# ASSESSING PHYSIOLOGICAL RESPONSES OF *SMALLANTHUS SONCHIFOLIUS* UNDER WATER DEPRIVATION

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## Introduction

❖Yacon [Smallanthus sonchifolius (Poeppig Endlicher) H. Robinson, Asteraceae] is a root crop that originated in the Andes (Fernández et al., 2006)

❖Eaten raw, sweet, contains no starch and is nutritious (Kemp et al., 2019) Myriads of antidiabetic and nutritional potentials (Žiarovská et al., 2019)

❖A rich source of inulin-type fructooligosaccharides with the ability to grow in wide ecological area

❖Highly resilient plant with natural adaptability at high altitudes

❖No prior research on physiological responses under water deprivation

## Key Findings

❖Young leaves exposed to severe water deprivation showed signs of decrease in all pigments, chlorophyll fluorescence, stomatal conductance, transpiration, and net photosynthesis

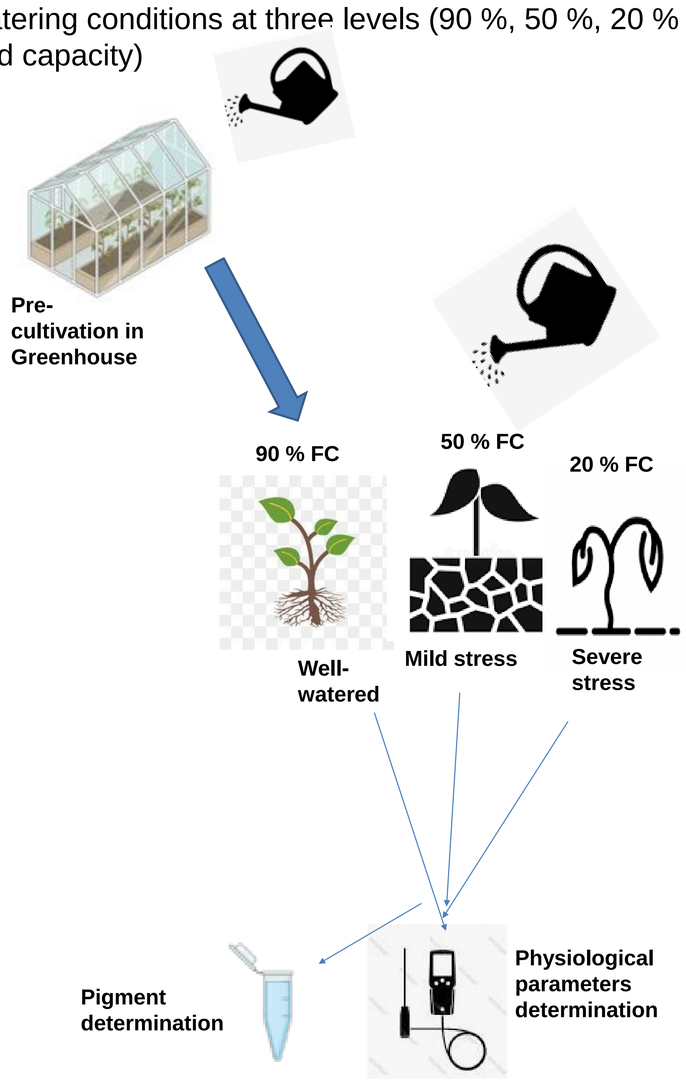
❖No significant effects on pigment concentrations and physiological responses under mild water stress

❖PER 14 genotype, the higher ploidy yacon showed significant superiority over ECU 41, a lower ploidy genotype under severe water stress

## Methods

Rhizomes from one octoploid (2n = 8x = 58)-PER 14, and one dodecaploid (2n = 12x = 87)- ECU 41 yacon genotype was selected and pre-cultivated under semi-controlled greenhouse conditions (25 ± 1 °C) (Figure 1)

Watering conditions at three levels (90 %, 50 %, 20 % field capacity)




❖Chlorophyll fluorescence (fv/fm) and Photosynthetic parameters (Net photosynthesis, Transpiration, Stomatal conductance) were determined

❖Pigment determination (chlorophylls a, b, carotenoids) were determined

## Results

❖Preliminary data showed that drought treatment significantly affected all parameters tested (chlorophyll fluorescence fv/fm) photosynthesis and stomatal opening (net photosynthesis and stomatal conductance

❖Well-watered condition (control) in both genotypes responded positively in all parameters as expected

❖Chlorophyll fluorescence did not differ significantly in both genotypes at water conditions (Fig. 5)

❖Recovery (RC) was possible after drought administration in both genotypes (Figs. 5-8)

❖As water deprivation time was increased, pigments (Figs. 1-4) and photosynthetic parameters drastically reduced ( Figs. 6-8)

