UNIVERSITY OF CALIFORNIA
COLLEGE OF AGRICULTURE
BERKELEY

AGRICULTURAL EXPERIMENT STATION
BENJ. IDE WHEELER, President
THOMAS FORSYTH HUNT, Dean and Director
H. E. VAN NORMAN, Vice-Director and Dean
University Farm School

CIRCULAR No. 180.
October, 1917.

SELECTING CORN SEED.

By Ernest B. Babcock.

The growing of Indian corn in California is increasing. In 1915 there were 64,000 acres in corn and there is probably double that acreage in 1917. This is fortunate in view of the present emergency, for it is desirable that corn production be increased in order to stop the importation of corn from Eastern states. There is sufficient suitable land in the favorable districts for corn growing to allow still further increase in acreage, and certain varieties can be grown successfully in districts where very little corn is now grown. Corn is also a splendid crop to use in rotation with potatoes for the purpose of eradicating disease-causing organisms that live in the soil. But, while extension of the corn acreage would result in greater production, it would not tend to improve the quality of the corn produced in this state. It is important, however, that the milling quality of our corn be greatly improved.

The quality of the corn crop is determined by two general factors, viz., (1) by methods of culture and of handling the crop; (2) by the kind of seed used. Cultural methods will not be discussed in this circular but the handling of newly harvested corn may be considered. Mature corn contains from 20 to 30 per cent of moisture and if it is stored without being thoroughly dried it is certain to mold and thus to be seriously damaged. Thorough drying means reduction of the moisture content to 13 or 14 per cent. Many farmers do not wait until the corn has dried sufficiently before shelling but attempt to market the crop while the moisture content is from 17 to 22 per cent. This is almost certain to result in deterioration of the corn. Therefore the newly harvested corn should not be shelled until after the ears are no longer limber, but firm so they snap when broken, and the chaff that comes off when shelling is dry and easily blown out. For those who grow corn extensively it is practicable and inexpensive to test the moisture content of the drying corn from time to time. (For information regarding methods and necessary equipment apply to The Dean, College of Agriculture, Berkeley.) Shelled corn should be thoroughly cleaned because chaff and pieces of cob hold moisture and increase the danger of deterioration.

But even when properly handled California corn is generally of poorer grade than it should be and would be if seed selection were commonly practiced. By proper care in seed selection and planting it is possible not only to attain any desired degree of uniformity but even the chemical composition of the corn kernel itself can be modified as desired. This responsiveness of corn to the influence of selection has been known and utilized for years in the corn belt states and in a few instances in this state, but California corn growers in general have derived very little benefit from seed selection. Corn is very susceptible to a change of climate or soil, so that it is always necessary to acclimate a variety new to California and then by seed selection to save and multiply those strains that produce the highest yield and best quality. Yet many California growers have been using seed imported each year from the middle west or else have planted unselected seed from varieties which have become acclimated, such as the King Phillip variety. While the average yield per acre in California compares favorably with the average yield in the corn belt states, it must be remembered that most of our corn is grown on deep soils and under irrigation. With proper seed selection, therefore, the average yield per acre in California should exceed the average yield in humid climates, while the uniformity of our product should come to equal that of older corn growing regions.



Fig. 1. Lowell Trubody, of Napa High School Agriculture Club, who has produced over 100 bushels per acre for four successive years.

That seed selection is just as effective in California as it is elsewhere has been shown by the boys' corn clubs of this state. The experience of the Napa County clubs exemplifies this fact especially well. In 1913 Lowell Trubody of the Napa High School Agriculture Club secured seed corn of the Reid Yellow Dent variety from a neighbor who had practiced seed selection for two years. This boy has continued to select his seed and has produced over 100 bushels on his acre of ground each year. As shown in Fig. 1 there is still need of selection for position of ear on the plant. Several other contestants have secured their seed from Trubody with notably successful results. What can be accomplished by high school boys can be done by every farmer who is willing to make the effort. Corn growers have a patriotic duty to perform which is likely to increase their production from 10 to 25 per cent and to improve the quality of their crop by making it more uniform.

Field Selection.

The following directions are adapted to the needs of individual growers who wish to increase their corn crop. But they will also serve to guide local community efforts to secure better seed corn for the 1918 crop. In the present emergency, with increasing use of corn products, such efforts should go as far as possible. The best fields should be located and, if possible, the seed ears should be gathered by a special crew of pickers. Each man or boy should be furnished with a picking sack which can be slung over the shoulder. When filled the sacks may be dumped into a near-by wagon. If sacks are not available the wagon can move up and down the field with the pickers by topping an occasional row.

Time to Select Seed Corn. The best time to select seed corn is just at maturity and from the standing corn. If the seed is selected from the crib, or after husking, only the size and shape of the ears can be considered; there is then no way to tell whether the fine looking ears were grown on excellent plants or not, or whether the best ears in the crib owe their superiority to heredity or to better soil and moisture conditions.

