GENERATION OF AN EMS MUTANT COLLECTION FOR ISOLATION AND CHARACTERIZATION OF GENES OF AGRONOMIC INTEREST IN DURUM WHEAT

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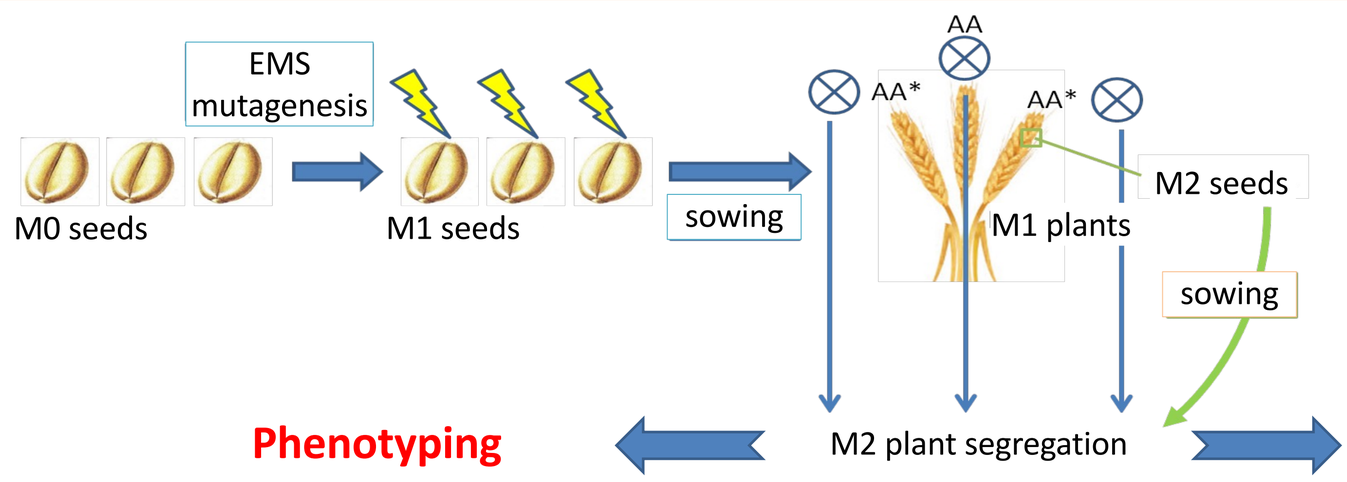
Mutagenesis is a popular and effective way to create genetic variations in crops, identify new genes, promote functional genomics studies, and accelerate breeding programs. Ethyl methane sulfonate (EMS) has been widely used to obtain mutants in crop plants because it has the advantages of higher point mutation, fewer chromosomal aberrations, and easier screening of mutants. The recent advances in large-scale genome sequencing techniques in species with complex genomes, like wheat, have made affordable to identify and characterize genes associated with traits of interest in mutant populations.

We have generated an EMS mutant collection of durum wheat cultivar 'Gallareta'. The EMS treatment reduced around 15% the viability of the M1 seeds, but 1800 M1 plants could be obtained. Preliminary studies in a set of 100 M2 progenies showed 36 families with altered phenotypes affecting height and size of the plant, phenology, color, size and structure of ears or fertility. Ninety-six M2 families were also analyzed for glutenin and gliadin composition by SDS-PAGE and, in seven of them, different patterns (compared to 'Gallareta') for high molecular weight glutenins (HMW-GS) and w-gliadins were observed. The EMS-induced variations included null alleles and proteins with different electrophoretic mobility.

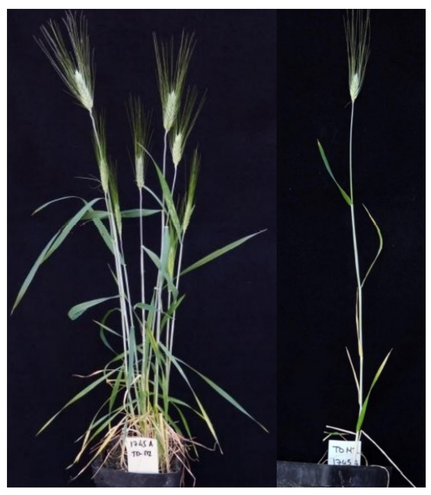


Phenotyping

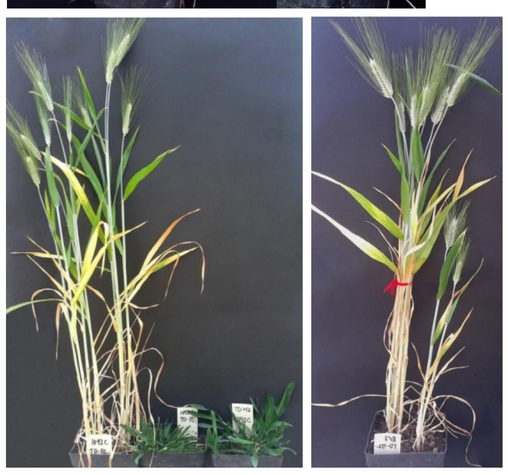
100 EMS lines

Phenotypic variability related to plant and spike

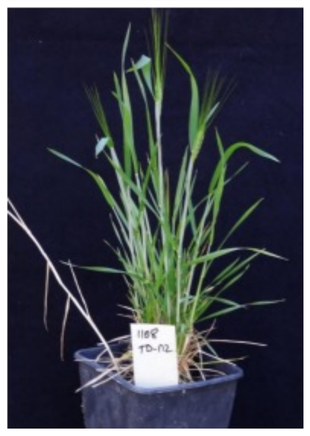
plant morphology & size



No tillering (12 M2 lines)



