

# Ohio Agricultural Experiment Station.

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## THE SELECTION OF SEED CORN.

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One of the important things to be settled regarding the selection of seed corn is, when shall this work be done? It may seem a little out of season to call the attention of the corn growers to this matter at this time of year. Many growers do not worry much about seed corn until a week or two before planting. Some, however, are beginning to learn that there is a better way; that the rail pen, or the middle of the corn crib is not the best place to look for seed of high quality. If seed corn be not gathered and so cared for that it is either thoroughly dried out before freezing weather arrives, or is kept where the temperature does not fall much below freezing, the vitality is likely to be greatly impaired.

For the sake of higher quality along other lines than germination, progressive growers are realizing the necessity for the fall selection of seed. This is especially important because it enables one to judge much more accurately of the comparative value of ears of corn for seed purposes. (I assume that it is very generally accepted that ears do differ in their ability to produce corn).

Ears of corn are not always as valuable as their appearance would indicate. Excellence may be inherent or extraneous. An ear of corn which is good because of inheritance is much more to be desired than one which owes its superiority to especially favorable surroundings. As ordinarily selected from the shock, wagon or crib a very large percent of seed ears are excellent because they have grown under much more favorable surroundings than the average. Indeed, it is probable that if we could follow each of these choice seed ears back to the field where they grew we should find 80 to 90 percent of them growing one plant per hill—their superiority clearly due to the fact that the mother plant had the food, sunlight and moisture of two or three plants poured into it.

It is exceedingly difficult to carry from one generation to another excellence, which is the sole product of environment, unless the environment be carried along with it. Many corn growers are sadly disappointed in their purchase of seed corn for this reason. What they needed was not so much the Reid, Funk or Leaming corn as the Reid, Funk or Leaming environment. Excellence which

rests mainly upon environment is transitory. One should seek for that which is hereditary. By selecting seed corn upon the plant as it is ripening in the field one can weed out some of the excellence which is due to environment but not all of it.

#### PLANT SELECTION.

With this thought in view, this Station conducted a test in 1906 in which ears selected from plants growing in the field under normal conditions of stand, and as nearly normal in other environment as it was possible to judge, were compared with other ears of the same variety and selected from the same field, but selected from the wagon, no attention being given to the stand in the latter instance. The ears selected from the wagon were superior in size and in general appearance, as might be expected.

Eight tenth-acre plots were planted from the two selections, four plots of the plant selected seed and four of the seed selected in the ordinary way. These plots yielded as follows:

#### PLANT VS. ORDINARY SELECTION.

Plot No.	Method of selection	Yield per acre. Bushels
49	Ordinary	68.64
50	Plant	76.57
51	Plant	70.56
52	Ordinary	68.53
55	Ordinary	69.07
56	Plant	71.43
57	Plant	71.43
58	Ordinary	70.82
Average of Plant selection plots		72.49
Average of Ordinary selection plots		69.26
Gain for Plant selection		<u>3.23</u>

In recommending the selection of seed corn upon the plant as it is ripening in the field it should be stated that it is better not to remove the ear from the stalk until it is quite well dried out. When corn is cut and put in shock to remain one to two months before husking, it will be well to go through the field a few days in advance of cutting and mark in some way each plant, growing under normal conditions as regards stand and fertility, which has the appearance of being satisfactory. We have marked these plants by tying a string or strip of old cloth around the ear to attract the attention of the huskers, also by topping the plant. The latter is quicker but

some confusion may result from the breaking of the dry stalks at husking. If the husking is to be done by machinery it will be necessary to gather the selected stalks together and shock separately.

When corn is left standing until ready for husking and cribbing or marketing, the seed ears may be gathered as selected some little time in advance of the main harvest.

In the following pages attention is called to some characters of importance in plant and ear which deserve careful consideration. The first of these is easily

#### MATURITY.

Many Ohio farmers are growing corn that is too late in maturing. A variety of corn, which has not acquired the habit of completing its growth before killing frosts are to be expected, is not a variety to be encouraged. A farmer who is growing such a variety should either discard it, or carefully and systematically select the earlier maturing ears for seed. The variation in the maturing of individual plants of a given variety affords ample opportunity for improvement in this direction.

Immaturity is a serious fault in corn. It injures its keeping qualities in the crib; it lowers its feeding value; it prevents the marketing of the crop as may be desired; it lowers its seed condition and, unless great care is exercised, entirely ruins it for seed purposes. One must not, however, go to extremes in this matter. The selection of plants, or varieties which do not use somewhere near the available corn season will tend to limit the yield.

