HEAT RESISTANCE IN OAT VARIETIES

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Oats are generally considered to be less tolerant to heat than any of the leading cereal crops. Despite this situation, the major oat-producing areas of the United States frequently experience high temperatures during the most critical periods of the growth of the crop, and decreased yields of oats resulting from heat and attendant drought are very common. Consequently, any information helpful in preventing or reducing such losses is of interest to oat breeders, farmers, and others.

Statements, presumably based upon observation or deduction, frequently have been published to the effect that red oats, i.e., varieties belonging to *Avena byzantina*, supposedly derivative from the wild *A. sterilis*, are more heat resistant than are the common oat varieties of *A. sativa*, which supposedly are derived from *A. fatua*. Red oats are more widely grown in southern United States and in California, and the warmer sections of the world where oats are produced. Published data on the comparative heat resistance of oat varieties have not been presented, however. Laboratory tests of the heat resistance of oat plants were begun in 1936 in order to obtain some information on this subject. The experiments were limited to young plants, and the results reported here on the relative heat resistance of individual varieties should be considered merely as preliminary indications.

MATERIALS AND METHODS

Much time was consumed in devising a technic which would indicate differences between varieties in heat resistance. The equipment available was a Freas electrically-operated, thermostatically-controlled oven used primarily for the drying of plant materials. The heat in this oven is produced by a current of air passing over electrically-heated coils. The warm air is forced through the oven by a motor-driven fan. The oven temperature was maintained within a range of 2½° to 3° C.

Originally the minimum temperature possible in the oven was about 60° C. Tests indicated this temperature was too severe for oat plants even when the period of exposure was as short as 45 minutes. After some adjustments, however, it was possible to obtain a temperature control ranging from some 48½° to 52° C, which was used in most of the tests.

Two asbestos baffle plates were inserted in the oven, one on the windward side and one at the top to deflect the direct hot-air blast from the plants. The current of hot air was still sufficient to keep the leaves of the oat plants almost constantly in motion.

The pots containing the oat plants were set in a pan containing about 2 inches of water in order to retard drying. This tended to reduce the heat from the bottom.