Hallauer, W. F	Irondequoit
1	2	3	*Hallock, L. H	Orient
		3	Harper, F. E	Syracuse
	2		Hartranft, Bert (deceased)	Cortland
	2	3	Haw, Charles E	East Syracuse
	2	3	Hay, E. R	Clyde
		3	Hayes, John H	Clark Mills
1	2		Heffer, Frank E	Irondequoit
1			Heffer, W. A	Irondequoit
		3	Herckner, Alexandrine	Wayland
		3	Herman, Otto H	Chili
1	2		*Hill, William	Irondequoit
		3	Hills, J. Goldsmith	Newtonville
1	2	3	*Holmwood, M. H	Orchard Park
		3	House, W. J	Arkport
	2	3	Howell, T. W	Port Byron
1	2		Hulett, Frederick C	Irondequoit
		3	Hull, P. M	Red Creek
	2		Hunter, E. D	Florida
1	2	3	*Jennings, M	Canastota
		3	Jeram, Wm., Jr	Watervliet
		3	Kains, M. G	New York
1	2		*Keller, G. M	Brighton
1	2	3	*Kilbourn, Russell	Clinton
		3	Klock, Newton E	Canastota
		3	Kreuzer, Joe A	Chili
		3	Kuchler, Geo. W., Jr	Ithaca
		3	Lacy, Leo A	Rome
		3	Laudersdale, W. E., Jr	Geneseo
		3	Laurent, Arthur A	Monadnock, N. H.
1	2		*Le Van, C. D	Sanborn
1	2	3	Locke, C. G	Arkport
		3	Lockwood, H. L	Buffalo
		3	Lovell, F. J	Hornell
1			Lupton, J. M	Mattituck
		3	Lyon, A. H	Tabor, N. J.
		3	McBratney, George	Batavia
1			*McCann, John	Elmira
		3	Marion, Ralph	New York
1	2		*Moore, C. H	Binghamton
1	2	3	*Moore, W. Frank	Binghamton
1	2	3	*Mowris, C. C	South Lima
	2		Murphy, Stephen	Newburgh
		3	Newton, A. B	Penfield
1	2		Norton, Thomas L	Wayland
		3	Pankhurst, Frank	Canastota
	2		Pengelly, T. B	Irondequoit
		3	Perry, John M	St. James
	2		Pettijohn, L. T	Livonia
	2	3	Pierce, H. N	Waterloo

1	2		*Post, Abram S	New York
		3	Priest, George E	Rochester
		3	Rayton, Frank	South Lima
1	2		*Richardson, E	Canastota
	2		Ridge, W. N	Lynbrook
	2		Rogers, W. P	Williamson
1			*Rupert, P. G	Seneca
	2		Russell, Charles P	Williamson
	2		Sambrook, Charles A	Port Byron
		3	Schiek, Frank H	Owego
		3	Schwingel, Jacob	Burns
		3	Simmons, James	South Lima
		3	Smith, E. E	Syracuse
		3	Smith, Leonard	North Tonawanda
		3	Snow, E. C	Fairport
1	2	3	*Southard, A. T	Peekskill
1	2		*Spears, John R	Little Falls
	2		Spengler, H. C., Jr	Newburgh
		3	Sweezey, L. J	Marion
1			Talmage, H. R	Riverhead
		3	Taylor, L. J	Arkport
		3	Ten Brœck, E. H	Newtonville
	2	3	Tharp, A. E	Willard
	2		Tighe, Frank T	Newburgh
	2		Tighe, M. A	Newburgh
1			Titus, G. Ben	Irondequoit
1	2		Tuthill, George W	Speonk
1	2	3	*Tuttle, Ezra A	Eastport
	2	3	Tuttle, F. J	Norwich
		3	Van Der Meid, Peter	Rochester
1	2	3	*Voorhees, C. E	Plainville
1			*Voss, Charles F	Elmhurst
	2	3	Warford, C. O	Newburgh
		3	Warner, J. Wesley	Newtonville
1			Warren, Almond J	Irondequoit
		3	Watrous, M. H	Rochester
	2		Watson, J. R	Newburgh
		3	Weber, Emma M	Hornell
1			*Wells, J. Q	Shortsville
		3	Wells, W. A	Peconic
1	2		*West, Chauncey	Irondequoit
1	2	3	*White, C. R	Ionia
		3	Wilkinson, Albert E	Ithaca
		3	Williams, G. O	Ithaca
		3	Williams, Willis H	Corning
	2	3	Wilson, J. H	Canastota
1	2	3	*Work, Paul	Ithaca
		3	Wrigley, G. P	Elmira

Membership

Memberships taken at first meeting	27
Total charter members	37
Members at beginning of 1912 meeting	62
Members for 1912–1913	103
New members for 1913–14	66

(To date of Report, April 10)

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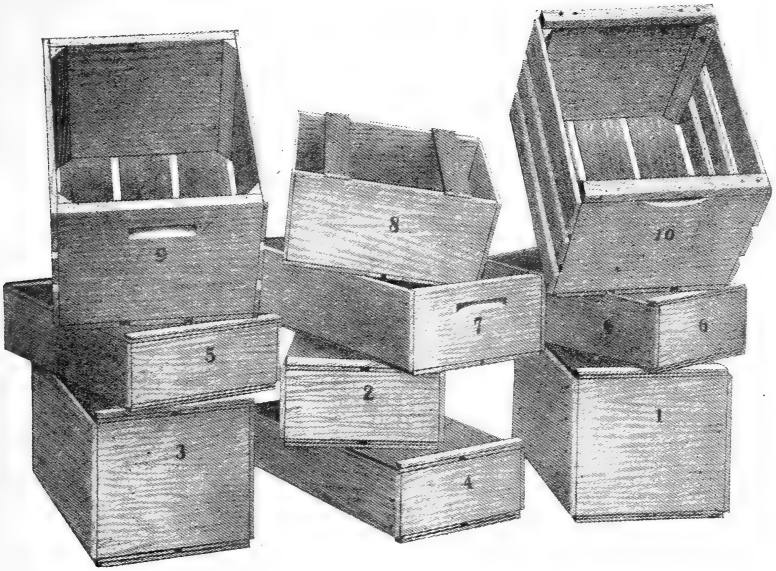
(Titles of papers appear in small capitals)



Box No. 1 Represents a full size standard green apple box.

No. 2. A half size standard green apple box.

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No. 6. A 20 lb. peach box.

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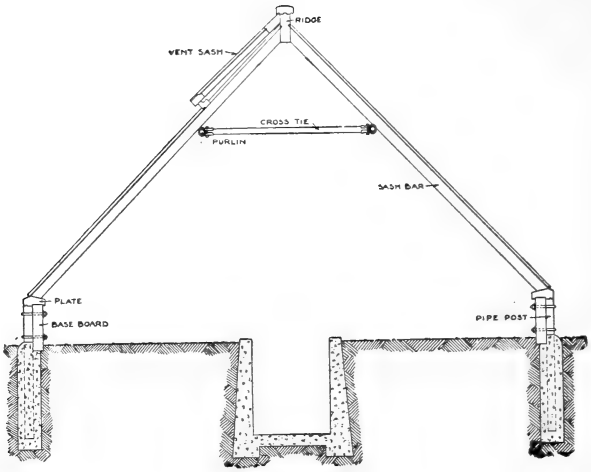

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DESIGNED PARTICULARLY FOR CUCUMBERS

SIMPLE PRACTICAL EFFICIENT

BULLETIN NO. 40 SHOWS OTHER SIZES

KING CONSTRUCTION CO.

General Office and Works,
North Tonawanda, N. Y.

TO DESTROY APHIS, THRIPS, ETC.

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spray with

"BLACK LEAF 40"

SULPHATE OF NICOTINE

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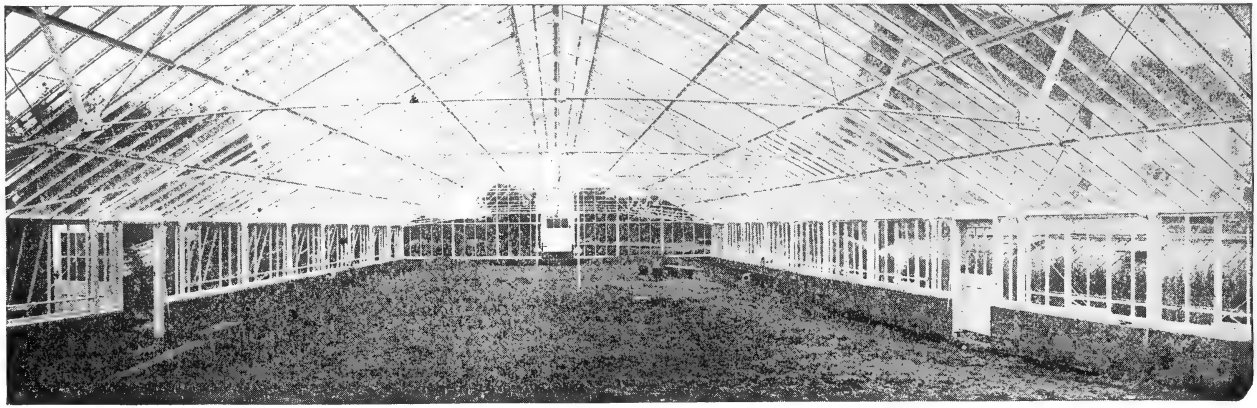

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The New York State Vegetable Growers' Association

Report for 1913-14

MR. C. R. WHITE

President of the New York State Vegetable Growers' Association from 1911 to 1914

The New York State Vegetable Growers' Association

Report for 1913-14

"The object of this Association shall be to organize and federate the interests of those engaged in vegetable growing to the end that larger crops of constantly improving quality may be grown and marketed with increased profit."

PRINTED AT THE FOREST CITY PRESS
ITHACA DAILY NEWS

Table of Contents

Thursday Evening, February 12

EDITORIAL NOTE.

The question is often raised whether reports of associations really accomplish a great deal. Are they read and is the material of real value? It was proposed at the 1914 meeting that our Report be not printed for a year and that the papers be combined in a later volume. This suggestion drew forth a wave of protest which made it clear that the previous work had been appreciated by the members. Moreover, some fifty copies have been sold to non-members, almost all outside of our home state.

The value of such a volume to the individual depends largely upon himself. The material represents the actual experience of the most successful commercial producers and the suggestions of investigators and teachers who have been devoting their whole time to the advancement of the vegetable industry. It is probable that only an occasional paragraph will be of actual money value to any one individual, but time and again do we hear of growers who have found within the pages of the Report suggestions that have been worth many dollars to them.

The material is rendered accessible by the insertion of many sub-heads and by including a complete index with many cross references.

TRUCKING IN EASTERN VIRGINIA.

T. C. JOHNSON, Norfolk, Virginia.

It is with peculiar pleasure I come this morning to meet you who are in the same line of work as many of my neighbors in Virginia. As your Chairman said, the business of growing vegetables for home use is not limited to any particular locality, but it is scattered over the entire country. But vegetable growing on a commercial scale is centralized at particular points. Among the reasons for so centralizing the work are accessibility to markets, transportation facilities, climatic conditions and soil adaptation. In the extreme South these centers were developed largely on account of favorable climate, responsive soils and transportation facilities. Further North the development depends upon other factors.

The Norfolk, Virginia, trucking industry is possibly one of the oldest in the country. It started in a small way about 1840. The truckers at that time limited their work mostly to the production of early potatoes, sweet potatoes, watermelons and cabbage. Gradually the work was extended to include peas, beans and cucumbers. Little progress was made from 1850 to 1870, but the work developed very rapidly from 1870 to the present time. This later development was stimulated very largely by the splendid transportation facilities offered in that region. The Eastern Shore counties date their principal advance from the opening of the New York, Philadelphia and Norfolk Railroad, and the forming of the Eastern Shore of Virginia Produce Exchange. During the year 1913, two Truckers' Cooperative Associations, one at Onley, Virginia, and the other at Norfolk, handled over seven million of packages of produce valued at about ten million dollars. Over five million dollars worth of produce was sold by parties outside of these Associations, making a total of about fifteen million dollars of market garden products shipped during the year.

The exploiting age in this region has long since passed, and the farmers are now working on a business basis. The list of vegetables now grown includes potatoes, sweet pota-

toes, cabbage, kale, spinach, lettuce, radishes, watermelons, muskmelons, peas, beans, cauliflower and onions, in fact, practically everything that is produced in trucking sections anywhere.

Transportation facilities are such that goods packed on the farm one day will reach Washington and Baltimore markets the next morning, and they will reach Philadelphia, New York, and Jersey City, the second morning, and Providence, Boston, and Pittsburg, forty-eight hours after leaving the farm. By shipping through the Association, all producers are enabled to ship at carload rates whether they have a full car or only a small consignment, that is, the Association takes charge of the goods and loads them in such a way as to make carload shipments, giving all of the shippers the advantage of the lower rates and better icing facilities.

Much of the development depends upon climatic conditions. Ordinarily the winter temperature does not fall below sixteen degrees above zero, and frequently it does not go below eighteen or twenty degrees during the entire winter. This enables the farmers to produce large quantities of kale, spinach, and other semi-hardy crops during the winter months.

Cropping Plans.

A typical crop rotation usually starts with potatoes, which are planted in February or March and harvested in May or June. These are followed by cowpeas, which are turned under in September for improving the soil. The ground is then planted to spinach, which is harvested during the winter months. Garden peas follow the spinach in February, and cucumbers may be planted between the rows of peas in April, the cucumbers in turn being followed by kale in August, and the kale followed the next February by potatoes. For the second series of the rotation, the potatoes are followed by corn with cowpeas sown between the rows of corn during the month of August. The peas and corn stubble are turned under in November and the ground planted to cabbage. The cabbage is harvested the following May and June, and a crop of cowpeas is again planted. They are followed by kale, which in turn is followed by potatoes. It will thus be seen

that kale, spinach and cabbage occupy the ground during the fall, winter and spring months, and that some soil improvement crops, such as cowpeas or soy beans, are usually grown during the summer. In some cases the winter crops are omitted in the rotation, and crimson clover is grown as a means of improving the soil. This scheme of crop rotation necessitates the extensive use of stable manure and commercial fertilizers as a means of maintaining soil fertility.

Spinach.

The spinach crop usually absorbs most of the attention during the winter months. The ground for the crop is prepared and the seed sown in September and October. Some growers plant a small amount of their seed the latter part of August, and some as late as November or December. The crop planted in August is usually harvested in October or November; that planted in September is harvested in November and December; and that planted in October is harvested in January, February and March, while that planted in November and December is harvested for the April market. It will thus be seen that the southern grower plans to market his spinach during the winter months, when the spinach in the northern markets is checked by the severe winter weather. Most truckers grow spinach on low, flat beds varying in width from four and one-half to seven feet wide with a furrow six inches deep between the beds. The beds are used as a means of procuring good drainage during the winter months. Four rows of seed are sown on the narrow beds and seven on the wide ones. The rows are about ten inches apart. This method of planting leaves quite wide alleys between the beds. From fifteen to twenty-five pounds of seed are necessary to sow an acre. The seed are sown with a horse power drill that is arranged to plant a bed at a time. The drill covers the seed about one-half inch deep, the ground then being immediately rolled with a light roller. As soon as the young plants have attained a height of two or three inches, they are thinned so that the individual plants stand five or six inches apart in the rows. The thinning is done either with a small narrow-bladed hoe or a large iron spoon. Where the spoons

are used they are usually ground to a sharp edge on one side and a short handle five or six inches is provided. With implements of this kind, it usually costs from four to eight dollars an acre to thin the spinach.

Immediately after thinning the spinach, it is given an application of about five hundred pounds of commercial fertilizer analyzing seven to eight per cent. nitrogen, five to seven per cent. phosphoric acid, two to four per cent. potash. The nitrogen used should be in a readily available form. Some growers prefer to mix their own fertilizers. Where they do so, one-third of the nitrogen is obtained from nitrate of soda, one-third from high grade blood, and the balance from fish. This fertilizer is distributed broadcast over the beds and worked into the ground with a wheel hoe or by means of the Cyclone cultivator. The frequency with which the top dressings are made depends upon the fertility of the land and the weather conditions. In the early fall five hundred pounds of the above fertilizer will sometimes push a crop to harvesting time, but the latter crops, when the weather is more unfavorable, are usually given two or three, and on rare occasions four applications of the above fertilizer. The object is to provide the plants with an abundance of readily available plant food so that they may use it whenever the weather conditions are favorable.

Spinach grows best on a slightly alkaline soil, hence it is customary to apply one thousand pounds of lime per acre immediately before planting the spinach. The lime is worked into the ground as the beds are formed. The first application of fertilizer is not made until three or four weeks after the lime is applied.

In harvesting the spinach, it is customary to cut the entire plant just above the ground. All brown or discolored leaves are carefully removed before packing into the barrels. Ventilated barrels are always used for marketing spinach, kale and other green crops. These barrels are made from a cheap grade of lumber. An acre of good spinach will produce from two hundred to three hundred barrels, sometimes the yield will be as high as three hundred and fifty, but some farmers are unable to get over one hundred and fifty barrels per acre.

Their crop is usually harvested in the morning while it is crisp, as it carries to market in much better condition than if harvested in the later afternoon. Practically all spinach shipped from the Norfolk region is iced either on steamship or in the cars, even if the shipments are made in the winter months.

Kale.

Kale is second only to spinach in importance as a winter crop. The seed of this crop is usually sown in rows twenty-five to thirty inches apart. From three to six pounds of seed are required to sow an acre. The seed of the Scotch Curled varieties is sown in August, while that of the Blue or Siberian varieties is sown in September or October. The crop from the August sown seed should be ready for market in November, December, January and February, and that from the late sown should be ready for the March and April markets. Kale is somewhat less expensive to grow than is spinach. The quantity of fertilizers is only about one-half that required for spinach and the growth of the crop admits of the use of more horse power in the methods of cultivation. The crop is harvested and marketed similarly to spinach. An acre of kale should cut from three hundred to five hundred barrels. The selling price on the New York market varies from sixty cents to one dollar and ten cents per barrel. It costs five cents a barrel to harvest and pack the kale, the barrels cost twenty cents each, and the freight and icing twenty cents. Other expenses incident to shipping, such as cartage, supervision of harvesting, etc., usually bring the harvesting and marketing expenses up to about fifty-five cents per barrel. It will thus be seen that kale selling at sixty-five cents does not leave much profit to the grower, especially when the cost of growing and marketing the crop is deducted from these prices; but if the kale sells from ninety cents to one dollar a barrel, a reasonable profit may be obtained.

Peas.

The kale crop is frequently followed in January by a crop of garden peas. The Alaska, Non-Pareil, Thomas Laxton, and Laxtonia are the leading varieties at the present time.

The hardier varieties are planted in January and the more tender in February or the first of March. Some growers follow the practice of planting the peas in rows five and one-half to six feet part, planting cucumbers between the rows of peas; others plant the peas in rows three feet apart. By the latter method, the peas must of necessity be followed by some forage or grain crop, as it is impracticable to follow them by any other truck crop during the summer months. The peas are ready for the market during the months of April and May.

It is customary to plant the cucumbers the latter part of March or early in April. The growers have found it profitable to plant early, even if there is danger of frost injuring the early plants. Some follow the practice of making two or three plantings, that is, the first planting is followed five or six days later by a second planting of cucumber seed in rows only five or six inches from the first. If the first planting is injured by the frost, the second planting will probably escape, but lest this should be caught, a third planting is made. This method requires the use of large quantities of seed, but the chance of getting cucumbers on the market early justifies this expense.

Cabbage.

Seed for the cabbage crop is sown the latter part of September and the plants transplanted to the field late in November or early in December. This crop usually follows a crop of cowpeas or corn as explained above. In preparing the ground for the cabbage, it is plowed and worked into thoroughly good tilth, and rows about three and one-half feet apart are then marked out. A small quantity of fertilizer running low in nitrogen and comparatively high in phosphoric acid is applied to the rows and worked into the soil with a cultivator. Two furrows are then thrown together by a turn plow in such a way as to form a ridge about one foot high where the row is to be. The ridge usually extends east and west. A small plow is then used for making a shelf or furrow on the south side of the ridge about one-half way between the bottom and top. The cabbage plants are then transplanted to this small furrow. The ridge on the north side fur-

nishes winter protection against the cold north, northeast and northwest winds, and the south side of the row on which the plants are set is exposed to the action of the sun during the winter months. By this method the plants are enabled to develop a good root system before leaf growth becomes active in February or March. As soon as leaf growth starts, additional fertilizers are given the plants. It is customary to use a fertilizer somewhat similar to that used for spinach. Sufficient fertilizer is used to force the crop to make a vigorous growth, usually twelve hundred to two thousand pounds per acre being required. It sometimes happens that, if too much fertilizer is used in the fall when the plants are transplanted to the field, rapid growth follows and the cold weather in January and February may give the plants a severe check. Consequently, when they resume growth in the early spring, they have a strong tendency to form seed stalks instead of heads. For this reason the truckers have found that it is best to postpone the application of more fertilizers until early spring. Such varieties as Charleston Wakefield, Jersey Wakefield, Copenhagen Market and Succession stand this winter treatment very satisfactorily, but such as Flat Dutch and the Danish Ball Head do not thrive so well.

The crop is harvested during the months of April, May and June. The market at that time will take a softer head than it will during the late summer, fall or early winter. Hence, it is customary to cut the heads as soon as the market will take them somewhat irrespective of the state of maturity, that is, the heads are cut as soon as they are large enough to justify shipping. It is thus necessary to make several cuttings over a field before the crop is entirely harvested.

Potatoes.

Potatoes for the early market are planted in February and March. This crop is grown in rotation with kale or spinach or other truck crops as mentioned above. The methods of planting do not differ materially from those practiced on Long Island and some other parts of New York, except that most truckers plant by hand, as very few horse power planters are in use on the truck farms. The northern grown seed of the

Irish Cobbler variety is used extensively. Experience has shown that this seed and variety answers the purpose of the truck farmer quite satisfactorily. Some growers follow the practice of growing a part of their seed from seed stock obtained from the North. Where this is followed northern grown seed is purchased during the winter and placed in cold storage until July, and then planted. The crop from this planting is harvested in November and stored on the farm until February, when it is planted for the regular truck crop. Seed potatoes may be grown in this way much more cheaply than they can be obtained from the North, but experience has again shown that the crop from the home grown seed is about two weeks later in reaching maturity than is that from seed directly from the North, and since these potatoes are harvested for the early market, the two weeks of time is a very important factor. It frequently happens that potatoes in May or early June will sell at three dollars to four dollars per barrel, while the same quality of potato the middle of June or the first of July will not bring over two dollars to two dollars and one-half per barrel. It will thus be seen that it is very important to have an extremely early crop.

Large quantities of nitrogenous fertilizers are required to produce this early crop. It is customary to use from fifteen hundred to two thousand pounds per acre of a fertilizer analyzing six per cent. nitrogen, seven per cent. phosphoric acid, and five per cent. potash, for the extremely early crop, but for the crop that is to be harvested the latter part of June or early in July, the nitrogen may profitably be reduced to five per cent., the phosphoric acid increased to eight per cent., and the potash to six or seven per cent. Most truckers apply the fertilizer in the rows immediately before planting. The rows are marked out with a small plow and the fertilizer distributed and worked into the soil with a cultivator. The seed is then planted. Even if horse power planters are used, it is customary to apply the fertilizer in this way, as much better distribution is obtained than is possible with most of the horse planters.

The potatoes in Eastern Virginia are not greatly troubled with late blight (*Phytophthora infestans*), but tipburn, black

leg and early blight are quite prevalent and Colorado potato bugs and flea beetles are always present to a great extent, hence the grower must be provided with means of combating these insects. Some are now using combined insecticides and fungicides.

The crop is always harvested and sold as "new potatoes" and not as matured potatoes. The fact of harvesting and marketing at this time has precluded the use of power potato diggers so common in the North and West, because the potato diggers bruise and skin the young potatoes to such an extent that they reach the markets in bad condition. The southern grower uses the plow in turning the potatoes out of the ground, a somewhat more laborious task than his northern neighbor encounters in harvesting his crop; but the price per barrel for picking, sorting and packing the potatoes is about the same as is paid in New York and Maine for picking the potatoes behind the modern potato diggers.

Beans.

Snap beans are grown either as an early spring or late fall crop. For the early spring crop, the Black Valentine, Curries Rustproof and Golden Wax are the leading varieties. Black Valentines are usually planted the last of March or the first of April, but the wax varieties are not planted until two or three weeks later. The beans from this planting are harvested for the early markets. The fall crop is planted the last of August or the first of September and the crop harvested in October. Beans are a short season crop with the Virginia truckers, consequently they are comparatively inexpensive to grow. Nor are the returns large per acre, but when the expense for growing the crop is taken into consideration, it usually proves quite profitable.

Intensive Trucking.

A small group of truck farmers are now practicing intensive methods, in which cold frames and hotbeds play an important part. These farmers limit their efforts to a comparatively small acreage, but the intensity of the methods followed frequently gives them as large returns as their neighbors derive from several times the area.

When this method is followed the farmer usually divides his plantation into two equal parts, on one of which he plants lettuce and on the other parsley. Prior to planting these crops, the ground is formed into beds or plats eight feet or nine feet wide on which the seed is sown in rows ten inches apart. Some growers follow the practice of sowing the lettuce seed in beds early in August and transplanting once or twice before finally shifting them to the larger beds where the heads are to mature, but others sow the seed in place and thin to a stand. The parsley seed is usually sown where the crop is to remain during the winter. If the lettuce is sown in place it is thinned so that the individual plants stand about twelve inches apart in the rows. About a month before it is expected to harvest the lettuce, spinach is planted between the rows on alternating beds. As soon as the lettuce on these beds is ready, it is carefully harvested and the ground is given over entirely to the spinach crop. The lettuce on the other beds is harvested when mature and the beds are immediately prepared for beets. Prior to planting the beet seed, cold frames are constructed over these beds. The cold frames are made by placing two parallel rows of boards six feet apart over the beds and covering them with three by six hotbed sash. The beet seeds are sown in the frames about the middle of December. The beets should be ready for the early spring market. The spinach is grown without any protection whatever. When it is harvested in March, the ground is plowed preparatory to transplanting cucumbers. As soon as the season is sufficiently advanced and danger of severe frosts has passed, the cold frames are removed from the beet beds and placed over the beds that are afterwards to contain the cucumber plants. The cucumber plants are started in hotbeds about a month before it is expected to transplant them to the cold frames. As soon as the season will admit, the cucumbers are carefully removed from the hotbeds and transplanted to cold frames. The beets are soon harvested and sold on the early spring market as bunch beets. As the season advances the cucumbers are given ventilation until finally the cold frames are removed and the cucumbers are allowed to occupy the entire space. The cucum-

bers are marketed in May and June. They continue to produce until the field-grown crop comes on the market. The vines are then cleared away and the ground given a heavy coat of stable manure which is plowed under immediately.

Cold frames are erected over the parsley beds in October. The glass remains on the beds during the winter, and as soon as spring opens, eggplants are transplanted to the cold frames between the parsley plants. Thus the eggplants and the parsley grow together for some weeks. As soon as the parsley season is over, the plants are removed and the eggplants are then given entire use of the frames. When danger of late frost is over, the frames are removed and the eggplants given the regular field cultivation. The fruit from these eggplants is usually marketed during the latter part of May, June and July. As soon as the eggplant season is over, this portion of the field is also given a liberal application of stable manure. The following year the parsley and lettuce change places, by this method one portion of the plantation producing lettuce, spinach, beets and cucumbers, and the other portion, parsley and eggplants within the twelve months period.

With this method of trucking, very careful attention must be given to the proper physical condition of the soil.

I realize that it is impossible to give a thorough discussion of this problem in the time allotted me, but I hope I have been able to throw some light on the methods practiced by your competitors in the middle South; I also realize that there are many practices followed by the New York vegetable growers that would be profitable for the Virginia growers to follow, and I am of the opinion that some of the Virginia methods may be applied with modifications to New York conditions with profit. The trading of experiences is certainly worth while, even if the methods followed in one section of the country do not apply directly to those in another.

QUESTION: What are the distances for cabbage?

PROFESSOR JOHNSON: Cabbage plants are set from sixteen to eighteen inches apart in rows from three to three and one-half feet apart. Some growers follow their cabbage with corn by planting the corn between the rows of cabbage before the latter is harvested.

QUESTION: How is fertility maintained?

PROFESSOR JOHNSON: Fertility is maintained by liberal use of stable manure, by the growing and turning under of leguminous crops, such as cowpeas, soy beans and crimson clover, and by the use of large quantities of commercial fertilizers.

QUESTION: What is the cost of growing spinach?

PROFESSOR JOHNSON: The cost of growing and marketing a barrel of spinach usually varies from seventy-five cents to one dollar. The cost may be summarized as follows:

Plowing and preparing the land	$5.00	per acre
Seed	3.00	" "
Lime	2.00	" "
Fertilizers	$25.00 to $35.00	" "
Thinning and hand weeding	$15.00 to $25.00	" "
Wheel hoeing and cultivation	$3.00 to $5.00	" "
Harvesting and packing	.10	per barrel
Barrels and covers	.22	each
Freight and icing to New York	.20	per barrel
Local drayage	.05	" "

It will thus be seen that the actual cost of growing an acre of spinach is about sixty dollars and that it costs from fifty-five to sixty cents a barrel to cut and market it. It costs about one hundred and sixty-five dollars to grow and market a two hundred barrel crop of spinach on an acre of ground.

QUESTION: What kind of spinach is grown?

PROFESSOR JOHNSON: Norfolk Savoy is grown almost exclusively in the Virginia region. Some growers have attempted to grow the Long Standing and Thick Leaf, but these varieties are not successful on our soils.

QUESTION: Which is the hardiest variety for our northern climate?

PROFESSOR JOHNSON: I am not familiar with your varieties in New York State, but judging from our Virginia con-

ditions, the Norfolk Savoy would be a good variety for your late fall or early spring crop, but such varieties as Long Standing would be better for your summer work.

QUESTION: Is spinach ever killed back by winter freezing?

PROFESSOR JOHNSON: Very seldom in the Norfolk region. Sometimes severe freezes will check its growth, but a liberal application of commercial fertilizer usually revives the crop within a few days.

QUESTION: How is spinach sold on the New York market?

PROFESSOR JOHNSON: The Norfolk-grown spinach is almost all sold on commission on the New York market. The Southern Produce Company, a cooperative organization of about four hundred members, selects a list of commission merchants in New York and other cities, with whom it makes contracts to sell spinach and other crops for its members. The association acts as the agent of its members in shipping the materials to these commission merchants. The commission merchants are selected after very careful examination of their business methods and financial responsibility. The association maintains an attorney who looks after the matters of collection and freight rates for its members without expense to the individuals. The commission merchants sell the goods immediately on receipt and make prompt returns.

MR. BONNEY: At this period we have before us the subject of precooling. Mr. Ramsey does not seem to be present. We have with us a man whom you probably all know or have heard of, a government expert, a man that we always like to hear because he knows what he is talking about. Professor Corbett.

PRECOOLING.

L. C. CORBETT, Washington, D. C.

It may be well in the outset to say something about what precooling really is and what the object of precooling work is.

In the citrus work of the Office of Horticulture and Pomology and in the vegetable work, we found that there was a great deal of difficulty in handling fruits and vegetables, even under our modern system of transportation under refrigeration in so-called refrigerator cars. The difficulty is this, that a product is harvested oftentimes when the outside temperature is comparatively high. The product is packed oftentimes in comparatively close packages. These packages, with the latent heat, are loaded into the cars; and it is supposed that the ice in the bunkers of the cars will not only counteract the latent heat which is in these packages, but will reduce the temperature to a point below which the organisms which cause decay, bacteria and fungi, will not work. Success in the transportation of any perishable product of this character depends upon reducing its temperature to a point below which these organisms of decomposition cannot act. If the time for reducing the temperature is long, the processes of ripening go on rapidly and the organisms multiply to an extent that they cause very considerable loss in transit, loss from decay. The problem of precooling, then, is the problem of reducing the temperature of the product to a point of safety before it goes into the car which is to carry it on its journey to the market. You can readily see that when a warm product goes into a cool car, it will be a considerable period of time before the center of the package is reduced to the same temperature as the fruits or products on the outside layers of the package, and with perishable stuff like celery and lettuce, we get decay in the center of the package.

The Package Question.

You are familiar with the packages which are used to ship lettuce from the southern regions, the barrel-high hampers, which are packed very tightly. The leaves of the heads are rolled tight, and then the heads are forced into the packages. When you have as many as a dozen heads on a layer, it is not a difficult matter to reduce the temperature of the outside heads, but it is difficult to reduce the temperature of the inside heads. So if a basket of warm lettuce is put into a refrigerator, it is a considerable time before the inside heads become cool enough to prevent molds and rots starting.

In every season there is a greater or less amount of loss and decay from the heating of the product in the center of the package. The whole problem of precooling is to reduce the temperature of the product so that it will carry safely from the field to the market.

Advantages of Precooling.

Products which have been precooled, as a rule, reach the market in very much better condition than those which have not been precooled. They are crisper—as the botanist would say, they are more turgid. They have lost less from evaporation, and as a result they stand longer when they are exposed for sale on the market, particularly if the weather happens to be a little warm. In cool weather, if transported in good condition, such products will stand fairly well without precooling. But in general precooling adds to the length of life of the product on the market.

Precooling No Cure-all.

The Department of Agriculture, through its offices of horticulture and pomology, is this year taking up the problem of the precooling of vegetables and has worked thus far with lettuce and celery. It is, of course, too early to speak with anything like decision or authority on the subject, but the work up to the present time is encouraging. It looks as though we were going to be able to put the material into the market in enough better condition to justify the expense of precooling. But let me tell you just here that precooling is not the whole cure by any manner of means. Going along with precooling, both in the case of fruits and in the case of vegetables, is the problem of careful handling; and when we study our records closely, we find that in the majority of cases the results from careful handling are quite as great as the results from precooling. Where the conditions are at all favorable, the carefully handled product will carry very satisfactorily, and it is a question in many localities whether or not it will be necessary to precool the product if it has been carefully handled in the field. By this I mean that the grower take precautions to handle his crop in the field as

carefully as possible to prevent disease, and that at harvest time he take advantage of the time of day and particularly of the care of the product after it has been cut before it goes into the car, to cool it as much as possible. In some instances, it has been found that, if the product is left in the field or left in an exposed place where it cannot be rained upon or where the dew will not fall upon it over night, it will go into the car and carry very much better than if harvested and immediately loaded.

Care In Handling.

Another phase of the careful handling side, which is so intimately associated with and is such a factor in the precooling, is the care which is exercised in preparing the heads of lettuce and the stalks of celery to go into the package. That is, if any diseased leaves or leaves which are disfigured or in any way injured are allowed to go into the packages, you have there a place where disease germs can immediately gain an entrance. Those of you who have studied the records of precooling with citrus fruits from California will remember that the clipper punctures were one of the great sources of loss in the citrus work, that as soon as the improved clippers were devised and used, and clipper punctures were eliminated, a very considerable portion of the loss in transit was immediately eliminated. The same law holds true with vegetables as with fruits. Rough handling and the breaking of the leaves should be avoided. Leaves that have been sunburned should every one be eliminated from the product which is to be packed for long distance transit, either in common refrigerator cars or refrigerator cars with the product precooled.

I believe that we shall find, too—this is anticipating—that the work of precooling will be of very great advantage to garden products, particularly celery, that is to be held for a considerable period in cold storage. If the celery could be reduced to somewhere near the temperature at which it will be held in cold storage before it actually goes into the storage chamber where it is to remain for two or three months, I believe it would keep very much better. But along with that is the question of the container in which the product is stored.

This is a very important matter, both with the shipment of lettuce and of citrus fruits and in the shipment or storage of celery.

The large celery containers that are used in New York State and in California are about two feet square and hold from six to eight dozen plants. In the large cold storage warehouses, there has been a great deal of difficulty in handling celery in these containers, because of decay in the center of the container. Take a container two feet square, pack the celery tightly in that, and have it hot, load it aboard a car, pack two or three carloads in a cold chamber, and it takes quite a long time for the refrigerating apparatus in that chamber to reduce the temperature to a safe point. When the celery is stacked up five tiers high, as it is in these warehouses, you can readily see that it takes a long time to get the latent heat out of these containers. Observation shows that decay takes place in the center of such containers. If the celery could be cooled before it is packed to a point where there was a lessened task placed upon the cold storage apparatus, a safe temperature could be reached much more quickly than under present conditions.

I believe in that respect we can be of great assistance to the cold storage people by precooling and by adopting a different type of container. A little preliminary work which has been done in this state indicates that a different type of container from the one usually used for handling celery will carry it for a considerably increased period. The substitution of the Florida crate for the standard crate which is used in New York and in California will undoubtedly be of very great advantage to those who store celery. This crate, as you know, is really a half crate. The Florida crate is about half as large as the standard New York and California crate and carries about four dozen plants, sometimes five. This is a thin crate. It is about ten or eleven inches thick, as compared with the standard crate, which is twenty-two or twenty-four inches. The result is, when those are placed in storage and proper arrangements provided for slatting the crates so cold air can come in among them, we have, so to speak, more outside plants in the small crates than in the large crates;

and as a result, the temperature in the container can be reduced much more quickly than it can in the large one. That is a very considerable factor of safety.

To sum up the situation, I can simply give you hints of a few things that seem to be more or less self-evident and a few things which have come out of our work.

Perhaps fifty or sixty per cent. of the problem of long storage and of long transit shipment is careful handling. Another considerable percentage of the problem is involved in the type of container. In a few sections of Florida, particularly around Sanford, they have been using a type of container for shipping lettuce, which is built on the same principle as the celery crate, which allows practically two layers of heads of lettuce to be placed in the package, instead of the large barrel-high hamper which is generally used. The barrel-high hamper has wire around the middle, is made like a Delaware peach basket, only it is as high as a barrel. It is very slender. In the bottom they can put about four heads, up further they can put six or seven heads, and on the top from seven to twelve, depending on their size. In this upper portion of the container, the heads are packed very solidly, and that is where the decay starts. In the container which has been devised as a substitute for this we have practically all outside layers of heads. There is no tightly packed inner portion which is difficult to cool. The lettuce carries very much better in those two-layer containers than in the hamper. It is difficult to get the growers to use the crate, because it comes in the flat and it, therefore, makes more work on the farm to prepare a container of that sort. Hampers come all set up, and they nest—one slips inside the other. For that reason—they are all from Missouri—it is up to you to show them that it is to their advantage to substitute a different kind of container for the one they have been accustomed to use. Then on the market—the fellow who vends the stuff is from Missouri also—you have to prove to him that it is to his advantage to buy the stuff in this new kind of container. For very long distance shipment and for long holding of highly perishable products like lettuce and celery, it is very, very desirable that the best type of container be used.

For the lettuce a container of the type of the lettuce crate or that used for shipping California cauliflower is very much better than the barrel-high hamper. The half crate in my judgment is very much better than the standard crate for the storage of celery in this state.

Aside from the question of careful handling and the question of the container comes the question of reducing the temperature of the produce as quickly as possible so as to put it at a point where bacteria and fungi cannot act upon it. That is the whole problem of long keeping. Anything which contributes to that end makes the transit of the product safer and makes the keeping of it longer.

Equipment.

PROFESSOR JOHNSON (Virginia): Could you tell us what kind of a plant would be necessary for precooling for the ordinary grower?

PROFESSOR CORBETT: That I do not think we can answer in anything like a definite way. Just how that can be worked out will depend a great deal on circumstances. If the business can be handled somewhat on a community basis, probably a mechanical plant will be best. If it has to be handled on an individual basis and you can either store naturally or get artificial ice cheaply, probably a very simple salt and ice plant will be most satisfactory. But that is a problem that we have not gone into up to the present time. We have been interested in the fundamental question of what effect the precooling has rather than trying to get down to the practical side of it. What we are using is a portable mechanical precooling outfit. We have a specially constructed car which has a modern mechanical refrigerating plant built into it, about a twelve ton ice plant aboard a car. The cold air from the refrigerating plant is carried through insulated pipes which are attached to the bunkers of the refrigerator car in which the material to be shipped is stored. The stuff is harvested, loaded into an ordinary refrigerator car, run beside our ice plant, and the temperature of the material is brought down to the point that we think a safe one.

Methods of Investigation.

We have a system of electrical thermometers which are inserted in the containers in which the product is shipped. In fact, we do this way. We use what we call the commercial pack, the farmer's own pack, and as he packs we insert thermometers which are electrically connected by means of a cable. For instance, one of these containers is packed by Mr. John Jones, and we place a thermometer in one of the outside heads and a thermometer in one of the inside heads in the container, and we place that in a certain position in the car. We have carefully packed packages, the heads of which have been very carefully handled and the heads carefully packed in the container, and a set of thermometers are placed in that. A series of these packages is placed in different parts of the car, because in a refrigerator car the temperature varies. It is no criterion to determine merely the temperature of the outside heads. With very delicate stuff like lettuce, it is an easy matter to freeze it, and we have to work carefully. Therefore, in order to reduce the temperature of these heads which are in the middle of the container, it often times takes several hours of careful work to avoid freezing the outside heads and still get the temperature of the inside heads low enough so that they will carry. So you see the importance of the type of container in which these products are packed. If packed tightly, as in the ordinary package, it may take four, five or six hours. That all adds to the expense. If you substitute a different container, you might be able to save half of the time in precooling, which cuts the expense almost in two. Those are problems that interlock.

I would say this. Go slow. We are not far enough out of the woods yet to advise you to go into the precooling work or to say what type of plant to put up, or to put up any plant at all.

A MEMBER: Plans are under way to equip a large number of these portable plants and to establish large precooling plants where the volume of business will warrant it.

PROFESSOR CORBETT: It is still in an experimental stage, but it has encouraging features; and if it does nothing more than to indicate the type of container and to show better types of handling, the work will be worth while.

QUESTION: Are the new containers barrel-high?

PROFESSOR CORBETT: The new crates hold twenty-four heads. The old hampers hold thirty-six or so. The new containers are about six and one-half inches high.

QUESTION: To what temperature do they try to cool lettuce or celery before it is loaded?

PROFESSOR CORBETT: They try to get it in the neighborhood of 38 or 40 degrees.

QUESTION: Have all the experiments been carried on in the South?

PROFESSOR CORBETT: In the South and West. The great bulk of them have been in California. We have worked in California, Georgia and Florida. Practically no work has been done in the North, except cold storage work.

MR. CATCHPOLE (Wayne County): What do you ship lettuce in?

MR. BONNEY (Genesee County): Our crate is about sixteen inches wide, twenty-three inches long, and eight and one-half inches deep. We could not get our lettuce in one of the small ones. The second grade of lettuce we put into the same crates and get thirty heads in.

MR. BONNEY: Mr. H. C. Thompson of the United States Department of Agriculture is now here and is ready to read the paper prepared by Mr. A. V. Stubenrauch for this meeting. Mr. Stubenrauch has been closely connected with the precooling work since its beginning. Mr. Thompson.

THE PRECOOLING OF VEGETABLES.

A. V. STUBENRAUCH, Washington, D. C.

I regret that this paper must be begun with a partial apology for the matter to be presented. Judging by the title

my hearers are entitled to expect a clear cut discussion of the results of the actual application of the system of precooling in the shipment of vegetable products. We have had, unfortunately, little experience with the shipment of vegetables, the major part of the work of the Bureau of Plant Industry with precooling having been done with fruits. The vegetable work has only recently been begun, but it is expected that the investigations which have been inaugurated this season will be continued and extended so that eventually full and accurate data will be available. The absence of data bearing on actual shipments of vegetables is not, however, as serious as might, at first sight, appear. The work done with fruits has served to establish the fundamental principles underlying the successful application of precooling and refrigeration to horticultural crops, and it is confidently expected that these principles will be applicable (with modifications to suit changed conditions) to the handling of vegetables. The experience thus far obtained in the Bureau work indicates that these expectations will be fully fulfilled. It will not be amiss, therefore, to utilize the results of the Department's investigations of fruit handling, precooling and shipping as a basis for this rather general discussion of the subject.

The work of the Bureau of Plant Industry along fruit transportation lines was begun about ten years ago. The work thus far accomplished includes investigations with apples, oranges, lemons, grape fruit, peaches, cherries, pears, fresh prunes, raspberries, loganberries, blackberries, grapes and pineapples. The work with vegetables thus far accomplished during this season has been with lettuce, but it is expected that celery, cabbage and tomatoes will be included before the season is ended.

Necessity of Care in Preparation For Shipment.

The most important fundamental principle developed from the fruit handling and transportation investigations is the fact that there exists a definite relationship between the method and character of preparing fruit crops for shipment and marketing and their behavior during transit and after arrival in market. The care with which a fruit is harvested,

packed, shipped and refrigerated governs the distance the product may be safely transported as well as the length of time it may be held in market awaiting disposal and consumption. This principle is referred to here because it has a most important bearing upon the utilization of improved refrigeration facilities.

In the study of refrigeration facilities it was found that, under ordinary shipping conditions in present-day refrigerator cars, a considerable length of time elapses between the picking and packing of a fruit product and the reduction of the initial temperature to the point when deterioration and decay will be arrested. This time varies from one to five or six days, depending upon the fruit product and the outdoor temperatures during transit.

When it is considered that the development of ripening and the progress of the physiological processes of deterioration of fruits or vegetables are hastened as soon as the product is harvested, the important influence of the character of handling, packing, temperature or any other agency which tends either to retard or increase the rapidity with which these develop, readily becomes apparent.

Temperature and Keeping.

The temperature of the product after harvesting has been found to be one of the most important factors affecting the life activities of fruits, and the length of time the product remains at a comparatively high temperature governs the length of time the product may be held in consumable condition. Consequently, the promptness and rapidity with which the initial temperature can be lowered to the point where the life activities will proceed at a minimum rate are most important. In some of the Bureau work a difference of a few days in the reduction of the initial temperature has been found to make a difference of from two to four weeks in the length of time the fruit may be held in good condition. The injurious effect of delay in cooling is most serious for the soft fruits, such as the berries, peaches and grapes. The ideal condition, therefore, is to reduce the temperature as soon as possible after the product has been harvested. So

far in the Bureau investigations, this general rule has been found to apply to all fruit products and thus this factor assumes fundamental importance.

The Ordinary Refrigerator Car.

Close observation of carloads of fruits and vegetables has shown that where the ice of the refrigerator car is depended upon to cool the product, the rate of cooling is extremely slow, when the carload as a whole is considered. As is well known to all handlers and shippers of produce, the cooling of a product after it is loaded in a refrigerator car under ordinary conditions is dependent upon the circulation of the air within the car induced by the presence of the ice in the bunkers at either end. As the air passes through the bunker, it is cooled by the ice, falls to the floor and flows toward the center of the car. As the air passes among the packages, it absorbs heat and rises to the top to be again circulated through the ice bunkers. The circulation of the air throughout the carload is dependent upon the difference in weight or density of the air column within the ice bunker and the current in the warmer body of the load. This difference is not sufficient to create a rapid circulation of the air. The movement of the air currents within the car is sluggish; consequently, if the produce is packed and loaded at a comparatively high temperature, the rapidity with which the fruits or vegetables are cooled is likewise slow. This is especially true with fruits and vegetables which are tightly packed. While the outside layers may be cooled without much difficulty, it requires a considerable length of time to affect the interior of the packages. The bulk of the product may thus remain at a comparatively high temperature long enough to allow deterioration to begin or decay to develop. Once deterioration or decay starts, these processes continue to develop even after the temperature has been reduced; hence the importance of prompt cooling as well as rapid cooling.

In the case of citrus fruits shipped from California, under ordinary refrigerator car conditions from three to five days are required to cool the fruit to a temperature sufficiently low to prevent the development of decay and deterioration.

In peaches which are shipped without wrapping, the cooling is somewhat faster, but still is too slow to prevent excessive deterioration with this more highly perishable fruit.

In the recent work with vegetables, the cooling of hampers of lettuce was found to be almost as slow as that of citrus fruits which are wrapped and tightly packed. It is safe to assume, therefore, that under ordinary shipping conditions where the ice of the refrigerator car is depended upon to reduce the initial temperature of tightly packed crates of vegetables, the rate of cooling may be too slow to prevent the development of the various diseases which affect the product while in transit.

Precooling.

In order to offset this slow cooling, a system of quick refrigeration before the produce is shipped has been developed. This system has been termed "Precooling" from the fact that the reduction of the initial temperature is accomplished quickly and promptly either before the product is loaded in the car, or after loading, but before the car begins to move on its trip to market. The process consists simply in utilizing special refrigerating facilities which will accomplish in a few hours what it may require several days for the ice of the car to do.

In the case of produce loaded on the cars, the cooling is accomplished by circulating a current of cold air through the load until the produce is cooled to a temperature which the ice in the car may maintain without difficulty. Naturally, a number of mechanical problems have had to be solved in carrying out this work.

Warehouse Precooling.

The produce may also be cooled in ordinary cold storage rooms before it is loaded into the car. In this system (known as warehouse precooling) the packages are widely stacked in order to allow free circulation between them. The refrigerator rooms should be provided with extra refrigeration capacity to enable the work to be done quickly.

For either of these processes the refrigerating medium may be ice and salt, or mechanical plants working on usual refrigeration machine principles.

Car Precooling.

For the precooling of produce after being loaded on the cars, known as "car precooling," rather heavy equipment must be provided, because the volume of air circulated must be at a maximum, while the temperature must be at a minimum in order to accomplish the work quickly. It is difficult under ordinary conditions to cool produce after it is packed, especially where, as is the case in car loading, the packages must be rather closely stacked. A considerable length of time is required to cool the entire load satisfactorily. The packages most exposed to the air blast and the outer layers in the packages are naturally cooled first, but where the product is tightly packed the interior of the packages is not easily affected. In the Bureau work, differences of fifteen or twenty degrees are frequently found between outer layers and the interior of the same packages. It is necessary, therefore, to continue the process long enough to reach the interior or to cool the outer layers to a minimum temperature and to depend upon equalization throughout the load to bring the average temperature of the carload as a whole to a point low enough to hold the produce in good condition.

Work With Vegetables.

I regret that it will be impossible to give records on precooling and shipments of vegetables, for the reason that this work has only recently been started in Florida and the data thus far obtained are insufficient as yet to enable definite analyses and deductions to be made. So far, ten cars of lettuce have been precooled by the experimental portable plant built by the Bureau of Plant Industry, and these cars were shipped to northern markets. Each precooled car is accompanied by a check car non-precooled and all cars contain marked crates of lettuce handled by the representatives of the Bureau in Florida and ordinary commercial packages of the same cutting. These crates are carefully inspected on arrival by representatives of the Bureau; the hampers are held several days under market conditions and further inspections are made to determine the market-holding quali-

ties of the produce. In this way accurate figures of precooled and non-precooled shipments are being obtained.

In addition, a comparison of the effect of different handling methods in the field are likewise being made. In general, it may be said that the precooling of lettuce has been followed by marked beneficial results. The lettuce arrives in the market in crisper condition and with less decay or deterioration than the same stock shipped without precooling. When the precooling is accompanied by methods of handling in the field through which a large part of the source of disease infection may be removed, the results are tenfold greater than by the utilization of precooling alone. This result amply confirms the work done with fruits, and from this we may confidently expect that the general principles underlying the precooling and handling of vegetables will be found essentially the same as those worked out for fruits.

The proper system of precooling applicable to the handling of vegetables has not as yet been determined. Under the ordinary conditions of producing and marketing truck crops at present, the utilization of the warehouse system, in which the packages are cooled before they are loaded in the cars, is perhaps impracticable, although under this system more thorough and uniform work can be accomplished. It is only where associations of growers or shipping companies are sufficiently large to enable them to erect precooling plants, or where packing-house or loading-shed facilities are sufficiently ample to justify the erection of precooling plants that the warehouse system can be successfully used. Such conditions exist only in a comparatively few districts. The use of the car cooling system therefore is apparently of the greatest importance to the vegetable industry at present.

Figures on the rate of cooling of lettuce are not yet available, but the work done shows that the time necessary to accomplish satisfactory results is longer than was at first expected.

We have been surprised at the difficulty with which hampers of lettuce can be cooled. The hampers are tightly packed, and the cooling of the interior of the package is dependent upon the conductivity of the heat from the interior to the

outside. There is no practicable way of circulating the cold air through the package itself. The same is true of the method of loading in the car. There are a number of hampers which cannot be reached by the cold blast. The cooling of these is dependent, therefore, upon the equalization of the temperature of the entire load after the circulation of the cold air has ceased.

In the cooling of a carload of lettuce or other vegetables, the limitations of the work are defined by the temperature which the produce most exposed to the blast will withstand without danger of freezing; and therefore, the time necessary to cool a carload will depend upon the volume of air circulated and the temperature of the circulating air. It follows that if the circulating air can be held at a low temperature without danger of freezing the product, the cooling can be accomplished more quickly than where air at a higher temperature must be circulated. These limitations are being carefully studied by the Bureau workers. In the case of some products—notably fruits which have been wrapped—it has been found that air several degrees below the freezing point of the produce may be circulated for a considerable length of time without danger of freezing.

So far, in the vegetable work, the temperature of the air current has not been allowed to fall much below the freezing point of the produce being cooled. It is barely possible, therefore, that after more experience has been obtained, it will be found that colder air may be safely used, and in that case the length of time required to cool a carload may be materially reduced.

There are limitations in the process itself. For example: If a very large volume of extremely cold air is circulated, the most exposed packages and the outer layers in the packages will be cooled to the danger point of freezing more quickly than where air at a higher temperature is circulated. The limits of operation are the temperatures of the crates most exposed to the blast, and as soon as these are in danger of freezing, the work must cease. It may easily follow that the danger point may be reached in these exposed packages before the greater bulk of the carload has been materially af-

fected. Consequently, if the process has to be discontinued before the bulk of the load has been cooled, the general average effect may be less satisfactory where extremely cold air is used than where more moderate temperatures are utilized. There is undoubtedly an optimum of temperature and volume of blast which will yield most economical and efficient results.

So far, the most satisfactory system of car precooling has been found to be a straight circulation of cold air through the car. In the Bureau equipment, the air is introduced through an ice hatch at one end and is withdrawn at the opposite end. Facilities for reversing the air blast are provided, and the current is reversed whenever the produce near the entering air becomes chilled to the danger point. This reversal of the air current is extremely important where a straight circulation system is employed, as it enables both ends of the car to be given maximum treatment.

A number of mechanical problems enter into the construction of a car precooling plant. These are the problems of the refrigeration engineer, however, and a discussion of them here will not be attempted.

In connection with the utilization of precooling by different industries, several processes which purport to give an increased rate of cooling have been devised and introduced. None of these, however, warrant the extra expense and royalties which may be demanded for the use of any patented process now being exploited.

One of these processes is at present being actively exploited by the company owning the patent. This process implies the utilization of a vacuum for increasing the rate of cooling within the carload. The claims of the process are based upon the withdrawal of the air of the car, exhausting it into the outer air, and thus supposedly creating a partial vacuum within the car and later replacing the exhausted warm air by cold air. No advantage has been found to result from this process over a straight circulation system, for the reason that it is practically impossible to obtain a sufficient vacuum to be effective within the ordinary refrigerator car without drawing into the car considerable volumes of air, through innumerable crevices, and this air must likewise be re-

frigerated before the bulk of the load can be cooled. It is doubtful, therefore, whether the claims for royalties on these patented processes are justifiable from the standpoint that they do not increase the efficiency of the work sufficiently to warrant the extra expense.

