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Involvement of carbohydrates and antioxidant enzymes in the oxidative balance during drought and recovery: the eucalyptus case

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When cellular functions are disturbed due to environmental deviations abiotic stress occurs. As the genetic variability suggests, mechanisms of damage, signalling and metabolic responses to abiotic stress differ among genotypes. Either way, plants respond to stress with increased production of ROS. Water deficit results in great losses in Eucalyptus plantations and new insights in the underlying mechanisms of recovering are required. Since drought may lead to oxidative stress due to stomatal closure and over-reduction of photosynthetic electron chain, it is important to study the oxidative balance involved during drought and recovery. Therefore, recovery of two *E. globulus* clones, watered to 18% (WS) and 80% (WW) field capacity was assessed. CO_2 assimilation (A) and MDA were used to characterize plant performance and oxidative stress. APX, SOD and CAT, as well as H_2O_2 and carbohydrates, were quantified to assess the cellular oxidative balance. Results showed the negative impact of drought by a reduction in A and higher MDA values, and an increase in sugar content and antioxidant enzymes. After stress relief, a differential readjustment occurs. Plant strategies to restore the physiological balance are suggested.

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Oxidative stress and antioxidant responses in olive tree subjected to cover crops under rainfed conditions

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Since Mediterranean basin is particularly vulnerable to present and future climate variability and climate change, olive tree will experiment some hard changes in its environment. Under adverse conditions, imbalances in metabolic processes may lead to increased accumulation of ROS, forming a potential threat of oxidative damage to cells. We propose green manure legumes to shift tillage, in order to improve soil water relationships during the drought period. The research was carried out in northeast Portugal under rainfed conditions. The treatments laid out were: ordinary tillage techniques and a mixture of eleven annual (AL) pasture self-reseeding legumes. The results obtained in summer 2011 revealed that olive in AL plot had higher concentrations of chlorophylls, carotenoids and total thiols, as well stomatal conductance, net photosynthesis, qP, F_v'/F_m', quantum yield of PSII, ETR and APX activity. Conversely, olive trees subjected to tillage had higher qN and GST activity. No significant differences were reported in electrolyte leakage, CAT activity and in TBARS and total phenols concentration. Thus, legume species may be a promising strategy contributing to the sustainable management of olive orchards.

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