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RALPH D. HETZEL, Director

(Part 1.)

CORN IN OREGON

by

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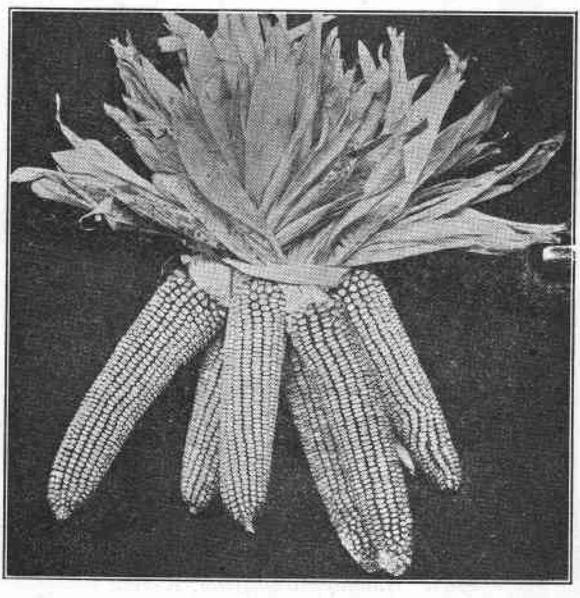

March 1914.

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OREGON AGRICULTURAL COLLEGE AND EXPERIMENT STATION

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INTRODUCTION.

Oregon is awakening to the value of its corn growing possibilities. The farmers are finding that this crop, when its requirements and best use under Oregon conditions are understood and provided for, is decidedly successful. Although the acreage and production are very small at the present time, (estimated 1913—21,000 acres; 598,000 bu.; value, $419,000; yield, 28 bu. per a.; price December 1, 70 cents), the skeptics who believed it impossible to grow corn in Oregon are rapidly being converted by the successful demonstrations that may be found now in nearly every locality in the state. The increased interest in diversified farming, dairying, and hog raising will undoubtedly make the corn acreage develop very rapidly in the next decade.

In a survey of the corn growing possibilities of Oregon, made by the writer in 1908, it was the consensus of opinion of the most representative and successful farmers, that corn could not be profitably grown under Oregon conditions—that it had been tried and found to be a failure. In nearly every case, however, the writer observed that the seed tried had (naturally enough) been secured from the corn belt states such as Illinois, Iowa, etc. In a very few instances farmers were discovered who were growing a fairly promising crop in the more favored localities. The failures and trials of these pioneers with the crop, really seemed to point out quite clearly the right way to final success.

How Successful Varieties Were Finally Produced. Six years ago the Oregon Experiment Station secured seed of the best varieties from every corn growing section of the United States, especial efforts being made to secure the hardier, early maturing strains developed in the northernmost states. A careful test of these varieties in comparison with the most successful local varieties obtainable, gave immediately some very interesting results. Two varieties—a yellow dent (the Minnesota No. 13) and a white dent (the Minnesota No. 23), both of which were developed for Minnesota conditions by the plant breeders of the Minnesota Experiment Station,—proved superior to all others, the first as a soiling and silage variety and the second as a grain maturing strain.

With these two varieties as foundation stock, the development of strains to meet Oregon conditions was started on the Experiment Station breeding plots and has been continued ever since without interruption. Year after year the selected strains were tested again and again against local varieties and the best varieties brought in from other states, and always the College strains have proved superior. In the past three years, seed from the College selections has been tested through co-operative trial with farmers in every section of the state and has been almost universally successful. Yields as high as 100 bushels of grain and 20 tons of silage have been obtained from this College seed—harvest that would be highly creditable even in Illinois or Iowa. Such results as these have aroused among the farmers in all parts of the state great interest in the possibilities of growing this valuable plant as a regular crop in the diversified rotation. It is not too much to say that Oregon has finally put itself upon the map as a corn growing state.

THE VALUE OF CORN.

There is no other crop which will produce as large an amount of feed to the acre for livestock as will a good crop of corn. As feed, corn is rich in nutrients, highly digestible, and very palatable for practically all kinds of livestock.

In Oregon its greatest use will be as a fall green feed and as both winter and summer silage, for dairy cows; as a fattening pasture for hogs; and eventually perhaps as silage for beef cattle.

Aside from its great importance for livestock feeding, corn has a distinct value in the rotation, because of its being a cultivated crop, which aids in destroying weeds and improving the tilth of the soil, putting the land in better shape for the following crop. Corn also has a certain special value in that it is one of the best of all the field crops for utilizing applications of yard manures to exceptional advantage.

When the special requirements of the crop under Oregon conditions are more fully understood, the Oregon farmer unquestionably will grow it extensively as a feed crop.

THE CORN CROP AT LARGE.

Authorities agree that corn originated on the plateau lands of Southern Mexico, and that its culture became general in the Americas as early as 1000 A. D. When Columbus discovered America he discovered America's biggest crop, which has since become, so far as

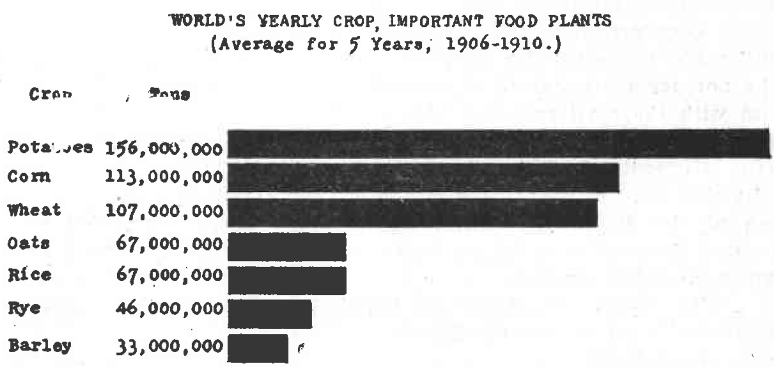


Fig. 2.

feeding value is concerned, the world's biggest crop. The world's yearly crop of corn, based on the five-year average annual production from 1906 to 1910, according to Montgomery, was 113,000,000 tons, or over 4,000,000,000 bushels. Of this annual harvest, the United States produces 73 per cent.

Within the United States itself, the corn crop is more valuable than any other two crops grown. Of this great crop, 63 per cent is produced in the eight Middle Western states (Illinois, Ohio, Missouri, Nebraska, Indiana, Kansas, Texas, and Iowa), commonly known as the "Corn Belt." The relative importance of the corn crop in the United

States and the world as compared with other crops is shown (according to Montgomery) in the following chart.

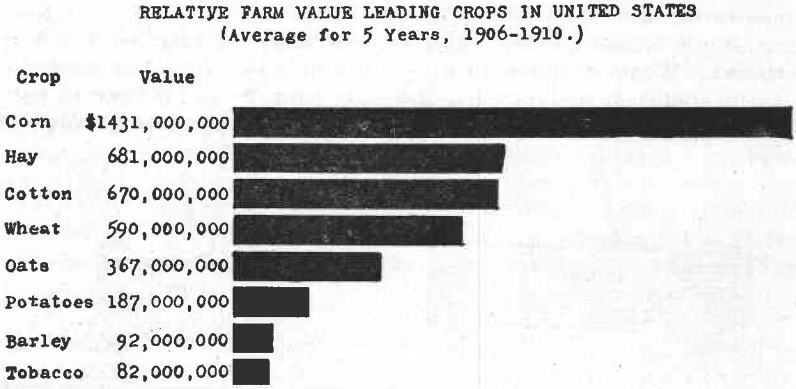


Fig. 3.

It has been estimated by one writer that Uncle Sam's yearly "billion dollar crop," if loaded into wagons holding 50 bushels each and standing in line end to end, would encircle the globe at the equator nine times.

