

DURABLE RESISTANCE TO LEAF RUST IN SOME EGYPTIAN WHEAT CULTIVARS

By

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B.Sc. Agric. Sci. (Plant Pathology), Fac. Agric., Kafr El-Sheikh Univ., 2007

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APPROVAL SHEET

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SUPERVISION SHEET

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ABSTRACT

The levels of field resistance, which are known as partial resistance to wheat leaf rust, caused by *Puccinia triticina* were studied at adult plant stages, to show the durability and stability of Egyptian wheat cultivars during the period from 2012 to 2016. A wheat cultivar to, posses leaf rust durable resistance, must undergo some tests to prove its durability. In this study fourteen tested wheat cultivars were grown under field conditions at four locations in. Kafr-Elsheikh, Behira, Sharqia and Beni Swef governorates during four successive growing seasons (2012/13-2015/16). The final rust severity (FRS%), (r- value) and (AUDPC) were found to be of lower values in wheat cultivars, Gemmiza 12, Sids 12, Sids 13, Misr 1, Misr2, Giza 168, Giza 171 and Sakha 94, These cultivars are characterized and believed to have durable resistance to leaf rust. Under greenhouse conditions the wheat cultivars Gemmiza 12, Sids 13, Giza 168, Giza 171 and Sakha 94 had longest incubation period (12 days) and latent period (13-15 days) in addition to they exhibited, the lowest values of pustules denisity cm² ranged from (5.00 to 15 cm²) and pustule size (mm²), ranged from 0.023 to 0.088 mm². These five cultivars could be characterized as highly resistance to leaf rust. Thirteen cultivars were identified by moluacilar marker for *Lr13*, *Lr34* and *Lr46* data showed that the wheat cultivars Giza 168 and Giza 171 carry the three genes of durable resistance *Lr13*, *Lr34* and *Lr46*, followed by cultivars i.e. Gemmiza 9, Gemmiza 10, Gemmiza 12, Sids 12, Sids 13, Misr 1, Misr 2 and Sakha.94 which carry two durable resistance genes *Lr34* and *Lr46*. Crosses between the nine wheat cultivars and the two durable resistance genes to leaf rust *Lr13* and *Lr46* showed the presentence of *Lr13* in the two cultivars, Gemmiza 10 and Sakha 94 and *Lr46* in four cultivars Misr 1, Misr 2, Sids 12 and Giza 171. Genotypes including Sids13, Sakha 94, Giza 168 and Gemmiza 12 which are as stable cultivars according to consideration of the two stability parameters. The effect of leaf rust infection on grain yield showed that wheat cultivars Misr 2, Sakha 94 ,Sids 12, Gemmiza 9 and Gemmiza 10 showed lower levels of final rust severity (FRS) and area under disease progressive curve (AUDPC), which exhibited lower levels of actual yield losses % ranged from 1.25% to 5.90% in the thousand kernel weight and from 1.24% to 3.93% in yield per plot. While Gemmiza 7 and T.S.S), which showed the highly level of (FRS%), (AUDPC) and actual loss% (10.71% and 10.76%) and (21.68% and 9.98%) in the two yield components, respectively, and was characterized as fast rusting or highly susceptible wheat cultivars. Resistance genes *Lr9*, *Lr19*, *Lr34* and *Lr46* which exhibited the least levels of rust severity% ranged from 0 up to 10MR, MS at the multi-locations (governorates) and during the three growing seasons of the study. These four resistance genes could be characterized as more effectiveness and stability against wheat leaf rust.. The quantitative analysis of the F1 and F2 leaf rust severity showed that the heritability values for all the tested crosses are considered to be higher, ranged from 84.78%, to 97.2%, The numbers of genes to all tested parents are controlled by two or three gene pairs. In most cases, in adult plant stage, these results indicate that the selection for this character in early segregating generations could be possible, while delaying it would be more effective, due to the important role of dominance effects in the expression of this trait.

Key words: Wheat, *Puccinia triticina*, *Lr,s* genes, durable resistance, Molecular markers, yield loss.

DEDICATION

*I dedicate this work to whom my heartfelt thanks; to **my parents, my husband** and my daughters **Rana and Safia** for their patience and help, as well as to my family for all the support and they lovely offered along the period of my post-graduation. Also, I feel deeply grateful to my dear country Egypt.*

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