OUTLINE OF A PLAN FOR CORN BREEDING

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Various systems of corn breeding have been proposed, each possessing its advantages and disadvantages. The possibilities for variation in procedure at many points are so numerous as to make it seem useless to attempt to lay down explicit directions to be followed absolutely in all details. There are, however, certain fundamental principles that must be recognized in this work. With these facts in view, the following outline is offered as a general guide, it being understood that many details are left to the judgment of the breeder to be carried out as conditions and circumstances may determine.

In the plan here described there are proposed two alternative methods of procedure to be followed after the first year's work; namely, mass selection and pedigree selection, which are described here as Method A and Method B, respectively. Mass selection is much the simpler and it is recommended for the busy farmer who may not be able to give the time and attention required by the more exacting methods of pedigree selection. Pedigree selection offers the greater possibilities for improvement if properly carried out, but success depends absolutely upon the accuracy with which all details of the work are

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conducted, and this system is recommended only for the breeder who can give the requisite time and the careful attention demanded.

The proposed plan of breeding is laid out under the following sections:

I. THE FOUNDATION STOCK
II. THE PRELIMINARY EAR-ROW TEST
III. SUBSEQUENT BREEDING—TWO ALTERNATIVE METHODS
   A. Breeding by Mass Selection
   B. Breeding by Pedigree Selection

I. THE FOUNDATION STOCK

1. Choose a variety well adapted to the local environment, at the same time taking into consideration commercial demands.
2. Select a large number of desirable ears, the more the better—several hundred if possible. It is preferable to take them from the standing plants in the field, selection being made in accordance with suggestions given in Section III, Method A.
3. Number each ear, skipping the even 10's to provide for checks, as explained below. Descriptive records of size, shape, type, etc., are of interest but not absolutely essential.
4. Germinate a sample from each ear. Observe variations in relative vigor. Such a test affords an excellent means of getting acquainted with your foundation stock.

II. THE PRELIMINARY EAR-ROW TEST

1. Select a uniform piece of land for an ear-row performance test. Plow so that the corn rows may be planted across the furrows at right angles. The same applies to the spreading of any manure or fertilizer on this land.
2. Plant seed from each ear in an individual row, numbering the rows to correspond with the ear numbers. A good, permanent label showing the row number should be placed at every tenth row.
3. Reserve the remnants of the ears for possible future use. Protect these remnants from the weather and from mice and other vermin.
4. Plant check rows from a uniform lot of seed at intervals of every tenth row, starting with No. 0 and continuing with the rows 10, 20, 30, and so on.
5. Duplicating the series adds immensely to the reliability of the work, and running a triplicate series is still better.
6. Rows should be 20 to 40 hills long, according to whether they are repeated.
7. The preferable system of planting for this purpose is one stalk to the hill, in which case the hills may be about 20 inches apart within the row.
8. No detasseling is necessary in this plot.
9. Watch the rows thru the growing season and compare their development. Notice characteristic tendencies of each individual row as a whole and note especially any variation in maturity.
10. Harvest and weigh each row separately. Taking into consideration state of maturity, select seed from the highest yielding rows. It is suggested that for Method A about 10 percent of the rows be taken; for Method B, not less than 40 rows.
(Repeating this trial a second year with the same ears will add still more reliability to the final selection.)
III. SUBSEQUENT BREEDING—TWO ALTERNATIVE METHODS

From this point, the breeding may follow either one of two different systems, namely *mass selection* or *pedigree selection*, as outlined in the following divisions under Method A and Method B, respectively.

**METHOD A—BREEDING BY MASS SELECTION**

1. Mix together the remnants of the most productive ears as determined by the preliminary ear-row test.
2. Plant this composite seed in a patch which is so located that the plants will not be exposed to crossing, thru contact with pollen of other corn. This plot we may call the seed patch.
3. Early in the autumn go into this seed patch and select ears from the standing corn, paying particular attention to the following points:
   a. Select only from hills having two or more plants and with no missing hills adjoining.
   b. Avoid plants growing in close proximity to barren plants.
   c. Select strong, vigorous stalks that are neither broken, leaning, weak, nor diseased.
   d. Ear should be borne not too high on the stalk and preferably hanging downward at maturity.
   e. Avoid excessively long or short shanks.
   f. Place special emphasis on maturity by making the selection early enough to distinguish between early and late tendencies as indicated by color of husks and denting of grain.
   g. In this manner proceed each year to select seed from the field. After the first year, the special seed patch may or may not be maintained, but the hand-picking should be practiced regularly.

**METHOD B—BREEDING BY PEDIGREE SELECTION**

1. Select a plot of uniform land as well isolated as possible from other kinds of corn (40 rods or more distant). Exercise precaution regarding plowing and fertilizing as mentioned above in Section II, paragraph 1.
2. Plant the remnants of the most productive ears as determined by the preliminary ear-row test, each ear in an individual row. In order to guard against possible detrimental effects of inbreeding, it is suggested that at least 40 such rows be planted.
3. Number the ears and the rows to correspond, allowing for a check row every 10th row.
4. Plant check rows of a uniform lot of seed, at regular intervals—every 10th row. These check rows must be detasseled completely.
5. A duplicate planting in another field will add immensely to the reliability of the work.
6. Make the rows 200 hills or more long.
7. Provide for an even stand by planting extra kernels and thinning the plants after they come up.
8. Detassel one-half of each breeding row, alternating the detasseled ends (or, if the duplicate planting suggested above is made, detassel entirely the alternate rows in each plot, taking the even numbered rows in one plot and the odd numbered rows in the other).
9. Detassel every plant in all check rows.
10. Detassel all inferior plants everywhere in the plot.
11. Harvest and weigh each row separately.
12. According to the performance record, select a proportion (not greater than one-fourth) of the competing rows.
13. From these high-yielding rows, select an equal number of ears from detasseled plants, the total number of ears selected being sufficient to furnish seed ears for a similar breeding plot the following year.
14. Keep records sufficiently complete to show at least the pedigree and the performance of every seed ear used in the breeding plots. To these may be added other records of significance when breeding for special characteristics.
15. Proceed in similar manner in subsequent years.
16. Plant a multiplying plot from extra seed produced in the selected rows of the breeding plot.
17. Select each year from the multiplying plot the best seed for planting the commercial fields.