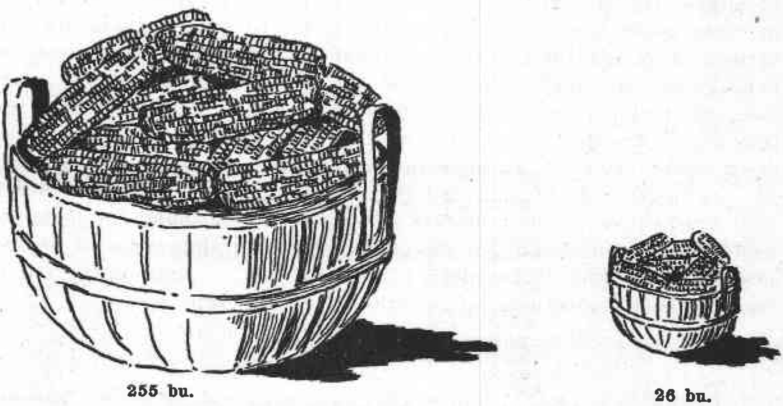


Fig. 4. Highest yield and average yield per acre.

The highest recorded yield of corn per acre is 255 bushels—on the ear, field weight. The average yield for the United States is 26 bushels per acre.

WHAT CORN REQUIRES.

The chief requirement of corn is a warm growing season and a moderately long one. Corn thrives in hot weather, both hot days and hot nights, provided the moisture and fertility requirements are met. The normal growing season for corn is, roughly, from the last heavy frost of spring to the first heavy frost of autumn, and ranges from 80 to 200 days. The average growing season desirable for corn is about 150 days. Corn likes plenty of sunny weather, freedom from dry hot winds, and good midsummer rains or else properly conserved soil moisture.

Corn is not a heavy moisture consumer,—in fact, is drouth resistant. Wheat requires about 40 tons of water for every bushel of grain produced, but corn requires only from 15 to 20 tons of water for every bushel of grain produced, to supply the transpiration requirements of the plant. A 50-bushel yield of corn at this rate would require from 7 to 10 acre inches of water or rainfall stored in the soil to supply the transpiration moisture. The most critical part of the growing season, as far as the plant's moisture requirements are concerned, is during June, July and August. In the corn belt states, the average rainfall during these three months is about 12 inches. Corn does not respond very well to irrigation, especially where the irrigation waters are cold, although it gives better response to such applications where the crop is grown for silage than where grown for grain.

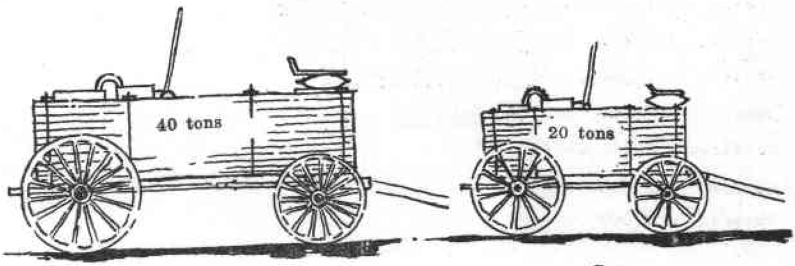


Fig. 5. Water required to produce 1 bu. of wheat and that for 1 bu. of corn.

As in the case of many other crops, corn must have a thoroughly well drained soil, and it prefers a mellow, fertile loam. A most important soil requirement for the corn plant is an abundance of organic matter, and if this is supplied, either the sandy loams or the silt or clay loams will give excellent results with this crop.

CORN IN OREGON.

It has been fully demonstrated that corn can be grown successfully in Oregon, but there can be no question of the fact that the climatic conditions are not favorable for the crop, and statements that corn will ultimately become the most important Oregon field crop are erroneous and not well founded on a knowledge of the requirements of the crop. In the writer's judgment, corn will never become a commercial crop in Oregon; that is, it will never be raised for the harvesting and shipping of the grain as it is in the Central states. That the Oregon corn crop will greatly increase in importance and prove of very large value to the Oregon farmer for feeding purposes, particularly for dairy cattle and hogs, the writer believes most strongly. But its rapid development and greatest value will not be secured in this state until the farmer realizes that the crop cannot be grown, and handled and used, in the same way as it is in the corn belt.

Climate. The important limiting factor affecting corn growing in Oregon is the cool day temperatures and the cool nights of the growing season common to most parts of the state. In the Willamette

Fig. 6. An Oregon corn field. "You can't grow corn in Oregon."

Valley, this condition is very marked, considering the low altitude, and is the chief cause for the fact that corn does not mature well, and therefore cannot be harvested and handled in the ordinary way, notwithstanding the fact that the growing season in the Willamette Valley is very long—about 225 days. The low night temperatures offset the long growing season as far as corn is concerned. In the Coast division, where the growing season is even longer (about 250 days), the same condition holds true. In the Southern Oregon division are found the most favorable climatic conditions in the state for corn growing. Although the growing season averages only about 188 days, both the day and night temperatures are higher during that period, and thus corn grows more rapidly and ripens more surely in that region. Even in the Columbia Basin, where the growing season averages about 160 days, corn does better than in the Willamette Valley, owing to the warmer night temperatures. Corn thrives particularly in that division in such favored spots as regards temperature as the vicinity of The Dalles, Hermiston, and close along the Columbia River. In the Blue Mountain region, where the average elevation increases to about 2000 feet and the growing season shortens to 120 days, corn growing is seriously handicapped and as yet not established, except in a few favored spots such as Eagle Valley. The Central Oregon division, with an average of 4000 feet elevation, has a growing season reduced to an average of about 90 days, and corn growing above an elevation of 3500 feet has not proved successful as yet. Below this elevation, in northern Crook County and portions of Malheur County along the Snake River, corn may be successfully grown. In Southern Klamath and Lake counties the crop is still in the experimental stage, but worth trying.

In addition to unfavorably low temperatures of the growing season, maximum production of corn is hindered by a poor distribution of the rainfall. Throughout Oregon, during the summer months, when corn makes its heaviest growth and demands the most moisture, the rainfall is very low. In the Willamette Valley and along the Coast, in Southern Oregon, in portions of the Columbia Basin, and the Blue Mountain region, the **total annual precipitation** is sufficient to produce a good corn crop. The lack of **summer rainfall** in these regions must therefore be offset by the storage of the winter precipitation in the soil reservoir, so that moisture conserving tillage methods are of the greatest importance to the Oregon corn crop on this account. On dry farming lands throughout the Eastern Oregon divisions, the total annual precipitation is too light for maximum production, and to produce a profitable crop requires not only the use of moisture conserving tillage methods but other special practices in growing the crop.

The sunny weather of the growing season, universal to Oregon, and the freedom from dry hot winds, are conditions favoring corn. High winds in a few localities, such as in the Columbia Basin (along the river), or at points along the coast, seriously affect the corn crop, and in those localities land not exposed to such winds should be selected for corn growing.

Soils. From the physical standpoint, corn must have a well drained, well aerated soil, sufficiently loamy and mellow, with abundance of organic matter, to warm up quickly in the spring and permit rapid growth throughout the season. In Western Oregon, particularly, corn should not be planted on poorly drained, wet, heavy, cold soils, for in combination with the cold nights of this part of the state, this