#### VIGOR OF PLANT.

A second character which is well worthy of consideration is vigor. While it is freely admitted that a good ear of corn is a very good recommend for the plant which produced it, many plants produce good ears which they are unable to carry to harvest. That this character is hereditary there is abundant evidence. In a breeding plot of last season (1906) this Station had growing side by side. rows planted from individual ears, one of which had 56, and another 49 percent of its plants broken over before harvest. Between, and upon either side of these were other rows of which, in one instance, not a single plant, and in two others, 3 and 6 percent only were broken. The ability to stand upright did not result from a lighter load, for the ear of which 56 percent of the progeny broke over yielded 75.6 bushels per acre, while the ear having every plant upright yielded 114.7 bushels per acre. The broken plant presents a problem which I believe can best be solved by a consideration of the vigor and stiffness of the mother plant.

Under vigor, leaf development and freedom from disease should be considered.

## WEIGHT OF EAR.

The aim in the selection of seed corn is, I take it, the securing of ears which, when planted, will produce the largest yields of marketable shelled corn per acre. When the environment is known to be uniform as to stand of plants and fertility of soil, weight of ear is probably the best indication of yield which one has. Even when the environment is unknown our tests indicate that heavy-weight seed ears can, upon the average, be depended upon to give increased yields. There are, however, marked exceptions to this general rule. The tests herewith reported represent three years' work in ear-row tests and include all the ears tested. These ears were not originally selected for variation in weight. They all appeared to be fairly good seed ears for this latitude, but, as might be expected, varied somewhat in size and weight. The weight was taken in the spring when the ears were thoroughly air-dry.

The summary of this work is given in the following table:

## RELATION OF WEIGHT OF SEED EARS TO YIELD.

## THREE YEARS' WORK IN EAR-ROW TESTS.

1906.

## Ear-row test of Clarage corn.

Average yield of 10 heaviest ears,	- - -	88.50 bushels per acre
" " " 10 lightest ears,	- - -	85.18 " " "
Gain,	- - -	3.32 " " "

## Ear-row test of Strain 84

Average yield of 10 heaviest ears,	- - -	106.12 bushels per acre
" " " 10 lightest ears,	- - -	100.06 " " "
Gain,	- - -	6.06 " " "

## Ear-row test of Strain 74.

Average yield of 10 heaviest ears,	- - -	95.93 bushels per acre
" " " 10 lightest ears,	- - -	86.85 " " "
Gain,	- - -	9.08 " " "

## Ear-row tests of 1904 and 1905.

Average yield of 10 heaviest ears,	- - -	82.3 bushels per acre
" " " 10 lightest ears,	- - -	77.2 " " "
Gain,	- - -	5.1 " " "

## General Average.

The 10 heaviest ears,	- - - - -	93.22 bushels per acre
The 10 lightest ears,	- - - - -	87.32 " " "
Gain for heavy seed ears,	- - -	5.9 " " "
Average excess weight of heavy seed ears,		2.06 ounces

I may say that our tests thus far have shown total weight of ear to be a little better guide to production than weight of shelled corn.

In view of what has already been said regarding maturity, it should hardly be necessary to add that maturity should go hand in hand with weight of ear.

## LENGTH OF EAR.

In our studies of individual ears of corn and the characters which are associated with high yield, we have noted that length of ear is of a little greater importance in making up this extra weight than circumference. In order to turn additional light upon this question tenth-acre plot tests have been conducted the past two seasons in which some 200 ears have been involved. These ears were selected from two varieties, the Leaming and Clarage, one-half of the ears being a little above the average length for the variety and locality, and one-half as much below. Composite samples, representing all the ears of each type of each variety, were planted upon separate plots located side by side. The ears selected for this test were as much alike in other ways as it was possible to find them. With the numbers involved it was hoped that the differences always found existing between individual ears might be overcome and the real relation of length to yield be made to stand in the clear.

Selections for the second year's work (as well as for the third, not reported) were made from new, or unselected seed.

## RELATION OF LENGTH OF EAR TO YIELD.

(CORN GROWN IN TENTH-ACRE PLOTS.)

Av. yield of 5 plots grown from medium long ears,	87.69	bushels per acre.
“ “ “ “ “ “ “ “ “ short ears,	82.84	“ “ “
Gain for long ears,	4.85	“ “ “
Average length of long ears,	9.49	inches.
Average length of short ears,	7.53	inches.

In some sections of our state these "long" ears would seem only of medium length, particularly if measured in the fall before they had fully shrunken.

If this test has a practical application it is to select ears for seed a little above the average length, rather than below.

## UNIFORMITY.

In order to give good results corn should be uniform as to height, habit of growth and maturity of plant; height of ear; size, shape and color of kernel.

It may not be amiss to emphasize the great desirability of uniformity as applied to color. Growers who sell the bulk of their crop, rather than feed it, will certainly find it to their advantage to avoid the mixing of varieties and colors. In districts where much of the corn is sold farmers should agree upon a variety and all grow it, thus avoiding mixing through cross-pollination.

