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Can nitrogen and potassium fertilization change the tartaric acid content in 'Syrah' grapes during maturation?

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The region of the São Francisco Valley in Brazil has unique features that enables the grape production throughout the year, with two or more harvests per year, event that increase the exportation of large amounts of nutrients to the fruit. Thus, the need of fertilization becomes important in order to obtain desirable characteristics of grapes for wine production and high yield. Tartaric acid is considered the predominant acid in grapes and consequently in wines, also providing specific organoleptic properties. Acidity is one of the most important parameters for the wine sensory profile and can interfere in color and flavor, which can be determined by the presence of organic acids, mainly malic and tartaric acids. At Embrapa Semi-arid experimental field, in Petrolina-PE, Brazil, Syrah vines, in four blocks and drafted on Paulsen 1103 rootstock, fertilized with 0 (control - Treatment 1) or with 120 kg ha^{-1} of nitrogen and 120 kg ha^{-1} of K_2O as potassium nitrate and urea (Treatment 2) were evaluated from 105 days after pruning and at five stages before harvest, according to the tartaric acid accumulation of the fruit, collecting 50 berries per each treatment and evaluation time. The tartaric acid quantification was realized by HPLC (WATERS, model Aliance e2695) with a DAD. The extracts were filtered in 0,45µm membranes and injected with three repetitions. During determination the DAD was maintained at 210 nm during 15 minutes, with a 0,6 mL min^{-1} flow and oven temperature at 26°C. The injection volume was 10 µL. The column used was Gemini-NX C18, 150 x 4.60 mm and Gemini-NX C18, 4.0 x 3.0 mm as pre-column, both from Phenomenex®. According to the observed amounts of tartaric acid in Syrah berries during ripening, there is a trend of reduction of tartaric acid levels for the two evaluated treatments, with contents varying from 4760.0 to 1589.4 mg $100g^{-1}$ and from 3352.6 to 1667.0 mg $100g^{-1}$, with a total reduction of 66% and 51% of the tartaric acid content, respectively, for the control and for the treatment with additional fertilization, with a progressive increase in time, mainly due to the dissolution of the acid content in the berries due to an increase in the berry size. The higher reduction of tartaric acid contents was observed earlier (from 105 days and 119 days after pruning, with contents from 4760.0 and 3282.8 $mg.100g^{-1}$) for the control treatment when compared to Treatment 2, when the highest decrease was observed between the stages 3 and 4 of the maturation curve, with means of 3371.8 and 1667.0 $mg.100g^{-1}$, respectively. During plant maturation process, the acids are used in respiration and energy production, and higher the plant temperature, more intense is the plant respiration and degradation of acids, which may explain the content decrease for both treatments. The application of fertilization in the conditions of the present study resulted in no significant difference of the tartaric acid content when compared with fruit content from vines that did not received fertilization (control), which may be explained by the fact that the soil of the vines already presented satisfactory soil nutrient content or by the fact that the plant nutrition did not affected the tartaric acid metabolism during berry maturation.

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