Kind of Plant to Select. An excellent corn plant is one that produces a large *yield* of fine grain when grown in normal competition with other plants. When working with dent corns select plants having one or two good ears to the stalk. Flint corns, like King Phillip, tend to produce more ears and can be selected for three or four ears per stalk. Pick plants that mature at nearly the same *time;* this will make for uniformity in ripening. Plants should be of medium *size* rather than very tall or short; they should also be strong and well

rooted, able to withstand heavy winds. The distance between the joints should be short. The position of the ears should be about four feet from the ground. Seed should not be taken from plants showing smut or other diseases or from plants standing near smutty plants.



Fig. 2. Corn grown by Alvin Hurd of the St. Helena High School Agricultural Club. This boy produced more than double the yield of his neighbor. He used selected seed grown by Lowell Trubody.

Kind of Ears to Select. The ideal ear is cylindrical or tapering only slightly from butt to tip, with butts and tips well filled out and with the husks long and tightly folded about the tip of the ear. The grains should be closely set and well developed thus producing a firm ear. Select medium-sized ears; the larger the diameter of the cob the greater will be the moisture content and the greater the difficulty in thoroughly drying the corn.

Care of Seed Corn. As soon as husked the seed corn should be hung up in a dry, shady, well ventilated place, in strings of 10 to 15 ears to insure its being well cured. The ears can be rapidly strung by looping coarse twine around one ear above another. Hardly any place is too good for this purpose, for well preserved seed corn means many dollars added to the value of the crop the following year. The more rapidly the excess moisture can be removed the better will the seed germinate. Artificially heated rooms are therefore the best place for drying the seed ears. They may be stored in a cool, dry place.

Test the Seed for Germinating Power. The next step is to eliminate all seed ears that give a low germination test. No farmer can afford to plant seed corn without knowing whether it is going to grow or not. This should not be done until the seed is well cured. All the equipment that is necessary is a box and some pieces of cloth. Fill the box

to within an inch of the top with wet sand or sawdust. Level the surface and spread over it a piece of cloth that has been marked off into checks about 1½ inches square. Number the checks or mark one corner so it will be possible to count in regular order to any particular check. A box 18 by 30 inches is large enough to test 240 ears. Lay out the ears to be tested in a row where they will not be disturbed for a few days. Starting at one end of the row take up each in order and with a small knifeblade pick out six kernels from different parts of the ear. Place these on a check in the germinator corresponding to the number of the ear in the row of corn. Cover the corn in the germinator with a thick cloth and set the box in a warm place for a few days. If left well moistened and kept warm the corn will germinate in 5 or 6 days. Lift the cover very carefully to avoid mixing the kernels from different ears. (Or simply mark off the checks on the surface of the soil and plant the kernels about half an inch deep, firming the soil over them.) The kernels from some ears may not germinate at all and others may produce weak, sickly sprouts. Such ears cause poor stands of corn and make it necessary to plant more seed than is needed, thus making thinning necessary. All such ears should be discarded.

Grade the Seed. The final step in selection is to grade the seed. Partial grading is accomplished by cutting off and discarding the ends of the seed ears about one inch from the tip and one-half inch from the butt. In order to secure a perfect stand when machinery is used to do the planting, it is necessary to have the kernels of uniform size. Three grades—large, medium and small are sufficient. By shelling each ear separately it can be thrown into the proper grade at sight without much loss of time. By adjusting the planter to drop the same number of kernels when changing from one grade of seed to another, a much more even stand will be obtained than if the grading had not been done.



Fig. 3. Selecting seed corn. The ears shown are well filled and are placed at the best height on the plant.

Testing Individual Plants.

An ordinary field of corn contains many distinct strains, some of which are superior in yield, vigor and plant or ear characters to all others. By selecting and testing superior individual plants some of these choice strains can be isolated and later increased for field planting. This has proved a very effective method of improving the corn crop.

Ear-to-row Test. The essential feature of this method consists in testing each ear separately in a row by itself. The rows are then compared during the growing season and as regards total yield and ear characters. Only the best rows are selected as seed for the increase plot. Under this plan the test plot should be isolated from all other corn so as to prevent deterioration by crossing with poorer strains.

The *remnant system* calls for an ear-to-row test plot as the first step. Only half of the kernels on each ear are planted in the test plot, the remainder being held over until the following year. The ear-to-row test plot need not be isolated under this plan as no seed is saved from it. The next year the remnants of a few, usually four, of the highest yielding ears are planted in an isolated breeding plot, and the stalks from all the ears planted in this patch, except the highest yielding ear, are detasseled. Seed ears are selected from the detasseled rows and grown the next year in an increase field to supply seed for general planting. After this system is under way on a farm there is maintained each year a small isolated breeding plot, an increase field and an ear-to-row test plot. This method excludes from the breeding plot all individuals except those whose producing power is known to be high. At the same time it provides for the intercrossing of these most productive strains which is beneficial in corn. By continuing the tests from year to year the work will tend toward the selection of the best producing ears for all or average seasons.

o