

## THE FIRST GENERATION CROSS BETWEEN TWO STRAINS OF CORN BRED FOR HIGH AND LOW EARS\*

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The parents of the cross considered in this paper are the Illinois High Ear and the Illinois Low Ear strains of corn. These strains originated from the same field of Leaming corn in 1902 and have been grown in separate plots continuously since then by the Illinois Agricultural Experiment Station, and selected for High Ears and Low Ears respectively, with the results shown graphically in Fig. 1. It is my purpose to consider briefly some of the characteristics exhibited by a first generation cross between these two strains arising from the same original stock which, after having been bred divergently for eleven generations, were recombined.

The two parents and the F. generation were grown contiguously in 1-13th acre plots, duplicated, on the Plant Breeding Corn Hybrid Field in 1914. The cross was made the year before by planting and detasseling a few rows of Low Ear

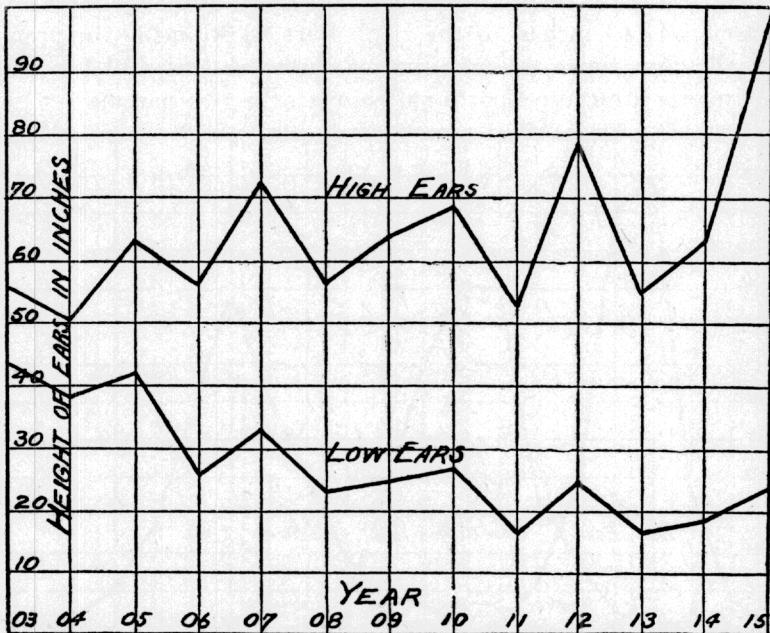


Figure 1

at one side of the High Ear plot so that the Low Ear silks were pollinated with High Ear pollen. Measurements were taken the fore part of October after all growth had ceased. By height of ear is understood to mean the length of stalk from the surface of the ground to the node from which the ear grows. In event of more than one ear the upper one is always measured as it is usually the principal ear. The number of internodes are counted from the surface of the ground to the ear-bearing node.

### HEIGHT OF EAR

\*Paper read before the Illinois Academy of Science, February 19, 1916.

	Low Ear	High Ear	Low Ear x High Ear
Mean .....	17.64±.20	68.06±.32	39.12±.25
Standard Devi- ation .....	5.34±.14	8.62±.23	6.99±.18
Coefficient of Variability ...	.303±.008	.1266±.003	.1786±.005

Probably the most obvious difference between the three strains is in the height of the ear. The mean height of the Low Ears is 17.64 inches, of the High Ears 68.06 inches, or practically four times as high; that of the cross was 39.12 inches or nearly a mean proportional between the two parents. The

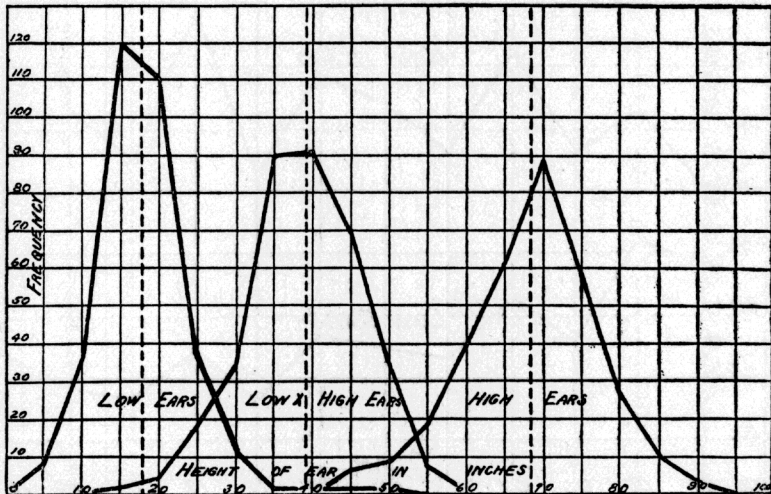


Figure 2

frequency distributions are represented graphically in Fig. 2, the height of ear in inches being plotted as abscissae and frequency as ordinates. The dotted lines represent the means. It is easily seen that the parent strains scarcely overlap at all, and that the cross is intermediate between them. The coefficient of variability in respect to height of ear of the cross is also intermediate between the coefficients of variability of the parents.