Small plants (7 M2 lines)



Grass-like plants (8 M2 lines)

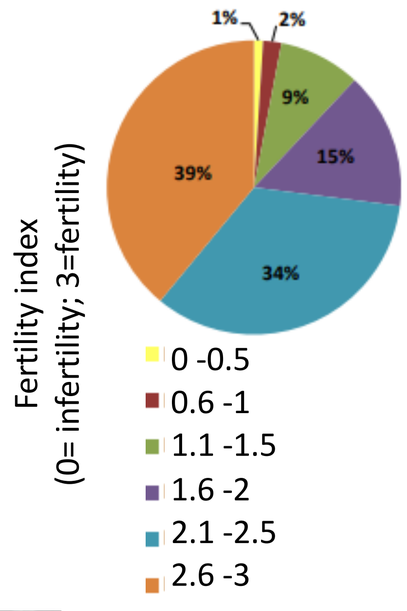
spike morphology & size

Multiflower (5 M2 lines)

Flower-in-flower (6 M2 lines)

Small spike (8 M2 lines)

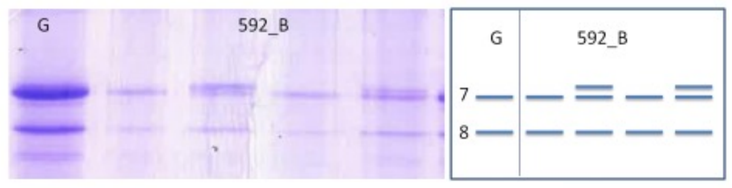
fertility



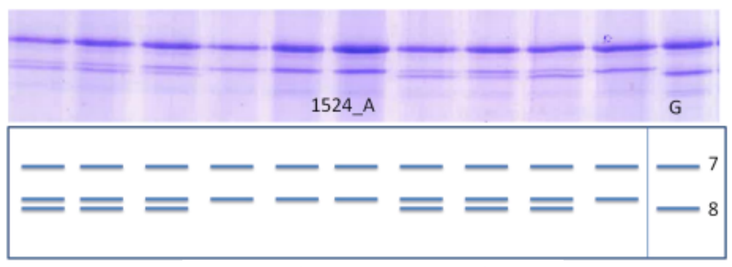
Biochemical markers

96 EMS lines

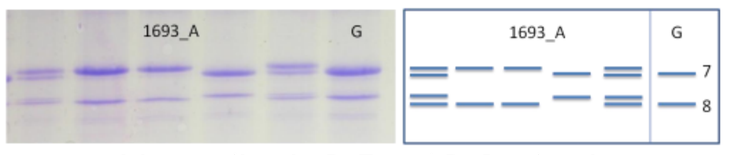
Different high molecular weight glutenin electrophoretic patterns compared to 'Gallareta' (G, alleles *Glu-A1 null* and *Glu-B1 7+8*)



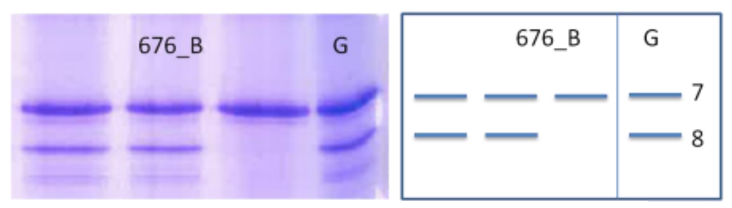
Mutant line in Bx7 subunit



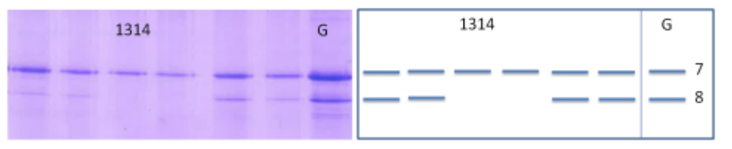
Mutant line in By8 subunit



Mutant line in Bx7 and By8 subunits



Mutant line in By8 subunit (null allele)



Mutant line in By8 subunit (null allele)

These results indicate that the EMS collection generated includes mutant lines that may allow the identification of new alleles of known genes associated to traits of interest for durum wheat breeding (i.e., yield components or functional quality), and the isolation and functional characterization of novel genes involved in less characterized developmental processes.

Acknowledgements

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