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Case Report

In Vitro Plant Response of Taro cv. 'INIVIT MC-2012' (*Colocasia Esculenta* (L.) Schott) to Water Stress Induced with Polyethylene Glycol 6000

Arletys Santos Pino*, Jorge López Torres, Aymé Rayas Cabrera and Víctor Medero Vega

Division of Plant Biotechnology, Cuba

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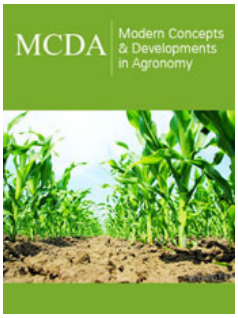

***Corresponding author:** Arletys Santos Pino, Associate Researcher, Division of Plant Biotechnology. Research Institute of Tropical Root and Tubers Crops, Santo Domingo, Villa Clara, Cuba

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Introduction

Taro (*Colocasia esculenta* (L.) Schott) is one of the most consumed tropical crops in the world. Corms contribute significantly to food and nutrients intake, being the second-most group of cultivated species after cereals [1]. In addition, tarin, a glycoprotein obtained from malanga, is used for medicinal purposes, such as anti-tumour, anti-hyperglycaemic and anti-hyperlipidaemic activities [2,3]. Taro production, often threatened by water shortage, reduces yields to 90% or causes total crop failure [4]. The main factor limiting the growth of this crop is the moisture available in the soil for its development during the growth stage.

Plant growth indicators have been used as variables to detect tolerance to water stress in several crops. The relevance of measuring these indicators lies in the changes they undergo in the presence of stress in the plant. Some of them are plant height, root length and number of shoots per explant [5]. In order to select *in vitro* plants tolerant to water deficit, water stress is simulated under these conditions. As stress-inducing agents at laboratory level, substances called 'osmo-stressing agents' such as mannitol, sorbitol, sucrose and Polyethylene Glycol (PEG) are used. Of these, PEG is one of the most commonly used [6].

The aim of this study was to determine the response of *in vitro* plants of taro cv. 'INIVIT MC-2012' (*Colocasia esculenta* (L.) Schott) to water stress induced with Polyethylene glycol 6000.

Case Presentation

In vitro plants of the cultivar 'INIVIT MC-2012' (*Colocasia esculenta* (L.) Schott.) in third multiplication subculture, propagated by organogenesis [7], were used. From these plants, explants of approximately 0.5cm in diameter and 1.0cm in height were obtained and incubated in the culture medium used for the study. To induce *in vitro* water stress, three concentrations of PEG-6000 (50, 100 and 150gL^{-1}) and a control treatment without PEG-6000 were added to the multiplication culture medium, consisting of MS salts [8], sucrose 30g L^{-1}; 6 BAP 3mg L^{-1}; AIA 1mg L^{-1}; myoInositol 0.1g L^{-1} and Agar 2.5gl^{-1}.

Plant height (cm): It was measured with a graduated ruler from the base of the plant to the point of insertion into the pseudostem of the last fully emerged leaf. The experiment was repeated three times, each time 20 plants were used for each treatment, for a total of 60 plants.

Result and Discussion

A reduction in shoot height and number of shoots was observed in the presence of PEG 6000, when compared to the control treatment plants (Table 1). These differences started to become noticeable after 10 days of the experimental period and were significant at the end of the experiment after 21 days of cultivation.

Table 1: Response to PEG 6000-induced hydric stress on morphological indicators in the Colocasia cultivar 'INIVIT MC-2012' at 21 days of culture

Treatment	Height (cm)	Number of Shoots
1 (Control)	2.43a	3.25a
2 (50 $g.L^{-1}$ PEG-6000)	1.94b	2.85a
3 (100 $g.L^{-1}$ PEG-6000)	1.66c	2.45ab
4 (150 $g.L^{-1}$ PEG-6000)	1.33d	1.65b

Note: Means with non-common letters in the same column differ statistically for $p<0.05$ according to Duncan's test.

These results show that PEG 6000 inhibited shoot proliferation and negatively affected plant growth, which is in agreement with what has been reported by other authors on the induction of osmotic stress in six hybrid cultivars of Colocasia [9]. In the taro cultivar 'Isleña Rosada Escambray', a decrease in plant height was found to be an important morphological indicator related to the growth and development of this crop against PEG 600 [10]. After PEG treatment, growth of diploid and tetraploid taro cultivars was significantly affected by increasing concentrations of this osmotressant after two weeks of cultivation [11].

Conclusion

The use of PEG 6000 decreased the height and number of shoots per plant. This response could serve as a basis for using the variables as indicators in drought tolerance studies on the taro cultivar 'INIVIT MC-2012'.

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