## INTERNODES

	Low Ear	High Ear	Low Ear x High Ear
Average Number .....	4.91	10.23	7.36
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The number of internodes in the cross was intermediate between those of the parents, the mean number of the cross being 7.36 as compared with 4.91 in the low ears and 10.23 in the high ears. The height of ear is due not only to the number of internodes, but also to the length of internode, and in this respect the hybrid is likewise an intermediate, the average length of internodes in the hybrid being 5.32 inches, whereas in the low ears it is 3.59 inches and in the high ears 6.65 inches. Fig. 3 shows graphically the relative heights of ear in the three strains and also the average length of internode for each strain drawn to the same scale.

An interesting difference resulting from the breeding for high and low ears is in the time of maturity. Although no attention has been paid to this character in making the selections, the low ears normally mature 10 to 15 days earlier than the high ears. In 1914 the low ears required only 54 days from planting to produce tassels; the high ears required 65 days, and the cross 56 days, showing it again to be intermediate although favoring the Low Ear parent.

## YIELD

	Low Ear	High Ear	Low Ear x High Ear
Bushels per acre .....	48.4	44.4	66.4

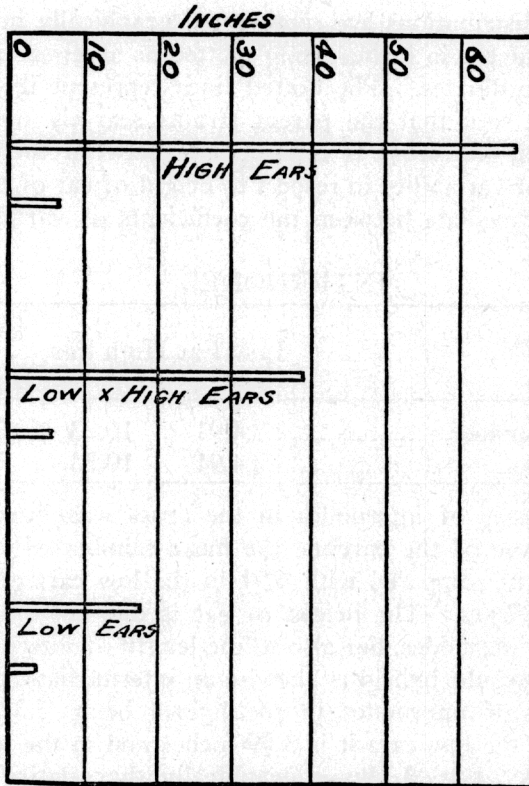


Figure 3

The parent strains have been close-bred for so long that their vigor is somewhat impaired, and the yield of grain is not as high as in the ordinary Leaming corn. In 1914 the High Ear plot yielded 44.4 bushels per acre, the Low Ear plot 48.4 bushels, and the  $F_1$  cross 66.4 bushels per acre, or 37 per cent more than the higher yielding parent and 27 per cent more than a standard strain of Leaming growing close by. While we have not the original stock from which the parent strains sprang, with which to compare these yields, we are probably safe in assuming that the vigor of the cross is at least as great as in the original stock.

We see, then, that the first generation cross between the high and low eared strains gives a type of corn on which the height of ear is intermediate between the two parents and which,

allowing for seasonal variations and fertility differences, probably approximates the height of ear of the original stock. The hybrid was reasonably uniform in respect to height of ear, its coefficient of variability being intermediate between those of the parents. In number of internodes below the ear and average length of internode, the cross was intermediate between the parents. The time required for maturity was intermediate in the cross, although favoring the Low Ear parent. In yield of grain, however, the cross gave an increase of 37 per cent over the higher yielding parent and 27 per cent over a nearby plot of Leaming, the variety from which the parents originated. It may be said then that in respect to certain physical measurements, for which the two strains have been divergently selected, the cross gives us values closely approximating the original variety, and in respect to yield the vigor lost to some extent by close breeding is fully restored.

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