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Selecting, Curing, and Testing Seed Corn

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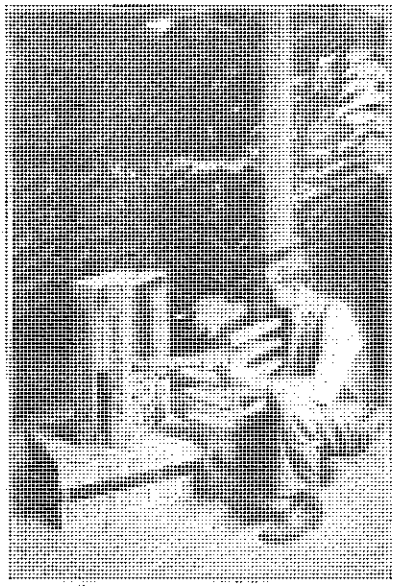
A good yield of corn depends upon a number of factors, three of the most important being—the selection, the curing, and the testing of the seed. Under average farm conditions, the proper amount of care taken in securing the best seed will be more than repaid.



PLANT WISCONSIN SEED

Home grown seed, if properly cured and of a good quality, will yield heavier than seed brought from a distance.

During the past ten years the quality and yield of corn in Wisconsin has greatly increased, due largely to the use of especially bred dent varieties. These new high producing strains are larger eared, deeper kerneled, and supplied with a more abundant foliage than the old varieties. Better care is now needed in the selection and curing of seed corn than was necessary with the early, shallow kerneled and not infrequently scrub varieties. Yet, on some farms, the same methods of selecting and curing seed corn are now practiced as were used years ago, and in many instances no attempt is made to test the seed for germination.

Just to see how good their seed corn really was, 350 practical farmers furnished the Experiment Station with samples of their seed in 1909–1910. This seed was tested and planted by C. P. Norgord who was then in charge of crop demonstrations on the state and county farms. From 211 farms

the seed corn gave an average germination test of 88.3 per cent and a stand in the field of 83 per cent. The poorer seed from 139 farms gave a germination test of but 51 per cent and produced a stand in the field of but 57.6 per cent. Had the seed corn planted by these 139 farmers been properly cured and tested, their yield could have been increased 25 to 30 per cent with but little additional labor or expense.

GATHER THE SEED IN THE FIELD

It is best to go into the field after the husks on the ears have turned yellow and select the well formed ears. These

FACTS FOR FARMERS WHO SAVE SEED CORN

Seed corn before harvesting should be allowed to become well matured on the stalk.

When the earliest matured ears are gathered, earliness is secured at the expense of yield and vitality.

Select only well formed ears from vigorous well-rooted plants.

Seed corn should be selected before the severe frosts or about the middle of September.

Seed corn at maturity contains from 20 to 30 per cent water and the germ is easily injured by freezing when it contains this large amount of moisture.

Twice as many seed ears should be gathered by the farmer as will be needed for planting. About 15 medium sized ears will plant an acre.

Seed corn should be put into the proper place for curing, the same day it is taken from the field.

can be placed in sacks or baskets and then brought to the side of the field. It is well to follow definite rows in securing seed corn, otherwise a large number of good ears are missed, and much of the ground will be gone over several times. A slight frost will not injure corn if it is well matured and it is better to run the risk of a frost than to select the ears too early. The latter part of the growing season seems to improve the vitality of the corn.

Care should be taken in choosing the seed, to secure ears which are attached to the stalk three to four feet above the ground. Those ears, which grow either very high or very low upon the stalk, should be rejected as such position

on stalk is not desirable. For the same reason, experienced growers avoid selecting ears with very short or long shanks, or from deformed stalks. They select only from stalks that are leafy, of medium size, and carrying one good ear that droops moderately.

After the seed ears are husked, they should not be allowed to lay in piles in the field or in the wagon box for several days. The safe way is to hang the corn immediately after picking where it will be cured. At this time ears which are imperfect are to be discarded. Only those ears should be retained for seed which are of medium size, straight of row, and uniform of kernel.

HEAT AND FRESH AIR NECESSARY IN CURING

There should be free circulation of air around the ears while they are drying.

Corn should not be dried in the direct sunlight.

Poorly dried corn will have its germination materially reduced.

Artificial heat or kiln drying quickly expels the excess moisture from the ears and prevents injury by freezing.

Kiln-dried seed corn has the greater vigor and vitality.

Do not over-heat the corn while moist.

Partially dried corn should not be exposed to zero weather.

After drying, corn should be stored in a dry room which is free from rats and mice.

For corn breeding work, especial care should be given to the selection of the best ears from the most desirable stalks. The corn field can be gone over and studied while corn is in the milk and all stalks showing desirable characteristics marked. If these ears and all the other best ears are planted at the southwest side or in the corner of the general field each year, in what might be called a breeding plot, a higher grade of seed can be secured than by general selection. In this way a crossing or interbreeding from the pollen of only the best type ears is secured and the pollen from the average or lower quality of field seed is excluded. The parent corn plant transmits its desirable characteristics to its progeny or succeeding crops as a cow might inherit the milk or butter producing qualities peculiar to the breed.

In the northern states where the seasons are short, a most convenient way of removing the excessive moisture from the corn is by the use of artificial heat. This method of curing is known as "kiln-drying" or "fire-drying" and may be performed in several different ways. By thoroughly kiln-drying seed corn and properly storing it, the corn yield can be materially increased over that which could be secured from seed which is not subjected to the drying process.

