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SCOTT'S FIELD SEEDS

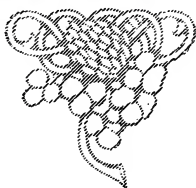


Selected and Cleaned to be
Free from Weed Seeds, Dead
and Immature Grains etc

O. M. SCOTT & SONS CO.,
MARYSVILLE, OHIO.



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MAR -1 1918



THIS IS hardly a typical seed catalogue. Devoted to a limited list of field seeds it affords no space for vegetable and floral side issues. The absence of bright colored pictures and sweeping claims may lose us the advantage they have of immediately engaging your interest. However, we feel that the man who loves the soil and whose objective it is to grow ten grains where but one grew will find these pages full of profitable information, and well worth reading to the end.

The unfavorable season of 1917, multiplied the difficulties of the seedsman. It will increase the farmer's troubles even more unless he takes unusual precaution as to field seeds. The reason for this lies in the unfortunate conditions of late summer and autumn. Dry weather and untimely frost kept most field seeds from reaching full size and maturity. Immaturity not only detracts from vigor but interferes with cleaning as well, for seed berries not fully developed are harder to separate from weed seeds and waste matter. Coupled with this is such a shortage of all the clovers and of several of the grasses that demand is likely to exceed supply.

The extra pains necessary to secure good seed will tempt both buyer and seller to be careless, when it never has been so urgent for every sower to know just what he is to sow, never so necessary to do every human thing to solve the problem of production; to avoid all possible guess work. The land owner will wish to do his part by increasing his yield. If he does not KNOW what seed to buy, his patriotic intentions, extra labor and increased expense will go for nothing. The time for waste and misspent energy is past.

We lay especial stress upon the need for efficient seed buying, and so ask you before reading this page further to turn to the paragraph on page 9 in which we explain clearly just how to prevent waste in buying your field seeds. It describes the test we have recommended for many years, and we underscore the recommendation this year when economy is a national obligation. To waste no ground through imperfect stands; to waste no space planting the weeds that are found in all but the best seeds; to waste no labor fighting weeds,—these are your problems.

The returns from sowing pure seed promise to be greater in 1918, than they have ever been. In a year when there is a premium on care in order to derive the utmost from your planting it is worth your while to know just what Scott's Seeds mean.

When we began ten years ago to develop a national market for our product (for forty years we have sold field seeds locally) we had two definite ideals to maintain: To sell field seeds only, and, second, to furnish better field seeds than could be had elsewhere,—seeds free from weeds and small, immature and dead grains.

We have never regretted sticking to this policy for, if one is to render a service, particularly under present conditions, he must do one thing well.

Field seeds is a career to us. We have seen many seedsmen carried away by the vision of unusual profits in garden and flower seeds, fall far short of their possibilities for field seed service.

If there is anything in the world that doesn't just happen, it is a pure field seed business. It requires personal interest, concentrated attention and nerve to sell pure field seeds. Every year the task we set for ourselves to find pure seed is a greater one.

The dependable quality of our seeds is indicated by the fact that a large number of experiment stations use them. County agents are coming to recommend them more and more. Ask your Experiment Station or County Agent about Scott's Seeds.

The extra care we have always used with our seeds places them in a class of their own. When you purchase Scott's Seeds you can feel secure in the confidence that you are procuring the best obtainable.

We try to supply seeds free from weeds for the reason that we believe there is a place for a seedsman who is willing to give all his time to an effort of this kind. There is little chance for permanent success in any business that is not built on quality, and especially is this true of the seed business. Certainly there is small satisfaction to be had from any endeavor to which anything but best efforts are given. In selling seeds best efforts can mean nothing but doing everything to make larger yields possible.

Sowing inferior seeds, seeds containing weeds, immature grains, dead grains, operates against crop production, saying nothing of the loss of land value due to infestation with noxious weeds. Clean seeds that have grown to plump maturity are the only seeds that will cover the land with profit bearing growth. Weed seeds make weeds; immature grains make weak plants; dead grains make a dead loss.

Larger and more remunerative crops are always raised by the farmer who puts extra work on his ground and exercises the greatest care in the selection of seeds.

The temptation to lower quality besets the seed business for it is the extra three or four pounds of weed seeds and dead grains cleaned out that make a profit impossible if the buyer does not consider quality.

In Scott's Seeds not only weed seeds and dead grains are removed, but as far as possible small, immature grains as well; for, as Mr. F. H. Hillman of the United States Department of Agriculture says in Farmers' Bulletin, No. 382; "The presence of a large proportion of very small clover seed from any source is equivalent to adulteration, since the crop-production power of small seed is known to be inferior to that of well filled seed."

We remember distinctly when buckhorn, some 25 or 30 years ago, began to be recognized as a pest. Mr. O. M. Scott, now in his eighty-first year, realized from the first the detrimental qualities of this weed and instilled into our minds a proper aversion to it.

Anyone who has experienced its ability to spread can easily understand why it is now so hard to get clover that is free from buckhorn. The only seed that is safe to sow is that which is absolutely free, for a single seed is enough to insure the presence of buckhorn in the field forever afterward.

The first remedy suggested by all authorities for controlling buckhorn is "Sow clean seed." The pest can be mitigated by planting the ground to a thoroughly cultivated crop. Possibly it can be wholly conquered, after several years, but it is more than likely to be a permanent feature.

While many other weeds, such as dodder, mustard, Canada thistle, etc., are just as obnoxious, the ineradicable buckhorn is the weed that is spreading faster than any other.

Weed seeds that you sow with your field crop are much more likely to grow than the field crop itself.

Weeds are hardy and prolific. They fight aggressively for food and sunlight and seem better able to survive than cultivated crops.

When a weed drops its ripened seeds a proportion lies dormant in the ground with abundant vitality. These dormant seeds may keep coming up year after year for many years. In the case of a new variety this means that one plant allowed to go to seed may impose upon the farmer the task of fighting its immediate descendants for years unless he is content to let it be a permanent occupant of the soil.

A single plant of mustard has been found to contain 10,000 seeds; buckhorn 15,000; pigweed 115,000; foxtail 113,000.

The State Grain Inspection Department of Minnesota gives the annual dockage on grain alone on account of weed seeds as about \$2,500,000.

European stations show losses of 30% and more of value on account of weeds.

The Iowa Experiment Station estimates the loss in Iowa on account of weeds at from five to seven million dollars annually. This estimate was made on the basis of an experiment showing a one-third larger crop on clean land.

Think what it would mean to add one-third to the production of your farm.

Undoubtedly it would take some years to get the fields clean enough to do this but a vast difference in yield can be seen the very first year if care is used to get seed that is free from weeds and from grains that will not grow.

In Bulletin No. 48, the Wisconsin Experiment Station says: "Some weeds are so noxious that if farmers knew their real character they would postpone all other business until they were destroyed."

Farm papers are full of inquiries asking how to get rid of weeds. Hardly an issue but contains letters telling of the years spent fighting patches of Canada Thistle, Crab Grass, Buckhorn, Sorrel, etc.

If the owner isn't a good fighter the patches spread, eventually the struggle is given up altogether and the farm is abandoned.

It is business suicide to sow weedy seed.

The Colorado Agricultural College says: "Many farmers are paying as much as a dollar per pound for the opportunity to plant on the farm several pounds of weed seed each year. Others do not pay as much for the opportunity to sow the seed but the work of eradicating these weeds cost them many hours of labor and no small amount of money."

The bulletin gives as an example two lots of alfalfa, one at \$12.00 per bushel and the other at \$9.60 per bushel. Sample No. 1 contained no weed seeds, chaff, nor dirt, the germination being 94%. Sample No. 2 contained 7% weed seeds, and 2% chaff and dirt, the germination being 80%. This illuminating comment is then made:

"If you buy 100 pounds of No. 1 you get 94 pounds of seed that will grow, at a cost of \$20, or a cost of \$21.28 for 100 pounds of perfect seed.

"For No. 2 you pay \$16.00 for 71 pounds of perfect seed or \$22.54 for 100 pounds of perfect seed.

"In the above case you pay \$1.26 for the privilege of planting seven pounds of weed seed on your farm. Even greater variations than the above can be given. Every man should know how good the seed is that he is planting."

There is no danger at all of paying for weed seeds if our simple test given on another page is used.

Careless persons often make the statement that it does not pay to sow pure seed for the reason that the ground is already full of weeds. But if a proper rotation is followed a farm may be kept practically free from weeds. Weeds must not be allowed to go to seed and weedy seed must never be sowed.

Maryland State Bulletin No. 9 says: "The question of pure seed is a very important one in weed control. There is scarcely any agricultural question of more vital importance than the question of good seed; none in which slighter differences can have greater influence on the result; none in which there is greater opportunity for fraud.

"Nearly all our bad weeds have been introduced in seeds of various crops, especially in grass and clover seed. Weeds are being carried every year to new localities in this way. One must be constantly on the lookout, and no seed should be sown without a careful examination for weed seeds.

"Every farmer wants to be sure whether the seed he is planting is the variety or strain he wants and whether it has

sufficient vigor to make healthy plants, that is, whether it will germinate properly and whether it carries any infectious disease. *He also wishes to know whether it is adulterated with weeds or other plants not desired.*"

The section of this catalogue "How to know Good Seed," explains how you can avoid being deceived in quality. It also explains just how you may "know whether it is adulterated with weeds or other plants not desired."

In Bulletin No. 170 the Vermont Station says of the weed situation: "This trouble is especially acute in Vermont where whole mountainside pastures have been thus destroyed."

Bulletin No. 660 of the United States Department of Agriculture, says: "In a sense farming might be called a warfare against weeds. Some farmers emerge from the struggle victorious, while others go down to defeat. So powerful are weed enemies in reducing crop yields, while at the same time multiplying labor, that the farmer should at every turn strengthen his position against them. He should bear these invaders in mind in planning crops he will grow and in deciding on the fields where he will grow these crops, in choosing the implements he will use, IN BUYING HIS SEED,—far more important than to kill weeds is to avoid having weeds to kill."

We believe that we are doing much to assist in this warfare. Besides furnishing seeds as nearly perfect in purity and germination as seed can be we are doing all we can to inform the purchaser so that he can tell just what he is getting. Of course we wouldn't do this if we did not know that Scott's Seeds will stand any test to which they may be put.

"What seed I have used of yours has given best results of any I have purchased."

Mr. F. L. Brumback, Cissna Park, Ill.

"I am perfectly satisfied with the seeds I bought from you. The best I ever bought."

H. G. Eldridge, Springwater, N. Y., R. F. D. No. 3.

"I had fine success with your seed last year."

Mr. Chester Black, Gibsonia, Pa.

"Your seed has been highly satisfactory in the past."

Mr. W. W. Heaton, Richmond, R. I.

"All the seed bought heretofore has given perfect satisfaction."

Dr. J. E. Caldwell, Perryville, Ky.

How to Know Good Seed

What Method Do You Use to Get at the Value of Your Seed?

THE Department of Agriculture Farmers' Bulletin No. 660, "Weeds; How to Control Them," says:

"First, the farmer *should know what constitutes good seed*; second, he should know fairly closely what high-grade seed is worth; and, third, he should be willing to pay a fair price for it. Laxity on one or more of these points is responsible for most of the farmer's trouble over poor seeds. . . . Cheap seeds are really the most expensive kind that can be purchased."

From Department of Agriculture Farmers' Bulletin No. 428, "Testing Farm Seeds in the Home and in the Rural School."

"In the matter of seed-buying *the best protection* to the purchaser is believed to be *self-protection* based on the ability to judge the quality of the seed offered."

We have always recommended careful seed testing. Samples may be sent to Washington for analysis by experts who will identify all the species contained and figure the percentage of each. In addition the number per pound of the more dangerous weeds is computed. Often there is no time to wait for returns from Washington and in such cases the following is a practical method of finding which one of a number of samples is the best.

Spread the sample on a piece of white paper and pick out and scrape to one side all waste matter, that is, weed and foreign seeds, blasted and immature grains, chaff, etc. Then compare the two piles, noting particularly the weed seeds in the waste pile. This simple operation gives an excellent idea of the worth of the seed and readily shows the comparative value of samples from different dealers as far as purity is concerned.

You have the prices of different samples. Find their comparative worth.

To make a germination test, remix the seed and count out, say, 200 seeds. Be sure to take them just as they come and do not choose the best grains for the object is to find out what percentage of the total seed will grow. The seed may be planted in a box of dirt or sand kept moist, or may be put between two blotters or strips of cotton flannel, placed on a

plate covered with another plate upside down. This prevents evaporation. Keep the blotters moist but not in water and as near the temperature of 70 degrees as possible. Examine the seeds each day and see how they are germinating. Weak or slow germination indicates that the seed will make weak plants. Sprouted seeds may be removed each day if desired. Some seeds require a longer time to germinate than others.

The proper germination periods are as follows:

Clover seed between three and six days.

Timothy and Red Top between five and eight days.

Orchard Grass between six and fourteen days.

Kentucky Blue Grass fourteen to twenty days.

By estimating the percentage of pure seed, (the exact percentage can be found only by using weights), and multiplying this percentage by the percentage that germinates, marking in decimals and dividing the market price by this result you get the approximate cost of one bushel of absolutely pure seed every grain of which will germinate.

Seed costing \$10 per bushel with a purity test of 99½% and a germination test of 94% costs \$10.69 per bushel for perfect seed.

Seed costing \$10 per bushel with a purity test of 99½% and a germination test of 80% on account of dead grains shows an actual cost of \$12.56 per bushel.

Seed costing \$10 per bushel with a purity test of 98% caused by weed seeds and other waste matter and a germination test of 80% shows an actual cost of \$12.75 per bushel. This third lot is about the same as lot two in actual value of perfect seed but is worth many dollars per bushel less on account of weed seeds.

If you want to go into the matter of seed testing a little more thoroughly send for Farmers' Bulletin No. 428, from which much valuable information can be obtained.

The accepted system of making purity tests seems to be the only practical one, but a person not familiar with it is quite likely to be deceived. You would naturally suppose that 99% pure meant that 99% of the seed would be good, plump, healthy grains. But this is not the case as is shown in

the following letter. We asked about clover seed; the same test is used on other seeds.

Washington, D. C., Aug. 30, 1916.

O. M. Scott & Sons Co., Marysville, O.

Gentlemen:—Replying to your inquiry of August 15th, I would say that it is the practice of this laboratory to consider all clover seeds as pure seeds in clover seed tests whether they are shriveled or not and all parts of seeds larger than one-half as pure seeds. Broken pieces smaller than one-half are considered as inert matter. This is also the practice recommended by the Association of Official Seed Analysts of North America.

Yours very truly, E. BROWN, Botanist in Charge

In making a purity test seed analysts classify impurities as follows:

Inert matter, including broken seeds, dirt, stone, sticks, chaff, and other similar materials.

Foreign seed, including all seeds except those of the kind being examined.

We call particular attention to the fact that no mention is made of dead grains, not even those that are so badly shriveled that any one can tell there is no life in them. It is left to the germination test to show the actual value of the seed.

Seed may contain 25% or even more of these worthless grains and still test 99% pure.

Above all things, test the seed yourself or have it tested. Do not rely upon a claimed purity test alone, but use our test in judging the amount of dead grains the sample contains.

Remember, however, that blasted grains are not of as much importance in the long run as weed seeds. The very brightest and plumpest seed testing 99½% pure may contain enough weed seeds of a noxious variety to cause one to be sowed on each square foot of the field.

The Farmers' Bulletin last quoted (No. 428) says: "The fact that seed of the principal forage crops in which both the purity and the viability closely approach 100% does appear on the market justifies one in assuming that all seed of these crops sold as high-grade should possess equally good quality."

This is the sort of seed that we are trying to furnish. By testing samples as suggested in the foregoing, you can judge for yourself how we are succeeding.

Scott's Seeds

Protection Against Disappointment

THOUSANDS of bushels of poor seed are harvested to one bushel that can be sold as WEEDLESS seed, so it is easy to see the importance of selection in any field seed business where quality is desired.

Machinery will take out a large proportion of the weeds, but if there are mature weeds in the field at harvest time, some weed seeds will remain in spite of the most careful cleaning.

Buckhorn, Dodder, Foxtail, Russian Thistle, etc., cannot be entirely eliminated from Red Clover, Mammoth and Alfalfa; nor can Buckhorn, Sorrel, Peppergrass, Dodder, Black Plaintain, or Canada Thistle be all removed from Alsike Clover and Timothy.

Blue Grass, Red Top, Orchard Grass, and other light-weight seeds, if grown in weedy fields, are cleaned with even poorer success.

To furnish field seed free from weeds, we must know where seed is grown that will clean properly.

As certain soil and climatic conditions favor particular trees, so certain localities produce the best field seeds of a given variety.

Some years a few square miles produce the only good seed of a given variety in the United States.

Scott's Seeds will help to rid your farm of weeds for two reasons: First, they have been carefully selected; second, they have been thoroughly cleaned. Our samples will convince you of their superiority.

There remains the question of price.