MR. WORK: This session is to be devoted to a round table discussion on the subject of the production of onions on muck land. We have asked two men to help us by opening the discussion. Mr. A. P. Fisher of Canastota is to first outline very briefly the method of growing onions as practiced at Canastota, one of the great producing sections of our state. Mr. E. R. Hay is to tell us how they handle the crop at Clyde. We have also here men from South Lima; we have at least one man from the great Orange County swamps; and we have a number of men from the muck lands of Wayne County. This is our opportunity. We are all here together. Let us join in a discussion of our subject, and let us learn all we can from the other fellow. Let us all feel free to tell what we know. As has been said, "There always seems to be one man in a crowd who knows what the other man does not know." Mr. Fisher.

ONIONS ON MUCK.

Round Table. Led by A. P. Fisher, Canastota, New York, and E. R. Hay, Clyde, New York.

MR. FISHER: In the vicinity of Canastota are approximately fifteen thousand acres of muck land. About one thousand acres are devoted to onion and celery culture. We have a great many problems to contend with in the raising of onions, as we do in everything else. In order to raise onions on muck land we must have the muck land to begin with. Our soil varies in depth, ranging from a few inches in thickness to several feet. Upon the deeper soil, the moisture can be conserved much better than on a shallow soil. Sometimes we see a very good crop of onions from a shallow

soil. If it is wet, the small amount of muck on top becomes very wet and stays wet, because the clay is right underneath, whereas if you have the deep soil, and the drainage is good, it sucks away a certain amount. In a dry season, the deep soil will hold considerable moisture. It keeps coming up and keeps the ground moist to within an inch or two of the top. We find that the deeper soil gives the best results in the long run.

We have to properly prepare the soil to raise onions. Some people believe that the fall is the proper time to plow; others believe that the time to plow is in the spring. We have seen crops of onions raised on ground plowed either spring or fall or not plowed at all. I would suggest that we plow in the fall and plow reasonably deep. Then, the ground is allowed to freeze and so is pulverized by the frost till the spring thaws it out, when we get to work and drag it well. After it is dragged we smooth it, sometimes we roll it to get it into proper condition. Then it is ready for planting. Some people prefer to put the fertilizer on the soil first, drag it in thoroughly, follow with the smoother, and then sow the seed. In either case, whether they put fertilizer in at first or later, we do not know which brings the better results. We have obtained good results either way; we have obtained poor results either way. I would advise putting on half the fertilizer before and half after sowing the seed.

Disease Control.

While sowing our onion seed, we also have in mind the sowing of something to prevent pests. We have the smut to contend with in our soil, we have blight, we have maggots, we have winds, we have it too wet sometimes and sometimes we have it too dry. Recently a number of us have found that sowing sulphur and lime with the onion seed, so that the sulphur and lime intermingle with the seed and form an envelope, has been the means of increasing our yield of onions from sixty to three hundred per cent. On land that has been very badly affected with smut, it is shown that the increase has been as high as three hundred per cent. On

lands that are not as badly affected, we have found from sixty per cent. upward.

Then we have the blight to contend with. The blight I hardly know how to handle. When it comes we are at sea, but we have had suggestions as to what we ought to do. They say we ought to spray. If we should spray all our onion land, it would be a great expense, an expense that we could not afford.

Then we have thrips to contend with. Nothing has been found as yet that would eliminate thrips entirely. Spraying has been advocated for that, a kerosene emulsion. We have not tried that. Our worst trouble has been the smut.

Sowing and Cultivation.

Leaving these diseases aside, we plant the onion seed with hand drills (in rows) from twelve to fourteen inches apart. I have taken a medium between the two extremes and seem to get good results. Then the cultivation. As soon as our onion seeds are planted and are up out of the ground, so that we think the cultivation will not injure them, we commence with wheel hoes, going back and forth through the rows, not too deep on the start, simply deep enough to catch the small weeds that are just coming up.

Weeders.

We cannot destroy the very small weeds in the rows by hand, so a number of machines have been devised for eliminating them. One that we had last season proved very satisfactory. One party I know had one of these machines, and one man took care of the weeding for seven acres until what few weeds there were got up where it was impossible to do anything with them (with the machines) and the onions got so large the machine could not be run through them. Then they had children go through them once to pull out the weeds and then allowed them to go. They made a very good crop of onions, four to five hundred bushels to the acre. Before we had a machine for the purpose—and I suppose the majority of the people would still undertake it—we did the weeding by hand, picking out one little weed at a time. If

we had to depend on the American people in that locality to do the work, there would be very little of it done. The Italians work the land on shares and do all the weeding. I think if a person had a small piece of onions, two or three acres, he could take care of it himself by using one of these weeders.

QUESTION: Do you know the name of these weeders?

MR. FISHER: One is built in Osborn, Ohio, by the Golden Celery Farm, the other one is built by the Vrooman Manufacturing Company of Painesville, Ohio.

QUESTION: Do you have good luck with the Golden Celery weeders?

MR. FISHER: This one has not been used there. The Vrooman has been used.

QUESTION: Can one man handle that Vrooman machine successfully?

MR. FISHER: Oh, very easily.

QUESTION: Is it a geared machine?

MR. FISHER: It is a geared machine.

QUESTION: How expensive is this machine?

MR. FISHER The Vrooman sells for thirty-five dollars. The other is listed at fifteen dollars.

After our weeding is over and the onions commence to form bulbs at the bottom, they spread over the ground pretty well, and it injures the tops more or less to do much cultivation. Sometimes we go through with a cultivator which has a single handle and a small blade, so as not to disturb the tops more than necessary. After going through once or twice, we let them go entirely.

Harvesting.

At harvesting time we pull six rows, putting them in one windrow. If the weather is pretty warm and the tops are rather large, we turn them up to keep the onions from being burned by the sun. They are allowed to remain there till

the tops are entirely cured down. Then crates are distributed through the field and the Italians do the gathering, picking up one at a time, cutting off the top, and putting it into the crate. When raised on shares, they are piled up, a certain number of crates to the pile, and we take alternate piles.

Varieties.

Here are some of the Red Wethersfields, partially flat, and there are the Red Globes. We do not go into reds very heavily at Canastota. Our principal crop consists of such as these, the Ohio Globe, or a half flat, Globe Danvers. We grow the Southport Globe, but not so much as the others. They seem to cure down better than the Southport as a general thing. On some soil the Southport seem to cure very well, other times they are a little late. We like the Southport for their shape, size and color. They sell very readily.

Machines For Sowing Sulphur.

QUESTION: How do you apply lime and sulphur with seed for subduing smut?

MR. FISHER: In Florida, New York, there is a man by the name of Hoffman, who builds a machine that has been used in our vicinity this last season for the purpose. It has a seed box and the sulphur and lime box side by side, sows three rows at a time. The wheel has a sharp tire which makes a groove. There is a spout by means of which the mixture of seed, lime and sulphur unite so that they are mixed and come down together into this groove and are covered by the coverer. The idea is to envelope the seed in the sulphur and protect them against the smut germ.

QUESTION: Could that not be worked satisfactorily with an ordinary seed drill?

MR. FISHER: I am doing that now. I have taken a fertilizer sower that goes on a two-wheeled seed drill and attached it to a one-wheeled seed drill, so that I can shoot the sulphur and lime down with the seed.

QUESTION: What proportions are used?

MR. FISHER: I use one hundred pounds of ordinary flower of sulphur to fifty pounds of lime. The lime should be air slaked.

MR. JAGGER (Tompkins County): Or hydrated, either one.

MR. FISHER: Mr. Jagger was down there this season and made tests with those machines. The trouble that we found with them was that they did not sow the sulphur and lime very well. It would sow unevenly. This machine I am working on at the present time Mr. Jagger tested on the floor of the storehouse of the firm that sells these machines, the Bateman Manufacturing Company, and I think his test of that machine was very satisfactory. I have one of those same machines (a regular phosphater), which I intend to attach to my Iron Age drill. It is positive in its action.

QUESTION: Haven't they a regular phosphate seed drill?

MR. FISHER: They have, but we are not able to use it on the muck. It does not put the sulphur and lime where you want it.

QUESTION: How much of that lime and sulphur do you use to the acre?

MR. FISHER: We use one hundred fifty pounds, one hundred of sulphur and fifty of lime. It should be well mixed and sifted through a fine sieve.

MR. WORK: These samples of onions represent another kind altogether. They are grown on upland on the farm of one of our Winter Course students in Vegetable Gardening. The thing that interested us particularly about them was the fact that last year, when everybody was dumping onions, this grower was able to sell all his. This winter they are bringing about twenty-five cents a bushel more than other people's onions. That is not all due to the variety. It is due to the fact that they are well grown and well stored. The variety is a good keeper. It is known as Ebenezer. I think it is catalogued by some seedsmen. What did you get for them, Mr. Bippert?

MR. BIPPERT (Erie County): We got about sixty cents a bushel, for a few of them fifty. This winter we are getting a dollar and a half a bushel on the Buffalo market.

MR. WORK: Perhaps it will be well for us to listen to Mr. Hay of Clyde as he outlines the method of his neighborhood.

Mr. Hay's Remarks.

MR. HAY: If Eve flavored Adam's soup with onions or served them raw at a vegetable growers' banquet, she probably did not have the kind of onion that we grow, but one of nearly uniform thickness from bottom to top. The bulb, I believe, is a product of development. The getting of seed that will produce the properly developed bulb I consider the first essential of successful onion growing. Generally, profit is not derived in any truck crop from a normal yield and normal price, but from a yield or price above the average. This is especially true of onions. Therefore, it behooves us to get a strain of marketable onions that will produce above the average number of bushels per acre. A man should never look twice at an extra dollar if, by paying it out, he can secure a better grade of seed. A very small increase in yield will pay big interest on the extra dollar so invested. Right here you are referred to Mr. Greffrath, who, as chairman of our Seed Committee, is trying for and I hope succeeding in securing better seeds for us. Some of us are growing our own seeds with fair success, though it is probable that only under irrigation can we get the best results. I aim by careful selection of bulbs for seed to obtain a type of onion having its long axis vertical rather than horizontal. Care must be taken, however, not to get the onion too long, or a crop of scallions may result.

I have here two types, one of which I aim to grow. Those onions take about the same ground space, but if you turn them up the other way, you will see that one onion is much larger than the other, which, while occupying the same area as the other, should and does produce a larger number of bushels per acre.

Rotation of Crops.

The second requisite for success, I believe, lies in rotation of crops, and in this rotation I have found nothing better to

precede onions than late celery. This crop properly cared for leaves the soil in better condition for onions than any other preparation I know. Other crops that leave the soil in good condition for onions are late potatoes and late lettuce.

Preparation of Soil.

I would not plow the ground after any of these crops. Whenever possible, I level the celery banks down in the late fall, using a heavy plank set on edge, drawn by means of a chain and held on edge by two handles. This is a short job, as two banks are broken down at once. The leveling is done in the fall so that there may be no banks to retain frost late the following season. As soon as the ground is fit in the spring, we harrow with a spring tooth. We also use a Meeker harrow and other tools for leveling, being careful to get the ground as level as possible. When this is accomplished, we sow fifteen hundreds pounds of a 4-6-10 fertilizer per acre, using an Empire broadcast distributor. I will say that the nitrogen of this fertilizer has its source in nitrate of soda, blood and tankage, thus furnishing nitrogen that is available throughout the season. The potash, as in most complete fertilizers, is in the form of muriate, which enhances the yellow color of our onions. The fertilizer is thoroughly harrowed into the soil with spring tooth and peg tooth. Then the Meeker harrow is passed over the ground and does away with nearly all hand raking. We have drilled onions immediately after the Meeker harrow, but prefer to first pack the ground with a plank and then sow. I use an ordinary one-row Planet Jr. drill, largely, I suppose, because my neighbors do so, but also because I believe I can get better distribution of seed and rows more nearly straight than with drills sowing more than one row. I have obtained the best yields from sowing six pounds of ninety per cent. germination test seed per acre. I hold that the seed should always be tested and the amount sown regulated accordingly.

Weeding and Cultivating.

As soon as the rows show plainly, we go between them with a single wheel cultivator and follow this with a double wheel,

straddling the row, using in each case the ordinary hoes or blades. By this time the weeds are usually advanced enough to be a menace, and we put on the disks and go ahead of the weeders, working as close to the onions as possible, but being careful not to cut too deep. We aim to go through our fields ten times with the hand cultivator, but sometimes we only get over the ground some eight times. This includes once banking the onions, using the plows. This is usually done after the second weeding when the purslane and other small weeds first appear. The banking smothers the small weeds, this saving considerable finger work. It is sometimes possible to get through the onions with the cultivator after banking them, but sometimes the banking remains except for so much of it as we can tear down with the scuffle hoe. A better color is obtained on the onions by leaving the banking up, but there is more danger on old ground of increasing the number of scallions and reducing the yield of good onions. I do not know that to be true on new ground. When we can no longer get through the onions with the wheel hoe, we use the scuffle hoe, cutting any weeds between the rows and pulling such as are in the rows as we go along. Care is used to pull these weeds before they get too large, otherwise the roots of the onions are torn up and growth retarded. If some weeds get too large, we either cut them off with a knife or leave them. However, leaving weeds to bear seeds for years to come is only storing up trouble. Our practice is, with the exceptions noted, to use the ordinary flat hoes and shallow cultivation. If, however, the ground becomes packed and hard or very wet, we put the narrow teeth on the cultivator and dig deep, even at the cost of breaking many roots. Parts of fields showing a yellowish color and not growing well have often shown as good color and as vigorous growth as the rest of the field after such treatment.

Harvesting.

We aim to pull our onions as soon as the majority of the tops fall over. If the crop shows signs of not ripening evenly, a light roller is passed over it to break down the tops, thus causing them all to dry at practically the same time. In pull-

ing, the onions are thrown six or eight rows in one and left ten days or more to cure. Then they are hauled from the field, topped by machine and stored in crates until sold. The machine does better work than can be done by hand and saves running the onions over a screen. The onions are usually sold soon after topping. Especially if the crop of the country is large, we aim to sell as soon as possible. Our crop is mostly taken by local dealers and men who come in from outside and make outright purchases. Occasionally some of the crop is consigned. The sales are nearly all in bulk.

QUESTION: What is the onion you have there?

MR. HAY: These are the Ohio Globes. They do not run true to one type. I have been growing my seed, and I am aiming for the type with long up-and-down axis.

MR. WORK: What kind sells the best?

MR. HAY: We have found but little difference. If any, the one with the long up-and-down axis is preferred.

MR. FISHER: In our locality they prefer the half flat or perfectly round.

MR. WORK: You think that is because the ultimate market prefers them?

MR. FISHER: Most of our onions go to the large cities.

MR. HAY: We have never had any objection to this type of onions by the buyers.

Fertilizers.

QUESTION: How many pounds of fertilizer do you use?

MR. HAY: Fifteen hundred pounds is my practice.

QUESTION: What make of fertilizer?

MR. HAY: I am using Armour's make, Truckers' Special.

QUESTION: Has a higher grade potash ever been used with success, say, for instance, a 3-7-15?

MR. HAY: I have as an experiment mixed with 4-6-10 a considerable quantity of potash, bringing the analysis some-

what like what you mention. I had fairly good results, but saw no advantage in this over the one I used.

QUESTION: How about dropping off nitrate of soda?

MR. HAY: That might be done. Someone had excellent success with 2-8-10. I do not say 4-6-10 is the best we could use, but it has given good results, and I do not care to change over large areas, at least. I aim to experiment a little.

QUESTION: Do you top dress the onions?

MR. HAY: No. I have tried top dressing, but with no particular results.

MR. WORK: Let us hear Mr. Jennings on that.

MR. JENNINGS (Madison County): That has always been our practice.

MR. WORK: Why?

MR. JENNINGS: We thought we got better results.

MR. WORK: At South Lima, Mr. Wilson, you have not found much difference?

MR. WILSON (Livingston County): We have not. It is just a matter of opinion.

MR. WORK: If there is not much difference, we had better put it all on at once and save labor.

MR. DRYER (Oswego County): When Mr. Greffrath called on me, we had about six acres of onions which in one part showed quite a little blight. There was no buttoning at all —the onions showed no form or shape. We applied three hundred fifty to four hundred pounds of 4-8-8. We had a pretty good crop, but it did not come up to the standard of the other.

MR. HAY: I have tried it in places where the onions were not doing as well as they should. Conditions were unfavorable for those onions, and the additional food perhaps helped them. When onions are very thick, the ordinary amount of fertilizer perhaps is not feeding them strongly enough, and a top dressing of proper fertilizer would probably help. The fertilizer I mentioned had nitrogen available throughout the

season. If a fertilizer were used in which the nitrogen was quickly available, I believe top dressing would be advantageous.

MR. HAW (Onondaga County): Would it be safe to use much nitrate of soda on onions very late in the season?

MR. HAY: I am afraid it prolongs growth too much.

MR. CLUM (Cayuga County): How do you ascertain the contents of your fertilizer?

MR. HAY: I take the agent's word for it. I do not mix my own fertilizer. That would be a sure way of ascertaining what you use.

QUESTION: Don't you have to thin your onions if you use six pounds to the acre?

MR. HAY: I did not. I used a little over six pounds of seed on part of mine this year, and they averaged about a bushel of small onions to the acre.

MR. WORK: Do you have smut or maggots?

MR. HAY: We do not have many maggots, due to the rotation of crops. Smut we are not troubled with.

QUESTION: What is your rotation?

MR. HAY: We rotate either celery and onions or lettuce, celery and onions—either a two or three year rotation.

QUESTION: Have you had experience with Southport Yellow Globe not drying down well, this causing you to use the Ohio?

MR. HAY: I have used both, and I thought I secured a little larger yield with Ohio.

QUESTION: Do they have a shorter season than the Southport Yellow Globe?

MR. HAY: Not much difference, possibly a little.

A MEMBER: I had trouble with mine in regard to drying down. I had very large onions.

MR. HAY: By sowing them a little thicker, perhaps they would not get quite so large and would dry down better.

MR. WORK: The Association is in touch with seed of all three of these. Of some we have commercial quantities, of the others samples. We would be able to put you in position to try these out side by side. If you plant them side by side under the same conditions, you can tell something about it. I want to call your attention to the Seed Service. We have a number of strains that have been tried out by our members and are available to members.

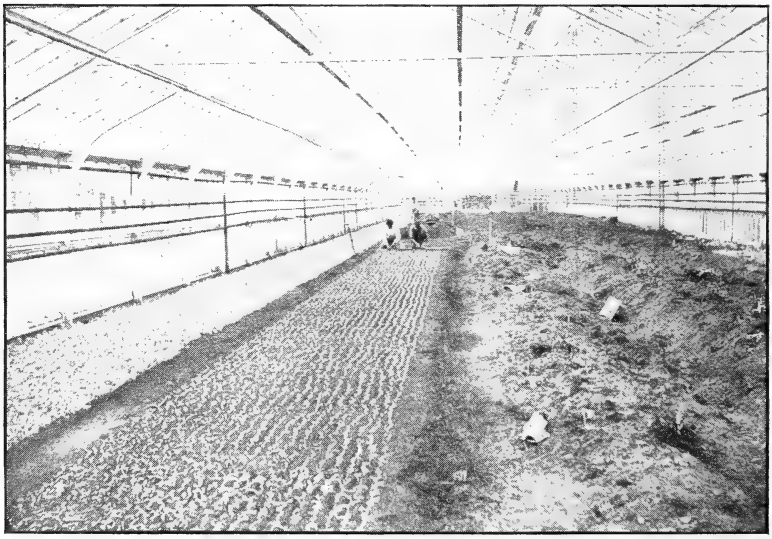
TUESDAY AFTERNOON.

CROPS UNDER GLASS.

ROUND TABLE. Led by PAUL WORK, Ithaca, New York.

This afternoon we are scheduled for a round table discussion on the growing of crops under glass.

We may, by way of introduction, look back upon the early history of vegetable consumption in our country. There was a time when the products of the garden were used in very



small amounts. A little green stuff in the late spring and summer, and perhaps a few potatoes and squash or the like to go into storage over winter was about all people expected.

During most of the winter and spring the chief diet consisted of cereals and meat. Those were the good old days of the big black bottle up in the corner that had to come down every so often, and from which everyone had to take a big tablespoonful every morning.

People think nowadays that a diet which includes more of vegetables and of fruits is more wholesome, and that the big bottle is not so necessary as it used to be. This change is evident on all sides.

Several factors have contributed in bringing about the increased demand for garden products. In the first place, our population is increasing. There are more people in the United States every year than there were the year before. That means that more vegetables are eaten. Then, the proportion of our people that lives in the cities is increasing. That means that a larger proportion of our population must be fed from a distance and a smaller proportion of the vegetables is grown by the people who use them. People were formerly satisfied to have vegetables during a few months. Now they want vegetables all the year. I notice the greatest difference in the three years I have been here at Cornell. We used to think it remarkable that people could have tomatoes all the year around. Now they want lettuce and cucumbers at every season. In 1910 we said: "There are some vegetables we can have all the year." In 1914 we were almost safe in saying: "There is no vegetable we cannot have all the year." I believe if we are willing to go about it rightly, this is thoroughly possible. It means that the forcing business has developed, and it means also that it is still developing. It is growing every year. We hear some pretty big cries to the contrary. Last October we heard them. A mighty wail went up through the land from Ashtabula and Erie about the terribly low prices and about the tremendous quantities of lettuce that were being dumped, and about the consequent losses. This year we are not hearing a word of complaint. As one travels in those parts, he sees more glass. Men that had eight acres last year have nine this year, and men that had one or a half are putting up more.

I think I may say the latter part of last season went a great

way to make up for the fall losses, but those same people said nothing in the spring. These facts indicate that there must be profits in it. In conversation this morning I heard a man quote another to the effect that if we can use as large an amount of capital in vegetable forcing as in other business, there is just as good money in it as there is in manufacturing. A greenhouse establishment is really a plant factory. It is a lettuce factory, a cucumber factory, or some other kind of a factory, and each year we are working more nearly under factory methods.

Greenhouses and the Labor Problem.

Even though the area of glass is small, yet there is much to be gained by it. I want to point out to you the importance of vegetable forcing in the connection of business of the market gardener. One of our most difficult problems is the problem of labor. Every one of you, I think, feels that problem. You have a good man, say in April. By fall he has become valuable to you. He is adaptable, he likes to please you, and he likes to do things the way you want them done. October comes, and what are you going to do with that man? You are forced to let him go in October. The next April you are looking around to see if you can get that man back again. Just as sure as that man is a good man, he is not going to be satisfied with the eternal shifting. How are we to solve that problem? There are several ways. One way is to manage our farm operations so that the work is as well distributed through the year as possible. Even then there is almost sure to be a period of a few months when we cannot use our help profitably. Will not the glass house help us to solve that problem? Suppose in connection with our market gardening we put up a little greenhouse. Do not try to put a whole acre under glass at once, but enough to keep you busy and enough to enable you to keep your one best man. Your day labor you can afford to let go in the fall, but it is the man that can take the lead, your best help, that you want to hold. With a little glass you will be able to keep that man and make him and the greenhouse together pay his salary during the winter.

Suppose you have a nice trade built up in the city. You are meeting men regularly with your goods. You drop out in the

fall and the next season you have that business to build up again. If you talk to a traveling salesman, he will tell you the same story. He will tell you that if he misses getting around to his customer one month or two months, when he is accustomed to getting around it every month, his trade is pretty near gone. He has to attack this lost business just as if it were new. Your situation is similar. Why could you not keep on supplying the grocer with lettuce during the winter? Then as spring comes on, you will be able to add cucumbers or tomatoes. As your other trade develops on, you will be in touch with him. "Next week," you will be able to say, "I am going to have this." Thus you can hold your trade right through the year. At the same time that you are doing that, you are doing another thing. You have experienced those dark months during the winter when you are investing money on every hand, but not a bit is coming in. You have to take your savings out of the bank and destroy the interest-bearing value of that money for a year; or if you cannot do that, you are pushed right to the wall. The use of some glass will help you, I think, to pay your bills as you go during that time; and not only that, but it will make it easier for you to pay cash, to lay in supplies in advance. Take packages, for instance. You can usually buy them more cheaply in the spring, when the factories are not busy. Thus the greenhouse helps to even up your income and your returns during the year.

I am not going to discuss each crop this afternoon. I am going to leave it to you. We have some good men here, men who have had experience and are successful. Let us give practically our whole time over to questions. I suppose we had better begin with lettuce. That is the most important of all the greenhouse vegetable crops. It is one that you can grow very nicely throughout the year. The first question might be this: What kind of soil do we want for growing lettuce? Mr. Zuck, will you give us your experience?

Soil Questions.

MR. ZUCK: The natural soil on which we grow Grand Rapids lettuce would not do at all for head lettuce. It is what

we call a black ash muck. There is more or less clay in it. We have lightened that soil by adding a couple of inches of yellow sand, which makes rather a light soil. Then with the addition of large quantities of manure, it is a light soil. Originally the marsh was a typical swamp soil, partly clay.

MR. WORK: That is more like the soil we find at the heads of some of these lakes. We have a heavy, alluvial soil that is black, though it is not muck.

MR. ZUCK: For several years we grew our lettuce on the natural soil, but we found it was too heavy. By adding that sand, we think we made an ideal soil.

MR. WORK: You still have some of the heavy element there? What is the advantage of that?

MR. ZUCK: It retains the moisture. Most of the large lettuce plants are located on a wholly sandy soil, and the one criticism I have of these soils is, they are too leachy. They do not hold the plant food when heavy waterings are given, and another point is this: A great many times when lettuce is about half grown, we find that our soil has dried out if it is a sandy soil; but if the soil is heavier, we can water when the lettuce is not over half grown and that watering will mature the crop, which saves pouring water on lettuce that is nearly ready to cut.

I believe also the heavier soil gives us lettuce of a thicker leaf. I have compared notes with other men, particularly Mr. Weinschenk of Newcastle, and his experience has been the same as ours, that lettuce grown on a heavier soil is more of the celery type or head lettuce type—thick leaves, very tender—whereas lettuce grown on a sandier soil makes more of a light, loose-leaf growth.

PROFESSOR BEAL: Are these grown on the ground or on benches?

MR. ZUCK: On ground beds.

MR. WORK: I do not think you will find any large growers today who grow their lettuce on benches. There are some who advocate growing their tomatoes on benches, because they can get them a little earlier.

QUESTION: Do I understand this sand is put on top or mixed in?

MR. ZUCK: We mix it all through.

MR. KILBOURN: We have a medium light clay loam and use large quantities of manure and bone meal.

MR. YODER: The soil of this location is rather a sandy loam and the soil where we had our previous experience was a little heavier. So far we do not seem to be able to get quite as heavy a lettuce on the light soil as we did on the heavier soil. I do not know whether it is the soil entirely. Our present experience seems to indicate that the heavier soil gave us heavier lettuce.

MR. WORK: Your soil where you are now is fairly light?

MR. YODER: I would not call it very light, but rather a sandy loam. We water with sub-irrigation.

MR. WORK: Our conclusion with regard to lettuce from what has been said would be that a soil that has somewhat of the heavier elements in it would be better than the very light soil; and yet if the soil is very heavy to start with, we must lighten it somewhat. Manure, I suppose we would agree, would be the most valuable material for the purpose, but if it is very heavy, applications of sand thoroughly worked in would be very useful.

QUESTION: How much manure would it be safe to use, fifty per cent?

MR. ZUCK: That is a hard question to answer. The general practice among all growers is to add a very heavy application in the summer, probably four or five inches. It maybe fresh manure or partly rotted manure. Then the practice is to add a partly rotted manure after each crop of lettuce is cut, and also the practice among many growers is to mulch cucumbers and tomatoes with fresh manure to conserve the moisture and to supply plant food. Thus there are in all several applications during the season.

MR. WORK: In the course of the year the soil gets eight inches?

MR. ZUCK: Fully eight inches.

QUESTION: How many crops of lettuce can you grow on the same soil?

MR. ZUCK: I think with Grand Rapids lettuce we almost always get three or very nearly three full crops, and then an intercrop with the cucumbers or tomatoes.

QUESTION: How many seasons are you able to use that soil?

MR. ZUCK: We have had soil in there nine years this spring. Advice seems to be that we change about once a year.

MR. WORK: The florists change their soil practically every year, or perhaps every two years. The vegetable men practically never change their soil. I know of some places where soil has been used year after year and year after year without change. I have been in greenhouses where it has been in use twenty years. They maintain the fertility by large amounts of manure, and when disease comes, they sterilize. The summer mulch system Mr. Zuck mentions, in which they put on a heavy coat of manure in the summer, letting it lie there and keeping it moist for some weeks, then raking off the very coarsest of it, seems to help materially in controlling disease.

MR. ZUCK: We always turn that manure under and then sterilize. There are not many places where they do not sterilize now.

MR. WORK: When the soil mulch idea was first suggested, people thought maybe sterilization would not be necessary.

QUESTION: Do they ever lime?

MR. ZUCK: We lime every summer. We add a couple of tons of ground rock lime to an acre.

MR. WORK: In contrast with this manure-sterilization-lime method of maintaining fertility, we have the scheme of the florist. They have to have some outdoor space that they can use for soil purposes, and they build up the fertility of that land by the use of cover crops, manure and tillage and get that soil into nice shape, while the old they take out bodily. They do not feel that the soil will give them results by sterilizing. How about lime, Professor Beal?

PROFESSOR BEAL: They use lime when they pile up the soil.

MR. WORK: Can you tell us, Professor Beal, why the manure-sterilization-lime system will not work with flowers?

PROFESSOR BEAL: It is the general practice of the florists to grow their crops in one year, throw out the soil, put in new soil and replant. I know of some florists that are trying to grow carnations, for example, two years in the same soil, and I have heard of places where they claim that they can grow carnations three years in the same soil. Most of the men who have tried that have found out to their sorrow that it did not pay. Just what takes place in that soil which makes it such that it cannot produce a good crop of flowers the next season I do not think anybody knows definitely. There is a good chance for investigation which we hope to get at some time. Whether there are toxic properties there, due to fertilization which the florist gives his soil throughout the winter season, or whether it is due to the changed physical character of that soil, from the heavy watering and heavy manuring, I am not sure. It may be both. The florist simply changes his soil because he feels the other system pays best. Probably it might be well to say for those who are not familiar with the growing of most florist crops that are benched that they are grown in four or five inches of soil on the bench. Or else, if they do not use the wooden benches, they use concrete benches with tile or gravel below, but there are only four or five inches of soil in which the crop is grown. So there are not the more natural changes taking place in that soil which probably do take place in the greenhouses of the vegetable growers where they are using practically the natural soil.

MR. WORK: I am wondering if that is not getting pretty close to the crux of the matter,—raising in benches or ground beds. In raising lettuce in benches, Mr. Zuck, is it necessary to change it?

MR. ZUCK: I don't know. Father started in business about twenty-five years ago with the old beds. In later years it has been the practice to leave the soil in.

MR. WORK: Did you ever maintain soil in the benches year after year?

MR. ZUCK: We used to. In those days we did not know about sterilizing, and we found it very necessary to change the soil.

MR. KILBOURN: I might say we have grown carnations in the same bench two years at a time, and I think in one case three years, and we have not been able to notice any difference; but I would caution anybody not to put too much dependence on the result of our slight experiment.

MR. WORK: That is the way with all these things. If we have adopted one practice and think of changing, we had better try it on a small scale.

MR. KILBOURN: We found the dirt we carried out from our carnations was useful in the kitchen garden.

QUESTION: For growing lettuce in benches, would you recommend changing the soil?

MR. WORK: I don't know. Not very many are growing it in benches. I would imagine that for a starter it would be the wise thing to try it. One ought probably to try the two practices side by side.

QUESTION: How about sterilization for flower soil?

PROFESSOR BEAL: They are not using sterilization very much. Mr. Ward tried the system of sterilization for carnations more extensively than anybody else in this country. They find it successful and are still practicing it. There are one or two other large growers who are using the system and find it to pay, but the average florist does not. I was going to ask how deep Mr. Zuck stirs his soil. How much of the lower soil does he bring up each year? How deep does he work that surface soil down toward the bottom?

MR. ZUCK: Our houses are so arranged that we can break up the soil in the summer with the two-horse plow. We generally take the wheel and chain off and let it go right down. I should judge it goes at least ten inches. We have plowed that way year after year, so the soil is at least ten inches deep. You never bring up the natural soil after two or three years.

MR. WORK: At Boston they often go eighteen or twenty inches.

PROFESSOR BEAL: So you do in a way change the soil.

QUESTION: What do you do to get eighteen inches?

MR. WORK: The point Professor Beal was making is simply this: By turning the soil deeply and thoroughly each year, we are practically changing it. We might say we get back to the same soil once in three years. It does seem apparent that the permanent use of soil goes hand in hand with ground beds. Are you men who are growing carnations in the soil year after year doing it in ground beds?

MR. KILBOURN: Ours are in benches.

PROFESSOR BEAL: I could not say about that. They usually have some sort of drainage, if they are growing in shallow soil.

MR. WORK: I take it the reason for this is that they want to control the soil more than we do. Wet one week, dry the next. Perhaps there are possibilities there for us. Maybe we are letting our crops do too much as they please. Perhaps it would be possible to control them more than we do by letting them stay a little wet or a little dry. If your carnations are coming on a week before Easter or Christmas, you hold them down?

PROFESSOR BEAL: Yes, but by temperature.

MR. WORK: To what extent do you control your temperature, Mr. Zuck?

MR. ZUCK: As we build, we put up several houses instead of one. We can, if one crop is coming on too soon, shut off the heat and hold the crop back. This matter of raised beds, it seems to me, could not be practically applied to vegetables except in the growing of fall tomatoes, because in growing the fall tomatoes, the soil is colder than the atmosphere, which is apt to cause wilt and other diseases; and if fall tomatoes were grown on benches, we could control the conditions. However, for winter lettuce, spring tomatoes, and cucumbers, I question whether raised benches would pay.

MR. WORK: The florists men cannot see the beds in a practical way. The vegetable men cannot see the raised benches. What we have been trying to do here is to see whether there are points from one side that would be helpful to the other. There is the question of bottom heat. Bottom heat is regarded as useful to others. We have undertaken to find out about that. In the far end of our greenhouse in the old range, there is a bed under which there are four steam pipes eighteen inches apart. We let just a little heat circulate there, so that we keep the soil just ten degrees warmer than the air. We want you to go out and see this. We understand there are some growers in Illinois who have bottom heat under their ground beds and who get good results with it. I do not know the details of their plan and do not know how successful it is. Have any of you any ideas on that? Does your lettuce grow more quickly on the benches, Mr. Kilbourn?

MR. KILBOURN: I think it would the forepart of the year anyway.

MR. WRIGLEY: All of our lettuce we grow in ground beds. I have tried it on beds in the air, but they grow too spindly. You cannot hold them back, and you have to water so much with beds in the air, that it seems to cause mildew. On ground beds we always find hold the moisture a great deal better.

MR. HUNTER: I have one house in which the two side benches are on beds, and the center is the solid bed. I like the solid bed best. I have about every three feet a row of tile. I can grow a crop with this. There is a circulation of air underneath. They are about ten inches under the soil.

MR. WORK: Do you use them for watering?

MR. HUNTER: No.

MR. WORK: Could you?

MR. HUNTER: I think I could.

MR. WORK: What is your soil?

MR. HUNTER: These pipes come right to the top of the subsoil, over the gravel.

MR. WORK: It is gravel underneath instead of clay. For sub-irrigation you ought to have a fairly tight bottom. Do you think that in the ground bed those tiles are worth while?

MR. HUNTER: I think they are. At any rate I can set up a solid bed at the same time as the other benches and get lettuce earlier and never have any trouble.

MR. WORK: The point I wanted to get at was this. Under your ground bed you have these tiles for aeration. Have you any ground bed that has not those tiles? I was wondering if there was any difference between tiles and no tiles under a ground bed. What do you think of the possibilities of aerating, Mr. Scott?

MR. SCOTT: I do not know. I have thought it might possibly be of some use.

MR. KILBOURN: Do you not think that might help to solve the problem with the fall crop of tomatoes? It would seem to keep the earth of the bed near the same temperature as the house.

MR. WORK: It would seem that way, but I am afraid the difference in temperature would not be enough to amount to a great deal.

MR. KILBOURN: I have seen them so thick the tiles would almost touch, practically making a medium between the bed and the solid bench.

MR. WORK: There is a question we debated when we put in our sub-heat. We decided not to put a false bottom over those pipes. If we find the distribution of our heat is not even enough, we may try out the other, although that does not look as plausible as the plan that we have adopted. How has your crop been this winter, Mr. Wrigley?

Distances For Lettuce.

MR. WRIGLEY: Good. We are growing Grand Rapids. We plant six by six.

MR. ZUCK: We plant six by eight.

MR. YODER: We plant seven or eight inches each way.

MR. KILBOURN: We plant about six by seven, sometimes seven by eight.

MR. WORK: How do you sell yours, Mr. Kilbourn?

MR. KILBOURN: Mostly to the local trade by the dozen.

MR. WRIGLEY: By the dozen.

MR. ZUCK: By the pound.

MR. YODER: By the pound.

MR. WORK: The pound fellows have it wide apart, the dozen fellows have it close. We sell by the dozen here. We find quite a difference in our market. Sometimes they will come along and want the small stuff, other times we have to let it get pretty large before they are willing to take it. But it seems to be generally agreed that the wider the distances are, the more satisfactory for growing by weight, while the closer planting is all right when sold by the dozen.

MR. WORK: I would like to ask if any of the greenhouse men are located quite a distance from the market. What proportion of your crop do you sell in Erie, Mr. Zuck?

MR. ZUCK: Between a third and a half. We ship lettuce today to the eastern part of New York State and eastern Pennsylvania.

MR. YODER: Akron takes most of our product, a little of it goes to Cleveland.

MR. KILBOURN: We sell ours locally.

MR. WORK: The reason this question is raised is just this: There are men like Mr. Bonney of Batavia and Mr. Hay of Wayne County, who see the advantage of the income in the winter, who see the advantage of having the labor right straight through, and of holding the trade. They are wondering if they can do the thing successfully and practically at considerable distances from their markets.

A MEMBER: The Ashtabula men sell most of their stuff in Pittsburg, and the Toledo men ship a lot to Chicago.

MR. WORK: Here is one point of difference. These are large producing sections, and the individuals have large

areas of glass. Suppose a man should start in with a house forty feet wide and one hundred feet long, placing it in such a way that he could add to it lengthwise, and build other houses beside it. A man with that area would have a little bit of difficulty in securing a perfectly continuous supply, and yet I believe by careful management, he could accomplish it and build up by an occasional trip a pretty fair trade.

MR. WRIGLEY: We ship about half what we raise to Waverly, Corning and Williamsport.

MR. WORK: This illustrates the case, for Mr. Wrigley has not a very large plant, about three-quarters of an acre. That means about thirty thousand square feet. Such a house as I mentioned, forty by one hundred, would be four thousand square feet. Do you make it a point to have your different crops of lettuce in different houses?

MR. WRIGLEY: Our trade is so great that we pull a bed out and reset at once—small lettuce and large in the same house.

MR. WORK: You think it is better to have your different strains in different houses, do you not, Mr. Zuck?

MR. ZUCK: We begin in the fall and plant right over our area, so that we have our houses full by the time the first planting is ready to cut and keep going right around all the time; but if we are cutting in a certain house and have too much, we can cool that house off and hold it. There may be some small lettuce in it just planted.

MR. WORK: It does not ordinarily happen that you have big lettuce and little lettuce in the same house. How about your continuous supply, Mr. Hunter?

MR. HUNTER: We do not pay any attention to that. If we have a plot vacant, we set it.

MR. WORK: How much glass have you?

MR. HUNTER: About three thousand square feet.

MR. WORK: And you say you are able to have it almost continuously?

MR. HUNTER: Yes.

MR. WORK: Is it in one house?

MR. HUNTER: Yes.

MR. WORK: A single house of about three thousand square feet, and yet he is able to have almost a continuous supply from that house. Some of the large houses in Toledo with no divisions but posts, with a great field under glass, are putting in partitions occasionally for the sake of varying the conditions.

Prices.

QUESTION: What do they get for lettuce by the pound?

MR. ZUCK: Wholesalers are paying twelve cents at present in five pound baskets.

MR. WORK: You can afford to grow it at five cents?

MR. ZUCK: Hardly in midwinter.

MR. WORK: But in the spring you can afford to do that. The curious thing about it is the lowest prices seem to come in the fall, do they not? There is something about springtime that makes people want vegetables. The glut comes in the fall and in the dead of winter. Markets will take vastly more lettuce in the spring than in the winter.

MR. ZUCK: You spoke in the beginning about the vegetable growers having the blues last year, and so we did, because we sold a large quantity of lettuce at seven and eight cents per pound in the dark winter months when it took all sorts of fuel. In April and May we had a big market for lettuce at twelve cents.

Head vs. Leaf Lettuce.

MR. WORK: Most of the men are growing Grand Rapids. I think there is only one place in the country that is growing any considerable amount of head lettuce under glass in winter, and that is Boston. A good many people have been going down there a good many times and they come back and are still growing Grand Rapids. It is true, I think, that our market would prefer the head lettuce if we could grow it as easily. Does anyone here grow head lettuce under glass?

MR. ZUCK: It seems that head lettuce cannot be grown satisfactorily in the West, because of the dark, cloudy weather in the winter. It seems that in Boston and the East, they have a larger percentage of sunshine.

MR. THOMPSON: It is my impression that they cannot grow Big Boston lettuce satisfactorily in Boston or any other place in the East. I think the time is not far distant when they will not be growing it even around Boston. I think the reason is they cannot compete with the Florida grown lettuce, and anything they can grow in the greenhouse does not compare with the Florida lettuce. When you can buy Florida lettuce for a dollar a hamper which is better than the greenhouse lettuce, I do not see how they can keep up the business.

MR. WORK: Is there much danger of the Grand Rapids lettuce being hit hard by the southern product in midwinter?

MR. ZUCK: I think that is what hits us. Last year reports came to us that the southern growers could not get any price for their head lettuce. Lots of their lettuce was shipped up here in carlots and it did not pay the express. That is the reason we got only seven cents a pound. It seems this year the southern people are not shipping the head lettuce they did, hence our big prices for Grand Rapids lettuce.

WEDNESDAY MORNING

MR. WORK: There is one condition in connection with the producing and selling of produce that I suppose attracts as much attention as any other, that is the fact that during the season there are times when we do not get enough for our stuff to pay the cost of production. Sometimes we do not get enough to pay the cost of marketing. The question that arises in our minds is this: is there some way in which we can secure an adequate return for our produce during the time when prices are so low? One solution of this problem that is attracting more attention every year and that is being put into successful practice by some growers is to market the product not in ordinary packages, but in tin cans. When the price goes down to a certain point, stop dumping

it on an already glutted market, and put it into cans and sell it during the next fall and winter. Mr. C. O. Warford of Newburgh is a gardener, and he sells on local market; but when the prices get too low, out of the market he goes. He is going to tell us something this morning about his methods of canning the surplus.

CANNING THE SURPLUS.

C. O. WARFORD, Newburgh, New York.

When the ministers have not much information to impart, but are going to tell the people what to do, they take a text; and as I have not very much information to impart, I am also going to take a text. It is this: "Sell what you can and what you can't you can."

If we were to start out today at any point in this land where there is a market gardening industry and ask the first one hundred growers we met, "What is the lowest price you are going to sell asparagus for this year? What will be your lowest price for beets and for string beans and for tomatoes?" the chances are that ninety-nine out of the hundred would answer, "That is a fool question to ask. Of course, we cannot tell what we are going to get. We get all the market will pay, but no one can tell how low the market will go or how many bushels we shall sell at a loss."

The one-hundredth man will answer, "The lowest price I am going to take for asparagus is eight cents per pound, for beets fifteen cents per dozen bunches, for string beans fifty cents per bushel, for tomatoes twenty-five cents per half-bushel," and so on all down the list. When you look into his face and notice his look of sincerity, you realize instinctively that he is telling you the truth, and then you ask, "What makes you so positive in your statement? Ninety-nine men say they do not know, and yet you are making positive statements."

Then he will look at you and answer, "I know because I sell what I can and what I can't I can."

He knows because at home he has a little canning outfit that can be started up at any time to take care of the pro-

ducts that cannot be sold at a profit in their fresh state. He knows that next season when crops are ready for marketing and he goes to a store and the dealer tells him that the market is full, offering him only half price, he can look the dealer squarely in the eye and say, "I want you to distinctly understand I do not have to take the prices you offer, because I have a market at home. I sell what I can and what I can't I can."

I suppose if we were to go back to the ninety-nine growers and tell them that they did not know their business and had not graduated from the infant class, there would be ninety-nine men who would feel insulted and who would probably tell us very plainly that they considered themselves amply capable and competent to carry on the market gardening business. But do we market gardeners really know our business until we know actually what our lowest selling price will be? Are we not weak in our selling department? We are getting the producing problem almost down to an exact science, but when it comes to the marketing problem, we get lost.

We form associations to hunt up outside markets and yell ourselves hoarse to get the railroads to give us lower freight rates on produce, so we can ship our goods farther away into markets that are already oversupplied by our brother growers in that section, and neglect the opportunities we have of securing a market right at home for our surplus products simply because we do not understand our business. And when I say that we do not understand our business, I mean it. I mean that no man knows his business who does not know how at all times to dispose of his goods at a profit. No manufacturer could succeed in business if he knew only how to produce goods and not how to sell them, and no market gardener can get the most out of his business unless he knows all about selling to best advantage after they are produced.

Some of the greatest fortunes of today have been made just by utilizing and finding a market for the so-called waste products. You can think of a number of great enterprises so founded. Fleischmann's yeast, once a waste product of the breweries; vaseline, a utilization of a Standard Oil product

that once was thrown away; the great fertilizer industry, a market for the surplus of the packing houses; beet pulp, the waste of sugar refineries; and dozens of other examples we all know. All these articles are being saved and utilized and sold to make their producers great fortunes simply because these men know their business and are utilizing the surplus wastes. One of these days the market gardeners will awake to a realization of the fact that there is too much waste on the farm that is not being utilized, and then all over the land, wherever a gardener is located, you will see either a co-operative cannery or a small home canner in operation.

The *Market Growers' Journal* in a recent issue stated that the vegetable industry last year amounted to sixty millions of dollars. It seems to me that is a very low estimate, but we will take these figures as a basis. Suppose there were but sixty millions of dollars worth sold, it is safe to say that there were at least five per cent. more left at home on the vines to rot because there was no market for the surplus and it could not be disposed of at a profit. This little item of five per cent., if it had been utilized, would have meant three million dollars more in the pockets of the hard-working market gardeners of our land. We did not know our business, or we would have had that three millions in our pockets.

I tell you it is a sin and a disgrace the way most of us market gardeners sell our products after we have spent so much in time, rent, interest, fertilizers, and back-breaking labor to produce the goods. We are just like the two men who were neighbors and who hated each other cordially. One morning one came into the house and remarked to his wife, "I fixed old Jones all right." "What did you do?" said she. "Gave his boy Johnny a tin horn." "Yes, and Johnny's mother sent him over here to spend the day."

Now, that is the way we producers do on the market. I go to No. 1 store and sell tomatoes at a dollar a basket. Then I go to No. 2 and he tells me he does not want any. Then I go to No. 3 and he tells me he has just bought from my next door neighbor for fifty cents. I believe the yarn, get mad, go to No. 4, and offer the tomatoes for forty cents a basket to get square with my neighbor. Neighbor goes to No. 4 and

is told I have sold for forty cents, so he goes back to No. 1 and sells for thirty cents, and then the market is down all around and every producer is hurt.

If I had owned a canner at home when No. 3 told me my neighbor was selling for a low price, I would have said, "Well, let the fool go his way. I sell what I can and what I can't I can. If you want these goods at my price, well and good. If not, back home they go and into the cans." And then you can just bet that No. 3 and No. 4 would have come across with the cash if they needed the goods; and instead of our neighbor going home with a grouch against us, he would have been telling our neighbors what a good chap we were and the good work we were doing in helping maintain prices.

There is nothing mysterious about the process of canning. Any man of ordinary intelligence can master the first principles of canning in an hour or two, a smart boy will do it in twenty minutes.

The Canning Process.

Briefly described, the process for all fruits and vegetables consists merely in preparing them about as one would prepare them for serving on the table, then placing them in tin cans, sealing them up air-tight and cooking a certain time, depending on the article being canned. Heat and heat only is used by the commercial canners to keep the goods, and once the goods are thoroughly sterilized, they will remain for years as good as or better than the way they were packed.

Every state experimental station will give you detailed directions how to prepare any article you wish to can, so I shall not take up your time here to go into details regarding the precise methods employed with each article. Neither am I going to take up your time describing the machinery and equipment needed in a canning factory. Anyone can obtain this information by writing to any canning machinery supply house and getting their catalogue. I will simply say that there is a wide range in the methods of equipping factories and the machinery used.

Equipment.

There are three types of canning factories in operation today:

1. The exclusive vegetable canning factory, canning just corn or peas or some special crop that requires a very high temperature, say two hundred forty degrees or more to keep. This factory is operated by steam only and employs what are known as closed top steam pressure kettles or cookers to sterilize the goods.

2. The exclusive fruit canning factory for canning fruits and tomatoes only, which require a temperature of but two hundred twelve degrees, the temperature of boiling water, to keep them.

3. The general purpose factory, which combines both types.

Prices on canning outfits range all the way from ten dollars for the home canner with a capacity of a few dozen cans per day to forty or fifty thousand dollars for the great, almost automatic outfits with a capacity of two to three hundred thousand cans per day. But there is no need for the individual grower to spend more than four or five dollars if he wishes to experiment on canning his surplus tomatoes, beans, beets, small fruits, and so forth.

All we had when we started was two wash boilers used on the kitchen stove. One was used to scald tomatoes, the other to cook or process. The only other equipment used was a ten-cent market basket to hold the tomatoes while being scalded and a soldering copper costing eighty cents for soldering tops on cans. For a charcoal furnace to heat the soldering tool, we used an old iron kettle with a hole punched in the bottom for a draft; and with this crude outfit we packed the first year five hundred cans, using up and finding a home market for about forty bushels of tomatoes, and the quality of goods packed equaled that of the highest priced factory.

In spite of the advent of high priced machinery, that same condition holds today, and the man with the inexpensive outfit can produce goods just as good in quality as the large outfits. In this line, as well as in many others, quality depends more on the man than on the machinery.

Profit.

A word about profits. Men who have been for years engaged in the business of commercial canning will tell you that there is no great profit in the canning industry, and they are right from the standpoint of the commercial canner; for all his raw material has to be purchased from the farmers who grow it and who get a good price for the products, not caring what kind of produce they deliver. The average farmer thinks anything is good enough for the cannery and has a grouch if the canner finds any fault with the goods delivered, and in consequence, the canner has to take anything he can get and do the best he can with it. Then, labor in this class of factories is very high, though not always very efficient, and the output is so great that all goods have to be sold through brokers and wholesalers, so profits necessarily are low.

But with the cooperative farm cannery or the home farm canner, all this is changed. The factory is operated simply to take care of the surplus. The owners of the plant are the producers, so if prices paid for the raw material are high, it does not hurt the owners of the factory, because the owners are the producers themselves. On the other hand, if prices paid for raw material are low and profits in canning correspondingly high, the increased profits go back to the growers and thus balance up their loss on produce. The help is more efficient as a rule; for it is most likely composed of the home boys and girls. Lastly, the prices received for the finished product are always larger, as the output is less extensive and thus can be sold direct to the retailers.

To show what can reasonably be expected in returns, we will figure out what it costs to produce a case of two dozen cans of tomatoes. I take tomatoes as an illustration because this is one of the most extensive articles packed. A standard No. 3 can, the can that holds a little more than a quart, costs today in Syracuse, Baltimore, Chicago, Boston, and a dozen or more other places, about seventeen dollars per thousand cans. Tops and solder for these cans will cost three dollars per thousand more, or twenty dollars per thousand for cans and solder. That is forty-eight cents for a

case of two dozen cans. New cases for these twenty-four cans cost thirteen cents each. Freight will average about six cents. Labels for cans at three dollars per thousand cost seven cents, fuel four cents, wear and tear five cents, and we will allow two cents for spoilage due to defective cans or to somebody's carelessness in packing, also five cents for interest on money invested. Now we have a total cost of ninety cents for the two dozen cans. To fill these two dozen cans will take just about four half-bushel baskets, and the labor item in preparing these tomatoes and filling and marketing is thirty-five cents, making a total cost of a dollar and a quarter for the two dozen cans, exclusive of the tomatoes. These goods will sell to the retail stores for a dollar and five cents per dozen cans, or two dollars and ten cents for the case, which leaves you eighty-five cents for the four baskets of tomatoes. That is twenty-one cents per basket, and you have saved the basket, which is another three cents, so you have really received twenty-four cents per basket for the tomatoes after paying for every expense.

Another little item comes in here, and that is the fact that, if these tomatoes had been placed on the market, two per cent. of them would have been unmarketable, due to crooked or cracked ones that would have been thrown out and left at home. So really by canning the tomatoes, we are receiving as much as though we sold them for twenty-five cents on the market. This is what we may call direct profits of the home canning proposition. There are several secondary advantages or little profits that we shall speak of later.

Cooperative Canneries.

The ideal method of canning the surplus, in my estimation, is through a cooperative canning company, managed by some young man who has been brought up on the farm and who has a practical knowledge of both canning and growing crops. The stock of the cannery should bear five or six per cent. interest, be paid in full, and the majority of it should be held by the growers, although a portion of it, say thirty or forty per cent., may be sold to dealers and capitalists. The factory should be prepared to handle every article that grows to best

advantage in that section. If it does not grow to advantage, it should not be grown at all, so the factory need not prepare for it. A certain fair price should be fixed for the factory to pay on all vegetables and fruits offered. Then, when the season's work is ended, all profits should be divided among the growers according to the amount of produce each man has furnished. For instance, suppose ten growers furnished tomatoes amounting to ten thousand bushels, and the profits from the tomato canning amounted to one thousand dollars, that would be a profit of ten cents per bushel. So the man who furnished two thousand bushels would receive an extra dividend of two hundred dollars, while the man who furnished but five hundred bushels would get but fifty dollars. If a thousand bushels of string beans were canned and the profits were five cents per bushel, the one-hundred-bushel man would receive five dollars extra and the ten-bushel man would get fifty cents as his extra dividend. By this method, everyone is placed on an equal basis. If the market for fresh goods is low and one neighbor takes his goods to the factory and thus relieves the market of his surplus, letting his neighbor get the advantage of the higher prices which come from a reduced offering, when there is any profit made by the factory, that profit belongs to him because he has furnished all the raw material.

The factory should also be allowed to sell fresh goods on the market, should the market for the fresh goods advance before goods on hand are canned. So the canning factory really becomes a market house for the growers as well as a cannery for the surplus. In this way all the profit in the business can be obtained; for the factory, being a growers' organization, can sell what it can and what it can't sell it can can.