During some exceptional years, when the corn fully matures in the fall before cold weather begins, it will withstand freezing and retain its vitality on the stalks or in open cribs. But under average weather conditions the vitality of the seed corn will be materially reduced and germination exceedingly low if the corn is exposed to these conditions.

Germination tests made at this station show that where corn was kept in a dry room or attic or was fire-dried it gave a germination test of from 98 to 100 per cent. Where it was left shocked in the field, in the open crib, or on the stalk throughout the winter the germination and vitality was so low, that the corn was unfit for seed.

PLACES TO CURE SEED CORN

Good	*Poor*
Special corn curing house.	On south side of building.
Kitchen.	On wind mill or fence.
Attic.	Under a porch.
Heated spare room.	In the stable.
Furnace room.	Over bins of grain in granary.
Tool or wagon shed.	Any damp and poorly ventilated place.
Any dry and well ventilated building.	

CURING ENOUGH FOR INDIVIDUAL USE

The farm kitchen or furnace room are probably the best places to cure small amounts of seed corn. By using some of the simple hanging devices, enough seed corn for an ordinary farm can easily be cured. An attic, which can be ventilated, has a chimney passing through it, or is located directly over a heated room so that it can be kept at a fairly

uniform temperature, is a very good place to cure corn. During the warm fall weather the attic is usually heated from the rays of the sun upon the roof and the effect upon the corn is equal to that of fire drying, provided the quantity is limited. If a large quantity of corn is to be cured in the attic, it will be necessary to warm the room with a small stove. There must be a good circulation of air through the room to cure the seed in the best manner.

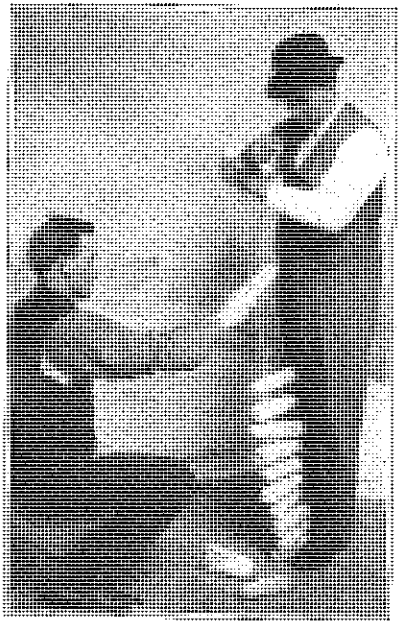


FIG. 2.—EXPENSIVE EQUIPMENT NOT NECESSARY

The double string method hangs the corn in the best possible manner for drying. The person standing holds one loop in each hand and moves them to the left and right while the other places cars in position.

HANDY DEVICES HELP IN CURING SEED

In curing seed corn, there are a number of devices for holding the ears. Any method which holds the corn so there can be a circulation of air around each car is satisfactory. A simple practical method is to use double strands of binder or other heavy twine, lacing the ears securely as shown in the illustration. Two persons can conveniently put up a large quantity of corn in a short time by the use of the double cord. One person holds the cords, while the other places the cars in the position, (Fig. 2). The cord may be suspended from a nail or hook hy the loop.

A device known as the "corn tree" (Fig. 3) provides a convenient method of curing small quantities of seed corn. As the corn tree is portable, it can be placed near a doorway or window where there is a strong current of air to help carry the moisture from the corn. Such a tree, six feet high, will hold enough seed cars to plant 15 acres.

Boards may be fastened together in panels and finishing nails driven on both sides at proper distances so that the

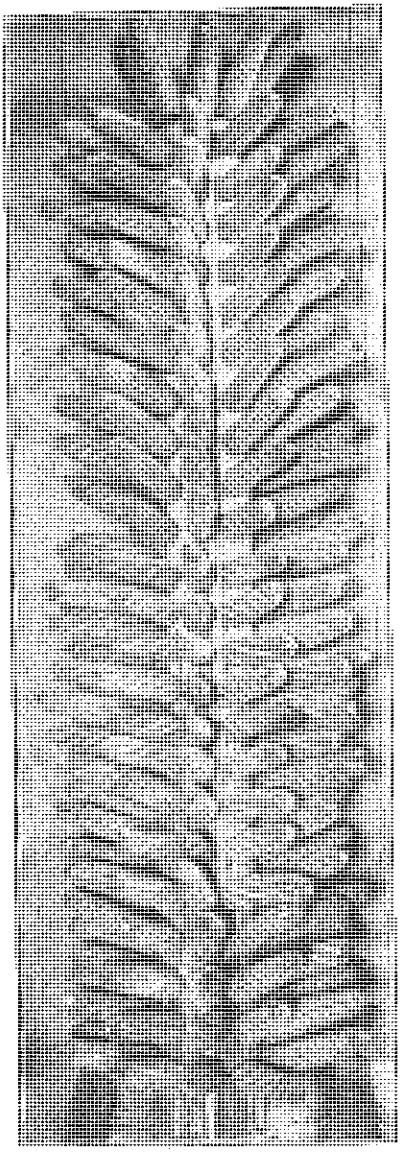


FIG. 3.—THE SEED CORN TREE

A smooth pole 6 feet long and 8 inches in diameter is fitted on a base. Rows of long finishing nails are driven into the post 2½ to 3 inches apart. Such a tree will cure sufficient corn to plant fifteen acres.

ears of corn when placed on the nails will not touch. By having the panels fastened about two feet apart at top and bottom, a large quantity of corn can be stored conveniently and letting the air circulate freely through it.

