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Physiological Responses of Yacon [*Smallanthus Sonchifolius* under Chilling Stress

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Abstract

Yacon [*Smallanthus sonchifolius* (Poeppig Endlicher) H. Robinson, *Asteraceae*] is a root crop that originated in the Andes. This plant has myriads of potentials due to its antidiabetic and nutritious properties. It also represents a rich source of inulin-type fructooligosaccharides. This ongoing study aims at assessing the cold stress response of this frost-sensitive plant. To carry out the experiment rhizomes with vegetative eyes from one octoploid ($2n = 8x = 58$), and one dodecaploid ($2n = 12x = 87$) yacon genotype was selected and pre-cultivated under semi-controlled greenhouse conditions (natural light conditions, air temperature $20 \pm 2 / 15 \pm 2^\circ\text{C}$ day/night, relative air humidity 65%-85 %). After pre-cultivation, plants in the four-leaf stage were transferred to a climabox with controlled conditions simulating cold stresses (5°C) for 14 days. Leaf samples were taken in regular periods to determine the leaf water potential and leave relative water content from control and treated (climabox) plants. A non-destructive physiological evaluation of the chlorophyll fluorescence and photosynthesis was also carried. Preliminary results show significant differences between the control and treated plants in all parameters tested. The dodecaploid genotype proved to have superior cold stress tolerance in terms of stomatal conductance and fluorescence quantum yield when compared to the other genotype. The genotype with a lower ploidy level was also not able to recover after the tress treatment. This study is imperative to decipher the strategies adopted by yacon plants in response to cold stress. It will also enable the identification of specific a yacon genotype as either stress escaper, stress avoider or stress tolerance. Understanding the cold stress response of yacon is imperative to further improve the breeding strategies of new resistance cultivars.

Keywords: Chlorophyll fluorescence , cold stress, photosynthesis, *smallanthus sonchifolius*