The Cannery For The Boy.

A moment ago I said that the cooperative cannery should be managed by some young man who had been brought up in the country, and this brings up the thought how to keep the young man on the farm. I believe that the home cannery in many sections will offer a solution to the question of how to keep the boy on the farm. Away down in the heart of

many a young boy there is a desire to be a business man, to be a factor in the commercial world, and he thinks he must get away from the farm to enter business life. You can easily satisfy that boy's ambition by getting him a small canning outfit, or better yet give him a few dollars and let him plan and equip his own little cannery. He will soon be writing to the various supply houses, getting their catalogues, will be coming in touch with the various experimental stations, and obtaining their literature on the canning proposition, and very soon you will see him with a few tin cans, a kettle and a soldering tool starting in the business; and because he is starting it on a small scale and learning the business as he goes, he will be sure to succeed. You will be surprised at the amount of your surplus goods he will require to keep his little cannery going and at the amount of cash he will pay you for this raw material. You will also be surprised at the many new lines he will gradually add to his business. In addition to canning, soon you will see him preparing jams, jellies, various condiments, catsups, chili sauce, even extracts and flavorings will be added to his line, so that soon he will have his little business going all the year around.

Soon you will find that he is busily studying up all about his raw materials, how and where they are produced and how to secure them at the lowest prices; and this will gradually lead him back to the studying of farm conditions, crop production, and so forth. Before you are aware of the fact, you will find him securing a parcel of land of his own, producing crops for his own cannery, and producing them at a less cost than you ever dreamed and marketing them at a profit because his motto will be, "I sell what I can and what I can't I can."

The Can As An Advertising Medium.

We talk a great deal nowadays about advertising to the consumer what we have to sell in the line of vegetables and small fruits. In the canning of the surplus, we have at hand the very best agent for advertising our goods to the consumer. This is one of the secondary profits connected with home canning. On every can of fruits or vegetables that is sold, there is room for an advertisement four by five inches. The next

time you go into a grocery, if you will pick up a can of fruits or vegetables, you will find that many times the label is composed of what we may term the front and the back. The back, in most cases, is a reproduction of the front, or has some meaningless scroll on it to fill up the space. One-half of the label, the part we will call the front, is all that is required to meet the trade's and the law's requirements, to tell what is in the can, where and by whom packed, and how much the contents weigh. The other half, or so called "back," of the label could just as well be used to carry an advertisement of the other goods that are produced by the grower and packer.

This part of the label, about four by five inches, would tell the housewife just what vegetables and small fruits one grew in season and where she could purchase them, and the beauty of this ad. would be that it would cost nothing for printing and distributing. The label printers charge no more for your labels if they are full of printing than if they are half filled, and the woman who bought a can of your goods if they were first class would be interested to know what articles you grew; and when she went to the store to purchase fresh vegetables and fruits, you can depend on it that she would surely ask for the articles she saw advertised on the can as packed by you.

Over-Supply of Canned Goods.

Now, someone will ask, "Suppose we all start in canning the surplus. Shall we not flood the market with canned goods?" I think not. I believe today that in ten thousand market gardening sections of these United States a small cannery could be started to take care of the surplus crops without seriously disturbing the canned goods markets of the country.

Last year there were canned in the United States and used by the consumers nearly fifteen million cases of tomatoes,—thirty million dozen cans or about thirty million bushels of tomatoes canned. There are in the United States today about twenty million families, and it looks reasonable that each family should consume an average of one can of tomatoes each two weeks or one case of twenty-four cans a year. That means an annual requirement of five million cases more than

we use at present, and that would allow an extra ten thousand canners to start in and can five hundred cases each, thus taking off the market in each section one thousand bushels each year. I believe if we were to take from the market one thousand bushels of tomatoes in each of ten thousand markets in the United States, it would make a great difference in our marketing problem.

Canning To Maintain Market Prices.

And right here is where the real profits in the surplus canning question come in. The profit in the home cannery is not only in the actual profit we get in canning, but in the increased price we get for the goods we sell in the fresh state. Take any market you wish as an example. Take a certain day in the tomato season when tomatoes are selling at a normal price of say fifty cents per half-bushel basket. This price allows the dealers to sell the goods at retail for five cents per quart, which price is quite satisfactory to the consumer; and everyone is satisfied all along the line, producer, dealer, and eater.

Now, all of us gardeners, perhaps fifty or so, are producing and selling at this price say one thousand baskets per day, just about enough for actual requirements; but tomorrow some of us have an extra picking, and the next morning we producers offer for sale one thousand five hundred baskets instead of the required one thousand. We all see the extra supply on the market and get scared. We begin to drop prices so that perhaps the market will drop as low as fifteen to twenty cents before we are all cleaned out. Perhaps the next day and the day after and maybe for a week there will be no more than one thousand baskets per day offered on the market, but that is enough for actual requirements and the market stays down to the low figure just because there were an extra five hundred baskets thrown on the market for one day.

Do you not see that a little cooperative cannery in that section would have remedied all this? When the growers entered market that morning and saw the extra supply, they one and all would have said, "Well, we will sell what we can and what we can't we'll can," and they would have received

a fair price, perhaps about twenty-five or thirty cents for every basket sold the dealers, and that extra five hundred baskets would have gone to the cannery and would have brought twenty-five cents. If that five hundred baskets had been given to the factory and canned at a loss, the growers would have been far ahead; for instead of selling all the tomatoes in market for fifteen cents per basket, the price would have stayed at twenty-five or thirty.

I believe, though, that there will be no great rush of gardeners getting canning outfits; for I think the most of us market gardeners think the business is too small to putter with and will take up too much of our time.

A great many of us are like the philosopher I once heard of. A certain tanner wished to get a suitable sign for his tannery, so he bored a hole through the doorpost and stuck a calf's tail into it with the tuft sticking on the outside. Some time after, he saw a solemn faced man standing steadily gazing at the sign. So the tanner stepped to the door and said, "Good morning." "Good morning." "Do you wish to purchase some leather?" "No." "Do you wish to sell some hides?" "No." "Are you a farmer?" "No." "What are you then?" "Why," said the man, "I am a philosopher and I have been standing here all this time trying to figure out how that calf got through that hole."

Now, that is the way with many market gardeners. They spend more time trying to figure out how to crowd goods on an oversupplied market than would be taken to can the quantity on a good home canning outfit.

MR. LOCKE (Steuben County): Have you experience with spinach?

MR. WARFORD: I have canned some, but I have not canned very much, because spinach is one of the crops we cannot grow to advantage in our section, there is so much grit.

MR. LOCKE: We have a good opportunity to grow it and want to know something about the expense and profit. I would not want to can the spinach if I could get thirty cents a bushel for it. Thirteen pounds is the legal weight in this state.

MR. WARFORD: You will be surprised when you come to can spinach, how it wilts when you blanch it. I think we got about three cans to a bushel of spinach.

QUESTION: What does that sell for in the can for a three pound can?

MR. WARFORD: I think spinach is quoted wholesale for about a dollar.

MR. LOCKE: We grow it on the muck and there is no grit at all.

MR. WARFORD: I think if you have a big acreage, it would pay. Spinach is an article that is being used more and more all the time.

MR. LOCKE: Have you had any experience in the canning of fruits?

MR. WARFORD: We canned sour cherries.

MR. LOCKE: Do you think that is profitable at all?

MR. WARFORD: Not at the present price for fresh fruit. We got about five cents a pound for canning.

MR. LOCKE: We sell fresh goods at eight to ten cents a quart.

QUESTION: What is the name of some of the canning machinery?

MR. WARFORD: I suppose the biggest supply house in the world is Daniel G. Trench & Company, Chicago. People in this section could get it in Syracuse. The Trench Company has an agent in Syracuse. There is a firm in Baltimore, A. K. Robbins & Company.

MR. BONNEY (Genesee County): If anyone is interested in this, just fire your questions at Mr. Warford. He certainly has had practical experience.

QUESTION: If a man had one of these cooperative canners and was doing a great deal of business, some morning when the market was glutted, would he not have trouble to get help in canning his goods?

MR. WARFORD: Yes, I think he would. But in a section where there is much goods grown, I think you would have some goods you could not sell to advantage on the market.

QUESTION: Taking your own section for example, what size of cooperative canning company do you think would be necessary? What is the money involved?

MR. WARFORD: You can figure, I think, about a dollar per case required. After you get a certain amount out, you can borrow money on that. We are prepared at home to take care of about two thousand bushels a day. It is not so much the capacity of the canning factory as it is that you are able to throw a big bluff at any time, because if the dealers on the market know you have this outlet, they will pay and will not hold you back.

MR. LOCKE: Is it not a universal opinion that the cooperative canning factories are a failure?

MR. WARFORD: I will tell you why they are a failure. Quite a few years ago some promoters induced the farmers to put in about twelve thousand dollars. I think the canneries that failed have been run by the promoters a little while, then thrown on the hands of the farmers, who tried to run them, not knowing what they were doing. As I suggested, it would be well to have a competent young man brought up in the neighborhood whom you knew you could depend on take charge.

PACKAGES FOR VEGETABLES

PAUL WORK, Ithaca, N. Y.

In most productive business, the manufacturing department is entirely separate from the sales department. Each has its managing head and each its working force. Each has its own distinct kind of work and each is headed by a man who has been highly successful in that particular line, and who might fail utterly in the other. There is as much difference between a producer and a salesman as between a common laborer and a capitalist. The difference between the production and selling is just as marked in the vegetable business as in any other.

It is a happy combination where different members of firm or family can devote their attention to these utterly distinct lines of effort. One of the most successful gardens at Roch-

ester is managed by three brothers, one devoting his energies to outdoor production, one to greenhouse work, and the third to marketing.

Not all of us are so situated that we can enjoy these advantages. Most of us find that we must first master the details of culture and then, if rewarded with good crops, must attack an entirely new and ever changing problem. We must learn how to dispose of the product to advantage. Thus must the vegetable grower be versed in two professions. He might almost be said to lead a Jekyll and Hyde existence, for dealing with nature and dealing with corrupt humanity tend to develop very different traits in a man. One can ordinarily feel sure, if he be half way observant of the laws of Mother Nature, that she will reward him, whereas the produce markets are filled with men, some of whom are honest and some dishonest. Some deal faithfully today and are robbers tomorrow, as may seem to suit their fancy. Thus, the life of the soil develops trustfulness and the life of the market develops suspicion and cynicism; the one develops simplicity and the other shrewdness and trickery. It is not easy to live in two worlds, but such is the demand, and we must face the problem as it is.

The only way to accomplish this is to apply ourselves diligently and to carefully study the factors involved. It is the object of this paper to point out some of these factors that must be considered in connection with the selling department. It must be understood at the outset that what applies in one place will not always work in the other, but that one may glean a useful point from the experience of almost any section, no matter how different the conditions.

High Quality.

The first requirement is a good product. Without it, no amount of energy and skill on the selling side will be permanently effective. The attainment of this end involves favorable growing conditions, careful selection of variety and strain of seed, and the best of cultural methods.

Packages.

Let us consider the packages to be used, illustrating our

points by reference to some that are employed in various sections of the country. Certain ideals are to be borne in mind. The first is that it shall be strong and shall protect the contents well. Most of the containers in use are strong, but this does not necessarily mean that they give good protection. The New Jersey tomato crate is not readily broken and protects well from some bumps. However, it does not protect the fruit from its own weight. The six-basket carrier is exceedingly useful for tomatoes, being strong and amply shielding fruits from any injury. It is especially useful for the early season when prices are high and even for the later pickings it may be employed for that part of the crop which is for table use. Crates which have made a trip north laden with peaches may be often bought for five cents each complete, but should not be accepted unless they are fresh and clean.

Appearance.

The next point to be considered is the appearance of the package. This is the chief factor in procuring the first attention which precedes every sale. A favorable appearance secures further attention for the goods and disposes the buyer in the proper direction. An unfavorable impression turns the buyer's attention away, and he does not really consider the merits of the offering. Clean, bright wood and good workmanship are essential to a good appearance. Packages which have been bought in advance must be properly protected if this appearance is to be maintained until the market is reached. Ten days' exposure to the weather is sufficient to destroy every appearance of newness and freshness.

Our next ideal is that the package shall present its contents attractively. The standard Boston bushel box (approximately 18 x 18 x 8″), with its large top, shows a broad surface of nicely packed tomatoes. At the same time, it avoids heavy pressure on the bottom layers. The box is packed top first, with the bottom open. The Buffalo tomato box is even better, being of about half the size and the same general proportions. The large sizes of the Diamond market basket,

without bales, but with block handles at the end, are much used at Canastota. These meet the requirements of appearance very satisfactorily and suggest our next point, namely, that a package should be easily handled. The large size and clumsiness of the barrel and of the Chicago cabbage crate (17 x 17 x 32″) encourage rough handling and consequent injury. The crate mentioned is usually made up of odds and ends of lumber about the farm and is anything but attractive.

QUESTION: Would the Canastota basket hold up in car lot shipments?

MR. JENNINGS: We have never shipped any in that way. We use it almost altogether for order trade.

MR. WORK: I would say this. A package similar to this is often stacked in cars criss-cross fashion and works very nicely. This might be a little doubtful on account of the flexibility. I am not sure but there ought to be an extra strap or two to stiffen it if you are going to stack it in cars.

One point suggests another, and the query illustrates the necessity of adapting the package to its use. The Canastota basket is most excellent for order trade but would require modification for car lot shipment. Similarly, a package must be well adapted to the crop to be marketed. A happy illustration of this is found in the practice of the Troy gardeners who pack Grand Rapids lettuce in used cheese boxes which they buy at very low prices. The wedge shape of the head makes it possible to pack it perfectly with the butts to the middle.

To follow this idea of adaptation a step further, do not put a high grade product in a low grade package. You can no more afford to do this than can a bank president to appear at his office unshaven, with muddy shoes, or wrinkled coat. Long Island cauliflower is one of the most aristocratic garden products to be found on our markets. The barrel is certainly a most homely package, especially after it has made a trip from Norfolk to New York, has been hammered around the markets for a few days and then sent out to Long Island. It does not give the flowers a fair show. Moreover, it is almost invariably roughly handled. A box or crate carrying

an even dozen heads is much better, being easily handled, stacking well, and displaying the snowy curd to fullest advantage. One of the arguments in favor of the box which is beginning to be apparent to the Long Island people is the fact that the Western New York product in such a package is gaining a very firm hold on the Pittsburgh market.

The same improvement in package has already taken place among muck land lettuce men. A box carrying two dozen first grade heads has largely replaced the hamper, this latter being used only for seconds and culls. Thus, the producer of high grade lettuce can no longer afford to put his primes or even ungraded stock in a package which is not distinguishable from the one which contains low grade goods.

Standardization.

It is best to use the standard package if it is a good one. The cost is lower, it is known on the markets, and labor is usually familiar with its packing and handling. However, if a change is desirable, it can ordinarily be successfully made, even in the face of some opposition. The merit of the contents will carry it through if good business methods are employed, and the package itself becomes a conspicuous mark of distinction from the ordinary product.

Cost.

The final test of a package is its cost. No matter how excellent it may be, we cannot afford to use a package that reduces rather than increases the net profit. The cost is reduced by buying early in large quantity and by careful scrutiny of quotations from many sources.

Grading.

The price that is paid for a basket of tomatoes or a shipment of lettuce or a car of cabbage is not determined by the best that is there but rather by the poorest. Suppose yourself on the market expecting to purchase tomatoes. You see a bit of juice dripping from the bottom of a crate. This might come from a single tomato. Nevertheless, your conclusion is that there are many more such. At the very best,

your suspicion is aroused. Suppose a car of lettuce is loaded chiefly with number ones. Suppose a few packages that are off color are slipped in. The dealer opens the car and finds one or two of these. He concludes that there are many poor ones all through. But suppose you place the poor ones in the back of the car. That may not hurt you seriously on the present sale, but look out for that fellow on the next! Thus a small proportion of inferior stock cuts the price of the superior. The moral is "Grade Carefully." It is true that seconds are hard to dispose of nowadays, but the proportion of the lower grades can be very materially reduced by careful choice of seed and by close attention to cultural methods. With good success in this endeavor, we do not mind leaving a few culls in the field. It is better for them to go back to the soil without the cost of handling than to undermine the market.

The detailed plan of grading must be determined in the light of your own conditions. A really good field of Danish Ball Head may be loaded practically as it is. On the other hand, an Elmira grower finds it profitable to make four grades of his cucumbers, and careful sorting is becoming more and more generally profitable.

Packing.

The first consideration in packing is solidity. Loose packing results in movement, and movement means bruising. We recognize this necessity when we use the screw press in barreling apples.

Pack for a neat finish. The goods attract attention more quickly and sell more readily if presented face up and in orderly ranks. The car lot shippers of cabbage recognize this when they arrange the load in neatly finished tiers.

Pennsylvania Experience.

In connection with these ideas, the question of cost and profit invariably arises. Such methods are not practical unless special skill in handling is developed on the part of the workers and unless the facilities are conveniently arranged. That these methods may be practiced to advantage is evidenced by the experience of a Pennsylvania grower, who

found each year that the acreage of his neighbors was increasing, as well as his own. During the season in question, he found himself with seventeen acres of tomatoes to dispose of among a population of not over sixty thousand. Moreover, the season was a splendid one and the crop throughout the region was very large. The price for ordinary tomatoes went down to fifteen cents per half bushel basket. Poor stock could not be sold at all, and many growers whose methods were not economical left their fruit in the field. The grower in question used a gang of twelve to sixteen year old boys for picking and packing, paying them on a piece work basis. A leaking or spotted tomato was discarded entirely, and in case of question a fruit was placed among the seconds. Each fruit was wiped, and if necessary washed, and was laid in its place in the basket, packing from the bottom up. The result was a finish similar to that of boxed apples. As a result, the grower experienced no difficulty in selling all of his crop, and he sold none at less than sixteen and two-thirds cents a basket. This amount was sufficient to pay the entire cost of handling from the field to the market wagon, in spite of the extra labor. Thus, the acreage return at the end of the season was most gratifying.

MR. HAW: Did you always use a rag to wipe tomatoes? Why not use a pair of canvas gloves?

MR. WORK: Good. We used to wash out our rags.

MR. HAW: Do the same with gloves.

MR. WORK: Does it pay you to wipe tomatoes, Mr. Haw?

MR. HAW: Yes, sir, for special trade right through the season. Our tomatoes are on sandy soil and are fairly clean.

MR. WORK: Two things turn away buyers—short measure and dishonest packing. The world, especially the world of buyers, is too wise to be long deceived by concealed culls. It does not pay.

Labeling.

The wrapping and labeling that is so conspicuous with all commodities except farm produce is gradually being adapted to vegetable marketing. One loses much of the advantage of

skill in growing and grading and packing if he does not inform the buyer where further supplies may be sought. Nor does the producer wish the middleman to enjoy all of the credit for the excellence of the product. Today lettered box ends for lettuce, lithographed wrappers for celery and asparagus, printed covers for tomato baskets, pasted seals for melons, and even labels attached to individual cucumbers by means of rubber bands are becoming more and more common. With most of these, the cost is insignificant. The last mentioned would appear to be so clumsy as to be out of the question, but Mr. G. P. Wrigley, one of our members who lives in Elmira, finds that the whole cost of labels, bands, grading and packing is but two cents a dozen, and the return is considerably greater.

Advertising.

The business world advertises, and it pays—when well managed. Nevertheless, a large part of the total expenditure is wasted. The little business card which appears week after week is probably of small value, but a Vermont market gardener finds it profitable to use a three-inch space each week, announcing something new with every issue. Mr. Wrigley, whose labeling scheme has just been mentioned, inserts a display advertisement in each of his city dailies to announce the advent of his crop each year. He finds it unnecessary to carry the advertising more than a single day.

Display cards for the grocers to use in their windows and stores are inexpensive and effective.

In closing, let it be clear that it is impossible to confidently advocate definite methods for particular men, but that each, using sound common sense, must work out a plan for himself. Careful study of your own local situation and open-mindedness in the consideration of the various possibilities are found to yield dividends in gross returns per acre and in net profit.

We have a few minutes for discussion. Are any of you using labels? Does that sort of thing pay, Mr. Bonney?

MR. BONNEY: I think it does.

MR. WORK: There is one thing about labeling. Do not label things in such a way that the packages are used again. On a local market the danger is that if you mark your packages nicely, somebody else will be using them. Here is a way to avoid that. Pack a basket of tomatoes. When you are through, tuck a little strip about an inch wide with your name on it so that it will be removed wherever the package is unpacked.

We had better keep our eyes on parcel post. The first fellow who gets there is the one who is going to establish a trade and get the greatest advantage from it.

There is almost no end of packages for mailing. They can be had fairly cheaply. The Long Island potato people are using a package which comes flat, not corrugated, which is packed full of potatoes, closed in and used for a high grade trade. It holds a peck. A man can tuck it under his arm. Would you muck men think it might be worth while to put up a head of Big Boston lettuce in a carton of just the right size? Mr. Bonney, do you think that would work?

MR. BONNEY: It would carry much better. Whether you get enough more for your product, I do not know.

MR. WORK: Two for fifteen is as low as you pay in the grocery. The question is whether a person paying seven and a half cents for a somewhat wilted head would pay ten cents for one done up in a neat little carton. What do you think of the labeling idea, Mr. Greffrath?

MR. GREFFRATH: I think the labeling idea is good. I do not think you could work the package question on muck land with lettuce. The labeling on a large package of lettuce is certainly good. When buyers feel that the stuff packed in the package is just what is claimed, they are willing to pay an extra price. I have used a label to good advantage, but there have been two years in succession when I have not had lettuce good enough to use that label. I know I can put that label back and get results with the party that has handled it before.

MR. WORK: By all means, protect your label as you protect your good name. Do not use your first grade label for your second grade lettuce.

MR. BONNEY: At this period Mr. Zuck will talk to us on the growing of greenhouse cucumbers. He is a man of practical experience, and we are going to get some good ideas.

GREENHOUSE CUCUMBERS.

F. J. ZUCK, Erie, Pennsylvania.

I was talking with Professor Carpenter of the engineering department yesterday. I wanted to get some pointers on heating with hot water as compared with heating with steam. He says there is just about as much difference as when a fellow picks out a girl—one takes one and one another, and each one has the best. And he went on to give me a few of the merits of each method.

I believe that is pretty much the way with many of our operations. I have my way, and I think it is the best. Someone else has his way, and he thinks that the best. Each way is the best in the locality in which each labors.

The cucumber plant owes the greenhouse man a great debt. It is by nature a vining plant and must crawl humbly over the ground. He, however, has raised its station in life by making it to grow erect and proudly. He also has brought it to the front as an early spring vegetable second to none.

The cucumber plant is monoecious—each plant has separate staminate and pistillate flowers. In the case of asparagus the pistillate flowers are on one plant and the staminate on the other plant. In the tomato the flower is perfect. The staminate parts and the pistillate parts are all in one flower. The joint of the stem is, so to speak, the unit and has four members, the leaf, the lateral, the tendril and the flower. The determination of the sex of a flower seems to be with the axil or joint, because two opposite flowers never come from the same axil. The English forcing type of cucumber very seldom has many more than one or two flowers from an axil, but in the White Spine type I have counted as many as fifteen flowers from one axil, and they are always either the male or the female. Bees, both inside and outside, are the agency of fertilizing the blossoms.

Types.

There are two types of the cucumber, the White Spine and the English forcing. Most of our present forcing varieties are a cross between these two types, some varieties approaching the characteristics of one parent and other varieties of the other parent. The Abundance is more like the English parent, in that the fruit is long and dark green, and the vine is a very strong grower. The Rawson Hothouse, I believe, has English blood in it, but it is more like the White Spine type, in that the fruit is shorter and much thicker, and the vine is not so strong a grower. This variety requires less time to come to maturity than the other and is considered by some to yield heavier.

Plant Growing.

No rules can be laid down for the time to sow seed. Our experience has been in northern parts, and we grow our cucumbers very late. We run our lettuce later than some others. Some have cucumbers up in the beds at the present time, while we have not. Seed sown the middle of February in a warm place will make plants for bedding by the latter part of March. Later in the season two weeks will give a good plant. Unless one has a good, warm place, nothing is gained by sowing early, as it will result in a stunted plant. A method of sowing seed is to lay off rows in a flat full of sifted soil about one and one-half inches apart and to place the seed an inch or more apart in the row. It is well to use plenty of seed in sowing cucumbers, but if one always saves his own seed and has something extra choice, he does not wish to put three or four seeds in the hill and throw half away. So I like to put one seed in a place, and then if there are any weak plants, one can easily throw them away.

After covering the seed and watering it, glass may be laid on top. This keeps mice from digging out the seed, keeps the soil moist, and holds the heat of the sun. A special place should be provided to give the plants more heat than they will get in an ordinary vegetable house. However, the flats can often be set near a heating pipe or in some other warm corner that will do nicely. The plants should not be left in

the flats long after the natural leaf appears, else the shifting will be too much of a shock. We started in nine years ago with the intention of sowing cucumber seed and then transplanting. People had said: "You are fools. Don't you know you cannot transplant a cucumber?" But we transplanted them and they grew. When ready to transplant, the flat should be well watered and the plants can be lifted out with a putty knife or other like tool. By this method each plant is spaced in the flat and can be lifted out with soil on the roots without disturbing its neighbor. For this first shift we use the clay pots exclusively. We gave paper pots a straight, honest trial. For two or three years we used them exclusively, and could not understand why the cucumbers did not grow right. When they would get to a certain stage, they would become stunted. We tried punching holes in the bottom to let the moisture out. We tried keeping them dry, we tried keeping them wet—everything, but we could not make the plants grow. Then we tried growing them in clay pots alongside the paper pots, and we could tell to a row where they were grown in clay and where in paper pots. Paper pots may be all right for some vegetable plants, but if any grower is having trouble with cucumbers in paper pots, a change should be made to the clay pots. The three and one-half inch size is large enough to give a good sized plant, although four inch are used by some growers. Whether clay or paper pots are used, they should be plunged in the soil to hold the moisture. This potting soil should be a rich loam that has been sterilized.

Soil.

The cucumber will thrive in any good soil, but prefers the lighter ones. If the natural soil is of the clay or muck type, one should lighten the soil by using bank sand or some other gritty material that will cut it. The preparation of the soil should be looked to very carefully, as it is here that the success or failure of the crop is largely determined. The preparation of the soil should be started the summer before the spring crop. I have had no experience with the fall crop. In preparing the soil for the fall and winter crop of lettuce, a very heavy application of manure is given and the ground is

sterilized. This sterilizing is considered by most growers to be beneficial. In fact, at our place it was found that steaming improved the crop noticeably. Several years through the early part of our garden operations we did not sterilize our soils. We had very good success with lettuce and tomatoes on soil which was not sterilized. But one year we made an experiment and we found that the cucumbers grown in the sterilized soil showed up much better than those grown on the unsterilized soil. So we sterilize every year now.

Through the winter season, after each crop of lettuce, manure and commercial fertilizer should be applied. This will not only benefit the lettuce, but will store up in the soil an abundance of plant food for the spring crop of cucumbers. Instead of putting into the soil immense quantities of manure just previous to planting the cucumbers, I believe it should be incorporated in the soil throughout the winter season, so that it will have a chance to become more readily soluble for the spring crop of cucumbers. Ground limestone, at the rate of two tons per acre, is applied each year, preferably in the summer.

Intercropping.

The time of bedding the plants depends on the individual grower. Lettuce is, of course, intercropped with the cucumbers, and if one wishes to extend the lettuce season to June first, the first plants should be bedded about the middle of March. To explain, if one's lettuce crop is in perfect rotation, he will begin to bed cucumbers March fifteen and will complete the planting by the last of April. Then the grower can begin to cut the lettuce that has been planted with the cucumbers, and this crop will last until the first of June. Of course, these dates cannot be exact, but may be used as a basis for planning the crop.

Many growers make the mistake of crowding the lettuce too closely about the cucumbers, and some give too much room. Lettuce is generally given about fifty square inches of space to the plant. Some plant as close as six by six, which is thirty-six inches; some eight by eight, which is sixty-four; but fifty seems to be about the medium. If the lettuce is planted any closer than this, it will play the part

of a robber, and a stunted cucumber will be the result. If more room is given, it will shorten the lettuce crop. At least five lettuce plants should give place to a cucumber. If one does not wish to lay so much stress on the cucumbers, he can crowd the lettuce a little closer, but I believe a good average is about fifty inches.

Spacing and Training.

Different growers use various ways to support the vines—sticks, wires, strings, and so forth. Twine, such as is used for tying grapes and which comes in rope form, may be used. I do not know how many strands there are in this rope. There are fifty or sixty or quite a large number. With a heavy knife or hatchet, one can cut off the fifty or sixty at one operation. This twine may be loosely twisted about the stem of the plant, and the little prickles will catch in the threads of the string and save the trouble of tying. As fast as the plant grows out, it can be drawn back and twisted about the string two or three times. When the crop is harvested, the plant with the string can be cut down, and the trouble of untangling is avoided.

There are three forms of trellises used extensively, the perpendicular, the "A," and the arbor. The perpendicular gives more light surface than the others. To explain: In a thirty-foot house the arbor system gives thirty feet of light surface. If the "A" system is used with four rows across the house eight feet high, there will be thirty-two feet of light surface; and with four rows across the house perpendicular, the light can strike both sides and there will be, if the rows are six and one-half feet high, fifty feet of cross-section exposed to light. Some growers plant fifteen inches apart in the row, with the rows seven feet apart. Would it not be better to make the rows three and one-half feet apart and the plants two feet apart in the row?

Trimming should start as soon as the laterals appear. It is always best to pinch the end of the lateral where it is to be checked rather than to let it grow far beyond the point where it is to be stopped and then have to use a knife. The vine should be kept free from laterals a foot or so from the

ground, which will make for neatness and will keep the vines and fruit from lying on the ground. The upper laterals can be pinched back after the first, second, or third joint, as the individual grower may see fit. It is better, however, to leave more vine than to trim too close, getting thereby a larger crop and a longer-lived vine. It seems to be quite a positive rule that in such varieties as the Abundance, if the lateral is stopped beyond an axil that has a pistillate flower, the first flower on the secondary lateral will be a pistillate flower. If, however, the first lateral is not stopped, there will be six or seven staminate flowers before there is another pistillate blossom. The White Spine type does not follow this rule, but has the flowers more evenly divided as to the sexes.

Harvesting.

The picking should be done every morning, but few growers go over the vines that often. Morning is better than evening because then the fruits are fresh and solid and will go on to the market in better shape. Each cucumber should be picked just when it is ready, else if permitted to get overgrown, its market value will be reduced and the vine will be weakened. There seems to be an old-fashioned notion that cucumbers must be cut from the vine. If, however, one is careful not to jerk or tear the vines, they may be picked off as well as cut, and the work can be done in much less time. The stem should be carefully pushed off rather than to be jerked off.

Watering.

Cucumbers need an immense quantity of water, as there is a vast leaf surface to evaporate moisture, and as they grow in the hottest part of the season. Textures of soils vary so greatly that no rule can be laid down as to the quantity to use. Anyone who is contemplating the building of a greenhouse should look very carefully to the water supply. This came to my attention a year ago when we had an exceedingly dry spring. A young man started out and had a good crop of cucumbers, but his well failed him and the crop was a loss. Many growers mulch cucumbers heavily with manure, which serves to hold the moisture in the soil and to leach its plant food down to the roots. The question has

been asked as to whether frequent waterings might not prevent the proper fertilizing of the flowers. I believe this question can be answered in the negative.

Ventilation.

The proper ventilating of the cucumber house is very important. One often notices in the morning after a house has been closed all night that the leaves are dripping wet. This condition, which also occurs on cloudy days when the houses are closed, will invite disease. Again, leaving out the factor of disease, a thrifty plant cannot be grown in a dead atmosphere.

Temperature.

The cucumber is a tropical plant and so requires a high temperature. When lettuce and cucumbers are grown together, a half-way temperature must be maintained. Later, when the lettuce is out of the road, the night temperature should be at least sixty degrees and the day temperature may be seventy or higher, especially if the day is bright.

Seed and Improvement of Strains.

Misshapen fruits or culls are not wanted by any grower, but how to get rid of them is a problem not yet solved. Among the causes of poorly shaped cucumbers are the following: Poor breeding, lack of available plant food in the soil, the age of the vine, and insufficient water. The remedy, then, must be in breeding and in surrounding the plant with those conditions that will make for a strong, vigorous growth.

A great deal depends on the seed. One cannot expect a heavy crop of perfect cucumbers from seed that has come from scrub stock. It is a good plan to save one's own seed from vines whose yield is the maximum, both of quality and quantity. One should constantly be on the alert when working about the vines to note those that are out of the ordinary. These may be marked and their performance noted for two or three weeks. If they continue to hold up with reference to production and disease-resisting quality, they may be left to bear seed cucumbers. It is not best to start a vine at seed production while very young, because it may weaken

when it gets older and thus transmit this characteristic to its progeny. We want a vine that will stand up through the whole season. On the other hand, it is not well to wait until the vine has become so old that it cannot give vitality to the seed.

One can hasten the process of breeding by covering the selected vine with mosquito netting and doing pollenizing by hand. If left open, the bees will pollenize, and they may cross from a strong vine to a weak vine.

Enemies.

There are many diseases of the cucumber plant, among which the bacterial wilt is the worst. The other diseases do not play so prominent a part in greenhouse operations. The first evidences of the wilt are a wilted leaf or part of leaf. Again, one may note the wilting of the entire plant. The peculiar actions of the disease are due to the fact that the bacterial germs find their way into the passages of the plant and stop the flow of the juices. Cucumbers may wilt from other causes, and in order to determine the nature of the trouble, several short sections of the diseased stem may be placed under an inverted tumbler over night. The sap will exude from the cut sections, and if it is very stringy, the trouble is the bacterial wilt. Authorities are quite well agreed that the disease is spread by means of the striped cucumber beetle. It seems that the beetle has a pretty good appetite for the wilted leaf. As soon as a leaf wilts, they will begin to feed on it. Then some will go to a healthy vine and inoculate it by feeding on it. Hence, the only remedy is to destroy the diseased parts promptly and to fight the beetles. They can to a certain extent be kept out of a house by keeping the end doors and the side ventilators shut. Some growers claim that spraying with bordeaux will prevent the beetles from attacking the plants, and one can even go to the extent of going over the vines early in the morning when the beetles are not very active and catching them by hand.

MR. WORK: Do you grow cucumbers outdoors?

MR. WRIGLEY: Not at all.

MR. WORK: That makes it worse. A greenhouse is a mighty nice place for a disease to winter over.

MR. SPIEGEL: Have any of the practical growers tried to suspend camphor in the air against the beetles? I have tried it and found it very effective. They stay near the floor. I have also tried it outdoors and it is very effective. In this case, powdered camphor is spread on the ground.

MR. KILBOURN: How is the camphor applied?

MR. SPIEGEL: We use it right around the hill.

QUESTION: How does the cucumber wilt winter over?

MR. WORK: In the soil.

QUESTION: Would moth balls do instead of camphor?

MR. WORK: The same thing.

A MEMBER: I have tried it and could not see much difference. I could not see that the striped beetles kept away.

A MEMBER: I have seen the striped beetles crawl over the moth balls.

The red spider is a very dangerous pest. Here again an ounce of remedy is worth a pound of cure. It will not be carried through the winter on lettuce, and no plants should be carried through the winter that will harbor it. Chickweed and other weeds that may grow in out of the way places will nourish this pest over winter and so should be cleaned out of a house. When it once makes its appearance, the only way to fight it is to syringe with a strong stream of water, striking the leaves from the under side. This will dislodge them. In order to be effective, this work will have to be followed up every day or two.

MR. GRANNELL: Will you explain the system of pruning?

MR. ZUCK: We generally cut every lateral back after the second or third joint or lateral axil.

MR. WRIGLEY: I would like to know how to take care of anthracnose?

MR. ZUCK: We never had it.

MR. JAGGER: It is sprayed outdoors. I never heard of any spraying being done in the greenhouse.

MR. WORK: Would it seem that spraying would be effective with bordeaux?

MR. JAGGER: It would seem probable.

MR. WORK: What is the method of infection?

MR. JAGGER: Spore infection through the air.

MR. WORK: Bordeaux is the thing to try, but make it thorough. Have you done it?

MR. WRIGLEY: We have. It is not very effective. Bordeaux affects the yield, I think.

MR. WORK: It injures the foliage?

MR. WRIGLEY: The vines, after they are covered with bordeaux, do not seem to yield for a couple of weeks.

MR. JAGGER: I do not know that any work has been done on that point with cucumbers.

MR. WORK: In putting the bordeaux on, you are probably closing some of the air openings.

MR. JAGGER: With potatoes it is just the other way. It increases the transpiration.

MR. ZUCK: If you control the house properly with regard to air, that is one of the great preventives of leaf disease.

MR. WORK: How about keeping moisture in the air for the cucumbers?

MR. ZUCK: I do not know that it is absolutely necessary. We water our vines a couple of times every week rather lightly.

MR. WORK: Do you try to keep the atmosphere in the greenhouse fairly moist?

MR. ZUCK: More so than for tomatoes.

MR. WORK: It is a case of getting moisture into the air and changing the air. It is like ventilation. We do not want to get the heat down and yet we must get ventilation. It seems to be the idea among growers under glass that closing the ventilators is very poor economy.

MR. GRANNELL: Do you use the overhead wire supports before you put the string on?

MR. ZUCK: Yes, sir. If one's house is built strong enough, with a supporting system above one can run wires lengthwise of the house to support each row. Then these strings can be tied to the parallel wires overhead. Otherwise a person will have to use some sort of horses or wood bucks to support these.

MR. WORK: Some of the Rochester growers, where they have no trusses, put up light bars about one-eighth inch thick, one-half inch wide, crosswise of the house, string their wires through those, and leave them there all the time. In our greenhouse we have been rather crude in supporting our wires. We use that general system, but simply put up posts of one by three, then run our wires lengthwise on top of these. We anchor the supports tightly at the end. The permanent system, I think, is pretty nearly as cheap as far as first cost is concerned, and it is there to stay.

QUESTION: What is an average yield?

MR. ZUCK: With vines two by three, in a short season from June first to August first, an average of a basket of thirty cucumbers per vine, may be considered very fair.

MR. WORK: I have as a fair average from Rochester about thirty-seven dozen per hundred square feet. From Boston I have learned that they run from twenty-five to sixty dozen per hundred square feet. There seems to be a reasonable amount of agreement. My figure for you, Mr. Zuck, is thirty-six dozen.

MR. WORK: Do you shade your cucumbers?

MR. ZUCK: We do not.

MR. WORK: Is it not necessary?

MR. ZUCK: We have never experimented any in that line, but some days, if the sun is up pretty high and it is extremely hot, we wet the vines with the Skinner overhead irrigation system, and this helps to cool the temperature, but it seems to me that shading the plants would be a distinct detriment to the welfare of the vines.

QUESTION: What method of pollenizing do you use?

MR. ZUCK: With bees entirely.

MR. WORK: Do you have trouble with them?

MR. ZUCK: Yes, we do. The conditions under which the bees work are very poor, and generally when they get through, they are pretty weak, because the bees going into the house are persistent fellows and keep bumping against the glass and kill themselves. It is very discouraging. We quite often have to buy new hives entirely. If the spring is cold, we have to set the hives right inside, where it is warm, to get the bees to work. If it is warm, we take out a light of glass and set the hive against the opening.

MR. WORK: Can you set a hive in the end of the house and have openings each way, requiring them to go into the house in the morning and later letting them loose?

MR. ZUCK: I do not know about that.

MR. WRIGLEY: I grow my vines very close together and get sometimes on an average as high as three dozen per vine, but they are not all first grade cukes.

MR. WORK: Mr. Reed is a thoroughly successful grower of late cabbage. He grew twenty tons per acre during the past dry season, and he has been averaging very high year after year. I am sure you will be glad to hear how he does it.

LATE CABBAGE.

E. N. REED, Cortland, New York.

While it gives me great pleasure to come here and talk on "Late Cabbage," at the same time, I would feel a great deal more at home if I were back in the field taking care of a cabbage crop. My chosen business is farming and not telling how to do it. The vegetable growers asked me to talk about twenty minutes on the cabbage subject. It was evident they thought I could tell all I knew in that length of time. But when I sat down to outline my talk, I found I could tell all I knew in less than twenty minutes.

In 1906 I entered the freshman class in cabbage growing, and after eight years of experience added to all my father handed down to me, I have not yet graduated, and what is

worst of all, I think I never shall. I shall not attempt to lay down a set of rules, whereby you can go home and grow a good crop of cabbage. There is no rule that will fit all the varied conditions under which we raise our crops. I can only give you an outline of what I have done and the methods followed.

Before I go any farther, perhaps it will be well to briefly describe my conditions. My brother and myself are engaged in equal partnership in dairy farming. Our farm is located one mile south from the city of Cortland, on what is called the first rise of ground. The soil is a clay loam. It is very far from a Garden of Eden, as it has plenty of stone and a great variety of weeds. We raise cabbage as a cash crop. Late cabbage is a crop that is raised very extensively by both truck and dairy farmers.

There are three types of late cabbage grown in our section:

First. The Danish Ball Head, a standard late cabbage with which most of us are familiar. This cabbage has more or less of a round, hard head.

Second. Red Cabbage, a cabbage more tender than the other late sorts and not as heavy a yielder. In shape it resembles the Danish. Most seasons it cracks quite badly.

Third. The Flat Dutch, a large flat cabbage, as its name signifies. This type is usually raised by growers who want a cabbage that looks large. Each of these types has features adapted to special market conditions, but probably seven-eighths of the late cabbage grown is Danish Ball Head. The Danish Ball Head is especially adapted to conditions where heavy yields are wanted. It does not crack as badly as the red, and a heavy head does not look as large as the flat types. We had to draw six carloads of cabbage four miles farther to market one year because we were unfortunate enough to get seed of one of the flat types instead of Danish Ball Head, as we ordered.

I do not like the expression "late cabbage." It gives most of us the idea that they are a crop that can be put in sometime in the middle of the summer, and after the crop is once set, that will be the end of it, so far as care goes, until it is ready to harvest in the fall. Most cabbage put in in this way

will be about as solid as a head of lettuce and weigh just about as much. One buyer called them cushions—a very fitting name.

Cabbage Seed.

Most of our seed comes from Long Island, New Jersey, Michigan, Oregon, and some is imported. Many of us have sad recollections of that year when our cabbage proved to be early ones or red ones when we ordered Danish. A good share of the seed is raised on a contract, or, in other words, large seedsmen hire men to grow a certain number of pounds for them. Some tomato seed growers have been known to raise a kind of tomatoes that produces a great quantity of seed, when the quality and productiveness of the tomatoes are very poor. Possibly this is the case with some cabbage seed we get. At best, cabbage seed growing seems to be a job that has been left for some hired man to attend to. No wonder we get mixed strains when one neighbor raises early seed, another raises late ones, the two being so near together that cross-fertilization takes place. A great many seed growers raise their cabbage plants only up to a stage where they first commence to head, then carry them over winter to produce seed the next spring. In this way, there is very little chance for head selection. So we must take seed from good, bad, and indifferent stock when buying commercially.

It is much easier to carry these soft heads over winter in a good growing condition than it is a mature head. My brother and I have been working on the proposition of raising seed by the mature head method for the past five years. We have obtained a full crop of seed only once in that time, but what few seed we did get each year have not failed to produce at least twenty tons per acre, the average being about twenty-five, last season between twenty-one and twenty-two.

We have kept the same strain each year and selected from it, always bearing in mind its eating and keeping qualities, as well as its productiveness. Its eating qualities are just as good as our best domestic varieties. We have tested one strain side by side with strains from four different sources, also some direct from the old country. It has not failed to produce at least one pound per head heavier than strains from

these other sources, conditions being equal. We have done all our work with the Danish Ball Head, so we are sure not to get other varieties mixed in, as is often the case in a seed growing section.

The cabbage plant seems to be twice as hard to breed up as other plants, because it takes two years to get a crop of seed. There seem to be insect and fungus enemies that make no end of trouble. Perhaps these are the reasons why so few have tried to produce good seed. This coming season we are in hopes to have seed enough to supply a few parties besides ourselves.

Where one is forced to depend upon commercial seed, it is a good plan to buy early enough so some seedlings can be raised before seed sowing time. By so doing, one can often detect mistakes, such as getting early cabbage for late ones, or reds for whites. This will also give you a germination test.

Do everything else right about a cabbage crop except get good seed, and you will surely fail.

The Seed Bed—Seed Treatment.

The seed bed should be located on a fertile, well drained piece of ground where there will be no washing or accumulation of water. Choose ground as free from weeds and vermin as possible. In or near an old barnyard is a very poor place. The soil should certainly be free from club root or any of the cabbage rots.

The ground should be thoroughly fitted. If it is so fine that there are no lumps larger than a pea, it is all the better. Give the ground a good dressing of lime or wood ashes, also apply about one hundred pounds of complete fertilizer to every six hundred square feet of ground. This is about the area required for sowing a pound of seed when the bed is not screened. Cover the seed with a peg-toothed drag as shallow as possible. Then firm the ground with a roller. We always treat our seed before sowing with the following solution: For one pound of seed dissolve one corrosive sublimate tablet in one pint of water in an earthen dish. These tablets can be obtained from any drug store for about one

cent each. Now put in the seed and soak fifteen minutes. After which take out and spread to dry, but not in the sun or near artificial heat. The seed can be sown wet just as well, but it is not quite as handy. This treatment will kill any cabbage disease that might be clinging to their oily seed coat.

Where seed is sown in the open we usually allow one-half pound of seed for one acre of cabbage. Of course, this is four times too much if it were not for insects and so forth. It is always best to have plants enough. A dollar invested in seed goes a great deal farther than it does in plants, even if one was sure he could get good, healthy plants. We usually sow our seed about the first of May.

The Cabbage Field and Its Preparation.

We prefer to have as great a period between two crops of the cabbage family as possible. The cabbage crop will adapt itself to a great variety of soils, if it has enough to feed on. A soil too much on the gravel order is as bad as one too wet. We usually put our cabbage on sod ground, which has been plowed eight or ten inches deep. We prefer to plow, either in the fall or early spring. Then this ground can be kept thoroughly worked until setting time.

By dragging at least once a week, most of the weed seeds in the soil will be germinated and killed, also the early moisture will be maintained, which is of great importance.

A twenty-five ton crop of cabbage probably removes more tons of moisture and green matter than any other crop the average farmer raises.

After the heads are removed, probably there are left fifteen tons of roughage. Most of us place too little value on this roughage. The Maryland Experiment Station analyzes the cabbage plant for digestible protein as follows: Heads, .41%; roughage, 1.42%. Silage only analyzes 1.20. If a man has no stock to feed his roughage to, they ought to bring a good price from some neighbor who has.

Fertilization.

Cabbage needs plenty to eat, as well as drink, if we expect to get large crops. It takes as much fertility out of the soil

to raise five tons of cabbage per acre as it does twenty bushels of wheat. Very few crops will repay for the use of fertilizer like cabbage. Manure and commercial fertilizer are best for cabbage. We usually apply about ten tons of manure per acre and from four hundred to seven hundred pounds of commercial fertilizer. If no manure is at hand, about one hundred pounds of 4-8-10 will answer. We also apply about one ton of lump lime per acre. The fertilizer and lime are applied broadcast. It does not pay to put the fertilizer in hills for late cabbage, because they are gross feeders and the more the root system can be spread the better. Spreading the fertilizer has a strong tendency to spread the root system. It takes about one thousand spoonfuls of water to make one spoonful of commercial fertilizer all available for a plant. Here comes that important factor moisture again. Often if a field of cabbage is a little slow in the latter part of the season, a dressing of two hundred to three hundred pounds of nitrate of soda will start them along. A satisfactory way to apply the nitrate is by turning small handfuls through a tube taken from a grain drill. The height the tube is carried from the ground will govern the spread of the nitrate. In this way, none of it falls upon the leaves.

Setting the Plants.

Setting cabbage is of more importance than most of us think. We ought not to be satisfied with just making the young plants live. Too often there is a fight between life and death of a week or ten days before the young plants start to grow. This loss can never be made up. Lost time is never found. The probabilities are the crop will be three weeks farther behind in the fall if the plants are slow about starting. We prefer to loosen our plants in the seed bed with a screw-driver or some similar tool, when taking them up. There are some cases where plants can be pulled all right, but generally most of the root system is spoiled. Medium sized plants are preferable to large ones, because more of their root system will be maintained in transplanting. We like to have our cabbage all set by the fifteenth of June. Then they will start in time to get most of the spring mois-

ture which we have kept stored up by continuous dragging. Usually the sun or the cabbage crop gets the moisture at this time of year.

Never set cabbage when the ground is wet. If you do you will pack the ground around the plants, so it can never be loosened up, thus causing a great loss of moisture. Of all setting tools, we prefer Masters' Plant Setter, which enables one to set plants in rows both ways. The work can be done when the ground is very dry, as the setter places the roots down in the moist dirt with a little water for each plant. The ground does not have to be packed around the young plant, thus forming a hard ball. The water seals the roots to the ground and so little water is necessary that a dry mulch is maintained on the surface around the young plant. This mulch is of great importance. Four quarts of water is sufficient to set one hundred plants or forty quarts for one thousand. With two men to set and one to dig plants, we can set about ten thousand in a day of nine hours. This is equivalent to over two acres set three feet each way. The machine setter is a great labor saver over the old-fashioned hand way, but in nine cases out of ten the plants are set very unevenly and rowed only one way. It takes quite experienced help and a lot of water, and not every small farmer or gardener can afford to own one, nor is he able to hire one when he wants it. We always row our cabbage both ways, about three feet by twenty to thirty inches, as we think the ground will stand. We use a small peg-toothed garden cultivator when going the narrow way.

Cultivation.

Perhaps we do not cultivate more than three or four times this way, as the plants will soon shade the ground. Usually the plants are cultivated quite late in the season the other way of the rows. If the ground has been dragged about once a week before setting and the cabbage is rowed both ways, it will seldom be necessary to do any hand work on the crop. When my brother and I were small, our father used to let us raise a small patch of turnips for market. We used to govern the size of the turnips by the number of cultivations we gave them. That is, if the turnips were going to be too

small, then we would cultivate real often; and if too large, then we would stop. We think this applies to the cabbage crop. Never cultivate over one and one-half inches deep unless the cabbages have started to burst. Then a very deep cultivation will help to check their growth. In a dry season cabbage is apt to form a small, hard head, which cracks very badly. If the cultivator is kept going more frequently than usual, it will greatly help to keep the heads growing so that when late rains come on, there will be plenty of room to take care of the extra rush of growth which would otherwise cause the head to burst. It often pays to have a man go over the field and loosen all heads that look as though they might crack. A six-tined manure fork is a satisfactory tool to use. By cultivating in the heat of the day, fewer leaves will be broken off. The ground has been more or less tramped down by setting. Therefore, the cultivator should be started as soon as the plants straighten up.

Diseases.

In our section club root and stump rot or black heart cause most of the disease troubles. Without a doubt stump rot or black heart, which is a bacterial disease, is the most serious thing a grower can get into his soil. A crop rotation of even ten years does not seem to be a remedy. So it seems we must look to a prevention rather than a cure. Once the disease gets into the soil it spreads very rapidly. Every precaution should be taken not to get dirt from an infested field to a non-infested field by carrying it on farm machinery, animals' feet, or plants from a diseased seed bed.

Feeding stock diseased roughage, then spreading the manure on a non-infested field is an ideal way to spread the disease. So far we have been entirely free from it and intend to keep so if possible. All cabbage seed should be treated as heretofore described, as seed very often carry the disease.

Club root is familiar to us all. It has been found that a rotation of five or six years between cabbage crops is sufficient to kill it if the ground is kept free from all plants belonging to the cabbage family. This includes mustard. It

is a slime mold disease and is greatly held in check by the use of lime. This disease spreads mainly from soil inoculation. Therefore, it is best not to set plants from a seed bed that shows the disease.

Insect Pests.

Like all crops, the cabbage has its insect enemies. First comes the flea beetle, then the root maggot. The flea beetle eats the leaves of the young plants, while the root maggot works at the roots. It can readily be seen that the root maggot is a far more serious insect than the flea beetle. The adult of the cabbage maggot much resembles the house fly. It lays its eggs around the stem of the young plant, which soon hatch into small white maggots that find their way into the ground and feed upon the root system. In many localities this pest has become very serious, and as a result the seed bed must be screened with cheese-cloth in order to get a stand of plants. In other localities where the pest is not so troublesome, people are sowing twice the usual amount of seed to get a given number of plants. Since screening protects against both root maggot and flea beetle and also hastens the young plants a week or ten days, there can be many things said in its favor. Seed sown under a screen will produce nearly twice as many plants as by other methods. I am not going into detail about the screening method, because the Geneva Station has published a bulletin on the subject, which will pay anyone who is interested to get and read. (Bulletin 334). The principles are as follows: Boards from six to ten inches wide are set up around the seed bed and held in place by short stakes. Over these boards is stretched cheese-cloth, which is fastened to their edges. Wires stretched across the boards will prevent the cloth from sagging in the middle. All cracks should be made tight and all openings under the boards should be banked with dirt. It is better if the bed to be screened is not over six to nine feet wide. The cloth should be put on at least as soon as the young plants appear and be removed about one week before setting time to let the plants harden up. Last year we screened one-half of our bed and were so well pleased with the results that we intend to screen it all this year. The cost per thousand plants

is from six to twenty cents, depending upon how many years a man is able to use the same screening material. The insect that made the most trouble in our locality last year was the plant louse. It always seems to make the most trouble in a dry season, because cold, wet weather will kill it. It has great powers of reproduction, being capable of rearing from twelve to twenty litters of brood in a single season, and in turn the young will multiply when only six days old. Some strains of cabbage seem to be attacked worse than others. For instance, we had a narrow strip of red cabbage and a narrow strip of Gregory's Danish Ball Head through our field last year. These two strips seemed to be infested ten times as badly as the rest of the field raised from our own seed. We sprayed these two strips twice, while the rest of the field seemed to be practically free from lice. The cabbage louse being a sucking insect, most of us have always used kerosene emulsion as a spray, but the Geneva Station now recommends a mixture of three-quarters of a pint of "Black Leaf 40" (nicotine mixture), four pounds of dissolved soap, and forty to one hundred gallons of water. Small fields can be sprayed with a knapsack sprayer, but for large areas an orchard outfit with two leads of hose does the best work. The plants will require a thorough wetting on both sides of the leaves and also in the center. Two applications of this kind have been found to entirely free a field from lice. Sometimes a little squirt hand spray can be used to advantage where there are only a few patches of lice scattered here and there.

Some of us have been troubled with cutworms. Soil infested with these should either be used for a cultivated crop the year before cabbage are to be set or fall plowed and kept dragged once a week before setting time.

Conclusion.

Four essentials for a good crop of cabbage are: (1) plants raised from good seed which insures every plant to produce a good head; (2) sufficient fertility to carry the crop through the entire season; (3) maintaining the supply of moisture; (4) thorough preparation of the soil and cultivation of the crop.

Luck lends very few chances for a heavy yield. If conditions are not right, they must be made right.

