

INHERITANCES OF LEAF RUST RESISTANCE IN SIX WHEAT CROSSES

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ABSTRACT

Wheat leaf rust is very destructive to the susceptible wheat cultivars. Breeding for resistance is still the most economic and desirable method for controlling the disease. The objective of this investigation was study the nature of inheritance of leaf rust disease resistance. This study was to carried out at the Experimental Farm of Sakha Agricultural Research Station, Kafr El-Sheikh Governorate, during the three growing seasons of 2007/08, to 2009/10. Six population “P1, P2, F1, BC1,BC2” and F2 of six wheat crosses: cross 1 (Sakha 69 × Line 1)), cross 2 (Sakha 69 × Sakha 94), cross 3 (Sakha 69 × Sids 12), cross 4 (Sids 12 × Line 1), cross 5 (Sids 12 × Sakha 94) and cross 6 (Line 1× Sakha 94) were evaluated leaf rust resistance. Gene action, heterosis, inbreeding depression, potance ratio, heritability and genetic advanced were estimated using Six population matting design. The study included leaf rust resistance as average coefficient of infection (ACI). The obtained results from figures of normal curve distribution and (χ^2) test suggested complete dominance toward resistance in the crosses 3 and, 4; partial dominance toward susceptibility in the crosses 1 and 2; over dominance toward resistance for the cross 5 and over-dominance toward susceptibility in the cross 6. Different segregation ratios were recorded in the crosses under study for F₂ generation where, 3: 1 (one dominant gene) in the crosses 3 and 4; 7:9 (two complementary recessive genes) in the crosses 2 and 6, while, 1:1 (one dominant gene) in the backcross for crosses 3 and 4; 1:3 (one recessive gene) in the backcross for the crosses 2 and 6. Dominance gene effects were generally higher in magnitude than additive effect in six crosses, indicating the important role of dominant gene in the inheritance of leaf rust resistance. Moreover, at least, two types of epstatic gene effects were important in the basic genetic mechanism. In most cases, additive × additive type of gene effects were relatively more important than additive effects in the inheritance of leaf rust resistance in six crosses, but less

important than dominance ones. These results indicate that additive, dominance effects and the different types of gene interactions were important in the inheritance of leaf rust resistance under investigation. The results indicated that the genotypic variance for leaf rust resistance in all crosses was the major part of the phenotypic variance. High heritability values, in broad sense were obtained for leaf rust resistance in the six crosses. High genetic advance was associated with high heritability values for leaf rust resistance in the six crosses. Moderate to high value of predicated genetic gain were obtained for leaf rust in the six crosses. Significant heterosis was found relative to mid- and better parents for leaf rust resistance and inbreeding depression values, was highly significant and negative estimates except, one cross.

Key Words: Leaf Rust Resistance, Wheat, Gene action, heterosis, inbreeding depression, potance ratio, heritability and genetic advanced.