

DNA MARKERS-ASSISTED SELECTION TO PYRAMID RUST RESISTANCE GENES IN WHEAT BREEDING LINES

Daniel CRISTINA¹, Alina-Gabriela TURCU¹, Cristina-Mihaela MARINCIU¹, Gabriela SERBAN¹, Indira GALIT¹, Elena-Laura CONTESCU¹, Vasile MANDEA¹, Matilda CIUCA¹

e-mail: mcincda@gmail.com

Abstract

Rust diseases (leaf, stripe and stem rust) of wheat constitute a major threat to wheat production worldwide including Romania. Durable rusts resistance is a significant component for food security and combining/pyramiding of rusts resistance genes into new wheat cultivars is the main strategy to increase durability of resistance. This work reports a gene pyramiding wheat breeding approach assisted by DNA markers used to develop new breeding rust resistant lines. In this study 60 breeding lines were analyzed for the presence of resistant haplotypes *Lr34/Yr18//Sr57/Ltn1*, *Lr37/Yr17/Sr38*, *Lr46/ Yr29//Sr58/Ltn2* and *Lr68/Ltn4* using DNA markers. The results showed that 17 wheat breeding lines carried the *Lr* genes pyramided in homozygous or heterozygous state, other 13 lines carried only one *Lr* gene, while 30 breeding lines had no resistant alleles *Lr*, from the analyzed *Lr* genes. In homozygous state we found the following combinations: *Lr34+Lr37* (one line); *Lr37+Lr46* (six lines), *Lr37+Lr68* (one line) and only one line, GCO-12, with three resistant alleles in homozygous state *Lr34+Lr37+Lr46*. This line also carried heterozygous alleles for *Lr68* gene, so, this result suggest that it is possible to obtain a line with four resistance *Lr* alleles (*Lr34+Lr37+Lr46+Lr68*) using markers-assisted selection (MAS). The wheat breeding lines with two, three or four resistance alleles were identified in the F5 generation and will be used to accelerate the rust resistance breeding program at NARDI Fundulea. Furthermore, this study proves the value of MAS breeding strategy, for the acceleration of wheat rusts resistance cultivars development.

Key words: rust resistance, markers assisted selection, wheat breeding, *Lr* genes pyramiding