There are several elements of higher price, (not higher cost), that must be considered in the furnishing of the best seed. Sources of supply must be constantly sought; there is extra labor in cleaning; the undesirable matter taken out cuts the weight. These are not all the things that must be covered in fixing prices. A little consideration of these points will make it easy to understand the character of seed that is offered with cheapness as an inducement. If the buyer takes no interest in quality he will pay very dearly indeed. Often the proportion of impurities in a bushel boosts the price of the

actual good seed in the bushel to an exorbitant figure, even when the invoice price is far below current prices. (See pages 7, 10 and 33).

Field seeds, like other commodities, are bought and sold on the basis of market quotations, so there can be little difference in prices wherever purchased, grades being equal.

No one seller of seeds can have much advantage over another. In view of this it would seem that the buyer is sure to get whatever he pays for no matter where he purchases a bushel of clover seed, whether it cost eight, ten, or twelve dollars per bushel. While it can be said of other commodities that you get just what you pay for, it is not always the case when buying field seed.

A pound of fifteen cent coffee is worth about fifteen cents; twenty-five cent coffee is worth about twenty-five cents.

But when the market price of good clover seed is twelve dollars, you get less than ten dollars in value if you buy ten dollar seed. The viable clover seeds in the bushel might be worth ten dollars if by themselves, but a large part of this value is destroyed by the impurities that are to be found in this kind of a bargain. Along with your good seed you are sure to get several pounds of dead grains, and, ninety-nine times out of a hundred, you buy trouble for years to come from WEEDS.

Strenuous competition and wide-spread market information make it impossible for any dealer to sell pure seed at the price of poor seed.

If prices are low quality must be low.

We claim to have this advantage in quoting prices: We are, so far as we know, the only seedsmen dealing in field seeds alone. This enables us to watch the markets closely and to buy in large quantities at favorable times.

The only way we can cash in on this advantage is to make it to your interest to buy of us.

Scott's Seeds often cost less than the ordinary run and even if they should cost a little more they go much further.

In reply to your inquiry as to how I came to write to you for seeds, would say that your catalogue was handed to me by a neighbor who recommended you as reliable dealers. Am well pleased with seeds received so far. Clover seed 100% pure.
Howard Detrick, Strattonsville, Pa.

Alfalfa

ALFALFA is one of the oldest of cultivated plants, and is, undoubtedly, a native of central Asia. During the Persian War, about 500 B. C., it was brought to Greece. Later it was carried to Rome, from there to North Africa, and thence to Spain. From Spain it was introduced into Mexico and from there into South America, working its way from Chile to Southern California, and to all parts of the United States. Gibbon's *Decline and Fall of the Roman Empire* mentions the introduction of Alfalfa into Italy from Persia by the Romans.

The word "alfalfa" seems to be a Spanish form of an Arabic word "alfacafacah," meaning "THE grass," or "the best fodder."

Considering the time that alfalfa has held an important place in agriculture, and the many men who are devoting their time to the study of the plant, it seems that more definite knowledge as to varieties might be available, but the authorities disagree as to the origin and the desirability of different strains. Especially noticeable is the contradiction apparent in results of experiments made to compare so-called strains of the ordinary American alfalfa grown in various parts of the United States.

For a number of years Montana and Dakota seed have commanded a price per bushel two or three dollars higher than Kansas seed, it being asserted by growers in the two former states that seed grown so much farther north would more surely withstand winter-killing. We have for several years sowed seed from various localities, some having been grown as close to the equator as Peru and some as far north as Montana. Though the seed came from such widely separated localities we have found no perceptible difference in hardiness as far as origin is concerned, as all our alfalfa winter-killed during the extraordinarily severe weather six years ago, the only exception being the Grimm. We have had little or no trouble from winter-killing since.

Consequently we do not pretend to know a thing about the comparative hardiness of alfalfa, but we do know that the sale of common or ordinary American grown alfalfa is dependent to a considerable extent upon the kind of advertising there is behind it, and that there must be some talking point to

hammer away on. The northern alfalfa growers are certainly good advertisers and in the seed business "Northern Grown" is a name to conjure with, even though it may denote a merely fancied excellence.

We believe that as soon as alfalfa becomes generally used farmers will pay no more attention to latitude in buying alfalfa seed than they now do in buying red clover. Some of the hardiest alfalfa brought to this country by Prof. Hansen was grown in the cotton-growing section of Turkestan.

Alfalfa seed is not raised much farther north than Wisconsin, so that State is the ideal place for testing seed from all sections of the country. Tests made in 1916 are especially significant as the winter was a severe one.

The Alfalfa Order of Wisconsin was organized in 1911, and has a very large membership. We quote from a letter of October 12, 1916, received from the Secretary, Prof. L. F. Graber of the Wisconsin Experiment Station.

"Your letter of the 7th received and I note that you are interested in our work on the winter-killing of alfalfa produced from southern and northern grown seed. By southern grown seed we have reference to seed produced in Kansas, Nebraska and Oklahoma. Our tests so far have only included southern seed from these states. We are not yet ready to give any information on seed produced in New Mexico and Arizona or Southern California."

"For a long time it has been the general belief that the only seed adapted to our conditions was that produced in the northern States such as the Dakotas and Montana, the latter having the preference. As a result of this the northern grown seeds have been sold for three to four dollars a bushel more than seed of equal quality produced in Kansas and Nebraska."

"In order to test out this matter we have had the members of our State Alfalfa Growers Association—the Alfalfa Order—try out the different strains of alfalfa and much to their surprise (as they had much prejudice against Kansas seed) they found that the Kansas and Nebraska seed grew to be equal in every respect to the Dakota and Montana strains. Their experience has been identical with ours here at the Experiment Station Farm. Last winter was a very severe one in this State and resulted in much damage to alfalfa and clover fields throughout the southern part of Wisconsin. This gave all strains of seed a severe test which makes the data we have gathered quite conclusive. We have every reason to believe that Kansas grown seed and Nebraska grown seed are just as satisfactory for Wisconsin conditions as seed produced further north."

"The matter of hardiness in alfalfa is not so much a proposition of where the seed is grown or how old the field is, it is more particularly a matter of the strain or variety of alfalfa."

Note also the following from Prof. Graber:

December 12, 1917.

"We have no further results of interest in regard to the value of Grimm Alfalfa. Where the genuine seed of this variety is used it has proven far superior to common alfalfa in its ability to live through severe, open winters.

"Our results with Kansas seed have shown it equal in hardiness and yield to the Dakota and Montana grown seed. Seed coming from states south of Oklahoma we have not tested sufficiently to make any definite statements."

H. L. Westover of the United States Department of Agriculture, in a letter dated November 22, 1916, says:

"In our work at the Federal Station at Redfield, South Dakota, during the past three years we have noted but little difference between South Dakota and Montana seed. Kansas seed, however, has been quite perceptibly less hardy than Nebraska, and the South Dakota and Montana seed have both proven hardier than Nebraska. In general, our experience has been that the seed grown in Montana and the Dakotas is hardier than that grown farther south. In favorable winters, it frequently happens that none of these strains suffer any great amount of winter-killing, even in the Northern States. The real test of hardiness comes in rather severe winters and then we nearly always find that the northern-grown seed will come through the winter better than that grown as far south as Kansas."

But Mr. M. Champlin of the South Dakota Experiment Station in a letter of November 8, 1916, says:

"In reply to your letter of November 4th, I regret to state that we have made no definite tests of the comparative hardiness of South Dakota, Montana, Kansas, Idaho and Nebraska grown seed. In connection with our variety tests, we have observed, however, there has not been a very great difference in hardiness between the Kansas non-irrigated, Montana and South Dakota grown seed."

In view of the information now available we shall continue to favor Kansas seed as we have in the past. We believe that we are entirely justified in our long continued policy of favoring Kansas seed, for the reason that Kansas furnishes

The Grimm Alfalfa which I bought of you last season although we did not get it until very late, came through the winter fine and is looking very good now.
J. G. Thompson, North Heath, Mass.

I will recommend your Grimm, as it did well in both germination and purity tests. Walter C. Wood, Hyde Park, Vt., Lamoille Central Academy.
The Grimm is looking fine since the last rain and the warm days of last week.

ideal conditions for growing alfalfa. These conditions result in close stands and a minimum of weeds. In no other place can we find seed as pure. As we wish to sell weedless seed, our preference is naturally for the locality where cleanest seed is to be found.

If seed is to be sown for hardiness the more expensive Grimm had better be used, rather than to buy seed of doubtful origin and worth, at a fancy price. If extra care is used in preparation of seed bed and seeding, the sower can economize by using a smaller quantity per acre.

Dry weather and frosts in 1917 injured alfalfa seed throughout the country. Hence the supply is limited and the quality is not as good as usual. Our seed is free from weeds and the germination is up to standard, but the seed grains are not as large nor as bright as they were in last season's seed.

As might be expected, giving heed to the demands of our trade, we have a large stock of seed grown in Montana, though we have but very little from South Dakota as the crop in the latter State was almost a failure.

Why Alfalfa Sometimes Fails

Although there is still much to learn about alfalfa, it is, of course, no more difficult to make an alfalfa seed sprout than it is to make any other kind of clover seed sprout. The needful thing is to provide conditions favorable for its growth throughout the several years it may occupy the ground. One can afford to go to more trouble in preparing the ground for alfalfa than for red clover which lasts but two years.

Alfalfa can be produced on almost any kind of soil. Failure is more often due to incomplete preparation of the ground than to type of soil.

The Michigan Experiment Station compiled the following table from reports of 701 seedings, representing 4,065 acres. The table is purposed to show the principal causes of poor results or failures in seeding alfalfa.

Poor preparation of seed bed.....	34.4%
Lack of inoculation.....	30.6%
Winter-killing.....	12.4%
Weeds.....	9.7%
Light, infertile soil.....	5.9%
Seeding with nurse crop.....	4.3%
Insufficient drainage.....	2.7%

Preparation of Seed Bed

It is not possible to plow timothy or blue grass sod for immediate planting of alfalfa, without having the growth of alfalfa greatly interfered with by grass. A cultivated crop, such as corn should be raised the year before; then it is unnecessary to plow the ground unless it is foul or of a very heavy character.

If plowing is thought best it should be done in the fall, especially if early spring seeding is contemplated, for in seeding alfalfa the loose, open seed bed, such as is prepared in plowing a short time before seeding, should be avoided. It takes nearly six weeks for plowed ground to settle for alfalfa seeding. Otherwise, capillarity, or the power of the soil to draw the water to the surface, is interfered with.

The surface should be cultivated until the soil is as fine as a well-prepared garden. The top covering prevents evaporation, and thus keeps the soil warm, besides leaving the seed in complete contact with the soil, which makes plant food easily available when the seed sprouts.

The young plants are likely to die in poorly prepared spots, these eventually becoming weed distributing stations. Hollows become filled with water and ice, which may kill the alfalfa.

Competition of Weeds. Poor Seed

The ground always contains weed seeds, for this reason thorough cultivation at intervals to kill them as they sprout is advisable. After going to this trouble it is surely unwise to sow seed that contains weed seeds that will sprout at the same time as the alfalfa and probably overcome it.

Lack of Fertility

While alfalfa is a deep feeder, drawing its foods from greater depths than most plants, it is more tender than other clovers when young, and needs encouragement. Well rotted manure is the best fertilizer, but usually not available. Fresh manure on account of weed seeds should be applied to the preceding crop, or before plowing, the weeds being destroyed by frequent cultivation up to seeding time. Green manure crops supply humus so necessary to alfalfa, but are likely to cause an acid condition of the soil.

Fertilizers

If it is impossible to use either of the above, commercial fertilizers should be used, especially on poor soils. We like bone meal best. Any fertilizer used should contain a large amount of phosphorus and some potash. Alfalfa gathers its own nitrogen, if inoculated.

Acid Land. Need of Lime

The percentage of lime in the ash of alfalfa is almost 35, nearly twice the percentage shown by red clover, and more than 7 times that in timothy. Lime is beneficial to most plants and to the legumes it is absolutely necessary. Much more lime is needed for alfalfa than for red clover.

If sorrel, dock, red top, or blackberry bushes thrive in your fields and clover does not, undoubtedly lime is needed. If muriatic acid poured on the soil fails to make bubbles, lime should be used. If limestone pebbles or shells are present lime need not be added. The absence of these, usually though not always indicates the absence of lime. Valleys are not so apt to require lime as hills.

When in doubt about lime, use it or consult your station.

A large crop of alfalfa cannot be expected unless the bacteria which find their home in the nodules on the roots are present. These bacteria gather free nitrogen from the air, and pass it on to the alfalfa, but they have no use for an acid soil.

Of the three forms of lime, the one that is the most economical in your section should be used.

One hundred pounds of raw lime rock when burned is reduced to 56 lbs. of burnt lime or quick lime. When this is water-slaked it takes up 18 lbs. of water, making 74 lbs. of hydrated lime. Therefore 56 lbs. of burnt lime or 74 lbs. of hydrated lime is equivalent to 100 lbs. of ground limestone.

Probably not less than two tons of ground limestone per acre should be applied and more will not hurt. Apply as long before sowing as possible, even a year in advance.

Drainage

All plants require air in contact with the roots. If there is too much water in the soil, the air is reduced, and root development retarded. A lesser top growth follows. Drainage takes off surplus water and admits air, causing circulation. Many soils do not need tile at all. Almost any wet soil, if

properly drained, will raise alfalfa. The tile should be put in as deep as may be practicable.

Inoculation

A great many scientists have been giving years of study to the subject of inoculation. As far as we know every one of them agrees that it is necessary to introduce the proper bacteria into the soil if the best stand of alfalfa is expected. The cost for either time or material is small, so it scarcely pays to run the risk of partial or complete failure in order to save the trouble. One method of inoculating is the scattering over the new field of soil taken from an old alfalfa or sweet clover field that is known to be inoculated. Two or three hundred pounds of soil per acre should be used. Sow in the evening or on a cloudy day and harrow in immediately. Another method is the use of commercial cultures. Most of them are thoroughly reliable. The kind we have we guarantee to produce nodules. One advantage they have over soil from an old field is that with the cultures there is no danger of introducing noxious weeds. Nitrogen is the most expensive fertilizing element. If the bacteria are supplied alfalfa fills the soil with it at no cost.

Winter-Killing

Alfalfa seldom winter-kills on land well-drained. Any clover is apt to winter-kill if there is little humus in the soil. Ground containing plenty of humus is porous and ventilated; there are air spaces which favor the rapid carrying-off of excess moisture. Stiff clay soils that are devoid of humus become filled with water which in freezing weather forms ice and causes the soil to expand and heave, pulling out and breaking off the roots. Fields that carry red clover through the winter will do the same for alfalfa. If each year it is becoming harder to keep a stand of clover, put humus in the soil. Soils that contain humus are warmer than soils that do not.

Nurse Crop

Coburn and Westgate say that when a nurse crop is sowed alfalfa usually succeeds in spite of the nurse crop, rather than because of it. Most authorities agree with this statement. When young, alfalfa needs the sunlight, and all the moisture

and fertility, especially in a dry season. In the spring on very fertile land that is well adapted to alfalfa a nurse crop may be used to keep down weeds; this may be a half sowing of oats, barley, rye or winter wheat, to be cut for hay. Clipping to keep back the weeds may prove as satisfactory, for a growth of grain that is heavy enough to smother weeds, would necessarily keep back the young alfalfa plants, which at first are much weaker than weeds.

Seeding

Alfalfa may be successfully seeded at any time from early spring until late summer. Many prefer early seeding with a nurse crop of barley, oats or rye, to keep down weeds.

Successful stands are often obtained by drilling the seed in the wheat fields in the early spring.

Sowing in the corn is a good gamble, if care is used to have the field free from weeds and in good order. A one-horse drill may be used, or the seed broadcasted, followed by a small harrow. If one cultivation is omitted, the alfalfa has a better chance.

Some sow in June, but we have found that foxtail, and other weeds are still likely at that time to be a serious menace, and, because we don't like weeds, we prefer to sow from July 20th to August 20th. This gives plenty of time for getting the ground in fine shape and killing the weeds by cultivation. At this time the young plants receive full benefit of moisture, sunlight and plant food, as they sprout. Late seeding is especially desirable on thin lands, otherwise, weeds are sure to cause trouble.

Fertile ground does not require as much seed as poor ground. Poor seed will not go as far as good seed. Broadcasting requires more seed than drilling. Thus the amount required per acre varies, but as a general rule fifteen pounds per acre will be found about the right amount. After sowing harrow lightly to cover seed and smooth out any furrows left by the drill. Alfalfa seed should never be covered to a greater depth than one-inch. The top should be left loose.

Harvesting

Alfalfa leaves contain twice as much protein as the stems. This should be kept in mind when the hay is being made, and every means used to save the leaves.

The Kansas Experiment Station found that the protein content of alfalfa when one-tenth in bloom is 18.5%, when in full bloom, 14.4%. For this reason the mature hay is better for horses. Providing new shoots have started the best time to cut is just as the field begins to show blooms. There should be an abundance of shoots about 1½ inches long. If too long they will be clipped by the mower and growing time will be lost, for alfalfa grows from the end of the shoot like a fern. Growing time is lost and a diminished yield results if the crop is cut too soon.