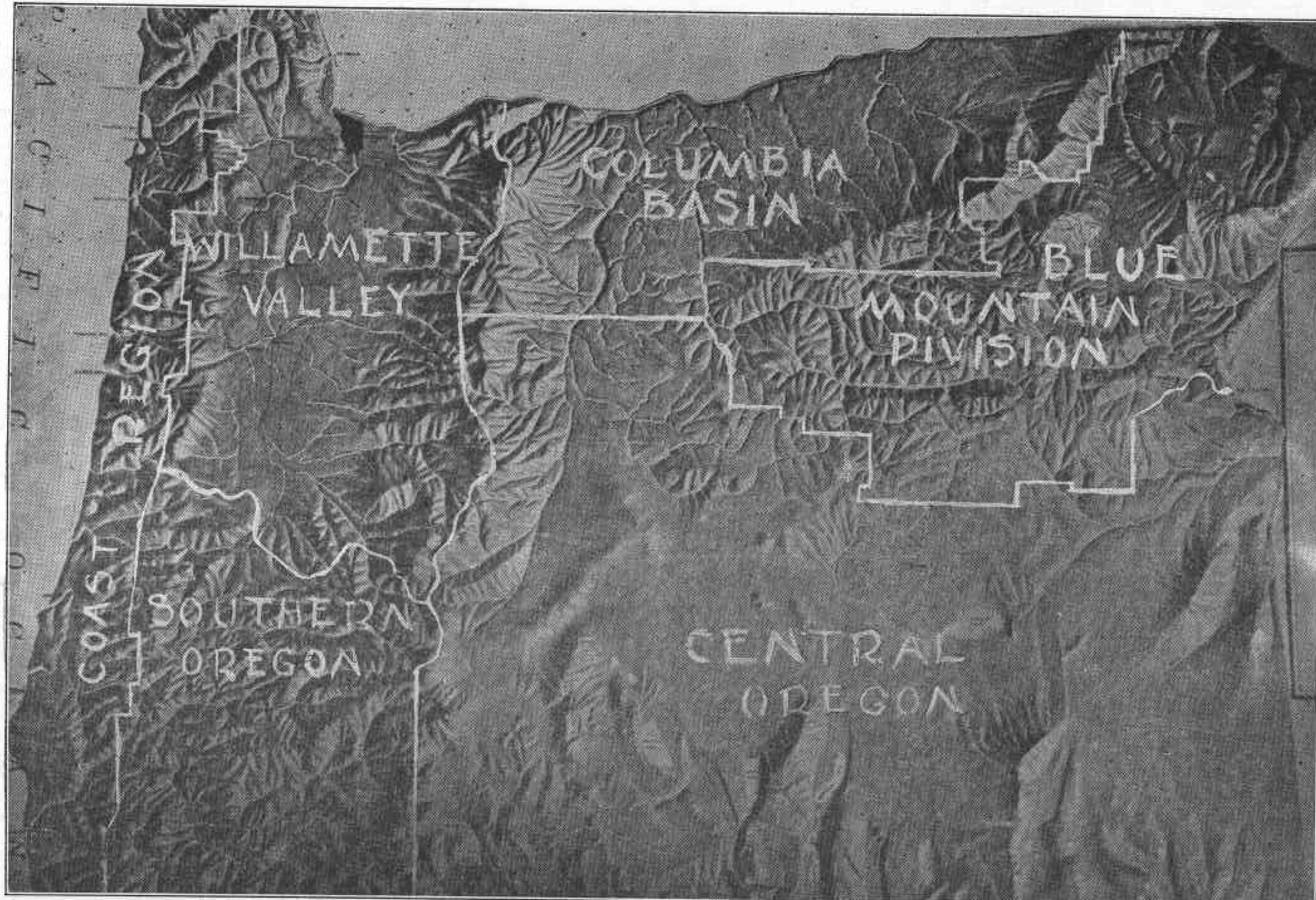


Fig. 7. Rough relief map of Oregon, showing natural geographical and agricultural divisions, boundaries of which follow county lines. (From Portland Branch Weather Bureau model.)

condition will prevent a successful crop. The lighter, warmer soils are the better type in every part of the state, since they offset to a certain extent the low temperatures of the growing season. In the **Willamette Valley** the sandy river loams well manured, or the well drained silt loams of the valley floor, if deeply plowed, thoroughly cultivated, and amply manured, afford excellent soil conditions for corn. The "beaverdam" of the Valley, if well drained, will produce excellent silage crops, while the red hill soils, if deeply plowed and manured and kept thoroughly cultivated to conserve moisture, will give very good results. The sticky soils or "adobe," while very difficult to handle, as a rule produce excellent crops of corn.

Under these favorable soil conditions, a properly grown crop in the Willamette Valley should produce corn at the rate of 40 to 100 bushels per acre (although of course this would not necessarily be fully ripened and well matured corn), or from 10 to 20 tons per acre of first class silage.

In the **Southern Oregon** division, in addition to the warmer growing season, are found almost universally the lighter types of sandy loams, which, if kept well supplied with organic matter, and in some cases with phosphorus in the form of commercial applications, will produce yields of from 50 to 100 bushels per acre of matured corn, and excellent yields of silage.

In the **Coast** division, the sandy loams along the rivers, or the marsh land mucks, or the red hill loams, where they are sheltered from the wind, are all soils that favor corn production. Added to this, there is the long growing season and abundant summer rains, the result being that very heavy yields of soiling and silage corn can be grown,—from 15 to 25 tons per acre,—but the maturing of grain is practically impossible. On this account, late-maturing fodder-producing varieties should be avoided. Locations protected from the winds are also advantageous.

In the **Columbia Basin** the two chief soil types, the sandy loams and the silt loams, are both very favorable for corn production. The coarse sandy types can not be used successfully, however, except when very heavily manured, or increased in organic matter in other ways. Corn matures nicely throughout this section, and 50 bushels per acre of ripened grain may be obtained on the irrigated lands, or 15 to 25 bushels may be secured on the dry farming lands,—according to the rainfall—which ranges from 10 to 25 inches.

In the **Blue Mountain** and **Central Oregon** regions, both the sandy loams and the black silt loams are well adapted to corn production, but in these divisions the climatic conditions are the limiting factors. Indeed, in the Wallowa, Grande Ronde, and Baker Valleys, in the Harney and Klamath countries, the crop has not yet been successfully established, although trials of the hardier varieties give promise of success up to elevations of 3500 feet. It will not be possible to mature corn well in any part of these regions but excellent yields of green feed and silage have been obtained.

FERTILITY REQUIREMENTS.

The special plant food requirement for corn is an excess of nitrogen. In soils very rich in nitrogen, such as new marsh soils or rich black bottom lands or clover or alfalfa sods heavily manured, where wheat or other cereals would make so excessive a growth of straw as to prevent a satisfactory yield of grain, corn finds just the conditions it thrives upon. The corn crop is what we may call a "gross feeder"; that is, it wants an amplitude of coarse organic matter, such as barnyard manure, to give its maximum return. Abundance of organic matter has a marked effect upon corn for several reasons. It produces the physical conditions desired—a quick warming, well aerated, mellow seed bed that absorbs and retains moisture and is easily cultivated. On the other hand, it has a very marked effect in making available the mineral plant food elements of the soil, which corn requires, and, perhaps even more important, stimulates those bacterial activities which bring about nitrification, thus causing the manufacture of large amounts of the soluble nitrates which become available in midsummer just at the time when the corn is making its maximum growth, when other cereals have practically matured. Then, too, organic matter such as barnyard manure contains in itself large amounts of the important plant foods required by the crop in a readily available form. A 50-bushel crop of corn takes from the soil 74 pounds of nitrogen, 26 pounds of phosphoric acid, and 42 pounds of potash.

The Great Value of Good Rotations. As in the case of potatoes, the surest way of obtaining maximum yields, is through a well planned rotation with legumes and the use of manure, such as will maintain and increase the organic matter. In the Willamette Valley and along the coast, the clover and vetch crops; in Southern Oregon, the alfalfa or clover or vetch; on Eastern Oregon irrigated lands, the alfalfa or clover; and on the dry lands, the alfalfa or peas, are the legumes which should be included in the rotation and immediately precede the corn crop. Corn thrives following a sod crop of clover or alfalfa, and it is generally advisable to add a good dressing of barnyard manure just before plowing under such a sod. Where a rotation is not used, heavy applications of barnyard manure or the plowing under of green manures such as early fall-sown rye and vetch is even more important. Dressings of from 8 to 12 loads of manure per acre are not too much. Such applications, of course, should be thoroughly disked in before being plowed under.

The effect of a good rotation in maintaining the yield of corn is nowhere better shown than by two long-continued experiments at the Illinois Experiment Station.

CORN YIELDS AFTER 29 YEARS OF CROPPING.

Illinois Experiment Station.

1. Effect of Rotation on Yield.*

Crop Years	Crop System	13-Year Experi- ments.	29-Year Experi- ments.
		Bushels.	Bushels.
Average of 1905-6-7	Corn every year	35	27
Average of 1903-5-7	Corn and oats	62	46
Average of 1901-4-7	Corn, oats, clover	66	58

*The original yield of these fields was more than 70 bushels per acre.

An excellent rotation for corn in Oregon, either on the dairy or hog farm, is similar to that used at Illinois—(1) Corn (manured); (2) Oats or barley (seeded to clover); (3) Clover; (4) Clover.