The wire hanger is also a very good device on which to store seed corn. (Fig. 4). These hangers can be cheaply and easily made from the common electric-weld wire fencing. Clip the cross or horizontal wires alternately long and short on each side of the heavy up and down wire. Then when all cross wires are cut, each longitudinal wire makes a complete hanger. By bending the ends of the longitudinal wires to form a hook one hanger can be suspended beneath the other. In addition there are several patent wire and steel hangers now on the market which make serviceable racks for curing and storing seed corn.

Wherever seed corn is being cured there must be a free circulation which will remove the moist air from around the ears. This is just as important as the application of heat. Molds will develop, which

destroy the germination of the seed, and the ears rot if the warm moist air is not removed. If there are openings at opposite sides of the room, where a quantity of seed is being cured, a current of air will sweep through the room and the corn will dry perfectly. Corn can also be cured underneath the roof of a corn crib, shed, or other dry building during the early fall. It should be hung where there is a strong circulation of air through the building.

Corn should never be placed against the south side of a building where there is likely

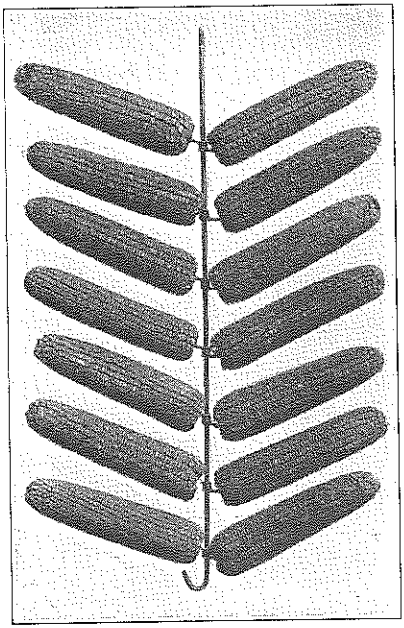


FIG. 4.—PATENT HANGERS FOR HOLDING CORN

When the ears are well separated the warm air circulates around each ear and dries out the corn thoroughly without danger of its molding.

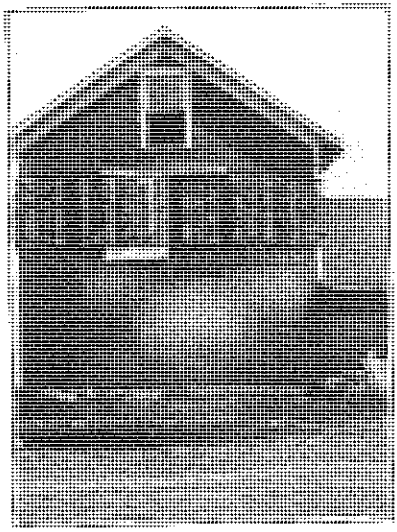


FIG. 5—A FAVORITE, BUT A POOR PLACE TO CURE CORN

On the south side of a building seed corn is exposed to sudden changes in temperature which, influencing the moisture content of the ear, renders it subject to injury by frost.

to be strong sunlight, as the rays of the sun will soon injure the vitality of the seed on the side of the ear turned toward the sun. If corn is cured by hanging under a porch or under the roof of a corn crib in the fall, it should be stored for the winter in some dry room where it will not absorb moisture from the outside atmosphere before hard freezing or damp weather arrives.

It is so easy to secure good seed corn by curing with artificial heat and be sure of having high germinating seed,

that no other method except fire drying, can be equally recommended to the farmers of Wisconsin.

The series of tests made by Mr. Norgord in 1909-1910 showed very plainly the advantages to be gained by the proper curing and storing of seed corn. Careful record was kept of the methods followed by each of the 350 farmers in handling their seed. The places where the seed was cured and the results of germination tests are given in Table I.

TABLE 1.—STORAGE, GERMINATION AND STAND TESTS OF SEED CORN USED BY 350 WISCONSIN FARMERS.

Methods of storage	Germination			Average stands 1910-1910	Number of tests
	1909	1910	Average		
1. Kiln dried	93	90	91.5	89	16
2. Furnace room	93	89	91.0		8
3. Room above kitchen	92	81	86.5	81	112
4. Attics	92	77	84.5	79	75
Average	92.5	84.2	88.3	83	211
5. Under porches	79	62	70.5	63	27
6. Granaries	65	43	54.0	77	20
7. Barns, tool houses and other out-buildings	86	52	69.0	60	52
8. Corn cribs	38	37	37.5	49	26
9. In shock during winter	81	1.5	41.2	41	4
10. Windmills and outside of walls of buildings	45	23	34.0	56	10
Average	65.6	36.4	51.0	57.5	139

These tests show plainly that artificial heat is necessary to produce good seed corn in Wisconsin. When corn was cured indoors where artificial heat could be applied, the seed gave an average germination of 88.3 per cent, while that cured outdoors where no heat was applied gave a test of 51 per cent.

A KILN-HOUSE FOR CURING SEED CORN

For the curing of large quantities of corn, if there is not room enough in the house, a special building can be erected or an old one remodeled. On a number of farms such buildings have been erected or remodeled with the idea of providing a place to kiln-dry seed corn, as well as a work shop, which will be warm during the winter.

