Some Factors Influencing the Artificial Drying of Mature Grain Corn

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The increase in corn acreage in many areas of Ontario during recent years has been outstanding. This has been particularly true in the instance of corn grown for the production of grain. The most plausible explanation of this change in agricultural practice is the advent of early strains of hybrid corn. The better strains of this type of corn have consistently out-yielded barley by a very profitable margin. They are also more adaptable in that they can be planted later in the spring, and can be harvested after all other crops have been removed from the field.

The increased production of grain corn has brought with it problems relative to the drying of the harvested crop. Where seed production is involved some kind of artificial drying is usually needed. Even where the crop is designed entirely for feed, and this should be the case where double cross hybrids are grown, some use of artificial heat to speed drying would be of decided advantage.

It was for this reason that some investigations were undertaken at the Field Husbandry Department of the Ontario Agricultural College to secure additional information that might be of service to those contemplating the drying of grain corn.

The investigation had three definite objectives: First, to secure information on what temperatures corn of varying initial moisture content could stand and still retain satisfactory germination; second, to determine the possibilities of speeding up and thus decreasing the cost of drying grain corn by the use of higher temperatures than could be used where the dried product was intended for seed purposes; and third, to investigate the lag in temperatures between the interior of the ear and the surrounding temperature, during the process of artificial drying.

Material and Methods

A thermostatically-controlled air-circulating type of electric drier was available that could be regulated to hold any temperature from around 70°F to around 210°F. Along with this an excellent supply of ears was secured from a large hybrid corn test area. These ears, although all mature, presented a range of moisture content at harvest time and were most suited, therefore, to the purpose in mind. It was realized that hybrids may differ in their reaction to drying by artificial heat. However, it was being through a very small hole in the cover of the drier. The corn was placed in a cool place until needed, and emerged from this storage in excellent condition with little apparent change in moisture content.

At the beginning of each experiment the ears were weighed and placed in wire trays in the drying chamber. Drying process started at the predetermined temperature. Drying temperatures ranged at 5°F intervals from 105°F to 175°F. The drying continued for a period of 10 to 20 hours, reduced the moisture content to around 12%, and was weighed at 2-hour intervals. At the conclusion each ear was dried to a moisture-free basis and the moisture content determined initially, and at each 2-hour weight. Influence of fluctuating temperatures was studied at continuous temperatures.

Where the germination of the dried grain was tested, ears were sampled previous to drying and at the drying period. Fifty kernels were removed from each ear, about 2 inches from the butt of the ear. The same kernels were planted in soil and germinated in the greenhouse, and sprouts were considered in the final rating on germination.

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Kiesellbach (4) reports that fully matured corn with remarkably low initial moisture may be dried artificially to 112°F without any significant effect on the wrinkling of the pericarp of the dried seed. Robb (5) reports very satisfactory seedling emergence when mature corn grown in soil in greenhouse plots. Keinholz (3) indicates that the field germination than results obtained by the use of a germinator. Dimmock (1) reports satisfactory curing by planting in flats in the greenhouse.

For purposes of comparison the results secured.