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publication of the Pennsylvania Vegetable Growers' Association  
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The eleventh annual meeting of the Pennsylvania Vegetable Growers' Association was held in Room E of the Pennsylvania Farm Show Building, Harrisburg, on January 21 and 22, 1936. Among the more important transactions at the business session were the treasurer's report, which showed receipts of \$116.36 and expenditures of \$48.75, leaving a balance of \$68.61; the election of officers, in which the executive officers named above were regularly elected for 1936; and the adoption of three resolutions, as follows:

1. Resolved that the Pennsylvania Vegetable Growers' Association express approval of the reporting of motor truck receipts of fruits and vegetables in the Philadelphia markets, which has been initiated by the Federal and State Bureaus of Markets, and urge these agencies to continue this service.

2. Resolved that the Pennsylvania Vegetable Growers' Association commend the cooperating agencies, including the Department of Agricultural Economics of the Pennsylvania State College and Experiment Station, on the studies which have been begun on the marketing of fruits and vegetables in the Philadelphia area, and respectfully request the continuation and extension of these studies.

3. Resolved that the Farm Show Commission be requested respectfully to install mist sprayers on the tables on which the Department of Welfare Institutional displays are exhibited in the Farm Show Building.

A full and varied program was presented during the two-day educational meetings, including the talks which are presented herewith. Thought-provoking questions and lively discussions added greatly to the value of the program, but space and means do not permit including these discussions in this report. Not all of the talks are included in this issue of the News; others will be presented in subsequent numbers.

Section I. Production Problems

How Can I Make a Profit by Growing Vegetables

H. D. Brown, Ohio State University

Which vegetable can I grow with the greatest assurance of making a profit? This and the question indicated in the above title are asked more frequently than all other questions relating to vegetable gardening.

The one answer which indicates fully ninety per cent of the possibilities may be simply stated, i.e., do something that your competitors are unable to do or grow a variety or a vegetable that your competitors cannot grow or do not know about.

To achieve this goal it is necessary to develop intelligently the best of human and natural resources. The emphasis should be placed upon the word intelligently. Vegetable growers cannot sit back and get governmental checks for crops that they have not produced. They are, however, engaged in a rapidly expanding industry in which they have hundreds of opportunities to excel. They are engaged in the most intensive branch of agriculture. They can grow one or all of some thirty vegetables. These vegetables are all attacked by one or more diseases and insects. New varieties are constantly being produced and new insect and disease control methods are constantly being perfected. The alert gardeners are the first to capitalize on these new productions and discoveries.

It is obvious that the exact method of doing something that your competitor does not know how to do or cannot do will change each year. A new variety profitable in 1935 may be replaced by a better variety in 1936 or a new insecticide or fungicide may replace older ones at any time. A few pertinent examples will illustrate the importance of utilizing up-to-date information in the vegetable gardening business.

#### Choice of a Location

Strange as it may seem some recent information is extremely helpful in selecting a place of business.

Region A study of acreage trends indicates an increase in market gardening and a decrease in truck gardening during periods of low prices. The opposite is true during periods when vegetables are bringing high prices. This fact is not generally known by gardeners although the reasons are obvious. The market gardener is located near to his market and does not have to pay large freight bills which eat up much and many times all of the possible profits of the truck gardener who is located at a considerable distance from market.

Soil fertility During the past two or three years, methods have been perfected for making soil analysis very quickly. It is now possible in a few minutes to analyze soil for all of the known essential fertilizing materials. It used to take days and weeks to get the same information. No gardener should buy or rent a farm without knowing the state of fertility of every type of soil on the farm. In many instances agricultural workers in the local State Experiment Station or State University will make the tests and make recommendations free of charge. If we assume otherwise equal advantages it is certainly true that "the cheapest way to grow a crop is to grow it on land that will grow a good crop." It often happens that it costs two or three times the purchase price of the farm itself in order to bring it to a state of fertility equal to that of a nearby farm which could be purchased at the same price or at most, only a few dollars more per acre. Gardeners located on fertile soils have a great advantage and those located on poorer soils have an almost impossible handicap to overcome.

Water Supply Mr. Arthur L. Smith, a very successful gardener, made the following statement to a class of vegetable gardening students this fall. "You know that we vegetable growers never make any money during seasons of adequate rainfall." It has been known for many years that irrigation is one of the essentials for success in the vegetable gardening business. Mr. Seabrook of the Seabrook Farms in New Jersey is credited with the statement that irrigation increases the yield and quality of vegetables at least 200 per cent. Certainly irrigation is a source of great satisfaction to gardeners who have irrigation facilities during dry periods and yet thousands of gardeners pay no attention to the water supply when they select their garden. There are hundreds of angles to the irrigation problem. For instance, Mr. Arthur L. Smith and many other gardeners living east and south of Columbus, Ohio, are located over an underground river which comes very near to the surface in many places in Ohio. Mr. Smith secured an apparently inexhaustible supply of water by sinking four lengths of 48-inch concrete tile from the soil surface into this river (total depth about 18 feet) at a negligible cost. Other gardeners have other types of shallow wells which are equally effective.

Columbus is noted for the two large dams on the Scioto River from which the city water supply is secured. These dams on the Scioto River supply eleven billion gallons of water annually, yet industries pump twice this amount from the underground river each year. At Worthington, Ohio an eight-inch well forty feet deep extending into an underground river has a rated capacity of 1,000,000 gallons of water per day. Gardeners located west of Columbus must sink wells to a depth of about 200 feet to get an adequate water supply. It costs these gardeners from 15 to 30 dollars more per acre each year to water their vegetables than it does for the more fortunate gardeners who are located over the underground river at an equal distance from the same city. This represents a difference in cost of operation equal to a \$300 per acre capital investment yet the assessed value of the land in each section is approximately the same.

Gardeners in other sections of the country are even more fortunate. Mr. Neil, a celery grower near Venice, Ohio needs only to divert the course of a constantly flowing stream of water to irrigate his crops. Mr. Norman Beebe backs the water up in drainage ditches by means of temporary or adjustable dams on his muck farms near Niles, Michigan. The water is allowed to flow away as soon as the area is sufficiently moist. Practically all of the muck in the Hardin county marsh in Ohio lies over an impervious calcareous subsoil which provides an ideal condition for subirrigation on small and large tracts. A free supply of water could be provided by dams in this area were it not for the law prohibiting the obstruction of the flow of water in a watercourse (Section 6499). Large tracts of land are subirrigated near Sanford, Florida using water from artesian wells.

It is highly essential that gardeners study carefully the possibility for an adequate water supply before selecting a location. There is a growing tendency to produce vegetables in localities where condition for their production are especially favorable.

Cultural Practices

The Lowly Turnip It should not be inferred that irrigation should be used for all vegetables. A cheap supply of water may be too expensive for some crops. Another practice followed by Arthur

Smith will illustrate this point and also emphasize the fact that it is not easy to excel and keep a step or two ahead of competitors. Mr. Smith grows from 100 to 150 acres of turnips each year. He rents nearby farms for this purpose primarily because it is not advisable to grow turnips or related crops on the same soil two years in succession and he does not have enough land for a rotation of this type. The land which he rents for the turnip crop is summer followed, and is cultivated with sufficient frequency during the summer to conserve moisture and kill weeds. The turnip crop is sown from July 15 to

August 20 and that sown between August 1 to 15 generally returns the most profitable crop. No other crop precedes the turnips during the growing season. In this way an excellent yield is usually secured even during exceedingly dry years. Of course Mr. Smith follows many other practices not commonly followed. For instance, he never uses more than one and one-half pounds of seed per acre. He grows his own seed so he will be sure of the variety and strain. He has storage facilities for 40,000 bushels and has effected many labor saving practices in growing, harvesting, and marketing the crop. Even with these improved practices it is difficult to make a profit in turnip culture at present. Mr. Smith says, "There was a lot of money in raising turnips for 10 or 12 years after the war. Unfortunately several bright young men have either copied my growing methods or have improved methods of their own so that now too many are growing turnips on a large scale. This results most unfortunately in profits for all growers concerned which approach the vanishing point."

Head Lettuce This is a crop that has fascinated me ever since 1914 when I grew my first crop on a small scale at the University of Illinois. Since that time I have grown at least fifteen fairly successful crops. In the trial plots at Ohio State University the New York variety strain Number 12 yielded at the rate of 20,000 marketable heads per acre which averaged 1.64 pounds per head during the rather favorable 1935 season.

Head lettuce in Ohio is an example of a crop which requires the use of special equipment, special strains, and special fertilizer and cultural practices. It is a cool season crop and at least six weeks of its growth must be completed under glass in order that the remaining six to ten weeks growth in the field can be made before extremely hot weather arrives. The seed is sown in sterilized soil (to avoid diseases) about February 15 to 20 and the seedlings set one and one-half inches apart in sterilized soil as soon as they are large enough to handle. The plants should be set in the field in fertile soil from the first to the tenth of April at Columbus being sure to use only well hardened plants. Ten tons of well rotted manure and 800 pounds per acre of fertilizer was applied several days before the seedlings for the 1935 crop were set in the field. One-half of one plot received an additional application of 800 pounds per acre of cyanamid 14 days before the plants were set. This plot yielded at the rate of 14,172 pounds per acre compared to a yield of

13,296 pounds per acre for the plot which did not get any supplementary nitrogen. Water was applied by means of an overhead system whenever needed.

Spinach One more example will suffice to illustrate the importance of knowing the value of new varieties. During a visit to the Virginia Truck Experiment Station in 1934 I learned that the new variety Old Dominion originated at that Station, was the only variety to survive a very severe winter at Norfolk. A quarter acre planted at Columbus the following September not only survived the severe winter of 1934 and 1935 but it did not go to seed in the spring as quickly as the older Virginia Savoy. This planting proved so profitable that we have a five acre planting this fall in order to test not only the overwintering ability in Ohio a second year but also to test the effect of fertilizers applied to the side of and under the rows at the rates of 250-500 and 1000 pounds per acre. Incidentally, the spinach was all sown by means of an S. L. Allen three-row tractor drawn combination seeder and fertilizer drill. This reduced the cost of seeding to a minimum. An excellent stand was secured by the use of eight pounds of seed per acre as it was all treated with fresh red copper oxide to reduce the loss from damping off organisms. It has not been necessary to cultivate this fall because frequent frosts have killed all weeds.

It is likely that many growers will plant this variety during the fall in the northern tier of states in the near future. It is also likely that this variety will then cease to be as profitable as it has been during the past season.

Freezing Mr. Frank App of the Seabrook Farms of Bridgeton, New Jersey in an address before growers at the Hartford Convention of the Vegetable Growers Association of America, Inc., last August, stated in part, "During the past six years we have been shifting--- from a harvest market season to a twelve month marketing season, through the freezing of our products." This example was chosen, first, because it illustrates the very definite association between production methods, processing methods, and marketing methods. It is almost impossible to consider these essentials separately. It was chosen also because freezing methods are likely to alter greatly the type of vegetable which is marketed in the near future. Dr. Fellers and Dr. Isham in their paper published in the 1935 proceedings of the Vegetables Growers Association of America, Inc. state, "Certainly the future of the frozen vegetable industry looks bright. One has only to sample some frozen peas, spinach, asparagus, or sweet corn in midwinter to become a warm friend of frozen vegetables. Losses in nutrient values of spinach, asparagus, and peas are negligible as a result of freezing." Although Mr. App makes use of the extremely low temperatures (-20 to -25°F.) for freezing it has been proved that temperatures of 0°F. are satisfactory for the freezing of many vegetables. Growers located where they have access to cold storage facilities should carefully study the possibilities of this phase of the vegetable gardening business. It is by no means a get rich quick plan. Moreover, it requires an intelligent management of many technical operations. Enzymes must be killed by blanching. Effective equipment must be available for harvesting and shelling the peas on an economical basis. A thorough knowledge of preservation and cold

storage methods is imperative. Moreover, the market is likely to be oversupplied within the next five years, possibly to be replaced by a vegetable prepared in a still different manner not yet known to man.

These examples will serve to illustrate a few of the possibilities, in the vegetable gardening business, that may come to those what are informed of new developments. Many other equally good examples could be described. The use of rotenone in the form of derris dust and sprays is especially promising for the control of cabbage worms, Mexican bean beetles, onion thrips and pea aphids. This relatively new insecticide is moreover non-poisonous to human beings, a very important consideration.

Other gardeners choose to effect economies by judicious handling of labor, and especially important factor at present. One plan that is gaining favor is to distribute a definite percentage of the profits of the business to faithful and efficient employees.

