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Poster Communication Abstract – 4.08

INVESTIGATING THE TOMATO RESPONSES TO TRICHODERMA ATROVIRIDE BIOSTIMULANT BY FRUIT-OMICS AND RHIZOSPHERE METAGENOMICS

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Selected strains of the *Trichoderma* fungal genus added as biofertilizers to soil can have beneficial effects on plants in addition to the well-known ones of arbuscular mycorrhizae (strict root symbionts). The inoculation of *T. atroviride* exerted significant effects on plant growth stimulation. It also reduced post-transplant mortality of industrial tomato seedlings in outdoor experiments with significant economic benefits from the point of view of production (Project: Microbi Alieni - Regione Lazio). In this presentation, an 'omics' snapshot was provided at harvesting to enquire about correlations between inoculation effects on rhizosphere (metagenomics by Nanopore technologies) and berry molecular changes (metabolomics by untargeted NMR and transcriptomics by RNA-Seq). The rhizosphere, through metagenomic analysis, highlighted the occurrence and persistence of the bioinoculant, which was associated with both moderate impact on other *Trichoderma* species and with reduction of some tomato pathogens (e.g. *Fusarium* spp) compared to untreated plants. Standard agro-parameters (yield and total soluble compounds) and the content of water-soluble fraction (ca. 28 compounds, including aminoacids, carbohydrates, and organic acids) were similar in treated and control tomatoes, except for formic and lactic acid which showed lower levels in inoculated plants. These compounds are critical markers of tomato quality (loss in case of increased levels).One of their possible origin is product fermentation. Transcriptomic analysis showed a significant difference in the expression of glycerolipid (GL) and glycerophospholipid (GP) metabolism genes; namely, out of a total of 10

genes, 6 were common to both pathways and up-regulated versus untreated plants, one gene was specifically down-regulated in GL and 4 up-regulated in GP pathway. These results suggest that variations in cell membrane composition may have occurred. However, NMR analysis of the lipo-soluble fraction did not identify significant differences of the chemically assigned compounds between treated and control. The increased levels of a few unknown metabolites require further investigation. Overall, the data suggest that inoculation with *T. atroviride* may contribute to preserving berries from fermentation either by acting on lowering harmful microbes when the tomatoes make contact with the soil or by improving the defence mechanisms of the plant.

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