The basal sprouts are the best guide to cutting, but in dry seasons the new shoots are sometimes slow in appearing. In this case the blooms must be taken as the sole guide, for the feeding value diminishes rapidly as leaves are shed to protect the plant from the drought.

If the hay is allowed to dry too rapidly this loss of leaves happens during the curing process. A little experience however soon demonstrates that alfalfa is easily cured.

Alfalfa may be put in the stack or mow damper than is generally supposed, that is while the stems are still quite tough or flexible.

Alfalfa should be let lie until the leaves are wilted then raked into windrows and then into cocks, until cured. A very heavy crop may be tedded. Alfalfa may be stacked when so dry that moisture cannot be wrung out by twisting the hay.

Any kind of hay should be exposed to the hot sun as little as possible while curing. Too long exposure bleaches the leaves of alfalfa, and causes them to become brittle and fall off. Moreover, if the leaves have been burnt in the sun, they will not absorb the water in the stems and the hay will cure slowly and unevenly. Curing through the action of air and wind is best, therefore, alfalfa should be cured in cocks, instead of in the swath.

Pasturing

Alfalfa may be pastured if due care is used. For hogs it is especially valuable, and if mixed with such grasses as timothy, blue grass, orchard grass, or bromus inermis, there is little danger of cattle bloating or of injury to the alfalfa plants.

However, trampling may easily ruin a fine stand of pure alfalfa. In view of this it is hardly wise to turn stock on the field until a year or two before it is to be plowed up.

Cultivating Alfalfa

After the first year alfalfa may be cultivated with a spring tooth or special alfalfa harrow, immediately after cutting, when the soil is relatively dry. Grass and weeds, being comparatively shallow rooted are pulled out, but the teeth of the harrow slip around the deep rooted alfalfa plants without injuring them. This method of cultivation eliminates a serious objection to top dressing with manure which is usually full of weed seeds.

Disking is no longer recommended.

Rotation

Alfalfa may be made an invaluable part of the rotation.

Coburn says: "Where alfalfa is allowed to succeed itself year after year, a large proportion of the benefit which might be derived from its power to enrich the soil is lost. Alfalfa has little use for the atmospheric nitrogen which it stores in the soil, nor for the surplus of ash elements which it draws from the subsoil, for it can draw more from the same sources as they are needed. Unless alfalfa is followed by crops that need and can make use of the fertility which it has rendered available, this fertility is in considerable measure wasted. The only method of growing alfalfa so that the most benefit may be derived from it is to make it part of a rotation. A non-leguminous crop following a few seasons' growth of alfalfa will make use of the fertility gathered, to the marked profit of the planter."

Leaves Turning Yellow

The first growth of alfalfa sometimes shows yellow. This may be due to lack either of humus or of drainage. Sometimes it is because the young plant is feeding in the surface soil and the condition disappears when the tap root has pushed further down.

Leaf spot is a not uncommon, but not serious disease of alfalfa. Small brown spots appear on both sides of the leaf which becomes yellow and falls prematurely. Leaf spot is most likely to occur during humid weather, and in the second or third cutting. Clipping invigorates the growth and the trouble usually disappears.

Turkestan Alfalfa. A Warning

This alfalfa is imported from Asiatic Turkestan. It is a dwarf variety and we have known of many instances where fields have had to be plowed up because it was unwittingly sowed.

Under ordinary conditions one-fifth of the alfalfa sowed in this country is imported, 90% coming from Turkestan. Thus there is danger of getting this seed. The market value is about \$2.00 per bushel less than home grown seed.

Turkestan seed is duller in color and a good sized sample usually contains seeds of Russian knapweed which are chalky white in color, wedge shaped and a trifle longer than alfalfa grains. We shall be glad to identify any samples sent to us although this can be more satisfactorily done by the Department of Agriculture. Their Bulletin No. 138 deals with Turkestan Alfalfa seed and is very interesting reading.

Varieties

The name alfalfa is given to any plant of the genus *Medicago* that is used as a forage crop. In general, when used without a qualifying term, alfalfa refers to the species *M. Sativa*. Ordinarily the *M. Sativa*, or purple flowered alfalfa is called common alfalfa to distinguish it from the less familiar varieties. One of the best known of the latter, the Grimm, is classed by some authorities as a member of the *Sativa* species; others, basing their conclusion on the variegated flowers of the Grimm group it with the species *M. Media*. This latter species is thought by many to be the result of a natural crossing of *M. Sativa* and *M. Falcata*. *M. Falcata*, (yellow lucerne or Swedish Clover), has yellow flowers, and sickleshaped pods; is a native of Northern Europe extending far into Siberia, and is hardier than the *M. Sativa*, though it probably is less productive. The botanists who class Grimm as descending from a cross between *M. Sativa* and *M. Falcata*, explain the superior hardiness of the Grimm as inherited from the *Falcata*.

These three species, *M. Sativa*, *M. Falcata* and *M. Media*, are the only ones that have been grown to any extent in America, though investigators are constantly experimenting with imported varieties in the hope of discovering a plant that will be especially adapted to the arid regions of the West.

There are a number of special strains of the above species of alfalfa based on the development of certain favorable characteristics, principally resistance to drought and cold. We enumerate a few of these below. We can supply other varieties not listed.

Grimm Alfalfa

Fifteen or twenty pounds of alfalfa seed was brought to Carver County, Minnesota in 1857, by a German immigrant named Wendelin Grimm. This seed produced especially hardy plants, and after becoming recognized as a superior strain, it was given the name of the man who introduced it.

It is impossible to distinguish the seeds of Grimm from those of ordinary alfalfa, and the growing plants are very similar. A careful examination, however, shows many of the Grimm plants to be more decumbent than the ordinary. The chief characteristic that makes Grimm superior to ordinary alfalfa seems to be the buried or low-set crowns, and their tendency to spread.

The pictures of Grimm show a most decided branching root system, because they are usually taken from selected plants. In spite of the claims made by many raisers of the seed it is a mistake to call Grimm a strictly branching-root variety and the common alfalfa tap-rooted, for probably not more than 35% of Grimm roots are branched while 25% of the roots of common alfalfa show this tendency. Branching roots are often the result of soil conditions. In loose soils the tap-root will extend straight downward until the water table is reached. If hard soil is encountered the root will branch.

Grimm is thought to be the result of a cross between the common and the yellow-flowered species, or *falcata*, the latter giving the Grimm its peculiar crown and root formation and thus rendering it more resistant to winter-killing. While Grimm blossoms are mostly the same color as those of common alfalfa, usually blossoms of various colors are found.

There is no doubt at all that Grimm is the hardiest of any of the better-known so-called hardy, or variegated varieties, and where winter-killing is likely to occur it should be sown.

The result of tests at nearly all experiment stations shows the superior hardiness of Grimm, there being no difference in

its ability to withstand severe winters no matter where the seed was raised. We have grown it for seven years, and believe it to be worth the higher price it is necessary to ask for it. It went through the winter of 1911—12, when practically all the alfalfa in our county was destroyed.

Unfortunately, the demand for Grimm has been so great that almost any kind of seed would sell. As a result many growers have allowed weeds to infest their fields, and it is difficult to get weedless seed. When we first sowed Grimm we were twice put to the expense of pulling weeds from the fields on account of the weedy condition of the seed.

Since we have been selling Grimm, we have been called on to replace with our seed Grimm that the buyers felt compelled to return on account of its being unsafe to sow.

Because we devote all our time to the selection and cleaning of field seeds, making a special effort with Grimm, we are confident that no one else is supplying seed as free from weed seeds and dead grains.

Just as important as purity is the question of genuineness. In buying Grimm nearly everyone wonders if he is getting seed that is true to name.

For the following reasons you can be assured that we are in just as good position as anyone to furnish seed that is absolutely as represented.

Practically everyone of the large distributors of Grimm lives in territory where the alfalfa seed crop is a failure much oftener than it is a success.

As a result, seed must be raised for them in territory where the crop is sure, just as our seed is grown for us.

For four years one man in the Northwest has supplied our seed. He pulls the weeds from his fields. Not once have we had a complaint as to quality, and, better still, we have had not a single complaint as to genuineness or winter-killing. Nor do we expect to have as it has gone through some very severe winters where other alfalfa in the same field was entirely lost.

As ordinary alfalfa is quite high this year, there is not the usual difference in price.

Ask for Grimm leaflet.

Warranted Genuine Grimm

You have perhaps read much in the past few years about Guaranteed Grimm, but upon careful investigation found that the seed was merely "guaranteed" and not subject to replacement in case it should winter-kill. We have been wondering just what advantages are to be obtained by the seed buyer under such a guarantee of variety.

The seeds of Grimm and ordinary alfalfa can not be distinguished and there is very little difference either in the blossoms or the appearance of the roots. Winter-killing therefore is the only proof of genuineness which remains, although on rare occasions even Grimm may fail.

However, as stated before, we have never had a single complaint of our Grimm winter-killing; accordingly we have decided to replace any Grimm that fails to go through the winter successfully, providing of course it is sown on reasonably well drained land and not too late in the Fall. We will take your word for it.

This should be of special interest to those who favor Grimm; for, in addition to this real guarantee of genuineness, we are supplying seed that we know is far above most Grimm as to freedom from weeds and dead grains.

Cossack Alfalfa

This strain is a natural hybrid of *Medicago Sativa* and *Medicago Falcata*. The original supply of seed was gotten from a single plant in Siberia by Professor Hansen.

The blossoms are decidedly variegated. Great claims are made for Cossack but there seems to be some doubt as to whether it will be much superior to the Grimm.

The Grimm is looking fine since the last rain and the warm days of last week.

This is my first attempt at raising alfalfa and am very much pleased with it so far.

Shall always be glad to refer anyone to you wishing seed.

P. G. Warfield, Buckland, Mass.

The Alfalfa seed I got from you in August is fine.

Albert J. Culver, Hopkinsville, Ky.

Sweet Clover

SWEET CLOVER is supposed to be a native of Bokhara in Asiatic Russia and has been known for over 2,000 years. Although brought to this country nearly 200 years ago it is just now receiving the attention that it deserves.

For centuries it has been recognized as a honey plant and its name is due to this feature, *Melilotus* (meaning honey lotus or honey plant).

There are a large number of varieties but only two are well known in this country, namely, white biennial (*Melilotus alba*), and yellow biennial (*Melilotus officinalis*).

As the yellow does not grow as rank as the white, it is not as desirable, although it is being used somewhat for pasturing.

The unhulled white sweet is more economical than the hulled for winter and early spring sowing on top of the ground where it will be covered by freezing and thawing.

When Sweet Clover is mentioned without any special variety being named, it is always understood that the white is meant. There are few countries in the world where it will not grow and it has proven valuable in every section of the United States. It will grow in the most humid and in the most arid sections of the country, on acid, alkali, sandy, raw clay, stony and worn-out soils where there is practically no humus or organic matter at all. It will prevent erosion on hillsides and will thrive on soils on which no other clover can be successfully grown.

A Land Builder

Going much deeper than the plow, the large tap roots decay quickly after the plant dies, facilitating drainage, and adding a great amount of organic matter to the soil.

Sweet Clover will change sand into fertile soil. It is said that King Island off the Coast of New South Wales has been changed from an island of sand to a profitable grazing country by Sweet Clover.

Coal strippers are using it extensively for reclaiming the large banks of dirt which are moved from the top of the coal.

It improves the texture of gumbo soils.

Sweet Clover has been found to be one of the most desirable crops for enriching orchards.

It prepares the ground for other plants. As an example, Sweet Clover allowed to grow on washed hills will eventually be replaced by blue grass.

It produces more top, root and seed than any other clover. The Illinois Station made an estimate of the total top and roots in a crop of Sweet finding that they amount to 6.38 tons of dry matter per acre in a full grown crop. Think what this means as a fertilizer. If left to grow it attains a height of 18 to 30 inches the first year. The second year it grows to be 5 to 8 feet in height.

Sweet Clover will break up raw clay and waxy soils. In the spring of 1915, we plowed a field, one-half of which contained a vigorous growth of Sweet Clover, our intention being to plant corn. We were unable to plant the corn, the season being wet, and the waxy clay soil poorly drained. The spring of 1916 was also wet but we found no trouble in getting a fine seed bed where the Sweet Clover had been turned under. The other half of the field could not be gotten into shape until late in June on account of clods.

We have sowed Sweet Clover late in August on heavy yellow clay that had been hauled from a new street. Though a decent seed bed could not be made an excellent growth resulted. The stand was left through one season and then turned under for corn which gave a remarkably good yield.

For Pasture

Sweet Clover will make pasturage two weeks earlier than any other plant, and will stand pasturing the year round, even after there have been several frosts. Stock will soon learn to like it, especially if turned into it in the spring before other green food is available. Close grazing is a benefit as it causes the plants to stool. When dry weather has put everything else to sleep Sweet Clover is still on the job, offering an abundance of green shoots. It will stand pasturing much better than alfalfa and is also more satisfactory than alfalfa for the stock. Either on account of the cumarin, a well-known drug used as a tonic, which is contained in Sweet Clover and gives it its bitter taste, or on account of its more fibrous stems which do not induce gorging, Sweet Clover will not cause bloat, nor overwork the kidneys.

The first year, it can be pastured or it will produce one crop of hay. It can be pastured in about two months after

it has germinated. The second year it will produce two crops of hay, or early pasturage and one hay crop, or a seed crop may be substituted for the last hay crop. Sweet Clover makes fine pasturage on that part of the farm where nothing else will make a satisfactory growth. It can be pastured through the entire season and, in that case, will usually produce enough seed to reseed itself. However, when one wishes to make a permanent Sweet Clover pasture it is a good plan to seed both the first and second year, so that, when the old plants die out the second year, year old plants will be coming in.

For Hay

The first year cut when knee high. The second year cut before blossoming; otherwise stems will be woody. Sweet Clover is the equal of alfalfa in feeding value and, the second year, will make from two to four tons per acre. Cut in the morning and rake into windrows before the leaves are dry enough to shatter. The next day put in shocks to cure. If the shocks are large enough for a fork full the leaves will not lose off in pitching. Be sure to have the mower set fully five inches high so that the crown and young shoots will not be injured.

Rotation

Being a biennial like Red Clover, Sweet Clover will fill its place in the rotation. It may be sowed on the wheat in the spring just as Red Clover. Excellent pasturage is then afforded for late summer or fall when everything else is likely to be quite brown. The following spring it is turned under for corn.

Seeding

Sweet Clover can be sown at almost any time during the year. Fall seeding is usually done in August or September. The principal objection to late fall seeding is that the plants will die out the next year before the roots have had time to make a heavy growth. Of course this is desirable when the land is to be occupied but one season. As Sweet Clover needs a firm soil, sowing any time from December to March is desirable as thus special preparation of the ground is saved. For later sowing the ground should be prepared just as for alfalfa. The seed should be lightly covered to a depth of not more than one-half inch. Never plow nor plant deeply. Loose soil is the cause of many failures. Growers who have

experienced trouble getting the right kind of a stand in their own well cultivated fields are often surprised to see the plant growing wild along the roadside and on railroad embankments. On thin limestone hills, Sweet Clover will thrive, but, if no lime is present, it should be supplied. It will do better on poorly drained soils than other clover. With no nurse crop to take the moisture it will withstand any drought. It should be sown at the rate of 15 pounds of hulled and scarified seed to the acre. Sweet Clover should be inoculated, and requires the same bacteria as alfalfa.

Scarifying

The growing of Sweet Clover is often unsatisfactory on account of the low percentage of germination which may be no more than 20%. This objection has now been overcome by the use of a scarifier brought out by the Iowa Experiment Station. This machine scratches the hard seed coat and makes it possible for water to penetrate easily. We have installed one of these scarifiers with which we treat all of our Sweet Clover thus raising the germination percentage to 80 or 90 per cent.

Seed Production

Plants should be cut while wet with dew to prevent the seed from shattering, and before the seed is fully matured. The seed may be threshed but the use of a huller is better. The first growth should be cut for hay the mower being set quite high.

A considerable amount of hulled seed is imported and contains buckhorn and other weeds, so it is well to be careful in testing samples.

Summary

Feeding value is almost equal to alfalfa.
The large roots and fibrous stems break up difficult soils.
Will grow where humus is lacking.
Will prepare the ground for alfalfa.
Furnishes pasture earlier than any other plant. Hogs are fond of the roots and should be well ringed.
Will grow where other clovers fail.
The decaying roots leave large holes for drainage.
Will prepare washed or bare ground for blue grass and prevent erosion.
Is free from plant disease.
Furnishes more matter for green manure than other clovers.
Will grow where even weeds give up.

Red Clover

RED CLOVER was first cultivated in Persia. It was carried to Spain and Italy about the 16th century and was soon introduced into Holland. From Holland it was taken to England and about 1770 to Pennsylvania.

Red Clover is often called June or Medium Clover, the latter term to distinguish it from Mammoth.

It has been found that Red Clover has a habit of drawing the crown of the plant into the soil, thus protecting itself from being uprooted by frost in winter.

However, one of the chief objections to Red Clover is the fact that on our soil it winter-kills more easily each year. Authorities agree that this increasing tenderness is caused by the continued depletion of humus. Of course, winter-killing may be caused by poor drainage but abundance of humus provides ventilation and helps to prevent water-logging.

