PERFIL TRANSCRICIONAL EM ESCALA GENÔMICA DE GENES ASSOCIADOS A RESPOSTAS À TEMPERATURA EM VIDEIRA

GENOME WIDE TRANSCRIPTIONAL PROFILLING OF TEMPERATURE RESPONSE PATHWAYS GENES IN GRAPEVINE

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Environmental cues, such as light and temperature, are critical factors controlling plant growth and development. In grapevine, as in other plant species, the responses to temperature changes allow coordination of endogenous metabolic and physiological processes with the external environment, maximizing fitness and adaptation. Genome wide transcriptional profiling, coupled with morphological and biochemical analyses, has been used to investigate the responses of grapevine to temperature. Three independent experiments, consisting of 10 individuals, and two technical replicates were submitted to 23oC and 9oC. Transcriptional profiles were investigated by microarray and RNAseq techniques, analyzed by Bayesian methods in R programing environment. Carbohydrate analyses were performed by HPLC and enzymatic assays and biochemical investigations, by spectrophometry. The morphology of growth points of five representative individuals, from two independent experiments, was investigated by transmission electron microscopy. Extensive transcriptional reprogramming in response to temperature shifting was observed for phytohormone-controlled pathways, such as gibberellin, jasmonate and abscisic acid, including signaling partners and transcription factors. Genes associated to carbohydrate metabolism have also displayed distinct transcriptional regulation in response to temperature. The regulation of a subset of ethylene responsive genes, the C-repeat binding factor family, was also significantly affected by temperature. Similarly, the plant shoot apices and root systems exhibited modified developmental and morphological patterns in response to temperature. The contents of chlorophyll were also affected by temperature in grapevine, in agreement with the observed morphological and biochemical modifications. Taken together, our results suggest that gibberellin, jasmonate and abscisic acid mediated signaling pathways are key routes controlling grapevine responses to temperature. The role of carbohydrates in regulating growth and development in response to temperature is likely to be critical to the physiological responses and dependent on hormonal control. These findings may contribute to understand environmental sensing and developmental regulation in a widespread perennial species of economical importance.

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