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Biotic and Abiotic Stress Tolerance in Plants: the Challenge for the 21st Century

BOOK OF ABSTRACTS

6 to 8 · NOVEMBER · 2013

Cana Brava Resort · Ilhéus - Bahia - Brazil

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Workshop on Biotic and Abiotic Stress Tolerance in Plants:
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Ilhéus-Bahia, Brazil
6th-8th November 2013

different light levels (15, 25, 35 and 60 %), using plastic screens for mitigation of light, along with the control (full sun). Under these conditions, all variants showed changes in the activities of GPX and PPO in leaf level. In 25% of light, was found an activity of GPX higher for the variants L and S, whose results were confirmed by the accumulation of H_2O_2 in leaf level, detected by the histochemical analysis. On the other hand, the S variant showed a highest PPO activity in the different light levels evaluated, except for the control treatment (full sun). Already the L variant increased the PPO activity with increasing light level. In addition, the TBARS concentrations, resulting of the lipid peroxidation of cell membranes, were greater in 60% of light for variant L. However, in full sun, there was high accumulation of TBARS for all the variants of brazilwood. The results showed that in the different light levels evaluated there was changes in antioxidative metabolism for all the variants. The knowledge of this biochemical plasticity of the brazilwood morphotypes is very relevant for identify the optimal pattern of their developments, principally for the restoration of forests.
Work supported by CAPES

S02P12

Photoperiod modulates development and hormone-mediated transcriptional networks in grapevine

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Plants use exogenous abiotic cues, such as light and temperature, to synchronize growth and development to the most favorable environmental conditions, thus, maximizing fitness and adaptation. Sensory pathways interpret and integrate the environmental cues and the information and output responses are timely organized by the endogenous central oscillator mechanism, allowing the anticipation of seasonal changes in abiotic conditions. The timing mechanism regulates up to 90% of higher plants transcriptomes, representing several essential processes, such as: primary metabolism, photosynthesis, regulation of growth, hormone levels, nutrient uptake, developmental transitions, and defense responses. In the current work, we have employed high throughput transcriptional analyses to investigate the role of daylength in controlling grapevine growth and development. The genomic context effects of the natural variation found between a wild tropical genotype (*Vitis del rioi*) and temperate traditional cultivars (*V. vinifera* cv. Weisser Riesling, *Vitis* spp. cv. Seyve Villard 5-276 and *V. riparia* cv. Riparia Gloire) were investigated. Homologs of photoreceptor coding genes are present in grapevine genome, including those corresponding to the most important day-length sensing molecules in higher plants; phytochrome and cryptochrome. Grapevine phytochrome family has undergone differential expansion, suggesting functional diversification. Photoreceptor genes are differentially regulated in short and long day conditions in grapevine. The expression of the bHLH transcription factor *PHYTOCHROME-INTERACTING FACTOR 4* (*PIF4*), associated to warm temperature responses, is also differentially regulated in response to photoperiod. Genes coding for signaling partners of stress-associated hormones Salicylic Acid (SA), Abscisic Acid (ABA) and Jasmonates (JA) are also differentially regulated in response photoperiod. Genes involved in photosynthesis and carbohydrate metabolism are highly responsive to day-length in wild and cultivated grapevine. In temperate grapevine cultivar Weisser Riesling, long days induce carbohydrate accumulation in starch granules in the plastids. In contrast, starch granules are absent from the plastids of the tropical wild species *V.del rioi* grown under long days. Thus, the integration of *in silico*, high throughput transcriptional, biochemical and anatomical analyses may contribute to elucidate the role of the day length perception in controlling the growth of plants with developmental patterns distinct from those of model species, such as Vitaceae, a woody perennial heliophilous liana.
Work supported by Embrapa (02.11.11.04.00.00) and CNPq (307031/2010-1) to VQ.