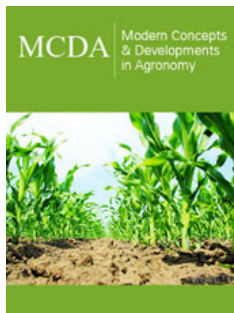


Effect of Coconut Water on *In Vitro* Multiplication of Taro Meristems Cultivar 'INIVIT MC-2012'

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Abstract

Is sustainable development an idea that can be achieved when it becomes a way of life? The aim of the paper is to advocate for a more human-centered design approach, recognizing the challenges inherent in addressing the dynamic and complex nature of socioecological systems. This article emphasizes the need for interdisciplinary teams, qualitative approaches, continuous learning, and the establishment of institutions and organizations that can effectively sustain sustainable development as a vibrant way of life.

Keywords: Sustainable development, Human-centered design, Socioecological system

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Introduction

Taro (*Colocasia esculenta* (L.) Schott) is a plant widely cultivated and used since time immemorial as food and medicine. Flavonoids and triterpenoids are the two main groups of therapeutically active compounds found in the plant. Pharmacologically, the plant is antimicrobial, antidiabetic, antimetastatic, antifungal and anti-inflammatory [1]. Because of its nutritional quality, taro rhizome powder represents a valid alternative for the development of more nutritious food products. Due to all its nutritional qualities, taro plays a fundamental role in human nutrition [2].

In vitro culture provides a useful tool for the rapid propagation of healthy plants with full physiological capacity. Due to the high percentages of contamination in the *in vitro* establishment of taro, the use of meristems is necessary to achieve better results in the disinfection of the explant [3]. The use of these explants prolongs the time between *in vitro* establishment and the first subculture to multiplication. Organic compounds in the culture medium have been used by several authors to enrich the culture media to promote plant growth. The addition of natural organic substrates such as coconut water, peptone, potato homogenate, banana homogenate, juices, and yeast extract can promote the development of shoots grown *in vitro* since they represent a source of vitamins, amino acids, fatty acids, carbohydrates, peptides, and growth hormones [4].

The following research was conducted with the objective of evaluating the effect of coconut water on *in vitro* propagation of taro cv. 'INIVIT MC-2012'.

Case Presentation

In vitro meristems of the cultivar 'INIVIT MC 2012' (*Colocasia esculenta* (L.) Schott.), was used according to the protocol described by Santos [3].

A basal liquid culture medium for multiplication (MM), composed of MS salts [5], sucrose, 30g.L⁻¹; 6 BAP, 3mg.L⁻¹; AIA, 1mg.L⁻¹; myoInositol, 0.1g.L⁻¹, was used as a control, and 100ml.L⁻¹ of coconut water was added to this same culture medium. It was distributed in 150mm long x 26mm diameter glass test tubes (10ml/tube). Subsequently, they were sterilized in autoclave at 121 °C and 1.2kgcm⁻² pressure for 15 min.

The culture tubes were placed in the shaker under agitation (60rpm). The experiment was repeated three times, each time 20 plants were used for each treatment, for a total of 60 plants.

After 30 days, the length (cm) of the explant measured from the base to the point of insertion of the first leaf and the thickness (cm) were evaluated.

Result and Discussion

With the use of coconut water, the best results were achieved for the variables height (2.73cm) and thickness (0.39cm), with significant differences with respect to the culture medium without this organic substance (Table 1) in the *in vitro* multiplication of taro cultivar 'INIVIT MC-2012'.

Table 1: Effect of coconut water on *in vitro* multiplication of taro cv. 'INIVIT MC 2012' after 30 days of culture.

Note: Abbreviations: MM: Multiplication medium; SE: Standard Error

Means with uncommon letters in the bars differ statistically for $p < 0.05$ according to Duncan's test.

Treatment	Height (cm)	Thickness (cm)
1 (MM)	2,27 b	0,34 b
2 (MM + coconut water)	2,73 a	0,39 a
SE ±	0,009*	0,025*

By using coconut water in the first subculture to multiplication of taro meristems, explants with greater height, thickness and intense green color are obtained, ready to be transferred after 30 days to the semi-solid multiplication culture medium. It is not necessary to perform two subcultures in liquid multiplication medium.

In the bananas micropropagation (Grand Nain and Dominico) using 20 and 30% coconut water in the culture medium, a greater

height (6.6cm) was achieved compared to the culture medium without the addition of this substance (5cm). The number of roots, number of leaves and number of shoots were also favored [6].

In the *in vitro* multiplication phase of yellow pitahaya (*Hylocereus megalanthus*), the use of coconut water (20ml.L⁻¹) had a positive effect, which can make it a low-cost compound that can be used to design propagation protocols for this species [7].

In addition, organic substrates such as pineapple, banana and coconut water have been shown to promote morphogenesis and rhizogenesis since they produce effects similar to auxins and cytokinins [8].

Conclusion

The supplementation of 100ml.L⁻¹ of coconut water in the multiplication culture medium increases the quality of the explant obtained from taro meristems.

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