The purpose of a kiln-drying house should be to provide heat cheaply and evenly to the corn and to remove the moist air from around ears. The building should be pro-

vided with doors and windows, so that during warm days in the early fall all of these can be opened, allowing the wind to sweep through and aid in the drying of the seed.

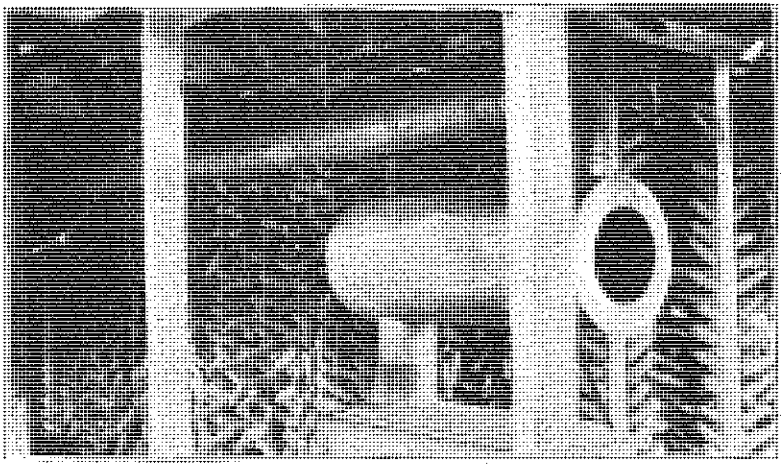


FIG. 6.—INTERIOR OF A SEED DRYING HOUSE

The seed ears are hung on strings and posts on each side and above the stove and pipe. The long stove-pipe distributes the heat more thoroughly.

During the night and on damp cold days, the building should be partly closed and a slow fire kept burning.

The easiest and most satisfactory way to apply warm air from a furnace room or stove to large amounts of corn is

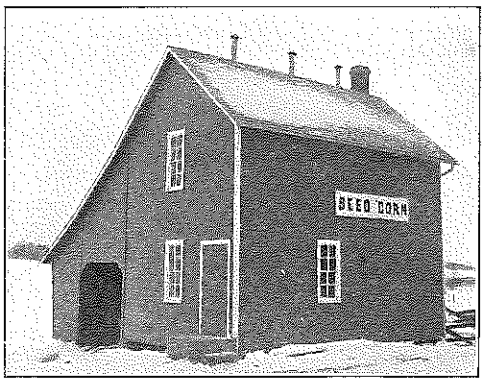


FIG. 7.—A KILN DRYING HOUSE FOR SEED CORN

Many farmers in Wisconsin are finding kiln drying of seed corn a profitable side line on the farm.

to locate the heating apparatus below the corn. Deflectors or large tin pipes can be used to distribute the warm air to all parts of the corn house. The warm air circulates around the ears, dries them quickly and thoroughly, and carries away the moisture. Many of the seed curing houses used by farmers who kiln-dry corn on this principle, are but oue story in height, with a basement or cellar for the stove or furnace. Others have the stove on the ground floor, which leaves sufficient space for a work shop while the corn is hung in the large attic or loft. (Fig. 7.)

In several successful kiln drying houses, the corn is not hung or racked but piled on slat or wire floors, thus saving considerable labor at time of selection. A constant current of heated air from below must pass up through the corn when piled in this manner or the corn will soon mould.

WHAT SEED TESTING DOES

Increases yield.

Enables growers to discard weak germinating and dead ears. (Each dead ear planted means a loss of at least three or four dollars.)

No matter how well corn has been cured, a general test by taking one or two kernels from a hundred or more ears in different parts of the room will prove good insurance. (Corn can be tested in February or March before spring work begins.)

If general duplicated tests are not practically perfect, car tests will save loss and disappointment. (Strong, vigorous germinating kernels will not rot so quickly after planting if weather conditions are unfavorable.)

Most farmers when kiln-drying seed corn, start their furnace shortly after the time the corn is stored and continue a steady fire for three or four weeks, depending on amount of seed and its dryness when husked. When corn is dry and the ears are solid and cannot be twisted, the curing is complete; and the corn, if kept in a dry place where there is no circulation of air, will not be injured by freezing weather.

When the importance of planting ear tested seed corn is fully realized, few farmers will plant corn without first submitting it to the test. It is not a difficult task to ear test corn. If an increased yield of corn can be secured by testing each ear before planting, and rejecting those ears that do not germinate or show lack of vitality, why not try it?

FIG. 8.—HOW CURING AFFECTS THE STAND

The seed was cured in three ways, in a furnace room, a tool shed, and on the south side of a barn. The difference in the stand would more than pay for the extra work.