Clover sickness is usually due to the absence of available plant food because of the exhaustion of potash and phosphorus from the soil. It is often due to an acid condition. In many instances it will be found advisable to inoculate the seed even though Red Clover has been raised on the field in former years.

The department of agriculture, in cooperation with the Indiana and Wisconsin Experiment Stations has been investigating this trouble. The results so far indicate that in the cases under observation it may be controlled by the incorporation of certain green manures, together with proper fertilizer treatment.

If as much care was used in preparing the seed bed for Red Clover as for Alfalfa the yields would be wonderfully increased and winter-killing would be lessened. If possible Red Clover seed sown in the early spring should be drilled or raked in or covered in some way. If a fertilizer is used it should be one rich in phosphorus, as most clover soils are deficient in that element, though they usually have plenty of potash. The clover will provide itself with nitrogen from the air.

Farmers' Bulletin No. 260 of the Department of Agriculture says, "First-class Red Clover seed should contain very few weed seeds. This means at most but a few hundred and

should mean less than 100 in each pound. Even this seems a large number, but clover seed production has not yet received that special attention which insures perfectly clean seed, and a few hundred weed seeds per pound constitutes a small number when compared with the thousands and tens of thousands of weed seeds per pound found in many samples of Red Clover seed."

These sentences should be carefully read and thought over by any one who expects to sow Red Clover for they very clearly outline the results of careless buying.

No one ever writes us that he can buy better clover seed than we are selling but quite often we receive samples of seed that can be purchased at a cheaper price. Many of these we send to the Department of Agriculture for a purity and germination test. Practically all of the large number sent to us last year contained more or less weeds; some of them represented seed that was unfit to sow if it cost nothing at all.

In the case of one sample of clover seed sent us by a grange, the seed was purchased because it could be bought for \$10.50 per bushel whereas our seed was \$13.50 per bushel. A Government test of this showed the purity to be 96.68, the germination 54.5. These multiplied together and the price divided by the result just as we suggest doing in our test, show the actual cost of the pure seed in that lot to be \$19.93

The purity of our seed is seldom less than 99.75 and the germination is probably better than 90%. If figured on this basis the cost of our seed, if every grain was perfect, would be \$15.00, while our seed contains practically no weed seeds at all. The seed bought by the grange contained 17 different kinds of weed seeds, 6,210 to the bushel or 1,552 in the 15 pounds of seed sown on the acre.

This is not an unusual case. Of course it occurs oftener with Red Clover than with other seeds for Red Clover matures about the same time as some of the very worst weeds, as, for instance, buckhorn, wild carrot, sorrel, etc., to say nothing of dodder.

The clover seed I got of you last spring grew fine. I got as fine a stand of clover as I ever saw and I always have gotten fine stands from your seeds. That is the one main reason why I am sending you seventy-two dollars today for more seed.

John W. Botts, Michigantown, Ind.

If weed seeds are in Red Clover when sowed it is safe to assume that they will be in the seed crop when harvested, for the progenitors of both probably met each other years before, the weeds seeming to be especially fond of the company of Red Clover.

Every year a large amount of Red Clover is imported from Europe.

We quote from a report of the Department of Agriculture: "The imports of Red Clover seed exceeded those of any previous year, enough Red Clover seed being brought in to seed over 4,000,000 acres at a normal rate of seeding."

"Tests of imported seeds have shown that large quantities of Red Clover seed brought into the United States germinated so poorly as to be of little or no agricultural value."

This is reason enough for always using our test when buying Red Clover seed. Every single pound of this imported seed contained buckhorn, and the department says that it does not produce as much hay as home-grown seed.

Red Clover is not as plump as last year's seed and contains more blighted grains. But by using extreme care we expect to be able to furnish as usual seed practically weedless and about up to our usual grade in every way.

Many State Experiment Stations located not too far north are advising fall sowing of Red Clover. This is especially advisable south of the Ohio River.

We sell more Red Clover than any other seed and, through special attention given it, we expect to continue to furnish seed that is free from weeds. We are proud of our Red Clover.

It is generally supposed that Red Clover seed is used in dye-making but this is not true. No record of such use has been found although the matter has been carefully investigated by an employe of the Bureau of Plant Industry. In an old Swedish Encyclopedia he found mention of the fact that poor peasants sometimes used clover blossoms for coloring.

I turn under clover every year. Clover purchased elsewhere was not good. Scott's was the best I ever had, hence I remember you.

*Hon. Wm. L. Ormrod, Ormrod Road,
Churchville, N. Y.*

Mammoth

MAMMOTH CLOVER, also called English, Sapling, and Pea Vine Clover, like Red, is a biennial, but where soil and climate are particularly favorable, or where prevented from producing seed, it is likely to show a perennial tendency.

As Mammoth Clover matures about three weeks later than Red it is better suited for sowing with timothy or red-top, red clover being overripe at the proper time for harvesting either timothy or red-top.

Mammoth grows to a greater height than red, has larger roots that penetrate to a greater depth, and for this reason will often do well on soils where medium clover will make an unsatisfactory growth, the vigorous growth of the Mammoth enabling it to gather more plant food from impoverished soils.

On poor soils Mammoth makes more desirable hay because the growth is not so rank. The long roots enable it to withstand drouth and winter-killing better than red. On sandy soil it is superior to red clover which it excels as a green manure crop on account of its large growth of roots and stems.

While the hay is coarser than red clover hay it has the advantage of ripening a month later at the time when there is less danger from rain.

If a seed crop is to be made the clover should be pastured until about June first or clipped, otherwise the plant is likely to exhaust itself in the production of stems and leaves. If the weather is especially dry care must be used in pasturing as the plants may not receive enough growth to produce a large seed crop. On very poor soils it may not be necessary to pasture at all.

Mammoth makes a much surer crop of seed than red. It matures seed about three weeks earlier. Some growers assert that seed is produced just between two broods of clover weevil which often do much damage to red clover.

The very heavy growth usually smothers out most of the weeds and as a result we can always furnish Mammoth that is free from weed seeds. It seldom contains blasted grains.

For the last ten years we have made a specialty of Mammoth for the reason that we have received many letters

inquiring for Mammoth from farmers who complained that whenever they had bought Mammoth they had to reap a crop of red. Of course this is provoking and we determined to furnish Mammoth that could be relied upon. We sell an increasing amount of this seed each year.

One man wrote us that he had looked for Mammoth as long as Ahab looked for Elisha; another said that he has been trying to sow some Mammoth for twenty years.

We know our Mammoth is true to name. Ten to fifteen pounds per acre are sown.

Alsike

ALSIKE seems to have been first cultivated near the village of Syke or Alsike, Sweden, and to have been introduced into England in 1834. It is not known when it was brought to America. On account of its appearance and habit of growth it was once thought to be a hybrid between white and red, but is now supposed to be a distinct species.

While not strictly a perennial it usually remains in the ground for several years. Enough of the heads escape the mower and the grazing of stock to do much toward reseeding. It is not nearly as particular about acid soils as red clover and will withstand winter-killing much better. It should be used in mixtures on any type of soil where the seeding is to remain more than three years, in this respect being preferable to red which dies in two years.

It is particularly adapted to wet soils, sometimes doing well in standing water.

Being free from the diseases that affect red clover, it will grow on most soils even those that raise an indifferent crop of red.

The hay is finer than red clover hay and is preferred by stock, but less is produced per acre.

Alsike gathers nitrogen from the air the same as red clover, and would be as valuable in the rotation as a soil builder except for its smaller root and stem growth.

Alsike and timothy ripen together and the alsike does not crowd the timothy as badly as red clover does. For these reasons alsike is preferred for growing along with timothy.

Because the alsike does not crowd it is often sown with red clover. It interferes but little with the growth of the red clover and should the latter fail to grow or be killed the alsike will quite likely take its place. Often alsike, on account of its spreading roots, will keep the red clover from "heaving" out. Much less alsike than red should be used.

Except where grown for seed it is usually best to sow some other seed with alsike, such as timothy, orchard grass, blue grass, or red clover.

A good hay mixture is 3 parts timothy, 2 parts red, and 1 part alsike.

There are approximately 700,000 alsike seeds to a pound, and 250,000 in a pound of red clover, so it takes much less of alsike to sow an acre of ground, probably not more than five pounds.

As the seed is so small it should be lightly covered.

Probably because of acid soil, Canada thistle, sorrel and buckhorn infest many of the sections where alsike is raised for seed, so it is well to look out for these weeds when testing samples. They cannot be entirely removed in cleaning, as many of the weed seeds will be the same size as the alsike. This is especially true of Canada thistle.

Owing to its smaller size alsike is hard to clean, but, by using care in selection, we are always able to furnish seed that is practically weedless.

As alsike goes three times as far as red clover and is considerably cheaper this season, a substantial amount can be saved by mixing it with, or by substituting it for, red.

Quite often we have alsike which contains a little timothy seed that we sell at a special price.

Crimson Clover

CRIMSON CLOVER is said to be a native of Southern Europe. It was introduced into Chester County, Pennsylvania, in 1820 but, until 1880, its distribution was quite limited.

Crimson Clover is a winter annual, that is, being sown in late summer it goes through the winter in a green state and matures its seed and dies in the spring. It will seldom stand the winters north of the 40th parallel. Although it is often

used on the sandy soils of Michigan with success, being somewhat protected by the snows, it is best adapted to humid regions where the winters are rather mild and even. It will grow on almost any type of soil. On stiff clay or sandy soils where red clover refuses to grow it will do well, especially if fertilizer containing phosphoric acid and potash is used to give the young plants a start. Crimson does especially well along the Atlantic Coast from New Jersey to Georgia and has filled the need for a clover suited to southern soils.

Its chief use is as a green manure crop. When plowed under it decays rapidly. It is an intermediate crop growing at a time when it does not conflict with money crops such as corn, cotton, grains or vegetables. It can be seeded after any crop that is removed 100 days before frost. The root growth is large and the soil is greatly benefited even after the hay crop is removed. Fertilizer may be applied to the preceding crop or at the time of seeding or very early the following spring. Crimson Clover will do much better than red clover where lime is deficient.

Crimson Clover is often sowed with a light seeding of buckwheat or cow peas and even cow horn turnips, the Crimson being thus afforded shade from the hot sun which often kills the young plants. This is especially desirable if the seeding is to be done very early. If sowed late with grain, winter oats, wheat, rye or barley are used.

Where Crimson Clover has not been seeded before it should by all means be inoculated. The Alabama Station harvested 4,056 pounds of hay from an inoculated plat; from another plat of the same size uninoculated, only 471 pounds.

Fifteen pounds per acre is usually sowed, the seed being very lightly covered. The seed is sown according to latitude from August first to October first. Practically all of the Crimson Clover sowed in this country is imported from Europe. This means that the seed usually contains the seeds of noxious weeds so that a careful examination should be made before buying. (Use our test.) Very often we can furnish home-grown seed.

We shall need several bushels of Crimson Clover seed in our neighborhood and will you please quote us on it. Can you guarantee the seed to be free from weeds as I have found all your other seed to be?

B. L. Neal, Waiteville, W. Va.

White Clover

WHITE CLOVER is usually called White Dutch to distinguish it from White Sweet Clover. White Clover is a native of America.

Its chief value is when used for pasture or in lawn or pasture mixtures. It is a perennial making its best growth on rich moist soil but will grow on almost any soil. When sowed in mixtures it will furnish nitrogen for itself and the grasses, besides making a balanced ration. It will stand any amount of trampling. If unmixed, during August when maturing seed, it will cause horses to slobber, owing to the acrid nature of the seed. On account of its creeping root stocks and the abundant production of seed it spreads rapidly. It does not winter-kill and remains green from early spring until late autumn. It withstands drought better than alsike and red clover.

Often seeds of White Clover, which are harder than the seeds of most clovers, will lie in the ground several years until a very wet period, followed by warm weather, causes them to germinate. The result is that we have what is known as a White Clover year.

There is no honey better than that made from White Clover blossoms. There are over 800,000 seeds to the pound.

Japan or Lespedeza

THIS was brought to us from Japan. It was first introduced in South Carolina and is becoming popular in most sections of the South. It is an annual. It has deep roots and will grow on very poor soil, but, unlike crimson clover, does not do well on sandy soils.

Vetch

TWO kinds of Vetch are of agricultural importance in this country—Common Vetch (*Vicia Sativa*) and Hairy Vetch (*Vicia Villosa*). The common Vetch is subdivided into spring vetch and winter vetch. The hairy vetch also is called winter vetch and is so listed by some seedsmen, but the term "winter" belongs to the common vetch by priority of use and is probably more widely known in that connection. It is therefore advisable to order the *Villosa* under the designation "hairy" or "sand" vetch.

Common Vetch is an annual and is rarely grown except in the Pacific coast states. The spring vetch will succeed where Canada field peas do, but the latter is the more valuable crop.

Hairy Vetch is a biennial if planted in spring and is much hardier than the common. It will grow in most localities and will succeed on poor land. Its name "Sand" vetch refers to its value as a crop for poor sandy soils. Vetch usually makes a good crop in spite of drought.

Hairy Vetch is very hardy and may be fall sown in all the northern states. It may be sown in corn at the last cultivation for green manure or hay. It is valuable in the eastern half of the United States where crimson clover cannot be grown.

It is especially well adapted to the sandy soils of Michigan where it is used as a winter cover crop or for seed production.

Vetch is sown alone or with wheat or rye as a supporting crop. Where the winters are severe the nurse crop is indispensable.

Late summer is the best time to plant, say from the last of July until the middle of September, sowing from 25 to 35 lbs. of Vetch with one bushel of rye. The more Vetch sown the more the soil will be helped.

Vetch grows rather slowly in the fall, but recovers quickly in the spring and makes an abundant growth which may be plowed under or pastured or cut for hay.

Vetch may be seeded in the spring, either by itself or with a nurse crop such as oats or barley. Sometimes it is mixed with Canada peas and oats. In any case it will furnish excellent summer pasture.

It is almost necessary to inoculate Vetch if the best stand is expected.

Most of the seed in this country is imported and is often mixed with the common vetch, which is much cheaper in price. It is comparatively free from weeds, but often contains many hard grains which make the germination low.

This year we expect to be able to supply home grown Vetch which has the advantage of being unadulterated, free from weeds and of much higher germination than the imported vetch.

Vetch and Rye Mixed

We have a considerable quantity of vetch and rye mixed, just as harvested, that is lower in price than the two would be if bought separately.

Soy Beans

THE Soy Bean is a native of Eastern Asia, coming from China or Southern Japan. In this country it has been an important crop for about twenty years.

It is large, upright, branching, and resembles a tall-growing hairy leaved, hairy stemmed field bean. It grows from 1½ to 4 feet high. The short hairy pods contain two or three seeds which, according to variety, are yellow, black, brown, green, olive, etc. They resemble peas more than beans, as they are short and round.

Clover is so often a failure that it is necessary to find some legume that pays as large returns and at the same time is a sure crop. Soy beans not only gather more nitrogen from the air than clover but have a larger root system. Thus even though the crop is saved for hay or is pastured instead of being plowed under, the benefit to the ground is as great as from clover as is indicated by the large yields of wheat and corn following a well-inoculated crop of soy beans. The Ohio Experiment Station found that wheat yielded 10.3 bushels more to the acre on this sort of ground than on corn ground.

A good hay crop can be realized by planting them after wheat or oats have been removed.

The soy bean is used for green manure, hay, forage, grain, and silage. As green manure a crop of soys is equivalent to a good stand of crimson clover and better than cow peas.

They are probably the most desirable leguminous catch crop.

In addition to this they are coming into great favor as a substitute for navy beans. While not as palatable they have a much greater food value.

The soy requires from 90 to 150 days to mature. Some of the varieties will mature as far north as Northern New York, but, the plant having originated in a warm climate, many varieties will not ripen except in the South.

It does best on light, warm, sandy loam, but it will grow in poor soils and each year increases the fertility of the land by means of the nodules on its roots. It endures drought, and stands excessive moisture fairly well.

The plant is moderate in its fertilizer requirements. Lime, applied previously to seeding, should be used on acid soils, though liming is not as essential as with other legumes.

Soy bean hay resembles alfalfa hay very closely in percentage of protein and in percentages of digestible nutrients.

Alfalfa Hay.....	14.3	Per Cent Protein
Soy Bean Hay.....	15.4	Per Cent Protein

Digestible Nutrients

	Protein	Carbohydrates	Fats
Alfalfa Hay.....	11.0	39.6	1.2
Soy Bean Hay.....	10.8	38.7	1.5

As might be expected trials made at experiment stations show that for milk and butter production soy bean hay is nearly as good as alfalfa hay. The soy bean will never take the place of clover for hay, but it is invaluable to fill in with, in case of failure of a clover seeding or of a spring crop.

Combined with Kaffir corn, sorghum or millet, the soy bean supplies one of the best green feeds for the dairy. The forage produced by the soy is higher in protein than can be obtained from any other annual crop of equal yield.

Milk can be produced by feeding soy bean stover at less cost than when corn is used. At the Newark, N. J. Station excellent results were obtained by cooking the stover for growing hogs.

