

## **DEVELOPMENT OF A MARKER ASSISTED SELECTION PROGRAM FOR THE IMPROVEMENT OF DURUM WHEAT (*TRITICUM DURUM* DESF.)**

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Italy is the main producer of pasta in the world and the genetic improvement of durum wheat represents a strategic activity for the entire agro-industrial sector.

DNA markers have an enormous potential to improve the efficiency and precision of conventional plant breeding via marker-assisted selection (MAS). This paper describes the work carried out at the Cereal Research Centre (CRA-CER) for the development of a MAS breeding program dedicated to the pyramiding of genes for low lipoxygenase (LOX) activity (*Lpx-B1.1*), high protein content (GPC; *Gpc-B1*), high yellow pigment content (YPC; *Psy-A1*) and disease resistances. The following R genes were considered: leaf, stripe and stem rust (*Lr14c*, *Yr36* and *Sr13* or *Sr26*, respectively), powdery mildew (*Pm36*) and soil borne cereal mosaic virus (SBCMV; *QSBm.ubo-2BS*).

A set of durum wheat varieties and introgression lines carrying the desirable genes were chosen as donor lines, while the recipient line was the Italian durum cultivar PR22D89, characterized by a high gluten quality and good yield.

The crosses were performed separately for each donor line with PR22D89, than the introgressed genes were first fixed in a homozygous after the screening of the F<sub>2</sub> populations. Then, the F<sub>2</sub>/F<sub>3</sub> plants homozygous for the same genes and meeting the required phenotypic standards were selected for further crosses in order to combine up to 4 genes of interest segregating in the same populations.

Presently, several hundreds of genotypes are under evaluation and some F<sub>3.5</sub> lines are carrying genes at the homozygous state combining four different traits of interest: high GPC, low LOX activity, resistance to stripe rust and powdery mildew; as well as high GPC, low LOX activity, resistance to stripe and leaf rust. These lines exhibited a good increase in GPC with a very limited negative impact on grain kernel weight.