Still other gardeners depend largely upon the use of labor saving machinery and efficient management. Men with adequate experience, enthusiasm, and perseverance, operating on land well adapted to Vegetable Gardening, must also have adequate equipment and ample capital if they are to succeed. Incidentally an accurate system of cost accounting is essential.

It is evident from the foregoing that the business of vegetable growing is a complex business. Successes are possible to the well informed and practical, but failure is almost sure to greet those who go in to the business unprepared.

### Building Soil Fertility for Vegetable Crops

A. W. Wiggins, Clarks Summit

Mr. Chairman and Vegetable Growers of Pennsylvania:

Sometime ago the Program Committee asked me to talk to you a few minutes on "Building Soil Fertility for Vegetable Crops." First I thought I would not as I have had but three years in vegetable production but have been interested in soil fertility for some time.

Many tons of commercial fertilizer are used annually without any appreciable effect upon yield and quality of the crop. This is brought about by the deficiency of soil organic matter, which produces certain physical, chemical, and biological conditions under which plants cannot grow to best advantage.

The conditions which permit the accumulating of organic matter in the soil are: limited air supply; low temperature; excessive supply of water; absence of micro-organisms; lack of calcium carbonate; and the addition of organic matter. In adding organic matter, we mean green manure crops, farm manure, crop residue and waste material.

The condition that confronts us now is, that manure is so scarce and high in price. In consequence, we shall have to grow our humus, the more the better; let us all grow 50% more this year.

About twelve acres of the garden spot that I am using for vegetables has grown vegetables for over forty years. Until four years ago this had manure added nearly every year. Now we are growing green crops, plowing them in, and adding about half the amount of manure.

As soon as a crop is harvested and we are not using the ground for a second crop, that crop is cut off, soil disked, and as we use that soil year after year, we sow rye as it makes a nice growth in the fall and starts out early in the spring. Again let me say, as soon as you harvest your crop you should sow something for humus, have protection for your soil during the winter and protect washing. In sowing this rye we used a disk drill. The surface soil contained plenty of waste material but this did not bother in the drilling.

I might add here: after drilling the rye we sowed five pounds of radish seed on that same ground, using a clover seed sower, then rolled it in; these were the nicest radishes we had all year.

During the winter if you can add manure or refuse of some kind, it all helps to make humus, which makes the ground loose, so that it receives and retains more water.

In the spring we let the rye grow as long as we can before plowing, depending on the crop to follow. After plowing we disc, add lime if needed, harrow it in, then add the commercial fertilizer that we think we need for that particular crop to follow.

In deciding what fertilizer to use, we must look at the crop it is to be used on. We are most concerned about nitrogen, phosphate and potash to be added. In adding the amount of fertilizer used per acre by twelve or fourteen of the leading vegetables we find that they use two and one-half times as much nitrogen as phosphate, and about four times as much potash as phosphate.

In growing the real early vegetables, this nitrogen must be added in an available form, as nitrate soda or sulphate of ammonia, something that acts quickly as at this time of year, being cool, nitrification has not started to work. On later crops we can add nitrogen in other forms.

In addition to the manure and green crop plowed under, we have been using 800 pounds of a 4-16-10 per acre broadcast, worked well into the soil with a harrow, then finishing up with a meeker harrow, which makes the soil fine, level and solid.

When adding available nitrogen to celery this fall about a week before we put up the boards for blanching, we used nitrate of soda. We think it worth while as it filled up the centers in fine

shape, made it very crisp and tender. It seemed to bleach the same as where none had been applied. We shall try the same thing next year to compare the results. This might have some effect on the keeping quality which I do not know.

In closing I want to say grow more humus.

#### Growing Tomatoes for Market

Harry W. Hopkins, Clarks Summit

On this subject of "Growing Tomatoes for Market", I might say that during the last few years there has been a greater difficulty in finding the market than in growing the tomatoes.

First I may remark that I grow tomatoes because I like to and because I need the money. My market is Scranton, twelve miles away and all good road. I sell wholesale. In fact, for the last twenty-four years, I have sold almost entirely to one firm. During the tomato season, I take a load each week day night, at present, starting about one o'clock in the morning and getting back about four o'clock. This gives me time to unload, talk with the buyer, look over the market, and size up things for the next day. This way I have all day to look after the farm which is quite an advantage. To some, it may seem like a long day but it is like smoking or any other bad habit---you soon get used to it.

This way may not be ideal, but our selling costs are very low. As we sell only the better grade, setting at least three different times and using several different varieties, we try to have first class tomatoes over as long a season as possible. In fact, the latest tomatoes are frequently the most profitable and we usually have a market for some whether it happens to be good or bad. Some are usually sold before they get to the wholesalers.

As for the poorer tomatoes--and sometimes too many ripen at once or they get so cheap as to be unprofitable--, we haul only enough to supply the trade. We do not pick a lot of tomatoes and throw them on the market just for the sake of saving them. The last few years I have sold them to an Italian trucker. He would bring a gang of men and women and, in a couple of days, scrape up six or seven hundred baskets. They don't want them until they are dead ripe since they use them to make tomato paste. While I do not get much out of them, it keeps the neighbors from saying that I pick only the best and leave the rest.

I wish there was something unusual that I could tell you about growing tomatoes but I'm afraid there isn't. The older you grow, the less sure you are that you know it all. But there are some changes that we have made in the last dozen years that have helped us to raise our family somewhat as we would like to and also to produce a quality product as cheaply as possible.

First, we use only good, smooth, fairly easily worked land so that practically all the work can be done by horses. About all the hand work we do is to hoe them at the first cultivation. I used to have some early but stony land that raised fine tomatoes but required considerable hand work. It was both expensive and unsatisfactory so I sold the land and have never been sorry. Men that can hoe are almost a thing of the past.

Of course, we all realize that good seed and the right varieties are important. I think very few of us realize the adaptability of different varieties to certain types of soils and climate. For instance, John Baer and Greater Baltimore do well under my conditions but I have never been very successful with the Marglobe.

Styles in tomatoes, like in women's clothes, change. When I first began to grow tomatoes, I raised mostly Truckers' Favorite, a purple variety, because our market wanted a purple tomato just the same as they wanted a white sweet corn. Both of them are now very difficult to sell. Then came Chalk's Jewel which, being earlier than some of the older varieties, soon became popular. I grew Bonny Best for several years. They were nice but never very large. Then came the John Baer and, as most of you know, the Department of Agriculture does not recognize the Jewel or the John Baer as being distinct from the Bonny Best.

About twenty years ago, I began using John Baer's and was so pleased with them the first year that I immediately began saving my own seed and have continued to since. I have never found anything to equal them as an early to medium early tomato for our local market. For a later and also for the latest tomatoes, I use a variety which I got from a neighbor. It had been grown locally for several years under several different names. It appears to be a strain of Greater Baltimore about two weeks later than the John Baer but of the Stone type. These two varieties fit in well for my trade. Although they are rather large sometimes, neither of them is bad about cracking in wet weather. My experience has been that a tomato that is slightly flattened is not so likely to crack as a more nearly globe shaped one.

Of course for a green wrap and for shipping, you need a tomato of the Marglobe type. I have been looking for one that would be satisfactory under my conditions. The two chief faults have been too many small tomatoes and their danger of cracking. I tried two strains last year in a test plot that looked promising. Scarlet Dawn looked very good for an early Marglobe type.

I use nothing but home grown plants started in a greenhouse and grown in boxes or flats. The earliest are given as much space as we think we can afford. The second early are usually grown sixty-three to a box, and those set around June 20 are one hundred eight to a box.

Our rotation varies somewhat. Tomatoes usually follow cabbage but sometimes follow sweet corn. The latest are sometimes planted on sod ground, but we always try to have our latest on about the least frosty place on the farm in order to have them as late as possible.

I have tried different distances for setting the plants: 4x4; 4x4½; 4½x4½; 3x5; 4x5; 3x6. I have come to the conclusion that 3x5 is very satisfactory for the Bonny Best type, and 4x5 for the later ones. But I usually set 3½x5 and 4x5. If I had a very light soil or rather poor ground, perhaps I would make them slightly narrower between the rows. I like to give them plenty of air and sunlight because I think there is less danger of leaf spot or blight where they have plenty of space. They are also more convenient to pick, especially in wet weather.

I always used to use manure in the hills for tomatoes, using at least twenty-five tons of mine manure for that purpose each year. But it got to be almost impossible to buy it since they use electric motors instead of mules in the mines now. It also made a lot of work in a very busy time. For a number of years, I mixed my own fertilizer but for the last couple of years I have used a well-known brand of ready mixed fertilizer, a 4-16-10, with very satisfactory results. I put two fair sized handfuls to a plant, making a complete circle around it for about a foot just after the plants are set and just before the first cultivation. As I said before, nearly all the work of caring for them is done with horses. Under our present method of farming, weeds are not a serious factor but we are always careful not to cultivate when the plants are wet with rain or heavy dew.

In picking we put up a good, honest, attractive pack, being careful always to have as full a package as possible. No one ever made anything by trying to get away with a slack pack. We usually use a sixteen quart hamper type of basket, although we sometimes use a twelve quart climax basket. The latter is not so popular in our market as they were because too many tried to fill them about two-thirds full and call them full baskets.

I have been asked how I save my own seed. Well, perhaps it isn't just according to Hoyle, but more like a busy trucker. I like to wait until the tomatoes are at their best. We usually have plenty at that time to select from. Then if I have time, I look for outstanding plants. Sometimes I find such plants when I am picking. I like to wait until I know just what a plant is going to do so I can see whether it has the vigor necessary to produce a heavy crop of the desired type of fruit and see whether it is free from disease and cracking. If I have an unusually nice crop, I try to save enough seed for several years. I always keep some in reserve for an emergency, for I had an experience which taught me a lesson. One year an accident happened to my latest plants and I bought some seed from one of the oldest seed firms in the United States. For less than one dollar, I got all the fifty-seven varieties and lost several hundred dollars.

In saving the seed, I select well ripened tomatoes, cut them in half and scrape out the pulp and seeds. I let the seeds stand in whatever juice collects for a couple of days till all the pulp has separated from the seeds. The seeds may then be washed, spread thinly on paper, and dried thoroughly in the sun. I usually keep the seeds in tin cans so that neither moisture nor mice can get at them.

The last thing I do in raising tomatoes is pull the vines and burn them, in case there should be any disease. Then I try to get some sleep. And when I get rested some, I commence to study seed catalogues and dream of raising some tomatoes like those you see in the pictures.

Nineteen Years' Results with Fertilizers,

Cover Crops, and Barnyard Manure

W. B. Mack, State College, Pa.

Fertilizer experiments on truck crops were begun in 1916 by Dr. C. E. Myers at the Pennsylvania State College, and have been in progress without interruption since that time. The experiment was laid out in four sections of about 1½ acres each, and a four-year rotation of cabbage, potatoes, tomatoes, and wheat followed by clover and timothy was followed on each section. The sections were started in rotation, so that each crop was grown every year on one of the sections, and all were grown during the course of four years on every section.

Each of the four sections was divided into six series of 17 plots each. Every fourth plot was originally planned as a check plot without fertilizer, but yields rapidly decreased until no crop was produced on certain unfertilized plots. In consequence, all check plots were uniformly fertilized until 1932, when different fertilizer treatments in the row or hill were begun on these plots.

Sweet corn was introduced instead of wheat and sod in the fourth year of the rotation, beginning in 1928.

The treatments now include the following comparisons:

1. Single plant food elements, nitrogen, phosphorus, and potassium, in comparison with each other and with combinations of two elements.
2. Combinations of two plant food elements, in comparison with each other and with complete fertilizer.
3. Comparisons of different amounts of each plant food element, when applied in a complete fertilizer in which the other two plant food elements remain constant in quantity.
4. Comparisons of different amounts of barnyard manure, with and without additional commercial fertilizer.
5. Comparisons of rye and vetch cover crop with barnyard manure, each with commercial fertilizer.
6. Comparisons of different single plant food elements, combinations of two elements, and complete fertilizers broadcast, with half as much applied in the row.

Records have been made of yield, earliness, quality of crop, and disease infection under the different treatments. Space will permit only a few summaries of total yields at this time. It might be stated, however, that high total yield has been found to be associated to some extent at least with high early yield and high quality, and that fertilizer treatment had little influence, if any, on the amount of disease or insect damage.