Do not let a failure be repeated. Find why you failed. The experience is costly enough the first time. The school of experience is a sure way to knowledge, but the tuition is rather high.

It is just as well to learn from your neighbor's failures as to have them all yourself.

A poor cabbage season is just the right time to have a good crop. This is when they bring some money. Have a good crop every year, then you are sure to hit it.

The cabbage crop last year in New York State was valued at about three million dollars. Did you get your share of that vast sum? If not, why not? Someone else must have taken his share and yours too.

A MEMBER: Do you always sow your seed broadcast?

MR. REED: Yes.

A MEMBER: I think if you once sowed your seed in rows you would never sow broadcast again.

QUESTION: Does not the soil bake around the plants? What about the root system?

MR. REED: Our soil does not seem to bake much. The plants will soon shade the ground after they are up. We plan to sow seed thin enough so they get a good root system.

QUESTION: How do you keep the weeds out?

MR. REED: We do not take the weeds out at all. We choose ground which is as free from weeds as we can. The cabbage will come on quicker than the weeds. The seed bed is out of the way by the middle of June and there are few weeds that bother as early as this.

QUESTION: Do you put your seed bed right in the lot you are going to use for cabbage?

MR. REED: We usually do. I would prefer to put my seed bed on a field that has never had cabbage on before if I could. Some are breaking up a corner of an old pasture. If you do this, do it in the fall or early enough in the spring to get a connection with the lower soil.

QUESTION: Would you rather use sod ground or old ground for a cabbage crop?

MR. REED: We have always used sod ground. We are taking our sod ground that has quack grass in it. We plow that ground, say some time in August, put a harrow right on and work it thoroughly; and quite often if it has quack badly, it will clog a common harrow and you will have to rake and burn or draw off the roots. Keep the harrow going occasionally until the end of the growing season. In the spring we take that ground and throw it the other side over. By having plowed as early as we did in the fall, that sod will be pretty well rotted. Now the quack can be taken out of this side just as we did the other side. The trouble with people trying to kill quack is they always leave enough in the bottom of the furrows so it comes right up through. We usually use a common spring-toothed harrow.

MR. HAW: How does a disc harrow work?

MR. REED: It works very satisfactorily. It cuts up the quack a little more. The spring-tooth pulls it out a little better. We have had pretty good success with both.

QUESTION: How would it do to put on a late crop of buckwheat and plow it in? We tried this, plowing it in when it was in blossom.

MR. REED: You plowed it again in the spring and worked the quack out from the other side.

SAME MEMBER: There seemed to be no quack there, and we put on corn, I think, the next year.

A MEMBER: Please give your experience in feeding roughage.

MR. REED: The second day of February, our cabbage roughage was all fed and there was a difference of just one can of milk between that morning and this morning, February 11th. One can less. We substituted the feed of cabbage with a feed of clover hay. We have found this to be true for the past three years.

QUESTION: How many cows are you milking?

MR. REED: Fifteen or eighteen that freshened in the fall.

QUESTION: Did you feed corn silage all the time?

MR. REED: Yes, right along.

A MEMBER: The corn silage is not as good this year because it was all frosted before being put in.

MR. REED: I think you will find the greatest loss with frosted corn comes by letting it stand so long that it loses a great many leaves.

QUESTION: What do you cut your roughage with?

MR. REED: We use a pair of tobacco shears. A man can cut about one acre per day. We throw the roughage into piles about as large as haycocks.

QUESTION: How do you handle these when it is stinging cold weather?

MR. REED: We throw them right into a rig and let them stand in the basement over night. The frost draws out pretty well, but the cows will eat them just the same if they are frozen some.

QUESTION: Do you feed before or after milking?

MR. REED: The roughage is always fed after milking.

QUESTION: What kind of lime do you use?

MR. REED: Freshly burned lump lime.

QUESTION: Do you apply it in the spring?

MR. REED: We usually apply it to the field in the spring and drag it right in.

QUESTION: Do you sow your fertilizer early?

MR. REED: Just about the time we are ready to set.

MR. COOK: What time in the spring do you sow your lime?

MR. REED: Any time that it is most convenient. Usually about the time we sow the fertilizer.

MR. COOK: What does that lump lime cost you delivered at your station?

MR. REED: A little less than four dollars.

QUESTION: Where can you buy it for that price?

MR. REED: Ours comes from M. E. Reeder, Muncy, Pa.

QUESTION: Do you sow all the nitrogen at one time?

MR. REED: No.

QUESTION: Does it do any harm to get nitrate of soda on the leaves?

MR. REED: It will burn the leaves as well as waste it.

QUESTION: Do you try to apply it as close to the roots as possible?

MR. REED: No. The cabbage is a gross feeder, and you will find the roots all through between the rows. One reason why the fertilizer is applied broadcast is to spread the root system.

A MEMBER: Would lime be essential if you lived in the natural limestone belt?

MR. REED: I think not, although an actual test would tell you better. My section is almost free from lime.

QUESTION: Can you grow cabbage on muck land and get it to head?

MR. REED: I do not know. Can any one else answer the question?

A MEMBER: I do not think so.

QUESTION: How would a loose muck soil with a marl bottom do?

A MEMBER: With a good marl bottom not over eight inches below the muck, it works first rate.

QUESTION: How does your hand setter work where the ground is stony?

MR. REED: It works very satisfactorily. I do not think you can find a machine that will do better.

QUESTION: What does it weigh when full of water?

MR. REED: I do not know exactly, the water reservoir holds about twelve quarts.

QUESTION: Do you have to stop and press the plants in?

MR. REED: Not at all. The pressing would destroy the mulch of dry dirt around the young plant which is of great importance.

QUESTION: How do you carry your plants?

MR. REED: I have a little basket about a foot wide and fourteen inches long. The plants are laid in this so they can be picked out with the left hand and dropped into the setter.

QUESTION: Will your setter set strawberry plants?

MR. REED: It is recommended to, but I have never set any with it.

QUESTION: How deep do you set your plants?

MR. REED: Possibly a little deeper than they were in the seed bed. In good mellow ground the weight of the setter will set them deep enough.

QUESTION: After setting in a very dry time, say in tne afternoon with a hot sun, how many do you have to reset?

MR. REED: Perhaps last season was one of the dryest ones in this section. We set three and one-fourth acres in one piece and in the fall I do not think there were over two hundred plants missing from any cause. The man who cultivated the piece thought he took out one hundred with the cultivator. This piece was never reset.

QUESTION: Do you think it does any harm to break off the lower leaves?

MR. REED: I have heard this discussed quite a good deal. I prefer not to have them broken off from my plants.

QUESTION: Would it do greater harm to leave off cultivation?

MR. REED: I think it would. We usually cultivate quite late the wide way of the rows.

QUESTION: How many times do you hoe your cabbage?

MR. REED: We never hoe our cabbage at all. If the ground has been thoroughly worked before setting time and you cultivate both ways, it will seldom be necessary to do any hand work.

QUESTION: How many acres do you grow?

MR. REED: Usually about four or five.

QUESTION: How often do you try to cultivate?

MR. REED: About once a week. Always after every rain.

QUESTION: Do you have any trouble with club root in Cortland County now?

MR. REED: Yes, a great deal of it.

QUESTION: If you had a crop of cabbage that grew very well in the fore part of the season and then produced only rather small heads, would you consider that a bad type of seed or cultivation?

MR. REED: There are three possible causes. A poor strain of cabbage, lack of fertility or lack of moisture.

QUESTION: What do you do for worms?

MR. REED: The most satisfactory method is to spray with paris green. A good thrifty plant will generally take care of itself.

A MEMBER: We have had good success with paris green.

QUESTION: Does it pay to spray for the aphis?

MR. REED: I do not think so in the majority of cases.

QUESTION: Will the aphis live over in the ground?

MR. REED: It will live over in the stubs and roughage left in the field.

QUESTION: Do you think if you took the aphis right on the start that would cut off the trouble with the rest of the field?

MR. REED: It might help, but still they spread from all over the neighborhood. They seem to come all of a sudden and where they come from you do not know.

WEDNESDAY AFTERNOON

GOOD SEED.

R. L. WATTS, State College, Pennsylvania.

The chairman of the meeting has told you how important it is for market gardeners and truckers to use good seed. I feel, however, that it is unnecessary for me to present arguments to show the importance of planting the very best seed. But it is in order to say, that the vegetable growers of this country are decidedly behind the general farmers with regard to this proposition. In Pennsylvania, nearly every corn grower realizes the importance of planting the best seed that can be obtained. They know very well that if seed is purchased from the dealers that name the lowest prices, there will be no certainty whatever of their getting a good crop. Not so with the vegetable growers. Hundreds of them do not hesitate to place orders for the seeds that they want with the house where they can be secured at the lowest price. The rank and file of the commercial vegetable growers in Pennsylvania do not use as much intelligence in procuring good seeds as do the corn growers of our state, and I think this is true, to a certain extent at least, in the State of New York.

In general farm cropping, a great deal is said, these times, about farm management. Your own institution of Cornell University occupies a prominent position in this matter. But, how about garden management? Are we not behind the general farmers with reference to the skilful, scientific management of our commercial gardens? Are we not behind them in selecting seeds with a view to increasing yields and improving quality? I believe that we are.

I need not take very much time today to give examples of gardeners here and there, all over this country, who are making splendid progress because of unusual care in the production and selection of seed.

A few years ago, I met a turnip grower in New Jersey, at a County Fair, exhibiting a large number of turnips. Looking over those exhibits, I found one lot that ran unusually

uniform. They were as fine turnips as I ever saw. I said to the grower, "Where did you get the seed from which these turnips were grown?" He replied by saying, "I grew it myself." "How did you do it?" He gave the history, how he started with a flat turnip ten years ago. He did not like the flat form and he began to select roots for seed purposes which had a tendency to be round. Rapid progress was made, the round roots were obtained. Then there was trouble, for the roots began to take on an elongated form and it was necessary to make rigid selection in order to retain the roundness. He succeeded and was very proud of his accomplishment.

Some time ago I was traveling on a train in Indiana. In conversation a vegetable grower referred to superior radishes which he was growing in the greenhouse and said that he grew the seed himself. He gave the history of his efforts and was proud of the results. He was getting high prices for radishes because he had a superior product.

I met a prominent cucumber man in Ashtabula. He, too, said he was using his own seed. I went through his breeding house, and realized that this was one of the reasons why he was getting such great results.

In Massachusetts, I met a very successful lettuce grower who produces his own seed.

In Pennsylvania, a man grows White Cob Cory sweet corn. The results are above the average. Seed is grown in a special breeding plat.

A melon grower in New Jersey has established a reputation for selling unusually fine watermelons in Philadelphia. He puts a label on every melon, containing the name of the grower and guaranteeing it to be satisfactory. He grows the seed himself. I do not need to multiply examples.

What Is Good Seed?

At this point, I want to raise the question as to what your understanding is of good seed. I used to think that seeds were good when they were true to name. If a man buys a variety, he wants that variety. No seedsman has a right to make a substitution.

Then, too, it must be viable. We do not have very much trouble along this line. As a rule, the seeds we buy grow. Most of the seed houses maintain germinating stations. While seeds generally grow, there is a possibility of your losing several hundred dollars because you have bought seed which is not viable. You had better buy in good time and determine the viability or germinating power in order to make certain of avoiding loss.

Garden seeds must be free from impurity. Sometimes an unscrupulous grower will slip a little turnip seed into the cauliflower seed.

Strains.

But the subject I want to talk about, primarily, in this connection is the question of strain. Seeds are not good unless the strain is good. There is not much danger of getting pebbles and sticks in our vegetable seeds, but there is danger of buying a poor strain. For example, at State College we have been growing tomatoes for some years in the greenhouse. This year I found that the tomatoes were not first class. There were too many rough specimens. The man in charge said there was no doubt about them being Bonny Best. Upon investigation, however, we found that an inferior strain had been used and that this was wholly accountable for the poor results.

We have reached a point in vegetable gardening when we cannot afford to use seed that we do not know. There may be some exceptions. Perhaps the most noteworthy exception is celery. I would hesitate to make a statement that a man knows what he is going to get from the celery seed he plants, but so far as the seeds are concerned which we can grow on our own farms, we have reached the point where we should know whether the seed planted will give us good results or not. Experiments at State College, in charge of Mr. C. E. Myers, to determine the variations between strains of a given variety, show that it is exceedingly important to get the best strain of a given variety.

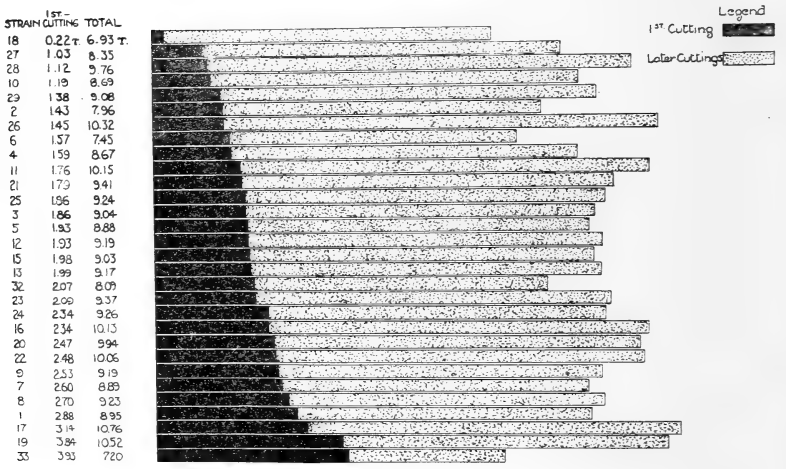
Results In Pennsylvania.

The first chart shows strains of Jersey Wakefield cabbage. I cannot say, definitely, that every line represents a differ-

ent strain, but I do know that every line represents a different source of seed. In other words, we got seed of Jersey Wakefield from as many places as you see lines on the chart. We bought the seed in ounce packages, so that we would have enough seed to conduct the experiment for several years. The experiment has been carefully conducted on a soil with uniform conditions. The plants were started under glass, side by side, under the same conditions. From the striking results shown by the chart, I know you will grasp the idea that

PLATE I

HARVESTING RECORD
of
JERSEY WAKEFIELD CABBAGE



it is far more important to have the best strain of a given variety than to merely select a well known variety without recognizing the fact that marked variations exist in all cultivated varieties of the different classes of vegetables.

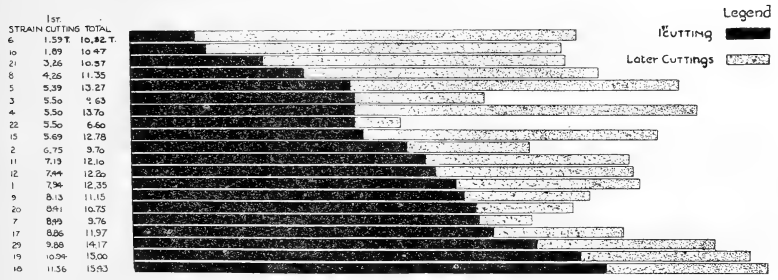
The black lines represent the first cuttings of early cabbage. You market gardeners know how important it is to get heavy, early yields. It is the first cuttings that command high prices. Notice the difference,—all Jersey Wakefield. When sold on our local markets, we got fifty dollars a ton for this first cutting. The top line shows a decidedly leafy strain, which was very slow in heading. Instead of the

typical pointed head of the Jersey Wakefield, the heads were more rounded. It was a most unsatisfactory strain, and yet it was bought from one of the most reliable seed houses in the United States. The dotted lines at the right represent the total cutting for the season. These results are from six or seven crops of cabbage. You will note how the Jersey Wakefield varies.

The next earliest variety that most of us are familiar with is the Charleston Wakefield. You will note that the variation is not quite so great as with Jersey Wakefield. The total yields varied considerably, but not quite so much as the Jersey Wakefield. That is what I want to bring out, that varie-

PLATE III

HARVESTING RECORD
of
EARLY SPRING CABBAGE



ties of cabbage, early and late, vary greatly in their yielding qualities.

Notice what happened with Early Spring (see chart). Suppose you wanted to reach the market early with a flat cabbage, as large a variety as possible, and that you bought strain No. 6. Suppose your neighbor across the fence had bought strain No. 18. The seed might have been bought from two houses in the same city. You would have a wheelbarrow load to market and your neighbor a big wagon load.

The differences with Danish Ball Head are not quite so great as with Jersey Wakefield, yet you will note that the strains varied greatly. With our limestone soil, we do not grow much Ball Head cabbage. Our Hagerstown clay loam is a good hay soil, but it is unsatisfactory for cabbage.

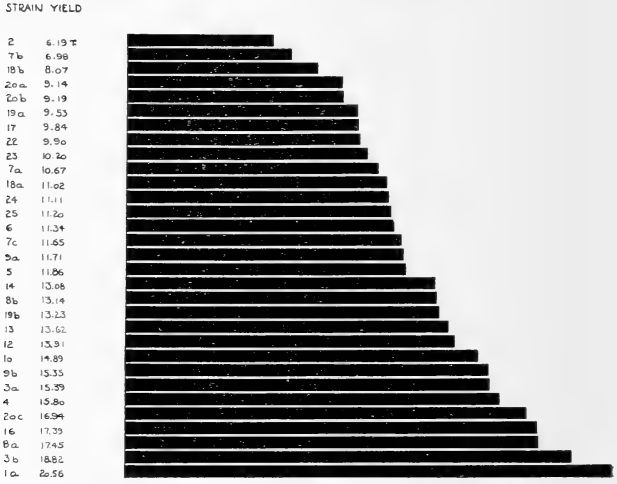
Here is a newer variety, the Volga. You will notice that it runs fairly uniform as compared with the Wakefield type. Strain No. 4 produced at the rate of eighteen tons to the acre, and here is a strain that produced at the rate of twenty-five. The Volga cabbage is a much better producer in limestone soils than the Danish Ball Head.

The Enkhuisen Glory and Copenhagen Market also do well in limestone soils.

How Can We Get Good Seed?

Now the question naturally arises, how can we get good seed? I imagine I hear someone say, "I knew long ago that

PLATE V



these differences exist. You have not told us anything new," and I realize the truthfulness of this assertion. I have a feeling today, and it is very strong, that I cannot tell you anything new about getting good seeds, and yet I believe the most of us could obtain and plant better seed than we are now using.

There are various ways of obtaining seed. One method is to order from a house, regardless of its reputation. Or we can make up our mind that a certain house is reliable; we be-

lieve it is all right because we have bought seed from it before, and if it sells good tomato seed, cabbage seed is all right. Don't be too sure about this. Last summer a reputable seedsman came to State College and expressed a special interest in our strain tests of cabbage. We took him to the experimental plot. He commented on the various strains. After a while we came to the abominable strain I have mentioned, and he said, "Look at this strain. Isn't that an outrage? From whose seed was this row grown?" We said, "Do you really want to know? Well, that is your seed." That such poor cabbage should be grown from his seed was beyond his comprehension. We told him, "Yes, that is your seed. We have planted it for the last five or six years. There is no possibility of mistake. Results have tallied up every year."

Remember, there is no better seed house in Philadelphia than the house this man represented. And the house paid twenty-five cents more a pound to get this seed. I do not want to be misunderstood, for I am a good friend of the honest seedsmen and I could mention many seedsmen in whom I have confidence. But here is the trouble. We, as commercial growers, have not been willing to pay the price necessary to produce as good seed as the careful grower may produce on his own ground. Is this not true? There are exceptions, of course, but the rank and file of the commercial growers of vegetables are not willing to pay high prices. Seedsmen, therefore, produce seed on a large scale and sell it at low prices, because commercial growers demand such prices.

Have you ever been on a cabbage seed farm when the growers are roguing in the fall of the year? What do they do? Here is a plant that is rather off type and they discard it. Perhaps ten per cent. of the plants are thrown away.

Saving Seed.

But how does the commercial grower do if he wants to save his own seed? Instead of discarding ten per cent. he finds perhaps one plant in a thousand or more that satisfies his ideal, and he saves the seed from this plant. Most of the seedsmen are doing the very best they can, but intelligent

growers, such as the members of this Association, ought to be putting some brains of their own into this matter of getting better seed.

What are the methods? Perhaps there is some specialist in your community who likes to grow seed, whose strain you have found particularly desirable, and you might make arrangements with him to grow seed for the community. I know a New Jersey asparagus grower whose seed seldom fails to give good results. He prides himself on the results. This might be the best thing that can be done in various communities. Yet it seems to me that the vegetable grower who is producing on a large scale should find out what are the principles involved in the growing of good seed, and produce much of his own seed.

I believe we have reached a point where we might have some of our seeds grown under control. There is no reason why the cauliflower growers of a state, or several states, could not have their seed grown under the direction of a well paid expert.

I want to call your attention to two charts, showing experiments with asparagus. Palmetto has held up better than any other variety. I believe the Asparagus Experiment Station, Concord, Massachusetts, will have some varieties that will take the place of all these old varieties. I have great confidence in the Concord Asparagus Experiment Station. We planted two varieties—Palmetto and Argenteuil. We divided the roots into three sizes, large roots, medium roots, and small roots. (See table.) It will be seen that large roots produce large yields, indicating the importance of discarding all small roots at the time of planting.

QUESTION: Can we grow our own early cabbage seed?

PROFESSOR WATTS: Yes, although it is more difficult than with late cabbage.

Celery Seed.

MR. WORTLEY (Bermuda): Have you had any experience with celery seed from Italy at nine shillings a pound?

PROFESSOR WATTS: No, I have not.

MR. WORTLEY: It is the Golden Self Blanching variety. I

may mention that I come from Bermuda, where the growers are very much interested in their seed supply. They have to pay very high indeed for celery seed, twenty-five dollars a pound. I have imported from France celery seed at seven dollars a pound. While the experiment has just begun, the seed is giving very good results. We have over four hundred varieties of vegetables under test, at present. We have fourteen strains of beet. I got two farmers to come and judge the roots. Both independently selected one of the fourteen. That was from thirty-five cent seed from Denmark against American seed costing one dollar.

Onion Seed.

QUESTION: What is your idea about growing onion seed in this section?

PROFESSOR WATTS: I see no reason why onion seed could not be grown in any section where the onion thrives.

QUESTION: What is the average yield of onion seed from a bushel of onions?

PROFESSOR WATTS: I do not believe I can answer this question. Perhaps some one in the audience can.

A MEMBER: Two or three pounds.

QUESTION: What is it worth a pound?

A MEMBER: All you can get.

MR. GREFFRATH (Livingston County): I could state that the Association has quotations from some very reliable growers who are quoting seed that we know to be as good as can be had at about a dollar and a half a pound, with the commission of the Association added.

PROFESSOR WATTS: What does it usually cost with a commercial grower?

MR. GREFFRATH: It is being quoted this year from ninety cents to two dollars and a half.

QUESTION: Would you outline a plan for us to follow in growing any special kind of seed, like onion or lettuce seed? How should we make our plots?

MR. GREFFRATH: One of the best ways to get a good type of seed would be to go through your field just at the time when the crop is dying. You could then select a type that is ripening uniformly. Gather a bushel or so of uniform color, uniform size, the shape that you want to breed up to. Plant them and then make your selections from the plot. I know that several of the growers at South Lima are beginning to practice this method. The other plan that we use there, in selecting our seed, is to make the selection when the onions are taken out of the storehouse. This gives us a special keeping variety. We can get a good onion to hold up, but there is one thing we are lacking in making that kind of a selection. We do not get an onion that ripens evenly in the fall, which would be overcome if we made selections in the field.

QUESTION: Do you give the same treatment as you would in growing the ordinary onion?

MR. GREFFRATH: The bulbs should be wintered over, then planted in the spring and given the same treatment till the top is ready to cut off and seed is cured.

QUESTION: How do you thrash onion seed?

MR. GREFFRATH: I should say the clover huller is a good thing to thrash them out. But the majority of seed in our section is rubbed out in the winter time by hand through a screen that is just large enough to permit the seed to go down through and separate the hulls. On a good clear day when the atmosphere is dry, it takes but a little time. Then run the seed through a fanning mill.

QUESTION: Do you wash the seed?

MR. GREFFRATH: Yes, sir. I would take, say, a half bushel, put it into a wash tub, fill the tub with water, stir it, and all that remains floating will go overboard. When you do that, you want to be careful to thoroughly dry your seed before you sack it. This seed is water cleaned. Then it is suspended on sieves of mosquito netting or something finer. The screens are four feet wide and six feet long, and are put in the greenhouse. Some of the growers do not clean it until

they are about ready to sow. Then they will water clean it just before they are ready to sow, dry it just enough to run it through the drill, and in that way they will hasten the germination two or three days. But if you are going to sell it, you want to be very careful to have it thoroughly dried.

ASSOCIATION SEED SERVICE.

MR. GREFFRATH: Before we take up the question of our Seed Service, I would like to announce to the members of the Association as a nominating committee the following: W. L. Bonney, W. F. Hallauer, M. Jennings, R. Kilbourn.

The Seed Service.

MR. GREFFRATH: The next thing in order is the discussion of our seed matters. As you know, this Association has established a committee to look after our seed problems. Mr. Work, who has been much interested in this and has given much time in looking up parties that are making a business of growing good strains of seed, after making a large number of inquiries as to these seeds, is in a position to present to the Association quite a number of different strains. Mr. Work has asked me to assist by looking after orders. It has been his business up to the present time to find out where these strains can be procured and get the prices of the seed, and requesting that the orders be sent to me. I have received quite a number of orders and had them filled, but the Seed Service is not taking hold with our members as it should. For some reason or other someone must have started the ball rolling well on a certain kind of Danish Ball Head cabbage, because we took all the seed a certain grower had to offer. With the other seeds the orders are far fewer than they should be. Many of the growers want seeds not listed on the circular letters mailed to them. They should make their needs known to our Secretary, and he would know what kind of strains to look up. Mr. Work has taken up the matter of getting strains of peas from a leading grower. The grower quoted a good price, and up to the present time I have not had an order for a single ounce. That puts us in a bad light.

For that reason I state that we ought to present our wants to the Secretary quite early, so he would know what kind of seed to ask for, and we would have some kind of a show with the grower the following season. We dealt with a party in Michigan, as was mentioned here last year. Quite a number of orders were taken for his seed. That man's crop was short, and he filled only about forty per cent of the orders taken. That same grower is ready to make contracts for next year. There are members who grow seed that have spoken to me and said: "If we had some idea of your wants, we would quote accordingly." One onion grower in our vicinity quoted us and received orders for only a few pounds. This year he quoted higher. His orders this year came a little heavier, and he has reduced the price.

It will be our aim not to get any seed from anyone unless we are pretty nearly sure that the seed will please. Mr. Work will state experience with French celery seed.

Celery Seed.

MR. WORK: We corresponded with a French firm regarding celery seed. They said they could not supply us. We asked them for samples. They sent them, and we placed those samples. Mr. Greffrath tried a sample, and results were very unfavorable. What about your sample, Mr. Hay?

MR. HAY (Wayne County): That that I sowed arrived too late to give it a very thorough test, but it germinated well. I transplanted the plants when they were large enough, and they grew very well, but they were not true to type.

MR. GREFFRATH: Evidently one of those was meant for Silver Leaf. This celery seed question has been a very hard one. I hardly know how to take it. I don't believe any careful grower can afford to buy celery seed the year he expects to plant it. The only way to be reasonably sure is to buy our seed a year in advance and test it ourselves. I make a practice of buying seed from at least four or five different houses that have a good reputation, a fair amount from each, test it thoroughly, and send back what does not prove good. The loss of planting an entire crop of that seed is something

that none of us wish to experience, and that is the only way that I could say that we could safeguard ourselves along the celery line. In the onion seed line, it is altogether different. We feel quite sure, as Professor Watts stated, that seed that is grown in our own vicinity, whose method of selection we know, is going to produce a good type of onions. There are many seeds of which we can feel sure.

There was a firm from Denmark which quoted seed. A little was used in my town last year, but it was not tested as carefully as it should be. The price was much lower than any of the dealers quoted on French seed. I have heard some seed from Copenhagen well spoken of in Irondequoit. I find quite a number of growers who say that Henderson's celery seed is A1. It has that straggly green heart, but I think if it is put in cold storage it does come out well.

MR. WARREN (Monroe County): That celery did come out of storage as well as any seed that I had.

MR. GREFFRATH: I can speak from experience. After it is trenched, it bleaches nicely.

American Grown Celery.

MR. HOWELL (Cayuga County): What about American grown celery seed?

MR. WORK: I have some samples here of a seed that is American grown Golden Self-blanching. We have not heard any definite reports regarding it. We have, however, heard of one or two places where American grown seed has given good results. We think we can get hold of more samples. Are there some of you who would be willing to try samples of American grown this season?

MR. GREFFRATH: I have grown American Self-blanching for three years. Last year I had five acres, and I think it is fully as good as any French seed I ever had. The same party I got the seed of sells French seed at $20, and the American is $10. The latter has better foliage in the fall and is not easily affected by frost. Last year we had a heavy freeze the fifteenth of September. The plants from American seed looked better than those from French seed. They were healthier, and all through the growing season they were ahead of the French.

MR. HOWELL: Do you know in what section of the country the American seed is grown?

MR. GREFFRATH: One man says, "I have seen that grown in California;" another says, "I saw it in New Jersey;" another, "Long Island." So I do not know.

A MEMBER: I tried some of that seed last year, and it seemed to give me better satisfaction than the other.

MR HUNTER (Cayuga County): Did it grow as solid as the French seed?

MR. GREFFRATH: Very finely. There was not a pithy stalk in twenty-five acres.

QUESTION: All true to kind?

MR. GREFFRATH: Yes, very true. I want to say that I don't think there were over one-half dozen green ones to the acre.

QUESTION: How does the yield compare, all things considered?

MR. GREFFRATH: The yield before the freeze was fine, one of the best prospects we ever had. On the fourteenth of September we thought we had a bonanza, and the fifteenth we had nothing. Whatever we got from the fifteenth of September had to come up from the ground.

MR. WORK: We have all had the idea that it wasn't celery seed unless it came from France. I have had a little correspondence, and it looks very much as if over there they have taken good care of their seed and here we have not. When we do breed it well, it is just as good as the other. Good roguing has an important bearing on pithiness, though there is little doubt that cultural conditions, such as frosts and cold, have something to do with it. Altogether I think we ought to be able to get about as good seed here as anywhere. Don't you think so, Mr. Greffrath?

MR. GREFFRATH: This is good enough so that I want it, and three of my neighbors who knew about the seed have given me orders for three pounds. I think I can get a price on it from this party for the Association. The house quotes the

celery to me at $10. I would be willing to take orders.

MR. WORK: Do some of you care to give orders conditionally?

(Ten pounds were ordered).

MR. GREFFRATH: I figure on sowing one-quarter pound to the acre and having some to spare. Three ounces to the acre would be a fair sowing.

MR. WORK: If any of you are interested in samples of American grown seed, we shall be glad to look into it.

Late Celery.

MR. HOWELL: How about green celery?

MR. GREFFRATH: I would like to have Mr. Hallauer tell us what is the best green celery being grown?

MR. HALLAUER (Monroe County): For a late keeping winter variety I think French Success; for a medium early I think Winter Queen. We have some French Success at the present time just as fine as in the fall.

MR. HOWELL: How stored?

MR. HALLAUER: This I have is in cold storage. I would also state that with French Success last year I found very large differences in the strain of seed. The best I have found is from Mr. Harris of Coldwater.

MR. SCHWINGEL (Allegany County): There is one from the Holmes Seed Company very good for a green strain.

MR. HALLAUER: There is a strain of green celery which is called Meisch. This seed is grown in Setauket, N. J., by Beulah. He has a little of this seed. It is very fine celery if you can get the true strain.

MR. GREFFRATH: Mr. Hallauer, have you ever seen that grown in New York State?

MR. HALLAUER: Yes, I had a little myself at one time.

MR. GREFFRFATH: I brought some seed from the South. We tried it in Syracuse, had about 3000 plants. It grew beautifully, but I did not like the way it held up. It turned spotty inside the leaf. I thought maybe it was a little too tender. It evidently did not go that way with you.

MR. HALLAUER: Ours kept very well.

MR. GREFFRATH: It might be I did not have a true strain. It looked fine in the fall, but open it and there would be little brown spots around the bottom about three inches up the stalk, and it was very bitter. There might have been some disease which attacked it in that particular locality.

MR. HOWELL: Was it wet in the trenches?

MR. GREFFRATH: It was very wet.

MR. HOWELL: I have laid the trouble to that.

MR. GREFFRATH: With the other kinds it was all right.

MR. WORK: French Success is recommended. Is any other celery wanted?

QUESTION: How will this stand trenching for the winter?

MR. HALLAUER: Very well.

MR. JENNINGS (Madison County): We grow Kalamazoo Broad Rib.

MR. WORK: Do you like it? Have you a good source of seed?

MR. JENNINGS: We think so. I sometimes think it might be better.

Is the Seed Service Worth While?

MR. WORK: Mr. Greffrath has stated the Seed Service situation pretty clearly. We have been making an effort ever since the organization of the Association to establish this Seed Service. We have gone rather slowly, because some of us did not know much about it, and we wanted to make a go of it if we could. To date we have not been able to line up a very big list of seeds that we wanted to recommend. We think we have found out enough about it so that, if we have adequate support, we can go right ahead with it, to some extent for this year, and certainly for next year we ought to be able to handle a good list of seed. Are you really interested? Do you want this Seed Service developed, and if we can offer good seeds do you care to patronize the Service? I would like to hear from you on that. Do you think there are possibilities in the Association work?

QUESTION: What kind of seeds are they?

MR. WORK: I will mention some of them.

Asparagus.

Just lately we got in touch with a source of asparagus seed. This is from a grower that I know personally. He is recognized as a good man with asparagus, and he has done careful breeding for a good many years. His seed is available to members at 80 cents a pound. Are there any men starting asparagus beds this year? Six. Are there any who have not settled the seed question or who are interested in this? He has strains of Argenteuil and Palmetto, our two standard varieties. That is available to our members at $1.15 a pound postpaid, or in five-pound lots at 80 cents a pound f. o. b. That is not an exceedingly low price, but it is not bad.

Onions.

We have a number of strains of onions. We have heard of still another one the last day or two that is very highly recommended. They are available at prices chiefly in the neighborhood of $1.60 per pound. One of the best known strains in this state, one that has been highly successful, we can have for $1.85 in less than ten-pound lots and for $1.60 per pound in ten-pound lots. That seed is exceedingly carefully cleaned. That means something in the way of purity, and where it is thoroughly cleaned, you are getting somewhat more real seed in the pound. This is Southport. At the time one of the seed letters was sent out, there were 150 pounds of Yellow Globe Danvers available at $1.60. We also had a small amount of another strain of Yellow Globe Danvers at $1.50, so we still have some onion seed available. If you have not placed your orders, we would like you to register for it in the hall.

Necessity of Trial.

There is this about it. We don't want you to go ahead with a lot of seed without knowing anything about it, but we are not going to know anything about it until we have had some trials. Even if you do not want to place a big order,

place a small one and get acquainted with it. Last year at our meeting we arranged for the contracting of 92 pounds of Red Globe. We had inquired about this grower, had exceedingly favorable replies, and this seed has been delivered to our members. This same grower expected to be in a position to accept contracts for growing seed during the coming season. However, his bulbs have been sold out, and he is short. But we have had samples from another grower in Ohio of a strain of Ohio Yellow Globe. It has been tried in Cornell tests and in other tests by our members. It has proved to be first class as nearly as we could tell from small samples. That man is willing to contract for seed at $1.25 per pound, and that means to our members an increase of five per cent, which would make it $1.32. We will accept orders at that price—seed to be grown in 1914 for 1915 planting. We guarantee nothing, but we think it is good, and we shall expect a ten per cent deposit before the order goes in. Will those men who are willing to place orders for certain amounts of that seed please speak up?

MR. HOWELL: I would be willing to contract for a couple of pounds.

MR. GREFFRATH: I notice when you mentioned Ohio Yellow Globe several members shook their heads. I find there is a difference between average Ohio Yellow Globe and Southport. Quite a number of years ago, I sent to Ohio and had 15 pounds choice seed mailed to me, which I crossed with the Southport Yellow Globe I was growing. The Ohio is pear-shaped, while the Southport is more round. The Ohios were beautiful in color with a very heavy skin, but inclined to be a little soft. As a type alone I do not like them. For that reason I crossed them. Since then I have seen some Ohios that resembled the Southport we have here.

Cauliflower.

We are handling an excellent strain of cauliflower. Long Island, you know, is famous for cauliflower. The growers there have selected a strain that suits their purposes splendidly. It is an Early Dwarf Erfurt, not quite as early as Snowball, but a nice header, and a splendid cauliflower.

MR. WARFORD (Orange County): I considered it the best cauliflower I ever grew, and the best seed I had had. One thing I liked about it was that it practically bleached itself without any drawing up of the leaves.

MR. COLEMAN (Albany County): Is that the kind sent me?

MR. WORK: Yes.

MR. COLEMAN: It turned out finely.

MR. WORK: Mr. Reeves is from the Island. How is it considered there?

MR. REEVES (Suffolk County): The majority use that seed.

QUESTION: How does it compare with Snowball?

MR. WORK: It is more vigorous in its growth than Snowball. Snowball does not close over so much.

MR. REEVES: Snowball comes more in a heap.

MR. SIRRINE (Suffolk County): I should say the Erfurt would be better for this section on account of the heavy growth of leaf protecting the head in cold weather.

MR. WORK: The price of that seed is one dollar an ounce.

MR. CLUM (Cayuga County): Quotations are all the way from a dollar to four dollars.

MR. WORK: That is one of our most confident offerings. Do some of you care to give orders now?

(Thirteen ounces were ordered).

QUESTION: Have you had experience with cauliflower on muck?

MR. JAGGER (Tompkins County): The crop I saw was not very successful, due to dry weather and so forth.

MR. WORK: There is a man at Waterloo that grows cauliflower on muck, but I have never been able to follow it up and find out more about it.

QUESTION: How much will an ounce plant?

MR. SIRRINE: About three ounces to the acre, 7000 plants.

MR. WORK: We have Early Refugee beans grown by one of our officers, $4.20 a bushel, f. o. b. his station, Central New York.

Tomatoes.

We have one of the best known and one of the most excellent strains of Earliana tomato at 35 cents an ounce, $5.25 a pound. There is a second grade of that which is from crown and selected fruit. The price per pound is $16.80, the price per ounce, $1.35. That is a very special selection. This man keeps his stock seed separate and plants special breeding plots every year. This is practically stock seed. The other at 35 cents an ounce has given very good satisfaction. He makes three selections. For the highest notch of selection he gets $5.00 an ounce, then there is the second grade, and the third, which is better than most strains of Earliana, which sells through the Association at $5.25 a pound, and ordinarily for $6.00.

Peas.

About the peas. Here is the list. To these prices should be added 20 cents each for the bags, 10 cents duty and freight to your station:

Alaska	$3.50	per bushel
Extra Early	3.50	" "
Earliest of All	3.50	" "
Admiral	3.00	" "
Advancer	3.50	" "
Excelsior	4.00	" "
Market Garden	3.50	" "
Senator	3.50	" "
Thomas Laxton	3.50	" "
Premium Gem	3.50	" "

How does that compare with the prices you are getting this year?

MR. HUNTER: I paid $8.50.

MR. CLUM: I gave $7.50 for Gradus and $6.50 for Alderman.

MR. WORK: Are there some that are interested?

MR. HOWELL: There are a good many kinds that several are interested in that you don't quote, and probably the majority have bought.

MR. WORK: What sorts do you want?

MEMBERS: Gradus, Alderman, Shropshire, Hero, Thomas Laxton, Pot Latch, Telephone.

MR. HAY: I would like to try a small dwarf variety on the muck.

MR. GREFFRATH: Premium Gem is the smallest.

MR. WORK: American Wonder is very small.

MR. HOWELL: Nott's Excelsior would do finely on muck. It gave as nice a crop of peas as I ever saw.

Potatoes.

MR. WORK: We have a few potatoes, Irish Cobblers. The stock is said to be clean and all right, but small. Prices are $1.05 a bushel for large and 80 cents second size, f. o. b. central New York shipping point. Do you wish to order?

(Twenty-two bushels were ordered).

MR. WORK: This is our chance to find out what you want, so we can help you. Fordhook limas are asked for. Are there others who are interested for 1915? How many are interested in Early Jersey Wakefield cabbage? Five. If we tackled that Early Jersey Wakefield, we would follow up some of these Penn State results. We would go right to them for the information. We would then go to the sources of that seed, and we would do all we could to get a special rate on that seed for our members.

How about beets? The Canadian organizations have developed this seed business quite a good piece. The Ontario Vegetable Growers' Association now has a purchasing agent. They buy a good many seeds from Germany, and they get very reasonable prices. There is one firm they buy from, and they say they have very good satisfaction. We wrote to find if they would care to do business with us. So we may be able to offer you some kinds of seed from over there. The prices are very low, at the same time the seed has given satisfaction in Canada.

How about carrots? Nine are interested. What sorts do you want?

MEMBERS: Half Long Danvers, Chantenay.

MR. WORK: What beets do you want?

MEMBERS: Early Winter, Crosby, Egyptian, Edmands, Detroit Red, the old flat Egyptian, Crosby's Egyptian.

QUESTION: What is the best kind for canning factories?

A MEMBER: Detroit Dark Red.

MR. HAY: I would like to ask if anyone has raised a larger variety of carrots than Chantenay and Danvers Half Long?

MR. GREFFRATH: I think the Danvers Half Long is the largest on the market. I have raised thirty tons to the acre.

MR. WORK: Are there other seeds you are interested in? How about late cabbage seed? We had some this year and it went like hot cakes. How many are interested in Danish? A dozen.

QUESTION: Can you tell me what is the best strain?

MR. WORK: I don't know yet.

MR. WORK: We have found two other strains of Danish Ball Head. We have gotten in touch with them very lately. We have had two or three letters in each case recommending them, not by dealers but by actual growers. There is the Danish Middle Stem at $2.50 a pound and the Hollander at $3.00. Do you want to order?

(Two and one-half pounds ordered).

Melons.

MR. WORK: How about melons? Are you interested in the Burrell Gem or Rocky Ford type? We have had splendid reports of this kind of seed.

MR. COLEMAN: I tested them one year. They did very well, but they do not take in our market. They want a larger melon.

MR. WORK: Your strain is getting pretty well mixed up over the state, is it not, Mr. Warren?

MR. WARREN: We think there is nothing like the Ironde-

quoit melon. If careful in selecting seeds, the Irondequoit melon is the only melon for our market. We find other markets are taking them also.

MR. CLUM: Is there any difference between Irondequoit and Tip Top?

MR. HALLAUER: There is a very decided difference. The Irondequoit has more the appearance of the Surprise melon, only it is not netted, while the Tip Top is a different color.

MR. HOWELL: Tip Top is a lighter colored melon than many strains of Irondequoit or Surprise.

MR. HALLAUER: I never grew the Tip Top, but at Toledo the Tip Top was pointed out to me.

MR. WORK: What I had thought of was that perhaps as an organization we might have a place under those same lake shore conditions that are growing such fine melons, but away from the growers where seed could be tested and bred without crossing.

MR. WARREN: You have to have the proper soil. I think you can get good melons and get good seed and good netted melons on one place even though the other fellow has poor melons. I do not think they are liable to cross much.

QUESTION: What kind of soil do you grow those on?

MR. WARREN: Sandy loam mostly, and some sand.

Onion Sets.

MR. WORK: How about onoin sets? At Toledo I saw the sets of a grower who offers them to us. Yellow Strasburg, spring delivery, per bushel $2.10; White Portugal, $2.37 f. o. b. Toledo. They are a nice size. This firm is pretty careful about the grading.

(Eleven bushels were ordered).

MR. WORK: Are there any other vegetables wanted?

Lettuce.

MR. WORK: We have a figure of $1.35 on the Henderson strain of Big Boston. We have not been able as yet to get a much lower figure on that than is available to you.

MR. GREFFRATH: Our little association in South Lima has the same price. We have an additional discount of 15%. There is no reason why this Association should not get a better discount, but we must show that we use the seed in quantity.

MR. WORK: We can take some options at $1.35 with 15% off.

MR. LOCKE (Steuben County): I think you can buy lettuce as good for less money. I get seed from Ferry for $1.00.

MR. WORK: How many would care to order lettuce seed for the coming season at $1.15?

MR. GREFFRATH: It might be well to look up different sources if people prefer. At Fancher, for instance, Mr. Prettejohn swears by Vick.

A MEMBER: Some of the growers at Fulton found Vick's seed germinated much better than Henderson's. The crop was about the same.

A MEMBER: I had two acres of Vick's seed and everything was good.

A MEMBER: The fore part of last season Vick's seed did not seem to mature as well in the Fancher district as Henderson's.

QUESTION: I would like to ask if anyone has had experience with Black Seeded Big Boston?

MR. SCHWINGEL: It headed fairly well with me, nothing extra.

MR. WORK: We might take some orders for Henderson's seed at $1.15 or better, according to developments.

(Twelve pounds ordered).

Other Vegetables.

QUESTION: What is the earliest sweet corn you have?

MR. COLEMAN: Howling Mob is medium early, Break o' Day, and Early Dawn.

MR. WORK: Adams is generally recognized as about the earliest, but it is not a real sweet corn. How about White Cob Cory?

MR. COLEMAN: A great deal is grown in our section.

MR. WORK: That is not as early. How many would be interested in Evergreen sweet corn for 1915? Only two. How many are interested in a first early sweet corn? Six or eight. What about cucumbers? Eight or ten are interested. How many want White Spine? What others do you want?

A MEMBER: Davis Perfect.

MR. WORK: How many would want them of the pickler type? One interested. We have done some business here this afternoon. It looks as if we cannot do business by mail. If the Seed Service does not progress better than it has, we may not want to do much more with it.

MR. SPIESS (Orange County): Peter Henderson has two strains of Romaine lettuce.

MR. WORK: How many are interested? Two or three.

MR. HOWELL: Southport Globe onions.

MR. WORK: That is $1.57 for this year. How many would like to hear quotations on Southport? A good many.

MR. GREFFRATH: I do not believe you can get any grower to select out of this year's crop. Some of the growers are holding back their quotations for next spring's delivery.

MR. GREFFRATH: Seed that will test 90% or better this year will test 70, 75, or 80 next spring, but it depends upon how it is kept. I believe that with the option that I have on some seed, I will purchase my seed this fall for 1915 sowing, especially if onions keep going the way they do. I believe there are some men here who prefer to carry onion seed over a year. That is not my experience. The seed which I sowed five pounds to the acre this year I would have to sow six pounds next year.

Hothouse Cucumbers.

A MEMBER: Why does Mr. West ask $5.00 an ounce for his cucumber seed? I can buy it for $1.10 a pound in Syracuse from Mr. Bauder, a representative of the Monroe County Market Gardeners' Association.

MR. WARREN: We don't recommend anyone's seed. Mr. Gunnason has no right to say that it is Mr. West's seed through the Monroe County Market Gardeners' Association unless Mr. West has given it to him.

QUESTION: Do you think Mr. West has sold seed outside his immediate neighborhood?

MR. WARREN: I don't believe he would select it so it could be sold for $1.10.

A MEMBER: I can raise just as good cucumbers as West can raise for a dollar. Eighty dollars a pound is outrageous.

MR. WORK: As far as I know, Mr. West has not been selling his seed unless possibly in a very small way. There are lots of Irondequoit cucumbers. He has been breeding those, developing and selecting for a good many years. He has a type which he regards as exceptionally good. He has offered the result of his personal effort in developing the strain at $5.00 an ounce.

A MEMBER: I don't think you ought to have offered them in the name of the State Association at that price.

MR. WORK: Is it worth while for a man to buy an ounce of hothouse cucumbers at that price?

MR. WARREN: It certainly is. It is hard to get a very good strain.

MR. WORK: What do you think of West's strain?

MR. WARREN: I never saw anything better.

A MEMBER: I would be willing to pay a good price, but three cents apiece for a seed I would not stand for.

MR. BONNEY: I do not see what grievance this gentleman has. He is not obliged to buy the seed.

A MEMBER: It is not that. It is the injury to the Association.

MR. WORK: That seed of Mr. West's has not been available to people in general. It is now available to members of this Association. Mr. West is an exceedingly successful grower and has a splendid strain. Some seemed interested in getting the strain. Mr. West was willing to offer it at the price mentioned. When you are selling cucumber seed,

you are practically selling the strain, for any grower can save seed, after he has a start.

MR. GREFFRATH: I might say that I met Mr. West a short time ago just prior to having him fill this order. I asked him how much seed he had and whether they made a specialty of raising cucumber seed. He said: "No, we have not been in the habit of selling cucumber seed, but we did have a little more than we wanted, and I would not mind letting a little of it go. We are not trying to sell it."

MR. CLUM: Do I understand he is selling the Irondequoit melon seed?

MR. WORK: No, this is a cross between White Spine and one of the English forcing cucumbers—cylindrical, with the minimum of white markings, practically no shoulder, a very nice, uniform color—a splendid forcing cucumber, of what is known as the Irondequoit type.

MR. WARREN: It is very straight, with very few seconds.

MR. HUNTER: Doesn't that require a stronger heat than an ordinary White Spine? Mr. West grows them under a very strong heat. I tried them, not carrying the same temperature, and I could not do it.

MR. WARREN: In my opinion it is not necessary to have any more heat for an Irondequoit cucumber than for a White Spine. I have always thought the White Spine was a little better yielder than the Irondequoit or Abundance, as it is sometimes called.

MR. HALLAUER: I do not think it requires any more heat. It is all greenhouse-grown seed and is a cucumber that is grown especially for the greenhouse. I would be perfectly willing to pay Mr. West $5.00 an ounce for it if I needed any seed.

A MEMBER: The Irondequoit cucumber is salable mostly in the Buffalo and Rochester markets.

MR. WORK: We do not want to sell it to anyone who does not want that kind of cucumber.

MR. WORK: Miss Schlegel of East Aurora has been doing some work this last year with corn, and she has attained

some results that seem exceedingly satisfactory. She would like to state to you briefly just what she has done, and I am sure it will be a pleasure to hear from her.

A New Strain of Sweet Corn.

MISS SCHLEGEL: My farm is only one-half acre, but we have farmed there to our advantage for our own table. I began to work along certain lines. I was interested in tomatoes and finally in Bantam corn. But it has been just this one year. You can't get results in one year. Do you all know what fine corn Golden Bantam is? One fall I noticed that here and there were white kernels among corn I had retained for seed. I think I can trace that to some early Evergreen corn in the neighborhood. I separated out those little kernels and planted them. I kept the corn quite apart from any other contamination. That year it was quite satisfactory, and I have a picture which shows an ear of White Bantam and two ears of Yellow Bantam. Here and there on the Golden Bantam ears you can detect white kernels. I went along and planted again, and the next year I had pure, good White Bantam corn, and last year I planted only White Bantam in a certain patch. The White Bantam was so uniformly white that I believe I have got it pretty well established. I find there is one great seed firm that is quite interested in this white variety and wish to test it this coming year. This also shows another tendency, which first became apparent during this last season. I don't quite know how to account for it. You will see that that is quite a sizable ear for Bantam and has twelve rows. Bantam ordinarily has eight. I have six ears with ten rows. The twelve-row ear, curiously, has a few yellow kernels. The smaller ones are like Bantam. When I found an ear which promised to be a large one—good for seed, I tied a string around it. Finally, in the fall when they were allowed to go through one or two frosts, I picked them off. Just as I picked them, I photographed the ears.

My other line of experiment has been with tomatoes. I thought it might be interesting to have tomatoes with fewer seeds. I finally worked so that two years ago I had one that had no seeds at all. I photographed one that had six seeds.

In general, the tomatoes I had are those that have only little pockets of seed around the rind, and the inside is solid pulp. Another curious development. There were several plants for a number of years that we called the hearts, though we did not have any last year. They were rather small, heart-shaped, looking just like the section of a heart. There were two seed cavities only, the rest solid pulp. This tomato had a very good flavor.

BUSINESS SESSION.

MR. WORK: We have with us Mr. Kasting, who is president of the New York State Federation of Floral Clubs. He comes to speak of the bill appropriating funds for a teaching and investigational range of glass. This is one phase of the Association activities at Cornell, in which we ought to be working more closely with the florists.

Experimental Greenhouses For Cornell.

MR. KASTING (Erie County): I came to say a few words in regard to that bill. We had the same bill introduced again that we had last year. As you probably all know, it came out of the committee, went through the lower house, passed the Senate. The Governor failed to sign the bill, but he did so only under recommendation of the Efficiency Department. I want to impress upon your mind that I have always felt that the florists and vegetable growers were somewhat connected. Most of the florists used to grow vegetables in hotbeds. I am very much interested in vegetable work. I only want to make clear that we want the cooperation of the vegetable growers. Get after your Assemblyman or write to Governor Glynn. If it is put on as a rider in the big bill for the College, I do not care. We have been at it four years. This year we are in a peculiar position. The Assembly is Republican, the Senate is Democratic. All bills that start are put in the Ways and Means Committee. They have to come out of there before the House will act upon them. Mr. Clinton D. Horton, who is a very influential member, is personally interested. We have another good member who is

interested. I would like to have the vegetable growers help. You all know your Assemblyman. Tell him you need it. Write to the Governor you need it. That is the only way you can get things. I heard someone say the vegetable growers were not exactly pleased because the division was 60% and 40%. You realize that the florist's work is all under glass, at least very little outside glass. With vegetable growers you have more outside than inside growers. I would like to have the cooperation of the vegetable growers to help us along and get it. There are very few florists today that do not grow some vegetables. Some vegetable growers grow a few flowers, like chrysanthemums. The bill is simply this. We asked for an appropriation of $60,000 for the State College of Agriculture to build a range of glass houses to teach floriculture and vegetable culture under glass. I put the proviso in that two florists and one vegetable man should consult with the architect. We have three hundred forty-seven acres covered with glass in New York. I am a commercial florist, have been for eighteen years. I have worked up my business from forty thousand to one-quarter of a million this year. We must have facilities, and I believe the florists and the vegetable growers of the State of New York are entitled to this appropriation, so that the professors here can investigate diseases, give the ingredients of soil, etc. I ask you once more to help this bill along for the good of the state.

MR. GREFFRATH: I am very much pleased to hear Mr. Kasting make those remarks, and I feel that every vegetable man is in duty bound to give him a helping hand. I believe that as we go home, each one representing a local organization should insist that that body instruct their secretary to write encouraging and demanding the passing of this bill. We as vegetable growers are in duty bound to help those engaged in about the same lines as we are. The tables may turn. We might want them to help us, the same as we want the potato growers to help us. We all ought to be united for one grand purpose, and that is to investigate the causes of disease and to eradicate it. This covers some of the work the vegetable growers are interested in, the operation of

greenhouses. Many here have large sums invested in greenhouses.

MR. GREFFRATH: We are now ready to turn to our regular order of business. I am somewhat at sea in conducting this meeting. If I make any errors, I hope you will excuse me. The first thing in order will be the reports of the officers and standing committees. We have a letter from President White to be read by Mr. Work.

President's Address.

Buffalo, N. Y., Feb. 8, 1914.

