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SELECTION OF RESILIENT TOMATO GENOTYPES IN NUTRIENT AND DROUGHT STRESS CONDITIONS

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TOMRES, tomato, nutrient stress, drought

In the frame of the EU project TOMES, we have tested under environmental stress conditions 27 *Solanum lycopersicum* L. genotypes, chosen among a large international core collection. The plants were grown in 15L pots containing river sand in a semi controlled glasshouse. Four separated treatments were applied: Control (10.2 mM NO3-), Low Nitrate (2.88 mM NO3-), Drought (50% water) and Combined Stress (2.88 mM NO3- with 50% water). Physiological parameters (chlorophyll content, stomatal conductance and relative water content) were monitored during the growth cycle, whereas impact of treatments on growth (plant height, shoot fresh/dry weight, leaf area, number of floral trusses, root length and dry weight) and proline content was measured five weeks after treatment differentiation. Three outstanding genotypes were selected based on tolerance traits: T292, T150, T327. Growth of genotypes T292 and T150 was scarcely reduced under nitrogen and water deficit conditions, respectively. T150 also accumulated the lowest absolute amount of proline in drought-stressed condition. T327 showed the smallest decrease in stomatal conductance in drought treatment compared to the control. We measured reactive oxygen species (ROS) H2O2 and lipid peroxidation marker malondialdehyde (MDA), as well as ROS scavenger Ascorbic acid (AsA), known to protect organelles and cells from ROS damage. Consistent with a higher stress tolerance, all the identified genotypes showed lower membrane damage in all tested stress conditions compared to

control genotype M82. In detail T292 showed virtually no increase in H2O2 and had the highest AsA level in all conditions, indicating a higher accumulation of antioxidant compounds in this genotype. The gene expression pattern of APX, CAT and SOD6 in leaves is consistent with ROS content. We also analyzed the expression of LEA in T150 and T327 genotypes, and consistent with a lower perception of stress, both genotypes had lower induction of LEA compared to M82. P5CS (Proline Biosynthesis gene) and P5CDH (Proline Catabolic gene) gene expressions are consistent with the low levels of proline measured in these two genotypes. In conclusion, we have selected three candidate genotypes that show resilience to environmental stresses and identified molecular mechanisms that may contribute to the observed tolerant phenotypes.

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