The analysis of meal from soy beans shows at least 35% protein, which compares favorably with linseed and cotton seed meal. Meal from the soy bean has none of the bad effects of cotton seed meal. One bushel of bean meal is equal to 2½ or three bushels of corn for pork or beef production. The soy bean can be used in place of oats in the rotation, and its availability as a substitute for linseed and cotton seed meal gives it an advantage over oats. Soy beans produce three times as much protein as oats. Being rich in protein the beans are a most valuable addition to the home grown concentrates for balancing the ordinary carbohydrate-rich ration.

Experiment stations are urging that soy beans take the place of oats in the rotation. By planting corn and beans together, then soy beans alone either for hay or grain, followed the next year with wheat and clover, a legume is on the ground continuously. As an average crop of soys, if inoculated, will store up as much as 125 pounds of nitrogen per acre, it can be seen what they will do for soil improvement when used in this way.

The scarcity of clover seed and the high price of hay makes it imperative that some legume be used that will produce an abundance of hay and forage and at the same time be economical to sow. There is nothing that will fill this want as well as soy beans. While they are somewhat higher than usual, they are much more reasonable than the clovers. They not only make more hay to the acre but store up more nitrogen. While the early varieties are rather scarce, the Mammoth Yellows are plentiful and consequently lower in price. We shall be glad if first and second choice are given in ordering.

Seeding

In seeding soys the seed bed should be prepared about the same as for corn, cultivating at intervals in order to kill weeds, for, like alfalfa young soy bean plants are easily crowded out by a rank growth of weeds. They may be sown about corn planting time but not until all danger of frost is past and the ground is warm. The seed should be sown not over 1 to 1½ inches deep. If a seed crop is expected they should be sown as early as possible but for hay or green manure they may be sown quite late, even into July, the variety used making some difference. Although solid drilling requires more seed to the acre and in wet seasons there may be some annoyance from weeds, many growers prefer this manner of planting for hay, silage or green manure crops. From 4 to 6 pecks are used. Laboratory experiments in New Jersey point to an increased or intensified use of atmospheric nitrogen when legumes are planted close together. When so planted there is possibly a greater recovery of nitrogen from the air per acre. Thick seeding is probably best for sandy soils. Planting in rows saves seed and permits cultivation.

For green manuring or hay solid drilling is probably the most desirable, but for seed the beans must be drilled in rows and cultivated. For solid drilling use the oats feed of an ordinary grain drill adjusted to drill say 75 pounds per acre. A grain drill can be used for drilling in rows by covering up the necessary feed holes. This requires from 20 to 30 pounds of seed, according to the size of the beans. The rows should be 28 to 30 inches apart with the beans 2 or 3 inches apart in the rows. When a corn planter is used some recommend attaching a shoe at the planter runner for regulating the depth.

Cultivation

As the entire bean is pushed out of the ground in sprouting, in case a heavy crust forms, it may be necessary to harrow the ground lightly before the beans sprout, but this should be avoided if possible. Unless weeds are getting the best of the beans they should not be disturbed until three or four inches high, when they are quite tough. When planted in rows they may be cultivated with a weeder until 8 or 10 inches high, or a light harrow may be used. Often this is all the cultivation necessary. No cultivating should be done after the blossoms appear, nor when the plants are damp.

In Corn

When planted with the corn soys may be "hogged off" or "lambed off," or both cut with a binder for putting in the silo. When the former, the lambs or pigs are turned in when the corn is about ready to cut for fodder and the soys have begun to ripen. Pigs up to 50 or 60 pounds and the lambs will eat the beans without injuring the corn if it is desired to harvest it. If the entire crop is to be pastured, sheep or hogs of any size may be turned in. They take on fat and improve in general condition wonderfully. It is a good plan, if convenient, to feed soys to the stock a few days before they are put into the field so that they will become accustomed to, and eat the beans readily, otherwise the larger animals will favor the fresh corn. Beans are so rich in protein that it is not necessary to feed tankage or any other protein feed.

For hogging off or for silage the beans are planted right in the rows with the corn. A special attachment can be gotten for the planter that makes it possible to do the whole job at once, or the corn may be drilled first at the regular depth and then the drill filled with the beans, going back over the corn rows, being careful to plant the beans no deeper than one-inch. The corn is planted about 18 inches apart and the beans about 6 inches apart in the rows. This requires, say, 10 pounds of beans. If the planter has a fertilizer attachment the beans may be mixed with the fertilizer or with dust, drilling the mixture as fertilizer. On a small scale corn and beans may be mixed together and drilled, but this is not a very satisfactory arrangement.

Soys should be planted in all corn fields when possible to utilize them, unless the fields are inclined to be very weedy,

for this is an easy means of inoculating a new field, and there is no extra expense in cultivating. As they gather nitrogen from the air and the corn gets some of this, the growth of the corn is not lessened and even though it were, the benefit to the ground and the extra forage would more than offset the loss. At least one ton of silage or soiling is added to the field. Many report yields of two tons, a large profit at practically no expense.

For Silage

The addition of soys gives the silage a much greater feeding value as they contain 145% more digestible protein and 40% more fat than the corn silage. If the beans are grown in separate fields three loads of corn run through the cutter followed by a load of soy beans make a well-balanced feed. They can be used much riper than for hay as they go into the silo without curing and the juices of the corn soften the stems. The harvesting is done with a binder just as the corn alone would be harvested. Varieties of beans and corn that will mature at nearly the same time should be used.

Cornell University in a series of experiments found that non-leguminous plants grown with legumes contained a great deal more protein than when grown alone. As an example oats grown with field peas contained 7% more protein than oats grown alone; timothy with red clover 44% more. It seems reasonable to suppose that corn grown with soys should contain more protein than when grown by itself, especially if the soys are inoculated.

For Hay

Soy bean hay has a greater feeding value than alfalfa and in curing will stand more unfavorable weather conditions than red clover or alfalfa. They should be cut when the pods begin to fill and a few yellow leaves are showing. Well-matured hay may not be so palatable but is more easily cured. When once started the harvesting should be completed in as short time as possible as the leaves fall rapidly when ripe. They may be cut with a mower and left on the ground until wilted; then raked up and placed in tall loose cocks for a week or ten days. An ideal method, however, is the use of the self-binder, setting the small bundles into cocks to cure. The pods and leaves are then off the ground and will not be

full of dirt, a thing to be desired, for soys are cut at a season when there is likely to be rain and as the ground is soft from cultivation, leaves and stems are often covered with dirt.

For Seed

The seed cures to best advantage on the stalk so beans should not be cut until absolutely necessary to prevent loss from shattering. A good guide is to wait until most of the leaves have fallen off. If the beans are well ripened it is possible to thresh in a day or two after cutting. If the beans are not allowed to get thoroughly ripe, and some varieties must be cut early or too many beans will be lost, the beans should be kept in cocks until thoroughly cured, otherwise the seed may be damaged when stored in bins or sacks. They should be cut when dew is on the ground. Some of the large growers of seed cut with a binder just as soon as the top leaves turn yellow, allowing the small bunches to lie three or four days according to the weather and then put in small shocks, reshocking at the end of ten days if the weather is favorable. In four or five weeks the beans are thoroughly cured. This leaves a large amount of leaves on the straw, most of which are lost if the beans are allowed to ripen thoroughly.

Threshing

An ordinary grain separator can be used by removing the regular concave and using a blank or board. The speed must be cut down so as to avoid splitting the beans. Special bean separators can be purchased at reasonable prices. Soy bean straw is relished more than any other straw by sheep, cattle and horses.

Inoculation

There is no question at all but that soy beans should be inoculated. They may grow nearly as well without inoculation but will do this at the expense of the soil. When inoculated the roots become filled with large nodules which makes them the ideal crop for soil building. There is also little doubt that when they are inoculated the protein content of the plant is much greater. For reasons stated before we believe it is especially important to inoculate soys that are to be planted with corn. In 99 cases out of 100 "no inoculation means no nodules."

Soy beans can be successfully grown by any one and they will surely make any grower a more successful farmer.

While there is little danger of sowing weeds with soys there is some danger of planting soys with a small percentage of germination as they are easily injured in the curing process. There is also likelihood of planting a lot of split beans.

We have the most improved machinery for cleaning them and believe we are furnishing better beans than can be purchased most places.

We give below dates of maturity for Ohio. The number of days required for the ripening of beans will vary somewhat with the locality and weather conditions.

In ordering soy beans we shall be glad if first and second choice is given. Dry weather and early frosts have made nearly all varieties scarce and we expect to be out of several of them before the season is well along. We shall undoubtedly have several varieties not listed here.

Yellows

Ito San

This small yellow bean is one of the best known varieties. It is a heavy seed producer, grows to a height of about 24 inches and matures in about 105 days. Owing to its early maturity it is excellent for use as a catch crop. A good variety to sow with corn for hogging down. Although rather short it ranks well as a hay producer. We have a large supply in stock.

The Ohio Experiment Station has improved the Ito San by selection, calling this improved bean Selection 9100. We have very few of these, (S. 9100) to offer. Next year we hope to offer a limited amount grown from a few selected plants of the 9100.

Elton (Formerly Called Chestnut)

A yellow bean that will mature in 110 days. A short wide spreading variety with an abundance of foliage. It produces seed very abundantly. The seed pods instead of being scattered over the plant as in other varieties grow bunched together in the center of the plant. This bean cannot be surpassed for seed production or to plant with corn for hogging down. It will mature as far north as Vermont.

Hollybrook

Matures in about 120 days, growing about 36 inches tall. It is a large producer of seed and hay and is desirable to plant with corn for hogging off or for silage.

Mongol

We consider this bean to be possibly the best general purpose variety on the market. It matures in 115 days. The plant grows to a height of about 30 inches with medium sized stems and an abundance of foliage, making it an excellent hay variety. It is very much like the Medium Green, is a much heavier yielder and will not shed its leaves so readily or shatter as badly.

At the Ohio Experiment Station this bean in a four year test yielded 25.95 bushels of beans to the acre as compared with 22.71 bushels yielded by the Medium Green.

Sam Jordan who has done much with beans in Missouri and who is considered an authority on soy beans says, "Mongol is the heaviest seed producer I have tried, much better than the Medium Green in every way."

A. W. Sweeton, County Agent of Windham County, Vermont, after conducting a test of twelve different varieties says, of the Mongol, "The leaves were very large and the whole plant heavily podded to the very top, the beans being almost mature. A good variety to plant with corn or alone. Seems equal to the Medium Green in every way."

This bean will be entirely satisfactory in the New England States, as an all purpose bean to substitute for the Medium Green which has always been popular there.

Mikado

This variety grows to a height of about 32 inches, maturing beans in 120 days. It is excellent for grain, hay or silage but the stalks and branches are somewhat coarse.

Haberlandt

This is one of the most productive varieties. Has large yellow seeds, grows to a height of 36 to 40 inches and matures in about 130 days. This makes it a little late for maturing seed north of the Ohio River although it is excellent for hay and silage any place.

Mammoth Yellow

This is a late southern grown variety. It will not mature beans north of the Ohio River but is grown quite extensively for hay as far north as the New England States. Many mix a few pounds of an early variety with the Mammoth Yellow so that the hay will contain more fully developed beans. This should be an excellent plan especially this season when Mammoth Yellows are quite plentiful and lower in price than the early varieties. For soil improvement or for hay Mammoth Yellows will be found more economical this season than clover seed. We have several cars of these of superior quality.

Browns

Early Browns

This is practically the same bean as the Ito San but seems to be hardier. Mr. E. E. Evans of Michigan, who introduced both tells us that the Early Brown, besides being somewhat earlier, is a better all round variety than the Ito San.

Ohio 9035

This bean matures seed in 120 to 125 days. This is one of the best beans developed by the Ohio Experiment Station which probably has done more work with soy beans than any other station. It is an erect bushy plant growing to a height of about 30 inches. The leaves are large. It is a large seed and hay producer. For Central Ohio and farther south there is no better variety either for hay or for seed production. Farther north, in cases where a large quantity of hay is desired, it will be found to excel most other varieties. It probably resists shattering better than any other bean, an excellent point in its favor.

Blacks

Black beans withstand cold, wet weather in the early stages of growth better than the yellow beans. Most of them have fine stems and leaves and are desirable for hay and for silage, but many growers prefer the larger and coarser yellow beans for the latter purpose. As the hogs can not find the black beans the yellow kinds are more suitable for hogging down. In blacks the same variety often goes under several different names. We have found the Wilson, Ebony, Sable, Black Beauty, Jet, Pekin and Arlington to be very

much alike. Experiment Station reports vary greatly as to time of maturity and other characteristics. From the earliest to the latest they vary about 10 days in time of maturity.

Sable

The Sable matures in about 120 days; erect, growing to an average height of about 36 inches. It has a small stem and thin branches which make it desirable for hay. It is probably a heavier yielder of grain than other black varieties.

Wilson

It matures in about 115 days, growing as high as 4 feet. It is inclined to vine more than the Sable and the pods are somewhat higher from the ground. It is very popular in the East but as the seed is always scarce we recommend one of the other black varieties as second choice in ordering.

Pekin

About the same as the Sable.

Jet

This is a heavy yielder of grain and very similar to the Sable.

Arlington

Also similar to the Sable but somewhat earlier.

Ebony

Bushy with fine stem and branches. We have found it earlier than the other varieties, maturing very little later than the Ito San.

Black Beauty

A bean grown largely in Illinois. The Illinois Station says it is the same thing as the Ebony.

Greens

Medium Green

This was at one time the best known bean but is gradually being discarded as a seed producer for the reason that in unfavorable seasons it suffers more than other varieties and

at all times shatters so badly that there is a big loss in seed. The seed is always very scarce and high in price. As a substitute we strongly recommend the Mongol described above.

Morse

Light green or olive. A heavy yielder. Matures in about 115 days, growing to a height of 30 inches. Its pods very close to the ground which makes it less desirable for silage but a very good bean for hogging down.

Mixed Beans

We often have mixed soys that we can sell at a special price.

I am pleased to advise that we have a satisfactory germination report from our seed laboratory on the lot of Ito San Soy Beans recently shipped by you, and are accordingly placing in course of settlement a voucher in your favor.

R. A. Oakley, Agro. in Charge, Washington, D. C.

The beans did real well and seemed very well suited to this locality. They are the little Brown. We cut most of them for hay and only saved about 5 bushels for seed. Had about three tons of hay.

J. J. Cameron, Millersburg, Ohio.

Your letter received concerning the Soy Beans bought of you this spring. They did exceptionally well.

Willard Wohrer, North Vernon, Ind.

In reply to your letter of the 29th, will say I am very much pleased with the results of my Soy Beans. Our County Agent figured that I made \$45 clear profit off of the 1¼ bushel of beans I bought of you, not taking in consideration the value the crop of beans was to the land, besides this I had them sowed on a very thin piece of land.

J. R. Shelton, Princeton, W. Va.

The Soy Bean seed that I bought of you last spring did so well that I allowed the crop to ripen and have 30 bushels. I am greatly pleased with your seed of all kinds that I have had experience with.

W. H. Ross, Brentwood, N. Y.

Canadian Field Peas

FIELD PEAS are usually spoken of as Canadian Field Peas, the name having been given when the plant was comparatively unknown and the seed mainly imported from Canada. However, few varieties originated in that country.

Being a legume they are soil improvers and furnish a ration rich in protein. They can be sown for soiling and fodder and are unsurpassed for green manure. They are usually sown with oats, about one bushel of each, thoroughly mixed. This combination makes a very desirable hay or soiling crop, the yield being quite large.

Unlike cow peas they should be sown as early as possible in the spring, and do best farther north than Central Ohio.

One bushel of field peas, one bushel of oats, four pounds of Dwarf Essex Rape and eight pounds of sweet clover make excellent hog pasture that can be sown in the spring, the pigs being turned in when the oats and peas are about eight inches high.

Cow Peas

THE Cow Pea, a native of Asia, was introduced into this country over a century and a half ago, and soon came into general use in the Southern States. Here it has remained a successful crop, owing to the fact that frost seldom interfered with its growth of foliage; however, the cow pea has gradually found its way into northern latitudes where it has been of high value as a forage crop and a soil improver.

The growing of the cow pea serves to improve the soil in two ways. It not only breaks up a stiff clay soil, but like other legumes has the capacity of taking nitrogen from the air. An even greater advantage is seen in the fact that it makes a considerable growth on land which will not produce red clover and other legumes, and which is not suitable for the growing of other grain crops.

The feeding value of the cow pea is equal to that of red clover and ranks high in palatability and digestibility. Its high percentage of protein makes it even more profitable for feeding purposes.

Cow Peas should be sown as soon as the ground is thoroughly warm and dry. When sown with a seed drill, about

six pecks of seed should be used. On well drained land Cow Peas will make a fairly good showing, although the plant is best adapted to a rather sandy soil. Harvesting should begin when the first pods show signs of ripening.

Where the land has not grown Cow Peas before, inoculating material should be used, as experiments have proven that it adds much to both the crop and the soil.

The most common varieties are the New Era and Whip-poor-will, although the Black, Clay and Michigan Favorite are well-known varieties. For very late planting the New Era is recommended.