To the New York State Vegetable Growers' Association:

It is with a very deep sense of disappointment that I write this brief communication instead of being present at the fourth annual meeting; but a combination of circumstances compelled me to feel that I can be of greater service to the greatest number by filling my engagements in the field, where I shall exert my influence during the week. Although I shall not be with you in person, I shall be with you in spirit, and you may rest assured that I shall continue to exert my best influence for the welfare of our Association. The field for its work and influence is large, and while it may seem at times its progress is slow and the membership does not increase as fast as it should, yet a review of what it has already accomplished cannot but convince us that it has fully justified the belief that there was a field rich in possibilities for achievements which are of great benefit to both the producers and the consumers of that most important product which we produce. Had we done no more, the fact that we have caused our industry to be recognized by the College of Agriculture, the State Department of Agriculture, similar organizations representing other horticultural branches, and the agricultural press, would justify the right of our beloved association to exist.

But we have only commenced. All along the line efforts are being made to bring about better marketing conditions for the products of the farm. The greatest question today

is not how to grow more, but to learn how to produce more cheaply and to so pack and market our products that we shall derive profits which shall be in keeping with the profits received by men who are engaged in other occupations. The people who are engaged in the production of the most necessary and healthful of foods are the peers of any class. The times and conditions demand that we as an organization should stand shoulder to shoulder and press forward hand in hand with other similar organizations to place agriculture in its rightful position as the foremost and most respectable occupation of man.

While I do not wish to, in any way, discourage the ambitions of those engaged in any branch of vegetable production, I do feel that before we divide our ranks by the formation of independent associations, we should consider well what the ultimate result will be. All branches of the occupation have many interests in common. Are there any important questions which have presented themselves for solution that are not in the broadest sense common to all branches of our industry? If not, why form independent associations? If so, are they of sufficient importance to justify the creation of a separate body? Have not the divisions and subdivisions of the agricultural industries been carried far enough? I believe the heads of all institutions which are engaged in agricultural development agree that it should be carried no farther. Is their judgment not worth having?

If our association is not broad enough, let us make it broader. The world is not demanding narrow men and institutions. The demands and needs of the time are for broader men and broader institutions. Can we not then clasp hands and unite in a greater effort to place the entire industry in the foremost ranks of agricultural pursuits?

Let the spirit which shall emanate from our Association be so broad and full of promise that no branch of the industry shall feel that theirs is in any sense subsidiary.

Hoping that the sessions will all afford the greatest amount of benefit and enjoyment for all, and wishing those

who shall be chosen to carry on the work for the coming year Godspeed, I am

Most sincerely,

C. R. WHITE, President.

MR. GREFFRATH: Our next business will be the report of the executive committee.

MR. WORK: Your executive committee met last night and took certain actions. One of these has to do with the work of the Federation Council. These are things that we want to discuss all together. I wonder if we had not better hear from the Committee on Federation first.

MR. GREFFRATH: We will hear from the Committee on Federation.

Report of Committee On Federation.

Your committee on Federation respectfully submits its first annual report. There are undoubtedly great possibilities in this field for work. I have been a firm believer in the good that might be accomplished by this Council.

Its object is to connect local organizations either large or small, over the State, with this Association, and to promote the formation of such local organizations and secure the affiliation of these existing organizations with this Association.

The official representatives of local organizations together with the Executive Committee are to constitute the Federation Council of this Association. Any local or district organization representing vegetable growers may become affiliated with this Association by the appointment of an official representative and the payment of an annual fee of five dollars.

In regard to the work done by this Committee the past year, I find that some of the local organizations are not so well organized as they should be. I have written the secretaries of some twelve or fourteen organizations within the state, and have pointed out the benefits that might be derived from this Council. I have received replies from many of them. Some two or three have affiliated, which is a rather

small beginning. However, I feel that many are interested in this work, and that in time we shall have representation in this Council from all quarters of the State. In our meeting yesterday, many growers representing local organizations expressed themselves, and much interest was shown in this branch of the work. Another year I believe we shall have a much larger representation, the idea being new to many. I find there is some lack of interest and of a cooperative spirit at the present time among some of the local organizations, which is undoubtedly due to their not being supported by an active membership.

The success of cooperative movements in any section in any line should be constantly held before the members, unless the Association is working unusually well. The greatest difficulty in the way is the fact that many members of local organizations have not acquired the cooperative way of thinking, and for this reason a constant educational campaign should be made to keep the growers interested and let them see the advantages. Your Committee recommends that the members of local organizations improve the opportunity under the plan of cooperation between the local organizations, our Association and the Extension Department of this College, to secure speakers on cooperation. Under this plan, I think the weaker associations of this State can be built up. I believe that all members of local organizations can help in many ways, and I would suggest that they talk cooperation among their members and become actively interested in helping to build up their associations. Most of us are accustomed to the competitive system and have not the training in pulling together. Many of the growers think they lose their independence by joining an association, when it really is the only means of making them independent. For an association to be successful in its undertaking, there must be a good working plan, and as soon as sufficient members can be secured, they should incorporate and have some working capital. This will enable them to employ a manager, who, by his activity, should greatly further the interest of his association. If such an organization should be prosperous, and I certainly believe it would, its influence would grow and the growers

in the surrounding country would want to join, so evidently the membership would be increased. I am greatly in favor of associations controlling the entire output from a section. This will place them in better position to deal with the buyer, and the large buyer will be attracted, if the association has a reputation for its brand, and for this reason all members will receive better prices. Also the growers, having seen the benefit, will give better general support, and the business will grow. There are undoubtedly many ways of building up such organizations, but as I have said before, activity is what is needed, and I hope the growers, who are members of this organization will get together and work for cooperation in their locality. If you have not the right plan, reorganize. Get a few live men interested. Start in a small way, and when once the start is made, stick to it and you will win. Have your association affiliate, so as to have your representative meet with us another year, and let us know the needs of your association; for we can all point out ways where we can be useful to each other. The exchange of ideas and experiences can be compared to the mutual advantage of all. Why not buy all of our fertilizer through one large manufacturer and save a barrel of money? Why not buy our crates and spraying material the same way? Could we not devise some plan of keeping in closer touch with one another in regard to marketing our fruit and produce, and not glut first one market and then another? In fact, there are a great many things that we can accomplish, but first let's get together, and then pull together, and by so doing we shall better conditions for everybody. This is the kind of cooperation that counts.

S. J. Cook, Chairman.

Mr. Cook: I wish to say that I took up this work rather late in the season. Mr. Work furnished the names of several of the New York organizations, and I wrote, requesting that they affiliate with this state organization if they could see their way clear to do so. I received reply from two or three of the local organizations. There seemed to be at this time just a little lack of interest. We had in mind to do this: By having each local organization affiliate with the state organi-

zation, one accredited member would be elected from each affiliating organization who would be entitled to a seat in the Federation Council. This Council was intended as a sort of clearing-house for ideas and activities in association management. I have at least made a small effort in this direction. I would recommend that the work be continued. I think perhaps some of the local organizations did not have really time to take the matter into consideration. I recommend that this work be continued. We have not any too much encouragement, but it takes time. We decided to hold a meeting of this Federation Council immediately after the banquet tonight. I would recommend that this Federation Council be continued to further the interests of this work. I think it is a work that will be very beneficial to this organization as well as to local organizations. It will mean the bringing together of the state organizations in such a way as to gain greater knowledge of the work.

MR. GREFFRATH: It has been suggested by Mr. Cook that this committee be continued. (Moved and carried). We will now hear from the Executive Committee.

Plan For Affiliation of Local Societies.

MR. WORK: Very early in the movement for a State Association, the question of relations with local societies arose. From the beginning, it has been felt that these organizations should be encouraged and assisted in every possible way. It is felt that a scheme of affiliation should be worked out in such a way that the local groups can be part and parcel of the state body. However, no one has seemed to know just how to establish such a relation. It has been very difficult to work out a definite means for making the wish effective. At every meeting the question has been considered, and your Executive Committee has given it close attention. The problem is to devise a scheme which will aid the local groups and be attractive to them, at the same time encouraging the development of real strength in the state body. We all realize that the united force and the enthusiasm and the dissemination of useful information are most valuable, but they are all

more or less abstract and indefinite, and so a little difficult for the rank and file to see. The following plan has been gradually developed in the minds of your Committee and is offered in the hope that it may at least partially solve the problem:

1. That all organizations which affiliate pay a fee of five dollars. 2. Each organization is to receive one copy of the Report of the Association; is to receive a cut of the seal of the Association for stationery (we have designs in hand now). 3. That these organizations are to enjoy representation on the Federation Council. As soon as the constitution can be changed, these organizations are to pay five dollars plus ten cents per member for every member over fifty. The small organizations then would pay straight five dollars, the large organizations, like some that we have, would be asked to pay ten cents per member for their membership over fifty. They would receive in addition to the privileges mentioned above the privilege of full individual membership, with everything that that means in the way of Seed Service, in the way of publication service, in receiving individual copies of the Report, and so on, at $1.50 instead of $2.00. That action was approved by the Executive Committee, and has their recommendation. It would make full membership in the Association available to members of the local organizations at $1.50 instead of $2.00. Let us have your views on that proposition.

MR. GREFFRATH: Is this matter clear? This reduction to $1.50 embraces all affiliated members, even below fifty.

MR. WORK: Every member of an affiliated organization would have the privilege of membership at $1.50 instead of $2.00.

A MEMBER: I would like to inquire how that is going to affect membership outside of the local associations? How are you going to appeal to the man who does not belong to the organization at $2.00?

MR. GREFFRATH: Tell him to get together with others and make an organization.

MR. WORK: Have you any further ideas on the question? The point raised is this: If membership in the State Association is available to members of affiliated local organizations at $1.50, that $2.00 membership will not appeal to people who are out of reach of the local organizations.

Is Such the Case?

A MEMBER: I pay my dues to the local organization as well as the $1.50, and he pays $2.00 for membership in the State Association alone.

MR. WARFORD: Why is that working any injustice to the individual? I belong to a local organization, and if our organization should affiliate, I understand that I might pay this organization $1.50 because I have the benefit of that organization. If I should happen to move away, I would consider this New York State organization was standing by me, and I certainly ought to be willing to pay the extra fifty cents.

MR. GREFFRATH: We talked this matter back and forth last night, and we decided that that would be one of the first things. If a man was affiliated with a local organization, he would not stand in the way of putting on that extra forty cents. I believe that $1.50 to members belonging to affiliated local organizations is perfectly proper and not unjust in any way.

MR. BONNEY (Genesee County): Another point that was not brought out regarding a situation which we are facing. While we have been able to get a few of these local organizations to affiliate with us, we are not getting a large membership in the state organization. When a local group pays us five dollars and becomes represented in this state organization, the rest of the members say: "Well, I am represented in the state organization, and there is no reason for me to join." To make an inducement for the members to come in individually, we have lowered the price, hoping to enlist a larger number of members.

MR. HAY: I would like to know somewhat of the benefits that are to be derived from this Federation Council, what their powers and their duties are.

MR. GREFFRATH: We are to discuss that at a conference tonight after the banquet. There are many ways that we can broaden out. It has been suggested that if anything comes up that is injurious to any local organization, instead of calling the whole number of members of the New York State Vegetable Growers' Association together or letting the thing hang over, we can call together the Council, and bring the matter before them to decide whether the state society will take action as a body. There are many cases when it would be beneficial if, instead of bringing the whole body together, each organization have just one man to represent it. If there is nothing further to be said, are you ready to act on this? If so, a motion would be in order to adopt this suggestion of the Executive Committee.

MR. DRYER: I move the adoption of the report. (Seconded by Mr. Gesell. Carried unanimously).

MR. WORK: To bring this into effect, we must have a change in our constitution. As our constitution stands, we must take action on it at this annual meeting and then take action at the next annual meeting and so make the change. It was suggested last night that, instead of requiring a whole year to change the constitution, we might substitute a scheme by which we could have all our members informed of a possible change and yet do it in shorter time.

The Executive Committee would recommend that amendment be made to Article VIII, which has to do with federation and reads thus:

"Any local or district organization representing vegetable growers may become affiliated with this Association by the appointment of an official representative, and the payment of an annual fee of five dollars. It shall be the duty of the Committee on Federation to promote the formation of such local organizations, and secure the affiliation of these and existing organizations, with the State Association."

We would change that to read thus:

"Any local or district organization representing vegetable growers may become affiliated with this Association by the appointment of an official representative and the payment of an annual fee of five dollars plus ten cents per member for all membership in excess of fifty. It shall be the duty of the Committee on Federation to promote the formation of such local organizations, and secure the affiliation of these and existing organizations, with the State Association."

Action on this change would be taken this year, and again next year, and then it will go into effect. As I understand it, a motion is now in order to amend the constitution as recommended. Then I will present to you a plan by which the constitution can be more readily amended in the future.

MR. WARREN: I wonder why it would not be better to assess each organization so much per member. I wonder if it would not keep the larger organizations of the state out of the affiliation. If you have two hundred members, the fee will be $20.00.

MR. HAY: Would it not be liable to cost your large organizations more than $20.00 if they had a per capita tax?

MR. GREFFRATH: Some organizations have only fifteen or twenty.

MR. WARREN: We have an association of 150 or 175 members at Irondequoit. We do not need to join if we don't want to. Some members may say we might as well save our twenty dollars.

MR. BONNEY: I think the Irondequoit association is larger minded than that.

MR. WARFORD: We have an organization of 27. Five dollars seems to even up. I move the amendment be adopted. (Seconded by Mr. Warren. Carried unanimously).

MR. COOK (Chautauqua County): I was just thinking how that would hit the South Shore, but I feel confident in saying that our organization will never buck against that. We had some talk about it. Mr. Cockburn says: "That is some money, isn't it?" I believe if it works out that way it

will be very good. Our Board of Directors seem to be perfectly willing to stand that ten cents per capita tax.

MR. WORK: We have to make the change now in Article III, which has to do with membership. It reads:

"Sec. 1. Membership shall be of two kinds, active and sustaining.

"Sec. 2. All vegetable growers are eligible to active membership.

"Sec. 3. Fees—active membership, two dollars per annum; sustaining membership, one hundred dollars."

Sec. 3 is to be amended as follows:

"Sec. 3. Fees—active membership, two dollars per annum; to members of affiliated local associations, one dollar and fifty cents; sustaining membership, one hundred dollars."

QUESTION: That applies to one year after another?

MR. GREFFRATH: No change this year, but it will apply in 1915 and thereafter.

MR. GREFFRATH: A motion for the adoption of this amendment is in order.

MR. HALLAUER: I move its adoption. (Seconded by Mr. Coleman. Carried unanimously).

MR. WORK: The last amendment that we need is intended to make it easier to amend the constitution as far as time is concerned, but no easier as far as notification of members is concerned. Article IX reads as follows:

"Art. IX. This constitution may be amended by a majority vote at any annual meeting, provided such amendment shall have been presented in writing at the last preceding annual meeting."

The present scheme provides that everyone that is here and everyone that is at the meeting next year shall know about it.

The proposed amendment would make the article read thus:

"Art. IX. This constitution may be amended by (1) petition of ten members or action of the Executive Committee; (2) submission to members in writing thirty days before the

annual meeting; (3) majority vote of annual meeting in person or by duly authenticated ballot."

MR. DRYER (Oswego County): Do you propose to change the constitution so as to be able to change it easily?

MR. WORK: It will be more flexible as regards time, but not as regards number of members. Six weeks are needed, but every member will be informed in writing of the proposition.

MR. DRYER: I feel that with a change in the constitution we should be careful.

MR. WARFORD: I move the adoption of this amendment. (Seconded by Mr. Dryer. Carried unanimously).

MR. GREFFRATH: It has been suggested that we proceed with the election of officers.

MR. BONNEY: Your Nominating Committee took into consideration the remarks of our President last year who has served us for three years, and while we feel that we would like to retain Mr. White in office, he said last year that he positively would not serve again, and we feel that he ought to be relieved from this duty. In looking around to find a man, we felt that the man who stood next to Mr. White officially was the man to naturally follow, because he is the best qualified man in this state to fill the position. We suggest the nomination of Mr. Henry Greffrath of South Lima.

MR. GREFFRATH: I am devoting about as much time as I possibly could to the seed business. There are men here who are better qualified, regardless of whether I had the office of Vice-president this year or not, to fill this office than I am.

MR. BONNEY: I would suggest that the Secretary put this question.

MR. WORK: We have heard the report of the Nominating Committee regarding the office of president. Do I hear a motion?

MR. DRYER: I move the report be accepted as presented.

MR. WARREN: I move the Secretary be instructed to cast a ballot for Mr. Henry Greffrath.

The first motion was seconded and carried unanimously.

MR. BONNEY: As Vice-president for the Association we recommend Mr. S. J. Cook.

MR. GESELL (Livingston County): I move the acceptance of this recommendation. (Seconded by Mr. Dryer. Carried unanimously).

MR. BONNEY: I wish we had Mr. Tuttle to nominate the next person, the gentleman to fill the office of Secretary. I cannot do the subject justice, but he is a live wire, and I would nominate Mr. Paul Work.

MR. COLEMAN: I move the acceptance of this recommendation. (Seconded by Mr. Schwingel. Carried unanimously).

MR. BONNEY: In selecting nominations for the various offices, your committee tried as far as possible to select men, their qualifications being equal, in different sections of the state; but as it is our annual custom to meet in this place, we are better acquainted with men in the western part of the state. We know we have splendid material in the central and eastern part of the state. We would nominate for Treasurer the present incumbent, C. H. Aldrich of Long Island.

MR. WARFORD: I move the acceptance of the recommendation. (Seconded. Carried unanimously).

MR. DRYER: As to the Executive Committee, the committee put Mr. Bonney at the bottom of the list to let him work up again. (Acceptance of recommendation moved and carried unanimously).

(The Business Session was adjourned at 5:45 till the next afternoon at 4:30).

THURSDAY AFTERNOON, 4:30.

Treasurer's Report.

PRESIDENT GREFFRATH: The first thing we shall do today is to take up the report of the Treasurer. Mr. Work has received the Treasurer's book, and I think he can give us some information on it.

MR. WORK: Unless there is special demand for it, I shall not undertake to read the report in full. Besides the balance which the book shows, $53.00, we have about $80.00 not recorded for advertising and memberships. Then 34 new members have joined during the meeting and there have been 25 renewals. The book is in condition for an audit up to January 30.

PRESIDENT GREFFRATH: You have heard the Treasurer's report as given by Mr. Work. (Motion to accept the report was carried unanimously).

MR. WORK: It might be to the interest of the society to make this audit pretty thorough. We could have a formal report made to be embodied in the Report.

PRESIDENT GREFFRATH: I appoint Mr. Work chairman, Mr. Schuknecht, and Mr. Stasch to audit the Treasurer's report.

Place of Meeting.

The next thing to come up is the place where we shall have our next annual meeting. Is there any other place besides here?

MR. HAY: It would probably be impossible to hold a good meeting anywhere else except here.

MR. WORK: We have cordial invitations from Syracuse and New York City.

MR. BONNEY: I feel as though our meeting here ensures us a good attendance. It seems to me for the present at least that our annual meetings should be held here. Farmers from all over the state, as well as vegetable men, come here at this week. They will attend the meeting. If we should appoint an annual meeting in Syracuse or on Long Island, I do not think we would have a corporal's guard at the present stage of our organization.

MR. COOK: Mr. Bonney expresses my opinion on that point. I would favor continuing our annual meeting here for the very reason that he has stated. We are in a better position to enlarge our membership here than any other place I know of in the country. Just a few of the old members

would go to a meeting elsewhere. I do not think any would go to New York City to join our organization.

MR. HALLAUER: I feel the same as Mr. Bonney and Mr. Cook.

PRESIDENT GREFFRATH: I had a line from the Chamber of Commerce of Syracuse and made a reply to this effect: While I thanked them for the kind invitation and while I personally, so far as convenience was concerned, would sooner see the meeting at Syracuse, yet I did not think it was possible for them at the present time to offer the inducements that are offered here. A motion is in order.

A MEMBER: I move that we have our next annual meeting at this place during Farmers' Week. (Seconded. Carried unanimously).

Local Meetings of the State Association.

PRESIDENT GREFFRATH: Is it the wish of the Association to have some other meetings at different places through the season, and would those meetings be attended? I believe there is a feeling among some of the growers that the meetings are all held in one place and that it is for one particular part. I know I would like to have a meeting down near Rochester.

MR. HALLAUER: Would it be a good plan to have a meeting during one of the days of fair week in Syracuse?

MR. BONNEY: I think that point was brought up in one of the Executive Committee meetings, and it seemed to be the general sense of those present that during fair week there is so much to attract the attention, we could hardly get the members together.

MR. HALLAUER: It seems to me that if we had the mid-season meeting during the month of July or August, it would be much better. I know a great many from our locality have not been able to attend the State Fair, because it comes at a time when it is impossible for us to get away.

MR. BONNEY: The fruit growers have their regular meeting in Rochester, and still they have another meeting down

on the Hudson. It is a question in my mind whether it would not be a good thing for a portion of our organization to go down and see the Irondequoit people work at a time when they are busy. The question is, would it not bring us closer together to go to Long Island, Syracuse, Utica, Rochester, South Shore?

PRESIDENT GREFFRATH: Speaking of these midseason meetings, why would it not be good to have several of these, to have a vegetable gardeners' meeting in such places as Irondequoit, where the business is carried on very extensively? Then, for all those members who are interested in that particular line of work, it would be very interesting to go there if it was carried on in an educational line. I would like to attend the meeting with some man who is engaged in growing muck crops in some other section. We get new ideas.

MR. COOK: I think that would be quite a good scheme

MR. BONNEY: The trouble is, when those fellows are busy, we are busy. Could we get enough out? Is there really enough interest in this organization for men to give up their work for a day or two and attend such a meeting?

PRESIDENT GREFFRATH: If you knew that you were going to some place where a man was interested in growing the same crops you were, that there were men there that were posted on diseases that attacked a certain crop, would you not attend?

MR. BONNEY: I certainly would. I think this, too. As soon as we have offered the invitation to the potato men to come into this organization or affiliate with us, it might have a mighty good effect to go down and see those people, for instance, on Long Island.

MR. HAY: Your idea was, for example, to have the greenhouse men have a meeting by themselves and the muck men by themselves?

PRESIDENT GREFFRATH: That would be my idea, because a greenhouse man would not be particularly interested to come to the muck man's place.

MR. HALLAUER: I would suggest that we have two summer meetings during the coming season, the time and place of those meetings to be left to the Executive Committee to decide, the members to be notified by mail. It may be you would want one meeting to interest the greenhouse and garden people, another to interest the muck people, yet it would be a general invitation to all.

PRESIDENT GREFFRATH: I really believe it would create a feeling that would be beneficial to the Association.

MR. HALLAUER: I would make a motion that we have two meetings appointed the coming summer. (Seconded).

MR. WARREN: Would that mean a whole day's session? Would there be just a short meeting and then a visit to the gardens?

PRESIDENT GREFFRATH: It would be a sort of educational meeting.

MR. WARREN: If the Executive Committee wished to come in our section, would they come to Rochester or would they come to Irondequoit? We have a good big place, but what we want to know is whether they are coming there to look around or not, so we could be prepared to take them around?

PRESIDENT GREFFRATH: Knowing what I do of Irondequoit, I do not think they would have to walk a great deal.

MR. HAY: They certainly took good care of us when the national association meeting was held in Rochester.

MR. WORK: Before that motion is put, I would say there is another thing some of us have been talking about. I have been thinking about it a couple of weeks and have placed it before a number of men, including the Executive Committee. The thought was that, before the feeling of this meeting is entirely cold, we might hold a series of meetings in other places, that we might organize a team that would give as good a one-day program as we have a three-day program here. If the local people wanted it and were willing to support it, we could start in at Long Island and go to Troy, Syracuse, Rochester, Buffalo or Dunkirk, and hold five meetings suc-

cessively. Or if that were too big an undertaking, that could be reduced to three. Such an arrangement would make the expenses a great deal less. One set of expenses would take care of the three days. I would like to hear it discussed.

MR. BONNEY: There are quite a number of growers on Long Island that personally I did not know about, and I think perhaps most of us do not. They are engaged in a line of work which would interest greenhouse men in a way, cold frame work. I understand there are several hundred of those men who are doing splendid work down there. They are isolated and have no organization. Are they not entitled to know what we are doing and to get in touch with us? It was brought to me that possibly those men, if we had something definite to offer them, might come in.

MR. COOK: As I came into the room, I was talking with Mr. Pickell in regard to what the Farm Bureau might do for this organization. I have been talking also with Mr. Rogers. We thought it was just possible that we might be able to interest some of these Farm Bureau men to talk cooperation for us. Mr. Rogers, I think, has helped our organization in Chautauqua County. We might be able to do that, and after we had a representation of so many men in such a locality that wished to form a cooperative organization, it would seem that it would be a good idea then to have a meeting there. Say take two speakers, Mr. Work and some other good man, get this body of men together, and talk cooperation to them to see if they were not willing to form a local organization which would affiliate with the state organization. It seems as if we could get to a number of the smaller towns. We are getting fine results in the South Shore by having members in the small towns. I believe if we can get this started in the right way, they will come themselves. The growers will have to do some work themselves. It would be splendid if the men here today would go home and get twenty together, get the speakers there, form an organization, and affiliate.

MR. WORK: I would say we are doing pretty nearly that thing through our office, corresponding with localities and men we think would be interested. We have available one

hundred dollars for paying the per diem of men who can go to these meetings. We have had two difficulties. One is to get the local organizations to call for it. On the other hand, we have had some difficulty in getting speakers. I think we are getting to the point where we can solve the speaker question. We can send one or two men to meetings anywhere at practically any time. We can get state men like Fippin and Myers at any time by paying half their expenses. We have tried to arrange speakers in circuits. We feel that for a man to give his time and his work is asking a good deal of him. With the institute work, the men get five dollars a day and up. Should we try this series of what we might call team meetings in addition to what we have been doing?

MR. WORK: We should pay the per diem and the local association pay the expenses.

PRESIDENT GREFFRATH: It has been moved and seconded that this Association hold two meetings during the summer. (Carried unanimously).

MR. WARFORD: It seems to me as though that was really a good policy. In our section the Farmers' Institutes have not given the satisfaction they otherwise could, because it has been all "cow." It seems as if, were a team sent out from this organization, it would meet the demand of a farmers' institute for specialties in the vegetable business. I believe it would bear results.

MR. BONNEY: Would it not be a good idea for our Secretary to write to organizations and ask if they would care for such a thing?

PRESIDENT GREFFRATH: As I understand it, I think that part of it could be taken care of all right. What we want to settle is what part of the expenses should the local organizations pay?

MR. COOK: I think as we have the one hundred dollars, it would be well to use it for that purpose and let each organization pay the speakers' expenses. My idea would be to get a goodly number of men interested in the state organization, and becoming members, they would be more interested in the affiliation of their local organization with the state association.

PRESIDENT GREFFRATH: There is no need of taking action on that.

MR. WORK: Suppose we find these local places want meetings of one day with a team of say three men. Is it feasible for us to put through a deal of that sort? Is it desirable if it is feasible?

PRESIDENT GREFFRATH: I do not think at the present time I would encourage that. We have not the funds, have we?

MR. WORK: I think we could get help on that. That would have to be looked into, and we should get quite a good many members.

Annual Report.

PRESIDENT GREFFRATH: The next thing is the printing of the Report. It was taken up by the Executive Committee. The question was, should we try to cut down expenses by not printing the Report? The majority of the Executive Committee thought favorably of it. One inducement that has been held out to many new members is that they would receive a copy of the Report. Would it be good policy to cut it out for this year? Members are looking for the Report.

MR. WARREN: I for one think it would be a very unwise move to cut out the Report. We have adopted in our meeting yesterday an amendment to our constitution, saying that we would charge five dollars for each association and ten cents per member for all those having a membership above fifty to unite with this Association. Using our Monroe County Association as an example, we have four members here. We have a membership of one hundred seventy-five. If we expect to get many members from our Association, they want to know what we are doing here as a State Association. If we cannot show them by our Reports what we are doing, I believe they are going to hesitate to vote to unite with the Association. There are very few associations of this sort that do not print a report. The people who stay at home look for a full report afterwards. Those men will sit down and read a report of that kind. Then they can make up their minds whether they want to affiliate with the State Association or not.

A MEMBER: Mr. Hay handed in my name as a member a short time ago. That Report came to me. I sat down and read it, and I said: "Well, I have my two dollars worth." I have been encouraging members of our local association to join, telling them what they could get.

A MEMBER: If they print this book, this will be mailed just to the associations that affiliate the same as ours. Why not put a little fee on if they want any extra?

PRESIDENT GREFFRATH: We amended our constitution to read that each affiliated association is to receive one copy and that every state member from the affiliated association is to receive a copy. I do not see how it is possible for us to cut it out. I do not see any need of taking action. What about periodicals? Is it widely known that members can subscribe to *Market Growers' Journal* at half price? The bulletins, you all know, are available to members. Is there anything else that we want to take up at this time?

MR. BONNEY: I know as a member of the Executive Committee that we would like to have suggestions. If you men coming from different parts of the state realize the needs of your particular section, I wish you would express yourselves as to work the organization should take up.

Experimental Work Needed.

MR. HALLAUER: I think the people here know pretty well what Mr. Warren and myself want. We want experimental work along the line of greenhouses. I am also interested in muck. I think the majority of people in our locality are more interested in greenhouses and general vegetables.

MR. WARREN: I do not think this State Association, as far as finances are concerned, has any way of aiding us materially in that way, but we are to have some help from the Farm Bureau and the University of Rochester; and I believe this University, through the New York State Vegetable Growers' Association, will have an opportunity to try to furnish a man that will be capable of coming into our locality, amid the gardeners in Monroe County, to do experimental work right on the ground. The University of Rochester has offered to

pay the expenses of an expert for either one year or two years to come to the gardening sections and study the different diseases that are now troubling the market gardeners, and we are going to take advantage of that opportunity. All we have to do is to advise him as to what conditions and diseases are troubling us. I think that, through the New York State Vegetable Growers' Association, they will be asked to suggest a man from Cornell who will be able to fill the bill.

PRESIDENT GREFFRATH: At South Lima we are very much interested in the control or prevention of blight on onions. I know there are other sections that are much interested in that. We are also interested in trying to understand a new disease that attacks our celery, causing the plant to die off after the roots are nicely started, the plant later taking new life as the rains come. Some specialist will have to take that work up.

MR. WARREN: Have you no Farm Bureau representative in your county?

PRESIDENT GREFFRATH: I am not positive as to that.

MR. WARREN: If you are not in such a county, I believe that you can be included, and the Farm Bureau is doing just that kind of work. The money has been appropriated from Washington to study the different diseases on the farms. If that is the case, we can get quite a little help from the Farm Bureau. As Mr. Cook has suggested, I believe it is a wise policy to try to get the Farm Bureaus to affiliate with the New York State Vegetable Growers' Association.

MR. WORK: I am not thoroughly familiar with the Farm Bureau situation. There are certainly possibilities in it. The Farm Bureau idea has undoubtedly demonstrated its usefulness in doing in each section the thing that is needed. Our feeling here at Cornell is not one of antagonism to other agencies that are aiding agricultural progress. We are vitally interested in real agricultural progress, no matter what may be the source of the movement. We want it to be effected as efficiently as possible for the people of the whole state.

MR. HAY: There is one disease of lettuce prevalent practically throughout the state that I think none of us have been

able to find any remedy for, and I believe something will have to be done in this regard by the state authorities. That is the rot on the underside of head lettuce.

MR. WORK: Mr. Jagger has been working on that.

PRESIDENT GREFFRATH: Mr. Jagger told me last fall what the disease was, but up to the present time they have discovered no remedy. He thought that was the same disease that was attacking our celery.

Committee Work.

MR. WORK: Is there anything to be said about committee work? When this Association was organized, a great deal of the work was done from the office. Quite a little of the committee work was initiated in that way, and the men who are in those committees did the things that were suggested to them. In the case of two committees, we have the initiative coming from other points. In the Federation Committee Mr. Cook has been very active; and in the Seed Committee, Mr. Greffrath is helping powerfully. He is making suggestions and taking the lead. We ought to have the same situation in other directions.

There is one thing that has not been mentioned this whole meeting, the question of weights and measures. Our Legislation Committee has done mighty little. We ought to have one man on that committee in Troy, Albany, or Schenectady, where he can keep in touch with what is going on at the Capitol. In the case of the experimental committee, that man ought from his own initiative to get in touch with the members. The members ought to be willing to write to him telling what problems ought to be investigated. He ought to sift those problems, and the State Association should put its weight behind him. Our committees ought to be served by their chairmen.

MR. BONNEY: I think Mr. Work has struck a vital point with us. That is just where the secret of our success in this organization is going to lie. We cannot as a body accomplish these things.

MR. COOK: As stated in my report yesterday, I think the Federation Committee is needed, because the Federation Committee is certainly able to do a large amount of work for the good of this organization. I will continue to work on this committee if you want me to. Whatever I go into I go at with the idea of doing something.

A MEMBER: I wish we could have a little longer sessions. The fertilizer session lasted over the hour because we got into the game after the speaker got through with his game. He should have time to develop the subject, and then we should have time to discuss it.

MR. BONNEY: I realize this fact, that during Farmers' Week every moment is occupied and every room is occupied. If we could have a meeting of muck land growers exclusively. if we could have a meeting of greenhouse men exclusively, or truckers, every man would be interested intensely.

PRESIDENT GREFFRATH: I believe it is a good suggestion. I believe it would be well if our program were planned according to this another year.

MR. WORK: Do you all believe in that longer period idea?

MR. HALLAUER: I do not think any of our sessions have been carried on long enough for discussion. I think the discussions are sometimes more educational than the address.

MR. BONNEY: Limit the speaker to fifteen minutes.

A MEMBER: I would not advise that. They ought to have half an hour.

PRESIDENT GREFFRATH: I think at present the only way is to limit the speakers.

MR. PICKELL: I believe two-hour sessions could be worked to advantage.

MR. BONNEY: You had better have them short and snappy and quit before you get through than to have them drawn out. If you separate them, that will do away with a deal of trouble.

(A motion to adjourn was carried unanimously).

WEDNESDAY EVENING.

AT THE BANQUET.

MR. FULLERTON: It gives me great pleasure to introduce one of the rarest things on earth, a man that really knows what he is talking about. I love professors. My dearest friends are professors. I do not think there are any in our family at all, but as I have got in this game I have found more professors than there are market gardeners. I have read more books than I have met market gardeners. It is very rare that you get an after dinner speaker or a great speaker, a noted speaker, that knows anything whatever about the subject on which he speaks. Nearly all of them prime up either on a United States bulletin or one from the College, or go down to the Astor Library in New York and get all the data; but Dean Watts was formerly merely just a plain every day cabbage grower. When a man has grown cabbages enough to support a wife and children, well, he knows something about cabbages. He knows about cabbages, he has raised quite a number of professors, and he has elevated himself from a professor to a dean of the agricultural college of the biggest state in the United States outside of Texas. Dean Watts of Pennsylvania State College, who will speak to us on "Professors and Cabbages." He knows about them both.

PROFESSORS AND CABBAGES.

R. L. WATTS, State College, Pennsylvania.

I congratulate the vegetable growers of New York on the success of this Association, and in assembling such a large body of men and women at the annual banquet of the members. I wish that Pennsylvania were as far along in the organization of our vegetable work as your state, but we have made a start and we expect to make splendid progress during the next few years.

The subject which appears on the menu is quite different from the one on which I was asked to speak, but I have been thinking, since looking over the program, that professors and cabbages are similar in that both are sometimes hard drinkers and both become "busted" occasionally.

(Mr. Fullerton: Sometimes they go to seed).

There is nothing like having a toastmaster that can help you out.

I was told a story a few days ago about a ship that was sailing southward from New York. After it was out from port some distance, a woman came to the captain and said: "Captain, as we approach the equator, I wish you would call my attention to it. I have never been down that far and I hope you will point it out because I am very anxious to see it." She was nervous about the matter and appeared frequently before the captain to repeat her request. Finally the captain, becoming weary of the annoyance, said: "Now, lady, if you will take this glass—it is just about time to see the equator." So the lady took the glass, placed it before her eyes, and the red-headed captain quickly pulled a hair from his head and held it before the lens. "Yes," said the lady, "I see it, and there is a camel walking over it."

This idea of growing vegetables and developing strong vegetable departments in our agricultural colleges is a splendid movement and deserves the support of the vegetable growers of every state in the Union. It is not an imaginary matter, for real departments actually exist. I want to speak tonight on the relations between the grower and the college. I shall discuss this matter, not from the standpoint of New York, nor from the standpoint of Pennsylvania, but from the standpoint of every state in the Union which is endeavoring to develop the vegetable interests.

What is the duty of the college? What is the duty of the vegetable grower? As I understand it, the duty of the college is threefold. In the first place, the duty of the college is to give such courses in vegetable gardening as the sons and daughters of the state need. This means that we must have short courses in vegetable gardening, so that the boy or girl who cannot afford to go to college for two, three or four years can get a good course in a few months. We must have courses which will enable our sons and daughters to go to college for one or two years and then return to the farm. These students should be at least eighteen years of age be-

fore entering college, and the courses should be for the accommodation of young men and young women who have not had the opportunity to prepare for college.

Then, too, it is the duty of the college to provide four-year courses for young men who want to locate on the farm and grow vegetables or who want to prepare for professional careers. I believe it is the duty of many states to provide a liberal number of courses for four-year men who want to specialize along vegetable lines.

Second, I believe it is the duty of the college in Pennsylvania, in New York, and in many other states, to solve the problems which practical growers are confronting out in the field. I say it is the duty of the college to solve these problems, and not merely to tackle them, carry them for a year or two, and then give them up. I do not know that the colleges are to blame. A young man starts a certain experimental project. He may wish to study the club root of the cabbage. He may study it for a year or two, and then perhaps some other institution employs him, and the college which he has left does not continue the line of study.

A number of men have come to me at this meeting and have said, "What do you know about this trouble or that trouble?" One young man spoke about the rot which attacks the flowers of cabbage plants about the time they are going to seed. He says, "I am specializing along this line, and I want to learn how to grow cabbage seeds a little better than any other man in our community." It may be that in Cornell University you have men who know this trouble. I do not. I have never seen anything in print about it. This is simply one of the troubles that our young friend is confronting, and there are hundreds of such problems. It is the duty of the college to study these problems and to solve them.

Third. It is the duty of the college, after the problems are solved, to convey the results to the men on the farm who are doing things, and this is the most difficult of the three lines of work.

Of the three lines of work—instructional, research, and extension—research work is most in danger. Why? Because you are going to send your boys and your girls to col-

lege whether there is adequate room for them or not. There was a time in Pennsylvania when the friends of agricultural education would urge the boys to go to State College and take courses in agriculture. A personal campaign was conducted. But now, we do not dare advertise for students because our facilities are inadequate to accommodate all that would come. Now, I say the boys are going to come. You can't keep them away. This means more and larger buildings, better facilities, and more teachers. You all know how the extension movement is growing. The people are demanding that the campus of the agricultural college be the entire state, and not a few acres of land. This is right, too. If your college is solving problems and getting results, these results should be conveyed to the men on the farm. People are going to see to it, and money will be appropriated for this purpose. But the research work is in danger. Our extension workers will not have anything of value to take to the men on the farm unless the college is actually solving some of the problems that are confronting our growers. Here is your opportunity. I tell you, you cannot have a great department of vegetable gardening in this institution unless you men get behind the research work. At State College, during Farmers' Week, several people put their hands on my shoulder and said, "Why don't you get bigger buildings?" I replied with the answer, "That is your business, not mine." I say to you men here tonight, it is your business to get what Cornell University needs in order to solve your problems and to serve you. In other words, the Department of Vegetable Gardening of this institution is merely a tool—it is your tool. And what do you want this tool to do? You have tremendous interests in potato culture, vegetable gardening, and vegetable forcing. What do you propose doing towards meeting these needs? Will you see that your department of vegetable gardening is properly provided with greenhouses, with land, with men? All of these needs must be met if your interests are to be properly served.

THURSDAY MORNING

MR. GREFFRATH: The topic for discussion this morning will be "Vegetable Forcing." We have with us a man who is going to take up this subject who has had experience as a grower, and we may expect some valuable points. Professor Watts.

THE VEGETABLE FORCING BUSINESS.

R. L. WATTS, State College, Pennsylvania.

I have said many times within the last year or two, that if I were to select a business along horticultural lines, I should give first consideration to vegetable forcing. My reason for making this statement is that, in vegetable forcing, conditions affecting production are under control. I might have included floriculture in this statement, because I believe this industry offers just as great inducements as vegetable forcing.

I do not hesitate to speak of vegetable forcing as a line of farming, because we have men who are growing crops under glass on a farm scale. There are men who have four, seven, and even ten acres under glass, and all in one house. Nine or ten acres in one house is real farming under controlled conditions. I have a man in mind who has not had a failure in his greenhouses for the last fifteen years. We need not fear such cold weather as this if we have made proper provision in the way of a good boiler and proper fuel. We need not worry very much about hail because, if we are business men, the greenhouses will be insured. We need not worry about destructive frosts that occur in the spring and fall of the year, because a good heating plant will protect our crops. We need not worry about water, because an overhead system of irrigation may be used at any moment. We need not worry about the soil being filled with pests that cause losses out of doors, because we can literally cook the soil with steam. We need not worry about insects that feed upon the plants, because these may be destroyed by fumigation. Farming under controlled conditions is an attractive proposition.

There are many large towns in Pennsylvania, and in other

states, that do not have greenhouses which are devoted to the forcing of vegetables. I believe there are many good opportunities for vegetable forcing.

From the standpoint of the market gardener, the greenhouse industry will help him to solve his labor problem. I do not see how it is possible for gardeners to keep good labor when they employ men in the spring of the year and discharge them in the fall. How can we obtain good men with a system like this? If we desire good men, we must provide labor for them the year round. Again, to keep good men, we must provide each family with a cosy, comfortable house.

Location.

The location of greenhouse should receive the most careful consideration. I have noticed that most men who operate vegetable forcing establishments have not deliberately located their houses so far as community is concerned. They are men who first engaged in market gardening or truck farming, and they have learned that they could build greenhouses and increase their profits by growing vegetables under glass. A very small house may be built at the start, and, if it pays well, the amount of glass is increased until a large area of ground is covered. A man seldom deliberately seeks a location that is the very best that could be found. If so, he would look for a soil that is the best for vegetables. This ordinarily means a sandy loam that contains a liberal amount of organic matter. It is also very important to be near a railway siding. One of the most successful growers in the country, who has several acres of glass, hauls his coal two or three miles and his produce seven miles to market. Another grower, whom I have in mind, built his large range of greenhouses right along side the railroad. The manure is shoveled into the greenhouse from the car; the produce is taken from the packing shed right into the car; and the coal is shoveled from the cars into the boiler room. This man seldom uses a wagon. All supplies are brought to the greenhouse on the train, and the products grown there are taken away in the same way. This is efficient business management. On the other hand, I do not find fault with the grower, who is very fond of his

place and does not care to move, for building greenhouses, if he can thereby increase his earnings.

The houses must be built in a way that will be economical, and that will involve the least expenditure of labor in the growing of the crops. The modern greenhouse has large doors, so that you can drive in with a wagon, a plow, a harrow, or any kind of implement. It is supplied with an overhead system of irrigation, so that the watering may be done at the least cost. Everything must be arranged in the house so as to involve the least labor in the performance of the daily work.

Crops.

As to crops, there are really only three of paramount importance, namely, lettuce, tomatoes and cucumbers. Other crops are grown, but I would not advocate their culture on a large scale until a market for them has been developed. The tomato is usually regarded more difficult to grow than lettuce. Personally, I do not think this is true, but I doubt whether it is possible to utilize a greenhouse plant to the best advantage without growing both lettuce and tomatoes, or perhaps lettuce and cucumbers. I have yet to hear of the first man who is willing to make the statement that there is any profit in growing either tomatoes or cucumbers at midwinter, and very few are willing to admit that there is money in lettuce at midwinter. There must be rotation of crops in order to realize the largest profits. We must plan our houses and equipment so that they will be in use practically the year around. I believe that a rotation something like this is the most satisfactory in many sections: A crop of tomatoes in the fall, the last tomatoes picked sometime in January; then a crop of lettuce, or perhaps two crops of lettuce if you grow the plants properly; followed by a crop of cucumbers or tomatoes in the spring. This will keep your house busy eleven months, and you will need the twelfth for house cleaning and soil sterilization.

At State College, we have managed to harvest a crop of tomatoes in the fall, two crops of lettuce in the winter, and usually a crop of cucumbers in the spring. If you figure on taking off two crops of lettuce in midwinter, you will have

to grow large stocky plants to set in the beds just as soon as the first crop is sold. We have found that, by starting the plants in pots and planting six inches apart for the second crop, we can grow lettuce in four or five weeks which will be large enough to sell for fifty cents a dozen. You note that with this rotation it will take good management throughout the season, or you will not be able to take off four crops during the year.

The largest receipts are ordinarily during the month of July. There is much work to be done in the houses during the hot months of the summer and the houses should be ventilated as freely as possible.

Digression On Celery Blanching.

Some growers use the ridge and furrow construction, houses thirty feet wide, with two rows of ventilators at the ridge. This is a very satisfactory type of construction. (The following remarks were suggested by a lantern view which was used at this moment, showing the mulching of celery) : This crop of celery was planted out in May, and the mulch was applied about two weeks later. The mulch consisted of horse manure that had been aerated a few days. This system of celery culture is becoming popular throughout the United States. The mulch is applied to the depth of about four inches, and this requires about forty tons of manure to the acre. The rows are two feet apart, and Golden Self-Blanching plants are set four inches apart in the row.

QUESTION: That would not do for dirt banking, would it?

PROFESSOR WATTS: In my own home garden, I have used the mulching system with the late crop. I paid no attention to the manure when I banked the plants in the fall. Yet I do not want to speak positively in regard to this matter. It may be that if very much manure comes in contact with the plants, it would cause mould or else rusting. I have an idea you might rake out some of the coarsest of the manure before the soil is banked.

QUESTION: Would you need that manure on muck?

PROFESSOR WATTS: Yes, even on muck soils manure is an advantage. Intensive celery growers tell me they cannot get maximum returns without some manure, but the system is used more generally on other types of soil.

MR. POMEROY: Is the manure put on simply as a mulch?

PROFESSOR WATTS: It is put on as a mulch but it serves other purposes. Every time it rains, liquid plant food is conveyed to the roots. So much manure has been used that the weeds cannot grow. The mulch also renders cultivation unnecessary.

Mr. Weinschenck at Newcastle has a house which covers about two acres of ground and is three-quarter span in construction. There are two rows of ventilators at the ridge and large doors at the ends. One thing of interest in this house is that Mr. Weinschenck hauled muck from a nearby area and mixed it with the shaly soil of the greenhouse.

MR. GREFFRATH: The ventilating space does not seem to be in proportion.

PROFESSOR WATTS: I often feel that these men must have more difficulty in maintaining proper conditions and in controlling temperatures. I have my doubts whether such wide type of construction is desirable. Mr. Weinschenck has a roadway extending through the house.

(Lantern views were used in connection with the following remarks):

The greenhouse I mentioned as containing nine acres belongs to Searles Brothers of Ohio. It is of ridge and furrow construction with the houses twelve or thirteen feet wide. It is the largest range in the United States that is being used for vegetable forcing.

An end view of a portion of Mr. Ruetenik's range of houses shows the large ventilators over the large doors and two rows of vents at the ridge. This type of house is giving splendid results at Cleveland.

This is a very inexpensive structure near Boston used for the forcing of rhubarb. Steam pipes are provided around the

sides of the house and on top there is space for the sash, which is removed and stacked when the house is not in use.

At Kennett Square, Pennsylvania, mushrooms are grown more largely than in any other section of the country. A very inexpensive type of house is used, though some new houses have been built recently that cost three or four thousand dollars or more. The mushroom industry is regarded by the growers as about the most uncertain business a man can undertake.

MR. POMEROY: Can they grow mushrooms in those houses better than they can in the caves at Akron?

PROFESSOR WATTS: I do not know. Are they uniformly successful there?

MR. POMEROY: I understand there is one firm there that always gets a crop.

PROFESSOR WATTS: That may not be due to the caves. It may be he has mastered all the details of mushroom culture.

MR. POMEROY: I understand that the temperature in this cave does not change two degrees.

PROFESSOR WATTS: I should think that would be an important factor.

Near Boston, cucumbers are grown largely in cold frames, transplanting them from the greenhouses. It will interest you to know that on the fifth of July they were still using glass over the frames. I believe this system of frame culture could be extended very profitably in Pennsylvania and other states, because cucumbers nearly always bring good prices.

Searles Brothers, at Toledo, Ohio, use a sterilizing system which has given them very good results. It consists of perforated pipe pegs as shown in the illustration. Some use the pan system and have had very good results. I do not think it matters much about the system. The soil must be thoroughly cooked, and held at a temperature of about two hundred degrees for an hour.

In the tomato industry at State College, we have not found any variety that has been giving better results as far as

yields are concerned than the Globe, which is a large, purplish tomato. As an early summer greenhouse tomato, it is highly satisfactory. In the field there is a tendency of the Globe not to color well at the stem end, while in the greenhouse this tendency is not so marked. The large stems are also more objectionable as a field tomato, because late in the season we may not care to take time to remove every stem; but it is a good tomato in the field and particularly good under glass.

Tomatoes.

One of the best red tomatoes for the greenhouse is the variety grown by Mr. Chauncey West of Irondequoit, known as the Peerless. It is an English variety which Mr. West has improved by careful selection.

A little package that is very valuable on the local markets is a basket of the shape of the peach basket, with a little wire bail over the top, holding four quarts of tomatoes. The wood is almost pure white, and with the neat copper bail, and fancy tomatoes inside, consumers can scarcely resist making a purchase. For the selling of tomatoes, plums, and crops of this kind, I do not believe there is a package on the market that is so attractive as this little basket with the wire bail.

A package which is being used in some of the western states to some extent is a paper box that will hold about four quarts of tomatoes.

Parcel Post.

At State College, we have been making some parcel post shipments. We have tried the strongest and best package that could be obtained for shipping tomatoes. We have made distant and nearby shipments. In long distance shipments outside the second zone, nearly always one or more tomatoes in the package will be damaged, but when shipped within the first or second zone, the tomatoes usually carry satisfactorily. So that we believe parcel post can be used to a certain extent successfully for nearby shipments. We also believe the postal authorities will have to make improvements in their methods of handling these perishable products.

The single stem system of tomato training is familiar to most of you. The lateral branches are removed as fast as the plant grows, and when the plant attains a height of about five feet the terminal bud is removed.

In greenhouses at Kennett Square, tomatoes are nearly always grown on the bench, but various blights and troubles are causing a great deal of trouble in this district. I believe that for inexperienced growers the results will be more uniform in beds than on benches where conditions are more artificial.

MR. GREFFRATH: The subject for the hour before us is "Vegetable Insects." Every grower who raises any kind of a vegetable has had some trouble with insects. Professor Herrick.

VEGETABLE INSECTS.

G. W. HERRICK, Ithaca, New York.

I do not quite know what to discuss with you this morning, and I am going to leave it partly to you. I have a few slides, and then I should like to have you ask any questions you desire concerning vegetable insects, which I shall try to answer.

It is a fact that vegetables are infested with a great variety of insects, and it becomes a study by itself really to learn about these insects that attack vegetables. It is a wide field to cover.

The Cabbage Root Maggot.

I am going to discuss first of all the cabbage root maggot. I presume those of you that have grown cabbages or radishes are acquainted with this maggot. It is a white worm-like insect which develops from the egg deposited by a small fly. This fly belongs to the same group of insects to which the house-fly belongs. The adult insect, which is somewhat larger than a mosquito, appears in the early spring and deposits its whitish eggs, which I presume you have never seen, because they are rather inconspicuous, next to the root or stem of the cabbage in crevices of the soil; or possibly where

the soil is pressed away a little, it will drop the eggs next to the stalk. It may lay several near one cabbage plant. These hatch into the white maggots which burrow up and down the roots until finally the fine roots are all withered and killed. Then the plant wilts above and dies. After about three weeks the maggots on the roots become mature, and then they change into what we call pupae, which are dark colored, short, and oval. From these the adult fly comes out ready to deposit its eggs for another generation. At least on Long Island there are three generations of these flies during the season. During the autumn it is probable that the adult fly hides away under rubbish to pass the winter, appearing again in the spring; but it is certain that the puparia pass the winter, and from them come the adult flies. The stages in which it lives over the winter are passed in the field underneath the rubbish that is left there or about the edges of the field underneath whatever rubbish they can find.

The question arises, how can we protect cabbages in the field from this insect? It is impossible where cabbages are grown on a large scale to treat each individual plant accurately with any insecticide which will be very effective. We have used the carbolic emulsion, which is very practicable in a garden; but in a field on a large scale one is forced to use tarred paper pads. Tarred pads first came into use in Wisconsin, being introduced by Professor Goff. These bands are hexagonal in shape, and in the middle of each there are little slits, as well as a slit to the edge, which allows one to bend it a little and slip it around the cabbage plant. You would be surprised at the number that one man can put on in a day and at the small expense involved in treating a large field of cabbages. It is a practical thing. In putting them on, one should press them down so that the insect is prevented from laying its eggs on the soil or at least so that the eggs can be laid only on top of the paper pads, where they dry up and fail to hatch. That is about the only practical method of fighting this cabbage maggot in the field on a large scale. There are some things you can do in addition in the matter of cleaning up rubbish at the end of the season, especially around the edges of the field, in order to destroy

all the hibernating places of the flies and puparia. If it is feasible, the field should be plowed in the fall or early winter, in order to destroy as many of the over-wintering forms as is possible.

A MEMBER: Last year on part of my field, when setting my plants, I left a little depression near each plant. Then I took some air slaked lime and wet it with water to the consistency of cream, then added coal tar to scent it. That formed a little cake. I thought I did the work much more quickly than when I have used the papers.

QUESTION: Where do you get these papers?

PROFESSOR HERRICK: They used to be manufactured by a company in New York City, but my letters have been returned to me from there the last few years. It was W. H. Gassert of New York City. The pads could be bought for a fourth of a cent apiece.

A MEMBER: The Joseph Harris Company of Coldwater, New York, carries them at a dollar and a half a thousand.

PROFESSOR HERRICK: You can make them at home. You need a band of iron forming half of a hexagonal outline, with a little die in the middle for cutting the slits in the middle of the card. The tarred paper is run on a roll. (Such a tool was exhibited).

QUESTION: What is the object of cutting them hexagon shape? How about square?

PROFESSOR HERRICK: I think they could not be put around the plant so easily.

QUESTION: How about round?

PROFESSOR HERRICK: If you use a round one, you will waste a lot of paper. This seems to be the most economical machine for cutting the paper and wastes the least of it, while the pads seem to fit around the cabbage plants and conform to the surface of the soil.

QUESTION: Does this insect come from the top and start down towards the bottom?

PROFESSOR HERRICK: Yes. The eggs are laid in the crevices of the soil and the maggots work downward into the roots of the cabbage plant. So much for the fighting of this insect in the field. Many of us grow late cabbages and have trouble with these maggots in the seed bed. It is difficult apparently to grow a crop of plants for late cabbages, at least in the central part of the state, because they are infested tremendously not only with this insect, but by a certain species of flea beetle. Many times growers have to buy their plants.