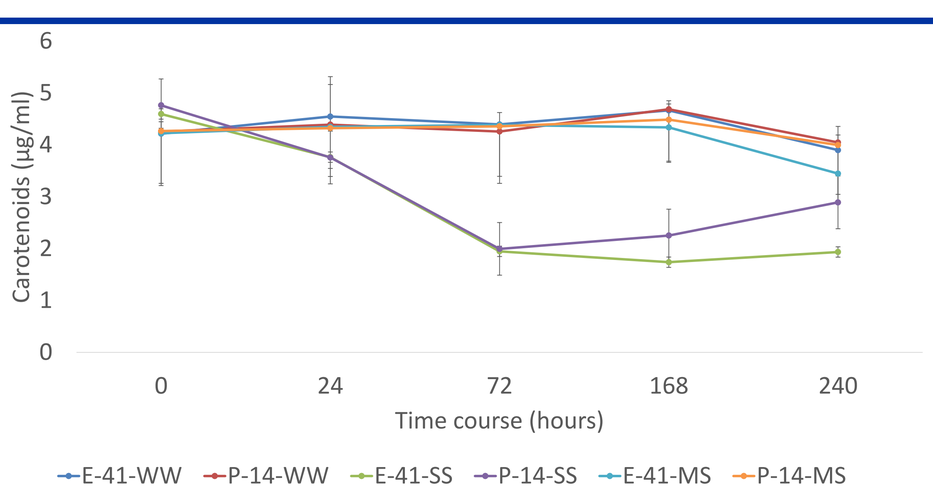
## Conclusions

✓Both yacon genotypes could thrive in limited water condition at specified period of time

✓Drought stress responses observed in this research showed that higher ploidy genotype proved superior

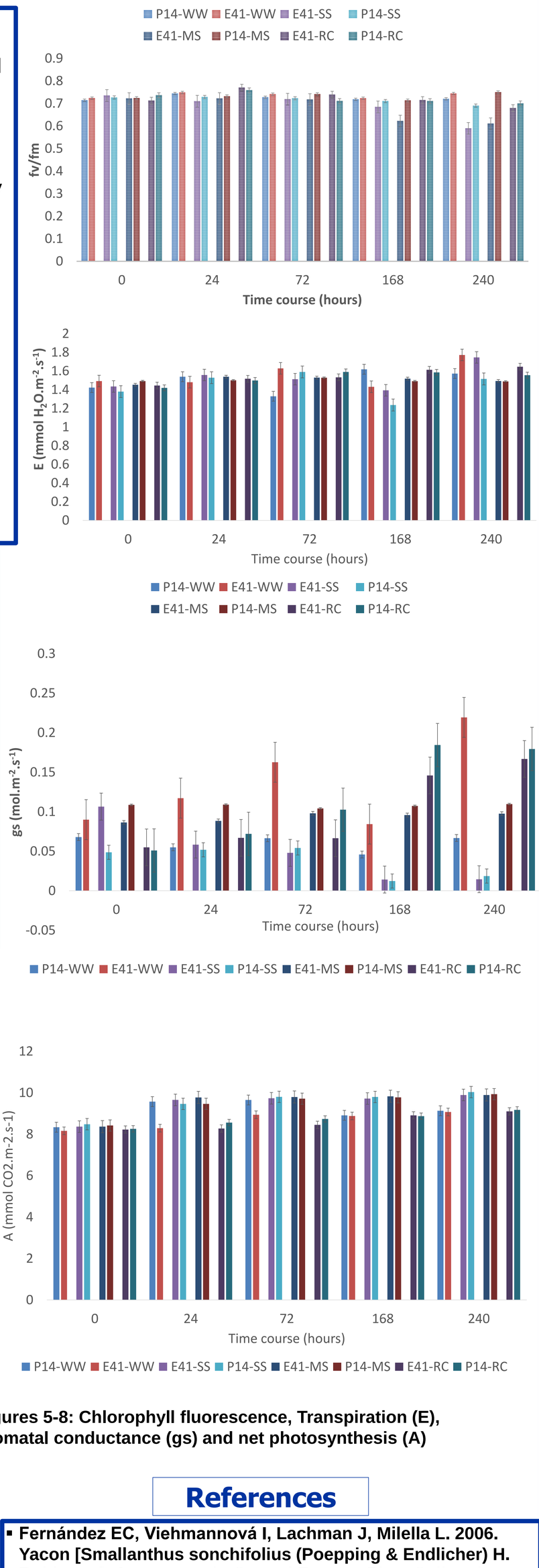
✓As drought conditions worsens around the world, the possibility of cultivating nutraceutically important plants such as yacon is encouraged

✓ Further physiological/proteomic analyses are still on-going to answer some key questions about the role of proteins in drought response




**Figures 1-4: Photosynthetic pigments: Carotenoids, chlorophyll a and chlorophyll b under water deprivation level at 240 hr time course**

**Key: ECU 41 Well-watered (control) (E41-WW), PER 14 Well-watered (control) (P14-WW), ECU 41 Mild stress (E41-MS), PER 14 Mild stress (P14-MS), ECU 41 Severe stress (E41-SS), PER 14 Severe stress (P14-SS)**




**Figures 5-8: Chlorophyll fluorescence, Transpiration (E), Stomatal conductance (gs) and net photosynthesis (A)**

## References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