1-1-1959

The Cold Test for Corn

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The cold test for corn measures the ability of seed corn to survive and emerge under adverse field conditions. It provides information not obtainable from the standard germination test. Consideration of both cold test responses and standard germination responses provides the grower, dealer or farmer with a clearer insight into the quality of corn seed lots.

Basically the cold test is a duplication on a laboratory scale of cold, wet conditions frequently encountered in the field after planting and prior to emergence of corn. These adverse conditions prevent or retard germination leaving the seeds in a vulnerable condition for invasion and destruction by soil micro-organisms, primarily Phthium spp.

Uses of the Cold Test

The cold test has been successfully applied to a number of problems. It is used to test the effectiveness of seed treatment materials. Corn breeders have used it to evaluate the resistance of inbred lines and hybrids to adverse conditions. Seed companies use the cold test to evaluate their harvesting and processing procedures, particularly with respect to the mechanical injury incident to these operations, to evaluate carry over seed and commercial lots offered on the market.

Seed Factors Affecting Cold Test Performance

The response of corn to the cold test is affected by several factors associated with the seeds: (1) age; (2) maturity; (3) genetic background; (4) mechanical injury; and (5) seed borne organisms. In general, old or carry over seed, immature seed, badly damaged seed or seed infected with certain

organisms can be expected to give a low cold test germination. In addition, some hybrids and inbred lines are more susceptible to cold test conditions than others.

Environmental Factors Affecting Cold Test Performance

Many factors other than those associated with the seed affect cold test responses. The environmental conditions under which the test is conducted are particularly important. The soil, soil moisture content, temperature, length of the cold period, various pre-treatments, and seed treatment are all influential in determining the degree of response. By manipulating these conditions the severity of the reaction can be easily adjusted.

Cold Test Methods

Cold test methods have not been completely standardized. Several different types of tests are in use. In general, soil gathered from a corn field and mixed with sand is used. Various type containers such as plastic boxes, flats, or paper towels are used. The seeds are planted in the soil and the soil moisture content adjusted to 60 to 80 % of saturation. The tests are then subjected to a temperature of 46^{o} to 50^{o} F. for periods ranging from 5 to 10 days. After the cold period the tests are transferred to a warmer temperature (80^{o} to 86^{o} F.). After the seedlings have emerged the percentage emergence is determined.

What does the Cold Test Tell?

The cold test gives an indication of what can be expected from corn seed lots under severely adverse conditions. In contrast, the standard germination test indicates what can be expected under nearly ideal conditions. Normally, field performance will fall between these two extremes.

The cold test provides information on the vigor of seed lots, the uniformity and adequacy of seed treatment, and the extent of mechanical damage to the seed. Based upon the cold test response the grower or dealer may decide to retreat the seed, to withhold low performance seed from the early market or possibly to withdraw them entirely from the market.

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April 23, 1959