Maggots In Cabbage Seed Beds.

A method of combating this pest has been worked out by Mr. Schoene of the Geneva Station. He has found that by shading the beds of seedlings with thin cheese-cloth, he has been able to protect the plants so that the growers have been able to raise their own plants very nicely, free from the attacks of this maggot. If the bed is outdoors, you can simply set up planks around it. Some prefer six-inch boards, some eight-inch, some even ten-inch. Set those boards up around the edges of the bed, and then over them stretch thin cheese muslin. He has shown in his work with these cabbage plants that the cheese cloth that has about twenty to thirty threads per inch gives the best satisfaction. The muslin is put on just after the seed are sown or may be put on a little later than that; but certainly it ought to be put on before the plants get above the ground and before the flies have time to come to the plants to deposit their eggs. To prevent this muslin from sagging down in the middle, wires are usually run across to support it—galvanized wires. Mr. Schoene has found if the cloth is removed ten days before the plants are to be set in the field, the plants will prove hardy and will set better in the field than many grown in the open. There are other advantages. These plants are forced ahead so you can actually produce them earlier under the muslin than in open beds. If the muslin is left there too long, there is a tendency for the seedlings to become too spindling.

QUESTION: How does the cloth protect the plants from the maggots?

PROFESSOR HERRICK: The dirt is packed up carefully along the edges so the flies cannot get under and they cannot get down in.

QUESTION: How long after the plants are transplanted will it be before the flies lay their eggs?

PROFESSOR HERRICK: That will depend on whether you are planting the late cabbage or the early cabbage. On Long Island the flies appear by the middle of April sometimes, and from that up to the first of May.

QUESTION: How long do you leave those tarred papers on?

PROFESSOR HERRICK: They can be left on till the cabbages get a good strong start and will probably do no harm if left indefinitely.

QUESTION: Do those papers interfere with working your crop?

PROFESSOR HERRICK: They will interfere to this extent, that they ought not to be covered with dirt when you are cultivating. You can not cultivate quite so close because if you cover them with dirt, the fly will deposit its eggs there.

Cabbage Aphis.

The cabbage aphis is one of the injurious insect pests upon cabbages in the central part of New York State at least. In some seasons it appears in great numbers, in other seasons it is not abundant. For the past few years it has been abundant and has caused a great deal of injury in this state. Two or three years ago we studied the life history of the aphis very carefully and carried out some experiments in controlling it. If we study the life history and habits of an insect, we are likely to find somewhere in that life history some weak and vulnerable point, and that is what we are after. We found that the eggs of this cabbage aphis were laid in great numbers on the cabbage leaves in the field in the fall. They are black, readily seen by the naked eye, and laid both on the upper and on the under sides of the cabbage leaves, in great numbers. They will rest right there until

the following spring. We found them hatching on the thirty-first day of March. We found that there were thirty generations during the year and that there was an average of about twelve days for each generation. That accounts for the enormous numbers of lice that appear in the field during the fourth or fifth generation, the latter part of June, July, or August. The eggs are black or very dark brown, and they look like tiny footballs.

I want to bring out the point that the eggs rest on the leaves all winter long. The old cabbage stumps in the spring will throw out tender, succulent shoots, and it is there that the aphis in the spring of the year finds food ready for its liking. On the thirty-first day of March we found the aphids feeding on one of these sprouts. One of the things we must do to control the cabbage aphis is to clean up old stumps and leaves.

QUESTION: If they are plowed under, will the aphids live over?

PROFESSOR HERRICK: I am afraid you cannot plow long cabbage stems under. We have tried that here in an experimental field. We did as good a job of plowing as almost anyone could do, and yet where no pains were taken to pull up the stumps and lay them flat in the row, they still projected above the soil.

QUESTION: With a disc harrow they can be cut up before plowing, can they not?

PROFESSOR HERRICK: Possibly. We did not try it.

A MEMBER: We sometimes cut them off with spades and send them to market. It is not a very long job to chop them off with a sharp spade.

PROFESSOR HERRICK: I want to say a word regarding spraying for the cabbage aphis. During the summer of 1911 I sprayed a badly infested field of cabbage containing two acres to see what we could do to control the aphis, and to see what material would kill it best, and to see whether it could be done economically. In spraying that field of two acres, we used a knapsack sprayer. We sprayed them with

black leaf, a tobacco extract, and soap. That forms one of the best combinations that I know anything about. That was before the Black Leaf 40, the stronger tobacco extract, came on the market. Now, I should use the Black Leaf 40 at the rate of three-quarters pint or a pint to one hundred gallons, adding to that three or four pounds of laundry soap. It cost us two dollars and fifteen cents to spray an acre of the cabbage, counting the labor at a dollar and a half a day. We did it thoroughly and spent more time probably than the ordinary grower would spend, and we did check the cabbage aphis. I am almost convinced that the cabbage aphis can be checked and controlled by spraying. I believe that one of the best ways to spray cabbages is to spray them with a barrel in a one-horse wagon, having two leads of hose and a man at the end of each lead. There is no doubt that you can reach a cabbage plant better if you hold the nozzle in your hand than you can if that nozzle is set automatically. You have to hit the aphid to kill it. You cannot put on a poison, because the aphid is a sucking insect and will not get it.

If cabbages are going to bring you but five dollars per ton, then it is a question whether it will pay to spray or not; but if the cabbages are going to bring fifteen or twenty dollars, then in many cases it will pay to spray them, and you can afford to spray them two or three times at two dollars an acre.

Regarding automatic sprays. If you are going to use automatic or power sprays for spraying cabbages, then I should say that the best arrangement would be to have two nozzles to each row and point them towards each other, so they will hit the sides of the rows as they go along. Then if you can have a nozzle set to spray directly downward, you can do fairly effective spraying for the aphis with that kind of a machine.

MR. RUSSELL: In my spraying I had just two nozzles and had them at an angle of perhaps forty-five degrees. The spray went between the leaves as they stand out and quite thoroughly. Going over the field several times, I covered the plants comparatively reasonably. I have used a sticker

some, but last year it was recommended not to use it, and I tried it with very good results without the sticker.

PROFESSOR HERRICK: I should use only the soap, which helps the tobacco to spread and stick. The objection to these tobacco extracts is that when you spray them on in fine drops, the little drop stays right there—it does not spread like oil. Otherwise, they are the best contact insecticides I have ever seen because you do not have to prepare them.

QUESTION: Is the black leaf injurious to the cabbages?

PROFESSOR HERRICK: The black leaf and the black leaf 40 are not in any way injurious to the cabbage. The cabbage aphis is subject to the attacks of five or six parasites. If you can check the cabbage aphis a little with one or two sprayings, those parasites will get the upper hand and control them later.

QUESTION: How do you reduce the soap?

PROFESSOR HERRICK: I should just shave it in hot water and heat till it is dissolved.

QUESTION: When you use black leaf 40, no matter what you spray for, it is advisable to use soap, is it not?

PROFESSOR HERRICK: I think it is.

QUESTION: Can you combine it with lime-sulphur?

PROFESSOR HERRICK: You can combine it with lime-sulphur in spraying apple trees.

MR. RUSSELL: You should start to spray as soon as possible after you see them on the plants.

PROFESSOR HERRICK: I have watched this cabbage aphis year after year. It will begin in a certain part of the field and gradually spread like the waves on water as you throw in a stone, till finally it covers the whole field. If you would watch that field closely and when you found these little infected areas, if you would spray those few thoroughly, you would do a great deal in checking the spread of that insect later in the season.

QUESTION: Would that be better than to pull up those plants and dispose of them?

PROFESSOR HERRICK: If you care to lose those plants, that would do as well.

MR. GREFFRATH: I assure you that it gives us pleasure to see so many of you here that are interested in market gardening. I wish we could interest more of you to become members. I know there are quite a large number of ladies in attendance. I wish to extend the invitation to them to become members. We have quite a number of ladies who are members.

The subject taken up at this hour is "Market Problems." It is to be discussed by one of our number who will speak from his own experience. It gives me pleasure to introduce Mr. Warren of Irondequoit.

MARKET PROBLEMS.

A. J. WARREN, Irondequoit, New York.

As the President has just told you, I am not a professor, so perhaps my grammar will not be as good as that of some of the preceding speakers. I am not an orator, so my gestures will be limited. I am just a common market gardener and shipper of vegetables.

The problems of market gardening are many, almost as the names that a certain groceryman had in Rochester last year. One morning the market was quite well filled with potatoes, and they did not move quite as fast as they ought to, and so he took advantage of the oversupply and went to fifteen or twenty of the gardeners, who had potatoes left on their wagons and bought them. Not having packages enough to empty all of the gardeners' crates, he asked them to leave their crates until the next day, which they did, each having his own name on his crate. He lined all these crates up in front of his store, perhaps fifteen or twenty different men's crates. An Irishman came along. He looked at those crates, and he said: "Are these your goods?" The groceryman said:

"Yes." "Well, sir," he said, "you have got more durn names than any man I ever saw."

That is what we are up against in the business. We have more problems than we can settle at one time. I shall tell you briefly of some of the conditions in Rochester and try to bring to you some suggestions that I think would be of value to us if worked out.

There are two important questions that concern the producer of today:

FIRST. What vegetables shall I grow that will net me best returns financially?

SECOND. Where shall I find the best market for my goods?

The first question is one that you must decide for yourself. Very few men agree as to what vegetable is the most profitable to grow, because some men have better success with one crop than another and the soil on their respective farms is in all probability different from their neighbors'.

The second and most vital question is the *market problem.* You ought not to decide where you will market your goods until you are ready to sell. Market conditions are changing daily, and unless you are different from most men, you intend to sell where you can get the most money. This is my case, and I do not think you men are exceptions.

The market conditions in some localities are so entirely different from the conditions in others that it is indeed a problem to solve.

If you intend to market your goods on one particular market, you must know just what kind of a package to use. A great many times we think we are not getting as much for our goods as we ought, but the package we are shipping in is not like the package they are used to having—therefore, the difference in price. You must know how to prepare your vegetables and be acquainted with the rules and regulations of said market. On some markets the roots are washed and on some they are not washed, and it makes quite a difference. Different rules are in force in different places, and especially in cities of the first class. In Rochester we use fourteen, fifteen, and sixteen quart diamond baskets for tomatoes, beans, etc., and each basket must be plainly stamped. In

some cities crates are used. In Syracuse, Scranton, Wilkes-Barre, Buffalo, and a great many other cities, fourteen and sixteen quart Jersey baskets are used for tomatoes. In Rochester for lettuce, beets, carrots and vegetables of this type, we use display boxes holding one and one-half and two bushels, while in some cities barrels are used for these vegetables. So you can plainly see that if you intend to market your goods in different places, you must be familiar with the kind of package that is used on the particular market to which you intend to ship.

The Story of the Rochester Markets.

Just a word to tell you of some of the conditions we have to contend with in Rochester. A few years ago, before vegetables were grown as extensively as they are now and before Rochester became a city of the first class, the gardeners and farmers were allowed—notice, I use the word *allowed*—to stand on the streets in a certain section of the city. I have arrived at the market place as early as ten o'clock in the evening and stayed there until daylight many and many a time. I have watched the people who reside in the city going to and from their different places of amusement during the evening and early morning hours, and then wrapped myself in a blanket, lain down on the cold stone sidewalk and attempted to sleep until such a time as the retailer came to buy my goods. He did not sympathize with me, he did not even seem willing to pay a fair price for my goods, but rather seemed to think that as I was from the country and perhaps my hands and clothes showed close relationship with the soil, that any old greeting and any old price was good enough for me.

But gentlemen, things have changed in Rochester.

We multiplied so fast that they could not take care of us at the old stand.

We blocked the streets.

We stopped the street cars.

We aroused the city people from their peaceful slumbers.

In fact, we became so troublesome that they finally began to realize that something would have to be done.

So a new market was built. We appreciated the new market very much, because we felt that we had been provided with a place where we could go, sell our goods, and return home without being pushed about from pillar to post.

The city authorities said that they did not intend to use the market as a money-making investment, but simply to charge enough rental for the stalls to make the market self-supporting. So a minimum price of $30.50 was placed on each stall, and we were to bid for a choice at public auction, which we did, getting our stalls for from $31.00 to $35.00 each. At these prices the city was able to pay the running expenses of the market, pay the interest on the bonds, and pay off some of the bonds each year.

But after a year or so the city began to see a prospect of making the market into one of the city's most paying investments, so they decided to increase the minimum price of the stalls to $60.00 per annum and make us bid for a choice over and above that.

Then, on the sixth day of April, 1910, there was formed in the town of Irondequoit an association known as the "Market Gardeners' Association of Monroe County." What for? For the purpose of fighting for our rights. And, gentlemen, believe me, we fought. Listen!

We assured the city authorities we thought we knew our rights, and "to come down to brass tacks," we did not believe we could be compelled to pay anything to market the goods we grew; but they told us that a city of the first class had the power to make ordinances governing the city streets, which I believe they have. And then the fun began.

We told them that we would be willing to pay the same price we had heretofore paid, *but no more.* We signed a petition stating that unless we got our stalls at the same old price, we would buy no stalls at all, and the result was we got our stalls for one year with the privilege of three if we wanted them.

Last spring our three years was up, and knowing that we would not stand for a raise of the minimum price, they attempted to make us pay more money in an indirect way. They changed the rules, making it into a retail market. They

insisted that, according to an act of the legislature, the stalls would have to be sold at public auction (this legislature gag was a new one), and that huckster, commission man, farmer, gardener, and almost anybody *that had the price* could buy a stall and stand side by side.

We did not relish the idea of being mixed up with the hucksters, maintaining that they often bought inferior goods and would sell them for less money than we asked for ours, thereby cutting the price. Many times a retailer or consumer would buy vegetables from them—thinking they were growers—because their vegetables were cheap, and if the goods were not first class or anything was wrong with them, the producer got the blame.

So we balked again.

This time the city told us that we could take the stalls or leave them, and further adopted a city ordinance forbidding us to use the city streets unless we paid a license. In this way they thought they had us. But they figured only one side of the case. We immediately called a meeting, informed the city that *we did not want their stalls,* and *refused to a man* to attend the auction of stalls on three different occasions. We secured an option on some property adjoining the city and informed them that we would build a market of our own, and as we could not use their streets, if they wanted any *vegetables,* they could come to *our* market and *carry* their vegetables home themselves.

After a few reports of our deliberations had been printed in the press, and the consumer realized what the outcome meant for him, he demanded a fair deal for the producer. I should like to read a clipping from the *Rochester Union and Advertiser,* April 26, 1913, showing the attitude of the consumer.

Barring Food From Rochester.

"One phase of the present controversy between the market gardeners of the surrounding country on the one side and the Common Council, the Public Market Commission, and the hucksters on the other, deserves more attention than it has apparently been given by the public. This is the clause in the new ordinance by which those who do not pay the forty

dollars or more for a stall at the public market or the forty dollars required for a huckster's license are forbidden to sell garden produce in the city by peddling it about. This shuts off a market gardener from selling his produce by going from store to store. This prohibition prevails even against those who may rent a stall or pay a market fee for a day. We believe that when the people of Rochester realize what this provision means they will either demand that it be repealed or that the public market be abandoned.

"When a market gardener goes to market with his wagon load of produce, there is no assurance that he will sell the whole load. Sometimes he does not. Now what is he to do? Under the previous market regulations he could drive about to stores until he managed to dispose of the remnant of his load. Almost necessarily this meant that he would dispose of his produce at some concession in price, with a consequent lower scale of prices to the consumer. There are many in the country surrounding Rochester who do market gardening on a small scale. They bring in a few vegetables in the spring or some berries later and occasionally butter and eggs. Their total profit for the year is probably only about forty or fifty dollars. They cannot afford to pay forty dollars for a market license. They do not come to market on more than twenty-five days in the year. They were accustomed to pay the twenty-five cent fee. If they failed to dispose of their goods, they then peddled them about the city. They will now be forced to keep out of Rochester and Rochester will have to pay higher prices as the result of a decrease in its food supply. The only ones benefited will be the hucksters.

"It has always been a puzzle to many how the hucksters have such influence with our lawmakers. The huckster of today is, of course, vastly different from the swindling peddler of years ago. But even his present status as a hustling business man does not explain his present strength. He is generally, but not always, a resident of the city and directly or indirectly a taxpayer. This gives and should give him an advantage over a non-resident of the city in any controversy that may arise in regard to business. But the people of the city have the right to as much of the benefit that comes from

the prevalence of market gardening in the surrounding country as they can possibly obtain. It cannot be claimed that they derive the full benefit of their residence in this city when the market gardeners and other growers are hampered in their efforts to dispose of their produce in the city. The hucksters would obtain all they are honestly entitled to if the men from the country were forbidden to go from house to house in an endeavor to dispose of their produce, but were allowed to sell by peddling to store or market.

"Most of us cannot conceive why the market gardeners are so strongly opposed to occupying sheds with hucksters. We can understand a certain wish not to be identified with retailers, but cannot see why their stand should be so firm in the matter. However, this is a thing that can be readily adjusted. It is not difficult to arrange things to suit the producers. To do so would not be, as someone has said, letting them run the market. But they are the purveyors of food to Rochester and they deserve some consideration at the hands of its people. The apparent hostility to the producers is inexplicable. We do not believe that the differences are incapable of adjustment. It is almost certain that if all the parties to the controversy would come together in a more conciliatory spirit than has yet been shown, the matter could be settled quickly. There are too many non-essential points for reasonable people to remain apart. And in the study of the situation, the rights of the people should not be ignored."

And *again* we got our stalls at the same old price.

The Fruit of Cooperation.

I have told you about some of the things we have had to contend with, and it would not be fair if I neglected to tell you some of the good features of our market. We have good sheds for the protection of ourselves and our horses. We have good police protection, "although if no one but farmers entered the market, there would be no need of the police." We have a good restaurant, which about six a. m. seems to the farmer about the best thing there. We have traffic rules that are rigidly enforced. We have large and convenient shipping platforms, railroad facilities, and good lights. As a rule,

I think we fare about as well as the producer in most cities, and why shouldn't we be well taken care of, for no city in the United States is surrounded on all sides by more fertile soil and better adapted gardening facilities than Rochester, New York. Gentlemen, we did not see the need of cooperation until we were crowded to the wall. You men who are here from different localities, if you do not have a local organization in your section, when you go home arouse your neighbor gardeners and form one right away. Without cooperation nothing can be gained. With strong cooperation nothing is absolutely impossible. "The law of business success is cooperation."

I guess I have taken up enough of your valuable time telling you about our petty troubles in Rochester, but I wanted to emphasize what some of the conditions are that the grower has to contend with after toiling to grow his goods and how we can overcome these difficulties if we only stick together.

Cooperation among the producers instead of competition, that the producer may receive the whole of the consumer's dollar instead of thirty-five or forty per cent. of it for his goods, as is now the case, is the aim of a bill introduced into the Senate in Washington last month "to create an agriculture capitol or clearing house" to be run by the farmers under government charter. I am not sure whether this would be a good thing, but it would bear investigation.

The bill would furnish machinery for scientific marketing and standardizing of farm products, to be directed by a national or country-wide organization of producers *without being under government control.*

I believe the time is coming when it will be necessary to standardize our goods. We are altogether too careless about grading and packing. We are apt to feel that to dispose of our goods and get our money is all that is necessary. But, gentlemen, I believe the *most* essential thing is the *satisfaction* that our goods please the other fellow.

Until recently we gardeners have felt as though we were not getting a square deal from either the national or state government. Experimental stations have been studying the diseases for the farmer and the fruit grower and results have

been obtained. But tell me how much money has been appropriated to study the diseases of the greenhouse or the vegetables in the field? To be sure, through the Farm Bureau we expect to get some assistance, and I hope it will not be long before material benefit will result.

Parcel Post Marketing.

How about marketing some of our goods through the parcels post? I personally do not think the plan will ever succeed to any great extent. I think perhaps if a small grower could get customers enough to handle all his goods and he could afford to spend time to pack them, the plan might be successful to some extent; but for a man whose business is more extensive, I have my doubts as to the success of the plan financially. A package that would carry vegetables to their destination in good condition would necessarily have to be made of wood and would cost too much money. The package would be handled too roughly. The rate would be too high. And if through any cause these perishable goods were delayed, the loss would be greater than the profit.

Crop Reports.

I would suggest that we ask for more accurate reports to be printed in the daily press. The prices now printed are more or less guessed at from day to day, and the result is the retailer and consumer are misled and sometimes feel that the producer is charging more than market price. This causes ill feeling and dissatisfaction, making more of a gap between the consumer and producer, which we do not care to widen.

Weight Instead of Measure.

I believe that a problem would be solved and market conditions bettered if a law could be passed and enforced compelling the producer to market certain vegetables, potatoes, carrots, turnips, beets, parsnips, spinach, peas, beans, etc., that are now sold in most cities by the bushel, according to measure (except in car lots), and lettuce, rhubarb, etc., that are sold by the dozen in some cities, by the pound, eliminating

many discussions and avoiding many arrests for short measure. By so doing, a retailer would get just what he paid for. I believe it would be better for the consumer and the producer, especially in regard to lettuce. It would induce the producer to grow better and heavier lettuce, and the consumer would be more willing to buy and pay the price.

Honest Packing.

I believe we would be better gardeners, sell more goods at better prices, knowing that they would please the buyer, if we were compelled to grade our goods and pack them in uniform size and quality from bottom to top. A bushel of vegetables or a barrel of fruit *faced* is deceitful, and yet if you buy a barrel of apples or pears today it is faced. If you deceive the other fellow once, he is twice shy, and has a right to be. This problem, if solved, would better market conditions. I lost the sale of fifteen hundred bushels of pears last fall because I would not face the baskets.

We hear a great deal about the producer selling direct to the consumer, thereby eliminating the middleman. I do not believe this will ever be done. The farmer does not have the time to peddle his goods from house to house, and is usually glad to unload at a fair figure. Although it is a fact and generally accepted that the middleman gets the largest share of the producer's dollar, the time is not yet when we feel that we can get along without him entirely.

I believe that small growers who cannot ship in car lots could better themselves sometimes by combining and shipping to some outside point, rather than offering their goods for sale on an already over-stocked market, thereby keeping the price so low that the goods are not worth hauling.

I think that the express rates are excessive and unjust. Since the first of February the rates have been changed. For instance, a Syracuse man who has been in the habit of buying vegetables from Rochester and paying sixty cents per hundred pounds expressage has had to charge exorbitant prices in order to make a profit. Under the revised rates he would have to pay seventy-five cents per one hundred pounds and cannot afford to buy. I believe if there was a law com-

pelling the express companies to handle our perishable goods in a proper way, it would induce the growers to ship more to outside markets rather than flood the market near home. If the railroad companies would offer good local freight service between nearby cities, it would be a step toward decreasing express rates.

Government Aid.

Listen to a clipping from the press of February 7, 1914, Saturday last, from the Secretary of Agriculture, and then judge for yourself as to whether or not we are opening the eyes of the American people:

"This is the way Secretary of Agriculture Houston sizes up the work confronting the Division of Markets. Its program for 1914 and 1915 promises to be one of the administration's chief assaults on the cost of living for both farmer and consumer. Scores of calls for its aid by cities already have come from widely separated sections. The city of Providence, Rhode Island, requested its local market divisions be surveyed by an expert from Washington. The city is now reorganizing its market business along the lines suggested. Massachusetts has asked for assistance in the establishment of a better system for marketing milk. Wisconsin wants information as to the best method of marketing butter and cheese. Sumpter, South Carolina, has asked help in solving its local market problems, and other state and city governments, as well as hundreds of individuals, are turning to Uncle Sam for expert information as to the sale and transportation of foodstuffs.

"We are adequately, or nearly so, teaching the farmer how to raise more, but we are not yet adequately teaching him how to realize more. Congress has been asked to appropriate $194,140 for this work for the fiscal years of 1914 and 1915.

Importance of Marketing.

" 'It is of vital importance that we aid farmers to solve the problem of marketing their products,' said Secretary Houston. 'We must not only aid them to discover the best nearby markets, but we must also aid them to secure a just price for the

specific commodity which they offer to the public. That there are evils and waste is obvious. Many of the farmers do not know just what the trouble is. They have the feeling that they are not getting for the commodities what they should, and in the absence of any clear knowledge of just what the evils are, they frequently are inclined to take radical positions and to urge radical measures.

" 'A great deal of pressure was brought to bear on us to request at least $1,000,000 for this work at this time, and there will doubtless be a good deal of criticism because we do not suggest an appropriation of a million or more dollars. It is my judgment that it would be unwise to do that now. We have set forth the plan and the amount we think it will cost at present.

" 'The farmers must be induced in particular communities to develop staple products, to standardize them, to properly prepare them for market, to study what market to reach at a given time, and the best and most economical method of shipping the products.

" 'Of course, I am not speaking of concerted action which shall have for its object the establishment of a closed market or the fixing of prices. I imagine we shall not accept such a principle in agriculture any more than we would in manufacturing. It is as unnecessary as it would be undesirable.'

City Marketing.

"A sum of $14,000 will be spent getting and disseminating information on the one subject of city marketing and distribution, which particularly concerns the consumer. Study is being made of the utilities and limitations of both private and municipal markets. The practice of huckstering by the farmer and by professional hucksters is being gone into thoroughly.

"Light freight service on trolley lines is another thing being investigated. At present it has been found that the consumer pays enormous overhead charges on all materials that the farmer brings into town in his wagon. Most of this, it is declared, could be eliminated if a freight and express service were maintained by interurban trolley lines between

midnight and seven o'clock in the morning, during which period the passenger traffic is negligible."

Now, gentlemen, if I have said anything that you think is worthy of discussion, or if there are any questions you wish to ask, I hope you will feel free to speak, and if one man cannot answer them perhaps some others can. I thank you all for your kind attention.

QUESTION: Do you think it would be feasible for farmers to establish their own markets just outside of town?

MR. WARREN: I do not think so if the conditions are favorable in the towns and the stands near where they are located, but with the people in Rochester conditions were getting so bad we felt as though something would have to be done.

A MEMBER: We shall have to do something in Syracuse soon or you fellows will drive us out.

MR. WARREN: One of the main questions that confronts the market gardener when he is facing the question of going to the city and paying for a stall is as to whether or not the market gardener can be compelled to pay a license to market the goods that he grows. That is a question I have asked a great many different people. As yet I have not had any answer that satisfies me. I think this State Association should look that up and find out whether or not we can be compelled to pay a license to sell the goods that we grow.

QUESTION: How about the merchant in the city who sells your product? Must he be protected some way from the market gardener who sells his stuff all through the small city?

MR. WARREN: I presume so, though if they put a bar on a market gardener huckstering, that would do away with that. I believe a market gardener should have the privilege of going into the city and selling his goods on a public market without a license, but I do not believe he should be allowed to sell from house to house without license.

QUESTION: Do you think a few markets in different sections better than one large market?

MR. WARREN: That depends upon the size of the city. I think two markets in Rochester would be better. The mar-

ket in Rochester is so far from the center of the city and so near one side of the city the people on the other side of the city do not have a chance to get to the market.

PRESIDENT GREFFRATH: I was much interested in hearing the conditions as they exist in Rochester repeated, although I was quite familiar with them—how the Market Gardeners' Association of Monroe County compelled the city of Rochester to come to their terms. It is just another one of those many illustrations that have been presented to us here the last two days of what cooperation can do, and it shows us how slack we are if we do not grasp the opportunity. Let us not go away from here without making conditions so that we can cope with these obstacles that come in our way as an organized body.

PRESIDENT GREFFRATH: The subject for the hour is tomatoes, and it is to be taken up by a man who has had wide experience along this line, Mr. A. E. Wilkinson, who will now address us.

TOMATOES.

ALBERT E. WILKINSON, Ithaca, New York.

Last year at the meeting I talked on the subject of cabbages. In talking, I mentioned the variation which existed between the seeds from different seedsmen. It has been found that in the case of certain cabbages there was a difference of thirteen or fourteen tons in yield as compared with seed from other sources, but all grown under the same conditions.

I find on investigation that the same difference exists with tomato seeds. I am sorry that I have not full data regarding Bonny Best, Earliana, Chalk's Early Jewel, and other well known varieties. In the West there is an experiment station that has tested for a series of years the Stone variety of tomatoes. They have found in testing twelve strains from twelve seedsmen that there is a difference of over three and one-half tons per acre, according to the place where the seed was bought. Three and one-half tons at ten dollars per ton means thirty-five dollars to the man who is raising tomatoes for the cannery.

They found not only that there was a difference in the actual yield, but that there was also a difference in the earliness of the tomatoes, not only with Stone, but with other kinds. They found also that there was a difference in the color and a difference in the characteristic growth of the vine as well. One firm sold seed of a certain variety that produced a very rank growing vine of a lighter color and different shape from the same sort bought of a neighboring seedsman. I wish I could give you some data regarding the men who produce these higher yielding strains of seed, but I cannot.

The Indiana Experiment Station demonstrated by trials that probably the best seed came from Michigan. However, it is possible for people in New York State to produce their own seed, and there is no reason why a man cannot save his own seed, improving them by selection, in that way increasing the yields per acre.

Not only was there a difference between strains of seed, but there was a difference between varieties. I find in traveling through the canning sections that the majority of the men are talking Chalk's Early Jewel. I find in some cases they are using Earliana, a few Bonny Best, probably for the late season work the Stone. In tests running through three years in a western experiment station, they found that Chalk's Early Jewel stood fourth in the list. Greater Baltimore was the leader, yielding at the rate of six and three-quarters tons to the acre.

In this test they discarded such varieties as Globe, Magnus, Prosperity, as being of very little value for the man who wished to make money from tomato growing. However, they did say that these other varieties may be of interest to people who have home gardens. You will see, then, that the results with the tomato crop, as far as tests are concerned, are practically the same as those given last year for the cabbage crop. There is wide variation in seeds from different seedsmen, there is wide variation in varieties. But after all, each grower can produce and should produce seed that will yield more than that of some of his neighbors who purchase their seed.

Early Plants.

The question of starting early plants is of vital importance to many men. I have here a little chart which represents the tests of three years, put forth by a western college. This would apply equally as well in the East. By looking at the chart we find that we have five methods under trial.

1. Seed bed plants without any thinning.
2. Seed bed plants thinned, so the expense was a trifle more.
3. Transplanted once. There is very little difference between this and thinning.
4. Transplanted twice.
5. Transplanted to veneer dirt-bands.

The results of these methods are as follows:

Method	Cost of plants per acre	Yield per acre	Value of crop per acre
Seed-bed plants	$1.30	5.26 tons	$ 52.60
Hotbed plants not transplanted	4.90	10.15 "	101.50
Hotbed plants transplanted once	4.95	10.3 "	103.00
Hotbed plants transplanted twice	6.70	10.82 "	108.20
Hotbed plants grown in dirt bands	8.80	14.92 "	149.20

You do not notice a large difference between methods 2, 3 and 4. We might say if we give the plant enough room—plenty of sunlight, root space, and so on—we are able to produce plants that are fit without transplanting once or twice. But how is it with the last method? Here is used a veneer band of a large size. The yield was over four tons greater.

QUESTION: Would you have better tomatoes from this last method?

MR. WILKINSON: It is evidently so.

QUESTION: Would you get better price per ton?

MR. WILKINSON: Probably you would. There is a selection in thinning.

QUESTION: Will the rankest plant produce the best fruit?

MR. WILKINSON: Not necessarily. It is a question whether it would pay to purchase wooden bands in place of paper pots.

In my experience, I have not used the dirt bands. I have used paper pots.

QUESTION: Do you like them?

MR. WILKINSON: Very much indeed, but not the kind the manufacturer sells. I want to make my own. I use the red siding paper, costing sixty-five or eighty-five cents per roll, and cut it into correct sizes.

QUESTION: What advantage do you derive from thinning the plants?

MR. WILKINSON: Thinning the plants, in the second case, corresponds closely to one transplanting.

MR. CLUM (Cayuga County): I would like to ask you how far you think that could be extended advantageously, that is, how often transplanted and how large at the last transplanting? How much added space for your plant is an advantage?

MR. WILKINSON: I have transplanted as many as eight times from the time of sowing the seed. At the last transplanting the plants were more than a foot in height and very nearly a foot in width. Place the plants six inches apart. That is as far apart as it is practicable.

MR. CLUM: I have been accustomed to growing plants at the last transplanting seven inches, cutting out with a spade. That is expensive in getting into the field. The question is, can I grow them in dirt bands or paper pots and get as good a plant? If I could grow in paper pots, I could get along with my work faster.

MR. WILKINSON: One of the great advantages of the paper pot is that it has all the roots when set in the field.

MR. CLUM: In a five-inch pot you could grow an A1 plant, such as the market gardener who is trying to get his goods on the market just as early as he can wants.

Soil.

MR. WILKINSON: There has been some question about preparation of soil for tomatoes. There is a difference of practice among men. Some do not care to apply manure

where tomatoes are to be placed. I come from a section where they do not believe in artificial fertilizer. The method used is one of furrowing out and placing a good forkful of well rotted manure where the plant is to grow. The growers there get results. I have noticed good results where they do not do that at all. They grow the plants after one of the following methods. They use fertilizer right along in the furrow. They get results, averaging eleven to twelve tons per acre. There is another section where they broadcast the fertilizer with good results.

In preparing the land with manure as a basis, if you plow the land the year before for some other crop, then the year the tomatoes are planted use a combination of fertilizer if you wish, or furrow out and use the manure. In growing for the canning factory, you would prepare your land by thorough plowing and thorough harrowing, then use the fertilizer right around the hill or broadcast it.

But in each of these schemes, it seems necessary to have thorough preparation of the land, as deep plowing as possible and as thorough harrowing and fitting as possible. The tomato is a plant that has a large root surface and needs all the space in the well prepared soil.

MR. COLEMAN (Albany County): How would you set the plant in the manure?

MR. WILKINSON: The best method is to throw a forkful of well rotted manure out of the wagon into the furrow at the proper location, take the fork and divide the manure, and place the plant in the middle. The plant does not touch the manure. Dirt is placed around the plants. That is an expensive method and only practicable with a market gardener.

I have here some very good results of fertilizer trials. We want to determine what influence nitrate of soda or dried blood has upon the development of the plant. Here are the figures:

Fertilizer containing nitrate of soda yielded $14.22 profit per acre.

Fertilizer containing dried blood yielded $13.94 profit per acre.

Fertilizer containing both yielded $24.46 profit per acre.

Dried blood or nitrate of soda alone does not seem to be necessary for the largest return, but a combination of both of these seems to be best. That is for the largest returns.

From all experiments that have been carried on, there is evidence enough to believe that two per cent. of nitrogen in the fertilizer formula is best for tomatoes, either in the form of dried blood or nitrate of soda. Experiments have been carried on with six per cent. potash and ten per cent. potash, and the returns were the same.

MR. HAW (Onondaga County): Did you have a check on that potash?

MR. WILKINSON: The test carried on in the western state included plots without potash, with six per cent., ten per cent. and a great many others, including checks. There are some locations in New York State where ten per cent. potash is absolutely necessary in order to get a yield of tomatoes. Now, in what form do you use this potash, muriate or sulphate? From the experiments carried on in these midwestern colleges, it has been found that the muriate yield per plot varied from one to five and one-half tons; with the sulphate it varied from one and one-third to six and forty-one hundredths tons. In each case the sulphate appeared to be superior to the muriate as a source of potash. Thus, there was an average difference in all experimental work of twenty-two per cent. in favor of the sulphate.

QUESTION: Did this fertilizer have any effect upon the color or ripening?

MR. WILKINSON: It probably did. From all experimental work that I have been able to look over, I have found that practically everyone agrees in the Mid-West that about ten per cent. acid phosphate is necessary. In New York State we are not willing to say that ten per cent. of acid phosphate is necessary. In fact, we use a fertilizer with probably two per cent. less of phosphoric acid.

In Indiana they have determined under a three-year test that a 2-10-6 formula was best for their conditions, and the fertilizer made up in this way would consist of one hundred

thirty pounds nitrate of soda, two hundred fifty pounds high grade tankage, analyzing eight per cent. nitrogen, or one hundred fifty pounds dried blood, fourteen hundred thirty pounds acid phosphate, and two hundred fifty pounds sulphate of potash. They wanted to determine exactly how much was necessary per acre. So they tried different amounts. They tried first two hundred fifty pounds to the acre, then five hundred, then a thousand, then a ton. They found in each case that five hundred pounds per acre was the amount to apply if they wished to get results of the highest profit and the most economically. Two hundred fifty pounds gave very little profit per acre, one thousand very little more than five hundred, and two thousand really gave less than the five hundred.

MR. COLEMAN: Is that when you depend on commercial fertilizer entirely?

MR. WILKINSON: Yes. In New York State we are not advising a fertilizer of that kind. We are advising a 2-8-10 fertilizer, and we are advising growers to use nitrate of soda with a high grade tankage, 8-10, and the acid phosphate and potash for the best results.

The question is often asked by different men growing tomatoes, is it advisable to place fertilizer in the hill with the plant or to broadcast? From observation and from the experimental data of the different stations throughout the country, I have determined that there is little difference as far as results are concerned. However, if you are situated like the gentleman from Troy (Mr. Coleman), where you wish tomatoes very early and secure a high price for your product, I would prefer to place the fertilizer in the hill with the plant. If growing for the cannery, the season is then longer and the fertilizer may be applied broadcast.

A MEMBER: I have had best success on a light, gravelly, sandy soil, where they use fertilizer alone, to use five tooth cultivators, driving up the row and setting the plants right in the furrow. We average around ten tons.

Cultivation.

MR. WILKINSON: Tests were carried on which lasted

three years in the West. I believe in this case it is still Indiana. We find that there are two methods of cultivation there, one called "average," which resembles the work carried on by the average farmer in that location, the other "thorough cultivation." What did thorough cultivation consist of in 1910? It consisted of fifteen cultivations and ten hoeings, where the average was four cultivations. That year there seemed to be very little profit, one over the other. The average difference was three dollars and a half in favor of thorough cultivation.

Taking these figures as a whole for the three years, we find the average difference in favor of thorough cultivation above all expenses is twenty-four dollars and seventy cents per acre. That may mean the difference in many cases between profit and loss. The figures are as follows:

Three Year Test.

Kind	Cost per acre	Yield per acre	Value crop per acre
	1910		
Average	$ 2.00	2.52 T.	$ 25.20
Thorough	19.50	4.6 T.	46.30
	1911		
Average	3.00	9.75	97.50
Thorough	7.50	13.78	137.80
	1912		
Average	1.50	9.49	94.90
Thorough	5.50	13.36	133.60

Pruning and Staking.

I find a great many men in New York State are asking this question: What about staking and training and pruning the plants? Is it practicable? It is rather a perplexing question. How many men know about the conditions in Ohio, where five hundred acres are worked in this way? They use stakes, prune their tomatoes, and grow them in most up-to-date ways. However, few men know just what market these men grow for. It is for the early market entirely.

In general, you might say that for the man who is producing early tomatoes, the staking will aid him greatly; for the man who is growing for the cannery, it would be another story.

Evidently, from the canner's side, it does not pay to bother with stakes. However, there is a different story to tell with the early grower. Where did the large yield come from that we find where there is no pruning? It came from the tomatoes that began to bear July thirtieth. On July thirtieth the tomatoes were fifty cents a bushel. The market gardeners would not want to be considered very heavily there. They want tomatoes, two, three, or four weeks earlier than this date.

Here are some conclusions that I have drawn from these experiments as to the effects of pruning and staking. If you wish early fruit, fewer culls and fewer seconds, but a smaller yield, then stake and prune. If you wish a large yield, but late, with a large number of culls and seconds, do not prune, do not stake.

MISS MILLER: What would you advise for the home gardener?

MR. WILKINSON: I would advise the home gardener to have some of those early tomatoes and to have in another place some that will be a little later. If the garden is very small, say fifteen by thirty-five, I would advise staking altogether.

QUESTION: In using the method of letting them run over the ground, can you influence the number of culls by cultivation?

MR. WILKINSON: You can influence the number of culls by cultivation, by improvement of seed, and by selection of varieties.

A MEMBER: I have found by working my soil to the plants and forming a small bed for drainage, I have a very small per cent. of culls.

MR. WILKINSON: In every case where the tomatoes were separated into the different classes, there were more first

quality where the plants were allowed to run at will, but a larger proportion with the stake method.

QUESTION: With the stake method, do you plant nearer together?

MR. WILKINSON: Much nearer. Where running at will, three by four, four by four, four by five; with stakes, eighteen inches with two feet or three feet between rows.

MR. COLEMAN (Albany County): Do you know whether the staked and unstaked tomatoes were planted at the same distance in those variety tests?

MR. WILKINSON: Yes, there was the same number of plants per plat.

A MEMBER: There would seem to be a chance to change those figures in actual practice.

MR. WILKINSON: Yes, because where stakes are used, a larger number of plants may be set, resulting in larger yield per acre. It is claimed in Ohio where they stake their tomatoes that they are able to produce more tomatoes than by other methods, because they have more plants. Some report as high as twenty to twenty-five tons per acre. In our best canning sections, if they report fifteen or sixteen tons, they are doing very well indeed.

QUESTION: Is wire fencing practicable for tying up?

MR. WILKINSON: If you have a small garden, yes; if a large garden, no.

MR. HUNTER: Why would it not be practicable in the field?

MR. WILKINSON: In the first place, you must place the wire there and take it away. The leaves will work their way through, and you must take those out.

MR. CLUM (Seneca County): Mr. West had perhaps an acre trellised with common galvanized wire. He is a practical man. It seems as though he knew what he was doing.

MR. HUNTER: I meant plain wire.

MR. WILKINSON: It would be practicable if plain wire was used, but not poultry wire.

MR. HUNTER: Would they whip more than on stakes?

MR. WILKINSON: I think so. You have a large body exposed where wire is used, but with an individual stake there would be less surface.

MR. HAW (Onondaga County): I saw last spring a wire fence with six or eight inch mesh.

MR. CLUM: I have seen a row twenty rods long grown on a hog fence. It was a success as far as the growing of the tomatoes was concerned, but the fence was altogether too much.

MR. WILKINSON: The cost of stakes per acre: With three thousand seventy-five stakes, they would cost about a cent apiece. They are five feet long or a little longer. The cost of placing those stakes is eleven dollars and eighty-five cents. The annual expense with those stakes would not amount to much more than twenty or twenty-two dollars for placing the stakes and for loss of poor stakes. Then, there must be added the cost of removing the stakes again and storing, probably a matter of twelve or fifteen dollars. So you have a total expense of close to thirty-five dollars.

MR. CLUM: Can you get stakes in New York State for a cent apiece?

MR. WILKINSON: Mill edge is the thing to use.

MR. COLEMAN: Hop poles would be good, wouldn't they?

MR. CLUM: Just the thing.

MR. HAW: We use alder, but they last only about two years.

MR. COOK (Chautauqua County): I would like to ask if any of the growers who have been following the plan of staking tomatoes have also grown them on the ground at the same time and have arrived at any conclusion as to the ripening of the tomatoes.

MR. CLUM: About a week or ten days ahead of the ground tomatoes.

A MEMBER: I have noticed just about that difference.

MR. CLUM: When you get them off the stakes, you have

something you are not ashamed to let the people consume. The others may do for the canning factory.

MR. COLEMAN: I do not stake any. I do not think it is profitable in a large way.

MR. COOK: I wish to say that we grow some of the finest tomatoes that ever grew outdoors in our section of the country, and they grow right on the ground. We have fine quality tomatoes. Our test for this would be to plant the tomatoes at the same time, those on the stakes and those on the ground. Then make a test as to earliness. I do not believe the stake men can beat us on the ground fifteen minutes. Our ground is a gravelly loam.

MR. WILKINSON: Do you not think they could beat you in this way, that you have to place your tomatoes four by five feet apart or so, and they plant at a smaller distance apart?

MR. COOK: Our early tomatoes are planted about three and one-half by four. With canning tomatoes, it is a different proposition. We grow lots of tomatoes up there that we have sold as high as a dollar and a half for a twenty-pound basket, and we have been able to get that price for ten days or two weeks. No tomatoes grown on stakes.

A MEMBER: I have grown them both ways. Mine are a great deal better on the stakes, and I think more than ten days earlier in our location. We are on a rather heavy clay soil. We save a great deal in cleaning the tomatoes, and the difference in time. Instead of getting a dollar and a half for a twenty-pound basket for these early tomatoes, we get fifteen cents a pound and get that for about ten days. After that, the price goes down quite rapidly. In those ten days or two weeks, we can sell all the tomatoes we can get.

MR. WILKINSON: I was talking with a grower from Canada the other day, and he does not believe in staking at all. He is able to compete very successfully with the men in Ohio, who stake. I think the question is probably local and depends greatly upon the man.

MR. HAW: I think a good deal depends upon climate.

A MEMBER: One man told me you cannot raise tomatoes on the ground as well as on the stake. I said: "Try it." He had just as good plants, but did not get any early tomatoes. He was on a dry, gravelly soil.

MR. CLUM: There is another advantage. You can continue cultivation much longer. Also it is a great deal easier picking the fruit. You can pick much more.

MR. WILKINSON: I have figures on picking, and it was found to be otherwise.

Cost of picking, grading and packing:

	1910	1911	1912	Average
On stakes	$10.95	$19.80	$29.91	$26.22
On ground	9.18	18.84	31.80	19.92

Those figures represent the cost, but they do not represent the convenience or ease of operation.

QUESTION: Does spraying control the blossom end rot?

MR. WILKINSON: We have yet to find authorities who give a remedy for that, or anyone who has combatted that trouble successfully. It seems to be in some way connected with the variety, the season, the soil. Certain varieties are troubled with the disease more than others, certain soils are troubled wtih the disease more than others. As far as spraying is concerned, the advice is to use bordeaux mixture, but men report right and left that bordeaux mixture has very little influence as far as they are able to observe.

THURSDAY AFTERNOON.

FERTILIZERS FOR VEGETABLES.

L. L. VAN SLYKE, Geneva, N. Y.

In the growing of vegetables or any other crops, the use of fertilizers is not the whole thing. This fact needs to be emphasized at the start, so that it may be kept constantly in mind, even if nothing else is. The belief has been, and still is, too common that supply of plant-food is the chief or only thing to be considered in the successful growing of vegetables.

as well as many other crops. This misleading thought permeates agricultural literature, as is evident from the view so constantly expressed that soil fertility and abundance of plant-food mean the same thing. They do not. Plant-food is only one element of soil fertility and of the successful growth of crops, though, perhaps, we are justified in regarding it often as the most important one, if we can properly say that any one condition of successful crop growth is more important than any other.

The power of any plant to make use of its food to the fullest advantage is influenced by several conditions, a full discussion of which would involve a study of soil fertility, plant nutrition and methods of crop management, furnishing material enough for an encyclopedia, but too much for a brief address.

Conditions Essential To Utilization of Plant-Food.

Now, the use of fertilizers is effective or ineffective in promoting crop growth according to whether certain other conditions are present or not; and, as preliminary to our discussion of the special subject before us, let us briefly state in outline the fundamental conditions that are essential to the most efficient utilization of plant-foods.

(1st) Good seed, referring to variety, vigor or vitality, freedom from presence of other seeds and freedom from disease.

(2nd) Sunshine to furnish warmth and light.

(3rd) Adaptation of crops and varieties to special conditions of soil and climates.

(4th) Sufficient water supply, properly distributed, whether by rain or irrigation.

(5th) Suitable physical structure of soil, making conditions favorable for the growth of plants, brought about, according to special circumstances, by (a) underdrainage; (b) thorough tillage of proper character and at suitable times; (c) proper rotation of crops; (d) periodical incorporation of organic matter; (e) maintaining supply of calcium carbonate in soil.

(6th) The presence of beneficial micro-organisms in soil and conditions favorable to their growth, secured when

necessary by means of inoculation through treatment with farm manure, use of soil, or special preparation, according to particular circumstances.

(7th) Absence of substances poisonous to plants, including acid compounds.

Assuming that these conditions are satisfactorily adjusted, then crops are able to make efficient use of the plant-food that is within reach of the feeding rootlets. Conditions that are unfavorable in any one respect may easily make it impossible for a crop to utilize the plant-food that lies right at hand ready for use, whether that plant-food occurs naturally in the soil or has been applied in the form of fertilizers. We can see, therefore, that, from a practical point of view, all other conditions are preparatory, and in a sense subordinate, to the one final purpose of enabling the crop to obtain and use its food. When climatic and structural soil conditions are suitable for promoting crop growth, then the primary problem of crop production is crop-feeding.

Without going farther into detail regarding these preliminary considerations, and assuming that those conditions are present which enable plants to use plant-food efficiently, we will take up our special subject.

Quality, Quantity and Earliness.

In the growing of vegetables, two factors are, or should be kept in mind, (1) quality, (2) quantity. In case of many crops a third factor may become predominant and that is earliness.

We understand readily enough what is meant by quantity and by earliness, but it may be well to stop a moment to discuss just what we mean by quality in vegetables. The word is used to cover a variety of characteristics which affect, and often determine, the marketable value of a product. These special characteristics are entirely different in different kinds of vegetables. We mention as chief among the important qualities of vegetables the following: (1) flavor, (2) texture, (3) form, (4) size, (5) color, (6) shipping and keeping quality. I presume others may suggest themselves to you. As I shall point out later, these qualities may be influenced

more or less by the proper use of fertilizers. But first, let us take up these different qualities for a closer consideration.

The one chief edible quality which all vegetables must possess in common is that they be palatable or agreeable to the taste and appetizing. Flavor and texture enter largely into the matter of palatability, while all the qualities mentioned above may influence the appetizing property. Often a good test of the high quality of some vegetables is the ability to make one's mouth water at sight or smell, though we must confess that in some cases such a test may be very misleading.

Under flavor we would place taste and smell or a combination of these. The fundamental kinds of taste in vegetables are sweet, sour and bitter. Sweetness as a desirable quality should be prominent in sweet corn, peas, melons, squashes, pumpkins, beets, turnips, etc. It is a desirable quality, though less pronounced in asparagus, celery, parsnips, carrots, potatoes, etc. We look for acidity in rhubarb, tomatoes, etc. In plants used for salads and greens, a suggestion of bitterness is usually desired. For flavor as shown by the combined senses of taste and smell, we have as pronounced representatives onions, horseradish, cabbage, turnips, cauliflower, brussels sprouts, celery, etc., in most of which the characteristic flavors are due to the presence of certain sulphur compounds. The next edible quality of importance in most vegetables is what we call texture, which is dependent on tenderness, succulence and crispness, a quality of such obvious fundamental value that we do not need to dwell on it.

Regarding form, size and color in vegetables, these are qualities that appeal to the eye but are of no less marketable value than the edible qualities, provided that the latter are not sacrificed to the former. The notions and whims of consumers are numberless regarding these points and may be well or ill founded. But to discuss these details further would lead us too far from the main purpose of this paper. In regard to shipping and keeping quality we will speak later.

Before dropping this part of our discussion, we must touch briefly upon some of those qualities that are undesirable. We have overdeveloped flavor as in the case of excessive pun-

gency in some onions, or the strong disagreeable flavor of some celery, unpleasant bitterness in lettuce, over-acidity in tomatoes, entire absence of sweetness in peas, corn, beets, turnips, etc. Then we may have undesirable texture as illustrated in the coarse, tough, fibrous character in case of beets, celery, radishes, lettuce, asparagus, corn, etc.

Generally speaking, the ideal qualities of vegetables are largely dependent on conditions that make possible quick and uninterrupted growth. When growth is interrupted or unduly retarded, then some undesirable quality of flavor, texture, color, etc., is likely to develop. So far as interruption of growth is due to lack of sunshine or of rainfall, when this is the only source of water supply, one is, of course, helpless. However, under favorable conditions of soil, of light, warmth and moisture, the quality of vegetables can be fairly controlled by judicious regulation of the amounts and kinds of plant-food supplied.

The Work of the Plant-Food Elements in Plants.

In beginning our consideration of the use of fertilizers in influencing the quality, yield and earliness of vegetables, let us first take up some fundamental facts as to the particular kinds of work done in plants by the principal plant-food elements, nitrogen, phosphorus and potassium.

Nitrogen.

Nitrogen shows its influence most strongly in the development of the green parts of plants, the leaves and stems. Thus, an abundant application of nitrate of soda is usually followed by extreme luxuriance of stem and leaf growth. In the growing of vegetables this effect is of the highest importance, especially in the case of those crops in which the leaves and stems form the marketable crop, such as celery, asparagus, cabbage, onions, etc. And even in the case of most crops like peas, beans, melons, corn, tomatoes, etc., nitrogen is of the greatest value, because we must have a good growth of leaf and stem as a necessary preliminary for the complete development of plants. We must remember that the leaves constitute the working laboratory of the plant and

if this laboratory is not well equipped, we shall not get those compounds for which we grow many crops, such as sugar, starch, proteins, and others.

The effect of furnishing plants large amounts of available nitrogen is to retard the maturing process, since the vegetative activity is carried on in the stems and leaves at the expense of growth in flower and fruit. This is highly desirable in the case of many vegetable crops.

We must also keep in mind another fact in regard to the use of nitrogen in plant growth. The amount of nitrogen furnished a plant regulates the general growth of the whole plant and, therefore, the amount of plant-food constituents that a plant can use. It is useless to furnish a crop large amounts of available phosphoric acid or potash if we do not at the same time supply some nitrogen; because the amount of phosphoric acid and potash a crop can use is more or less largely controlled by the amount of nitrogen the crop gets.

How does nitrogen affect the quality of vegetables? Assuming, of course, that all conditions are favorable for plant growth, the amount of nitrogen largely affects or determines the following points in quality: Color, succulence or tenderness, size and keeping quality. Nitrogen is largely responsible for, though not the direct cause of, greenness in leaves and stems. Therefore, it is fair to say that, when we want the right kind of bright green color in those crops which we sell in the form of stems and leaves, we can get it only by a generous use of nitrogen in plant-feeding. In respect to succulence, tenderness and crispness in vegetables, especially the stems and leaves, abundance of nitrogen must be used to obtain products that possess these desired qualities in the right degree.

A question may properly be raised at this point: Is not the use of nitrogen in excess often responsible for too rank, coarse, and fibrous development of stems and leaves? The use of nitrogen has been credited with those effects. I believe that the use of nitrogen in large amounts, when the amounts of available phosphorus and potassium are relatively too small, may be regarded as the cause of coarse texture and tough fibres, especially when the growth occurs at

high temperature, in bright sunshine and with lack of moisture at some period of growth.

Size is due largely to generous feeding with nitrogen, other essential conditions being favorable.

The keeping quality of some vegetables may be very materially affected by nitrogen feeding. For example, cabbages grown with large amounts of nitrogen are all right for immediate consumption and of delicious crispness, but their keeping quality is impaired. For immediate consumption one can, therefore, use larger amounts of nitrogen than when the crop is to be stored for a considerable length of time.

Phosphorus.

The special interest of phosphorus to the vegetable grower is its effect upon the germination of seeds. Available phosphorus compounds containing calcium, like acid phosphate, favor rapid development of the young seedlings by stimulating the growth of roots and thus giving the young plant a good start. Under favorable conditions this early start may materially shorten the time in which the crop matures.