Table I shows the yields of the different crops from plots receiving single elements, combinations of two, and complete commercial fertilizer. The amount of each element and the source were the same in each case; N represents 60 lb. of nitrogen per acre, from 367 lb. nitrate of soda; P represents 100 lb. of phosphoric acid per acre, from 625 lb. of 16% superphosphate; K represents 80 lb. of water-soluble potash, from 167 lb. of muriate of potash. All applications were broadcast.

Table I. Effects of Plant Food Elements, Alone and in Combination

Fertilizer	Yield Per Acre				
	Sweet Corn Doz.	Tons	Tomatoes Tons	Potatoes Bushels	Cabbage Tons
N	792	1.42	6.2	94	3.1
P	867	1.67	9.5	110	8.0
K	750	1.28	6.0	90	4.0
NP	1104	2.67	12.0	128	13.3
NK	993	2.09	8.0	124	7.0
PK	973	2.36	12.4	167	11.6
NPK	1188	3.33	15.3	192	14.9

It is apparent that phosphorus alone is the most important, but that each element in combination improves the yields of all crops.

Table II shows the effects of variation in analysis of complete fertilizer. The amount of each element varies from 50 to 150 per cent of the standard amounts stated above, the other two elements remaining unchanged.

Table II. Effects of Different Analyses of Complete Fertilizer.

Fertilizer	Yield Per Acre				
	Sweet Corn Doz.	Tons	Tomatoes Tons	Potatoes Bushels	Cabbage Tons
$\frac{1}{2}$ N + PK	892	2.21	12.9	158	11.5
N + PK	1000	2.61	14.2	166	13.6
$1\frac{1}{2}$ N + PK	1033	2.84	13.7	171	13.2
$\frac{1}{2}$ P + NK	942	2.33	14.1	177	10.8
P + NK	1092	2.87	14.8	208	13.1
$1\frac{1}{2}$ P + NK	1150	3.20	17.9	212	14.3
$\frac{1}{2}$ K + NP	1046	2.78	14.5	187	12.6
K + NP	1025	2.72	14.1	191	11.4
$1\frac{1}{2}$ K + NP	1071	2.71	13.7	146	13.0
$\frac{1}{2}$ N $\frac{1}{2}$ P $\frac{1}{2}$ K	971	2.54	10.7	147	9.4
N P K	1025	2.72	14.1	191	11.4
$1\frac{1}{2}$ N $1\frac{1}{2}$ P $1\frac{1}{2}$ K	1050	2.69	14.8	179	12.7
2N 2P 2K	1000	2.55	15.8	154	13.8

Several interesting facts are brought out in this table. One is the rather small effect of the different analyses on the yield of sweet corn. Phosphorus had the greatest influence, but potash had very little, the least amount producing just as good yields as larger amounts. Another interesting fact is that increasing the phosphoric acid above the standard amount ( $1\frac{1}{2}$  P NK) produced the best yields of any commercial fertilizer combination, even better than twice the standard amount of all three elements (2N 2P 2K).

Additional potash above the medium amount did not improve yields in any case except in the number of ears of sweet corn, and in this respect the difference is probably no greater than that which one would expect by pure chance.

The influence of different sources or carriers of the plant food elements is shown in Table III. In all cases, the amount of plant food is the same as that specified above, and, except for the one specified, the carriers are nitrate of soda, superphosphate, and muriate of potash.

Table III. Effect of Different Plant Food Carriers.

Fertilizer	Yield Per Acre		Potatoes Bushels	Cabbage Tons
	Sweet Corn Doz.	Tomatoes Tons		
Nitrogen Carriers				
Sodium Nitrate + P	1104	2.67	128	13.3
Ammonium sulfate + P	998	2.54	139	11.8
Sodium nitrate + PK	1225	3.36	199	14.5
Ammonium sulfate + PK	883	2.27	149	10.6
Dried blood + PK	992	2.46	149	11.1
Tankage + PK	1000	2.49	187	11.8
Calcium nitrate + PK	1233	3.43	220	14.4
Cyanamid + PK	1167	3.34	162	13.4
Phosphorus Carriers				
Superphosphate + NK	1208	3.26	198	14.1
Steamed bone meal + NK	1192	2.91	204	11.8
Rock phosphate floats NK	1025	2.15	141	9.5
Muffate of potash + NP	1175	2.81	183	11.3
Sulfate of potash + NP	1067	2.74	172	11.1

It is evident that the inorganic carriers of nitrogen, except ammonium sulfate, were better than the organic carriers. In complete fertilizer, the other inorganic carriers were better than ammonium sulfate, but nitrate of soda in combination with phosphoric acid only was little different from ammonium sulfate in a similar combination.

There was little difference between superphosphate and bone meal, and between muriate and sulfate of potash.

The comparisons of manure and cover crops are presented in Table IV. The plots receiving manure alone also were cover cropped, but those receiving manure and fertilizer had no cover crops.

Table IV. Effects of Manure, Cover Crops, and Fertilizers.

Fertilizer Treatment	Yield Per Acre		Potatoes Bushels	Cabbage Tons
	Sweet Corn Dozens	Tomatoes Tons		
20 Tons manure	1181	3.64	250	14.9
30 " "	1167	3.66	270	16.2
40 " "	1229	3.57	250	16.9
10 " " + NPK	1067	2.95	200	14.1
Rye & vetch cover crop + NPK	973	2.50	165	12.9

The comparisons of broadcast and row treatments are presented in Table V. The row applications were made in two bands, one on each side of the row, for potatoes and sweet corn. The fertilizer bands were about two inches from the seed, and about the same depth as the seed. For tomatoes, the row treatments were applied in a circle about one foot in diameter around each hill, and the fertilizer

was mixed well with the soil as the plant was being set, in each year except 1935, in which the fertilizer was placed in a ring about 9 inches in diameter, about each plant, and about two inches deep. The medium applications caused no damage to stand of any crops, but the heavier applications reduced the germination of corn, and injured both corn and tomato plants. Cabbage and potatoes were not injured by any treatment. The row applications were always one-half of the corresponding broadcast treatments.

Table V. Row vs. Broadcast Applications of Fertilizers

Fertilizer Treatment	Yield Per Acre		Potatoes Bushels	Cabbage Tons
	Sweet Corn Doz.	Tomatoes Tons		
N broadcast	792	1.42	94	3.1
N in row	1088	2.79	141	10.2
P broadcast	867	1.67	110	8.0
P in row	927	2.08	130	8.7
NP broadcast	1104	2.67	128	13.3
NP in row	1026	2.62	145	11.3
NK broadcast	993	2.09	124	7.0
NK in row	1031	2.49	151	10.4
PK broadcast	973	2.36	167	11.6
PK in row	892	2.11	146	9.2
NPK broadcast	1188	3.33	192	14.9
NPK in row	1003	2.52	140	11.4
1/2N + PK broadcast	1033	2.84	171	13.2
1/2N + PK in row	982	2.25	151	11.6
1/2P + NK broadcast	1050	3.20	212	14.3
1/2P + NK in row	1052	2.66	164	12.6
1/2K + NP broadcast	1071	2.71	146	13.0
1/2K + NP in row	1008	2.42	160	11.2
2N 2P 2K broadcast	1000	2.55	154	13.8
2N 2P 2K in row	996	2.64	158	12.3

When the broadcast applications were small, as with single plant food elements, row applications of half the amount gave somewhat better results; with heavy applications, however, the broadcast applications were generally better than half as much in the row, though there are notable exceptions. Double the standard complete fertilizer (2N 2P 2K) for example, produced more ears of corn to the acre, but the weight was less than with half of this amount in the row. The yield of potatoes was greater with the row applications 2N 2P 2K and 1/2K + NP, than with the corresponding broadcast applications.

It is hoped to publish results of fertilizer treatments on earliness and on quality of crops in the near future.

## Section II. Marketing

### Philadelphia Important Distribution Point for Fruits and Vegetables

A recent study of the Philadelphia fruit and vegetable market shows that more than 16 per cent of the sales at the railroad terminals in October were made directly to out-of-town buyers, and that a considerable portion of the produce sold on the Dock and

Callowhill Street markets moved out of Philadelphia. Nearly one-third of the produce sold at the terminals went to buyers in Philadelphia without passing through either the Dock or the Callowhill Street markets, while approximately 40 per cent of the terminals sales were made to Dock Street dealers and 11 per cent to those on the Callowhill Street market (Table 1). The above figures cover both private and auction sales and are based on sales records of dealers receiving 80 per cent of the fruit and vegetable unloads for October.

The study from which the above figures are taken is one of the first ever made of the distribution of fruits and vegetables from a large terminal market and is a part of a general study of the Philadelphia produce market which is being made by the United States Department of Agriculture and the State Colleges of New Jersey and Pennsylvania in cooperation with the produce trade. The information on distribution which is being collected will show the total volume of each commodity handled during each season of the year in each of the wholesale fruit and vegetable markets of Philadelphia as well as the distribution of sales by commodities from each market.

The complete study now being undertaken includes a consideration of many other features of the Philadelphia market for fruits and vegetables. Buyers in Philadelphia and surrounding cities are now being interviewed to find out (1) what proportion of their fruit and vegetable supplies are bought in Philadelphia, (2) where they are obtaining produce bought elsewhere, (3) what hours of sale they prefer, and (4) their suggestions for improving the conditions and practices in the Philadelphia market. Attention is also being given to such problems as waste, traffic conditions, selling hours, selling practices and improved market information. During the past two years there have been no reports on the supplies of fruits and vegetables received by motor truck. Arrangements have just been completed for obtaining this information during 1936. This, together with the data on rail receipts which are being gathered, give a complete picture of daily unloads in the Philadelphia market.

Another phase of this study includes a survey of farmers in Pennsylvania and New Jersey who sell produce in the Philadelphia area. This work is now under way and early tabulations are not conclusive. The nature of this work, however, may be better understood by noting that records obtained from 49 fruit and vegetable growers in southeastern Pennsylvania indicate that approximately two-thirds of the produce sold by them is marketed through commission men (Table 2).

About one-seventh of their sales are made to chain stores. Other channels include cooperative selling, roadside markets, independent stores and canneries.

Considering only their Philadelphia business, these 49 farmers sell nearly three-fourths of their produce on Dock Street and about one-fifth on Callowhill Street (Table 3). The remainder moves direct to chain and independent stores or is delivered by the grower to the consumer. Of course, much of the produce sold by growers on Dock and Callowhill Streets finally reaches Philadelphia consumers through retail stores. The completed study, it is expected, will show the extent of this business. Thus there will be developed a complete picture of the fruit and vegetable trade in the Philadelphia area.

Growers made numerous criticisms of the marketing situation in the southeastern area of Pennsylvania, and likewise suggested improvements along certain lines. The sentiment prevailed quite generally that too much produce of inferior grade was being sent to market. The opinion expressed was that the use of the 5/8-bushel basket had a demoralizing effect on the quality of produce offered in the markets. Of the 49 growers interviewed 21 reported that culls were sent to market frequently at the request of commission men. For the purpose of eliminating culls on the market some growers suggested that a prohibitive commission charge should be placed on produce of this kind. Much inconvenience and delay in unloading produce in Dock Street was experienced by many of the growers who reported loss of time ranging from a few minutes up to seven hours. The congestion is generally greatest on Sunday night. Those who reported little congestion stated they had learned by experience at what hour to deliver in order to avoid traffic holdups.

While most of the growers interviewed knew their commission men personally (since the average distance from Philadelphia of persons interviewed was only 22 miles), only about a third of them had ever checked the financial rating of the commission men. With the importance of the commission method of selling, judging from the large amount of produce handled in this way, it is obvious that growers may avoid loss in the sale of produce by obtaining every assurance possible of the reliability of the agents who sell for them.

A majority of the farmers favored selling produce to chain stores. It was frequently stated that chains were satisfactory and reliable buyers, although some growers held that chain stores unfavorably influence the market price because of the large volume they handle.

The extent to which these 49 growers used secondhand packages is of interest to farmers. Nine producers use secondhand packages entirely, 11 very frequently, 2 for about half the produce sold, 9 for culls and off grade fruit only, 8 very seldom, and 10 growers never use secondhand packages.

Work under this project will be carried on during 1936. More producers will be interviewed and a survey will be made of all branches of the trade engaged in handling fresh fruits and vegetables.

