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Poster Communication Abstract – 2.45

EXPLORING THE MULTIFACETED NATURE OF DWARF27 (D27) GENES IN TOMATO

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Strigolactones, D27, D27-like genes, parasitic weeds, drought stress

Strigolactones (SLs) are a heterogeneous class of carotenoid-derived phythormones, whose roles as germination stimulant for parasitic plant seeds, signal for the establishment of symbiotic interactions with arbuscular mycorrhizal fungi (AMF), and regulators of shoot and root architecture have been extensively investigated. A panel of independent tomato (cv. Ailsa Craig) CRISPR/Cas9 knock-out (KO) lines for each of the genes involved in SL biosynthesis – *D27*, *CCD7*, *CCD8* and *MAX1* – was previously produced. The SL content in the root exudates was impaired in all the lines and, consequently, the germination capacity of the seeds of *Phelipanche ramosa*, one of the most widespread parasitic weed and threatening species for tomato cultivation in the Mediterranean region. Unlike other genes mentioned above, further comparative analysis on plant morphology, fertility, productivity, and fruit quality, showed that the β-

carotene isomerase *DWARF27* (*D27*) KO line is comparable to the wild type, while maintaining the acquired resistance against P. ramosa. Interestingly, recent studies in rice have highlighted a key role for *D27* in the crosstalk with abscisic acid (ABA) and in the response to drought stress, suggesting a more complex picture for this gene. In this perspective, the effects of drought stress in the *d27* mutant line are being evaluated. Additionally, phylogenetic analysis revealed the presence of two *D27-LIKE* genes (*D27-LIKE 1* and *D27-LIKE 2*) in tomato which, similarly to the latest observations in Arabidopsis, could be involved in SL biosynthesis. The production of CRISPR/Cas9 KO lines for *D27-like* genes in tomato is ongoing, and the editing efficiency of sgRNAs was assessed by High Resolution Fragment Analysis (HRFA) in tomato hairy roots. Overall, this study will contribute to provide new and intriguing evidence on the roles of *D27* and *D27-like* genes in tomato SL biosynthesis, and possibly, on their potential involvement in further physiological processes, an aspect still largely unexplored.