Potassium.

For the vegetable grower, potassium is of interest on account of its influence upon the formation of carbohydrates, such as starch, sugar and cellulose. With insufficient supplies of available potassium compounds, we cannot obtain starch or sugar. Sugar is, of course, of special importance in peas, sweet corn, melons, turnips, beets, etc. In this connection, a word will not be out of place in regard to the sweetness of parsnips, potatoes and similar products which have been subjected to low temperature. The starch in tubers and roots that are stored is converted into sugar slowly, and at ordinary temperatures this sugar is used up in respiration processes; but at low temperatures at which the change of starch into sugar goes on, respiration stops and the sugar accumulates. It is for this reason that parsnips, for example, need to be subjected to low temperatures before they become sweet.

The question has often been asked as to the comparative value of sulphate of potash and muriate of potash in the pro-

duction of starch and sugar in vegetables and fruits. In most of the experiments that have been made, no difference has been found. In relation to potatoes, sulphate has, in some cases, given larger yields, higher starch content, and cleaner tubers of more uniform size, than muriate, but this is far from being the rule. So far as we can now make a general statement, little or no difference is usually found on light soils, but on heavy or moist soils sulphate of potash will more generally produce potatoes of better cooking quality.

The importance of an abundance of available nitrogen, phosphorus and potassium in the growing of vegetables must be obvious when we consider the important work which each of these plant-food constituents performs. As we have previously stated, the most successful production of vegetables calls for early, rapid and continuous growth. To promote such growth requires the use of considerable amounts of soluble nitrogen and phosphorus. Though phosphorus is used in much smaller amounts by plants than either nitrogen or potassium, we must remember that its supply in most soils is much less. Potassium is used in relatively large amounts in the leafy portions of crops. Therefore, when the leaves and stems of a crop form the marketable portion, the amount of potassium taken from the soil is much greater than when some other portion of the plant is sold. Generally speaking, potassium usually needs to be applied rather generously on light, sandy soils and also on soils rich in muck or peat. On soils containing fair amounts of clay, much lighter applications often suffice, especially if the soil is kept well supplied with calcium carbonate, and also when sodium nitrate is extensively used.

Other Soil Amendments.

Before taking up the question of particular plant-food compounds and the amounts to be used, a word should be said about some particular points connected with soil management in growing vegetables, such as organic matter, calcium compounds or acidity, and some of the relations of the character of soil to vegetable growing.

It is desirable to keep in soils used in growing vegetables large amounts of organic matter, especially for the purpose

of holding moisture during dry spells. The method of supplying organic matter, whether by means of farm manure or by cover-crops, must depend upon individual conditions.

In the case of most vegetable crops, soil acidity, or deficiency of calcium (lime) carbonate, is a condition under which good crops cannot be grown. The few exceptions are potatoes, sweet potatoes, watermelons and carrots. The leguminous cover-crops that can be utilized on acid soils are cowpeas, soy beans, hairy vetch and crimson clover.

The only word further about soils at this time is this in regard to the influence of the character of the soil upon crop growth; light, porous, warm soils promote rapid growth and early ripening, while the reverse is true of heavy soils. Light soils should therefore be modified to hold moisture and heavy soils to become more open.

Fertilizer Materials.

In conclusion, we will discuss briefly some of the more common plant-food materials that are suited for use as fertilizers in growing vegetables. The materials which at the present time will be found most easily obtainable, most economical and in general, best fitted for the purpose in view are the following familiar ones: Nitrate of soda, sulphate of ammonia, meat and bone tankage, acid phosphate, sulphate of potash and muriate of potash. All of these materials except tankage are readily soluble in water and are, therefore, adapted for use, both in making top-dressings and in mixing with the soil by the usual method of application.

For quick growth, especially in starting crops, depend largely upon the nitrate form of nitrogen. If it is desired to make only one application and that at planting use, in addition to nitrate, sulphate of ammonia or meat tankage or both, using about one-third of each, or one-fourth each of nitrate and ammonia and one-half organic nitrogen. By thus having the nitrogen in three different forms, nitrate, ammonia and organic nitrogen, we furnish a supply, part of which is quickly available, and the rest becomes available gradually during the growing season of the crop. If one wishes to apply only nitrate nitrogen, whether alone or in a

mixed fertilizer, it is better to apply from one-third to one-half at planting time and the rest after the crops are well started, in one or two applications, according to special circumstances.

At the present time, I recommend acid phosphate in your work in preference to other forms offered for sale. Regarding potash, if you are in any doubt and don't want to test the matter for yourself, use sulphate. But in general, muriate answers just as well on light soils, especially if abundance of organic matter and calcium carbonate are kept in the soil.

A generous application of nitrogen is sixty pounds per acre, an amount which is contained in four hundred pounds of nitrate; of phosphoric acid, eighty-five pounds, contained in six hundred pounds of fourteen per cent. acid phosphate; of potash, one hundred pounds, contained in two hundred pounds of high grade sulphate or muriate. These quantities combined would make an application of twelve hundred pounds per acre of a high grade mixed fertilizer. More than fifteen hundred pounds may be regarded as high feeding. The amounts one can use most profitably is a matter that can be learned only by actual experiment under the special conditions of each grower.

Balanced Fertilizers.

We hear considerable discussion about balanced plant-foods or fertilizers, meaning the distribution of nitrogen, phosphoric acid and potash in those proportions which the plant can best utilize for most economical growth. For your purposes, there is only one point I would emphasize in relation to so-called balanced fertilizers. Keep enough available nitrogen in the soil to insure early, rapid and continuous growth, but make sure, in addition, to keep enough available phosphorus and potassium there to enable the nitrogen to do all the work it can, and also enough to prevent the nitrogen from running away with the growth of stems and leaves in the case of those crops in which the leaves and stems do not constitute the marketable portion.

Methods of Application.

In the matter of applying plant-foods, you must be govern-

ed largely by the results of your own experience and by the special circumstances under which you are working. However, a few suggestions may be offered in addition to some that have already been dropped. Place the fertilizer where it will, first of all, be at hand to furnish food to the feeding rootlets as soon as they are formed; that is, with most vegetable crops, in the row and distributed through the layer of soil surrounding and just below the seed. The extent of the root system of a plant will indicate how widely to apply the fertilizer. As to whether the application shall be made entirely at the time of planting or part at that time and part later, this must depend upon the amount and kind of fertilizer used and also upon the crop. When applications of more than one thousand pounds an acre are used, it is better to apply not more than one-half or two-thirds at planting time and the balance when the crop is well started.

Top-dressing.

Before closing, a word should be said about top-dressing. Only soluble plant-food materials should be used, and it is well to work them into the surface soil a little. When sodium nitrate, which is the material most commonly used for top-dressing, is applied, it is advisable to put on not more than one hundred pounds an acre at one time; it is also important never to put it on undiluted, if it is not to be worked into the soil, but to mix it with two to four times its bulk of any fine, dry, inert material previous to distributing. This dilution enables one to distribute it more uniformly and largely prevents injury to plants by spatterings of the dissolved nitrate, if the surface application is followed by a hard shower. Similar precautions are advisable in the case of top-dressing with any high grade or concentrated fertilizer, when it is to be placed on the surface near growing plants.

Summary.

In conclusion, I will summarize briefly the ground that I have attempted so hastily to run over.

(1) The effective use of fertilizers depends upon many other conditions, especially soil, climatic and physiological.

(2) In the growing of vegetables, quality, quantity and, in many cases, earliness are points of greatest importance. Under quality we include flavor, texture, form, size, color and shipping and keeping quality. High or desirable qualities are largely dependent on conditions that make possible quick and continuous growth.

(3) Under favorable conditions of soil, light, warmth and moisture, the quality of vegetables can be controlled to a considerable extent by judicious regulation of the kinds and amounts of plant-food furnished.

(4) Nitrogen largely controls the growth of stems and leaves and through them the general development of the plant. In vegetables the stems and leaves of which constitute the marketable portion, quality can be greatly influenced by nitrogen applications. Nitrogen regulates the amounts of phosphorus and potassium plants use and, therefore, the general growth of all crops.

(5) Phosphorus compounds along with calcium favor the development of seedlings and stimulation of root growth. Such early start under favorable conditions affects the earliness of the crop.

(6) Potassium compounds are of special importance in growing vegetables that store up starch and sugar in the marketable portion.

(7) Some special soil conditions to be controlled are abundance of organic matter and calcium carbonate. Light soils should be modified to hold moisture and heavy soils to become more open.

(8) The plant-food materials best suited for use in respect to economy, availability and accessibility are nitrate of soda, sulphate of ammonia, meat tankage, acid phosphate, sulphate and muriate of potash.

(9) In the use of fertilizers in growing vegetables, it is best to apply generous amounts of nitrogen but to make sure at the same time that neither phosphorus nor potassium is deficient.

(10) In general, if vegetable crops are grown so as to furnish products of high quality, the quantity will take care of itself.

PRESIDENT GREFFRATH: This is a round table talk. We have some time before us. Now is the time to ask any questions on the subject of fertilizing crops.

Form of Phosphorus.

QUESTION: Why do you recommend phosphate instead of bone?

PROFESSOR VAN SLYKE: The action of bone is slow. Where you want quick work, there is nothing that works so satisfactorily as the acid phosphate. Bone will become available in time if you can wait, but where you want immediate work, you must use acid phosphate. Phosphoric acid in the form of bone at present prices will cost you somewhat more, especially if you take into consideration availability. The reason I mention only a limited number of commercial materials is based in large measure upon the prices prevailing at the present time. The nitrogen in dried blood at present prices will cost you about thirty cents a pound, in nitrate of soda, fifteen. While the dried blood is an excellent material to use, it will have to be under very unusual circumstances when you can afford to pay thirty cents a pound for nitrogen in this form.

Form of Nitrogen.

QUESTION: Would you consider fish tankage to take the place of dried blood?

PROFESSOR VAN SLYKE: Yes, but the cost of nitrogen in that is higher than in nitrate. In some cases especially where you want a little slower action, it is better. The ground fish is apt to be somewhat coarser. One unfortunate fact is that the supply is so limited. Cotton seed meal as a source of organic nitrogen in fertilizer is very desirable, but the price is prohibitive in the North.

A MEMBER: I made an experiment on cotton seed meal on a little plot of celery, and I never had a nicer plot than that.

For Lettuce.

PRESIDENT GREFFRATH: What formula would you recommend for a good lettuce fertilizer for a summer crop on muck land soil, with head lettuce?

PROFESSOR VAN SLYKE: A fertilizer containing from three to four per cent. of nitrogen, about eight per cent. phosphoric acid, and ten per cent. potash.

PRESIDENT GREFFRATH: Have you any special source from which you would recommend getting the nitrogen?

PROFESSOR VAN SLYKE: In that case it would be well to have about half of it in the form of nitrate of soda. I should put on most of it before the crop is planted. It might be well to supplement with some nitrate of soda after the crop is well started.

Cyanamid.

PRESIDENT GREFFRATH: I would like to ask if there is any member present who has used cyanamid instead of nitrate of soda or other sources of nitrogen? I heard of a party last year who had received a sample bag of that from the manufacturers at Niagara Falls, and he used it on a portion of the crop of lettuce, marking the rows on which he used it. He claimed that he had very little need of marking them, for it apparently killed the lettuce plant, so there was very little left but the heart. He sowed it broadcast, also the nitrate of soda, which I think is a very bad plan. It is likely to burn. He used the cyanamid in the same way, and in a very short time it seemed to destroy the plant and he thought it was a total loss. The other crop came on, and the first recovered but it was about ten days later than the other crop, but he said the quality was so much better than anything he had ever seen he was going to use it this year.

PROFESSOR VAN SLYKE: I have not known in particular about the effects of cyanamid on lettuce. In the literature I have been following the effects of cyanamid for ten years or so, and I avoid recommending it at the present time, for the reason that we do not know enough about it to use it indiscriminately. It is generally recognized that if it is put on the soil at the time of seeding, it will injure the seed seriously; and so it is generally put into the soil one or two weeks before seeding, in these cases the seeds not being injured. But it is being used in some of our mixed fertilizers quite extensively as a source of part of the nitrogen, though, of

course it is diluted in that case. I should advise wholly against anybody attempting to use cyanamid alone except in an experimental way, and then with a good deal of caution. Where it is used with precautions along with other plant-food materials, it has been found to give on general field crops about as good results as ammonia nitrogen. It is really an ammonia compound. When it is put into the soil and becomes moist, it changes into ammonia. Under certain conditions another compound may be found, which is known by the name of dicyanamid, and that is very poisonous.

For Onions.

A MEMBER: I would like to have your formula for fertilizer on muck for onions.

PROFESSOR VAN SLYKE: It would be practically the same as I gave for lettuce. That is a good formula for vegetables in general. With reference to the onions, I should be inclined to use somewhat less nitrate of soda, perhaps a third nitrate of soda, and a third sulphate of ammonia, and the rest meat tankage, or perhaps a third nitrate of soda and the balance meat tankage. You do not want to force the onions too rapidly. In regard to the potatoes, use about the same. So far as formulas are concerned, it is not so much, in my judgment, the particular proportions that you put on as it is the total amounts that you put on; and the main thing is to be sure that you have enough of the different forms of plant-food.

For Potatoes.

QUESTION: How much on an acre of potatoes on sandy soil?

PROFESSOR VAN SLYKE: With reference to potatoes, I should recommend on a soil that has been well handled and that is known to contain considerable amounts of organic matter, whether from manure or from green crops turned under, a fertilizer containing not perhaps more than one-fourth of its nitrogen in the form of nitrate of soda and perhaps one-fourth in the form of sulphate of ammonia, and the balance in the form of meat tankage. In the case of a soil

that is rather poor in organic matter, I should cut down the amount of nitrate even more and increase the amount of tankage, and I should in that case supply rather more of the phosphoric acid in the form of tankage than in the form of acid phosphate, that is, where soil is lacking in organic matter, but potato soil ought never to be allowed to get into that condition. As to the amounts to use, I do not think it is good economy on good potato soils to use less than five hundred pounds an acre, and only under very exceptional conditions do I think it is good economy to use more than a thousand pounds. I think it is a good plan for you to experiment some in regard to amounts and find out what amounts you can use most profitably. Down on Long Island some years ago, experiments were made in which five hundred, a thousand, fifteen hundred, and two thousand pounds of fertilizer were used. Results showed that when a thousand pounds of fertilizer per acre were used, we got the largest return in net receipts. While there was a larger potato crop with fifteen hundreds pounds of fertilizer than with a thousand pounds of fertilizer, it was not enough greater to pay for the extra five hundred pounds used.

PRESIDENT GREFFRATH: Which way do you think it the best to apply the fertilizer to potatoes? There are a large number of potatoes being planted with the planter, and the planter, as I understand it, applies the fertilizer direct.

PROFESSOR VAN SLYKE: There is one point in connection with the amount of fertilizer used and the method of applying that should be taken into consideration. It is highly important to keep the fertilizer from coming into contact with the potato seed. All these materials used in our fertilizers are concentrated chemical compounds, and when they come into contact with any seed, or for that matter with any living plant, beyond a certain concentration, they injure the vegetable growth. So it is desirable, in the first place, that in putting in the fertilizer with potatoes, or with any other seed, it be kept as far as possible from coming in direct contact with the seed. It is obvious that if you are putting on five hundred pounds of fertilizer, it is a good deal easier to keep from injury than if you are putting on a thousand

pounds, or fifteen hundred, or two thousand pounds. We have found that where farmers use the same method of application with two thousand pounds as with five hundred, they get more injury. Up above a thousand pounds I think the difficulty can be overcome largely where you want to put on large applications of fertilizer by not putting on more than six hundred pounds in the row at the time of planting or previous, and then when the potatoes are up, say two or four inches, make an application alongside the row of the balance of the fertilizer that you want to put on, drilling it in slightly. Under those conditions you not only avoid the injury to the seed, but where you have considerable amounts of nitrate and particularly on light soils, you get the full effect of your fertilizer better than if you put the whole amount in at the time of planting.

QUESTION: Do you think you get the value of the fertilizer in the crop of potatoes when, after using five or six hundred pounds right in the row, you can see a line of white all the way up the field at digging time?

PROFESSOR VAN SLYKE: The probability is that such an appearance comes from the land plaster which is in the acid phosphate in the fertilizer.

QUESTION: Would that not indicate that a good deal of the fertilizer was left there?

PROFESSOR VAN SLYKE: That depends a good deal upon the form you put on. Rock phosphate usually gives good results the second year, but with acid phosphate, unless you put on very large amounts, the probability is that not enough would be left to affect the next crop noticeably.

For Celery.

QUESTION: Would you use the same formula for celery on muck land?

PROFESSOR VAN SLYKE: I would, in putting in the crop, but I would make applications of nitrate of soda as a top dressing.

QUESTION: What quantity would you use in putting in the crop?

PROFESSOR VAN SLYKE: If I had grown celery on the land before, I should be governed primarily by that. If I did not know anything about it, I should use from six hundred to a thousand pounds.

QUESTION: As to the effect of the keeping quality of the celery with nitrate of soda, will it stand up in cold storage?

PROFESSOR VAN SLYKE: If you do not put on too much. You can make, we will say, two applications of seventy-five pounds or three applications of fifty pounds. Possibly in connection with the keeping quality of celery, the question of disease comes up—the matter of rotting; and it is generally recognized that over-feeding with nitrogen tends to make a plant more sensitive to the attack of plant diseases. That is, the tissues are more tender, more easily broken, and therefore more susceptible to attack of disease.

Effect of Fertilizer on Acidity.

MR. RUSSELL: What danger is there of making a soil sour by the use of acid phosphate?

PROFESSOR VAN SLYKE: If you use large amounts of acid phosphate without applying lime carbonate or any other form of lime or without using nitrate of soda, there is sooner or later danger of making your soil acid, and particularly if you use along with it sulphate of ammonia and either muriate or sulphate of potash. It is not the acid phosphate that makes the soil acid. That may sound like a contradiction. While the soluble calcium phosphate, which is the compound that does the work in the acid phosphate, is an acid compound, it is not that that makes the acid in the soil, because that is taken up and used by the plant. The trouble comes from the land plaster (calcium sulphate), which is in the acid phosphate.

QUESTION: Does it not make a difference what it is treated with, whether it is sulphuric acid or the refuse from the oil manufactory?

PROFESSOR VAN SLYKE: No, I do not think it makes any difference. The statement has been made, but without

proper foundation, that the sulphuric acid which had been used in the refining of kerosene oil and which was then used for making the acid phosphate was prejudicial.

QUESTION: What proportion of nitrate of soda or lime would it be necessary to put in your acid phosphate in order to counteract any such action?

PROFESSOR VAN SLYKE: The probability is that if you put on per acre a hundred pounds of nitrate of soda in your fertilizer that would be sufficient to prevent acidity from acid phosphate. It may sound strange, but nitrate of soda has the power of preventing or correcting acidity, but it is explained in this way: The nitrate of soda is made up of two parts, the nitrate part and the soda part. Plants do not use sodium to amount to anything. They simply take up the nitrate, and that leaves the sodium in the soil. That at once combines with the carbon dioxide and makes sodium bicarbonate or saleratus, which is an alkali and neutralizes acids.

Potatoes Again.

MR. WORTLEY: I should like to ask your advice on some unexpected results I had. In Bermuda castor pomace is used very largely. It is used without phosphate or potash. The soils are very light, calcareous almost entirely. Sand is not known to contain silicon. These soils proved to be deficient in potash. They had been used for years in growing potatoes without any rotation, and I thought it would be very easy to use a 4-8-10 formula and get a very superior yield to that of castor pomace. I have been trying that with ten plots, and in five cases the pomace, at the cost of half that of the 4-8-10, has given better results. While I have had very good returns in one or two cases, the popular local manure has beaten the more expensive 4-8-10.

PROFESSOR VAN SLYKE: Do you know what the condition of those soils was with reference to the amount of organic matter in them?

MR. WORTLEY: It was not very high.

PROFESSOR VAN SLYKE: With a fairly warm climate, lots of calcium carbonate and frequent replenishings would be

ideal conditions for using up the organic matter. Under those conditions the probable reason why you did not get satisfactory results with the chemicals was due to the lack of organic matter. In putting in pomace, you are putting on organic matter.

MR. WORTLEY: In one case organic matter had been used very freely for fifteen years.

PROFESSOR VAN SLYKE: Did the application of chemical fertilizer give no satisfactory results?

MR. WORTLEY: In that case, it gave no improvement over the castor pomace. The manures were very carefully weighed.

PROFESSOR VAN SLYKE: Without a fuller knowledge of all conditions I could not explain just what was the trouble where the stable manure had been applied.

MR. WORTLEY: Do you think the rains would have anything to do with it? We applied certain manures later than we intended to. In that case, the increase was most marked.

PROFESSOR VAN SLYKE: Do you know whether the seed was injured? Did you put on all the fertilizer at once?

MR. WORTLEY: Yes, before the seed came up. There was no injury.

QUESTION: I would like to know how to overcome that scab condition in certain ground.

PROFESSOR VAN SLYKE: The ordinary potato scab is caused by alkaline conditions of the soil, and the only way of getting rid of that is to make the soil slightly acid. That is the quickest way. The application of sulphate of ammonia and acid phosphate and either muriate or sulphate of potash would all work that way. Do you have scab right along?

A MEMBER: We do have considerable. We use quite considerable quantities of sheep and cow manure.

PROFESSOR VAN SLYKE: I suspect that that is where your trouble comes from. Those animal manures in undergoing decay turn into ammonia first and for a while produce an alkaline condition of the soil; and if that came right at the

time when the tubers were forming, it might start the trouble with the scab. In that case, the same treatment would answer, the application of chemical manure in place of or along with those substances.

QUESTION: A better way would be perhaps to put the manure on the preceding crop?

PROFESSOR VAN SLYKE: Yes. To go back, I am very much interested in that condition of things in Bermuda. In putting on the organic matter, you get little or no leaching. With chemical fertilizers on that sandy soil, there would be great liability of large loss, and I would suggest that in further work only a part, five or six hundred pounds, be put in the soil at the start and the other be used as a surface application.

MR. WORTLEY: I have arranged to repeat those experiments entirely and to have duplicate ones.

PROFESSOR VAN SLYKE: The soil must leach. The nitrate would be the first thing to go out.

MR. WORTLEY: I used tankage and nitrate of soda.

PROFESSOR VAN SLYKE: That certainly would not go out that early in the season.

Does Nitrate Improve Soil?

MR. RUSSELL: Will sodium nitrate in any way deplete the natural fertility of the soil?

PROFESSOR VAN SLYKE: It will in this way: If you have in the soil already considerable amounts of potash and phosphoric acid and you put on large amounts of nitrogen without putting on phosphoric acid and potassium compounds, the nitrogen of the nitrate of soda will promote the growth of the crops and they will use up the potash and phosphoric acid there is in the soil; and if you go on putting on nitrate of soda without putting on phosphoric acid and potash, the result will be depletion of the latter. Nitrate of soda has a very marked effect in liberating potash in the soil. In your clay soils where you are growing anything that needs potash, if you use the nitrate of soda, you do not need to use in the

fertilizer as large amounts of potash as you would if you used no nitrate of soda.

For Spinach.

QUESTION: What formula would you use for spinach?

PROFESSOR VAN SLYKE: I should use practically the vegetable formula 4-8-10, anywhere from six or eight hundred pounds up. You see you cannot tell what to put on your soil within several hundred pounds. You will have to be governed by your previous experience or by experiments that you conduct yourself. In the case of heavy, leafy crops, I should put on from six hundred pounds up.

PRESIDENT GREFFRATH: Don't you think a liberal application of nitrate of soda in the early spring especially will be very beneficial to a leafy crop?

PROFESSOR VAN SLYKE: Yes. On any vegetable crop, as far as I know, because it is generally true, that in the early spring the amount of available nitrogen in the soil is less than at any other time in the year, for the reason that with previous cropping it has been used up, and during the fall there has been some leaching. The application of nitrogen which can go right to work stimulating the growth of the young plant is helpful.

For Muck Soils.

QUESTION: What kind of nitrogen would you recommend for muck soils?

PROFESSOR VAN SLYKE: Mineral nitrogen preferably, because you have a lot of organic matter there, and since it is of a character that becomes available very slowly, you cannot depend upon its becoming available in very large amount in any one season. I am inclined to think that in your nitrogen application to ordinary muck soils, you should put on the nitrogen very much as you would put it on a soil that does not contain much nitrogen, unless you do something to make the muck nitrogen available during the season by liming it or some such process.

QUESTION: What kind of potash would you recommend for a wet muck soil?

PROFESSOR VAN SLYKE: I should advise the sulphate.

QUESTION: What form of phosphoric acid would you use?

PROFESSOR VAN SLYKE: I should use acid phosphate. While sulphuric acid is used in making acid phosphate, they do not put in quite enough to do all the work. For example, we have here a certain amount of rock to be dissolved; it combines with and uses up the acid. The manufacturers make a point never putting in quite enough acid to dissolve all the rock. They do that because they do not want to have any free sulphuric acid left. If there ever is any free sulphuric acid in an acid phosphate, it is very small indeed and not enough to do any harm.

Reinforcing Manure.

QUESTION: Do you recommend acid phosphate to put on barnyard manure?

PROFESSOR VAN SLYKE: Yes, as a means of holding ammonia. The land plaster or sulphate of lime that is in the acid phosphate combines with ammonia to some extent, and the acid phosphate itself combines with the ammonia and holds it as a chemical compound, so that it does not escape in the air.

QUESTION: At what rate?

PROFESSOR VAN SLYKE: Forty or fifty pounds of the acid phosphate to a ton of manure. If you have muck on your land that is easy to get at, just dig that out and let it dry, make it fine and use that in your stable with your manure. There is nothing that is quite equal to muck as a good absorber. It will hold the liquid, and the ammonia, and will be very satisfactory. At the same time, the nitrogen that is in the muck will be decomposed also. In regard to the decomposition of muck, the application of organic matter—stable manure or dried blood or tankage, any of those things that undergo decay in the soil—helps to cause the organic nitrogen of the muck to decay.

Cover Crops For Muck.

QUESTION: How about cover crops for muck soils?

PROFESSOR VAN SLYKE: They are very desirable to a cer-

tain extent, provided you do not get in so much as to loosen up the soil and make it too porous.

QUESTION: What cover crop do you recommend?

PROFESSOR VAN SLYKE: Any cover crop that you can grow to best advantage.

QUESTION: How late could you sow crimson clover?

PROFESSOR VAN SLYKE: Probably August, if you could get the other crop out of the way by that time.

QUESTION: Why not plow it in the fall?

PROFESSOR VAN SLYKE: It is all right to plow it under if you can get it started. As I understand it, you are speaking of putting in a cover crop after you get off your other crop.

A MEMBER: Not necessarily.

PROFESSOR VAN SLYKE: That would be all right.

QUESTION: Would not alsike clover be good?

PROFESSOR VAN SLYKE: One trouble with putting clovers on muck soil is on account of the acidity. They will not grow on an acid soil.

QUESTION: Can you get cowpeas as far North as this?

PROFESSOR VAN SLYKE: There are certain strains that can be used here. If you will write to the Bureau of Plant Industry, Department of Agriculture, at Washington, they can give you the information and probably can send you a bulletin which will cover just that point.

QUESTION: When you add muck to the manure instead of acid phosphate, how much do you add?

PROFESSOR VAN SLYKE: Just add enough so that it takes up the liquid.

Unavailable Nitrogen.

QUESTION: How long does it take hair manure and hoof meal and things of that type to become available?

PROFESSOR VAN SLYKE: Probably in fifteen or twenty years they might be available. You used to hear a good deal about such materials, which are practically worthless as far

as immediate availability is concerned, being used in fertilizer. The manufacturers of fertilizers now have found a simple way of putting them into the fertilizer honestly. When the rock phosphate is treated with sulphuric acid, they put into that mixture the hair or the leather, and during the action the sulphuric acid wholly changes such things as leather and hair into forms of nitrogen that are about as available as good tankage. So it is possible under commercial conditions to change those worthless things into fairly good form. You may have seen in the paper the expression "wet process" of mixing fertilizer. It means just this process.

QUESTION: Could muck be put in that way and be made very available?

PROFESSOR VAN SLYKE: Yes, only there is not very much nitrogen in muck. It would hardly be worth while.

How Long Are Fertilizers Available?

QUESTION: How long will a complete fertilizer in the ground, if not used, be available to the plant?

PROFESSOR VAN SLYKE: Nitrate of soda would not stay there during the season. Sulphate of ammonia would stay till it is changed into the nitrate and washed out. The acid phosphate is fixed in the soil, so that very little of that is lost. The potash compounds are also fixed in the same way. Organic nitrogen would stay longer.

MR. RUSSELL: How long would nitrate stay in a clay soil that would not leach very fast?

PROFESSOR VAN SLYKE: I should say it ought to stay through one summer season and over into another.

QUESTION: Would any evaporate?

PROFESSOR VAN SLYKE: No, the nitrate is just like common salt or sugar, and it will not volatilize.

Lime.

A MEMBER: I live near the Caledonia lime deposit where they get the agricultural lime. Our people are using considerable of that agricultural lime. Can you tell me how

valuable that is for the farmers to use as far as helping the soil is concerned?

PROFESSOR VAN SLYKE: That is a high grade marl. It runs pretty nearly pure calcium carbonate. It is capable of being ground finer because it is softer than the ordinary limestone.

QUESTION: Would the product of the Syracuse Stone Company be as good as that when delivered?

PROFESSOR VAN SLYKE: The ground limestone of the Syracuse Stone Company is not as rich as the samples of marl in calcium carbonate.

QUESTION: Would that be valuable in throwing it on the manure in any way?

PROFESSOR VAN SLYKE: I would not throw it on the manure, because that would encourage decomposition.

Manure of Birds.

QUESTION: Is pigeon manure valuable?

PROFESSOR VAN SLYKE: Yes. It runs very much like hen manure.

QUESTION: Is it worth twenty-five cents a bushel?

PROFESSOR VAN SLYKE: Would it run fifty pounds to the bushel?

A MEMBER: I do not think it would. It is dry.

PROFESSOR VAN SLYKE: I think you could put it this way: you probably could afford to pay at the rate of three to four dollars a ton for it.

A MEMBER: Would you apply it something as you would phosphate?

PROFESSOR VAN SLYKE: A good plan is to mix it and make a complete fertilizer by putting about forty pounds of muck or sawdust, forty pounds acid phosphate, and twenty pounds of sulphate or muriate of potash, to one hundred pounds of the manure.

QUESTION: Is the same thing true of hen manure?

PROFESSOR VAN SLYKE: The same thing is true of hen manure.

Raw Rock For Muck.

MR. M. B. MCCARGO: Do you advise using raw rock phosphate on muck?

PROFESSOR VAN SLYKE: Yes. On the acid mucks, raw rock phosphate has been found generally to give excellent results. While I would not depend upon that wholly without knowing the conditions of the soil, I would use acid phosphate, but I would put on some raw rock phosphate too.

MR. MCCARGO: How long before it is available?

PROFESSOR VAN SLYKE: It ought to show some availability the first season. In Illinois where they have heavy, black, acid soils, they are using the rock phosphate very satisfactorily untreated. They simply put on a thousand pounds an acre once in four or five years. That appears to be sufficient for farm crops or other grains. It seems to be absolutely useless unless there is plenty of organic matter. As vegetable matters decay, additional acid is formed. That is very desirable. A good many of the muck soils are already acid, and they have not very much plant food in them to dissolve. One characteristic of muck soils is deficiency in potash and phosphoric acid. They do as a rule contain lots of nitrogen, but it is not in a readily available form.

QUESTION: Does it make any difference about the acid when a green crop is plowed under?

PROFESSOR VAN SLYKE: I do not know as it makes much difference providing the soil is not on the verge of acidity.

Lime On Muck.

QUESTION: What do you recommend as to the use of lime on muck soils?

PROFESSOR VAN SLYKE: It is generally desirable, but it is important to work it in pretty deep. If you work in only the first two or three inches, you will find that the soil burns out, as it were, and does not hold moisture in that upper layer, so it is desirable, if you lime the soil, to work it in four or five or six inches.

QUESTION: What kind would you recommend and when applied?

PROFESSOR VAN SLYKE: The fall is a good time. Spring is a good time if you have plenty of time to put it on and work it in. A good plan is to distribute it over the soil and harrow it in, although in some cases where one wants to work it down deep into the soil, it may be desirable to plow it in. As a rule, the best results are obtained by plowing and then putting on the lime and harrowing it in as deeply as may be. Use whatever lime is cheapest. Some say never put on the slaked lime or the quick lime. The cheapest thing to buy is rarely ever the slaked lime. It is a matter of price and convenience. You can get the ground limestone. That does not act as rapidly as the slaked quick lime.

QUESTION: Is this Syracuse lime that is not ground very fine as good?

PROFESSOR VAN SLYKE: That of the Solvay Company is a mixture of carbonate and slaked lime and quick lime. That will slake and become fine. If you can get it at a fairly reasonable price, it is a good material to use. On light soils one must be careful about liming, especially if using quick lime. The lime promotes the decomposition of organic matter, but usually that is what organic matter is there for, only we do not want it to decompose too fast. On light soils the application of slaked lime in amounts larger than five hundred pounds or a thousand pounds at most may do harm, chewing up the organic matter too rapidly, unless you take pains to do something to keep the organic matter there.

Other Materials.

QUESTION: What is alphano humus?

PROFESSOR VAN SLYKE: I do not know exactly what it is made of. It is largely organic matter, and it contains a little nitrogen, a little phosphoric acid, and a little potash. In some greenhouse work it gives good results, especially for furnishing organic matter. As a source of plant food for field use, the prices that are charged for it are altogether too great.

MR. GREFFRATH: Do you consider sheep manures that are pulverized a good product to buy?

PROFESSOR VAN SLYKE: They are a good product to put on, but too expensive to buy, eighteen dollars a ton. They run about two per cent. nitrogen, the same amounts of phosphoric acid and potash. You have probably less than eight dollars worth of plant food there. For field work the cost is too high. For greenhouse work in a small way, it may be useful.

QUESTION: How does that compare with pig manure ground?

PROFESSOR VAN SLYKE: Very much the same.

When Apply Manure?

QUESTION: In regard to stable manure, when would you advise having it spread?

PROFESSOR VAN SLYKE: If one is producing the stable manure on his own farm and there is nothing to prevent, the best time, all things considered, is to spread from the stable. There is only this objection to applying in the fall, and I do not think on the whole it is a very serious one where put on late in the fall; as it is spread on the surface, the rains come and wash out the soluble material into the soil, and the insoluble material that is left on the surface does not decompose as rapidly when separated from the soluble part.

QUESTION: You would advise plowing under in the fall?

PROFESSOR VAN SLYKE: It would be better.

QUESTION: You would not advise applying manure through the winter?

PROFESSOR VAN SLYKE: Yes. The objection I have mentioned is raised, but I do not think on the whole it is a very serious matter.

QUESTION: Do you think manure turned under in the fall is better than in the spring on a muck soil?

PROFESSOR VAN SLYKE: I should be governed very largely by convenience as to which was the easiest thing to do.

IRRIGATION SESSION.

MR. WORK: We must have all the factors right if we are to get returns from our investments. The moisture factor is one that we ordinarily leave to nature. Nature treats us fairly well. If we keep our soil in condition in other respects, we shall be able to get pretty good results a part of the time, but we are not satisfied with that. We want good crops every time. There is hardly a season when the rainfall is not deficient at some time or other. There is seldom a season when irrigation would not pay at some stage or other.

There are a good many methods of applying water in practice. The first is typical of the West, a furrow method of irrigation. There are a few growers who are practicing furrow irrigation in the East successfully.

Another method that is practiced about Boston is the hose method. That has been used to a considerable extent, and we are surprised sometimes at the amount that can be covered in that way. The Boston men use it quite a little on a fairly large scale. I am told that one man with an inch and a quarter hose can put an inch of water on an acre in five and one-half hours. That, I should judge, would be ordinary city pressure. If you are going to use the hose method, you must have fairly high pressure. This information comes from Florida: Two men can water an acre in three hours.

Sub-irrigation is practiced in vegetable production. We have often heard of Sanford, Florida, where the artesian water is available and where tiles are laid underneath the garden plots. In some cases they have been arranged in such a way that the drainage system and the irrigation system are one and the same. Sub-irrigation is not satisfactory where we have a very porous bottom. If you have gravel underlying your garden, it would be very difficult to work in this way. One of our own muck land growers in this state has practiced sub-irrigation on a fairly large scale. Mr. W. L. Bonney of Batavia has some fifty-five acres of muck. He used to have it drained with open ditches. Now they are all closed and tile are in use. There are all degrees in the

practice of it. Some muck land men simply close the ditch and raise the water table to a definite height.

Then, the type of irrigation that is most commonly practiced by upland vegetable producers and also to some extent by the muck land men is the overhead system. In past years we had many types of nozzles. Many of them were so constructed that they would be placed after the fashion of a lawn sprinkler every fifteen to thirty feet or more along a pipe line. With that sort of a system you are doing one of two things. Either you cover circles and leave some space dry, or else, if you make those circles large enough to cover everything, then there are some parts that are receiving double service. In other words, you do not get an even distribution. That type of sprinkler has been practically discarded.

Nowadays we are using chiefly an overhead system of irrigation generally known as the Skinner System. An acre is laid out with a feed line either through the middle or at one side. Lines of pipe are established about every fifty feet across that acre. These pipes are set up on posts. About every three feet are nozzles. They are threaded, made of brass. With forty pounds pressure they will throw about thirty feet. Those nozzles must be in perfect alignment on that pipe. We have a union which makes it possible to turn the whole line by means of a handle. The Manaway System is similar.

QUESTION: What about the wind?

MR. WORK: If the wind is strong, it may blow the water quite a little. With moderate winds and fairly steady winds, it compensates very well.

A MEMBER: It works better if the wind blows than if it does not blow at all—it throws it over the ground more evenly.

MR. WORK: That water comes down as the very gentlest mist. It takes eight and one-half hours to put on an inch of water. A three hundred foot line is operated with one hundred feet of one and one-half inch pipe, one hundred feet of one inch pipe, and one hundred feet of three-quarter inch.

A MEMBER: I have seen a Skinner System eight hundred feet long.

QUESTION: What is the address of the Skinner Company?

MR. WORK: Troy, Ohio.

QUESTION: What does it cost to equip land with the system?

MR. WORK: This is on a five-acre basis with a feeder line at one side and with the pipe lines fifty feet apart: You require four hundred fifty feet of one and one-half inch pipe, thirteen hundred fifty feet of one and one-quarter inch pipe, fourteen hundred forty feet of one inch pipe, and eight hundred ten feet of three-quarter inch, with the necessary connections. This is allowing for new pipe for the posts. You can use old pipe which you can buy pretty cheaply. This also includes the necessary unions and a machine. The unions cost two dollars and a half apiece, one of which you must have at the end of each line, and drilling machine costs ten dollars. The total of the equipment you would buy from them for the five acres is practically one hundred twenty-seven dollars. They send a complete list of equipment aside from what they furnish. That figures up about eight hundred dollars.

Twenty acres has been equipped with twenty-five hundred dollars, including one-half mile main pipe. I do not believe that includes any pumping outfit or an engine. With No. 1 outdoor nozzles, an acre takes about one hundred sixty-six gallons per minute, and it takes eight hundred feet of line for an acre. You can get a three horse power engine from one hundred twenty-five to one hundred forty dollars.

A MEMBER: I was told you could get a duplex pump, seventy-five gallons a minute, for forty-five dollars. How many gallons are there to an acre inch?

MR. WORK: Twenty-seven thousand one hundred fifty-two. At thirty cents per thousand gallons, it costs eight dollars fifteen cents for application. A good engine, we are told, will pump one acre inch for two dollars, depending upon conditions.

QUESTION: What kind of a system would you recommend for getting water if you had a creek running along a short distance from the place you wish to irrigate?

MR. WORK: The Skinner System would be good, or if you had tried out the furrow system and found it satisfactory with your conditions, that would be all right, and you would not have to have the pressure. Most of the market gardeners are using the Skinner System. It seems to me the common idea among growers that you can install the Skinner System for one hundred to one hundred twenty-five dollars per acre outside of the water supply. I think that is a very fair average cost.

A MEMBER: It cost me less than ninety dollars an acre to put in my Skinner System. I set low stakes to run my pipes over, so I can take them off in the fall. But it makes a great deal of difference whether you run a long line and use long pipes or a short line and use short pipes. My area is about eighty rods wide, and it is very long. We used many short lines.

QUESTION: Don't we need to remember that the price of pipe fluctuates from year to year?

MR. WORK: That is very true. Inch and a half galvanized pipe costs thirteen cents; inch and a quarter, eleven cents; inch pipe, eight cents; and three-quarter inch, five.

A MEMBER: I have bought it much cheaper than that.

QUESTION: Is a large size pump practicable for such a system?

MR. WARREN: A two thousand gallon pump is big enough for a big open furrow irrigation, too large for this system.

MR. WORK: As to questions regarding the use, I would recommend to you the *Market Growers' Journal* containing gardeners' clubs on irrigation.

IRRIGATION IN NEW YORK.

PROF. FIPPIN (Cornell Department of Soil Technology): Irrigation has a place in New York agriculture and is being practiced to some extent. From limited observations it appears to be practicable on the lighter soils devoted to intensive farming to crops worth fifty dollars or more per acre. For this

reason it is identified chiefly with the trucking interests. There are certain limitations to irrigation in the eastern states which do not apply in the West where the rainfall is very small. In New York, in common with all of the eastern country, it is especially important that the land have good natural or artificial drainage as there is always the possibility that a rain will follow an application of water. Further, the function of irrigation is not to meet the full requirement of crops but merely to supplement the natural rainfall at times when the natural storage capacity of the soil fails or is inadequate. Consequently, very much less water will be handled than in western irrigation. Due to the extent of intensive farming in the state, and to the considerable areas of light sandy and gravelly soils, irrigation may well have a much larger place in our practice than it now has. Our normal rainfall is from thirty-five to forty inches. This is our source of water which in connection with the uneven topography of the land produces springs, reservoirs and streams from which irrigation may often be practiced at small cost. Many farmers will begin to find it practicable to irrigate their meadows and grain crops from small streams adjacent to their land. Up to the present time, the more expensive methods of spraying have been employed in putting the water on the soil. Attention should be called to the fact that all of the methods employed in the West involving small equipment are practicable under our conditions, namely, the various furrow methods and flooding. Probably for most purposes, however, some phase of spraying is most desirable, as the amount of water handled is small and the supply of water is generally adequate for all needs.

The practice of irrigation concerns a number of departments in agriculture. First of all, there is the engineering problem of providing and transmitting water to the crop area. Frequently, this involves extensive pumping systems and reservoirs, all of which is concerned essentially with engineering problems. When the water has been brought to the field, there develop the agricultural questions of the method of application and the amount of water for particular crops. In this way we have brought into this conference the

Department of Farm Engineering, Department of Soil Technology, and the various Crop Departments, including Farm Crops, Vegetable Crops, Fruit Crops and Floral Crops. All of these have an equal concern in the practice of irrigation. As you know, probably, the vegetable growers have made more progress in the application of the practice. For best results in the investigation and discussion of irrigation, there is need of the friendly cooperation of all agencies concerned, which cooperation is well exemplified by the conference now in hand.

DUTY OF WATER.

PROFESSOR BUCKMAN (Cornell Department of Soil Technology): In any irrigation operation the "duty" or crop producing power of water applied is always a factor to be considered, whether the climatic conditions are arid, semi-arid or humid. In New York State the necessity of maintaining the amount of water utilized, within certain well defined limits, arises from two causes, first, the cost of applying this water, and second, the necessity of maintaining an optimum moisture condition in the soil. In any irrigation plant, no matter what the system of applying the water may be, it costs money to place the water on the land. This may be one of the small leaks that go to limit the profits of the grower.

Of more importance, however, is the moisture content of the soil. Every successful grower has some general ideas of this factor. It is a well known fact that at this moisture condition all soil activities go on to the best advantage, tending thereby to make the soil a better medium for plant growth. Although this optimum moisture content may shift between certain limits, over-irrigation is a condition which will certainly follow every careless or expensive application of moisture. This phase, which is essentially a soil problem, is often ignored, especially in humid climates, and is well worth emphasizing in any discussion of the "duty" or crop producing power of water as applied in New York State.

LITTLE KNOWN VEGETABLES AND HOW TO KEEP UP A CONTINUOUS INCOME.

H. B. FULLERTON, Medford, Long Island.

The profession of farming has only one serious defect; as pursued in the past the farmer had eleven months' outgo to one month's income. No other business in the world could stand it. The market gardener, who is really a very new comer in the United States, went the farmer several better. He reversed things, making three-quarters of the year yield him income and only one-quarter off season, when everything was outgo. Down at the Long Island Railroad Experiment Stations we have earnestly sought for ways and means, and that signifies varieties, that would enable us to keep the farm income on exactly the same basis on which all successful manufacturing and commercial businesses are conducted, that is, with income continuous outgo minimum. We start with rhubarb. As forced rhubarb lacks flavor, we did not raise it in houses, but in the open, and we hurry it up by placing half a barrel or a box about the plants and without any other aid get rhubarb from ten days to two weeks earlier, the reason being that we shut off the wind and the barrels retain a good deal, at least, of the heat which always comes during the spring days. This rhubarb, hurried along a little, is salable when rhubarb exposed to the wind is but barely expanding the leaves and has no stalk to speak of. Stalks raised in the barrel bring five cents each, while two weeks later, when everybody has rhubarb to sell, a bunch is worth but a cent and a half. Asparagus comes in next and before rhubarb is finished. We have not done anything towards hurrying this up beyond the old time early breaking of the ground and letting warm air in early and getting particularly strong growth the previous summer by the use of soy beans planted between the rows. Spinach, planted last fall, gives us another good income yielder at about the same time rhubarb comes in. The best rhubarb we have found is Myatt Linnaeus; the best asparagus, the Charles Prescott strain of Palmetto. This famous Concord, Massachusetts, grower now tells us that he has found something superior in the Reading

Giant. Of course, following these crops, come the early lettuce (May King doing best for us), radish and endive. We plant all varieties of radish, but we prefer the white curled endive, which is really a narrow-leaved, bitter lettuce, although American commission men mix it up badly with Batavian broad-leaved endive and call it all escarolle or scarolle, and other weird names.

From these on, of course, we have all the regulation vegetables, early sweet corn being a best seller and best exemplified as far as real earliness and sweetness is concerned by Golden Bantam. Early potatoes are another big income yielder for us, and while we have tried Early Ohio and all the other early strains, the only real early one we have been able to find is Quick Lunch, not a heavy yielder in quantity, but a very handsome paying item. Through the season, the best American eggplant we have had is the Black Beauty. The English Long Purple, however, is superior to any other variety we know in many ways. In yield it far exceeds any other strain. In flavor, delicacy and shape it is superior, and it will crowd out the big round eggs as soon as introduced. Globe artichoke, now mainly imported from Europe or from California, is one of the thistle family which blooms the second year, and it is the bloom bud which brings the money. Like chrysanthemums, to raise big ones it should be disbudded, leaving but one bud to the stalk. French Green is the most delicate.

Pe-tsai we have raised for eleven years. It is the most delicate of the cabbage family. It comes from China, will stand hot weather, is always blanched, makes a fine salad and the best cole-slaw obtainable. It also stands considerable cold, so can be raised for fall salad. Lately it created a considerable furor under the name of celery-salad, which is a bad name in every way, as it has nothing of the celery flavor, looks nothing like it and can't be eaten with any degree of joy as celery is, but must be served, if served raw, with sauces or salad dressings. The famous Long Green English cucumbers, we have found, do magnificently in the open, although in England they are raised only under glass houses. Its smoothness, great length and delicacy make it a valuable

addition to the American list. The Giant Gibraltar onion, a very fine strain of the Spanish onion like those grown in Bermuda, is the best of the big onion family. None of the

PE-TSAI OR CELERY CABBAGE

other varieties compare with it. It is a yellow onion, weighing from one and a half to three pounds. It will not keep as long as Red Wethersfield, but with proper care will keep far longer than any white onion and equally as long as any yellow skins, and is far more delicate and finer in flavor

than any other strain. Peanuts we have no difficulty whatever in raising, even the Mammoth having time to mature on Long Island. Further north the Spanish peanut, which is usually raised, would undoubtedly be more satisfactory because of the shorter time necessary in developing. The peanut pays to raise if for nothing else than a summer cover crop and as a legume benefitting the ground enormously.

Sakurajimah radish is another great favorite of ours with which we have worked for ten or twelve years. The largest one we have raised weighed forty-two pounds. It should be treated as a winter radish and planted late. Otherwise it runs to seed. It will average from twelve to twenty pounds in weight. The leaves are very long, sometimes reaching four feet. The mid rib is excellent, stewed; the green portion of the leaves makes fine greens, and the radish itself, being as delicate as a spring French radish and crisp, is fine sliced and eaten raw or cooked like turnips. It will keep all winter and is a very great addition to our vegetables. It is a favorite of Japan. We have tried out all sorts and kinds of pumpkins and again found Japan had all other territories down and out. Their Chirimen, which ranks as number one in Japan (where all vegetables are numbered according to their quality), is not large, but is almost solid pumpkin, with a very small seed cavity, thin skinned, ribbed like a cantaloupe, but flatter, and keeps perfectly for a year and a half in a common attic without any particular care.

We now get down to the fall season, and besides the regulars such as spinach, late sweet corn, lettuce, onions, potatoes, celery, cabbage and cauliflower, there is Brussels sprouts. We found tremendous disappointment in this and also great variation. No matter where we purchased seed we had good, bad and indifferent plants of all sorts of heights and all sorts of sprouts from large, mushy ones to hard, little ones the size of a marble. Our disappointment was annual until we found the Case strain, developed by Frank Case of Cutchogue, Long Island, whose seed is carefully grown and rogued and whose plants are uniform in height and in bearing qualities. Brussels sprouts continue the income not only through December, but on the Island frequently into February, when

the price is at its height. So we get pretty well through the year without the use of glass. Another little known good thing to keep the income going until outdoors is warm enough to start the new season is Witloof chicory, strictly a salad plant, sold in the cities as endive. It requires very little care and no particular skill. The roots are grown in the open through the summer, being cultivated and cared for as time will permit, the object being to get a large vigorous root. When frost comes, the top is cut off, care being taken not to injure the crown, and the roots lifted and placed in the sand floor of a cellar, or in a root cellar. If the sand is very dry, it should be watered, and but very little water is needed. We use none, because there is moisture enough to keep our plants growing in good shape. We get from three to five cuttings a winter, of one of the most delicious and expensive salads sold in our cities, of which the supply nowhere near reaches the demand.

Other particularly good things that are not as well known as they should be are the Montreal melons, bringing $36.00 a dozen in the New York market. All Montreal melons are not high quality, but the Mount Royal strain, which can be obtained of Ewing & Sons, Toronto, Canada, is the finest of that jumbo of cantaloupes. In strawberries by long odds the best of the entire family is the Chesapeake, developed down in the Delaware-Maryland-Virginia peninsula and distributed by W. F. Allen & Sons, Salisbury, Md. They are very uniform in shape, always conical, are firm and hence good shippers, and the best flavored of the entire family. The best blackberry of the family, and the one willing to stay where it is put, is the running vine or dewberry. The Lucretia is a good one, but the Austin, a selection and a very great improvement over the Lucretia, is superior and a money-maker. Allen of Salisbury, Md., also handles this. Alfalfa is another little known vegetable that is a money-maker in itself, an absolute necessity for dairymen and chicken raisers, and one of the best improvers of the soil known to man, as it not only opens up the earth in good shape, but fills it full of rootlets and in addition stores up a great quantity of nitrogen from the air. The secret of success

with alfalfa is an alkaline soil, well filled with humus, and it won't do to guess at the "sweetness" of the soil. It must be tried out with litmus paper. With these conditions, it is only necessary to get a good seed, and we have found the best seed is grown in our western states and can be secured from many of the big western seedsmen. European seed is not well suited to United States conditions and too frequently is loaded with extremely dangerous weeds. No big planting should be made of alfalfa without having the seed passed on by New York Experiment Station at Geneva.

We have conclusively demonstrated by the pictures shown upon the screen, that it is perfectly possible to conduct farming along the lines proven to be the most successful in other professions and mercantile pursuits. Well pleased customers have shown us that the little known vegetables called to your attention are all worth while additions to America's extremely limited list, and we know for sure, because we ship direct from our market garden to the city consumer, in a package we originated in 1906, called the "Long Island Home Hamper," with a motto of "From Farm to Family Fresh." Trusting that we have been able to present something worth while to the New York State Vegetable Growers' Association and other agricultural friends and that we have satisfactorily answered the various questions asked during the evening, it is with best wishes for the coming year I close my offhand picture talk.

THE SPEAKERS

1914 MEETING

S. J. Cook, Dunkirk, N. Y., Secretary South Shore Growers' and Shippers' Association. Chairman of Committee on Federation, N. Y. S. V. G. A.

A. P. Fisher, Canastota, N. Y., onion grower.

H. B. Fullerton, Medford, N. Y., Director Long Island Railroad Experimental Farms.

E. R. Hay, Clyde, N. Y., muck land vegetable grower.

G. W. Herrick, Professor of Economic Entomology, New York State College of Agriculture.

T. C. Johnson, Norfolk, Va., Director Virginia Truck Experiment Station.

H. R. Ramsey, Washington, D. C., in charge of precooling work, U. S. Department of Agriculture.

E. N. Reed, Cortland, N. Y., cabbage grower.

F. A. Sirrine, Long Island, vegetable grower and investigator.

L. L. Van Slyke, Geneva, N. Y., New York State Experiment Station.

C. O. Warford, Newburgh, N. Y., grower and canner of vegetables.

A. J. Warren, Irondequoit, N. Y., Secretary Monroe County Market Gardeners' Association, grower and shipper of vegetables.

R. L. Watts, State College, Pa., Dean and Director, School of Agriculture and Experiment Station, The Pennsylvania State College. Author "Vegetable Gardening."

A. E. Wilkinson, Extension Instructor, Department of Vegetable Gardening, New York State College of Agriculture.

Paul Work, Superintendent and Instructor, Department of Vegetable Gardening, New York State College of Agriculture.

F. J. Zuck, Erie, Pa., greenhouse vegetable grower.

The New York State Vegetable Growers' Association and its Work

The first question asked by a person who hears of an organization with which he is unfamiliar is, "What is it and what does it do?"

The New York State Vegetable Growers' Association was organized in 1911 at a meeting called for the purpose by seventeen representative vegetable growers from different sections of the state. The object was stated thus:

"The object of this Association shall be to organize and federate the interests of those engaged in vegetable growing to the end that larger crops of constantly improving quality may be grown and marketed with increased profit."

The policy of the society has been conservative rather than radical, and its growth has been moderate, though steady and substantial. A higher membership fee than is common, two dollars annually, perhaps limits the numbers to some extent, but insures a real interest on the part of those who are enlisted. The chief usefulness of the Association lies in its aim to unite in a body of state-wide and powerful influence the men who are engaged in the commercial production of vegetables. While many thousands are eligible, the present membership includes representatives of every important producing district in the state. This wide distribution enables the Association to secure attention and favorable consideration for its needs from legislature, commissions of various sorts, and institutions which are engaged in the discovery and dissemination of valuable information. Thus has our society's weight been felt in relation to marketing legislation, the improvement of state fair conditions, the movement for better government crop reports for vegetable men, and in other directions.