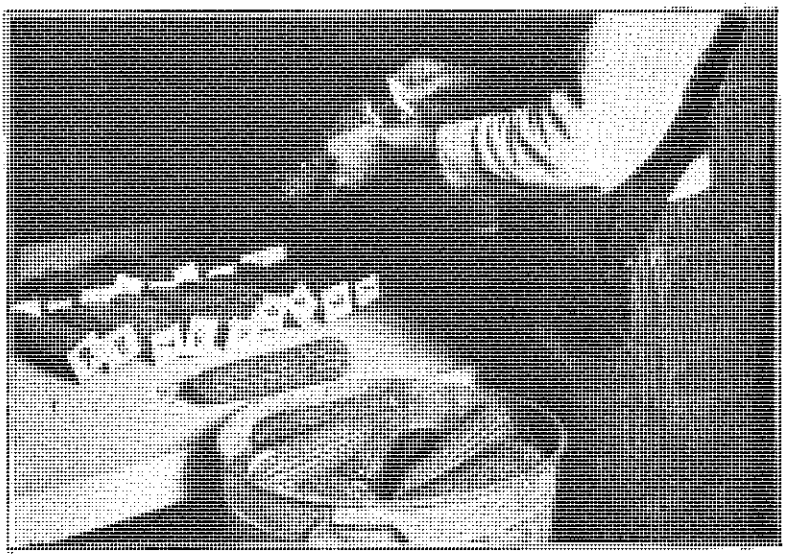


FIG. 9.—NUMBER EARS TO PREVENT MISTAKES

If a small tag with a number corresponding to the number of the square in the tester is placed on each ear, it is possible to check from the tester back to the ear.

MAKING A SEED CORN TEST

Only the most nearly perfect seed ears, having kernels of uniform width, and other desirable characteristics, should be saved for seed. These ears should be selected from the storeroom and laid out on the floor or on tables to be convenient for making the test. Care should be taken to place the ears where they will not be disturbed

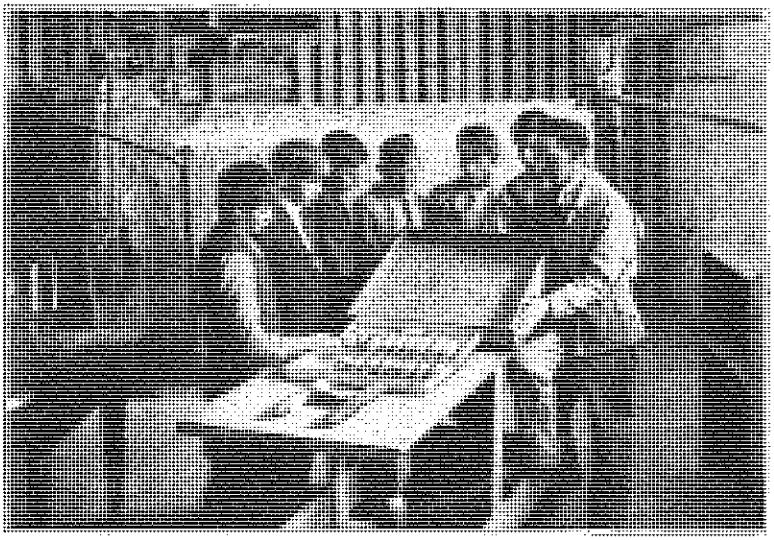


FIG. 10.—LET THE BOYS TEST THE SEED CORN

The home made saw dust box tester is one of the most reliable as well as cheapest of corn testers.

during the period of the test. If they are disarranged before the comparison can be made, the result of the test cannot be determined.

The ears can be arranged in sections of ten to correspond with the sections in the seed tester, which are usually in tens. A nail driven between each section will aid in keeping them apart. It is much easier, however, to number each ear. A small piece of cardboard on which is written a number can be fixed to the butt of each ear by means of a nail. (Fig. 9).

HERE ARE SOME TESTING DEVICES

Many devices have been recommended for the testing of seed corn, nearly all of which have their advantages. However, after using many different kinds of testers the station

has found the common square box tester also called "the sawdust box tester" to be one of the best. (Fig. 10).

A suitable box for making the germination tests can be made from common boards or siding. Soft ¾ or 1 inch pine boards make a light tester to handle. A convenient size to make the test box is 30 inches wide, 5 feet long and 4 inches deep. This will test 240 ears at one time or from 2½ to 3 bushels of seed. If the test box is given a couple of coats of paint, it will prevent warping and make a more permanent box.

Sawdust is an excellent material to use as a germination bed, but it should be first boiled in water to kill the molds.

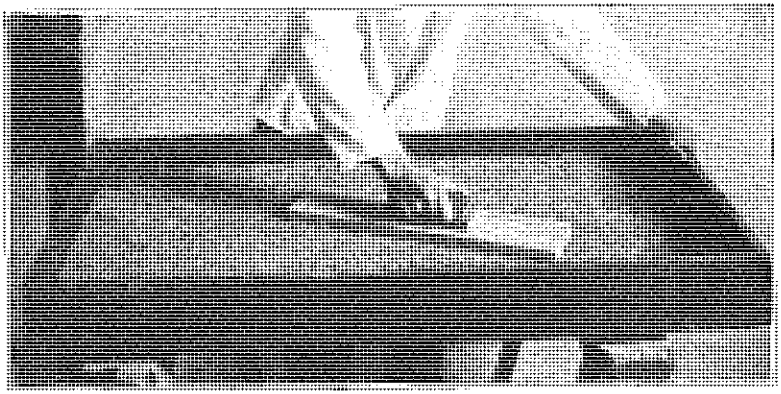


FIG. 11.—PACKING SAW DUST IN THE BOX TESTER.

A thick bed of saw dust retains the heat and moisture necessary to germinate the seed as under natural conditions.

The sawdust when moist should be packed smoothly in the box about two inches deep. This can easily be done with a brick or trowel.