Value of Commercial Fertilizers. But a rotation alone will not maintain fertility where the crops are removed from the land, so that manure and often a certain amount of commercial fertilizer must be used fully to maintain fertility on good soils, or increase it on poor soils, and the same experiment at Illinois on another series of plots on the same land showed the following results from the application of manure, lime, and phosphorus:

2. Effect of Rotation and Fertilizers.

Crop Years	Special Treatment	Grain Farming Legumes[1]	Livestock Farming Manure[2]
		Bushels.	Bushels.
Average of 1905-6-7	None	69	81
Average of 1905-6-7	Lime	72	85
Average of 1905-6-7	Lime, phosphorus	90	93
Average of 1905-6-7	Lime, phosphorus, potassium	94	96

1Legume catch-crops and crop residues.
2Manure applied in proportion to previous crop yields.

It is interesting to note that fertility and production may be maintained without livestock if a good rotation is used, almost as well as where livestock is kept. When it comes to transportation, however, the finished product, pork or butter fat, pays a much lower tax, and for many other reasons is the most profitable means of marketing the corn crop.

Great Value of Barn Yard Manure. The great value to corn of barn yard manure alone, which is the best of all fertilizers for this crop, is shown by the conclusive results of long continued experiments carried on at the Pennsylvania and Ohio Stations.

COMPLETE COMMERCIAL FERTILIZER COMPARED WITH MANURE.

Pennsylvania and Ohio Experiment Stations.

Station	Rotation	Yield of Corn (Bu. per Acre)			Financial Statement for One Rotation—All Crops				
					Fertilizer			Manure	
		No fertilizer.	Complete Fertilizer.	Farmyard Manure.	Cost per Acre.	Value of Increase.	Net Increase.	Value of Increase.	Value per Ton.
Pennsylvania 25-yr. Average	Corn-Oats-Wheat-Clover. .	42.1	56.90	(12 tons) 57.5	$21.44	$28.08	$6.64	$25.96	$2.16
Ohio 16-yr. Average	Corn-Oats-Wheat-Hay-Hay.	30.4	44.63	(8 tons) 44.03	$19.29	$29.35	$10.06	$30.00	$2.50
Ohio 13-yr. Average	Corn-Wheat-Clover.	33.8	43.74	(8 tons) 54.66	$ 4.88	$10.36	$ 5.48	$21.80	$2.72
Average of three trials		35.4	48.42	51.82	$15.20	$22.60	$ 7.39	$25.92	$2.46

In these experiments, (the cost of the applications and the additional costs of handling the increased yields, having been deducted, of course,) the use of a good rotation combined with ample dressings of manure proved very profitable, much more so than where complete commercial fertilizers were used, the average value of the manure per ton where applied to corn being $2.46. The Oregon farmer cannot hope to get good yields from corn unless the same businesslike methods of management with reference to fertility are used as in the corn belt.

Value of Phosphorus. Next in importance to the need of the corn crop for organic matter and nitrogen is its requirement for phosphorus. On soils that have been long and heavily cropped, or on sandy soils that are naturally rather low in phosphorus, the application of 160 pounds per acre of superphosphate or 200 pounds of steamed bone meal, once every three or four years in the rotation, will likely prove

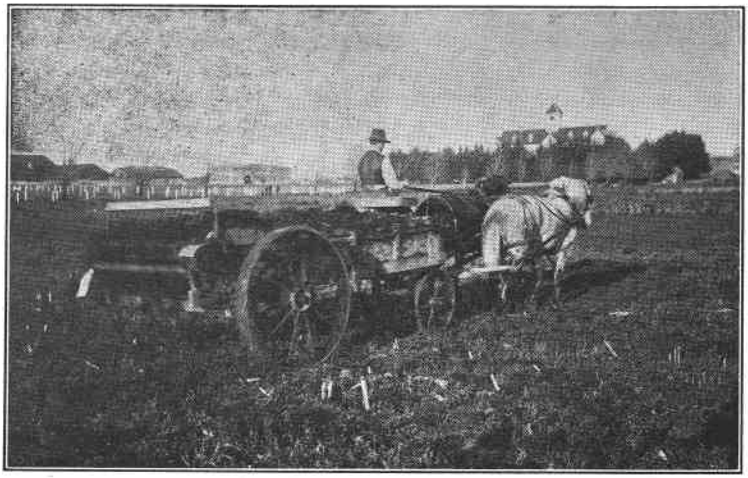


Fig. 8. Getting ready for corn on the College farm.

profitable and decidedly worth trying, if the fertility of the soil is low. It should be fully understood, however, that applications of phosphorus alone are not recommended; that is, such an application should be made only as a supplement to barnyard manures or other sources of organic matter, such as clover or alfalfa residues. An excellent method for the use of phosphorus applications to corn is to add 40 pounds of acid phosphate to every ton of manure applied.

On beaverdam soils, or the very sandy irrigated soils of Eastern Oregon, application of potash in commercial form will prove of value. It might be made in the same way as phosphorus, by adding 40 pounds of kainit to every ton of manure applied, or in the case of the beaverdam giving a straight application of 300 or 400 pounds of kainit per acre every third or fourth year, when the crop comes around in the rotation.

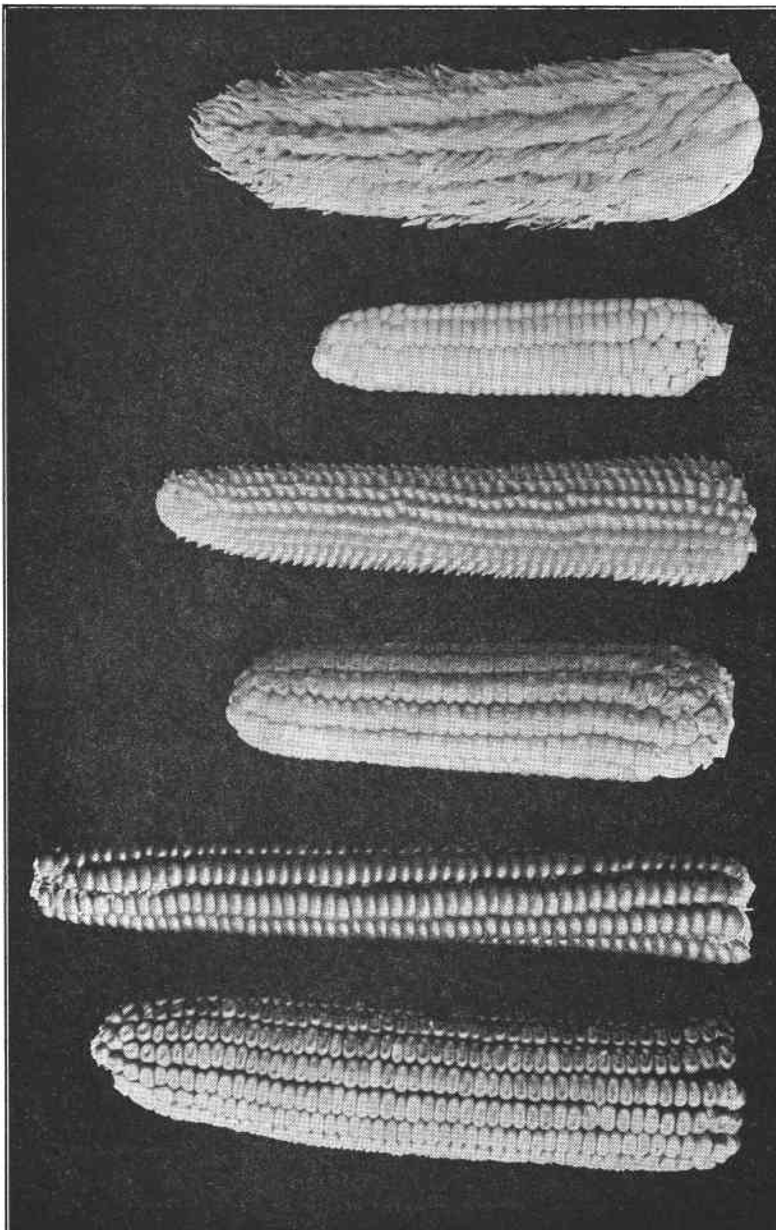
Value of Lime. On the soils of the Willamette Valley and coast divisions, which are almost universally lacking in lime and therefore sour, the application of this soil amendment will prove of value to the corn crop directly, and indirectly through the effect upon the preceding leguminous crop. The effect of lime in correcting acidity, in making the potassium and phosphorus of the soil more readily available, in increasing bacterial activities, and in increasing the friability of the heavier soils—all of these are beneficial to the corn crop, while for the preceding legume, upon which the corn crop is so dependent, the effect upon the nitrogen gathering bacteria is of paramount importance. The application of 2 to 3 tons of the ground limestone every six or eight years in these two divisions of the state will unquestionably prove profitable wherever the ground limestone may be secured and laid down at the farmer's station for an outlay of approximately $2.50 per ton. Lime is seldom required in the Southern Oregon division, and not at all through the Eastern Oregon divisions.