Annual Meeting.

The annual meetings at Ithaca, under the cooperation of the New York State College of Agriculture, have proved most

helpful. The programs have included papers by the leading vegetable men of the country, and round table discussions have provided a forum for the interchange of ideas and of practical suggestions from all districts of the state, as well as from without. The personal contact of grower with grower proves of inestimable value as a broadening influence, and the narratives of success in both lecture and round table and in conversation prepare men to go home filled with new enthusiasm and a new determination to walk the way of progress.

Annual Report.

The proceedings of these meetings are recorded in the Annual Report, which speaks for itself. Thus is this wealth of material made available to those who cannot attend the meetings and for future reference.

Seed Service.

No phase of the work of the Association offers greater possibility of material benefit than the Seed Service. Desirable sources of vegetable seed are sought out, whenever possible directly from the producer, and are made available to members through the committee in charge. The prices in most cases are sufficiently low that the saving on a few ounces or pounds repays a membership fee, though in some cases the excellence of the strain and the extreme care exercised in its production necessitate figures that appear high. However, the price of seed is a small item in crop cost and may be almost neglected provided the quality is good. The Association makes no guarantee, but the Seed Committee believes it has found good strains. The service is broadening every year, and there is a future for it.

Information Service.

The Information Service endeavors to aid growers in finding the best publications that will be helpful to them in connection with the subjects in which they are interested. A list of available experiment station bulletins and of books on vegetable subjects is published in each Report. See page 270.

Members send to the Secretary lists of bulletins desired at stated times each year. These are pooled and sent direct to the growers from the respective stations. A number of periodicals (see page 272) are available to members at materially reduced rates *when subscriptions are sent through the Secretary.*

State Fair.

The Association has each year staged at the New York State Fair a display designed to illustrate modern methods of packing vegetables for market. In the small space allotted, fifty or more distinct packs have been shown each year, and the exhibit has been of distinct educational value at the same time that it brings the work of the organization to the attention of the public.

The Executive Committee has undertaken to bring about an improvement in general conditions for vegetable exhibition at the State Fair and has met with most encouraging cooperation on the part of the New York State Fair Commission. President Greffrath has been appointed Superintendent of the Department, and the premium list has been revised and doubled in value. By reason of large premiums for the best specimens of the important commercial varieties, the list now appeals to market growers, as well as to professional exhibitors.

Local Meetings.

It is the policy of the Association to make its advantages available as conveniently as possible to as large a proportion of growers as possible. To this end, it has been proposed to hold one-day meetings of the Association in large centers of vegetable production. The progress in carrying out this scheme will depend upon the interest and support of members and others.

It has, from the beginning, been the policy of the State Association to encourage in every way possible the development of local organizations. Changes in the constitution of the Association are now in process of adoption which will render affiliation with the state body of the greatest value to local vegetable organizations. Members of these groups will

be enabled to enjoy the benefits of state membership at lower cost and will be entitled to a representative on the Federation Council. This movement was fully discussed in the business session, a report of which is found on page 143.

The Future.

The most encouraging feature in the development of the Association lies in the deepening interest on the part of the members. A larger proportion are willing to assist in securing new members and an increasing number of new men are being found who are willing to aid in active work. Vegetable men are busy men, and a few cannot be expected to carry the whole burden. The development of new activities depends upon the willingness of able men to lend a part of their time and energy to the work. With such support, the possibilities are unlimited.

CONSTITUTION OF THE NEW YORK STATE VEGETABLE GROWERS' ASSOCIATION.

ORGANIZED 1911.

ARTICLE I

NAME

This organization shall be known as the NEW YORK STATE VEGETABLE GROWERS' ASSOCIATION.

ARTICLE II

OBJECT

The object of this Association shall be to organize and federate the interests of those engaged in vegetable growing to the end that larger crops of constantly improving quality may be grown and marketed with increased profit.

ARTICLE III

MEMBERSHIP

Sec. 1. Membership shall be of two kinds, active and sustaining.

Sec. 2. All vegetable growers are eligible to active membership.

Sec. 3. Fees—active membership, two dollars per annum; sustaining membership, one hundred dollars.

ARTICLE IV

OFFICERS

The officers shall consist of a president, a first vice-president, and a vice-president for each county of the state represented in the membership of the Association, a secretary and a treasurer.

ARTICLE V

EXECUTIVE COMMITTEE

The Executive Committee shall consist of the president, the secretary, and three members elected at large who shall represent as far as possible the different phases of the vegetable industry of the state.

ARTICLE VI

COMMITTEES

Sec. 1. The standing committees shall be as follows: Marketing, Transportation, Legislation, Investigation, Federation. They shall consist of three members each, appointed by the president. In appointing these committees for the first time, the president shall designate one member of each committee for one year, one member for two years and one member for three years. Thereafter the incoming president shall appoint one member of each committee to hold office for three years, or until his successor is appointed.

Sec. 2. Special committees may be appointed by the president from time to time as occasion may arise.

ARTICLE VII

TERMS OF OFFICE AND ELECTIONS

Sec. 1. The president, vice-president, secretary and treasurer shall be elected by ballot at the annual meeting to hold for one year or until successors are elected.

Sec. 2. The members from each county shall elect a vice-president for such county to serve for one year, and shall report his name to the secretary at the annual meeting.

Sec. 3. The members of the first Executive Committee shall be elected by ballot, one for one year, one for two years, and one for three years. Thereafter at each annual meeting one member shall be elected to serve for three years.

ARTICLE VIII

FEDERATION

Any local or district organization representing vegetable growers may become affiliated with this Association by the appointment of an official representative, and the payment of an annual fee of five dollars. It shall be the duty of the Committee on Federation to promote the formation of such local organizations, and secure the affiliation of these and existing organizations, with the State Association.

ARTICLE IX

AMENDMENTS

This Constitution may be amended by a majority vote at any annual meeting, provided such amendment shall have been presented in writing at the last preceding annual meeting.

BY-LAWS

ARTICLE I

MEETINGS

Sec. 1. The annual meeting of this Association shall be held at such time and place as may be designated by the Executive Committee. Notice of the annual meeting shall be mailed to each member not less than thirty days before the date of such meeting.

Sec. 2. Special meetings may be called by the Executive Committee when it is deemed necessary.

ARTICLE II

DUTIES OF EXECUTIVE COMMITTEE

The Executive Committee shall have general charge of the business of the Association, and shall prepare a program for the annual meeting.

ARTICLE III

REPORTS OF OFFICERS AND STANDING COMMITTEES

The president, secretary and treasurer, and each standing committee shall make a report to the annual meeting each year.

ARTICLE IV

FINANCE

The necessary expenses of this society shall be paid by the treasurer on properly submitted vouchers approved by the president. The treasurer shall submit at the annual meeting a detailed statement of such expenditures, which shall be passed upon by an auditing committee appointed by the president.

ARTICLE V

INVESTIGATION

It shall be the duty of the Committee on Investigation to study the problems upon which the vegetable growers of the different sections of the state most need help, and to take measures to secure the investigation of these problems. In its annual report it shall include a review of investigational work of the current year.

ARTICLE VI

VACANCIES

Vacancy in any office or committee shall be filled by the president for the unexpired term.

ARTICLE VII

ORDER OF BUSINESS

The order of business for the annual meeting shall be:

Roll Call
President's Address
Reports of Officers
Reports of Committees
Papers and Discussions
Unfinished Business
New Business
Election of Officers
Adjournment

ARTICLE VIII

AMENDMENT

These By-Laws may be amended at any annual meeting by a majority vote.

OFFICERS AND COMMITTEES

1912-1913

Officers

President - - - - - - C. R. White, Ionia
Vice-President - - - Henry Greffrath, South Lima
Secretary - - - - - - Paul Work, Ithaca
Treasurer - - - - - C. H. Aldrich, Mattituck

Executive Committee

President and *Secretary, Ex-officio,*
W. L. Bonney, *Chairman*, Batavia
Ezra A. Tuttle, Eastport
Chauncey West, Irondequoit

Committees

Co-operation—M. H. Holmwood, Orchard Park; C. H. Aldrich, Mattituck; S. J. Cook, Dunkirk.

Investigation—T. Greiner, La Salle; H. B. Fullerton, Medford; E. D. Hunter, Florida.

Legislation—Ezra A. Tuttle, Eastport; C. O. Warford, Newburgh; J. G. Hills, Newtonville.

Transportation—W. P. Rogers, Williamson; C. C. Mowris, South Lima; F. W. Folsom, Orchard Park.

Seed Service—Henry Greffrath, South Lima; Edward Arnts, Syracuse; Paul Work, Ithaca; E. S. Davis, South Lima.

Federation—S. J. Cook, Dunkirk; Frank T. Tighe, Newburgh; James Simmons, South Lima.

1913-1914

Officers

President - - - - Henry Greffrath, South Lima
Vice-President - - - - - S. J. Cook, Dunkirk
Secretary - - - - - - Paul Work, Ithaca
Treasurer - - - - - C. H. Aldrich, Mattituck

Executive Committee

President and *Secretary, Ex-officio,*
Ezra A. Tuttle, *Chairman,* Eastport
Chauncey West, Irondequoit
W. L. Bonney, Batavia

Committees

Federation—S. J. Cook, Dunkirk; A. J. Warren, Irondequoit; H. R. Talmage, Riverhead; A. P. Fisher, Canastota.

Investigation—W. L. Bonney, Batavia; W. F. Hallauer, Irondequoit; H. J. Reeves, Mattituck; C. O. Warford, Newburgh.

Legislation—C. R. White, Ionia; J. G. Hills, Newtonville; David B. Carse, New York.

Seed—Henry Greffrath, South Lima; E. S. Davis, South Lima; Lewis E. Avery, Syracuse; Harold A. McChesney, Troy; Paul Work, Ithaca.

Transportation—E. R. Hay, Clyde; Charles N. Pickell, South Lima; Ezra A. Tuttle, Eastport; Mason H. Holmwood, Orchard Park.

MEMBERSHIP LIST

Asterisk indicates charter members.

Abbott, George E. ..... Rose
Albertson, Silas L. ..... Roslyn
*Aldrich, C. H. ..... Mattituck
Ameele, J. D. ..... Williamson
*Arnts, Edward ..... Syracuse
Ashman, Joseph ..... Buffalo
Atwater, C. G. ..... New York
Avery, Lewis E. ..... Syracuse
Baker, W. L. ..... Buffalo
Baldauf, J. U. ..... Clinton
Batzinger, Chas. L. ..... Schenectady
Becker, C. E. ..... Sodus
Bender, William ..... Syracuse
Benjamin, A. E. ..... South Lima
Bennett, F. L. ..... Arkport
Bennett, Roy C. ..... Arkport
Black, M. Newton ..... Stanley
Bogner, Joseph ..... New Hartford
*Bonney, W. L. ..... Batavia
Brooks, Geo. W. ..... Monroe
*Brooks, J. R. ..... Monroe
Brown, Geo. S. ..... Edinburg
Buntin, M. J. ..... East Aurora
Burnett, C. E. ..... North Rose
Button, Herbert ..... Cazenovia
Butts, Morris F. ..... Sodus
Calyer, Edward T. ..... Newburgh
Carse, David B. ..... New York
Case, Frank H. ..... Cutchogue
Churchill, John ..... Fulton
Clum, A. F. ..... Sennett
Colburn Brothers ..... Clyde
Cole, Charles S. ..... North Rose
Coleman, D. A. ..... Watervliet
Conner, Dr. Lewis A. ..... New York
Conrad, W. P. ..... Utica
Cook, Geo. O. ..... Roger's Rock
Cook, S. J. ..... Dunkirk
Danford, W. E. ..... Sodus
*Davenport, Walter ..... Accord
Davenport, W. Mead ..... Arkport
*Davis, Elliott S. ..... South Lima
Deitz, P. H. ..... Canastota
De Martinis, L. J. ..... West Bloomfield
De Nise, M. G. ..... Fairport
Dickson, William ..... Unadilla
Dimon, C. E. ..... Southampton
Dold, Charles H. ..... Buffalo
Donovan, John ..... Peekskill
Dougall, Edward ..... Syracuse
Dryer, C. A. ..... Fulton
Dryer, O. W. ..... Fulton
Dungan, D. L. ..... Arkport
Dungan, E. Root ..... Arkport

Dyer, Frank ..... Erieville
Eberle, Fred ..... Watervliet
Edmunds, Frank D. ..... Willimantic, Conn.
Elliott, Elmer ..... Albion
Erhardt, Paul B. ..... Penfield
Erkenbeck, F. P. ..... Fayetteville
Fikes, M. L. ..... Rose
Fisher, Anson P. ..... Canastota
Foland, William ..... Canastota
Folsom, Frank W. ..... Orchard Park
Fonda, Henry M. ..... Hannibal
Fonda, W. T. ..... Hannibal
Ford, James ..... Syracuse
Fraser, Samuel ..... Geneseo
Fullerton, Hal B. ..... Medford
Garrett, Walter ..... Watervliet
Gatchell, Arthur ..... Alton
*Gesell, August ..... South Lima
Gill, G. H. ..... Little Neck
Greffrath, Henry ..... South Lima
Greiner, Paul ..... Canastota
*Greiner, T. ..... La Salle
Griffin, Matt ..... Arkport
Gutchess, L. W. ..... Port Byron
*Hallauer, W. F. ..... Irondequoit
Hallock, L. H. ..... Orient
Harper, F. E. ..... Syracuse
Harris, W. H. ..... Saratoga Springs
Hauenstein, O. H. ..... Eden
Haw, Charles E. ..... East Syracuse
Hay, E. R. ..... Clyde
Hayes, John H. ..... Clark Mills
Heffer, Frank E. ..... Irondequoit
Herckner, Alexandrine ..... Wayland
Herman, Otto H. ..... Rochester
Herman, Robert ..... Orchard Park
Hewlett, Frederick C. ..... Irondequoit
Hills, J. Goldsmith ..... Newtonville
Hoff, John N. ..... New York
*Holmwood, Mason H. ..... Orchard Park
House, W. J. ..... Arkport
Howell, T. W. ..... Port Byron
Hughson, Charles M. ..... Buffalo
Hull, P. M. ..... Red Creek
Hunter, E. D. ..... Florida
Hunter, Jay ..... Auburn
Jagger, John H. ..... Orient
*Jennings, Milton ..... Canastota
Jeram, William, Jr. ..... Watervliet
Kains, Maurice G. ..... New York
Kelsey, David Stone ..... Hartford, Conn.
*Kilbourn, Russell ..... Clinton
Klock, Newton E. ..... Canastota
Knowlton, T. E. ..... Elba
Kreuzer, Joe A. ..... Chili
Kuchler, George W., Jr. ..... Ithaca
Lacy, Leo A. ..... Rome
Lauderdale, W. E., Jr. ..... Geneseo

Laurent, Arthur A. ..... Boston, Mass.
*Le Van, C. D. ..... Sanborn
de Lima, Mrs. Ella B. ..... Syracuse
Locke, C. G. ..... Arkport
Lockwood, H. L. ..... Buffalo
Lovell, F. J. ..... Hornell
Lyon, A. H. ..... Tabor, N. J.
McBratney, George ..... Batavia
McCampbell, Theron ..... New York
McCargo, James ..... Holley
McChesney, Harold A. ..... Troy
Mabon, Charles E. ..... Sanborn
Marion, Ralph ..... Oceanside
Merithew, Eugene ..... Canastota
Merritt, Hains R. ..... East Aurora
Miller, E. S. ..... Wading River
Mitchell, E. C. ..... Sodus
Moore, Charles H. ..... Binghamton
*Moore, W. Frank ..... Binghamton
*Mowris, C. C. ..... South Lima
Murphy, Stephen ..... Newburgh
Nead, Prescott E. ..... Brookview
Newton, A. B. ..... Penfield
Newton, J. C. ..... Hamburg
Osborn, K. L. ..... Rose
Pankhurst, Frank ..... Canastota
Perry, John Moore ..... St. James
Pickell, Charles N. ..... South Lima
Pierce, H. N. ..... Waterloo
Pomeroy, Daniel N. ..... Lockport
Porter, John L. ..... South Lima
Pratt, John W. ..... Fulton
Prettejohn, L. T. ..... Livonia
Priest, George E. ..... Rochester
Rayton, Frank ..... South Lima
Reed, E. N. ..... Cortland
Reeves, Henry J. ..... Mattituck
Robinson, L. H. ..... Castile
Rogers, W. P. ..... Williamson
Rosenthal, F. C. ..... Huntington
Rousseau, L. W. ..... Canastota
Russell, Chas. P. ..... Williamson
Sands, Guy ..... Camillus
Sarle, Chas. F. ..... New Berlin
Schichler, Robert ..... Coldwater
Schiek, Frank H. ..... Owego
Schoonmaker, Gross B. ..... Accord
Schuknecht, L. C. ..... South Lima
Schwingel, Jacob ..... Burns
Scoralick, Fred B. ..... Yonkers
Simmons, James ..... South Lima
Sirrine, F. A. ..... Riverhead
Smith, E. E. ..... Syracuse
Smith, Leonard ..... North Tonawanda
Snow, E. C. ..... Fairport
*Southard, A. T. ..... Peekskill
*Spears, John R. ..... Little Falls
Spiegel, Moe ..... Ithaca

Spiess, Charles H. ..... Middletown
Stasch, Emil R., Jr. ..... Ithaca
Steeleman, Letitia ..... Medford
Sweezey, L. J. ..... Marion
Talmage, H. R. ..... Riverhead
Taylor, L. J. ..... Arkport
Ten Broeck, E. H. ..... Newtonville
Tharp, A. E. ..... Willard
Thomas, Frederic C. ..... Coldspring Harbor
*Tuttle, Ezra A. ..... Eastport
Tuttle, F. J. ..... Norwich
Vandemark, A. S. ..... Schenectady
Van Der Meid, Peter ..... Rochester
Voorhees, Clifford E. ..... Plainville
Ward, C. H. ..... Sodus
Warford, Clarence O. ..... Newburgh
Warner, J. Wesley ..... Newtonville
Warren, Almond J. ..... Irondequoit
Watkins, M. J. ..... Ithaca
Watrous, M. H. ..... Rochester
Weber, Emma M. ..... Hornell
Wells, William A. ..... Peconic
*West, Chauncey ..... Irondequoit
*White, Charles R. ..... Ionia
Whitehead, John ..... Auburn
Wilbor, C. W. ..... Elba
Wilbur, C. K. ..... South Lima
Wilkinson, Albert E. ..... Ithaca
Williams, G. O. ..... Ithaca
Williams, Willis H. ..... Corning
Wilson, J. H. ..... Canastota
Wilson, L. J. ..... Castile
Wood, Walter W. ..... Red Creek
*Work, Paul ..... Ithaca
Wrigley, G. P. ..... Elmira
Wyckoff, C. F. ..... Ithaca
Zuck, F. J. ..... Erie, Pa.

LOCAL ORGANIZATIONS

IN NEW YORK STATE AFFILIATED WITH THE NEW YORK STATE VEGETABLE GROWERS' ASSOCIATION.

Fulton Vegetable Growers' & Shippers' Association.
Monroe County Market Gardeners' Association.
South Lima Growers' & Shippers' Association.
South Shore Growers' & Shippers' Association.

NOT AFFILIATED.

Arkport-Burns Growers' & Shippers' Association.
L. J. Taylor, Secretary, Arkport.
Central New York Vegetable Growers' Association.
Edward Arnts, President. 712 Third North St., Syracuse.
E. E. Smith, Secretary, 103 Mill St.
Erie County Growers' & Shippers' Association.
M. H. Holmwood, President, Orchard Park.
Chas. H. Houshalter, Secretary, Hamburg.
Fulton Vegetable Growers' & Shippers' Association.
John W. Pratt, Secretary, Fulton.
Ionia Growers' Association.
Leslie N. Dibble, President, Ionia.
L. I. Cauliflower Association.
C. H. Aldrich, President, Mattituck.
L. I. Potato Exchange.
H. R. Talmage, Secretary, Riverhead.
Monroe County Market Gardeners' Association.
G. M. Keller, President, Brighton.
A. J. Warren, Secretary, Irondequoit.
Newburgh Market Gardeners' Association.
Ep. Titus, Secretary, Newburgh.
Rose Vegetable Growers' Association.
K. L. Osborn, Rose.
South Lima Growers' & Shippers' Association.
Chas. N. Pickell, Secretary, South Lima.
South Shore Growers' & Shippers' Association.
S. J. Cook, Secretary, Dunkirk.
Troy Market Gardeners' Association.
J. H. Pateman, Secretary, Watervliet.

INFORMATION SERVICE

BOOKS

American Varieties of Beans, C. D. Jarvis ..... $
Asparagus, *F. M. Hexamer*, Orange Judd Co. ..... .50
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Longmans, Green & Co., 4th Ave. & 30th St., New York.
"Gardeners' Chronicle," London, Eng.

PERIODICALS

Market Growers Journal, biweekly, Inter-Southern Building, Louisville, Kentucky. One dollar per year. Official organ of the Vegetable Growers' Association of America, of the New York State Vegetable Growers' Association, and other organizations. A special rate of fifty cents per year has been granted to members of our Association, if subscription is sent through the Secretary.

The New York Packer, weekly, 98 Park Place, New York. One dollar per year.

New York Produce News, weekly, 6 Harrison Street, New York. One dollar per year. A special rate of one dollar for two years has been granted to members of our Association, if subscription is sent through the Secretary.

The Producers' Price-Current, published every business day, 173 Chambers Street, New York. Daily, one dollar per month, nine dollars per year. Weekly—any day's issue, $1.50 per year.

Rural Life, monthly, Rochester, New York. Fifty cents per year. A special rate of twenty-five cents per year has been granted to members of our Association, if subscription is sent through the Secretary.

The Vegetable Grower, monthly, Spencer, Indiana. Fifty cents per year. One dollar for three years.

Most agricultural periodicals give more or less attention to vegetable gardening subjects.

BULLETINS

ON SUBJECTS RELATED TO VEGETABLE GARDENING

Once or twice each year members of the Association are given an opportunity to select from this list such bulletins as may be of interest to them. This list is sent to the office of the Secretary, where the requests are assorted by states and forwarded to the respective stations, which very kindly cooperate by sending the publications direct to the members desiring them.

ASPARAGUS

STATION OR DEPT.	PUBLICATION	NUMBER	TITLE
Bur. Ent.	Cir.	102	The Asparagus Beetles.
U. S. D. A.	F. B.	61	Asparagus Culture.
Md.	Bul.	151	Fertilizers for Asparagus.
Mo.	Bul.	34	Asparagus and Rhubarb Culture.

BEANS

Cal.	Bul.	224	The Production of the Lima Bean.
U. S. D. A.	F. B.	121	Beans, Peas, and Other Legumes as food.
U. S. D. A.	F. B.	289	Beans.
La.	Bul.	101	The Diseases of Pepper and Beans.
La.	Bul.	111	Bean Anthracnose.
La.	Bul.	116	Preliminary Report on the Anthracnose or Pod Spot Diseases of Beans.
La.	Bul.	139	The Bean Blight and Preservation and Treatment of Bean Seed.
Mich.	El. Sci. Bul.	1	Studies of Peas and Beans Before and After Sprouting.
N. H.	Press Bul.	4	Weevil in Beans.

BEETS

*Bur. Ent.	Bul.	109	Part 1. The Southern Beet Webworm. Part 2. The Hawaiian Beet Webworm.
Mich.	Bul.	179	Sugar Beet Investigations.
Mich.	Bul.	188	Experiments With Sugar Beets.
Mich.	Bul.	197	Sugar Beet Experiments, 1901.
Mich.	Bul.	215	Experiments With Sugar Beets, 1903.
Mich.	Spec. Bul.	8	Planting Sugar Beets.
Mich.	Spec. Bul.	10	Sugar Beets.
Nev.	Bul.	23	On Sugar Beets.
Nev.	Bul.	32	On Sugar Beets.
Nev.	Bul.	43	On Sugar Beets.
Nev.	Bul.	44	On Sugar Beets.
Nev.	Bul.	75	On Sugar Beets.
B. P. I.	Bul.	181	Curly Top of Beets.
S. D.	Bul.	106	Sugar Beets.

BRUSSELS SPROUTS

Cornell	Bul.	292	Cauliflower and Brussels Sprouts On Long Island.

CABBAGE

Ariz.	Timely Hints for Farmers.	96	Cabbage and Cauliflower.
Col.	Bul.	143	Cabbage Growing in Colorado.
Bur. Ent.	Cir.	60	The Imported Cabbage Worm.
Bur. Ent.	Cir.	103	The Harlequin Cabbage Bug.
U. S. D. A.	F. B.	433	Cabbage.
U. S. D. A.	F. B.	488	Diseases of Cabbage and Related Crops and Their Control.
Md.	Bul.	133	Cabbage Experiments and Culture.
Mass.	Cir.	38	Cabbage, Cauliflower, Turnip, and Other Crucifers.
Mont.	Cir.	25	Cabbage and Cauliflower in Montana.
Mont.	Cir.	28	Cabbage Worms and Cabbage Aphis.
N. Y.	Bul.	301	Screening Cabbage Seed Beds.
N. Y.	Bul.	334	Screening Cabbage Seed Beds.
N. C. Dept.	Bul.		On Cabbage Snakes.
Ohio	Bul.	228	Two Recent Important Cabbage Diseases in Ohio.
Ohio	Bul.	252	Early Cabbage.
Pa.	Bul.	119	Cabbage Strain Tests.
Vt.	Bul.	175	Studies of Club Root.
Va.	Bul.	191	Cabbage Club Root.
°Va. Truck	Bul.	2	Some Insects Injurious to Cabbage, Cucumbers and Related Crops. (Postage required).
W. Va.	Bul.	120	Cabbage Worms and Suggestions For Their Destruction.

CANNING

Fla. Press	Bul.	189	The Small Canning Factory.
Mo. Dept.	Pamphlet	H	How To Can Fruits and Vegetables On the Farm.
N. C. Dept.	Bul.		Canning, Preserving, Etc.
Va.	Bul.	146	Canning Fruits and Vegetables.

CAULIFLOWER

Ariz.	Timely Hints for Farmers	96	Cabbage and Cauliflower.
Cornell	Bul.	292	Cauliflower and Brussels Sprouts On Long Island.
Louisiana	Bul.	140	Preliminary Report On Winter Cauliflower.
Mass.	Cir.	144	Cabbage, Cauliflower, Turnip and Other Crucifers.
Mont.	Cir.	25	Cabbage and Cauliflower In Montana.
*B. P. I.	Bul.	225	Spot Disease of Cauliflower.

CELERY

Cal.	Bul.	208	The Late Celery Blight.
Col.	Bul.	144	Celery Growing In Colorado.
U. S. D. A.	F. B.	282	Celery.
Mich.	Spec. Bul.	60	Celery Culture.

Mo.	Bul.	38	Celery Growing.
Mont.	Cir.	26	Celery Culture In Montana.
N. J.	Spec. Bul.	Q	Some Fungous Diseases of the Celery.
Ohio	Cir.	72	Celery Root Rot.

CORN

Conn.	Ann. Rpt.	1911	Pt. VI. Inheritance In Corn.
Fla.	Press Bul.	186	Corn Planting.
Fla.	Press Bul.	188	Corn Cultivation.
Fla.	Press Bul.	196	Hybrid Corn.
Fla.	Press Bul.	197	Crossing Corn.
Fla.	Press Bul.	198	Protecting Corn From Weevils.
Fla.	Press Bul.	215	Harvesting Corn.
Ind.	Cir.	2	The Selection, Preservation and Preparation of Sweet Corn.
†Maine	Bul.	183	Experiments In Breeding Sweet Corn.
N. Y.	Bul.	130	A Bacterial Disease of Sweet Corn.
N. C. Dept.			Many Bulletins On Corn.
Wash.	Pop. Bul.	60	Corn Growing In Washington.

CRANBERRIES

Mass.	Bul.	115	Cranberry Insects.
N. J.	Spec. Bul.	K	Insects Injuriously Affecting Cranberries.

CUCUMBERS

Bur. Ent.	Cir.	31	The Striped Cucumber Beetle.
U. S. D. A.	F. B.	254	Cucumbers.
Fla.	Bul.	121	Cucumber Rot.
Fla.	Press Bul.	209	Melon Worm and Pickle Worm.
Mich.	Cir. Bul.	19	Cucumbers As a Cash Crop.
Mo.	Bul.	36	Growing Cucurbits.
°Va. Truck	Bul.	2	Some Insects Injurious To Cabbage, Cucumbers and Related Crops. (Postage required).
°Va. Truck	Bul.	5	Spraying Cucumbers and Cantaloupes. (Postage required).

DISEASES

†Maine	Bul.	164	Notes On Plant Diseases.
Md.	Bul.	143	Plant Diseases and Spray Calandar.
Pa.	Bul.	110	Control of Insects and Diseases On Horticultural Crops.
Vt.	Bul.	153	Plant Diseases, Potato Spraying.
Vt.	Bul.	159	Plant Diseases, Spraying and the Weather.
°Va. Truck	Bul.	1	The Control of Malnutrition Diseases. (Postage required).

FERTILIZERS

Conn.	Bul.	170	The Trade In Cotton Seed Meal.
Conn.	Bul.	175	Cost of Agricultural Lime in Connecticut.
N. J.	Bul.	157	Field Experiments With Nitrate of Soda On Market Garden Crops.
N. J.	Bul.	172	The Use of Fertilizers.
Ohio	Bul.	246	Barnyard Manure.

GENERAL

Alaska	Bul.	2	Vegetable Growing In Alaska.
Ariz.	Timely Hints for Farmers	27	The Spring Vegetable Garden.
Cornell	R. C. Bul.	33	Vegetable-Gardening.
U. S. D. A.	F. B.	256	Preparation of Vegetables For the Table.
Mich.	Buls.	170-1	Vegetable Tests For 1898.
Mich.	Bul.	190	Vegetable Tests For 1900.
Minn.	Ext. Bul.	17	The Farm Vegetable Garden.
Mo.	Bul.	35	Time of Planting Vegetables.
N. H.	Bul.	125	Vegetable Novelties.
N. C.	Bul.	94	Fruits, Vegetables, Etc.
N. C. Dept.	Bul.		Culture of Vegetable Crops.
P. R.	Bul.		On Vegetable Growing.
Texas	Cir.	3	Truck Farming.

GREENHOUSES, HOTBEDS AND COLD FRAMES

Cornell	R. C. Bul.	30	Hotbed Construction and Management.
Bur. Ent.	Cir.	37	The Use of Hydrocyanic-acid Gas For Fumigating Greenhouses and Cold Frames.
Bur. Ent.	Cir.	57	The Greenhouse White Fly.
U. S. D. A.	F. B.	460	Frames As a Factor In Truck Growing.
Md.	Bul.	119	Greenhouse Pests In Maryland.
Md.	Bul.	127	Miscellaneous Greenhouse Notes.
Mass.	Bul.	144	The Relation of Light To Greenhouse Culture.
Ohio	Bul.	61	Sub-irrigation In the Greenhouse.
Ohio	Cir.	57	Soil Treatment For the Forcing Houses.
Ohio	Cir.	69	The Use of Manure As a Summer Mulch In Vegetable Forcing Houses.
R. I.	Bul.	107	Soil Treatment In Greenhouse Culture.
R. I.	Bul.	128	Soil Treatment In Greenhouse Culture.
W. Va.	Bul.	87	Greenhouses.

THE HOME GARDEN

Cornell	R. C. Bul.	33	Vegetable-Gardening.
Cornell	R. C. Bul.	34	Home-Garden Planning.
Cornell	R. C. Bul.	58	Planting the Home Vegetable Garden.
U. S. D. A.	F. B.	255	The Home Vegetable Garden.
Ill.	Cir.	154	The Home Vegetable Garden.
Neb.	Ext. Bul.	5	Part III. The Home Garden.
N. H.	Press Bul.	16	Vegetables For the Home Garden.
N. C.	Bul.	132	Pests of the Home Vegetable Garden.
N. C.	Bul.	184	Orchard and Garden Fruits.
N. C. Dept.	Bul.		The Home Fruit Garden.
N. C. Dept.	Bul.		The Home Garden.
°Va. Truck	Bul.	10	The Home Vegetable Garden. (Postage required).
W. Va.	Bul.	122	Farmers' Home Garden.

INSECTS

Del.	Bul.	4	Injurious Insects.
*Bur. Ent.	Bul.	82	Some Insects Injurious To Truck Crops. (Potato, Parsnip, Parsley, Celery, Lima Bean, Cucumber).
*Bur. Ent.	Cir.	63	Root-maggots and How To Control Them.
Bur. Ent.	Cir.	104	The Common Red Spider.
†Maine	Bul.	148	Insect Notes.
Maine	Bul.	177	Insect Notes.
Mich.	Bul.	233	Insects of the Garden.
N. Y.	Bul.	139	Plant Lice.
N. C.	Bul.	84	Some Enemies of Truck and Garden Crops.
N. C. Dept.	Bul.		Injurious Insects.
N. C. Dept.	Bul.		Insect Pests and Spraying.
Ohio	Bul.	233	Field Manual of Practice In Economic Zoology.
Okla.	Bul.	98	Cotton or Melon Aphis.
Okla.	Bul.	100	Garden and Truck Crop Insect Pests.
Pa.	Bul.	110	Control of Insects and Diseases of Horticultural Crops.
Va.	Cir.	7	Fighting the Insect Pests and Diseases of Farm and Garden Crops.

LETTUCE

Fla.	Press Bul.	200	Lettuce Rot.
N. C.	Bul.	147	A Study of Lettuce.
N. C.	Bul.	217	A Serious Lettuce Disease.

MARKETING

U. S. D. A.	F. B.	62	Marketing Farm Produce.
Pa. Dept.	Bul.	202	Marketing Horticultural Products.
*B. P. I.	Yrbk. Sep.	546	Cooperation In the Handling and Marketing of Fruits.

MELONS

Ariz.	Timely Hints for Farmers	44	Watermelon Growing.
Ariz.	Timely Hints for Farmers	46	The Melon Plant-Louse.
Ariz.	Timely Hints for Farmers	77	Cantaloupe Growing.
Ark.	Cir.	9	Suggestions On Commercial Muskmelon Growing.
Col.	Bul.	126	Cantaloupe Breeding.
Col.	Press Bul.	4	The Cantaloupe Blight.
Fla.	Press Bul.	206	Melon Aphis.
Fla.	Press Bul.	209	Melon Worm and Pickle Worm.
Ill.	Bul.	124	Marketing the Muskmelon.
Ill.	Bul.	155	Further Experiments With Muskmelons.
Ill.	Cir.	139	How To Grow Muskmelons.
Ind.	Bul.	123	Commercial Melon Growing.
Mo.	Bul.	36	Growing Cucurbits.
N. H.	Bul.	86	Growing Watermelons In the North.
N. M.	Bul.	63	Melon Culture.
N. C. Dept.	Bul.		Melons and How To Grow Them.

MUSHROOMS

U. S. D. A.	F. B.	204	The Cultivation of Mushrooms.
N. C.	Bul.	177	Edible Mushrooms of North Carolina.
N. C. Dept.	Bul.		Mushrooms, Edible and Poisonous.
*B. P. I.	Bul.	85	Principles of Mushroom Growing and Mushroom Spawn Making.

OKRA

U. S. D. A.	F. B.	232	Okra: Its Culture and Uses.

ONIONS

U. S. D. A.	F. B.	354	Onion Culture.
U. S. D. A.	F. B.	434	The Home Production of Onion Seed and Sets.
N. M.	Bul.	74	Onion Tests.
N. M.	Bul.	82	Growing Denia Onion Seed.
Wash.	Pop. Bul.	66	Onion Culture.

PEAS

Del.	Bul.	49	The Strawberry Root Louse. The Destructive Pea Louse In Delaware.
Bur. Ent.	Bul.	43	The Pea Aphis.
U. S. D. A.	F. B.	121	Beans, Peas, and Other Legumes As Food.
Mich.	El. Sci. Bul.	1	Studies of Peas and Beans Before and After Sprouting.
Ohio	Bul.	173	Blighting of Field and Garden Peas.

PEANUTS

U. S. D. A.	F. B.	431	The Peanut.
N. C. Dept.	Bul.		Peanut Culture.

PEPPERS

*B. P. I.	Bul.	6	List of American Varieties of Peppers.

POTATOES

Ariz.	Timely Hints for Farmers	51	Potato Culture.
Col.	Cor. Cir.	8	Growing Potatoes In Colorado.
Col.	Bul.	175	The Potato Industry In Colorado; Potato Insects.
Col.	Bul.	176	Productiveness and Degeneracy of Irish Potato.
Bur. Ent.	Cir.	87	The Colorado Potato Beetle.
Fla.	Bul.	120	Irish Potatoes In Florida.
U. S. D. A.	F. B.	35	Potato Culture.
U. S. D. A.	F. B.	91	Potato Diseases and Their Treatment.
U. S. D. A.	F. B.	407	The Potato As a Truck Crop.
U. S. D. A.	F. B.	489	Two Dangerous Imported Plant Diseases.
Hawaii	Press Bul.	3	Preliminary Experiments With the Quick Blight of the Potato.

Ill.	Bul.	127	A Study of the Factors Influencing the Improvement of the Potato.
Ill.	Cir.	81	Selection of Seed In Potato Growing.
Kansas	Bul.	194	Potato Culture.
†Maine	Bul.	147	Potato Plant Louse.
Maine	Bul.	174	Blackleg: A Bacterial Disease of Potatoes.
Maine	Bul.	194	Control of Blackleg Disease of the Potato.
Maine	Bul.	211	Potato Flea Beetle.
Maine	Misc. Pub.	435	Proper Growing and Handling of Potato "Seed" Stock.
Maine	Misc. Pub.	467	Potato Flea Beetle.
Md.	Bul.	167	Changes In Potatoes During Storage.
Md.	Bul.	172	Irish Potato Investigations.
Mass.	Cir.	26	Fertilizers For Potatoes.
Mich.	Cir. Bul.	15	Potato Culture.
Mich.	Spec. Bul.	66	Potato Diseases of Michigan.
Minn.	Ext. Bul.	35	Potato Diseases.
Nevada	Bul.	76	The Potato Eelworm.
N. H.	Bul.	22	Prevention of Potato Blight.
N. H.	Press Bul.	15	Two Serious Potato Diseases.
N. H.	Press Bul.	30	Potato Scab.
N. J.	Spec. Bul.	P	Experiments With Fertilizers Upon White and Sweet Potatoes.
N. J.	Cir.	18	Potato Diseases and Methods of Control.
N. J.	Cir.	20	Potato Growing In New Jersey.
N. Y.	Bul.	123	Spraying Potatoes.
N. Y.	Bul.	137	Commercial Fertilizers For Potatoes.
N. Y.	Bul.	327	Potato Fertilizers.
N. Y.	Bul.	349	Potato Spraying Experiments In 1902-1911.
N. Y.	Bul.	367	The Persistence of the Potato Late-Blight Fungus In the Soil.
N. Y.	Bul.	370	Efficiency of Formaldehyde In the Treatment of Seed Potatoes For Rhizoctonia.
N. C.	Bul.	85	The Late Crop of Irish Potatoes In the South.
N. C. Dept.	Bul.		Irish and Sweet Potatoes.
N. C. Dept.	Bul.		Second Crop Irish Potatoes.
Ohio	Bul.	65	Variety Trials With Potatoes.
Ohio	Bul.	174	Potato Investigations.
Ohio	Bul.	229	The Fusarium Blight and Dry-Rot of Potatoes.
Ohio	Cir.	58	The Early and Late Blights of Potatoes.
Pa. Dept.	Bul.	190	The Potato.
*B. P. I.	Bul.	245	Investigations of the Potato Fungus.
R. I.	Bul.	111	Potatoes.
Vermont	Bul.	115	Disease-Resistant Potatoes.
Vermont	Bul.	153	Plant Diseases; Potato Spraying.
Vermont	Bul.	159	Plant Diseases, Spraying and the Weather.
Vermont	Bul.	168	The Phytophthora Disease of Potatoes.

Vermont	Bul.	172	Place Effect Influence In Seed Potatoes.
Va.	Bul.	174	Potato Growing.
°Va. Truck	Bul.	3	Some Seed Potato Questions In 1909. (Postage required).
°Va. Truck	Bul.	7	Truck Crop Potatoes. (Postage required).
Wash.	Bul.	62	Potato Growing.

PRECOOLING

Mo.	Bul.	19	Carload Precooling of Fruits and Vegetables.
B. P. I.	Yrbk. Sep.	550	Precooling of Fruits.

RHUBARB

Mo.	Bul.	34	Asparagus and Rhubarb Culture.

SEEDS

N. C.	Bul.	108	Seed Testing.
B. P. I.	Cir.	101	The Germination of Packeted Vegetable Seeds.
*B. P. I.	Bul.	131	Germination of Vegetable Seeds.

SMALL FRUITS

Col.	Bul.	171	The Colorado Raspberry Industry.
U. S. D. A.	F. B.	198	Strawberries.
U. S. D. A.	F. B.	213	Raspberries.
Fla.	Bul.	39	Strawberry Culture.
Fla.	Bul.	42	Strawberry Insects.
Ind.	Bul.	164	Strawberries.
Md.	Bul.	160	Strawberries.
Mich.	Buls.	170-1	Vegetable Tests For 1898. Bush Fruits For 1898.
Mich.	Spec. Bul.	59	Small Fruit Culture.
Minn.	Ext. Bul.	6	Small Fruits On the Farm.
Mo.	Bul.	8	The Small Fruits Garden.
Mo.	Bul.	25	Strawberry Congress.
Mo.	Bul.	39	Raspberry Culture.
Mo.	Bul.	58	Strawberry Congress.
N. H.	Bul.	137	Strawberries For New Hampshire.
N. Y.	Bul.	124	Anthracnose of the Black Raspberry.
N. Y.	Bul.	246	An Experiment In Shading Strawberries.
N. Y.	Bul.	309	Variety Test of Strawberries With Cultural Directions.
N. Y.	Bul.	336	Newer Varieties of Strawberries With Cultural Directions.
N. C.	Bul.	187	Small Fruits and Grapes.
N. C. Dept.	Bul.		Strawberry Patch.
Ohio	Bul.	186	Strawberries: The Newer Varieties.
R. I.	Bul.	91	Bush Fruits.
Texas	Cir.	1	Strawberries Under Irrigation In South Texas.
Va.	Bul.	147	Bush Fruits.
Wash.	Bul.	108	Bluestem of the Black Raspberry.

Wash.	Pop. Bul.	26	Currants For the Home Garden Or Commercial Production.

SPINACH

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°Va. Truck	Bul.	4	Spinach Troubles At Norfolk and the Improvement of Trucking Soils. (Postage required).

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N. C. Dept.	Bul.		Insect Pests and Spraying.
Vermont	Bul.	159	Plant Diseases, Spraying and the Weather.

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*Bur. Ent.	Cir.	38	The Squash-vine Borer.
*Bur. Ent.	Cir.	39	The Common Squash Bug.

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N. J.	Spec. Bul.	P	Experiments With Fertilizers Upon White and Sweet Potatoes.
N. J.	Cir.	19	Sweet Potato Culture.
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Ohio	Cir.	107	A Successful Alfalfa and Truck Farm in Southeastern Ohio.
Pa. Dept.	Bul.	201	Market Gardening.
Vermont	Bul.	170	Mony Mukles Mak a Muckle.

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ABBREVIATIONS OTHER THAN NAMES OF STATES

Ann. Rpt., Annual Report. *Bul.*, Bulletin. *Bur. Ent.*, Bureau of Entomology. *B. P. I.*, Bureau of Plant Industry. *Cir.*, Circular. *Cir. Bul.*, Circular Bulletin. *Cor. Cir.*, Correspondence Circular. *Dept.*, Department. *El. Sci. Bul.*, Elementary Science Bulletin. *Ex. Bul.*, Extension Bulletin. *F. B.*, Farmers' Bulletin. *Misc. Pub.*, Miscellaneous Publications. *Mo. Bd. Hort.*, Missouri Board of Horticulture. *P. R.*, Porto Rico. *R. C. Bul.*, Reading Course Bulletin. *Spec. Bul.*, Special Bulletin. *U. S. D. A.*, United States Department of Agriculture. *Va. Truck*, Virginia Truck Experiment Station. *Yrbk.*, Yearbook. *Pop. Bul.*, Popular Bulletin.

ADDRESSES OF EXPERIMENT STATIONS, DEPARTMENTS, AND BUREAUS

Alabama: Auburn.
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Oklahoma: Stillwater.
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South Dakota: Brookings.
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Vermont: Burlington.
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Pennsylvania Department of Agriculture: Harrisburg.
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Bureau of Plant Industry: U. S. Department of Agriculture, Washington, D. C.

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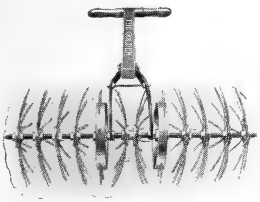

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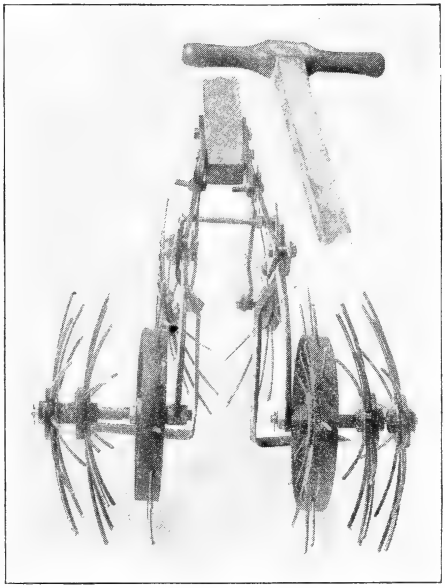

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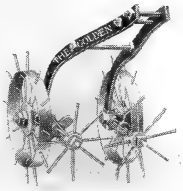

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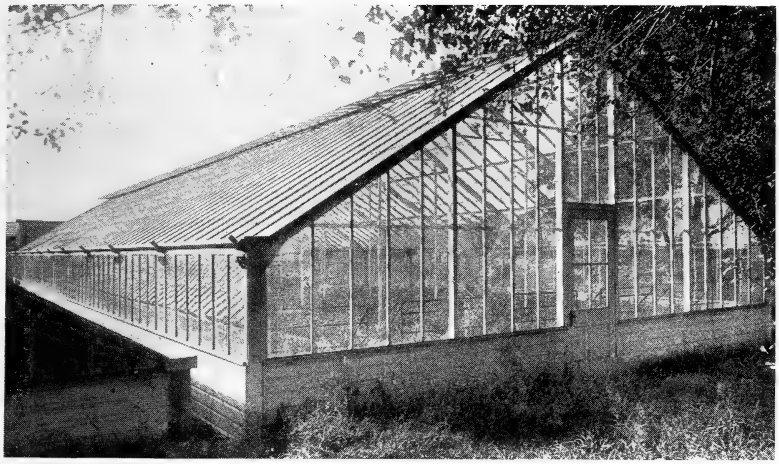

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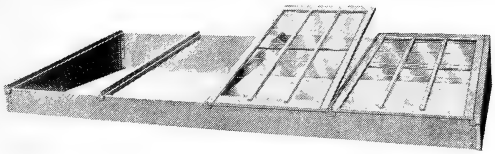

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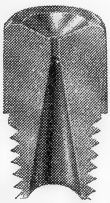

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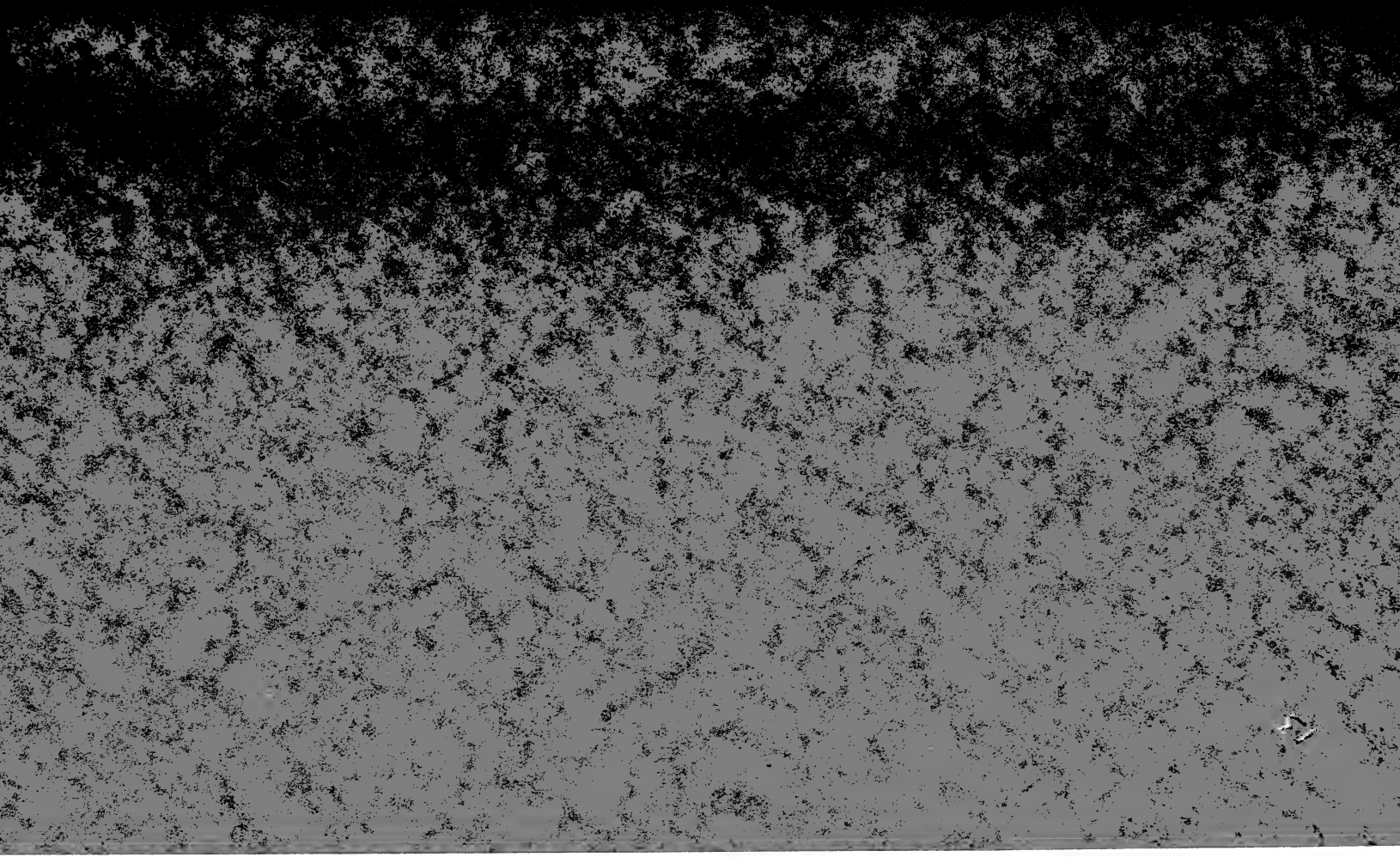

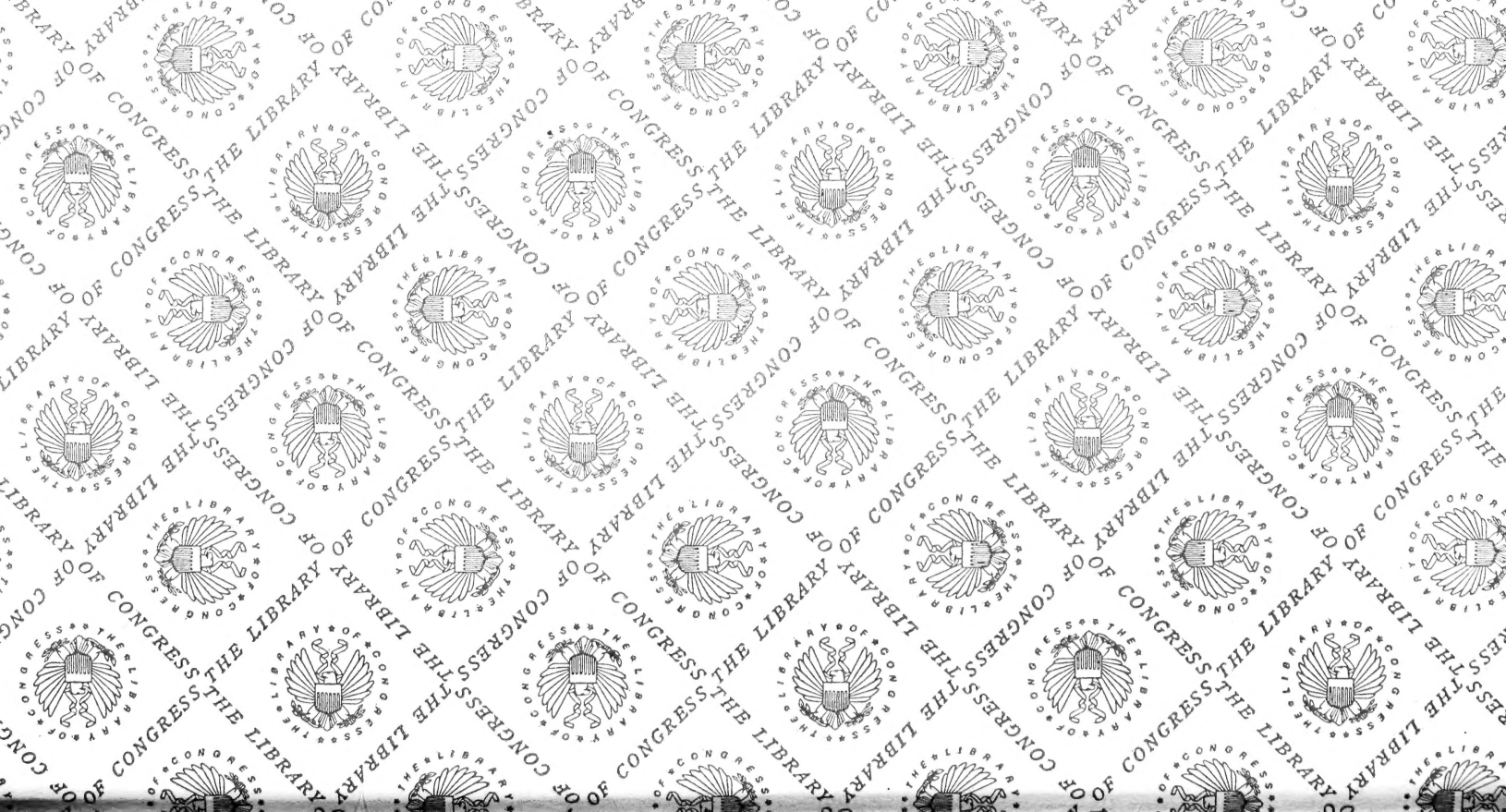
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