INHERITANCE OF HESSIAN FLY RESISTANCE DERIVED FROM W38 AND DURUM P. I. 94587

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The resistance of the spring wheat W38, C.I. 12061 and of the durum P.I. 94587 to hessian fly, Phthorimaea destructor Say, was discovered in the summer and fall of 1935 (1). Since that time breeding work has been in progress to transfer resistance from these strains into soft red winter wheat types. This paper presents data on the genetic behavior of resistance in progeny of crosses studied in this program.

METHODS AND MATERIALS

Plantings for inheritance studies were made both in the field and the greenhouse. The F2 populations in the field were spaced by planting the seed at 2.5-inch intervals. The F2 families were sown in two replications, each replication consisting of a 10-foot row in which approximately 48 seeds were sown. The field plantings were made shortly after September 1, well in advance of the so-called fly-free date, to take advantage of as severe a fly infestation as possible. In both 1937 and 1938, infested stubble was placed in rows surrounding the planting and in paths between plots, with the base of the stubble covered with soil. In 1938, an extremely heavy natural occurrence of the fly was in itself more than adequate for severe infestation. Temperatures were normal in the field in 1937, but exceptionally high temperatures prevailed in 1938 from planting time through the period of infestation. This resulted in the development of larvae in many plants of the resistant genotypes, which, nevertheless, did not develop typical symptoms of infestation.

In the studies under greenhouse conditions, as specified below, the plants were exposed to infestation under cheesecloth tents as described by Cartwright and LaHue (3). Temperatures were maintained at approximately 70°F. In the tests of F3 families, the numbers of plants of each family ranged from 20 to 30 for the majority of families. The population of hessian flies used in these tests originated from a collection made at Lafayette, Ind., in October, 1938.

The plants were classified as (a) infested or noninfested, depending on whether puparia were present or absent; or (b) as stunted or non-stunted, or upon both bases. In the first classification, the plants were removed from the soil and dissected, while in the second the evidences of infestation were visible without removal or dissection of plants. The stunted condition characterizes infested plants of susceptible varieties or lines of wheat when infested by one or more larvae of the fly. It is the result of the failure of leaf sheaths to elongate, causing a telescoping of the leaves, and is attended by the development of a deep blue-green color.

The inheritance of resistance in crosses involving the durum, P. I. 94587, and the vulgare wheats, W38 and B36162A13-12, as resistant parents is reported here.

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3C.I. refers to accession number of Division of Cereal Crops and Diseases.

4P.I. refers to accession number of Division of Plant Exploration and Introduction, Bureau of Plant Industry, Soils and Agricultural Engineering.

5Numbers in parenthesis refer to "Literature Cited", p. 408.