

FLOWER DEVELOPMENT AND FRUIT SETTING UNDER HIGH TEMPERATURE IN TOMATO: MOLECULAR AND BIOCHEMICAL ANALYSES

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In tomato high temperature severely impairs fruit setting and yield performance when it occurs during transition from flower to fruit causing poor floral development and pollen sterility. While the process has been well characterized at physiological and biochemical level, a global description of the network of genes involved in maintaining high fruit set under unfavorable growth conditions is still lacking.

To identify key genes critical for high tomato fruit-setting under HS, subtractive PCR, microarray analysis and qRT-PCR were used to obtain a gene catalogue and to profile gene expression in response to high temperature in two contrasting tomato genotypes, with high (cv Saladette) and poor (cv Pullrex) fruit-set ability. The results, obtained from RNA samples of floral buds of different developmental stages from plants grown under control (26°C/20°C day/night) and high temperature (36°C/25°C day/night) highlighted the complexity of the gene network activated in response to HS and allowed the identification of genes belonging to different functional categories (environmental stress response, cell wall modification, pollen germination and development, signal transduction, sugar and amino acid metabolism) crucial to cope with environmental and developmental signals. Parallel to developmental- and genotype- specific changes in gene expression modifications in physio-biochemical parameters as pollen vitality and germination, soluble sugars and polyamines content was observed in comparing the two tomato genotypes.

The relationship between changes in gene expression and the physio-biochemical adjustments observed in response to HS will be discussed for a comprehensive understanding the process crucial for tomato productivity at high temperature.