Timothy

THIS grass was first brought to this country from England by Timothy Hanson of Maryland in 1720. In some parts of New England it is known as Herd's grass, it being said that John Herd found the grass growing wild in a swamp in New Hampshire as early as 1700.

Timothy is distinctly a grass for hay rather than pasture as it does not take kindly to trampling and close grazing. It is our hardiest and best known grass and is a part of all mixtures.

The facts concerning seeding, harvesting, etc., are so well known that it is unnecessary to enumerate them.

Although it is not difficult to procure high-grade seed, it is almost impossible to distinguish blasted and immature grains from viable seed. The careful examination and comparison of samples is therefore a matter of importance.

Often timothy seed contains a considerable amount of sorrel owing to the fact that both grow on acid soil. It is well to be on the lookout for this as well as for Canada thistle which is not easy to identify in timothy seed.

In timothy seed you will nearly always find a small amount of alsike, and quite often grasshopper specks. It is not possible to entirely remove either of these, and while they hurt the looks of the seed they make no difference in the

Our dealings with you on Timothy seed have been very pleasant. Your seed has been of very high quality and in every case your service has been good. We like to deal with your type.

Mason Co. Agricultural Society,
D. R. Dodd, Agent, Point Pleasant, W. Va.

quality, and should not be confused with black plantain which is somewhat triangular and flat.

One peck is the amount usually sown per acre, or if clover is to be sown in the spring—a bushel to six acres. A satisfactory mixture is 7 pounds timothy, 7 pounds red and 3 pounds alsike.

Sometimes we can supply timothy with a little streak of alsike at the same price as pure timothy. The alsike helps the hay wonderfully.

Timothy and Alsike

TIMOTHY meadows generally contain a certain amount of alsike clover and when the seed from such meadows is run through our cleaner it is impossible to separate the alsike from the timothy. Especially in clover years large amounts of this seed are brought to us, some lots containing quite a large amount of alsike. The seed, being mixed, has a less market value than if it were separated, and for this reason we can usually supply timothy and alsike mixed at bargain prices.

Timothy grown with a legume will do better than when grown alone.

Timothy and alsike are alike in many respects. They do well on the same types of soil, ripen at the same time, and are suitable to the same conditions of climate. The sowing of timothy and alsike is therefore recommended by experiment stations. There is no doubt that the mixed hay has a much greater feeding value than timothy alone.

Timothy and alsike mixtures have become quite popular of late years, but, unfortunately, this has led some people to take advantage of the fact that it is difficult to recognize dead grains and weed seeds in them. Hand-made mixtures composed largely of tailings and inferior seeds are now being

The Timothy seed which I bought of you was as fine as I ever saw.

J. H. Dutrow, Jr., Charlestown, W. Va.

My Superintendent, Mr. Robertson, informs me and I also see with my own eyes that the Timothy seed which you recently sold me is germinating well and gives promise of producing a fine crop.

I enclose herewith my check to your order for \$99.33 being the amount of bill rendered. Middleton S. Burrill, 24 Broad St, New York, N. Y.

offered. We have sent more than one of these mixtures to our experiment station only to have it returned to us with the information that it was tailings and that no purity test could be made.

Timothy that is chock full of plantain and unsaleable at any price can be mixed with low grade alsike and sold as a good timothy and alsike mixture, although the percentage of germination may not be over 10 per cent. This seed will undoubtedly contain a very large percentage of Canada thistle, buckhorn, sorrel and plantain, just such weeds as it is impossible to clean out of timothy and alsike. Of course there is no need of sowing this kind of seed, but, for some reasons, many farmers are unwilling to take the trouble to have samples analyzed by their experiment stations or even to use the simple test which we suggest.

Our timothy and alsike is a natural mixture, just as it comes from fields of mixed hay. By using our test you can very easily see that it is practically free from weeds.

Grass Mixtures

GRASSES may be divided into two classes, hay and pasture, or tall and short.

Some of these grasses grow in bunches and some have creeping stems. For either hay or pasture as well as for soil improvement a mixture of grasses and clover is of greater value than any one kind grown alone.

Pasture Mixtures

AMIXTURE gives a longer period for grazing, furnishes a greater variety, yields a crop richer in protein and makes a better balanced ration than would the grasses composing the mixture if sown separately. But it does not pay to sow in a mixture any grass that will not do well alone. In choosing the grasses to go into the mixture such varieties should be selected that the good qualities of one will balance points in which the other is deficient. For example, the grass that forms roots on the surface is not desirable from the stand point of fertility; another may send its roots fairly deep but not be as suitable for a pasture grass as the other. The

two make a combination well adapted to grazing and maintaining the fertility. Pasture Mixture grasses should be selected with respect to their periods of growth so that grazing may be done through the longest possible period.

An example in support of this plan is cited by the Kansas Experiment Station as follows: A combination of Orchard Grass, *Bromus Inermis* and Meadow Fescue is taken. Orchard Grass starts early in the spring, makes a rapid growth and matures early in the summer. Meadow Fescue on the other hand starts late in the spring and matures late in the summer. *Bromus Inermis* is different in character from both of the other two. It starts early in the spring and usually continues to grow throughout the summer. One can readily see that this combination of grasses would be of far more value for pasture than any one of the varieties could possibly be if sown alone.

The Department of Agriculture found that grasses with a strong root system, like Meadow Fescue and Rye Grass, will prevent the winter-killing of other weaker grasses and clover. In a series of tests, the plat giving the best results was the one containing the largest number of grasses. We like to include in our mixtures quite a large number of varieties.

A small amount of various clovers should be included in the Pasture Mixture as legumes not only feed the grasses by pumping plant food from great depths to the surface, but also supply them with nitrogen drawn from the air, and, no doubt, greatly increase the protein content of the grasses. A small amount of alfalfa will do much towards getting the soil inoculated. White clover will grow where nothing else will and alsike does well in wet places. Due consideration must be given to the fact that the kinds of grasses that should be used depend upon the locality. Even in a single field parts will be found that are adapted to grasses that will not thrive in the rest of the field.

In making our mixtures we closely follow the suggestions of the different State Experiment Stations but, while we have different mixtures for different states, it can be seen that it is wise to tell us the sort of ground for which they are intended.

A pasture should not be merely sowed and left to shift for itself. Beef and milk can not be produced by grazing it without taking from the soil large amounts of plant food.

Manure should be used where possible or at least a commercial fertilizer containing a large amount of phosphorus. Outside of the limestone district applications of lime will be beneficial.

A thorough mowing in July or August prevents weeds which the stock had not eaten from stealing moisture from the grass. Mowing prevents weeds from going to seed and by cutting them off at this time many are killed. When pastures are dry it is an excellent plan to harrow thoroughly.

Meadow Mixtures

MEADOW MIXTURES, in contrast with pasture mixtures, should contain only grasses that mature at about the same date.

For reasons already stated it is more profitable to sow a mixture of several grasses, including clovers, for hay rather than to sow one kind alone, for then the roots fully occupy the ground to a considerable depth, each variety getting its food from a different level, the legumes acting as feeders for the grasses.

The quality of seed has a greater influence on the production of hay than has any other factor, for the seeds of most of the grasses are very light in weight and often are injured during the curing process. High-grade grass seeds, especially those that are free from weeds, are extremely hard to get but by giving the matter special attention, we have in all varieties, seed of high germinating power, the quality being far above the average.

Wet Land Pasture Mixture

Nearly all grasses can be profitably grown on ground that is low and moist but not swampy.

Dry Land Pasture Mixture

This mixture requires drought resisting grasses that need to be more carefully selected than grasses for wet land.

Sour Land Mixture

In this mixture we have grasses particularly adapted to acid conditions, a smaller amount of clover being used. It is not a difficult matter to get a good stand of grass on ground of this kind if a good seed bed is prepared.

Dry and Wet Meadow Mixtures

These mixtures are very carefully selected so that the grasses and clover will ripen at practically the same time. We cannot recommend them too highly for they are composed of high germinating seed that is practically free from weeds. The usual amount sown for both pasture and meadow is from 20 to 25 pounds.

Early Pasture and Soiling Mixture

THE SHORTAGE of labor and the high price of hay will encourage the growing of early or annual pasture mixtures. More energy value from the same acreage can be procured when these are made use of as soiling crops. Canada Field Peas and Oats probably take first rank. Rye and Vetch as well as Japan Millet and Dwarf Essex Rape are also used. Any of these can be added as desired to the following mixtures which we recommend:

No. 1. 8 pecks oats, 4 pecks field peas.

No. 2. 4 pecks oats, 3 pecks barley, 3 pecks rye.

No. 3. 6 pecks oats, 5 pounds sweet clover, 5 pounds alsike clover, 6 pounds timothy.

Permanent Clover Mixture

Very desirable where a permanent stand of mixed clovers is desired.

Kentucky Blue Grass (*Poa Pratensis*)

This variety of grass is native both to Europe and to North America, and, along with two or three other similar species, is the greatest American pasture grass. Authorities are of the opinion that it is grown more or less in every State in the Union. It makes the best sod of any of our grasses and does fairly well on a wide range of soils, although it is better adapted to clay than to sandy loam. It is a very nutritious pasture grass, but has little value for hay. The fact that it is both an early spring and a late fall grower makes it valuable for grazing at both ends of the season. Kentucky Blue Grass constitutes a part of practically every lawn and pasture mixture.

When sown alone from 30 to 40 pounds per acre should be used.

Owing to the light weight of Blue Grass Seed it is difficult to remove weed seeds and the germination is often quite low. This is true this season especially, for although there have been several large crops during the past three years, none of

them have made really good seed. There is much old seed on the market, so care must be used in buying as it is extremely difficult to get seed of high purity and germination. After much trouble we have been able to get a quantity of really high-grade Blue Grass.

Contrary to the opinion generally held the best Blue Grass seed is produced not in Kentucky, but in Northwestern Missouri. One reason for this is that in Missouri strippers are used that will handle only the ripe seed whereas in Kentucky the business is conducted on such a large scale that contractors begin stripping before the seed has ripened.

Orchard Grass (*Dactylis glomerata*)

Orchard Grass, known as Cocksfoot in England, is a native of Europe. Its American name is due to the fact that it is successfully grown in partially shaded places.

Orchard Grass will stand more drought than Kentucky Blue Grass, but is not especially adapted to dry land conditions. It starts very early in the spring and grows rapidly, so that it is valuable in a pasture mixture. Orchard Grass is inclined to grow in tufts or bunches so that it will not permit an even sod. Although of high nutritive value it is not relished by stock as well as blue grass and redtop. It thrives best on rich, well drained loams and makes a good growth in shady places. Twenty-eight pounds is the amount usually sown per acre.

It is seldom possible to get Orchard Grass that does not contain a considerable amount of dock and sorrel and, quite often, buckhorn, all undesirable weeds. Before we could find seed this year that met our views it was necessary to get samples all over the country. We have a limited amount of Orchard Grass that is almost free from weeds.

Redtop (*Agrostis Alba*)

Redtop belongs to a class of grasses that are very widely distributed over the globe. It is a perennial which ranges in growth from a few inches to three or four feet according to the conditions of soil and climate. It starts later in the spring than Kentucky blue grass, grows slower and matures later. Redtop is valuable for pasture and hay, but does not equal timothy. While adapted to a great variety of soils it does especially well on wet bottoms and should always be included in mixtures for such land.

Although Redtop is a light-weight seed we find it much easier to furnish it free from weeds. About 15 pounds of clean Redtop should be sown per acre.

Meadow Fescue (*Festuca pratensis*)

This variety is a hardy perennial with a strong growing root system. It is well adapted to low temperatures. It also makes a good showing in a warm climate. It is more successful as a pasture crop, although it makes very nutritive hay. Forty pounds of seed per acre should be sown.

Bromus Inermis, or Brome Grass

Brome Grass is a native of Europe and has been grown in the dry steppe region of Russia for centuries. Where continual pasturing is desired it is found quite valuable and it is a wonderful variety for dry soil. Bromus Inermis makes a large heavy growth and is relished by cattle. At least 20 pounds should be sown to the acre.

Tall Meadow Oat Grass (*Arrhenatherum elatius*)

This is a European perennial grass and is not extensively grown in this country. The grass grows in tufts or bunches and does not make desirable pasture unless sown with other varieties. It is a deep rooted variety and stands drought well.

There is a difference of opinion as to the feeding value of Oat Grass, owing to the fact that it makes a rather coarse hay unless properly harvested. Even though a little below the standard in feeding value, its hardiness as well as its rapid and vigorous growth make it a valuable crop. Sow 35 pounds to the acre.

Rye Grass (*Lolium perenne*)

Rye Grass is a native of Europe and is a great favorite in England and on the continent. Perennial Rye, probably the most important of the group, is used to quite an extent as hay and is valued highly as a pasture grass. In the United States it has never gained a prominent position, but is recommended for pasture mixtures. Fifty pounds per acre are sown.

Miscellaneous Grasses

Besides the grasses already mentioned, we are able to offer such varieties as Crested Dogstail, Hard, Sheep and Red Fescue, Sweet Vernal, Creeping Bent, Rhode Island Bent, Wood Meadow Grass, Canadian Blue Grass, Bermuda Grass, etc.

Millet

The term millet takes in a large group of forage plants, the Foxtail being the one most widely known in this country. To the Foxtail group belong the Common, Hungarian, German and Japanese varieties.

German Millet

This is the most largely used variety, being grown to a great extent in the West, most of the seed coming from that section. However, seed of German Millet which is grown in rich ground in Tennessee and cultivated especially for raising seed is more desirable than the western grown seed, although the price is somewhat higher. The amount per acre is 50 pounds.

Hungarian Millet

This is smaller and earlier maturing than the German. The hay is somewhat more desirable as it is not as coarse. The amount per acre is 50 pounds.

Japanese Millet

Makes a larger crop of hay than either of the above and is good cow feed. It was introduced into this country by Professor Brooks of the Massachusetts Experiment Station. It is often known as Billion Dollar grass. The amount per acre is about 15 pounds.

Sudan Grass

This variety of grass was introduced into the United States in 1909 from Khartum, Sudan.

Sudan grass shows a strong resemblance to sorghum. It is inclined to grow in bunches, often as many as 200 stems growing from one crown.

It will grow in almost any State in the Union, furnishing an extraordinarily large amount of forage.

When seeded in rows 40 inches apart about 5 pounds per acre will be found a sufficient amount. From 20 to 25 pounds should be used when sowed broadcast.

Dwarf Essex Rape

This valuable plant has been extensively grown in this country during recent years only.

The cost of sowing is very small as only four or five pounds per acre are required.

It grows from 1½ to 4 feet high and makes a large amount of forage for sheep, hogs or cattle.

Most of the rape used in this country is imported. On account of the small amount of Dwarf Essex being grown at this time, other varieties are offered, many of them of little value, some contain weed seeds.

Corn

FINDING corn suitable for seed purposes has been a strenuous task this season as the hard frost which came very early in September caught a great percentage of the corn before it was mature.

Many of our growers from whom we expected to get seed corn will not be able to pick out enough sound corn for their own seeding next spring. However a few planted their corn extra early and some fields escaped the frost on account of location, but at the time of writing this catalogue it is not possible to state definitely just what varieties we will have. The season has been probably the worst ever known and it is only by testing each variety a great many times that we will know that we are offering seed up to our usual quality. We are arranging now to test every single ear. This is a great task but we feel sure that growers will be sorely disappointed who do not take this much trouble themselves or have it done by someone equipped to handle the operation economically.

Our aim is to have each variety true to type and unmixed, but as nearly everyone has different ideas as to the ideal ear when selecting his seed corn there is naturally a great variation in the type of varieties bearing the same name. In Bulletin No. 414 Mr. Hartley of the Department of Agriculture says: "The nomenclature of corn varieties is in such chaos, that a varietal name is of little significance compared with the vigor, productiveness and purity of the seed. The Leaming is as constant and well recognized a variety as exists, yet seed ears purchased under this name in Connecticut or New York are, in appearance and productive ability as unlike ears of Leaming purchased in Ohio or Illinois as they are unlike ears of other varieties."

To produce a corn crop calls for more labor than the raising of any other crop on the farm. The seed corn to plant an acre costs less than the seed of any other standard crop.

Seed corn at five dollars per bushel makes the cost per acre only seventy cents—nothing, when compared to the cost of preparing the acre for planting. Yet many farmers who insist upon the very highest quality of field seeds and willingly pay a high price for them, laugh at the idea of any seed corn being worth four to five dollars per bushel.

The best insurance against loss of your labor is being

certain that you plant good seed. No one ever produced a good corn crop from poor seed.

A maximum yield can be expected only when there are no weak or missing stalks. To plant a bad ear means about 900 weak, barren or missing stalks to the acre.

The surest and most inexpensive method of increasing production is to plant better seed.

Cultivation, fertility of soil and drainage affect the production of corn but the crop depends first upon the selection of seed.

To quote Mr. Hartley again, "It is possible within a few years to double the average production of corn per acre in the United States and to accomplish it without any increase in work or expense. The lines of improvement which will most easily and quickly accomplish this are, (1) improvement in the quality of seed planted, (2) improvement in the condition of soil, (3) improvement in method of cultivation."