Table 1 - Distribution of Sales of Carlot Receipts of Fruits and Vegetables in Philadelphia 1/ - October 14-26, 1935 (Preliminary)

Commodity	Cars unloaded	Distribution of Sales			
		To Dock Street stores (per cent)	To Callowhill Street stores (per cent)	To other Phila. buyers (per cent)	To out-of-town buyers 2/ (per cent)
Apples	3/ 209	24.2	18.4	49.9	7.5
Beans	2	69.2	3.4	14.0	13.4
Cabbage	56	3.3	1.0	4/ 78.8	16.9
Cantaloupes	4	19.3	7.8	29.8	43.1
Carrots	9	28.3	5.5	44.8	21.4
Celery 5/	49	57.4	1.6	21.6	19.4
Cranberries	2	32.1	5.5	36.4	26.0
Cucumbers	3	63.9	8.6	15.0	12.5
Grapefruit	56	45.9	10.6	28.4	15.1
Grapes, Juice 6/	395	-	-	-	-
Grapes, Table	119	44.1	11.2	33.6	11.1
Honeydew melons	26	36.2	7.9	33.8	22.1
Lemons	24	56.2	11.5	17.7	14.6
Lettuce	78	41.5	10.6	17.7	30.2
Olives	1	58.4	4.6	24.6	12.4
Onions	66	36.2	7.1	35.6	21.1
Oranges	172	44.2	10.7	28.1	17.0
Peaches	1	41.7	21.5	28.0	8.8
Pears	65	49.2	17.6	22.2	11.0
Peas	33	37.7	13.1	32.2	17.0
Persian melons	1	35.4	7.1	41.4	16.1
Pomegranates	1	31.5	12.3	36.1	20.1
Potatoes	23	29.0	18.7	37.5	14.8
Prunes	16	39.5	17.7	29.9	12.9
Quinces	2	38.2	1.9	4.7	55.2
Tomatoes 5/	68	45.7	17.2	23.1	14.0
Others	7/ 29	-	-	-	-
All Commodities	1,510	39.8	11.3	32.5	16.4

- 1/ Cars unloaded on special sidings of chain stores not included, if the chain store was the original receiver.
- 2/ It should be noted that a larger proportion of each commodity than is shown in this column goes out of town, for some of the produce going to the Dock and Callowhill Street markets and some of that unloaded at the special chain store sidings is redistributed out of Philadelphia. This final distribution will be shown later.
- 3/ 63.16 per cent of the apple unloads were put into cold storage, so the distribution of sales shown applies only to the other 36.84 per cent which were actually sold.
- 4/ Includes cabbage unloaded at the kraut factories.
- 5/ The sample used for these products was smaller than for the other products, so there is some doubt as to the completeness of the distribution figures shown here.
- 6/ Most of the juice grapes were sold to cash buyers coming in their own trucks to the cars at the juice grape yards. Distribution figures were not obtained for these.
- 7/ Includes all commodities (except bananas) for which distribution figures are not shown.

Table 2 - Fruit and Vegetable Sales Made by 49 Farmers in 5 Counties of Southeastern Pennsylvania, Showing the Proportion Moving Through Each Channel - 1935

(These results are preliminary and will be changed by the inclusion of the records of additional farmers.)

Channel	(per cent)
Commission men	69
Chain Stores	13
Cooperative-FOB	8
Cash Buyers at farm	4
Roadside markets	3
Independent stores	2
Other	1

Table 3 - Fruit and Vegetable Sales in Philadelphia by 49 Farmers, Showing the Proportion Moving Through Each Outlet in the City - 1935

(These results are preliminary and will be changed by the inclusion of the records of additional farmers.)

Outlet	(per cent)
Dock Street	74
Callowhill Street	19
Chain stores	4
Independent stores	2
House delivery	1

Some Problems in the Conduct of Roadside Markets

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People, like bees, migrate from home with the coming of the warm summer days. Bees go into the country in search of flowers which grow abundantly in the open country and from these they lay in their supplies of food. People, too, from their crowded quarters in the cities, go to the country in search of flowers, camping grounds, fishing grounds, bathing beaches, health resorts, etc. The cool, shady groves and the beautiful stretches of country road make their appeal to city folks. Just think how easy it is today to get into your automobile and travel a hundred to a hundred and fifty miles into the country and return home the same day. This has been made possible by good roads and the coming of the automobile. The automobile has not only revolutionized country life, but it has also changed the complex of city life. It has had a tremendous influence in the breaking down of the barriers between country and city folks. It has been the means of bringing city and country folks closer together in a social as well as a business way. Not only is the automobile used for pleasure and recreation, but it is also a means of enabling farmers located on improved highways to dispose of a considerable volume of farm produce right at the farm. The general use of the automobile has brought the city consumer into the country in increasing numbers, thereby enlarging greatly the number of possible buyers who pass the farmer's gate. These tourists out for fresh air are also intent upon fresh vegetables and fruits and they often return home with their cars laden with good things to eat.

Farmer's roadside markets have developed rapidly in the last 15 years. They have passed beyond the experimental stage. The stands which happened to be situated in a favorable location soon expanded from the pioneer stage of a couple of rough boards supported by two wooden horses, a crudely constructed sign and an umbrella to the more permanent roadside markets of today which often have ample buildings for shelter, rest rooms, free tables, benches, facilities for water, and many other things which the traveling public appreciates.

Owing to the development of roadside markets since 1920, and the many problems that have arisen in connection with the successful conduct of markets, the Department of Agricultural Economics of the University of Maryland made a study of 275 roadside markets in 1925. Only 100 of these markets however were owned and operated by farmers. This was one of the first studies to be made of roadside markets in the United States. Again in 1934 another study of roadside markets was made in Maryland, the approach to the subject being somewhat different from the previous study. The study made in 1934 included 173 roadside markets located on the main highways in the State; of these 147 were farmer-owned, of which 91 sold produce grown on their own farms; 24 were owned by non-farmers who sold in competition with the farmers; and 2 were cooperative farm women's markets.

Of the 173 markets, 41 were of the permanent type, 63 were semi-permanent, and 69 were classed as temporary. Sales at the permanent markets averaged \$3,191 per year; at the semi-permanent markets, \$1,697; and at the temporary markets, \$230. Although the temporary markets constituted 40 per cent of the total and did only 6 per cent of the volume of business, they play an important part in disposing of surplus products from the home garden. Surplus products from the home garden were sold at over 50 per cent of the temporary markets. These markets are operated by family labor and have little or no investment. The income from this source is a clear profit, as the produce sold would otherwise have been a loss. The temporary type of market also provides an outlet for the products of those farmers who have a surplus of fruits and vegetables at certain seasons. It is unprofitable to sell these products through the regular marketing channels in such small quantities. These small quantities of seasonally produced products can be sold at a profit through roadside markets. Sales at the temporary markets in Maryland ranged from \$10 to \$2,000 for the season.

Twenty-four of the markets were non-farmer owned. The permanent non-farmer owned markets sell mainly gas, oil, and general merchandise, and the sale of farm products is a minor source of income. The sale of farm produce is the main source of income of non-farmers operating semi-permanent markets.

A producer should start with a rather simple type of market and expand it as the market becomes successful. A very popular and successful type of building is one which has a closed in back, good roof, and drop doors on the front and sides. The doors, when partly lowered, make excellent tables for the display of various products. It should be borne in mind that quality, standardization of pack, combined with service influence the buying public more than a top-heavy investment in building and equipment.

Advantages of Roadside Marketing

There are many advantages to roadside marketing, only a few of which I shall mention here. In the first place, roadside marketing practically eliminates local hauling. Local hauling was entirely eliminated by the operators of 125 of the 147 farmer-owned markets studied. The consumer buys at the point of production and does his own carting, thus saving the producer on expensive transportation charges to the city markets.

In the second place, the roadside market furnishes an outlet for certain products which may within a few hours become too ripe to stand shipping to the city markets. These products can be sold at the farm in small packages for immediate consumption.

Probably the greatest advantage of roadside marketing to the consumer is that she can buy fresh fruits and vegetables of natural color and flavor that have fully ripened in the field.

By eliminating certain marketing costs such as transportation, commission, shrinkage and loss from decay, produce can be sold at the

roadside for more than the city wholesale, but less than the retail price. This is of a financial advantage to both producers and consumers.

#### Location of Markets

One interesting thing revealed in our study is that the markets on the most traveled roads do not always have the largest volume of sales. On the Eastern Shore of Maryland, there is a direct relationship between the amount of travel and the sales at roadside markets, whereas on the Western Shore there is no direct relationship between the amount of traffic and sales at roadside markets. The road from Washington to Baltimore carries more traffic than any other road in the State and sales at roadside markets on this road were much smaller than the average for the State. This is probably due to the fact that, although this road carries the greatest amount of traffic, the number of potential roadside market customers is not as great as on many of the less traveled roads. A large percentage of traffic on this road is made up of trucks, busses and out-of-state cars. Only a small percentage of the people in this group buy at roadside markets. On the less traveled town-to-town or cross-country roads, most of the traffic is made up of local passenger cars. It is the people in local passenger cars who do most of the buying at roadside markets.

A roadside market should not be located on the side of a hill. The motorist is not likely to stop at a market located midway of a steep grade, nor is he likely to stop going down grade. The valley between two hills is little better because motorists are traveling fast and do not want to lose the momentum they have attained.

A market should under no circumstances be located behind an embankment or other obstruction, as a motorist traveling at a moderate speed will pass the stand without seeing it.

A roadside market should not be located on or near the edge of a narrow road. If adequate parking facilities are available, however, there is no objection to such a location.

The best location for a roadside market is along a level stretch of road or at the apex of a slight curve. A stand thus located can be seen at a long distance. This gives the motorist ample time to see the stand and to stop with ease.

Ample parking space should be provided. A driveway 75 to 150 feet long with room for cars to pass one another, or a parking lot provide the best parking facilities. Either of these parking arrangements will draw cars from both sides of the road. The presence of cars attracts business; this is one reason that space is so important.

A shady parking space is preferable to a sunny one, as many people like to remain in their cars while making purchases.

The parking space should be covered with oil, gravel, or some hard material, as the motorist dislikes to get off the hard surfaced road. Some types of hard surface material help to keep down the dust at market stands. Dust will ruin the appearance of an otherwise good display of high quality products.

Probably the best location for a market is on the righthand side of the road approaching the nearest city, as most buy on the way home from a trip in the country. Data from 80 markets studied in Michigan show that a market located on the righthand side of the road did twice the volume of business as one located on the left-hand side of the road approaching the city. When tourists start homeward, they begin to look for supplies to take with them for home use; therefore, locations near tourist camps or resort cities are desirable and have the added advantage of being able to sell to campers and resorters. Operators of markets located on the Eastern Shore reported that the bulk of their sales was to people going to the beach for the week-end. Most of the markets located near large cities reported that most of their sales were to people who had been out in the country and were on their way home. Some markets, however, reported that most of their sales were to people who worked in the city and lived in the country. Most of their sales were to people going home from work every day.

Location, important as it is, is not the only factor contributing to the success of a roadside market. There must be some bait. Bees seldom light on a pane of plain glass, but if some sugar or honey is placed on the glass, the bees will be attracted. So it is with roadside merchandising. There should be some inducement to stop.

#### Quality of Products

One of the most important ways to succeed in roadside marketing is to be able to get regular customers. The person who sells high quality produce and gives the customer a square deal is likely to get repeat orders. A tabulation was made of the factors responsible for getting repeat orders mentioned by the operators of 110 markets. Of the 110 markets, 99 gave quality as the chief factor; 25 mentioned price; 20 salesmanship; 15 honesty; and 10, fresh produce. More than one factor was mentioned by many of the operators of roadside markets. Based on 169 replies, about 59 per cent of the operators mentioned quality as the most important factor. Another important factor observed was that the markets which sold good quality products averaged the largest volume of sales.

#### Prices

Price is an important factor in the control of sales. Much attention needs to be devoted to prices. Prices vary widely at roadside markets from more than the city retail price to less than the wholesale price; however, most of the market operators charge somewhere between the wholesale price and the city retail price. For example, 123 markets charged less than the city retail price; 47 markets charged the retail price; and 3 charged more than the retail price. Prices charged will depend upon the produce offered for sale. Certain products, where the consumer appreciates freshness and quality, may

find a ready sale at higher than retail prices. In the long run, however, the price should be somewhere between the city wholesale and retail price. Since the consumer buys at the point of production and does his own transporting, it would seem reasonable that some of the saving in transportation should be shared with the consumer.

Operators of roadside markets should study the wholesale and city retail market prices. The agencies used by roadside markets in Maryland to determine price are as follows.

Agency Used	Number of Stands
Wholesale market	61
City retail market	48
Chain stores	45
Daily paper	15
Other stands	14
What public will pay	13
None	13
Local stores	6
Mark-up on cost	4
Federal government daily reports	3
Total	222

It is interesting to note that 13 markets charged what the consumer would pay, and 13 markets used no agency at all in determining the price to charge.