KINDS OF CORN.

As corn growing is not well understood in Oregon, there is sometimes confusion as to the different kinds of corn and which is the better kind for different purposes—pod corn, soft corn, flint corn, dent corn, pop corn, or sweet corn. The farmer need waste no time in experimenting on this point. The **dent corn,** if it can be grown, is unquestionably superior to all others as an all-around feeding crop. It gives the largest yields of digestible nutrients not only as grain but as green feed and silage or forage pasture. **Flint corn** has but one advantage over dent, and that is its greater hardiness. At the highest elevations, where dent corn cannot be grown, the farmer is justified in trying the flint varieties. But the flint does not make so good a grain feed or so high a yield, nor so good a quality of green feed or silage as does the dent corn. **Sweet corn** is slightly hardier and earlier than the dent corn and is very palatable to dairy cows as a green feed, but it does not make so heavy a yield as the dent and makes rather a sour silage. The place of sweet corn in Oregon is unquestionably a very important one, for ultimately very large acreages will be devoted to it profitably for canning purposes, but it is not of importance from the feeding standpoint. **Pop corn,** of course, is a very profitable crop in Oregon provided the market demands are not exceeded, but it is of no importance as a feeding crop. **Soft or flour corn** is not nearly so hardy to cold as the other kinds, nor is it of such high feeding value; hence it need not be considered for Oregon conditions. **Pod corn** is merely a curiosity—a link in the chain of evolution, pointing the way towards the origin of field corn—but of no commercial value.

VARIETIES FOR OREGON.

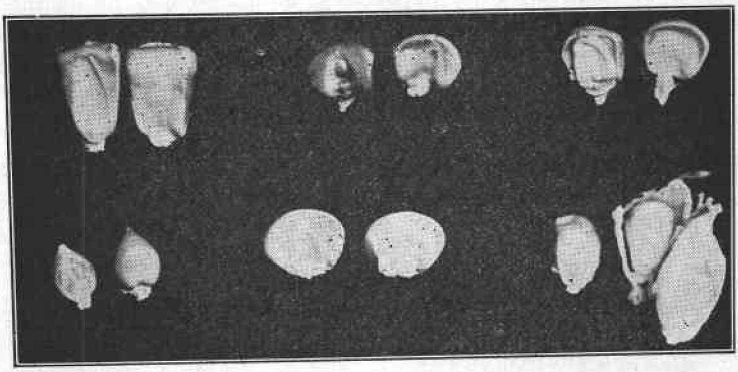
There are estimated to be something like 1000 named varieties of dent corn and the selection of the best varieties for Oregon conditions is of great importance, because Oregon conditions are rather extreme. Years of failure to grow corn successfully on the part of the Oregon farmer were due to the fact that when he looked for his



Dent Corn. Flint Corn. Sweet Corn. Pop Corn. Soft Corn. Pod Corn.

Fig. 9. The different kinds of corn.

seed he generally sent back east for the favorite variety that he knew to be successful back in the corn belt. Such varieties naturally did not succeed in the cool Oregon climate and hence led the farmer to believe that corn was of no value in this state. If the farmer really wishes to do experimenting that is worth while, it should be in trying out northern grown varieties of corn that have been selected and improved especially to fit Oregon conditions. While the Experiment Station is not at all sure that it has yet found the ultimate best variety of dent corn for Oregon conditions, it has been working steadily and progressing rapidly the past six years in the testing and improvement of varieties from which it is believed the ultimate best strains for the state will come. The Experiment Station recommends the following varieties for the different parts of the state, based



Dent **Flint** **Sweet**
Pop **Soft** **Pod**

Fig. 10. **Kernels of the six different kinds of corn.**

on the results of a great many experimental and co-operative trials throughout the region the past five years:

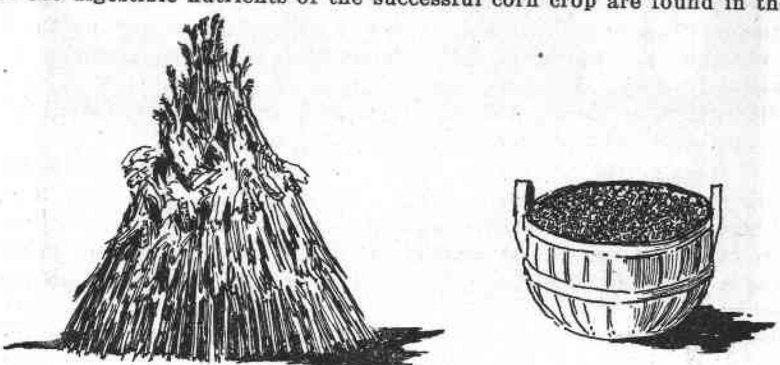
For the **Willamette Valley** and the **Coast** divisions, the College Improved Minnesota No. 13 as a green feed, silage, or "hogging off" crop, and the College Minnesota No. 23 for an earlier maturing crop under the more extreme conditions. A local corn of uncertain history, the Oregon Yellow Dent, is also very good for the Willamette Valley; and another variety which is proving quite successful is the Northwestern dent.

In Southern Oregon the College Minnesota No. 13 is undoubtedly the best variety for all purposes, although the Minnesota No. 23 has proved successful for an earlier maturing grain variety in that division, or at the higher elevations.

In the **Columbia Basin** on the irrigated lands, the College Minnesota No. 13 is recommended as the best silage and forage variety, and one of the best varieties found for the dry farming lands. The Brown County Dent, a Dakota strain, is also good. At the higher elevations or where the rainfall is lower, the College Minnesota No. 23 is good.

In the Blue Mountain and **Central Oregon** regions, the College Minnesota No. 13 can be grown successfully for forage or silage at an elevation up to about 3500 feet, but throughout this region the No. 23 and some of the best varieties of flint corn, such as the Improved King Philip and Smut Nose, should be tried.

Silage and Forage Value Largely in the Ear. The best silage, green feeding, or "hogging off" variety is one that may be rather too late to ripen fully its grain, but which produces a good heavy ear. Oregon farmers are constantly deceived as to the value of a variety because they are inclined to judge value by the height of the stalk and the amount of forage produced. There are many varieties, such as the Pride of the North and some of the fodder producing sorts, that will grow 2 or 3 feet taller than will the College Minnesota No. 13 and will produce a good deal more leaf and stalk and fodder, but this quality is of relatively little importance, or indeed may be distinctly a bad quality, for it should be fully understood that the major share of the digestible nutrients of the successful corn crop are found in the



It takes 170 lbs. stover to equal 100 lbs. grain.
Fig. 11. Of the total digestible nutrients 37% is in the stover and 63% is in the grain.

grain. In the best type of corn plant, the weight of the shelled grain will nearly equal the weight of the stalk, and by far the larger share of the digestible nutrients of the plant is found in the grain. A variety which produces excessive growth of stalk and fodder never makes a good yield of grain. Hence, in selecting the variety for any purpose in Oregon, the farmer should judge it largely by the amount of grain produced. This is of equal importance whether the crop is harvested for grain or silage. One reason for the poor quality of silage sometimes produced by the Oregon farmer is that the importance of having a high proportion of well developed grain before cutting has not been appreciated, and a sour silage of much lower feeding value is the result. Grain producing ability is even more important in the crop grown for "hogging off." A variety producing a sturdy stalk of medium height, with an abundance of broad leaves and a single heavy ear of moderately well matured grain is the variety best adapted to Oregon conditions. A variety that will fully ripen and dry out is not necessary from the standpoint of the best feeding use of the crop.