It is necessary to keep down such rank growing weeds as foxtail, cockle, ragweed, etc., as well as the smaller weeds in order to save the moisture and fertility of the soil for the corn, which needs both in abundance.

The New Hampshire Experiment Station in making tests to show the injury of corn due to weeds, raised 17.1 bushels on an uncultivated plot full of weeds. On a plot cultivated shallow five times, the yield was 79.1 bushels and on a plot cultivated deep five times the yield was 69.1 bushels.

Experiments have shown that in almost every case shallow cultivation is preferable to deep. In no case should corn that has reached a height of 2 or 3 feet be cultivated deeper than 4 inches. By the time corn has reached this height the roots have spread from hill to hill. Probably 2 or 3 inches is deep enough to kill the weeds and at the same time miss the roots.

Cultivation aerates the soil and keeps it warm by preventing the evaporation of moisture. The use of better seed, enriching of the soil and the right methods of cultivation may give double the yield of corn to be expected when these requirements are lacking.

There is some question as to whether artificial heat is necessary to the proper curing of corn. Most authorities agree that it is not advisable to allow the temperature to go much below the freezing point until the corn is well dried and we follow this rule in our curing.

Experiments have proven that poor care of seed corn has reduced its yielding power 18 bushels per acre without materially injuring its germination.

The germination test answers the question as to whether the corn will grow, but it cannot tell the reproducing value.

The butt grains are fertilized first, and the pollination of the grains proceeds in regular order towards the tip. Owing to this delay in development the tip grains are thought to vary from type more often than the grains on the rest of the ear.

Experiments conducted by the Kansas Experiment Station in the field show that 90% of the middle grains produce plants while only 86% of the butt grains and 70% of the tip grains produce plants.

This shows that corn should always be carefully butted and tipped by hand before grading, for no grader will entirely eliminate these undesirable grains. If they are not removed the planter is likely to drop the seed unevenly which will cause a smaller stand, as a uniform number of grains to the hill or space must be planted if the largest yield is expected.

Drilled corn, on account of the stalks being separated, usually produces a little better than corn planted in hills.

Corn should ripen early enough to escape frost and late enough to make use of all favorable growing weather.

Mr. Hartley says, "A Good corn for any section is a corn that matures in time to escape frost or drought and that produces grain or shelled corn of good quality abundantly. An error is very frequently made in northern sections in attempting to grow a corn that is not sufficiently late in maturing to make use of the entire period of good growing weather as longer growth is favorable to greater production."

The Early Clarage corn purchased from you last Spring was very satisfactory both as to yield and maturing early.

The Blue Ridge Ensilage was very heavy and from twelve to sixteen feet tall, two and one-half acres filling a forty ton silo.

Ross C. Marshall, Dublin, Ohio.

I have bought several hundred dollars' worth of seed from you and have found it the best that I have been able to locate. It is clean and will germinate. I bought Reid's Yellow Dent from you for myself and neighbors. It is the best that has ever been in this section. This year was a hard year but it matured as early as September 5. It is good enough for me.

H. H. Hildreth, Dola, W. Va.

Some farmers grow both a late maturing and an early variety. By following this method they are sure to have some good solid corn, even if early frosts get the late variety.

The smaller early types are now believed to be more favorable for filling the silo than the large ensilage corns. To give best results silage must have a larger percentage of nutritive value than is found in the immature sappy fodder of southern sorts. The ears should be ripe enough to be well dented and not too soft.

We can ship corn shelled and graded or on the ear, the price being the same in either case. Practically all of our customers prefer the shelled corn as it has been butted and tipped by hand and thoroughly graded and is ready for the planter when it reaches them. They are not only saved the trouble of grading but get more for their money as it takes an extra good bushel of ear corn to make a bushel of shelled corn after being butted and tipped. We expect to ship our ear corn in bags as the price of crates is prohibitive.

In ordering we shall be glad if you will give us first, second and even third choice. We will do our best to supply just exactly what you want. In any case you may rest assured that you will get nothing but seed of high germination, carefully tested and absolutely safe to sow.

In describing the different types we have tried to give the exact number of days in which they will mature, as we see no reason for listing a 110 day corn at 85 or 90 or even 100 days. Growing conditions, however, affect the maturity of corn several days either way so it is impossible to tell the exact number of days.

Guarantee

It is manifestly impossible to guarantee corn to grow and make a crop—too many things can happen after it has been planted—but we guarantee our corn to show a high percentage of strong germination in any test that you care to make.

Keep the shipment just as long as you please. If there is anything that you do not like about the corn send it back and we will return your money, paying all transportation charges of course.

In reply to yours of the 11-30-1917. Will say that the seed corn that you sent me last spring was fine, I think every grain grew. It ripened in good time and I gathered it before the bad weather set in. Every ear is sound and nice, would make the finest seed to plant. This corn is not mixed. I don't like mixed corn.

Albert Smith, Fraziers Bottom, W. Va.

History of Clarage Corn

THIS variety has probably a more clearly defined history than most of the corns originated in Ohio. It takes its name from Edwin Clarridge, who moved from Maryland with his parents to Ross County, Ohio, in 1789. At the age of 24 he moved to Fayette County where he sought to improve the corn already popular in that section. His idea was to have an early ripening corn and he chose ears from the stalk with this in mind, selecting those with the straightest rows, deepest grain and best filled tips. Mr. Clarridge died in 1867, but his sons continued to improve the corn.

In years when corn fails to mature neighbors make a beaten path to the crib of the man who has sought to raise a sure corn, one that ripens early enough to miss the frost and still produces a maximum amount of grain. Thus the fame of Clarage corn spread to other counties, and thus Clarage became a standard all over the country.

Although it does well on black ground, Mr. Clarridge chose it especially for clay land and this is where it is most profitably grown.

In 1857 a son-in-law of Mr. Clarridge sought to improve the corn by selecting larger and longer ears. Naturally it matured later. He called the corn Improved Clarage and this has become a standard name for corn that resembles Clarage in type but is somewhat larger. Of course any one that fools with corn thinks he is improving the type.

Ears of Clarage corn are usually from 8 to 9 inches in length, the grains running straight on the cob, and the taper not so decided as in many other varieties.

Little Clarage

This corn has become very popular in our county. The grower of our corn has raised no other for a great many years. Many of the men who have grown it claim that it will ripen in 85 days, but we have found that enthusiastic growers of early corn are usually about ten days off in their estimates of ripening time.

Ears average from $7\frac{1}{2}$ to 8 inches long and the corn never fails to ripen. The cob is small and the production of shelled corn will be about equal to that of many of the larger eared kinds. For an extra early corn we know of none that will surpass it.

Improved Clarage

This is a fair sized corn about one-inch longer than our Little Clarage and would come under the type called "Improved Clarage." It is a heavy yielder and will ripen in the most unfavorable seasons. It is adapted to either clay or black ground. The fodder is somewhat larger than the Little Clarage or 110 Day White. It makes a solid showy corn and will mature in 110 days or less.

Early Yellow Dent

Many of our customers report that this corn thoroughly matured for them last season although other corns in the neighborhood were caught by the frost. It is somewhat larger than the Little Clarage and the grains are narrower. It ripens in 110 days or less under normal conditions.

Leaming

This is a yellow dent corn, about nine inches long, with a medium large cob. It matures in about 110 days. Besides being a large yielder, it is valuable for either forage or ensilage, being used quite extensively in the East for the latter purpose. It was originally bred in Clinton County, Ohio, by J. S. Leaming. It is tapering and tends to go to a point at the tip. Ohio Bulletin, No. 140 says, "The Leaming is perhaps the oldest variety of corn which we have, dating back to 1826, and is likely the best established of any variety of corn."

Coil's Yellow Dent

This is a medium early corn with a very small cob. Although a yellow corn every cob is white. The grower who began raising it 40 years ago thought he liked the white cobs better than red. We have a constantly increasing demand for early silage corn and can recommend this as the fodder grows quite tall and contains an extraordinarily large amount of leaves, the joints being close together. It matures in about 115 days.

120 Day Yellow

This is well bred corn suitable for those who want something larger than the Clarage but not as late as Reid's Yellow Dent. In every way it is a satisfactory corn.

Reid's Yellow Dent

This variety resulted from the crossing of an Ohio and Illinois corn. It was originated in 1846 by Robert Reid who moved to Red Oak, Illinois from Ohio. The ears are from 8 to 10 inches long.

This is surely a thoroughbred corn. Cylindrical, the butts and tips well covered, the grains deep and closely set, it is the ideal ear in appearance. It has probably won more prizes than any other corn. The only trouble is that some growers have bred more for looks than utility.

Flint

This of course is the very earliest type and it will be in big demand this year. We have a limited supply.

110 Day White *(Commonly called 100 Day White)*

Of this corn we can not speak too highly. The ears average $8\frac{1}{2}$ to 9 inches in length. We could probably best describe it by calling it a white Clarage. The grains are inclined to be broad and they are never chaffy, but hard and firm and of great feeding value. Altogether, it makes the most solid corn of any variety we have ever seen.

It does equally well on either clay or black land. It is especially adapted for hogging-down or for husking from the stalk, because back of this corn are years of selection with the aim of making the ear waist high and the fodder small. This corn will show practically a 100% strong germination. In favorable seasons it will mature in less than 110 days, being earlier than most of the so-called 100 Day or Early White corns and superior to them. Those who like a white corn will find that this will meet every requirement.

McGinnis

This is an early white variety. It is rather mixed, some of the ears resembling White Cap. It is not as well known as some varieties, but is very popular and reliable in this section of Ohio. It matures in 110 days.

White Cap

This corn is a cross between yellow and white corn. It has yellow grains with white caps. It is believed that it is better adapted to poor soils than yellow corn but it is also fine for

black soil. It is a popular variety and a big yielder, being strong and hardy. The cobs are both red and white. It matures in 125 days.

Boone County White

Was originally bred at Thornton, Boone County, Indiana. It is a rather large, late growing variety, maturing in not less than 120 days. The grains are long and cream colored. It is excellent for fertile land. It is one of the best late varieties, but hardly safe very far north of the Ohio River.

Ensilage Corn

In Ensilage corn we have Blue Ridge and Clark's Prolific. Both are grown for us in Virginia, as our climate is not suitable for the maturing of such large corns.

U. S. Selections, No. 125 and No. 133

These varieties have been developed by Mr. C. P. Hartley of the Department of Agriculture. Next year we will have a quantity of both to offer.

We hoped to have a few hundred bushels of Selection 125 this year but it is rather late and we were able to save only a few bushels more than enough for our own use.

Selection 133 has been bred from Minnesota 13 and is very early. We believe that this will eventually become one of the leading varieties, especially in the northern section of the country.

Wheat

IT IS a very common thing to see Wheat fields full of mustard, cockle, dock and other weeds. If you could see what we clean out of Wheat you would not wonder at this; but the surprising thing is that anyone will sow Wheat which has not been thoroughly cleaned. By using a little extra care in buying seed, the yield can be increased several bushels per acre.

Very often a large amount of Rye can be seen above the Wheat. This not only lessens the yield but makes the Wheat sell at a lower price.

Our Wheat is just as carefully selected and cleaned as are our clover and grass seeds. We believe it will more than pay for itself by adding to the crop. It contains nothing but

large plump berries. The varieties listed below, which have proved the most desirable, are in stock. We are often able to furnish other varieties also.

Wheat should be sown two bushels to the acre as it has been shown through many tests that where this amount is used more profit is realized than where six, seven or nine pecks are sown. There is absolutely nothing in the claim that a peck or half bushel of certain varieties is enough for an acre.

Poole

This is one of the old standbys. It is beardless, a heavy yielder and stands the winter well.

Fultz

Another hardy beardless Wheat that is quite popular in Ohio and neighboring States.

Gypsy

This bearded variety is very desirable, especially in the character of stiffness of straw. It is hardy and a large yielder.

Gladden

This is a pure line selection of Gypsy, developed by the Ohio Experiment Station. It has very stiff straw, is a large yielder, and as a milling wheat is above the average. It is bearded, with a white smooth chaff and red kernel. We are growing some of this ourselves and hope to have a large quantity of extra quality.

Portage

This was developed by the Ohio Experiment Station and is a pure line selection from the Poole. In an eight year test at the Station it has been the highest yielder. It is a good milling wheat and in stiffness of straw ranks a little below the Poole. It has a smooth head, red chaff and red kernel. We do not know of a larger yielder and a better all around wheat. We are growing a quantity of it ourselves.

Spring Wheat

In Spring Wheat we have found the Marquis to be the most desirable variety. Owing to the recent high prices there is a growing demand for Spring Wheat.

Oats

IN THE United States, oats are second in importance to wheat and corn only. There are many different strains and varieties. We have found those listed below to give excellent satisfaction.

Sixty Day

Not only is this the earliest oats, but one of the largest yielders. Owing to its extreme earliness it will make a crop where later varieties will fail. The straw is short and does not lodge, which makes it particularly desirable for a nurse crop. It has great feed value for the reason that the hull is thin and light. One of the best varieties for a soiling crop used in connection with field peas.

Ohio 7009

An Ohio Experiment Station selection of the Sixty Day.

Siberian

A well known popular variety and a large yielder. We have Ohio No. 210. An improvement on the original in yield and stiffness of straw.

Improved American

It has a very stiff straw which stands up very well on rich ground.

Big Four

One of the old standbys.

Swedish Select

This variety originated in Sweden. It is very popular, being especially well adapted to upland soils and poor ground. It has a large root development which enables it to resist drought.

Silver Mine

This is another popular white oat. It is hardy, with a stiff, bright straw. In this variety we have some fine home-grown seed and expect also to have a car from Montana or Canada.

Scottish Chief

We sold this variety in 1916 for the first time, having brought in a carload from Montana. It is a trifle earlier than the average oats raised in Ohio and has a stiffer and shorter straw.

Oats are usually sown two bushels to the acre.

Rye

EACH YEAR Rye becomes more popular as a cover crop. During the last few years it has been especially profitable for grain. We have the Mammoth White and the Rosen varieties.

Rosen Rye

It is a pedigreed variety originated by the Michigan Experiment Station. The berry is larger and plumper than other rye, the heads long and broad. Another great advantage is the stiffer straw, enabling it to stand up better in heavy wind and rain storms. It showed an average yield of 40 bushels per acre at the Experiment Farm, and will always exceed the yield of ordinary Rye by from 5 to 15 bushels per acre. Sow about one and one-half bushels per acre.

Barley

ONE-EIGHTH of the entire production of Barley is raised in Wisconsin where special efforts have been made to increase the yield by establishing pedigreed varieties. These efforts have borne fruit in the development of a more desirable strain.

Experiments have shown that the Wisconsin Pedigreed Barley outyields the ordinary barley by 5 bushels per acre.

We have an extra fine quality of this Barley which we have very carefully re-cleaned.

We remove all small and blasted grains as well as all weed seeds.

Two bushels are sown per acre.

Beardless Barley

All Beardless Barley for sale in this country is more or less mixed with the bearded variety, so we can not guarantee our seed to be pure.

Beardless Barley does not produce as much grain as the bearded and is used largely for a nurse crop.

For this purpose about three or four pecks are sown.

In addition to the grains described here we can furnish Sorghum, Kaffir Corn, Buckwheat, Cow Horn Turnips, etc.

Lawn and Golf Course Seed

WE GUARANTEE our lawn seed to grow. Owing to its freedom from weeds and dead grains it should go at least 25% farther than other mixtures. We have lawn seed for both ordinary and shady places.

We shall not attempt to go into an extended discussion of lawns and lawn seed here. The matter is too important to crowd into a small space. In our booklet "Weedless Lawns" we believe we have handled the question of making and maintaining lawns a little more carefully than is usually done.

This booklet describes and illustrates the weeds usually found in lawns and tells how to get rid of them, how to keep from sowing them, and how to judge lawn seed, besides giving instructions for the sowing, mowing, watering, and general care of the lawn. It applies as well to the maintenance of golf courses.

We will gladly send the booklet on request.

Legume Bacteria

NITROGEN, which is essential to the growth of all plants and animals, is constantly being removed from the soil. Some of the instrumentalities of its removal are: the growth of grain and other crops, the drainage of the land, and the action of wind and rain. A portion of this loss may be made up by the manure produced on the farm and by commercial nitrogen, but the cost of the latter is too great for profitable use. The only way in which nitrogen can be supplied so that farming may be profitably conducted is to draw upon the unlimited supply in the air.

Only the legumes, clover, beans, peas, etc., are capable of utilizing the nitrogen of the atmosphere. They are rich in protein, requiring more nitrogen than other plants; being heavy nitrogen feeders would be against them if they could not take the nitrogen from the air and use it. The air is made up of several gases, the proportion of nitrogen being 79%.

A legume cannot of itself make use of this nitrogen but the bacteria which live within the nodules on the roots are able directly to utilize the nitrogen of the air. The nitrogen passes into the bacteria and is changed along with other substances that are present into more complex nitrogenous substances which are used in some unknown way by the legume. The legume gives the bacteria a favorable place for development. It supplies the bacteria with sugars and other substances they need and in return the bacteria make the nitrogen of the air available for the use of the plant.