On a piece of good unbleached muslin mark off 2½ inch squares with an indelible pencil. (Fig. 12). By marking the cloth ten squares wide and numbering only the outside rows, the number of any inside square can easily be determined. After this cloth has been marked, dampened, and placed on the sawdust bed, all is ready for placing the kernels in their places.

Take six kernels from ear numbered No. 1 and put them in square No. 1; six from ear No. 2 in square No. 2 until all

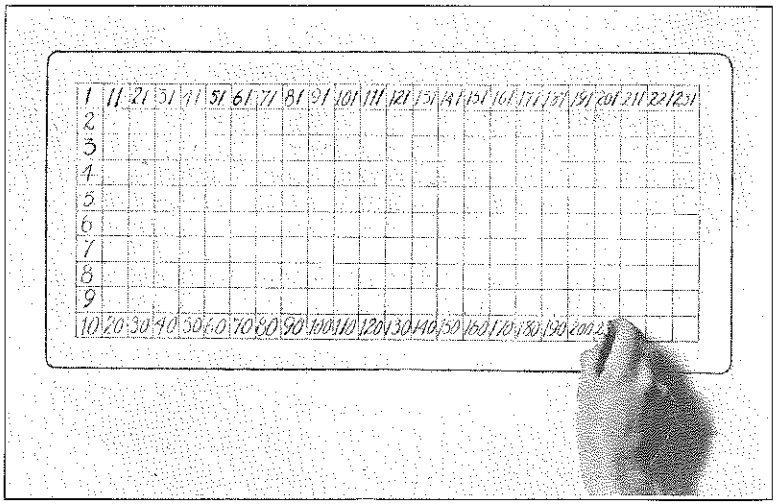


FIG. 12.—MARKING AND NUMBERING SQUARES

Then the cloth is dampened and placed on the sawdust in the box tester. Kernels from ear 6 go in square 6.

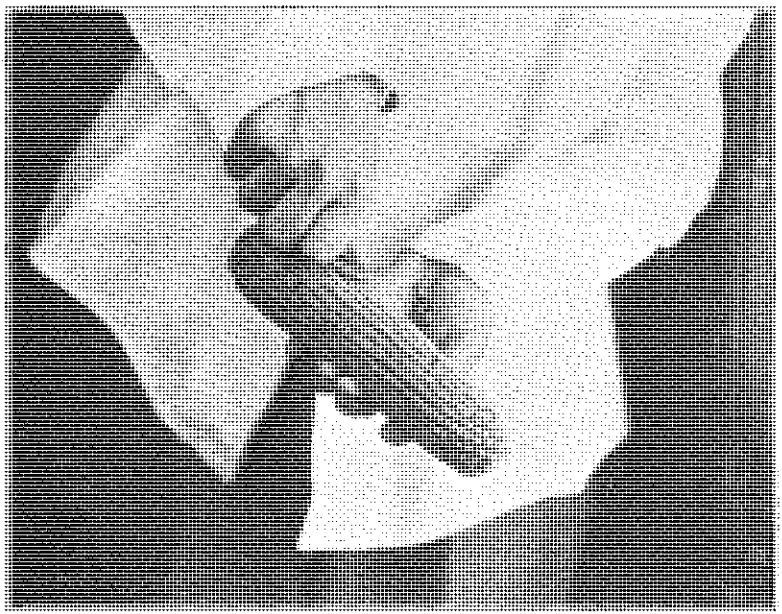


FIG. 13.—THE BEST WAY TO REMOVE KERNELS FROM THE EAR

If the knife blade is inserted between the rows of kernels or at the edge of the kernel and not between them, there is no danger of injurying the germ.

the squares are used or all the ears tested. In removing kernels from the ear take out two near the butt, turn the ear slightly and take two near the center then turn the ear a little more and take two out from near the tip. When "prying-out" the kernels do not insert the knife between the kernels but between the rows of kernels, for the point may pierce the germ injuring it. Place all the kernels germ side up in their squares with the tips pointing the same way.

With a "germination stick" time can be saved in transfering the kernels removed from the ears to their squares in the test box. This stick can be made from a piece of "inch stuff" just as long as the width of the germination box. With a ¾-inch auger bore 10 holes ¾ of an inch deep

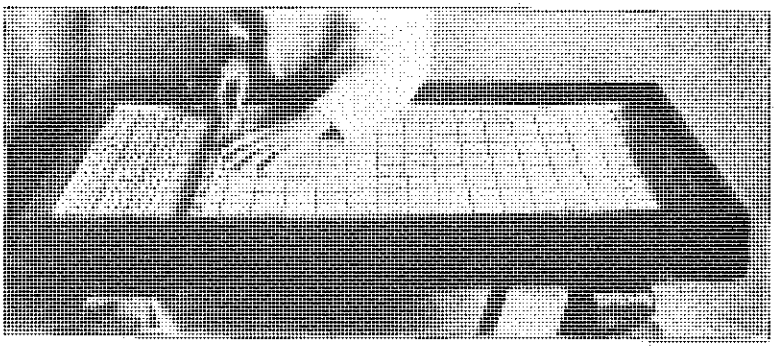


FIG. 14.—EMPTYING THE GERMINATION STICK

A small stick with holes in it a regular distance apart, shortens the time needed to place the kernels in the proper square.

and 2½ inches apart in the stick. Number the holes from one to ten. Now six kernels from each ear can be put in the holes numbered to correspond with the ear. When all the holes are filled the stick is carried to the germination box and kernels emptied into the squares. (Fig. 14).