USE OF THE CROP.

As already suggested, the writer does not believe the Oregon farmer should attempt to grow the crop for the ordinary commercial purpose and the ordinary use that has been made of it by the corn belt farmer. Corn should be grown in Oregon—(1) As a fall green feed for cows; (2) as silage for both summer and winter feeding for dairy cows in Western Oregon, and for winter feeding in Eastern Oregon; and (3) (perhaps most important) as a fattening crop for hogs —not to be husked and pen fed, however, but harvested by the hog itself in the field. As green feed for dairy animals, corn is a heavy producer of a very palatable and nutritious succulent during September and October, when clover and alfalfa and other forage and pasture are gone. As silage, corn finds an unusual place for feeding dairy animals during the summer months after the pasture has dried out and during July and August, when it is rather difficult to get succulent feed of other kinds, such as vetch or clover. Where alfalfa is grown, of course, summer silage is not required. Through the winter, corn silage forms a valuable succulent to be fed in combination with Thousand-Headed kale and roots in Western Oregon, while in Eastern Oregon, where the kale cannot be grown, the dairyman must depend upon silage and rutabagas and mangels for his winter succulent.

"Hogging Off." Throughout Oregon, the writer believes that for hogs the most profitable results may be had from corn where it is "hogged off." In Western Oregon, the corn dries out so poorly before the winter rains start and the winter weather itself is so moist, that it is almost impossible to store husked corn and feed it in the pen to hogs or other stock in the ordinary way, while on the Eastern Oregon dry farming lands the yield is so light as greatly to reduce the profits of the crop if the expense of husking is undertaken. Aside from these facts, however, thousands of successful trials in the corn belt have fully demonstrated the fact that the hog will make as large or larger gains per acre where he is turned into the corn when it is nearly ripe as he will make where it is husked and fed to him in the pen. Hence, the writer recommends this method of using the corn crop above any other, for it not only does away with the additional cost and other difficulties of husked corn, but gives better results with the hog.

Where "hogging off" is to be followed, 2 to 3 pounds of rape per acre should be seeded between the rows of corn at the time of the last cultivation. Rape is a rapid grower and is ready for pasturing in the latter part of September, when the corn is in the silage stage and ready for the hogs. It is a very palatable succulent, much relished by the hog in combination with corn, and, further, its high protein content makes an ideal balance to the high carbohydrates of the corn. In Eastern Oregon the same practice may be followed on irrigated lands, while on the dry farming lands, where moisture is insufficient, rape may be seeded in strips alternating with the corn rather than between the rows.

Fig. 12. Oregon corn—ready for the harvest.

Fig. 13. The harvesters—getting ready for the corn.

Forty-bushel corn will finish from 10 to 12 hogs per acre. Pigs which have been farrowed in the spring and pastured through the summer on clover, vetch,, alfalfa, rape or field peas, may be turned into the corn when the grain gets well dented, and finished there for the market. No cheaper or better method of pork production can be found than this.

Where this forage rotation for hog production is followed, 26-inch woven wire hog fencing temporarily stretched to good end posts and fastened to driven stakes between, is used as portable fence to move the pigs from one section of the rotation to the next., Two men and a team can set up 250 rods a day of such portable fence, which proves entirely satisfactory.

With such a system, of course, plenty of water and salt, and a little supplementary feed of barley, tankage, or the like, as needed, should be used. The writer believes that this plan may well become the Oregon system for pork production.

SELECTING THE SEED.

The best seed is selected in the field when the corn is ripe, when both the ear and the plant may be considered together. Such things as the vigor of the plant and its leafiness; as well as the shape, weight, maturity and quality of the ear, may properly be observed. This early gathering of the seed ears in the field will not only insure the best type of plants but will permit artificial drying of the seed, which will insure against low germination. The Oregon-grown seed, of course, is decidedly the best, as it comes from plants that have been acclimatized and more or less adapted to local conditions. Heavy, solid, well matured ears, cylindrical in shape, with even, well filled rows, uniform kernels square at the shoulder and slighty wedge-shaped toward the tip and not too deep, and with a medium-sized cob, should be selected and then subjected to the individual ear germination test. The beginner, of course, must secure seed either from a successful grower in the neighborhood or from the most reliable seedsman who handles Oregon-grown seed of the varieties recommended and has practiced field selection and artificial drying, and who either ships the seed in the ear or else guarantees the seed to have been ear tested and the butts and tips discarded before the corn was shelled.

Low germination is at present the worst fault of Oregon-grown seed. This is natural enough, owing to the very limited amount of the better varieties that is grown, and, in Western Oregon particularly, the lack of maturity and the moistness of the corn when gathered. Corn that has not been dried out properly is greatly injured in vitality by freezing temperatures and will deteriorate rapidly in storage even if not frozen, unless artificially dried. Varieties having very deep kernels or shallow kernels and large sappy cobs, or those that are late in maturing or gathered late and not artificially dried, are almost sure to be weakened in vitality and must be tested for germination. Since it only takes about 10 ears of corn to supply the seed for an acre of planting, a single ear low in vitality may cause a very great reduction

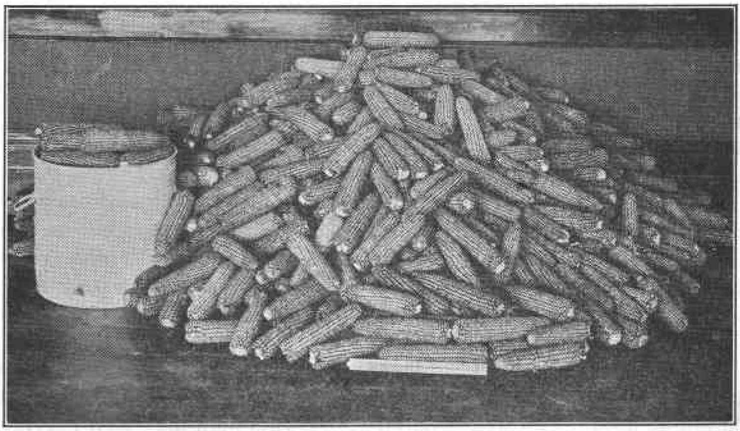


Fig. 14. Buy your seed corn on the ear.

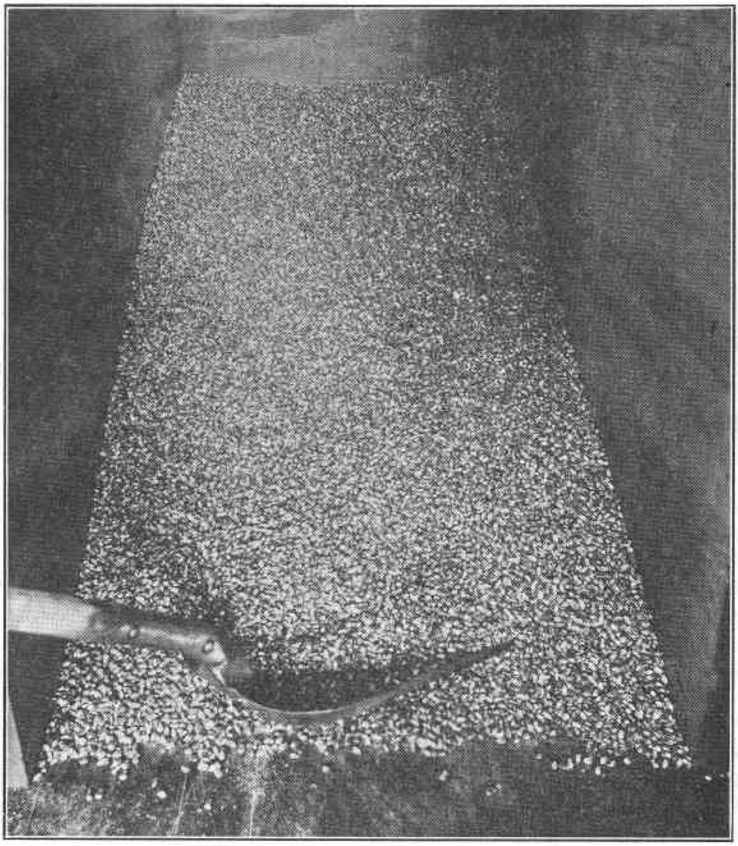


Fig. 15. It is not safe to buy shelled seed from the bin like this unless it has a reliable guarantee.

in the yield. Hence the great importance of a germination test of each individual ear, particularly of the present Oregon-grown seed. Even in those localities of Southern Oregon or the Columbia Basin, where corn ripens and dries out well before frost, it is advisable to make a general test of the seed to determine whether an individual ear test is necessary.