The bacteria penetrate the root hairs and rapidly reproduce themselves. After a time the bacteria reach the interior of the root, still reproducing, and pass from one cell to another. The root enlarges and the nodule is formed. A plant can not take nitrogen from the air unless the proper strain of bacteria is already in the soil or is introduced by inoculation.

To show that inoculation pays and performs a real service for the farmer legumes have often been grown experimentally in sterilized soil that is entirely lacking in nitrogen. In these tests the inoculated plants make vigorous growth in spite of the absence of plant food in the soil.

A leguminous crop can grow luxuriantly without nodules in a soil that is full of nitrogen. Its growth may not be affected by the lack of inoculation but the nitrogen of the soil is being used instead of nitrogen from the air and though a full crop may be produced the soil is being robbed. If there is not an abundance of nitrogen the plant growth is naturally less. Under either condition efficient management demands that bacteria be introduced. This can be done by the soil method which, because of the larger expense and danger of introducing weeds and plant diseases and the probability of getting soil not thoroughly inoculated with the proper bacteria, is being replaced by the pure culture method.

A strain of bacteria can be grown in the Laboratory that is stronger than those naturally in the soil. The bacteria are taken from the nodules and in various ways are isolated and grown on different media or materials. Bacteria multiply rapidly as they reproduce by dividing into two. With pure cultures the seed is very easily inoculated.

Where a new legume is to be grown, or if the same legume when formerly grown on the field did not show an abundance of nodules, inoculation is necessary. If the soil is once properly inoculated and kept in good condition, further use of inoculating material is not needed, but if conditions have not been favorable for the bacteria to live and reproduce they may have been killed or reduced in virility and should again be introduced. 105 pounds of nitrogen, 12 pounds of phosphorus and 35 pounds of potassium are taken from the soil by a 75 bushel corn crop. To replace these in the form of fertilizers would cost \$2.00 for potassium; \$1.50 for phosphorus and \$20.00 for nitrogen. Probably one-half of this nitrogen would be lost by leaching and even though it were all available the cost would be prohibitive. What is more profitable than inoculating legumes, when all this nitrogen can be replaced at little or no cost?

Besides storing up nitrogen for the use of following crops, inoculation in most cases increases the growth of the inoculated legume, besides, making this legume richer in protein. Even though the yield is not increased the plant is without doubt storing up nitrogen for crops that will follow instead of robbing the soil for its own use.

For the information above we are indebted to bulletins and articles written by the following:

Lewis Knudson, New York State College of Agriculture.
Lewis T. Leonard, U. S. Department of Agriculture.
Cyril G. Hopkins, Illinois Experiment Station.
Robert M. Salter, West Virginia Experiment Station.
Jacob G. Lipman, New Jersey Experiment Station.

We have enough confidence in the bacteria which we supply positively to guarantee them to produce nodules. We will gladly replace any that do not prove entirely satisfactory.

In ordering please specify the kind of legume. The following groups are each inoculated by a different strain of bacteria.

Alfalfa and Sweet Clover.
Soy Beans.
Cow Peas.
Field Beans.
Peas and Vetches.

FIELD SEEDS LESS WEEDS

The true clovers—Red, Mammoth, Alsike, Crimson, and White Dutch. Please read the following quotations from well known authorities.

"As the value of the legume plant in farming depends to a great extent on its nitrogen content, it is necessary in the absence of nitrogen-fixing bacteria from the roots to have the element nitrogen in an available form supplied by some means. This can be accomplished by the addition of a soluble nitrogen salt such as sodium nitrate. It is easily seen that under natural conditions much of this salt would be carried away in drainage water. Undoubtedly legume plants can be grown successfully in the absence of legume bacteria and vice versa, but with such a wise provision for the natural secretion of atmospheric nitrogen through bacteria and plants in mutual relationship, it is the only practical and economical scheme to follow. The use of legume bacteria, as they are commonly called, needs no defense in the light of the experimental and practical demonstrations of their value. It is a necessity . . . Intensity of inoculation and ease of application are the main points in favor of pure cultures."—*Lewis T. Leonard, U. S. Department of Agriculture.*

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"A live stock system of farming makes possible the recovery of some two-thirds of the nitrogen in the crops grown, providing these crops are fed and the manure carefully handled. This in itself, however, can only serve in postponing the day of ultimate soil exhaustion. Neither does the fact that the air above each acre of soil contains over 50,000,000 pounds of nitrogen, furnish the solution, it having been finally settled by the English investigators, Lawes and Gilbert, nearly 50 years ago that plants are not able to directly use this form of the element. It suggests, on the other hand, that an economical means of transforming free nitrogen into a form available to plants, is all that is needed to a solution of the problem."—*Robert M. Salter, University of West Virginia.*

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"Something over a century ago, Sir William Crooks, President of the British Association for the Advancement of Science, made the startling prediction that the world must cease growing wheat before the end of another 50 years because of the exhaustion of the supply of nitrate of soda in the South American deposits. Coming from a man of his standing the statement was considered authoritative. This was previous to the development of the science of bacteriology in its relation to soils. It was not until almost the close of the last century that Hellriegel and Wilfarth definitely proved that the nodules on the roots of legumes were the homes of a great number of organisms which were able to secure nitrogen from the inexhaustible supply of the air."—*Firman E. Bear, Department of Soils, Ohio State University.*

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"Nitrogen is one of the essential elements. There can be no life without it. It makes up nearly four-fifths of the gaseous envelope surrounding the earth, there being about thirty-five thousand tons of it over every acre of ground. Like the air above the ground, the soil atmosphere contains almost four-fifths nitrogen. This nitrogen, however, cannot ordinarily

serve as food for plants. It must be combined with other elements in order to do so.

"The source of nitrogen in the soil. The crops growing on the land must depend for their supply of nitrogen on the humus, for this contains practically all of the combined nitrogen in the soil. There is but one exception to this,—the plants of the legume family. These possess the power of utilizing free nitrogen for their growth. But even they are deprived of this power in the absence of certain bacteria."—*Jacob G. Lipman, New Jersey Experiment Station.*

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"Many of the older farmers of Illinois have stated to the writer that when this country was very new it was commonly found difficult to get a "catch" of clover on new land. After a good "catch" was once gotten, then it was easier to get clover to grow on that land the next time. There was a saying among the farmers that clover would not do well until they got the "wild nature" out of the land. Their final success was undoubtedly due, not to getting anything out of the land, but rather to getting the bacteria into the land. . . . While the failure of clover may often be due to drought, and in some places due to soil acidity (lack of lime), and sometimes even due to an insufficient supply of available phosphorus or of potassium, we now know with certainty that it sometimes fails because of the absence of the nitrogen-gathering bacteria, especially on land which has never grown clover, and probably also on land which has not grown it recently. We should always remember that the bacteria do not thrive in strongly acid soils."—*Cyril G. Hopkins, University of Illinois.*

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"Since the study of the nitrogen-accumulating power of legumes bearing root nodules deals with a definite and comparatively simple relation of a single type of organism to a single type of plant, it has been possible to develop these investigations upon a pure-culture basis; in other words, it has been possible to isolate the nitrogen-fixing organism from nodules of leguminous plants and with these cultures produce nodules upon other plants of the same species in different localities. Owing to the fact that different legumes are constantly being introduced into agricultural regions, the importance of being able to disseminate the nodule-forming bacteria is obvious. For many types of legumes this is desirable, not only from the standpoint of making the crop a better nitrogen fixer and better soil renovator, but because for most legumes the crop is actually larger when properly inoculated. . . . There is no doubt that under proper soil conditions inoculated legumes will be higher in total protein and possibly higher in percentage of protein than uninoculated legumes."—*Karl F. Kellerman, U. S. Department of Agriculture.*

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"One of the requirements for a good crop yield is a fertile soil. The fertility of the soil is dependent in large part on the presence in the soil of a sufficient supply of directly available nutrients. From the practical standpoint the farmer is concerned largely with the nutrient elements, potassium, phosphorus and nitrogen. These are the three important ingredients in fertilizers. It is not possible to increase the potassium

or the phosphorus of a soil except by the application of fertilizers, but it is possible to conserve or increase the nitrogen of the soil by growing legumes under certain conditions."—*Lewis Knudson, New York State College of Agriculture.*

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"The growing of legumes is absolutely essential as a part of any economic system which shall maintain the fertility of the soil; and for the successful growing of legumes the presence and assistance of the proper species of nitrogen-gathering bacteria are also absolutely essential. These facts being granted, it certainly follows that when sowing any legume on land where the same legume has never been grown before, or perhaps where it has not been successfully grown within recent years, we should always consider the matter of inoculation."

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"There is abundant evidence that one of the dominant causes for the failure or unsatisfactory growth of some of our most valuable legumes, and on some soils the sole cause of failure, is the absence of the proper nitrogen-gathering bacteria."—*Cyril G. Hopkins, University of Illinois.*

Legal Weight and Quantity Per Acre

KIND OF SEED	Pounds Sown Per Acre	Weight Per Bu.
Timothy.....	10 to 15	45 lbs.
Alfalfa (broadcast).....	10 to 15	60 lbs.
Alsike.....	5 to 8	60 lbs.
Red Clover.....	10 to 15	60 lbs.
Crimson Clover.....	10 to 14	60 lbs.
Sweet Clover (hulled).....	12 to 15	60 lbs.
Sweet Clover (unhulled).....	15 to 20	30 lbs.
Red Top Fancy (solid seed).....	14 to 20	14 lbs.
Blue Grass.....	30 to 35	14 lbs.
Orchard Grass.....	25 to 30	14 lbs.
Meadow Fescue.....	20 to 24	24 lbs.
Tall Oat Grass.....	20 to 30	14 lbs.
Lawn Grass Seed.....	60 to 80	
Canada Field Peas (with oats).....	90 to 100	60 lbs.
Cow Peas (broadcast).....	90 to 120	60 lbs.
Cow Peas (drilled).....	50 to 60	60 lbs.
Soy Beans (broadcast).....	60 to 75	60 lbs.
Soy Beans (drilled).....	30 to 40	60 lbs.
Hairy Vetch (with Oats).....	25 to 50	
Dwarf Essex Rape.....	4 to 7	50 lbs.
German Millet.....	40 to 50	50 lbs.
Hungarian Millet.....	40 to 50	50 lbs.
Japanese Millet.....	15 to 20	32 lbs.
Sorghum.....	70 to 90	50 lbs.
Buckwheat.....	60 to 75	50 lbs.
Oats.....	75 to 90	32 lbs.
Barley.....	90 to 110	48 lbs.
Wheat.....	90 to 110	60 lbs.
Field Corn.....	8 to 10	56 lbs.

A Few Points About Ordering

ORDER EARLY. We believe there is no need of urging our friends to order as early as possible this season for by this time everybody is acquainted with the transportation situation. It is sure to take longer to get seed this year than it usually does. More important still, there is never a time when it is not difficult to get pure seeds after the season is well along. It may pay sometimes to order by express. Please notice what we say under Freight or Express.

Order Blank

In sending orders we shall be glad to have you use our order sheet if convenient. It is also a very good plan to keep a copy of the order. When the shipping point is different from your mail address please give the county under each name.

Prepay Stations

If there is no agent at your station we must prepay the freight. If you don't know exactly what the freight will be, send more than enough money and we will return the difference. Thus you will be saved the trouble of extra correspondence and we will not have to send you a bill for the freight.

FIELD SEEDS LESS WEEDS

Freight or Express

We always ship by freight unless otherwise specified. However, one should keep in mind that express companies give low rates on seed, much less than on general merchandise. A small order can sometimes be sent as cheaply by express as by freight. To no place east of Marysville is the express on clover seed more than a dollar per bushel. As an example the average rate to New York and Pennsylvania is 75c; to West Virginia 55c; to Ohio 40c, somewhat according to the distance. Below we give a table of express as well as freight rates. Marysville is located in Union County, Ohio, thirty miles from Columbus on the C. C. C. & St. L. and the T. & O. C. Railways. Beans, peas and grains take the 4th class rate; seeds the 3rd class rate.

Freight and Express Rates from Marysville, O.

	Freight Class		Ex. Per 100 lbs.		Freight Class		Ex. Per 100 lbs.
	3rd	4th			3rd	4th	
Connecticut				New Hampshire			
Hartford.....	53	28	\$ 1.62	Concord.....	53	38	\$ 1.73
Dist. of Columbia				Ohio			
Washington.....	45	31	1.35	Cambridge.....	25	19	.68
Delaware				Celina.....	21	16	.57
Wilmington.....	46	32	1.43	Cincinnati.....	25	19	.68
Indiana				Circleville.....	20	15	.57
Auburn.....	27	21	.75	Cleveland.....	26	20	.68
Evansville.....	37	28	1.13	Fremont.....	23	17	.57
La Fayette.....	32	24	.75	Mansfield.....	21	16	.57
Indianapolis.....	29	22	.87	New Philadelphia...	26	20	.68
South Bend.....	32	24	.87	Pomeroy.....	27	21	.68
Illinois				Portsmouth.....	28	21	.94
Chicago.....	35	26	.94	Toledo.....	24	18	.57
Danville.....	33	25	.87	Youngstown.....	30	23	.87
Springfield.....	38	29	1.13	Zanesville.....	23	17	.75
Kentucky				Pennsylvania			
Hickman.....	42	29	1.39	Clearfield.....	45	31	1.13
Lexington.....	32	22	.87	Meadville.....	37	26	1.28
Perryville.....	25	13	1.13	Philadelphia.....	46	32	1.43
Williamsburg.....	26	14	1.32	Pittsburg.....	32	24	1.28
Maine				Wellsboro.....	45	31	.94
Portland.....	53	38	1.73	Wilkesbarre.....	46	32	1.35
Maryland				Rhode Island			
Baltimore.....	45	31	1.35	Providence.....	53	38	1.69
Massachusetts				Tennessee			
Boston.....	53	38	1.62	Knoxville.....	60	52	1.62
Michigan				Vermont			
Detroit.....	29	22	.75	Montpelier.....	53	38	1.62
Grand Rapids.....	36	27	.87	Virginia			
Jackson.....	29	22	.75	Hampton.....	44	30	1.69
Ludington.....	43	32	1.20	Charlottesville.....	44	30	1.35
New York				Richmond.....	44	30	1.62
Albany.....	46	32	1.43	Roanoke.....	44	30	1.39
Buffalo.....	36	27	1.13	West Virginia			
Canton.....	53	38	1.43	Charleston.....	31	24	1.05
Delhi.....	55	39	1.35	Clarksburg.....	30	20	.94
Elmira.....	39	27	1.20	Harrisville.....	31	22	.75
New York.....	48	34	1.50	Huntington.....	28	21	.94
Rochester.....	36	25	1.20	Morgantown.....	40	28	1.05
Syracuse.....	39	27	1.28	Wheeling.....	32	24	.75

Parcel Post

SEED may be sent by parcel post according to the following table. In the first and second zone the weight limit is 50 pounds; in the others the weight limit is 20 pounds.

Zone	Zone Rates	1st lb. or Fraction	Additional lb. or Fraction
1st within 50 miles of Marysville.....		5c.	1c.
2nd within 50 to 150 miles of Marysville.....		5c.	1c.
3rd within 150 to 300 miles of Marysville.....		6c.	2c.
4th within 300 to 600 miles of Marysville.....		7c.	4c.
5th within 600 to 1,000 miles of Marysville.....		8c.	6c.
6th within 1,000 to 1,400 miles of Marysville.....		9c.	8c.
7th within 1,400 to 1,800 miles of Marysville.....		11c.	10c.
8th within 1,800 and over miles of Marysville.....		12c.	12c.

Change of Prices

FIELD SEEDS are sold on the basis of market quotations so it is impossible to guarantee prices. Sometimes the market may make a decided change in just a few days. If prices should be lower when you are ready to buy we would hate to lose your order because our prices were higher than a later quotation from some one else. Should they be higher we would have to charge accordingly, so please drop us a line for latest price-list, providing you are not ready to place an order soon after our samples arrive. But remember, if in a hurry send along the order and we will guarantee to satisfy you.

Small Lots. It is necessary to make an extra charge for very small lots but we appreciate receiving these orders just as much as the large ones.

Up to Sample. We guarantee our seed always to be fully equal to sample but from time to time lots necessarily change.

Loss In Shipping. We guarantee shipments to arrive in good shape. If the bags are torn and some of the seed lost, just ask your agent to make a notation on the freight receipt showing the amount of shortage, send this receipt to us and we will send our check for the amount lost and make claim from this end of the line.

Bags Extra. It pays to ship only in the best bags. We sell them at cost so please do not be afraid to order plenty for you may return them and get your money back or send your own bags if you prefer. It is next to impossible to get three bushels in one bag. It would be much better if no bags contained more than two bushels for they are more easily handled by the railroad employes and much less likely to be carelessly handled and torn.

Terms. All our prices are quoted F. O. B. Marysville. We have to ask cash in advance otherwise we couldn't hope to continue this business at a profit, but if you haven't our price-list and are in a hurry for seed send along your order and we will ship by freight, draft attached, or by express C. O. D. We absolutely guarantee the seed and prices to be satisfactory.

APR 20 1918