Other important factors in the success of roadside merchandising are as follows: salesmanship, display, products sold, advertising, sanitation, appearance of market, and planning production to meet market requirements. The markets which were good in all of these factors averaged considerably larger sales.

Much could be done to improve the salesmanship of people operating roadside markets. An alert and courteous salesman will make friends, whereas a slow-moving, disinterested salesman will drive customers away. People prefer to buy from those operators who are pleasant and accommodating. A salesman should know something about the products he is selling--he should know the difference between an eating and cooking apple. Likewise, he should know the difference between varieties of products and the grades or qualities of products.

Products sold at roadside markets should be displayed, advertised and sold in a dignified manner. Products arranged in a neat and orderly manner will impress the customer as being of good quality, whereas a hit and miss arrangement of the products will detract from the appearance of otherwise good quality products. An attractive display will catch the eye of the traveling public. A well-landscaped lot with flower beds and green shrubbery furnishes an excellent background for a good display. Such a setting appeals to the motorist and induces him to stop. People often stop to see the flowers and then purchase farm products.

It is important that products be displayed in rather large volume. The motorist usually associates quality with quantity and is more likely to stop where the produce is displayed in large volume, because the volume indicates to him that the produce has not been picked over.

Markets specializing in fruits and vegetables should also carry a wide variety of products. The roadside customer usually wishes to purchase more than one product. A large number of products will also improve the beauty of a display.

Our study in Maryland indicated that vegetables were sold at more markets than any other class of products. Fruits and poultry products were also handled by most of the markets. Miscellaneous products such as honey, cider, soft drinks, and sandwiches were sold at 85 per cent of the markets. Also home-baked pastries, home cured meats, and home made ice cream are gaining in importance.

### Advertising

Advertising is just as essential to the success of roadside marketing as it is to any other merchandising business. A few dollars spent in effective advertising will usually be returned many times through increased sales.

There are various means of advertising, such as well constructed signs, registers in which visitors can write their names and addresses, personal name cards, and trade marks for use on the stationery and containers. All of these means, if properly used, may be effective. Probably the most effective and commonly used medium of advertising is by means of bill boards or signs. A market should have a name or trade mark, and this should be woven into all of the advertising material. A trade mark or name will aid the public in locating and identifying a market. The operator of one market puts his trade mark on every egg that he sells.

There is no means of advertising, however, that is more effective than the selling of high quality products. This is one of the best advertisements that a market can have. Many markets report that their best advertisers are their satisfied customers.

Of the markets studied in Maryland, 73 did no advertising, 99 used signs, 12, name cards, 10, advertised through local newspaper, 8 through direct mailing lists and 6 by means of labels.

The appearance of the roadside market has a lesser effect on sales than many other factors. There is a possibility that the expensive looking markets have more of a "citized" appearance, thus causing the consumer to feel that she is not getting fresh farm products. People who buy at roadside markets are concerned mostly about whether or not the produce was grown on the operator's farm. The most successful markets are more concerned about other factors such as display, quality of products, and salesmanship than they are about the appearance of the market.

### Planning Production

Careful planning of farm production can do much to increase sales and profits at roadside markets. Successive plantings, if large enough, will provide the market with a continuous supply of fresh products during most of the spring, summer and fall months. Many market operators do not plant enough at the proper time to take care of the demands of the market customers and have to depend upon neighbors or the city markets for a large per cent of the products they sell. Markets often run short of products at the time of their most active sales. Some farmers purchase from nearby farms such products as are in season and which they themselves do not produce on their own farms. Sometimes 8 or 10 farmers will join together and sell the combined products through one market. This arrangement is highly commendable. By combining the products of several farmers in this way it is possible to keep the market open for a longer period of time and at the same time it makes possible a greater volume and variety of products. It also lessens the temptation on the part of the operators of markets to replenish their supplies by purchasing from a city wholesale market. By carefully planning, a production program can be worked out on the farm which will make possible the marketing of various products as they are needed, thereby eliminating the necessity for outside buying.

Our study shows that the farmer-owned markets depend upon nearby producers and the city markets for nearly 1/4 of the products that they sell.

### Cooperative Farm Women's Markets

Instead of selling through their own privately owned and operated roadside markets, many farm women have organized cooperative farm women's markets. There are four of these markets in Maryland. One of these is operated by a group of farm women in cooperation with the Extension Service of the University of Maryland and the other three are operated by an association of farm women. The markets are located in the suburban areas northwest of Washington, D. C.

Each woman sells her own products at a stall or booth. Prices are set by the market manager or a committee and all members must sell at the same price. A variety of products are sold, including dairy products, fresh, cured, and cooked meats, poultry products, fruits, vegetables, nuts, home-baked bread, and many other kinds of home-cooked foods. Only those products raised on the farm or cooked and prepared by the farmers' wives are sold.

Ownership in these markets is usually vested in the association and each member pays a commission on her sales to meet the general expenses of the organization. The markets are usually open three days a week during the summer and two days a week during the winter, although some members attend only one day a week. One member reported that she has sold as many as fifty cakes and a small amount of other farm products in one day.

The farm women's market is a recent venture that has proved successful and has unlimited possibilities. A report by the Bureau of Home Economics in the United States Department of Agriculture Yearbook for 1933 states that there had been 479 of these markets organized in the United States previous to and during 1931, with a membership of 34,687 farm women.

### Volume of Sales

Sales at roadside markets vary widely. About 60 per cent of the markets studied in Maryland averaged less than \$1,000 in sales; these were mainly temporary markets that remained open for only a short period of time. The sales at the permanent markets averaged much larger, and at some of the extremely large markets ranged from \$10,000 to \$125,000 annually. While those markets with sales ranging between \$10,000 and \$20,000 constituted only 3.2 per cent of the total, they did about 27 per cent of the total volume of business. Only 17 per cent of the markets averaged above \$2,500 in sales, yet they did over three-fourths of the total volume of business. In the majority of cases the sales on Sunday are almost equal to the total sales during the remainder of the week. A maximum of from \$400 to \$600 on a Sunday has been reached by selling peaches or apples alone. Fruit growers may dispose of their entire crop of apples or peaches through their roadside market often within a few days' time. Many stands make a specialty of honey and often are successful in selling such a product that is not readily obtainable in the city markets. Markets specializing in this way have the advantage that the products can be offered for sale in rather large volume.

### Abuses

There are certain evils attending roadside merchandising which must be guarded against and overcome. Roadside markets must be kept decent and straight and in the hands of the producers. They must never be "citified". They must be maintained as places where products fresh from the farm can be offered to the public at reasonable prices. Nothing could do more harm than to offer products from the city market as strictly fresh farm products. Eggs fresh from the nest are good sellers at the markets, but an attempt to offer storage eggs as strictly fresh and at high prices would quickly draw trade away from the market. A roadside market is not a place where farmers or non-farmers can obtain high prices for poor quality products.

The non-farmer owned markets usually depend upon the city wholesale markets for a large percentage of their products. The practice of selling products from the city wholesale market has been condemned by some as unethical. The selling of limited quantities of city market produce is often a good business practice. Home-grown products supplemented with a certain amount of foreign products enable many producers to expand their business; but city products should not be represented as home grown. The operation of a roadside market by someone other than a farmer is not condemned provided good quality produce is sold and the standards established by other markets are not lowered. Non-farmer operated markets often provide outlets for a large volume of produce of neighboring farmers. In certain localities

there are careless and transient operators who buy cheap products in the city and sell them as home grown. These operators are "fly-by-nighters" and sell only a few days and are not concerned about repeat orders and market standards.

The resentment of unfair and fraudulent practices has been outspoken in other states as well as in Maryland. Government supervision and control has been advocated, and in some states official inspection, licensing and regulation are being tried. Other states have organized roadside marketing associations that sell only approved produce. As yet no state regulatory measures have been taken in Maryland. In order to meet this need a group of roadside market operators cooperating with the Maryland State Department of Markets have organized the Maryland Farm Roadside Market Association. As yet the membership in this association is very small, but new members will probably come in from time to time and it is hoped that ultimately there may be sufficient membership in the association to control and regulate roadside markets and keep them decent and straight and in the hands of producers. This is about the only way that the bona fide farmer can protect himself from the stigma of outside sellers.

Conclusions and Recommendations

1. Roadside markets should have a good location well off the edge of the highway with adequate parking facilities.
2. A roadside market should display a large volume of produce as well as a large variety of produce, especially of fruits and vegetables.
3. Prices should be reasonable.
4. Salesmen at roadside markets should be efficient, pleasant clean and neatly dressed.
5. The farmers should use some means of effective advertising such as signs, direct mail, labels and trade marks.
6. The farmer should plan his production program so as to have plenty of fresh produce to supply the market demands during most of the summer and fall months.
7. The market should have suitable buildings with conveniences for the public.
8. Roadside markets should sell an honest pack of full weight, count or measure and the products should be graded into two or more grades and packed in containers of different sizes to meet the various demands of customers.
9. The farmer should endeavor to sell as much as possible of the produce from his own farm or from nearby farms.

10. A farmer should start with a small type of stand and expand it as increased sales warrant the need of larger buildings and more equipment.

11. People who are now selling only a surplus from the home garden should expand their production if there is a possibility of making greater sales.

12. The excellent work started by the Maryland Farmers' Roadside Market Association should be continued and expanded.

The Limitations of Cooperative Efforts

H. D. Brown - Ohio State University

For years I had visions of great advantages that might come to growers that were willing and able to cooperate with each other for the mutual advantage of all. It seemed that the savings in labor alone would justify cooperative efforts. If the hundreds of gardeners that sold their produce in large cities could only delegate their selling job to a few well trained men it seemed logical to conclude that each of the hundreds of gardeners would have more time to grow vegetables, a task generally conceded to be better suited to them.

The gardeners and their families would be relieved in a large measure of staying up half the night with their produce, a practice that has always seemed wasteful. Moreover, it would appear that a few trained men could do a better job of selling the produce than hundreds of untrained producers, i.e., if there is anything to the thought salesmanship depends in part on personality. If the produce were sold by one rather than hundreds of agencies it would seem that there would be less chance for buyers to beat down prices by true or false statements concerning price quotations of competitors.

Furthermore, one selling agency should be better able to regulate the supply of vegetables by shipping out surpluses, by eliminating low grades, and finding new markets.

Cooperative agencies, it seems, should also serve their members in many other ways. They should be able to buy supplies more cheaply, secure insurance more cheaply, disseminate cultural information and accomplish more in the way of advertising. In fact, cooperatives should theoretically accomplish all of the objectives enumerated by Dr. J. W. Lloyd in 1919:

1. Reduce the cost of marketing.
2. Improve the distribution of the product.
3. Increase the demand for the product.
4. Standardize the product.
5. Protect the individual grower.

Unfortunately, these advantages are seldom realized. As I saw cooperatives fail time after time my faith began to weaken. It seemed that the promoters got all the profit leaving the growers worse off than they were before. As I studied these failures as an unbiased

observer several reasons for failure were evident. These are listed below in the order of their importance as I see them.

1. Expecting too much from cooperative efforts.
2. Suspicious and independent nature of cooperators.
3. Lack of grading system.
4. Underestimating the costs, and lack of an adequate system of bookkeeping.

#### Excessive Expectations

Cooperatives cannot and should not be expected to solve all of your financial worries. At best they cannot be much more effective than the most successful of growers who also market their own produce. Remember also that cooperatives must eventually compete with cooperatives in their own and other industries. If the theoretical advantages of cooperative efforts could be debunked it is quite likely that the total actual value that would accrue to individual members could be placed at approximately 10% of his total possible income. It is frequently stated that 90% of the growers problems involves cultural, not marketing, problems. This is a pretty strong statement in view of the recently expected benefits from the A. A. A. and other activities. It is my contention, however, that these activities prove rather than disprove the statement. It would be extremely difficult to prove that A. A. A. activities have paid a dividend to American farmers to say nothing of the general public. To be permanently successful any enterprise must be mutually advantageous to buyer and seller alike. Certainly the A. A. A. has paid no dividends to the vegetable growers of this Nation if we exempt the possible small profits that may have come to Western and Southern growers that marketed their produce under marketing agreements.

