INSECT RESISTANCE IN WHEAT

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AMONG the methods of preventing losses caused by the insect pests of growing wheat, the breeding of insect-resistant varieties now appears to be one of the most promising, and the following discussion relates largely to methods that have been or are being used to produce varieties resistant to the hessian fly, *Phytophaga destructor* (Say).

REVIEW OF LITERATURE

The earliest recorded observation of hessian fly resistance in wheat was made by Isaac Underhill near Flushing, Long Island, in 1782 (1, 8, 12). This resistant wheat was described as a hard-stemmed, yellow-bearded variety, which was subsequently given the name of Underhill. Packard (21) stated that, "Of the different varieties of fly-proof wheat, the Underhill variety has for nearly a century been highly recommended."

Chapman (8), in 1778, besides recommending a resistant variety of wheat, advocated late sowing as a precaution against fall fly attack and the planting of varieties of quick, vigorous growth against spring attack. This is perhaps the first observation on the desirability of delayed seeding, the most practical method of general fall fly control in use today. Delayed seeding, however, is ineffective under some adverse seasonal conditions and involves a disadvantageous agronomic practice. There is no known control of the spring brood of flies except the use of resistant varieties.

In the earliest references to "fly-proof" wheat, Underhill, Lancaster, Lawler, and White Flint are mentioned frequently. In later accounts, China, Clawson, Mediterranean, Red Chaff, Red May, and Fultz occur often.

Woodworth (37) is credited with making the first systematic study of the variations in fly resistance. He examined 125 varieties of wheat being grown at Berkeley by the California Agricultural Experiment Station, classified them into three groups according to degree of resistance or susceptibility, and also called attention to the fly resistance of durum wheat. Roberts, *et al.* (30) and Gossard and Houser (13), in resistance tests in New York and Ohio, found that vigorous-growing, strong-strawed varieties were less liable to injury by the fly than slow-growing, weak-strawed varieties and found little evidence to support the idea of immune varieties. Dawson was found resistant in many counties of New York, and susceptible in Canada and Ohio.

In the years following, many papers on fly-resistance studies appeared, notable