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Poster Abstract – B.13

DISTRIBUTION OF ASCORBIC ACID AND POLYPHENOLS IN TOMATO

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Because of its content in antioxidants, tomato (*Solanum lycopersicum*) fruit is an excellent food for promoting human health and wellbeing. Antioxidant such as ascorbate, polyphenols and carotenoids have often been studied for their cancer-preventive and immune system empowering activity. Among polyphenols, chlorogenic acid plays an important role in the control of tumor cell invasion in human. In plants, chlorogenic acid is effective against *Pseudomonas syringae* and *Alternaria solani* suggesting a possible role in enhancing resistance to pathogens. Nevertheless, to date little is known on the pattern distribution of antioxidants through the plant.

The aim of this study was to investigate ascorbic acid and polyphenol accumulation in different organs (fruit, leaf, stem, petiole and root) of the tomato plant pointing at genetic control mechanisms underlying different patterns. Particularly, we focused on selected introgression lines (ILs) coming from crosses between *S. pennellii* and *S. lycopersicum* cv. M82 (Eshed and Zamir Genetics 141:1147-1162 1995) that are IL12-4, IL7-3 and IL10-1 lines. Those lines have been described to express QTLs for fruit ascorbarte accumulation.

Our results showed that ascorbate is differently accumulated in tomato plant following the order fruit > leaf > petiole > stem > root. On average, mesocarp showed to accumulate ascorbate for nearly the 85% of fruit. IL 12-4 and IL 7-3 fruits accumulated higher amount (1.2 ± 0.2 and 1.6 ± 0.1 mg g^{-1} of fresh weigh) compared to M82 parental line. Also total polyphenols showed to accumulate different according to genotypes and in specific tissues. The highest total polyphenol concentration was observed in leaves. IL 12-4 and IL 10-1 leaves accumulated higher total polyphenol concentrations (maximum values were 2.1 ± 0.2 mg g^{-1} of FW and 1.9 ± 0.2 mg g^{-1} of FW, respectively) compared to leaves from parental line M82.

Polyphenol profile by HPLC analysis showed that chlorogenic acid, rutin, caffeic and ferulic acid were the most representative compounds. No significant difference in chlorogenic acid and ferulic acid contents were observed in different tomato lines, while caffeic acid was preferentially accumulated in the leaves of IL 10-1 line.

In conclusion, tomato accumulates a significant amount of ascorbate and polyphenols through whole plant. Ascorbate predominantly accumulates in fruit while polyphenols show higher concentration in leaves. Moreover, ascorbate and polyphenols accumulate differentially in the screened tomato tissues and genotypes. Further efforts will focus on genetic mechanisms controlling antioxidant accumulation through transcriptomic approach to add insights toward strategies for breeding tomato quality and contribute to human health.