A few examples will illustrate the importance of cultural practices. Assume if you please a potato grower in Indiana. In the first place he has a chance of getting a yield of possibly 250 bushels per acre of potatoes if he uses good seed but only 40 to 50 bushels if he happens to get poor seed and grows the crop in the same manner. It is just as easy for a well informed individual grower to get good seed as it is for a member of a cooperative. Obviously, there is a chance of getting a profit from the 250 bushel crop but none whatever from a 40 to 50 bushel crop. This illustration is taken from actual experimental results in Indiana. The difference is even greater than indicated because 90% of the 250 bushel yield was U. S. No. 1 potatoes but less than 50% of the 40 to 50 bushel yield passed U. S. No. 1 grade. Assume again that the grower had failed to spray the potato foliage. Instead of getting a 250 bushel yield from good seed the yield would probably have been less than 100 bushels per acre. Suppose again that the grower had failed to condition the soil properly or had planted out seed that rotted in the soil because the grower did not know how to treat the seed so that it would heal properly. The result might have been a greatly reduced yield in either instance. Many other factors involving cultural practices might also influence the yield and possible profits. Drought, floods, frosts, excessive heat, insect or disease pests might destroy the crop.

The question of quality alone is extremely important. One example stands out in my mind. About 15 years ago I took a trip through southern Indiana. During this trip I found peaches offered for sale at 75¢ per bushel with no buyers. These peaches were small peaches from unsprayed trees where the fruits had not been thinned. The peaches were consequently very small. It is doubtful if the grower received enough to pay for growing the crop. No amount of salesmanship could dispose of this crop. About 75 miles away another grower had a crop of beautiful peaches of the same variety. Each peach was about five times as large as the peaches on the first farm although the yields per acre in the two instances were estimated to be about the same. The large peaches were made possible by several improved cultural practices the most important of which was the simple expediency of thinning. The grower that had the larger peaches was getting \$2.50 per bushel and the entire crop was sold to buyers that came to the orchard.

These two instances will suffice to illustrate the relative importance of production techniques. The importance of these techniques does not, however, detract from the necessity of trying to get an added 10% profit from better marketing practices that might accrue from cooperative efforts. A 10% added profit during any period is decidedly worth while. The important thing is to avoid overestimating the profits that are possible through cooperative efforts.

It is of course evident that the dividing line between the objectives of cooperative and individual efforts is not always so clearly defined as implied in the preceding examples. In fact cooperatives should make it their business to see that the latest and best knowledge concerning cultural practices should reach their members. This does not imply that marketing experts should also be production experts. It merely means that marketing agencies should have a sympathetic attitude toward production problems, recognize outstanding difficulties, and encourage the study of cultural problems and the dissemination of information pertaining thereto. The degree to which such information is used depends upon the intellect of the individual and upon his natural and acquired resources, i.e. the extent of his productive efforts.

#### Suspiciousness and Independence of Cooperators

"The basis for the cooperative organization is men" not capital. The individualism of American farmers is a great barrier to the success of cooperative efforts. Their investments must be on the brink of destruction before they will subject this individualism and turn to cooperative efforts. Even then it takes a long time for the growers to have confidence in each other. Until this confidence is assured it is easy for competing agencies to induce members to market a portion of their produce outside of the regular cooperative channels. Such practices eventually ruin the cooperative.

Grading Essential

Purchasers of all commodities insist on knowing something of the quality of the product which they are buying. This involves standardized grades. Without such standards the seller cannot describe the product which he has for sale and the buyer does not know what he is getting. Cooperatives cannot succeed without an accurate system of grading. This fact is not generally understood by gardeners.

Some authorities even go so far as to state that the elimination of poor grade vegetables would solve the marketing problem. This is of course not true. It might help for a year or two but the acreage would soon increase until there was more than enough of the first grade products to meet all demands.

Under the present system there are many examples of the folly of inadequate grading. The grade is, however, important to the individual as well as to the cooperative.

It is essential, however, not to expect too much from grading vegetables. It may be a necessary tool for the success of cooperatives and yet graded vegetables might fail to bring a profitable premium. R. B. Corbett of Rhode Island has made a recent study of the value of grading from the individual gardeners standpoint. Some of his conclusions are of interest in this connection. He concludes:

1. "The superior grading practiced in these experiments yielded a return above costs in some instances, but in general was not profitable."
2. "The chances for a profit from rigid grading seemed less with such low-priced products as bunched beets and bunched carrots than with products such as tomatoes and peppers."
3. "Probably no single factor had a greater bearing on the profits from rigid grading than did the condition of the crop itself. An excellently-grown crop with few culls required little extra labor to grade a high standard, but more important still was the small percentage of the crop which had to be sold at low prices as seconds and culls."

This is excellent proof of the accuracy of my estimation of the relative importance of cultural practices.

Underestimating the Cost

It is more difficult to manage a cooperative than an individual enterprise. Exact costs must be known at all times. This involves detailed bookkeeping. Rebates must not be allowed. All members must be treated alike. This all costs money and the overhead will eat up all the profits if the management is poor. If this happens the members will desert the organization and be justified because the only purpose for the cooperative is to make the business more profitable for the individual members.

The bookkeeping system must be adequate from the start. It is probably the rule rather than the exception that cooperatives are started with very little conception of bookkeeping methods. Imagine the chagrin and disillusion of the members of a cooperative when they learn that their cooperative manager has money to prorate but does not know how much to pay each member.

Section III. Varieties

Tomato and Sweet Corn Trials in York County

G. G. Weber, County Agent, York County

Forty tomato and sweet corn variety demonstrations were conducted by York County growers to determine the most suitable varieties for this county. The growers who conducted tomato variety demonstrations were asked to check the varieties as to season, yield, and shape, with the following results -

Variety	Penn State	Grothens Red Globe	Marglobe	Prichard	Rutgers	Bonny Best	Break 'Day	Rich Day meat
No. Growers Reporting	12	10	8	4	3	2	1	1
Growers report on seasons								
Early	9	3	2	3	0	1	1	0
Second Early	3	7	4	1	3	1	0	0
Late	0	0	2	0	0	0	0	1
Reports on yield								
Poor	5	0	0	0	0	0	0	0
Fair	5	5	3	0	1	0	0	1
Good	2	2	2	4	0	1	1	0
Very Good	0	3	3	0	2	1	0	0
Reports on Shape								
Rough	5	0	0	0	0	0	0	0
Variable	5	1	0	0	0	0	0	1
Smooth	2	9	8	4	3	2	1	0

The following table shows how growers listed tomato varieties as to the desirability.

Variety	Results
Prichard	Three growers selected this variety as their first choice; one gave it second place.
Grothens) Red Globe)	Two growers selected this variety as their first choice; one, second place; three, third place; and one fourth place.
Bonny Best Rutgers	Two growers selected this variety as their first choice. One grower selected this variety as his first choice; two gave it third place.
Break 'Day Marglobe	One grower selected this variety as his first choice. Six growers selected this variety for second choice; one, third place; and one, fourth place.

Penn State One grower selected this variety for second choice; two, third place; three, fourth place; and one, fifth place.

Richmeat One grower selected this variety for fifth choice.

Henry Hoffman, Bridgeville, reports the following results.  
12 plants each variety - Seed sown March 6  
Set in field May 21st.

Harvesting Dates	July 9	July 18	July 24	July 29	Aug. 3	Aug. 6	Total Yield
(Yield in pounds)							
Penn State	6	10	8	8	6	14	52
Grothens Red Globe	1	4	6	8	10	8	37
Bonny Best	2	5	4	12	22	29	74

G. E. Wilson, Wilkinsburg, reports the following results.  
20 plants each variety - Seed sown Mar. 10 - Seedlings transplanted April 10 (potted) - Plants set in field May 20th. four by five feet

First picking date	July 27	Aug. 2
Penn State	0	7-1/4 lbs.
Grothens Red Globe	5-1/2 lbs.	0

William Abels, Willock, reports the following results.  
20 plants each variety - Seed sown March 19th  
Set in field May 17th - five by five feet  
Manure but no commercial fertilizer

Harvesting Dates	July 27	Aug. 3	Aug. 10	Aug. 17	Aug. 24	Aug. 31	Sept. 7	Sept. 14	Total Yield lbs.	Total Price
Price per pk.	\$1.00	.80	.50	.20	.12 1/2	.15	.35	.35		
Yield in pounds										
Penn State	4.50	15.5	11.25	49.0	34.5	4.0	5.50	9.90	133.25	\$2.99
Price rec'd.	.32	.98	.40	.69	.31	.04	.13	.22		
Quality	good	good	(many rotten)	(many rotten)	(many poor)	(many poor)	(many small)	(very poor)		
Yield in pounds										
John Baer	3.75	11.0	5.50	45.25	47.75	6.25	4.50	19.75	143.75	\$2.81
Price rec'd.	.27	.63	.19	.63	.43	.06	.11	.49		
Quality	good	good	(few rotten)	(few rotten)	good	good	good	good		
Yield in pounds										
Grothens New Red Globe	1.0	9.75	13.25	46.50	26.0	5.50	10.25	48.0	160.45	\$3.48
Price rec'd.	.07	.53	.47	.66	.23	.05	.25	1.20		
Quality	Good	(many dry rot)	(few rotten)	(few rotten)	(many good)	(many good)	(many good)	(small)		
Yield in pounds										
Rutgers	1.25	8.25	6.50	27.50	39.0	17.50	4.00	16.25	120.25	\$2.21
Price rec'd.	.09	.47	.73	.39	.35	.18	.10	.40		
Quality	good	(many dry rot)	(many rotten)	(many rotten)	good	good	good	good		

Sweet Corn Variety demonstrations

Henry Hoffman, Bridgeville, reports the following results.  
Corn planted May 1st. Marketable ears from 100 feet row.

Variety	Pulling Dates Aug. 1	Aug. 7	Aug. 14	Total
Marcross 39-11P28415	10 ears	16 ears		26
Top Cross Spanish Gold	14 "	12 "		26
Whipcross 7.2 E.S. Ex.		6 "	10 ears	16
Whipcross 2.6 W. & S.		8 "	29 "	37

Whipcross "Spanish Gold top cross was most uniform of the early."  
"Whipcross 2.6 was by far the best of the late."

Harry T. Magill, Tarentum, R. D. 2, reports the following.  
Corn planted May 20th. Marketable ears.

Variety	Pulling Dates Aug. 6	Aug. 9	Aug. 13	Total
Spanish Gold Top Cross 39 F.C.L.	92 ears	65 ears	96 ears	253
Whipple Top Cross 7.2 E.S. Ex.	37 "	52 "	90 "	179
Price per dozen	.25	.25	.14	

Sweet Corn Varieties and the Improvement of Sweet Corn Seed

Hal Mills - D. Landreth Seed Co., Bristol, Pa.

Again I must apologize for being absent from your meetings, but it seems that my bosses feel that I am the only one who can ride the rough roads, and swim the Spring flooded fields of Louisiana and Mississippi. Mr. Huffington has kindly consented to take my place (not in the wilds of the South which would be too much to ask of anyone) but he has agreed to read this paper for me.

Due to the reappearance of Stewarts' Wilt disease in the last few years, the whole program of sweet corn improvement and breeding has been upset. Many fine varieties and strains had to be temporarily discarded because the disease was so severe that only a few could survive. Unfortunately, the earliest golden varieties seemed to be most susceptible to Stewarts' Wilt. This led to the adoption and use of the later, but more resistant varieties, such as Golden Cross Bantam of which there are now sold many tons of seed.

But the growers and canners kept clamoring for earlier resistant varieties. Then followed the wild scramble by breeders and seedsmen to produce these. This led to the production of so many top crosses and so-called new varieties, particularly of the golden types, that the growers and canners (and I must admit, many of the seedsmen) are absolutely lost in the maze of names. (no pun or maize!)

A brief explanation of the terms hybrid, inbred hybrid and top cross might be of some interest here. A hybrid in the sense used by breeders and seedsmen is any variety which is created by crossing two distinct varieties. An example of a hybrid then would be our Bloomsdale Golden, formerly called Mills' Golden Sunrise. This golden hybrid was created by crossing in 1925 Golden Bantam with Long Island Beauty, a white variety. Bloomsdale Golden is now an established variety but is nevertheless, a hybrid.