After all the squares are filled, a plain tightly woven muslin cloth should be moistened and carefully placed over the kernels. Over this cloth is spread another sheet of cloth at least two feet wider and longer than the test box.

Now fill the box with moist sawdust until level with the top and pack the sawdust firmly. Fold the edges and ends of the top cloth over the sawdust and the test is ready.

The tester should then be placed where it will be held at ordinary room temperature or from 55 to 75 degrees Fahrenheit. During the day, the sawdust reaches a temperature which it holds during the night. Even though the outside temperature drops several degrees, that of the germination bed will remain fairly constant.

Under one side of the test box place a brick or small block to tilt the box slightly downward in the direction in which the tips of the kernels point. This causes the roots to grow in one direction and the stems in another and will aid in the reading of the test. It usually requires five or six days to make good tests. If at the end of three days, the sawdust is somewhat dry, it should be moistened again.

HOW TO READ THE TEST

After five or six days, the top cloth with its layer of sawdust can be rolled back and removed. Next roll back

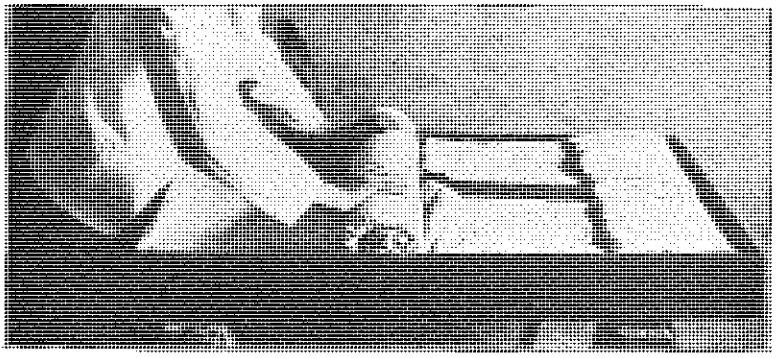


FIG. 15.—REMOVING THE TOP LAYER OF SAW DUST

The single cloth immediately above the kernels in the tester should not be disturbed until the top covering and saw dust are rolled back and removed.

carefully the cloth just over the kernels, taking care not to disturb any of the sprouted kernels in their respective squares.

The kernels should first be inspected to note if any have absolutely failed to sprout; second, if each kernel has put forth both root and growing point, and third, the vigor or vitality shown in the germination.

Only those ears should be saved for seed which have six strong vigorous sprouted kernels in the germination box.

All ears having kernels which in the seed tester show defective germination, should be moved forward on the table three inches. After the test has been thoroughly checked all the ears that were moved forward are rejected and the others used as seed.

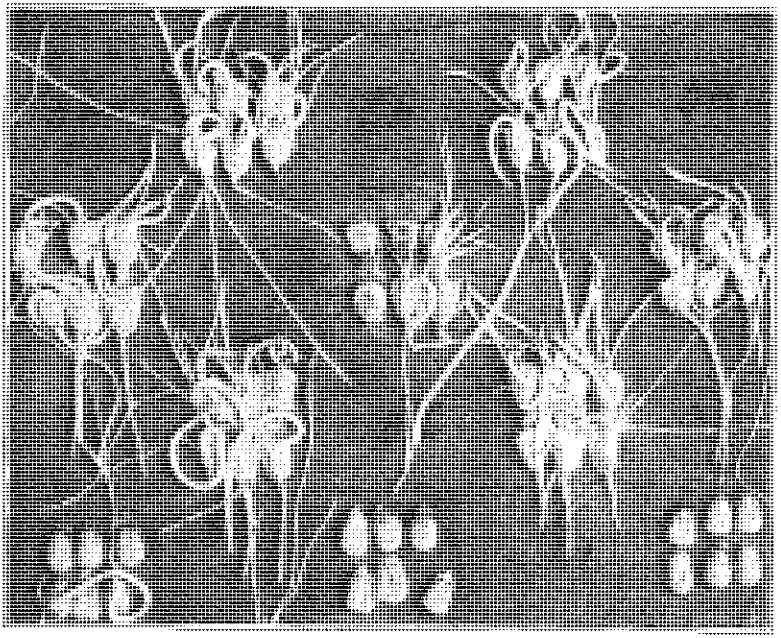


FIG. 6. 1—KNOW THE EARS WHICH WILL GROW

Every square which does not show a vigorous root and stem for each kernel should be noted. The ears corresponding to that number should not be used for seed.

Before shelling the good ears remove the butt and tip kernels as these are of different shape and will not plant uniformly with the other kernels, and also do not give a uniform germination. If the butt and tip kernels are used, they should be planted by themselves.

THE PLATE GERMINATOR FOR MAKING THE TEST

This is one of the simplest of testers to operate and the equipment for making is found in every household. Two plates porcelain or tin are used, also two small pieces of flannel cloth.

Cut the cloth to fit just inside the plates or a single piece of flannel can be folded to make a top and bottom spread.

Moisten and place one piece in the bottom of one of the plates. Not more than 50 kernels of corn are then spread upon it, germ side up and not touching each other. Place the other cloth over the kernels pressing down so it comes in contact with each kernel. Invert the other plate for a cover and the tester is ready to set away in a warm place. If placed under a stove in which fire is kept night and day, the tester will remain at nearly a uniform temperature and in four or five days will be ready to read. It will be necessary to look at the tester every other day to add water if the cloth becomes dry.