General Germination Test. A general test may be made very easily by selecting 100 seed ears and lifting out 3 kernels from each ear —one from near the butt, one from the middle, and one towards the tip of the ear. These kernels can be put in a plate germinator, and if the germination test is below 90% it is advisable to make an individual ear test in order to discard the ears of low vitality.

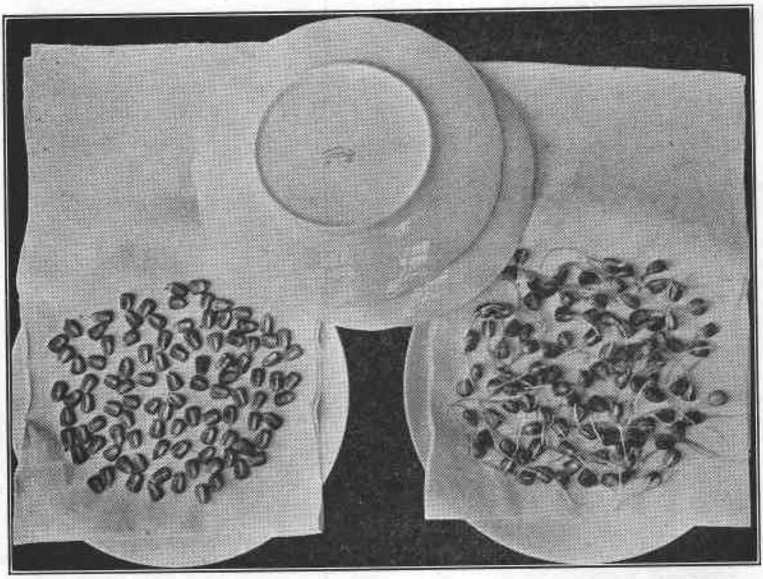


Fig. 16. Plate germinator for a general test.

A plate germinator for the general test consists of a dinner plate or the like with a little sand or sawdust in the bottom, over which a cloth is laid upon which the corn kernels are spread. Over this, another cloth is placed, the whole moistened with water, and then another plate placed over the top, and the germinator set in the kitchen or living room where it may keep moderately warm.

Ear Test. If an ear test is necessary, as is generally the case, a shallow box 20 inches square and 2 or 3 inches deep may be filled with sand or sawdust. The sand is then moistened and on top of it is placed a piece of cloth which has been marked off with pencil into 100 2-inch squares, on each of which is marked a number. The 100 ears of corn to be tested are then laid out on a shelf or rack or on the floor where they may be numbered and left in the same order until the germination test is complete. From each ear 6 kernels should be taken—2 near the butt, 2 towards the center, and 2 towards the tip of the ear, the ear being turned as the kernels are taken off so that no two kernels are taken from the same side of the ear. The kernels may be lifted out with a knife blade, care being taken to force the blade in at the side of the kernel so as not to injure the germ. These kernels should thus make a pretty fair sample of all the kernels on the ear. The 6 kernels are then laid in a square corresponding in number to the number of the ear laid out on the shelf. When all of the ears have been sampled and the kernels placed in their respective squares, another cloth, of slightly larger dimensions than the germina-

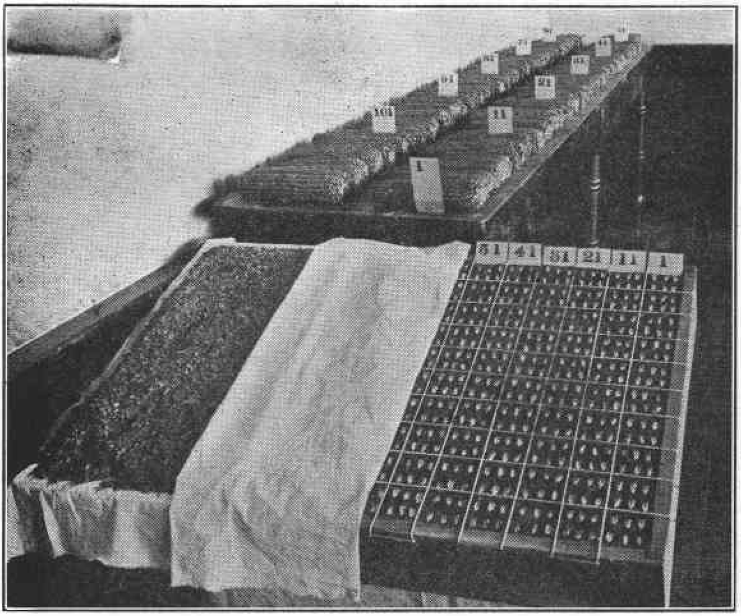
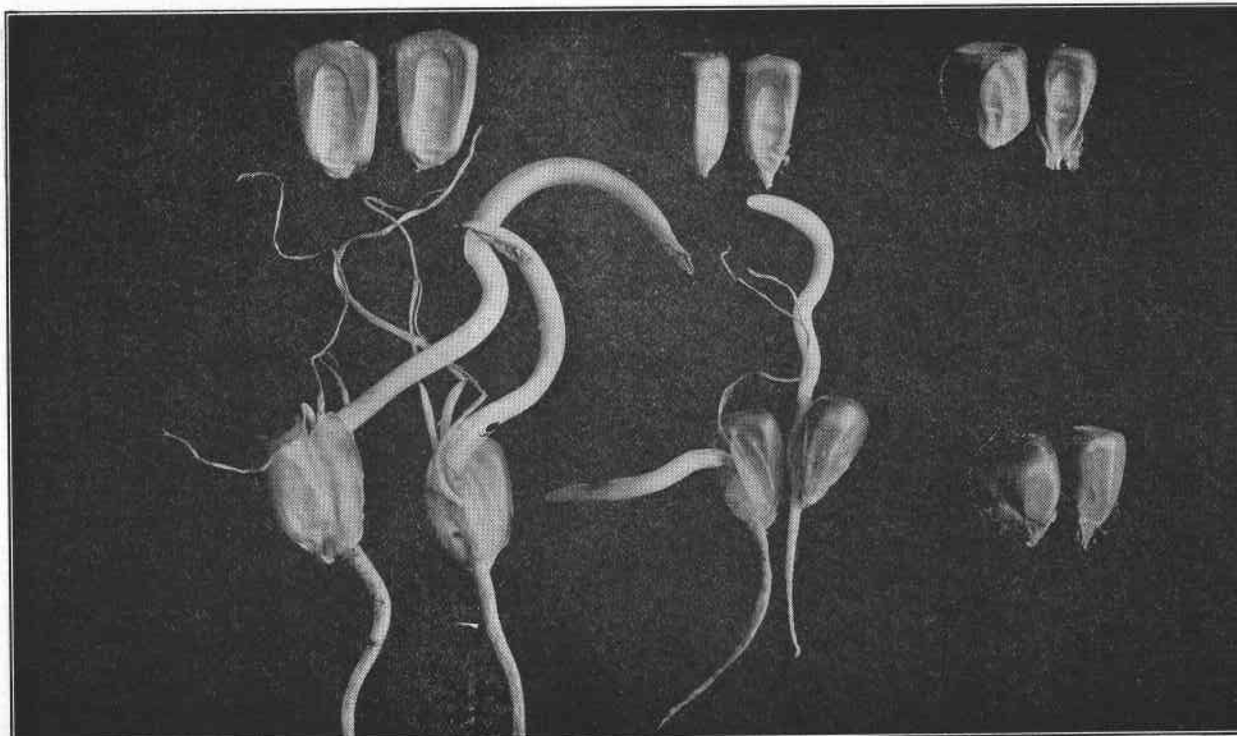


Fig. 17. Farm germinator for ear testing.

tion tray, is laid over the seed, on top of this a thin layer of sand or sawdust is spread, and the whole is then moistened. In place of the lower cloth, if more convenient, notches may be sawed or nails driven along the edges of the box 2 inches apart, and twine stretched from side to side and end to end, thus laying the tray off in 2-inch squares.