An inbred hybrid is one produced by crossing 2 inbred strains of sweet corn. An inbred strain is created by self-pollination for a number of years. Self pollinating is done by placing paper bags over the ear shoots before the silks appear, collecting the pollen in tassel bags from the stalks with the bagged ear shoots, and pouring this pollen on the silks of those ears when they come out inside the bags. After a few years of self-pollinating and saving of the best selfed ears, the vigor of the strains is somewhat reduced. The height of the stalks grown from those selfed ears, however, is very uniform, the size and shape of the ears becomes very uniform, and the undesirable characters have been eliminated. An example of an inbred hybrid would be Golden Cross Bantam. This is produced by crossing Purdue Inbred No. 39 by Purdue Inbred No. 51. On a commercial scale, this seed is produced by planting one row of the male strain, Purdue No. 51, for every 2 to 4 rows of the female strain, Purdue No. 39. The tassels from the female rows are removed before they shed any silks of the ears of the detasseled female rows, thus crossing the two inbred strains. The seed is saved only from the female rows. The care with which these crossing fields are rogued for off-type plants, and the care and thoroughness in the removal of all tassels from the female rows before any pollen is shed, makes all the difference in the world on the crop you will get from planting the seed produced. Such seed cannot be produced and sold at a cheap price. Beware of cheap seed of any vegetables, whether it is sweet corn, tomatoes, or peppers! You will get just what you pay for and no more.

A topcross is really a hybrid produced by crossing any so-called open-pollinated, established variety with an inbred strain. Such a top cross is now usually made by using the open-pollinated variety as the male row, and the inbred strain as the female rows, planting one male row for every 2 to 4 female rows in the field. The tassels of the female rows are of course removed before shedding any pollen. An example of a top cross would be Bloomsdale Golden Top Cross also called Suncross P 39. This is produced by crossing Bloomsdale Golden, the open-pollinated variety, with Purdue Inbred Strain No. 39.

It has been predicted that for 1936 many of these golden top crosses will be used, particularly those which are earlier than Golden Cross Bantam. Some of the best of these top crosses are: Spanish Gold Top Cross, Whipples Yellow Top Cross, Golden Bantam Top Cross, and Bloomsdale Golden Top Cross. Golden Market Top Cross looks promising, but has not been tried sufficiently to be recommended.

The question which most of us breeders and seedsmen are now asking is: "How long will the popularity of these inbred hybrids and top crosses last? What will become of them if Stewarts' Wilt disease disappears again as it did after the first outbreak a number of years ago?" Keeping up with the changing moods and times brought about by growers and canners fancies is a fascinating occupation, but over to the production of many headaches and heart aches. However, those doing this sort of work feel that the satisfaction of accomplishment makes the job worth while, the monetary remuneration being practically nil. There are some Landreth seed catalogs and some new tomato-booklets for those who care to have them - free of charge.

A Few Outstanding 1936 All America Vegetable Selections

Hal Mills - D. Landreth Seed Co., - Bristol, Pa.

As one of the 12 judges on The Seed Trade Association Council for All-America Vegetable Selections, I thought it might be of interest to vegetable growers and canners to mention a few of the vegetable varieties which were outstanding in our trials at Bristol in 1935.

1. Spinach - Dark Green Bloomsdale - Selection F. This was pronounced a very fine spinach by several experts such as Thompson of King Farms, Becker of Becker Farms, Dr. Magruder of the U. S. Department of Agriculture, Robson of Robson Seed Farms, and others. It is of the Bloomsdale Savoy type but of a darker green color and does not bolt to seed so quickly as most strains of this variety.
2. Beet - Half Long - Early Gem. This was outstanding because of its extreme uniformity of shape and dark red internal color. The quality was excellent.
3. Parsley - Paramount. For those market gardeners who cater to a fancy trade, this is an excellent dwarf strain of very fine moss curled parsley. It is extremely uniform and finely curled.
4. Kohlrabi - Triumph of Prague. This is a very early, uniform strain of the forcing type of white kohlrabi to be used where the market is extremely critical.
5. Tomato, Penn State. This is an early, self-topping variety created by Dr. Myers. We feel that this will take the place of Earliana where this variety is grown. The Penn State produces smoother fruits which are deeper and more solid than those produced by Earliana.
6. Radish - Comet - Scarlet Globe - Long Keeping. This strain of Globe radish was developed to remain solid after other strains had become pithy.
7. Pea - Confidence. This is a fine dwarf dark green foliage type, with the pods darker green than Gradus and Worlds Record, but about the same size and shape. It is prolific.
8. Spinach - Enkhuizen Monstrous. This has an enormous dark green plant of the Nobel type. However, it is darker green than Nobel, is more savoyed, is a bigger plant and is very uniform. It can be used where the smooth-leaf types are preferred.
9. Field Corn - Iowearth Hybrid Dent. The outstanding feature of this remarkable field corn was its resistance to wind storms. While all other varieties and strains of corn were blown down during a late summer storm, Iowearth remained standing although the stalks measured 10 ft. in height. The ears are about 10 inches long and very uniform. It is about as early as ordinary Golden Dent types.

There were 73 samples of vegetables to be judged for All America Selection. Those mentioned above were the best at Bristol. For those who would like to try out these new varieties, seed can be obtained from most of the reliable seedsmen although the crops were short in many cases.

Celery for Lancaster Markets

Amos Funk, Millersville, Pa.

For Lancaster markets green celery of the Fordhook-Emperor Houser type is grown almost exclusively. What the consumer wants on our market is a high quality celery having stems that are nearly round instead of flattened, as the stems of many of the easily blanched types of celery. These stems should be about six inches to the first joint and the second branch should be about as short as possible.

These are rather rigid standards and, I must say, they are not met in many cases. However, in order to come nearer to these standards we have set up under the supervision of Mr. J. M. Huffington, some strain demonstrations of the Fordhook-Emperor-Houser types of celery. We compared 22 strains and the ones most nearly meeting our market requirements were supplied by Ferry-Morse, Buist, and Schell.

Celery Variety Demonstrations in Lancaster County - 1935

Amos Funk, Millersville - Dry soil with no irrigation nor mulch. Plants set the second week in August.

Name	Source	Uniformity	Height	Base Stems	Heart Ribs	Remarks
Emperor 11A	Ferry-Morse	Uniform	Short	Br. base	Large	O.K.
" Special	Forbes	Variable	Med.	" " Mod.	"	O.K.
Houser	Buist	Uniform	Short	" " Wide	"	O.P.

Martin Mylan, Willow Street - Transplanted late in July in good soil with irrigation

Emperor	Ferry-Morse	Uniform	6"	Thick	Med.	Full	
" 11A	"	"	Short	M.	"	"	Spreading
" Special	Forbes	"	"	Broad	"Br.	"	Short-heavy
Fordhook	Woodruff	"	Med.	Med.	Broad	"	Good
"	Burpee	Fair	"	Broad	Deep	Large	"-coarse ribs
"	Buist	Variable	height	from	rather	tall	to short
Houser	Lagomarsina	Uniform	Med.	Thick	Broad	"	G-small groov
"	Landreth	Fair	"	Med.	"	"	Fairly good
"	Buist	Rather	short	but	heavy.	Sim. to	Forbes Emperor Sp.
"	Woodruff	off	type	Med.	Med.	"	Good type
"	Schell	Fair	"Tall	Sm'th	Full	2d-br.	long
Pascal (Cal.)	E.S.F.Ex.	Uniform	Tall	Broad	"	"	Stems light
(Jersey)	Forbes	Fair	Med.	Deep	Deep	"	Ribby-good

C. L. Keenar, Manheim, R. 2 - Plants set on Aug. 10 in gravelly shale, exceptionally dry soil. Irrigated. Heavily manured but no fertilizer applied. Mulched with tobacco ribs. Weights are of typical plants, untrimmed.

Name	Source	Height	Ribs	Heart	Remarks	Weight
Emperor	Ferry-Morse	Med.	T. Med.		Good	1 lb. 1 oz.
Emperor 11A	"	"	Short	Full	"	1 lb. 8 oz.
Emp. Special	Forbes	"	Broad	Full	"	1 lb. 12 oz.
Fordhook	Woodruff	"	Deep	"	"	9 oz.
"	Burpee	---	Very small	here	"	"
"	Buist	"	Short	Ribby	Good	2 lb. 4 oz.
"	Schell	---	Average	type	"	1 lb. 4 oz.
Houser	Lagomarsina	Med.	Med.	Large	Good	1 lb. 3 oz.
"	Landreth	"	"	"	"	1 lb. 15 oz.
"	Buist	Short	Ribby	"	"	2 lb. 2 oz.
"	Woodruff	"	Med.	"	"	1 lb. 12 oz.
"	Schell	"	Wide	"	"	3 lb. 12 oz.
(Set July 10 on very fertile soil. Variable in height and ribs.)						
Pascal (Cal.)	E.S.F.Ex.	Tall	Med.	Small	"	1 lb. 4 oz.
" (Jersey)	Forbes	Short	Broad	Full	"	1 lb. 9 oz.
("Washborad" ribbing)						

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If your dues for 1936 have not been paid, please forward \$1.00 to the Secretary-Treasurer, if you wish to receive subsequent issues of the Pennsylvania Vegetable Growers' News.

Publication of the Pennsylvania Vegetable Growers' Association  
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 A. C. Thompson, Morrisville - - - - - Vice-President  
 W. B. Mack, State College - - - - - Secretary-Treasurer

Summer Field Day at State College.

Thursday, August 20th, has been chosen as the date of the first Summer Field Day of the Pennsylvania Vegetable Growers' Association. The day will be spent in inspecting vegetable breeding experiments, variety trials, fertilizer tests, culture methods, and greenhouse crops of the Department of Horticulture, State College, Pa. Opportunity will be provided for inspection of experimental work in other phases of agriculture, if requests are made. Excellent picnic grounds are located on the campus as well as near the town of State College, and offer visitors the facilities for combining pleasure with business. Call your neighbors or your County Agent and find if others are planning to make a trip, and if so, join to make a pleasant and profitable outing.

New Developments in Vegetable Growing

Market gardeners and truck farmers, seedsmen, equipment and machinery manufacturers, and experiment station workers are continually discovering and devising new methods, tools, and materials by which vegetable growers may produce crops more economically or more efficiently. News of these discoveries are spread by farm papers, by advertising matter, and by experiment station reports, circulars, and bulletins. The practical man has scarcely time to read all of the information relating to improvements in methods and materials, but he cannot afford to miss many of the discoveries which different agencies are making.

One prominent New Jersey grower has discovered that ordinary kraft or wrapping paper is very satisfactory for celery blanching on a commercial scale. He mounts 90-lb. rolls of paper of the proper width on reels carried by a cultivator tractor, and also provides a carrier on the tractor for the large wire staples used to hold the paper in place. After the celery is harvested, the paper is either disked into the soil or is burned. The annual cost of the paper is greater than that of the special reinforced celery blanching papers, which may be used for several years if they are carefully handled and stored; the expense of rolling up the special paper, drying, and storing it is such that the total cost is about the same with kraft paper used once, or special blanching paper used as long as it holds out.

Growers in Massachusetts are devoting larger acreages to staked or trellised tomatoes each year. They use varieties which have been developed for greenhouse culture, and which produce large numbers of smooth, medium-sized or fairly small fruits not subject to cracking, such as Comet. The vines are trained to one, two, or three stems, according to the planting distance and the grower's preference. Planting distances range from eighteen inches to two feet in the row, and three and one-half to four feet between rows. Supports may be six-foot stakes driven firmly into the ground, or trellises consisting of firmly anchored end posts and sturdy stakes between these, supporting horizontal wires between which binder twine is stretched.

The plants are grown in about the same way as they would be in greenhouse culture: side branches or suckers are removed while small, and the vines are tied carefully to the stakes as often as necessary to prevent bending or breaking. Heavy fertilization is the rule, and many growers use straw or strawy manure mulches. Yields as great as forty tons of high-quality fruit to the acre have been reported.

The Connecticut Agricultural Experiment Station, New Haven, Conn., in Bulletin 380 announces a method of growing vegetable seedlings in sand. Advantages claimed for the method are more effective control of damping-off diseases; more uniform germination, and easier transplanting of seedlings to other flats. Clean sand is recommended, which should be washed several times with water heated to 160 degrees Fahrenheit, until the water remains clear after washing. The washed sand is placed in clean flats which are about two or two and one-half inches deep, and properly treated seeds are planted in drills one-fourth inch deep and are covered with sand.

The sand is watered with three pints of clear water containing one ounce of saltpeter (potassium nitrate) to each ten square feet of flat surface.

When seedlings are shifted to transplant flats, they are removed from the sand without injury to the roots by placing the flat in a vessel containing water sufficiently deep just to cover the surface of the sand in the seedling flats. This loosens the sand, and the seedlings can be lifted very readily.

Plant protectors, consisting of glassine, waxed paper, and similar materials shaped into a small hood for each hill of plants, were found to increase the speed of germination and the rate of growth of cantaloupes, as measured by the increase in weight of dry matter per plant. Experiments described in Bulletin 324 of the Arkansas Agricultural Experiment Station, Fayetteville, Arkansas, showed that daily maximum and minimum temperatures were increased by the protectors, as compared with temperatures in the open air, but that maximum temperatures on sunny days were increased most.