This method of testing is more suitable for determining. the average germination of a large amount of seed corn than for individually testing each ear. If one or two kernels be removed from 100 to 200 ears, taken from different parts of the corn room and are thus tested, the germinating power or vitality of the entire amount of corn is very nearly determined. Should the corn germinate less than 94, that is 3 kernels in every plate fail to sprout, then test each ear individually by the sawdust box method and eliminate the weak and dead seed ears.

The State Seed Inspection Laboratories use tin plate testers in making germination tests on the samples of corn, small grains, and grass seeds which are sent in for testing, but in place of the flannel cloths, square pieces of heavy blotting paper are used. They find the testers very reliable and accurate if a temperature of from 60 to 80 degrees Fahrenheit is maintained for four or five days and the cloths or blotters kept moist.

A RAG DOLL TESTER IS EFFICIENT

Since the "rag doll" tester has come quite largely into use, a description of it will be helpful. This simple tester has some advantages over the other testers, and if properly handled, gives excellent results. It is probably the cheapest and easiest tester to make and operate. It also gives an accurate test of each ear's ability to grow, if care is taken to keep the cloth moist and at the proper temperature.

To make the rag doll tester take some good quality muslin or sheeting and cut or tear into pieces about ten inches wide and five feet long. Down the center of each piece of cloth

rule a line with a heavy or indelible pencil. Then beginning at least 18 inches from one end, rule off lines across the cloth every 2½ or 3 inches until there are altogether 20 squares. Number the squares on the cloth from 1 to 20. The cloth is now moistened and spread out ready to put on the kernels.

Number the ears to be tested, or arrange them in series of ten as in making the sawdust box test. Remove from different parts of the ear six kernels and place in their respective squares. Have all the tips pointing to one side with the germ side of the kernel up. (Fig. 17). When all the squares on the cloth are filled it can be rolled up beginning

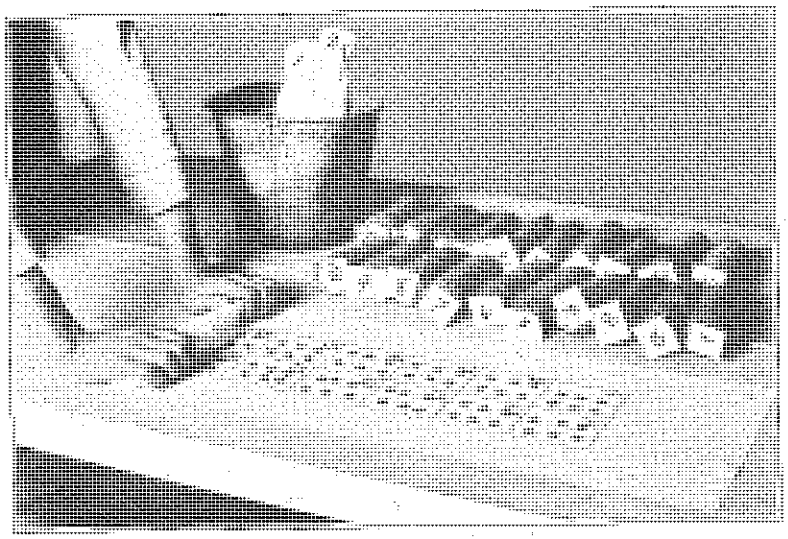


FIG. 17.—A RAG DOLL TESTER IS SIMPLE AND INEXPENSIVE

A single strip of cloth 9 inches wide and 60 inches long makes the tester. Each roll is numbered to correspond with every 20 ears tested.

at either end. Tie a string, not too tightly, around each roll and place in a bucket of lukewarm water from 6 to 12 hours.

After the rolls have soaked as long as desired, empty the water from the bucket and place a small block of wood in the bottom. Now set the rolls back in the bucket or pail so they will drain but not stand in the water. Remember to place the rolls so the tips of the kernels are pointing downward. Cover over the top of the pail with a cloth and set

it where it will be kept at ordinary room temperature for five or six days.

One of the disadvantages of this method of testing is that the rolls are apt to become dry if they are not carefully examined each day and moistened. If the rolls dry out too much it will probably spoil the results of the test. After the sprouts have grown at least 1½ to 2 inches the test can be read. Any ear, the 6 kernels of which did not produce strong, vigorous sprouts, should be rejected from the seed corn. Before using the cloths to make other germination tests, they should be placed in boiling water a few minutes to disinfect them and to kill the molds.

Many farmers are accustomed to test their seed corn for germination by planting a handful of kernels in a pan of sand or earth. Or they wait until warm weather when a few rows of kernels are planted in the garden.

Of course any method by which the germinating power of seed corn can be accurately determined is of value since results are what is wanted and the method of making the test is a matter of individual preference.

However, by this sort of testing only the approximate percent of germination can be learned, which should not be all that is desired if the farmer wants a perfect stand of corn. There is often considerable difference in the strength and vigor of seed ears and where the individual ear test is not practiced this better grade of seed corn is not found.

Three things—selection, curing, and germination, can do more toward producing a better and bigger corn crop than anything else. By selection, the farmer improves his corn, growing larger, heavier, and better ears; by properly curing it, he insures himself against seed which is of low vitality; by a germination test he avoids the sterile ears, and plants only seed which will make the most profitable return.

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