Each day the germinator should be watered and it should be kept in a room where the temperature is about 60 or 70 degrees. At the end of 5 or 6 days, the seed will have germinated, and all of those ears from which the seed does not show perfect germination should be discarded. Nor is it just sufficient that the kernels should germinate. Often the kernels from an ear will germinate weakly, showing a lack of vitality. Such an ear should be discarded, for the successful corn plant very seldom develops from a kernel of low vitality. The corn



Strong. Weak. Dead.

Fig. 18. Difference in vitality shown by the germinator.

plant that does not start vigorously rarely catches up, no matter how favorable conditions may be afterwards.

Of course, when all of the ears show poor germination and other corn cannot be obtained, it may be necessary to use the second grade seed, planting it more thickly to make up for the deficiency.

After the germination test is completed and the weak ears discarded, the small kernels at the butts and tips of the good ears should

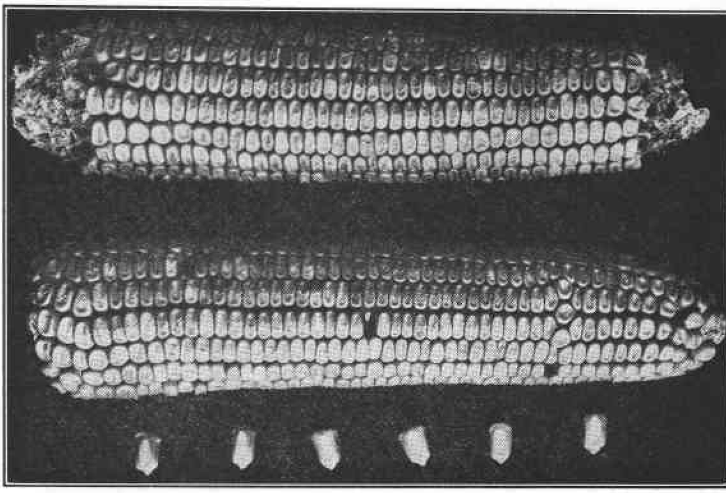


Fig. 19. Tested ear and ear with butt and tip taken off ready for shelling.

be shelled off and discarded; the rest should then be shelled, and if possible graded, when it is ready for the planting.

Just before planting, the planter should be run over the barn floor to test the rate at which the seed is dropped, to show that the desired thickness of seeding will be obtained.

PREPARATION OF SEED BED.

The silt loams or heavier types of soil should be plowed 8 to 10 inches deep in the fall, before the soil gets too wet to handle nicely. On dry farming lands also, the field for corn should be fall-plowed and the plowing left rough over winter. The many advantages of fall plowing need not be discussed here. If the ground is not plowed in the fall it should at least be thoroughly disked. This fall treatment aids in the penetration of the winter precipitation into the subsoil; assists in destroying weeds and insect enemies; chops up and incorporates the stubble or trash on the surface of the ground, causing it to decay; and considerably improves the tilth of the soil. The sandy loams need not be plowed until spring and do not require such deep stirring. Where there is much stubble or trash on the surface of the ground, it is always advisable, if fall plowing has not been done, to disk the land early in the spring prior to plowing. Manuring should be done during the winter or early in the spring, at the rate of 8 to 12 loads per acre, except on dry farming lands, where only very light applications should be made. Manure should always be disked in thoroughly before being plowed under, and this is very necessary also where a winter cover and green manuring crop has been grown to increase the organic matter. Heavy soils that have been plowed in the fall may very profitably be re-plowed in the spring, somewhat shallower. All plowing should be done only when the soil has become dry enough to crumble and pulverize well. Spring plowing should be followed immediately with the harrow to conserve moisture, and thereafter double disking and the use of the float and harrow will complete the preparation of a well pulverized seed bed in which the moisture may easily be conserved, with an occasional harrowing or other cultivation following the spring rains, which destroy the mulch. On dry farming lands, fall plowing, or fall disking and early spring disking and early spring plowing, followed by moisture-conserving tillage until planting time, are of especial importance. Where the corn has been "hogged off," extra thorough disking should be given in the fall if possible or else early in the spring, to offset the effects of the trampling of the surface soil.

PLANTING.

Neither very early nor very late planting gives the best results. In the Willamette Valley and along the coast, the 20th of April to the 10th of May is generally the best period. In no case, however, should the corn be planted until the soil has become warm and mellow and danger of heavy frosts is past. In Southern Oregon and in the Columbia Basin at the lower elevations, corn may be planted from the 10th of April to the 1st of May. In Central Oregon at the higher elevations, from the 15th of May to the 1st of June is the best period.

Throughout the state, surface planting with the one-horse drill or regular planter is preferable to furrowing or listing. In the trials so far made, the lister has not yet proved itself desirable for Oregon conditions. In the heavier, colder, moister soils of Western Oregon, the seed is more likely to rot or the plant be held back where listing is done, while on the dry farming land listing seems to dry out the surface soil too much to be of advantage. On these lands the grain drill may be used for planting corn, by stopping up the grain tube openings through which it is not desired to sow.

On the heavy soils in Western Oregon, the seed should not be planted more than 1 or 1½ inches deep, while on the lighter, dryer soils it should not be covered more than 2 or 3 inches. The depth at which the seed is placed does not have any marked effect upon the depth of the rooting system. Corn may be sown, of course, in drills or hills. On land that is weed infested, it is preferable to sow the corn in checks or hills, so that it may be cultivated in either direction. On clean land, planting in drills gives a little better distribution and larger yields. For planting small acreages, there are several good hand planters on the market.

Land should be marked before planting to get the rows straight and make cultivation easier.

Where the corn is planted in hills, the best distance apart is 42 inches each way, with from 3 to 4 kernels per hill, except on dry farming lands, where 2 to 3 kernels are sufficient. Where corn is planted in drills, the rows should be 42 inches apart, with one plant every 18 inches, except on very rich soil, where one plant every 12 inches in

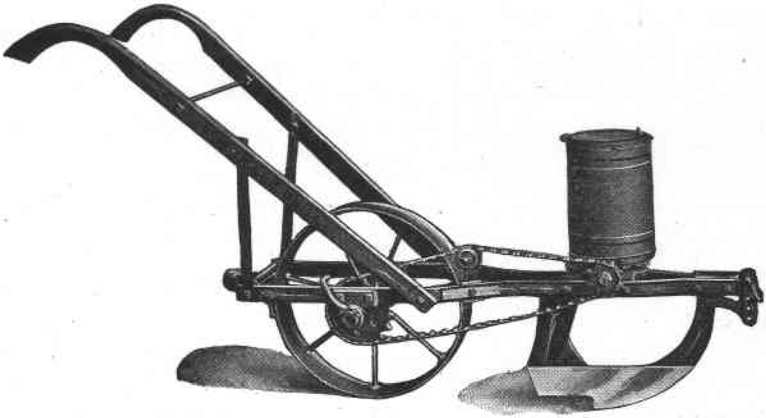


Fig. 20. One horse corn drill—cheap and effective for small acreages.

the row is better. For silage or green feed, the heavier rate of seeding should be used. The amount of seed required varies from 6 to 12 quarts per acre. On dry farming lands, 6 quarts of good seed is sufficient, while 8 quarts is about right for the average Western Oregon land, and 10 quarts for very rich ground or irrigated land. Where the germination or vitality of the seed is low, thicker planting should be used.

(Part II of this bulletin discusses the cultivation, harvesting, storing and marketing of corn—silage making, corn breeding, corn judging and exhibiting.)