

Improvement of Corn and Cotton by Field Selection.

I.

HOW TO IMPROVE YOUR CORN.

The Qualities Which Should Belong to a Good Stalk, a Good Ear, and a Good Grain.

Messrs. Editors: If seed corn is to be selected with success the work must be undertaken in a systematic manner. Selection of large ears at the crib is of course better than no selection at all, but even this method cannot be regarded with much favor, for there is no telling what type of stalk the ear grew on, whether it was fertilized from a barren stalk, or whether the type of parent will be satisfactory. Selection to be successful must commence with the individual plant and the work must be done in the field in order that the right type of ear shall be chosen, and in order that the ear chosen, from all outward appearances at least, shall have the qualities which it is desired to perpetuate. It is possible to influence a variety of corn in a comparatively short time, as the plant yields to selection remarkably well.

Selecting the Stalk.

A definite idea must be in mind before selection is undertaken, and what may suit one may not be at all suitable to another. For instance, if one were selecting corn for river bottoms, a larger ear and stalk could be permitted than on thinner uplands, though it is undesirable in any case to select for very large ears and stalks. A better method would be to select a variety of corn having a fair number of leaves unless intended for silage purposes, when a large amount of leaf would be desirable. Care should be taken to select from varieties that do not show a large number of suckers, as these simply draw on the food supply of the soil without increasing the yield, and as they are low to the ground they can seldom be harvested. A short, stout stalk is preferable to a large coarse one, and a very tall variety should be avoided, as it is hard to harvest, and breaks down badly as well. The large yields of corn obtained in the North are due essentially to one thing, namely, the closeness of planting, and this is a matter which should be carefully borne in mind in making selections. As corn tends to grow larger and coarser the further South we go, this is a matter that should receive primary attention, to select from stalks of medium size and to follow this up so systematically that the type of corn can be kept uniform and suited to the conditions of soil and climate under which it is grown.

Type of Stalk Controlled by Breeding.

The selection of the type of ear and stalk adapted to local conditions is a matter of the greatest importance, and in order that the right type be chosen, a careful individual study must be made of the plants in the fields; and this study should be made from the time the crop is started. The importance of starting early in the season is due to the striking individual characteristic of certain plants throughout the field. These should be marked and watched, for it is the exceptional qualities developed in the individual that has made it possible to achieve such wonderful things in the breeding of horses, beef and dairy cattle; and the principles in breeding plants are certainly analogous. It is the individual possessed of peculiarly well developed inherent hereditary powers that should be sought for a mother plant, for the matter of vitality and vigorous reproduction is a most important problem to the corn grower. Other desirable qualities of the corn plant may be affected by selection; for instance, the planting of the ear so as to bring it closer to the ground may be brought about. The length of the shank to which the ear is attached can be changed, as well as the position of the ear. With these facts in mind, and a clear perception that man has a mastery over corn and can adapt it to his will, the problem of selection becomes a matter of greater interest and concern to the farmer, for it is a simple process, requiring but comparatively little time to effect these changes so worthy of consideration. It is also a most fascinating study.

How to Breed a Good Type of Ear

If one desires a prolific variety of corn, selection must be made from the stalks producing two or more ears. As to type of ear to select, that will depend a good deal on the variety and the conditions under which the corn is to be grown. One or more medium-sized ears per stalk with a small cob will out-yield one very large ear. It is not desirable to develop coarseness in either plants or animals. Select only ears that are well silked and

have a good covering of husk coming well over the tip. Too much husk is objectionable, as it is an indication of coarseness. The shank bearing the ear should be short, and not over an inch to an inch and a half in diameter. The ears should point downwards so they will shed the water better. The number of rows to select per ear will vary greatly with the variety, but the standard should be from 16 to 24. In some varieties the number will run down as low as 12, but it is desirable to get it up to 16 as nearly as possible. The rows on the cob should be as nearly straight as possible and the grains should be even in length and character from end to end of the ear. The cob should be perfectly straight and of uniform size and not tapering off at the end, as is so often the case, for when that happens the grains will likely be deep at the butt and shallow at the tip. In such form they do not go through the planter uniformly, nor will they have the size and bulk of grains uniformly developed. The grain itself should be rather a wedge shape and long rather than broad, but not too long. With a white corn the cob should be white and the grain flinty in texture, with a large and well-developed germ. In a yellow corn the same qualities as to type of grains should be sought. The tip and butt of the ear should be well covered, the grain on the butt coming down close around the shank. In bad seasons this is not a matter of such great importance, for sometimes a drought may affect the pollination of the silks and prevent all of them from developing perfect grains. It is important in the selection of a type of ear which is to be standardized that an ideal be clearly fixed in the mind and kept definitely in view for all time in the future. In fact, it would be well to preserve some of the type ears from the first selection if they reach the breeder's ideal and keep others from one year's selection for reference.

