

CISGENESIS TO IMPROVE DURUM WHEAT SUSTAINABILITY BY A WHEAT DURABLE RESISTANCE GENE

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Fungal diseases can cause severe yield losses in wheat, together with downgrading in quality. Breeding resistant cultivars is thus a sustainable way for an efficient control of these diseases. The wheat Lr67 gene, also indicated as "magic gene", has been isolated from a common wheat landrace and introduced in the wheat cultivar Thatcher, conferring partial resistance to all three wheat rust pathogen species and powdery mildew. This gene acts by altering the hexose content in the apoplast, thus providing durable resistance without affecting grain yield. The aim of this study was to introduce the resistant allele of this gene by cisgenesis in the durum wheat variety "Svevo", a cultivar partially susceptible to stem and yellow rust races, based on previous phenotypic evaluations. After resequencing the LR67 gene in Svevo to confirm the lack of the resistant allele at the Lr67 loci on chromosomes 4A and 4B, three biolistic transformation experiments were carried out using a "minimal gene cassette" consisting of linear DNA fragments containing the promoter, the coding sequence and the terminator of the LR67 gene, excised from the source plasmid, and without any herbicide or antibiotic resistance marker genes. A total of ten, eight and seven T₀ regenerated plants were identified from each experiment respectively, as containing the LR67 gene by PCR assay with primers designed on the entire cassette. The presence of the cisgene has also been confirmed by Sanger sequencing. The same PCR method has been used to follow the inheritance of the gene from the T₁ to T₂ generations. Up to now, T₂ and T₃ seeds are available, for identification of homozygotes containing and expressing the cisgene, on which the resistance phenotype will be verified.