

Effects of gypsum addition in the reduction of aluminum toxicity in blueberry cultivars growing in an Andisol

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Blueberry (*Vaccinium corymbosum* L.) is an important crop in Chile that is principally grown in acid soils ($\text{pH} \leq 5.5$) as Andisol. However, it is sensitive to toxic aluminum (Al^{3+}), which is liberated under acid conditions. Gypsum addition is an effective agronomical practice to ameliorate its toxicity, without alters soil pH. In order to know effect of gypsum on chemical (nutrient content), physiological (growth, water relation, and photochemical performance) and biochemical features such as lipid peroxidation, radical scavenging activity, and antioxidant compounds in this species under aluminum toxicity were studied in two separated experiments. In first experiment, one year old plants of two cultivars, Legacy (Al tolerant) and Bluegold (Al sensitive), grown 15 days in nutrient solution ($\text{pH} 4.5$) were subjected to 100 and 200 μM Al and ameliorated with 2.5, 5 and 10mM of gypsum. In the second, blueberry plants grown (60 days) in an Al saturated Andisol ($\sim 70\%$), were amended with gypsum at rate of 0, 1000, 2000, and 4000 kg ha^{-1} . In both experiments, gypsum improved nutrient balance and Ca/Al molar ratio in leaves and roots, as well as photochemical parameters, carotenoids contents, and relative water content especially in Legacy. However, gypsum did not show clear effects on chlorophyll contents and leaf water potential. This amendment decreased lipid peroxidation and flavonoids in both cultivars, whereas radical scavenging activity, phenol, anthocyanins, and antioxidant enzymes were significantly increased. Gypsum can be an effective amendment to ameliorate Al^{3+} on blueberry, mainly in Al tolerance cultivars. Nonetheless, higher doses could be required to prevent harmful effect of Al^{3+} on Al sensitive cultivars grown in this soil types.

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