It is also important that the rows of corn on the ear be uniform, and that none of them squeeze out, as it were.

When and How to Make Selection.

Having decided on the type of ear, go through the corn-field early in the season, as already indicated, and pick out the plants which seem to show special vigor and which are apparently fertilized by the pollen from neighboring plants of desirable quality. If any of the stalks and ears fail to develop satisfactorily, discard them, and as soon as the corn begins to ripen, go to the field with sacks and pick out the ears from desirable stalks that most nearly approach the type in mind, carry these to the house or barn and put them safely away in rat-proof cages. They should be placed on open slats after shucking so as to dry uniformly. Ears taken from each plant should be carefully labelled, for these are to provide the grain for the seed patch next season. When the weather becomes cool store the corn so that it will keep at a uniform temperature and not be subjected to damp weather or to violent freezes.

* A Little Study of a Grain of Corn.

After testing the vitality, the protein content of by taking a few grains from each and cutting them open cross-wise and length-wise. The size of the germ and the amount of flinty matter will determine quite accurately whether the grain is high or low in protein. If there is a large amount of starch it is evident that the grain is comparatively low in protein; if there is a small amount of starch the reverse is true. With these facts in mind, it is easy to develop a strain of corn high in protein and low in starch; or high in starch and low in protein; or high in protein and oil, as the case may be, for the oil is all obtained from the germ, and grains should be selected that have large, vigorous germs where a high oil content is the object in view. It is quite possible by selecting for an increase or decrease of protein to balance up the corn and make it much more satisfactory as a grain food for cattle or horses than is often the case at the present time.

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II.

HIGHER YIELD OF SHELLED GRAIN PER ACRE.

This is the Aim Which Should Guide You in Selecting and Breeding Your Corn.

Messrs. Editors: In the improvement of corn by seed selection an endeavor should be made to start with the best variety as ascertained by actual

tests in the field through a sufficient number of years to eliminate weather conditions. It must be borne in mind, however, that in all plant improvement the same principles and practices that have been employed with such striking results in the improvement of the different breeds of animals must be followed.

For corn, there are three general methods of improvement: First, by importation of seed from some reputable breeder or grower; second, by careful selection of seed corn from one's own field or from a neighbor's; third, by careful selection and growing of seed corn in a field isolated something like four or five hundred yards from any other corn field.

Characteristics to be Sought After.

The characters that should be taken into account in the improvement of corn by selection are:

(1) Selection of ears from stalk standing in the field bearing two or more ears, as it has been demonstrated time and again that a variety that bears two medium-sized ears per stalk will generally give higher yields of shelled corn per acre than a variety bearing one large ear to the stalk.

(2) The stalk should be large at the base and tapering gradually towards the tassel, for two reasons: First, because it will be better enabled to withstand drought, and, second, because it will stand up better in wind storms.

(3) The ears should by all means be of a cylindrical form, with both butts and tips filled out, as this is the form that gives the highest percentage of yield of shelled corn per ear, other things being equal.

(4) The best-shaped kernel is a medium wedge, as this fills out the space on the cob most completely. Also, the distance between the rows of grains should be small, while the number of rows should be large and run parallel the full length of the cob, with little or no diminution in size, either at the butts or tips. The percentage of grain should be from 80 to 90, and should be held rigidly by the cob. It should also possess a high (90 to 95 per cent) germinating power and great resisting power to disease and insect ravages.

It should be kept clearly in mind that, with varieties of corn, selection should be made from the field and performed particularly with reference to total yield of shelled corn and the character which tend to give this and an improved quality of grains. If it is to be used in feeding growing animals, or to be ground into meal for human consumption, it should be high in flesh and muscle-forming material (protein); if for fattening stock, high in fat, and if to manufacture whiskey, alcohol or starch, high in starch, sugar, etc., (carbohydrates).

Barn Selection.

This method is largely used in this State. It leads to better results than no selection at all, but is far inferior to selecting the seed from the field in the fall after the maturity of the corn. One great advantage of field selection or barn-selection is that proper weight can be given to the character of the stalk, its prolificacy of seeded corn, etc., can be given. In barn selection, it is usually the larger ears that are selected for planting purposes, and these are not the best ears generally for seed. This method of seed-corn selection is largely responsible for the larger number of one-eared varieties we have in the South.

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III.

HOW TO IMPROVE YOUR COTTON.

Select Your Seed Now From Best and Most Fruitful Stalks, Those That Bear the Biggest Yield of Lint.

Messrs. Editors: As with other crops, the proper place to select seed of cotton for next year's planting is in the field, selecting from those stalks that have a hardy, vigorous growth, a large number of large well-matured bolls and that bear the greatest amount of lint cotton per stalk.

Select Most Prolific Stalks.

By selecting seed only from heavy yielding stalks the tendency will be of plants grown from such seed to produce greatly increased crops over the average of a patch planted from seed selected in the common way. Means should be de-

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