

DOES IT PAY TO MAKE AN INDIVIDUAL EAR TEST OF HYBRID CORN?

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With the advent of hybrid corn, changes in the handling of seed ears were introduced, most important of which is an improvement in drying methods. Individual ear testing, formerly recommended for best results with open-pollinated corn, was discontinued. Some aspects of whether or not ear testing might be worthwhile in hybrids have been investigated by the writer during the last few years. A number of hybrids were used, the seed ears were harvested reasonably early and dried down to about 12 per cent moisture. The ears were then culled to remove all those that showed discolorations or blemishes. Germination was practically perfect throughout. Favorable weather conditions prevailed during the fall while the seed was produced, and again during the spring after the seed was planted. *Fusarium moniliforme* was the principal seed infection found during this period.

Loss variability in hybrids.—In the better types of open-pollinated corn grown in Illinois, it is usually an easy matter, by means of a proper germination test, to select from the same seed lot a group of ears free from fungus infection and another group of which nearly all kernels are infected with *Fusarium moniliforme*. In attempting to make similar selections in hybrids the writer found more difficulty. Much difficulty was outstanding in the fall of 1937 when ten double crosses all produced in the same field with the same pollen parent, but different with respect to female parents, were ear-tested on a germinator. In some hybrids *Fusarium* seed infection ran high, while in others it was low. The selection of 10 ears with uniformly high infection and also 10 ears nearly disease-free, out of 200 ears tested in each hybrid could be made satisfactorily in only a few cases, but was impossible in certain of the hybrids. In some, a lack of disease-free ears was the limiting factor, while in others it was a lack of highly infected ears. The lack of variability often found with a given hybrid seed lot offers little opportunity

for improving the lot through elimination of undesirable ears by means of a germination test.

Less injury from *Fusarium moniliforme* seed infection.—Some hybrids have apparently shown better resistance than certain types of open-pollinated corn to the seedling disease caused by *Fusarium moniliforme*. This conclusion was reached when the results from planting highly infected seed were compared with results obtained from nearly disease-free seed. During the three years, 1936-1938, thirteen different tests of this kind, each with a different Illinois Hybrid, were made. After the seed was selected for planting, composite tests made with a germinator showed an average of 8.5 per cent *Fusarium moniliforme* in the seed lots used as nearly disease-free seed, and 88.8 per cent in the infected seed. When the same seed composites were first surface-sterilized to kill all but the internal infections and then tested on sterile media in petri dishes, there was 2.0 per cent infection in the nearly disease-free seed and 50.1 per cent in the infected seed. When untreated seed was used the average decrease in yield from heavy infection as compared to light infection for the three-year period was 3.8 bushels with mathematical odds of 236:1, indicating that the decrease had significance and was not due to chance. When the seed was treated with ethyl mercury phosphate before planting, the decrease in yield was only 0.4 bushel.

The small difference obtained would not have justified the commercial practice of ear testing. The principal reasons for this small average difference, as compared to a difference of 5.9 bushels in open-pollinated corn for a nine-year period ending in 1928 (reported on page 61, Illinois Bulletin 354) are probably three: (1) better resistance to injury from *Fusarium moniliforme*, (2) less difference in actual infection between the infected and nearly disease-free seed lots in the hybrids used because of less opportunity for selection of wide differences in infections, and (3) favorable

spring growing conditions during the three years in which the hybrids were used.

Better seed drying conditions. Rapid drying equipment is an almost necessary adjunct to large scale seed corn production. An experiment to determine the effect of different rates of drying on internal seed infection was conducted with several widely grown hybrids in 1937 and 1938. The ears were hand-picked when the grain was at about 30-per cent moisture and divided at random into three lots, each of which was placed under a different drying condition. One lot was dried to 12-per cent moisture in four days, another in four weeks, while the third group still contained 17-per cent moisture at the end of three months when the ears were dried rapidly to 12-per cent. The first lot simulated kiln-drying conditions practiced by most of the large hybrid seed corn producers, while the second lot represented first-class rack drying as ordinarily practiced by careful farmers and seedsmen who do

not have forced hot-air drying equipment. Infection to an almost negligible amount in these tests. The total internal seed infection with the various fungi concerned was 5.1, 18.3 and 69.0 per cent, respectively, for the three different drying conditions.

Rapid drying decreased the internal seed

CONCLUSIONS

From the results obtained under the conditions of these experiments it can be concluded that an individual ear test for the detection of disease with the object of eliminating diseased ears from the seed lots would not have been of enough benefit to prove economically sound. The reasons why it did not appear to be of marked benefit as compared to results obtained earlier with open-pollinated corn appear to be fourfold: (1) less variability in hybrids, (2) less injury from *Pyricularia maydisiformis* seed infection in some hybrids, (3) improved seed drying conditions, and (4) better disinfectants for treating the seed.