Proceedings of the LXVI SIGA Annual Congress
Bari, 5/8 September, 2023
ISBN: **978-88-944843-4-2**

Poster Communication Abstract – 2.16

EARLY SELECTION OF STRESS TOLERANT DURUM WHEAT RECOMBINANT LINES: TARGETED INTROGRESSIONS OF THINOPYRUM SPP. CHROMATIN IMPROVE SEEDLINGS RESPONSE TO HEAT AND WATER STRESS

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durum wheat, wild introgressions, heat and water-deficit, stress tolerance, stress combination

Extreme meteorological events caused by climate change are severely threatening the agricultural sector worldwide. Especially in the stress-prone area of the Mediterranean basin, heat waves and rainfall variability heavily affect durum wheat (DW) yield stability. To improve DW tolerance to heat and water-deficit phenomena, introgression of shortly sized chromosomal segments derived from wild germplasm is a promising strategy. Here, the response to heat (H) and combined water-deficit + heat (WH) stress of 4 chromosomally engineered DW-*Thinopyrum* spp. near-isogenic recombinant lines (NIRLs) was evaluated under controlled conditions. The NIRLs, carriers (“+”) and non-carriers (“–”) of differently sized alien chromosome segments included two primary types (R5, R112) with a *Th. ponticum* 7el1L segment on the distal ends of their 7AL arms and two corresponding secondary types (R69-9/R5, R69-9/R112) with a *Th. elongatum* 7EL segment distally inserted into the 7el1L ones. Margherita, an élite ICARDA variety, was included as heat tolerant control. Fourteen-day-old seedlings were subjected to H by increasing temperature from 20 to 42°C and maintaining it for 2 hrs. For the combined WH stress, 7-day-old seedlings were placed in a PEG solution (Ψ of -0,4) for 7 days, after which H was also applied using the same procedure as above described. With the main purpose of evaluating the effect on the stress response associated with presence of the wild chromatin, morphological (leaf and root length and weight), physiological (relative water content, RWC) and biochemical (proline and malondialdehyde, MDA content; activity of key antioxidant enzymes: SOD, POD, CAT, APX) parameters were measured after each stress imposition. Root traits were generally improved by *Thinopyrum* segments,

with an increased root/shoot ratio detected in R69-9/R5+ (H) and a higher root length in R5+ (WH). The 7el1L portion common to R5+ and R69-9/R5+ proved to positively influence RWC under H and WH conditions. The same was observed in adult plants of R5+ and R69-9/R5+ subjected to various H applications (Giovenali et al., 2023, doi: 10.3390/plants12040704 and unpublished), indicating a good predictive role of the seedling assay. RWC was heavily decreased in Margherita under WH stress, though not under H stress alone. Regarding the modulation of the antioxidant defence system, proline content increased to a various extent in all genotypes under both stresses, particularly in R69-9/R112 (both NIRL “+” and its “-” sib line) in WH conditions and in Margherita (H and WH stress). Following both stresses, some membrane damage was detected in all genotypes, with minimum variation of MDA content recorded in R5+ and R69-9/R5+. Preliminary results showed the activities of most antioxidant enzymes to be enhanced by the 7el1L portions of R5+ and R112+ (CAT, APX, POD) and the 7el1L + 7EL segment of R69-9/R5+ (CAT, SOD) under H stress.

Acknowledgements: PRIMA-EU programme, Call 2018 - Project “IMPRESA”.