Motor trucks were found by Cornell agricultural economists to have transported 94.5 per cent of the produce from 2085 farms in New York, New Jersey, Connecticut, Massachusetts, and Pennsylvania, supplying 248,098 tons of fruits and vegetables to the New York City market in 1934. Forty-one per cent of this produce was hauled directly from the farm to the market in trucks either owned or rented by growers themselves.

Costs of operation of 684 trucks which totaled a haulage of 2,179,443 ton-miles was 9.4 cents per ton-mile.

The motor truck was not found to be a cause for reduction of prices of fruits and vegetables in the New York City markets.

Space and time do not permit further summaries of information contained in publications devoted to the interests of market and truck gardeners. A great number of pamphlets are free for the asking, or the charges for them are very small. The information contained is worth many times the cost of the post-card or the nickel which is all that is required to bring it.

For the benefit of busy growers who are interested, the following list is given of publications on the subjects stated. These subjects are not necessarily the titles of the respective publications, but a request for the pamphlets by the numbers given will bring the right ones. Reprints from the Journal of Agricultural Research are technical in character, but many contain practical information which any grower can apply. (Stamps are not acceptable by the Superintendent of Documents, Government Printing Office.)

NEW AVAILABLE PUBLICATIONS ON VEGETABLE GARDENING

Culture Methods

- Asparagus cutting season. Ill. Agr. Exp. Sta. Bull. 401. 1934. Urbana.  
Ia. Agr. Exp. Sta. Bull. 339. 1935. Ames
- Beans, lima, bearing habits. Ohio Agr. Exp. Sta. Bull. 535. 1934.  
Wooster.
- Cucumber harvesting. Mich. Agr. Exp. Sta. Spec. Bull. 259. 1935.  
East Lansing.
- Greenhouse heating. U. S. D. A. Cir. 254. 1932. Washington, D. C.
- Irrigation. Pa. Agr. Ext. Ser. Leaflet 37. 1935.  
Ia. Agr. Exp. Sta. Bull. 308. 1934. Ames
- Plant growing. Sand culture of seedlings. Conn. Agr. Exp. Sta. Bull.  
380. 1936. New Haven.
- Plant protectors. Ark. Agr. Exp. Sta. Bull. 324. 1936. Fayetteville.
- Rotations. R. I. Agr. Exp. Sta. Bull. 243. 1934. Kingston.
- Tomato pollination. N. Y. Agr. Exp. Sta. Memoir 175. 1935. Ithaca.
- Tomato staking. N. Y. Agr. Exp. Sta. Bull. 580. 1934. Ithaca.

Vegetable Crops

- Celery growing. Col. Agr. Exp. Sta. Bull. 407. 1934. Ft. Collins.
- Collard growing. La. Agr. Exp. Sta. Bull. 258. 1934. Baton Rouge.
- Garlic growing. Cal. Agr. Ext. Ser. Cir. 84. 1934. Berkeley.
- Herbs. Minn. Agr. Ext. Ser. Cir. 54. 1936. University Farm, St. Paul.  
N. Y. Agr. Exp. Sta. Cir. 157. 1935. Geneva.
- Onion growing. Mass. Agr. Exp. Sta. Bull. 318. 1935. Amherst.  
Mont. Agr. Exp. Sta. Bull. 305. 1935. Bozeman.
- Peas, market. Cal. Agr. Ext. Ser. Cir. 85. 1935. Berkeley.
- Root crops. Pa. Agr. Ext. Ser. Cir. 166. 1936.
- Spinach production. N. Y. Agr. Ext. Bull. 282. 1934. Ithaca.
- Weeds. N. Y. Agr. Exp. Sta. Bull. 635. 1935. Ithaca

Handling and Storage

- Beans, green snap. Md. Agr. Exp. Sta. Bull. 383. 1935. College Park
- Peas, market. N. Y. Agr. Exp. Sta. Bull. 599. 1934. Ithaca.
- Vegetable storage. N. Y. Agr. Exp. Sta. Bull. 602. 1934. Ithaca.  
U. S. D. A. Cir. 278. 1933. Washington

### Vegetable Grading and Marketing

- Buying guide for consumers. U. S. D. A. Misc. Publ. 167. 1933. Washington, D. C.
- Grading and packing. Conn. Agr. Exp. Sta. Bull. 205. 1935. Storrs.
- Grade specifications and standards. U. S. D. A. Bur. Agr. Econ, Cir. No. 8. 1935. Washington, D. C.  
The Grading of Canning Crops in Pennsylvania. Mimeo Rpt. Mar. 10, 1934. Bureau of Markets, Harrisburg.  
Official Grades for Fruits and Vegetables in Pennsylvania. 1934. Bureau of Markets, Harrisburg.
- Tomatoes, canning, grades. N. J. State Dept. of Agr. Cir. 231. 1933. Trenton.
- Vegetable marketing, auctions. N. J. State Dept. of Agr. Cir. 261. 1936. Trenton.
- Vegetable marketing, motor truck. Mich. Agr. Exp. Sta. Spec. Bull. 227. 1932.  
N. Y. Agr. Exp. Sta., Dept. Agr. Econ., Farm Economics. No. 92, pp. 2246-2248, 2251-2252, 1935; No. 93, pp. 2279-2282, 1936. Ithaca.  
N. Y. Agr. Exp. Sta. Bull. 585. 1934. Ithaca.
- Vegetable marketing, roadside. Ohio Agr. Exp. Sta. Bull. 521. 1933. Wooster

### Vegetable Fertilizers

- Acid-neutral fertilizers. Va. Truck Exp. Sta. Bull. 90. 1936. Norfolk
- Barnyard manure. Ill. Agr. Exp. Sta. Bull. 421. 1935. Urbana.  
R. I. Agr. Exp. Sta. Bull. 251. 1935. Kingston
- Fertilizer placement. N. Y. Agr. Exp. Sta. Tech. Bull. 231. 1935; Bull. 659. 1936. Geneva.  
A survey on planting and fertilizing of vegetable crops. Mimeo Report, National Fertilizer Association, 1935. (Edited by H. H. Zimmerley) H. R. Smalley, Secretary, Washington, D. C.
- Beet fertilization. R. I. Agr. Exp. Sta. Bull. 242. 1934. Kingston.
- Cabbage fertilization. Va. Truck Exp. Sta. Bull. 88. 1935. Norfolk.
- Celery fertilizers, borax. Fla. Agr. Exp. Sta. Press Bull. 478. 1935. Gainesville.
- Celery fertilizers on muck. Ohio Agr. Exp. Sta. Bimo. Bull. 178, pp. 13-18. 1936. Wooster.
- Peas, canning, fertilizers. Jour. Agr. Research. Vol. 48, No. 8, pp. 703-736, 1934. Govt. Printing Office, Washington, D. C. (5¢)
- Sweet corn fertilizers. Ill. Agr. Exp. Sta. Bull. 417. 1935. Urbana.
- Tomato fertilizers. Va. Truck Exp. Sta. Bull. 80. 1933. Norfolk.
- Tomatoes, greenhouse, fertilizers. R. I. Agr. Exp. Sta. Bull. 252. 1935. Kingston.

### Chemical Composition, Nutritive Properties, and Quality of Vegetables

- Iodine content. Okla. Agr. Exp. Sta. Bull. 229. 1935. Stillwater.  
Ga. Agr. Exp. Sta. Bull. 190. 1935. Experiment.
- Pea quality, canning. N. Y. Agr. Exp. Sta. Tech. Bull. 233. 1935. Geneva.  
Jour. Agr. Research Vol. 49, No. 9, pp. 799-814. 1934. Govt. Printing Office, Washington, D. C. (5¢)
- Lettuce, vitamins. Jour. Agr. Research. Vol. 51, pp. 1041-1046. 1935. Govt. Printing Office, Washington, D.C. (5¢)

### Mushrooms

- Effect of carbon dioxide on mushrooms. Jour. Agr. Research Vol. 48 No. 7, pp. 587-601; Vol. 47, No. 8, pp. 599-608. 1933. Govt. Printing Office, Washington, D. C. (5¢ each)

### Vegetable Varieties

- General tests. Pa. Agr. Exp. Sta. Bull. 313. 1935; Journal Articles No. 721, 722, 727, 728, 729, 1936.  
Conn. Agr. Exp. Sta. Cir. 94, 1933. New Haven.  
N. Y. Agr. Ext. Bull. 279, 1934; Ext. Bull. 317, 1935; Ext. Bull. 343, 1936. Ithaca.
- Cabbage varieties. Mich. Agr. Exp. Sta. Spec. Bull. 249. 1934. East Lansing.
- Pepper varieties. Conn. Agr. Exp. Sta. Cir. 107. 1935. New Haven.
- Pumpkin and squash varieties for canning. Ind. Agr. Exp. Sta. Bull. 402. 1935. Lafayette.
- Spinach varieties. Ohio Agr. Exp. Sta. Bimo. Bull. 176, pp. 171-172. 1935. Wooster.
- Squash varieties. N. Dak. Agr. Exp. Sta. Bull. 258. 1932. Fargo.
- Sweet corn varieties. Conn. Agr. Exp. Sta. Bull. 361, 1934; Bull. 376, 1935; Cir. 112, 1936. New Haven.
- Tomato varieties. Ind. Agr. Exp. Sta. Cir. 207, 1934. Lafayette.  
Ill. Agr. Exp. Sta. Cir. 448. 1936. Urbana.

### Vegetable Insects and Insecticides

- General insecticide information. Entoma. C. C. Hamilton, Secretary, Amer. Assn. Econ. Entomologists, New Brunswick, N. J. 101 pp., 50¢
- Derris (rotenone). Mich. Agr. Ext. Bull. 164. 1936. East Lansing.  
N. J. Agr. Exp. Sta. Circ. 273, 1933. New Brunswick.
- Pyrethrum. Col. Agr. Exp. Sta. Bull. 401. 1933. Ft. Collins.
- Pea aphid. Jour. Agr. Research Vol. 51, No. 7, pp. 613-619. 1935. Govt. Printing Office, Washington, D.C. (5¢)  
Md. Agr. Ext. Ser. Cir. 114. 1936. College Park

Vegetable Diseases and Fungicides

- General. Pa. Agr. Ext. Ser. Cir. 173. 1936.
- Fungicides, effects on transpiration and growth. Ohio Agr. Exp. Sta. Bimo. Bull. 177, pp. 206-209, 1935; 165, pp. 147-151, 1933; 170, pp. 175-186. 1934; 171, pp. 198-203. 1934. Wooster.
- Soil sterilization, electric. N. Y. Agr. Exp. Sta. Bull. 636. 1935. Ithaca.
- Bean diseases, mosaic. N. Y. Agr. Exp. Sta. Bull. 656, 1935. Geneva.
- Bean diseases, rust. Jour. Agr. Research, Vol. 50, No. 9, pp. 737-759. 1935. Govt. Printing Office, Washington, D. C. (5¢)
- Cabbage diseases, club root. Jour. Agr. Research, Vol. 48, No. 8, pp. 749-759, 1934 (5¢); Vol. 51, No. 2, pp. 183-189. 1935 (5¢)
- Cabbage diseases, yellows. Jour. Agr. Research, Vol. 47, No. 9, pp. 639-661. 1933.
- Carrot diseases, bacterial blight. Jour. Agr. Research, Vol. 49, No. 6, pp. 493-510. 1934 (5¢)
- Celery diseases, yellows. Ohio Agr. Exp. Sta. Bimo. Bull. 168, pp. 109-115. 1934. Wooster.
- Mushroom diseases. Jour. Agr. Research. Vol. 46, No. 12, pp. 1089-1098. 1933. (5¢)
- Peas, canning, seed treatment. N. Y. Agr. Exp. Sta. Bull. 660. 1936. Geneva.
- Pea diseases, general. U. S. D. A. Farmers' Bull. 1735. 1934. Washington, D. C.
- Spinach, seed treatment. N. Y. Agr. Exp. Sta. Bull. 566. 1933. Ithaca. Va. Truck Exp. Sta. Bull. 87. 1935. Norfolk.
- Sweet corn wilt. Conn. Agr. Exp. Sta. Cir. 96. 1934. New Haven.
- Tomato, greenhouse, blotchy ripening. Jour. Agr. Research, Vol. 52, pp. 217-224. 1936. (5¢)
- Tomato diseases, leaf mold. Ohio Agr. Exp. Sta. Bull. 539. 1934. Wooster.

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