Seed Corn Injury at Various Stages of Processing and Its Effect upon Cold Test Performance

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ONE of the problems faced by corn growers, particularly in northern areas, is that of poor spring stands in cold wet years. Such reductions can be attributed largely to the development of seedling blights and rots which kill the young seedlings before or shortly after emergence. Poor stands reduce yields in many cases and in extreme years may make replanting a necessity. During favorable seasons for growth there may be few differences among hybrids in their ability to produce good field stands, yet large differences appear when the planting season is unfavorable.

Dickson (3) studied the effect of soil temperature and moisture upon the development of seedling blight of corn caused by Gibberella saubinetii. He pointed out that corn is a warm weather crop which has an optimum growth temperature range of 24° C to 28° C and that the pathogen grows at temperatures between 3° C and 32° C. Seedling blight developed, however, only at temperatures below 24° C. From these studies, Dickson concluded that temperature is the greatest single environmental factor affecting the development of the disease and that its greatest influence is upon the host rather than upon the pathogen.

Flor (4) found that Pythium injury to germination and growth of corn increased with the water content of the soil, but was less severe in wet soils in warm weather than in cold weather. Inoculation of the soil with the pathogen did not materially affect germination when the soil was kept at 30-40% of its water-holding capacity.

The fact that microorganisms are capable of reducing stands of corn in cold wet weather is well established (3, 4, 6, 14, 17), but a few organisms apparently attack corn seedlings successfully at relatively high temperatures (8, 15, 16). These studies support the general belief that “adverse conditions for germination” of corn consist of high soil moisture, low soil temperature, and the presence of one or more pathogens capable of causing injury.

Many investigators (1, 2, 9, 10, 11, 12, 13, 14, 18, 19) have reported that a portion of the reduction in stand may be caused by an inferior or weakened condition of the seed planted. Seed corn which has received rough handling and which has sustained damage such as cracking of the pericarp has been shown to be susceptible to invasion by seed-borne or soil-borne organisms capable of causing seedling blight or root rot.

Tatum (18) and Tatum and Zuber (19) found a high negative correlation between breaks in the pericarp over the germ and stands in a 7-day cold test at 45° F. Breaks in the pericarp over the germ and stands in a 7-day cold test at 45° F. Breaks in the pericarp over the germ and stands in a 7-day cold test at 45° F. caused a reduction in stand. Field stands were found to be significantly correlated with cold test stands by Tatum and by Pinnell (14). Tatum suggested commercial processing as a cause of much damage to corn, with most injuries being inflicted at the company’s plant and subsequent devices.

As most seed corn now is picked, shelled, cleaned, graded, and treated mechanically, the amount of physical damage occurring is greater than previous to the period of mechanical handling. The purposes of this study were (a) to observe the amount and types of damage upon seed corn by various treatments in the processing plant and (b) to determine the extent of damage upon cold-test germination.

Materials and Methods

Minhybrid 408 and Hybrid “B” a closed-pedigree hybrid, were grown by a commercial company in southern Minnesota in 1946. Samples of comparable lots of each were grown by a commercial company in southern Minnesota in 1946. Samples of comparable lots of each hybrid were grown by a commercial company in southern Minnesota in 1946. Samples of comparable lots of each hybrid were grown by a commercial company in southern Minnesota in 1946. Samples of comparable lots of each hybrid were grown by a commercial company in southern Minnesota in 1946.

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