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Hormonal regulation of defense-related secondary metabolism in polyamine-enriched tomato fruit field tested in contrasting agroecosystems

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Secondary phenolic metabolites, including flavonoids, play important role in plant defense mechanisms, and many of these have been implicated in improving human health. In order to test if higher polyamines, spermidine (Spd) and spermine (Spm), play a role in enhancing the genetic potential and increasing the content of such beneficial molecules, we tested fruit of a number of genetically-engineered tomato lines that, some of which accumulated higher levels of Spd/Spm. Other genotypes included in our studies were independent lines deficient in methyl jasmonate or ethylene, and their crosses with Spd/Spm lines. Two agroecosystems were black polyethylene and hairy vetch mulch tested at the USDA Beltsville, MD. The content of different phenolics and flavonoids in tomato fruit was analyzed by HPLC. In parallel, we also carried out RNA-Seq analysis of the fruit from some of these lines in order to obtain information about ripening-related expression of genes involved in the biosynthesis of phenolics and flavonoids. Our results have demonstrated an interaction between genotypes and agroecosystem in modulating accumulation of phenolic acids and flavonoids in ripening fruits. These finding will be discussed.