Inheritance of Stem Rust Reaction in a Khapli Emmer Cross

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This paper reports results of an inheritance study of the reaction of Triticum dicoccum Schübl. 'Khapli' to physiologic races 111, 15B, and 56 of Puccinia graminis Pers. f. sp. tritici Eriks. & E. Henn.

Hyens (7) inoculated 30 F₃ families from K hapli × T. aestivum L. 'Federation' with races 15 and 27 which are avirulent on K hapli and virulent on Federation. One family appeared homozygous for susceptibility to race 27. None of the families were homozygous for susceptibility to race 15. Aamodt (1) concluded from a study of K hapli × T. durum Desf. 'Mindum' that multiple genes control K hapli's resistance to races 9, 17, 21, and 34. Waterhouse (14) reported 2 dominant genes in K hapli for resistance to races 34 and 46. Heermann (8) and Heermann et al. reported that 2 dominant genes condition seedling resistance of K hapli to race 15B while adult plant resistance is conditioned by 2 partially dominant and 2 recessive genes. The partially dominant genes appeared identical or closely linked to the genes for seedling resistance, Khan (cited by Knott, 10) reported 2 dominant genes in K hapli effective against races 21-2, 126-1, and 222-4. Attaullah (2) also found 2 genes in K hapli for resistance to 21-2 and 222-4, but only one of these was effective against 126-1. Athwal and Watson (3) reported that K hapstein, a derivative of K hapli × T. aestivum 'Steinwedel', carries one dominant and one recessive gene which interact cumulatively to condition resistance to races 21, 126 Anz. 1, 222 AB, and 222 BB. Knott (10) found resistance of K hapstein to race 56 to be controlled by 2 dominant genes which he designated Sr13 and Sr14. Resistance to race 15B was conditioned by Sr13 and a previously described gene, Sr7 (11), common in wheats (T. aestivum) from Kenya. Sr13 acted as a recessive gene for resistance to race 15B.

MATERIALS AND METHODS

The inheritance of reaction to P. graminis f. sp. tritici was studied in the F₀, F₁, F₂, backcross-Fₑ, and backcross-F₃ from a cross of K hapli (C.I. 4013) with T. durum 'Marrocos 9623' (P.I. 192334).

A single-spore culture (designated 111-SS2) of physiologic race 111 was used to test all plants. Culture 111-SS2 was previously used to study the inheritance of reaction in 2 durum and 2 common wheats of the differential host variety series (4, 6).

 RESULTS

The 483 F₂ plants tested with culture 111-SS2 were homogeneous (P between 0.2 and 0.05) when infection types were combined. Based on infection types, the progeny were separated into 4 phenotypic classes in a ratio of 283 with infection types 0 and 0;162 with infection type 0;12; : 27 with infection type 13—n, and 11 with infection type 3—4—c. The observed distribution was an acceptable fit to a 36:24:3:1 ratio (P between 0.10 and 0.20). The phenotypic distribution of 300 F₂ plants and F₃ is shown in Table 1. The progeny with infection types 0 and 0;162 with infection type 0;12; were combined into 1 class for the analysis. The 183 F₂ plants that were not tested with culture 111-SS2 and the F₃ were distributed approximately in a ratio of 283:162:27:11 (P between 0.05 and 0.10). This ratio for reaction to 111-SS2 differ by 3 in favor for reaction to 111-SS2. Two of the generation type 0;12; and interact to condition the third gene, which conditions infection type 3—4—c. The observed distribution was an acceptable fit to a 36:24:3:1 ratio (P between 0.20 and 0.20). The ratio of Khapli and Marrocos 9623 differ by 3 in favor for reaction to 111-SS2. Two of the generation type 0;12; and interact to condition the third gene, which conditions infection type 3—4—c. The observed distribution was an acceptable fit to a 36:24:3:1 ratio (P between 0.20 and 0.20). The ratio of Khapli and Marrocos 9623 differ by 3 in favor for reaction to 111-SS2.