## POSITION OF EAR.

In the selection of mother plants the position of the ear is worthy of notice. Extremes may well be avoided. Ears borne at too great a height tend to pull the plant over as maturity approaches. The high ear also makes husking in standing corn difficult. It is probable that the continuous selection of the higher ears tends toward increased size and later maturity, as also the selection of extremely low ears tends to reduce the size of plant, shorten the growing season and decrease the yield. A medium height, to be determined by each grower for his own locality, is to be desired.

The seed and market condition of corn is greatly favored if the tip of the ear points downward, thus shedding water.

## SCORE CARD POINTS IN MORE OR LESS DOUBT

**THE CYLINDRICAL EAR.** Much emphasis has been placed upon the cylindrical ear. So far as the relation of shape of ear to yield is concerned our tests thus far have shown the tapering ear to be somewhat superior in yield. Until some evidence is forthcoming to the contrary this Station does not feel justified in placing any premium upon the cylindrical ear.

**THE FILLING OF THE TIP** In view of the fact that many of the highest yielding ears in our ear-row tests have been quite deficient in this particular it has not seemed proper to insist upon the conventionally well covered tip. It remains to be determined to what extent the uncovered tip is due to seasonal, accidental and hereditary influences.

**THE PERCENT OF GRAIN** Arranging the ears tested in our ear-row work with reference to their percent of grain, we have uniformly found that the ears having a medium to low percent of grain have exceeded in point of yield the ears ranking highest in percent of grain. While high percent is pleasing to the buyer of ear-corn, the grower's interest, certainly, and the dealer's, in the long run, is in bushels of shelled corn per acre. The sooner the sale of corn is put upon the basis of shelled corn of a known content of moisture, the better for all concerned.

**THE SHAPE AND SIZE OF KERNEL.** This Station is not prepared to say that every seed ear should be discarded which does not have kernels of a certain shape and length. There is, however, a general shape which we believe is associated with good weight and high yield; a shape which may be described as broadening gradually from a not too pointed tip to the crown, with edges comparatively straight, and of uniform thickness.

We have experiments in progress studying the relation of length of kernel to yield.

The Maryland Station, as reported in Bulletin 106, finds a large germ of great value. They say: "Plants from kernels having large germs are more vigorous, have more plant energy, and are stronger and hardier in every way."

Since selection for large germs tends toward an increase in food value, the germ being the richest part of the kernel, it would seem to be worthy of attention.

#### THE CARE OF SEED CORN.

While it is beyond the purpose of this short circular to treat at length of the care of seed corn, a few words should be said.

Seed corn as brought in from the field has a high content of moisture. If, in the attempt to dry it out quickly artificial heat is used, with little or no attention given to ventilation, the chances are that the germ will start to grow. Artificial heat is dangerous at this stage. The important things are ventilation, a dry atmosphere and a moderate temperature. Corn suspended from a wire in a well ventilated shed, granary, or dwelling house attic, in such a way that there is free circulation of air around each ear, is very favorably situated. Windows should be closed during nights and rainy days, but open the rest of the time.

If the fall be dry and hard freezing weather does not come until seed is well dried out, it will go through the winter nicely in such quarters. If the weather be damp and winter sets in early, it should have the benefit of artificial heat. A chamber or attic through which a stove pipe passes will answer; a furnace room in a dry cellar is very satisfactory. We have found long bushel boxes, about 1 foot wide, with  $\frac{1}{4}$  inch wire netting for sides and top, very desirable storage for corn which has first been handled as above until it is fairly dry. Such mouse proof boxes afford much ventilation and may be stored in a dry furnace room, or in a moderately warm attic with safety, as winter sets in.

Experiments have shown that corn which is *thoroughly dry* will not be injured by any degree of cold. This, while interesting, is not as comforting as it would appear to be for the reason that some confusion may result in deciding when corn is thoroughly dry, and further, corn once dry does not necessarily mean always dry. If left subject to a moisture laden atmosphere it will very likely take up enough moisture to render it liable to injury from severe freezing.

## SUMMARY.

Seed corn should be selected in the fall, and before the crop is harvested, in order that the best seed may be secured and properly cared for.

Seed selected from plants where the stand and other environment was normal has given an average yield of 3.23 bushels per acre in excess of seed selected in the ordinary way.

Heavy weight seed ears have exceeded medium weight ears in yield by 5.9 bushels per acre.

Medium long seed ears have exceeded medium short ears in yield by 4.85 bushels per acre.

Vigor of plant, as shown by ability to stand upright, is hereditary. Ear-rows growing side by side have shown a variation of from no broken plants to 56 percent of broken plants.