GAS EXCHANGE, CARBOHYDRATE METABOLISM AND PROTON PUMP ACTIVITY IN WATER-STRESSED GRAPEVINE

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Drought is considered the main environmental factor limiting plant growth and yield worldwide. Grape rank first among fruit crops in the world and normally grown in semiarid environments where drought is a problem. The objective of this study was evaluate gas exchange, carbohydrate metabolism and proton pump activity in grapevine leaves grown under drought conditions. Two-years-old, grapevines cv. Cabernet Sauvignon rooted in Paulsen 1103 were grown in greenhouse conditions divided into two groups, the first was watered daily and the second group was not. The photosynthetic rate, stomatal conductance, CO_2 internal concentration, transpiration and predawn leaf water potential diminished gradually along water suspension. Minimal values were observed at the end of experiment (12 days). Photosynthesis was progressively diminished with drought. Sucrose, glucose and starch concentration as well as the activity of sucrose phosphate synthase decreased in response to drought, while invertase activity increased approximately 1,8 fold. The decreased in total carbohydrate concentration in stressed plants could be attributed to the reduction in the photosynthetic rate, as the latter is considered to be the main source of accumulation of organic solutes under water stress. The proton pumps activity was reduced after 12 days of drought, and the inhibitory effect on the plasma membrane H^+-ATPase was more pronounced than vacuolar H^+-ATPase and H^+-PPase. Invertase play a key role in the response to osmotic stress by recovering cell turgor. These results showed that invertase favored maintenance of leaf water status and the proton pumps activity may affected the ions accumulation in the vacuoles.