THE INHERITANCE OF FUSARIUM WILT RESISTANCE IN FLAX

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The disease caused by Fusarium lini Boll. is characterized by a sudden wilting of the flax plant at any stage from the seedling to maturity. In certain cases, plants may show yellowed or wilted leaves on one side of the stem only but extending from crown to tip, or the main stem may die and new, apparently healthy branches appear at the crown. The amount of wilt in susceptible strains has been shown by Tisdale (6) and by Jones and Tisdale (2) to vary with the temperature. Between temperatures of 20° and 34° C, the amount is very high, but below 16° C and above 36° C, very little appears. The optimum for the wilt is at 24° to 28° C.

Certain variations in the results obtained by Tisdale (5) seemed explainable on the basis of genetic impurity in the parent stocks. In an experiment by the writer in which blue-flowered and white-flowered strains of flax were planted in alternate rows 10 inches apart, 1.12% of cross-pollinated, i.e., blue-flowered offspring, were observed in a total of 1,161 plants from the white-flowered individuals. All but one were tested and all these proved to be crosses. The observed number of off-types varied from none to as high as 4.29% on different plants. In the present work, in order to insure homozygosity, at least three generations of selfing preceded the crossing.

Since the environment plays such an important rôle in the expression of resistance and susceptibility, the F2 was classified on the basis of an F1 test. Since strains have been obtained which breed true for intermediate percentages of wilt, however, one cannot decide from an F3 progeny test alone whether or not the observed percentage of wilting is due to segregation. At the present time it seems that nothing short of extensive F4 tests can settle this point and provide a basis for determining the number of factors concerned in a particular cross.

1Contribution from the Department of Genetics, Wisconsin Agricultural Experiment Station, Madison, Wis. Paper No. 129. Published with the approval of the Director. Received for publication January 16, 1932.

2Reference by number is to “Literature Cited,” p. 748.