



## THE EFFECT OF SOME OF COCONUT WATER CONCENTRATION IN ARTIFICIAL MEDIA TO CHRYSANTHEMUM GROWTH (*Dendranthema grandiflora*) BY IN VITRO

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**Abstract** Artificial medium for in vitro culture is an alternative media to substitute Murashige and Skoog (MS). Growmore added with organic substances as coconut water can be used as artificial medium. Coconut water can affect plant growth, so the research is to investigate the influence of coconut water in different concentration to chrysanth's (*Dendranthema grandiflora*) growth should be done. The research was conducted in Laboratory of Molecular and Cell Biology, Department of Biology, Faculty of Mathematics and Natural Sciences, Syiah Kuala University Darussalam, Banda Aceh, from April until July 2013. The research was designed by using Randomized Block Design with sub sampling. Media act as group, while coconut water concentration as treatment. Observation was started from growing time up to a month after planting. The result showed that there was no significant different between using MS and artificial medium with different coconut water concentration to initiate shootlet.

**Keywords:** *Dendranthema grandiflora*, coconut water, MS medium, artificial medium

### I INTRODUCTION

Technological developments have driven the human lifestyle to be more advanced and modern so that the level of needs is also changing. One of them is the need for ornamental plants like chrysanthemum. Chrysanthemum is often known as seruni. This plant belongs to the *Asteraceae* tribe. According [1], the species of this tribe is often used as an ornamental plant, one of them is chrysanthemum. Chrysanthemum has a high variety of species, both in terms of shape and color, for example *Dendranthema grandiflora*. This plant is widely used as both cut flowers and flower pots. The technique of multiplying a plant with a quick and high quality can be done by tissue culture. According to Ref. [2], tissue culture is a technique to isolate cells, protoplasm, tissues, and organs grow on culture media containing nutrient-rich at aseptic conditions in order to obtain perfect plants. According to Ref. [3], tissue culture has a good prospect to be developed as it can become a superior commodity nursery technique. Vegetative propagation by tissue culture was also affecting the country's foreign exchange. For example, the implementation of ornamental plant exports can increase the income of the

state in the agricultural sector [4]. Tissue cultures are also often called as micropropagation *in vitro* techniques and plant production techniques. The success of tissue culture is strongly influenced by several factors, one of them is the culture medium. The commonly used media in tissue culture techniques are Murashige and Skoog (MS) media. However, there have been no reports of the use of artificial media (using leaf fertilizer) for the propagation of chrysanthemums by in vitro as has been done in orchid plants. Researchers in the Ref. [5,6] have conducted research on the use of leaf fertilizer as a growth medium of orchid by in vitro. In addition, the addition of organic materials such as coconut water to the media also gives effect to plant growth, but according to [7], the addition of coconut water in too high concentrations (20%) can inhibit the growth of chrysanthemum shootlet. Therefore, in this study the researcher will compare the effect of adding low concentration of coconut water (0-7,5%) on MS medium and artificial media to chrysanthemum growth (*Dendranthema grandiflora*) by in vitro.

## II METHODOLOGY

This research used experimental method using randomized block design (RAK) Sub Sampling which compiled as follows:

Table 1. The arrangement of treatment groups

Group	Treatment			
	K0	K1	K2	K3
A	AK0	AK1	AK2	AK3
B	BK0	BK1	BK2	BK3
C	CK0	CK1	CK2	CK3
D	DK0	DK1	DK2	DK3

Group: the type of culture medium used.

A = MS medium

B = artificial medium (Growmore fertilizer 2 g/L)

C = artificial medium (Growmore fertilizer 1.5 g/L)

D = artificial medium (Growmore fertilizer 1 g/L)

Treatment: the concentration of coconut water used.

K0 = 0% (0 mL/L media)

K1 = 2.5% (25 mL/L medium)

K2 = 5% (50 mL/L media)

K3 = 7.5% (75 mL/L medium)

Qualitative analysis includes visual data (time of appearance of shootlet). Quantitative analysis was performed on the height of the plantlet. The data will be analyzed by using variance analysis (ANOVA) based on F test of 5% level. If there is a real difference, then proceed with BNT test (the smallest real difference) (Tukey) at 5% level. Analysis of research data using SPSS program version 17.00.

## III RESULTS AND DISCUSSION

The result of data analysis in ANOVA test showed that the use of several groups of media with some of coconut water concentration did not significantly different with the time of the emergence of chrysanthemum (*Dendranthema grandiflora*) shootlet (Table 2.). Therefore, media A (Murashige and Skoog/MS), B (artificial Growmore 2 g/L), C (artificial medium/Growmore fertilizer 1.5 g/L), and D (artificial/fertilizer media Growmore 1 g/L) with some of coconut water concentration can be used for initiation of chrysanthemum shootlet.

Time of appearance of shootlet is one of the earliest indicators of explant growth by in vitro cultures. This is characterized by the emergence of small shoots on the armpits of the petiole. This shootlet is the result of regeneration of meristem tissue that will form the perfect leaves and stems.

Table 2. ANOVA Test Result

	Source	Type III Sum of Squares	Df	Mean Square	F	Sig.
Intercept	Hypothesis	850.083	1	850.083	927.364	.000
	Error	2.750	3	.917 <sup>a</sup>		
P	Hypothesis	10.750	3	3.583	2.237	.153
	Error	14.417	9	1.602 <sup>b</sup>		
Group	Hypothesis	2.750	3	.917	.572	.647
	Error	14.417	9	1.602 <sup>b</sup>		
P * Group	Hypothesis	14.417	9	1.602	.641	.754
	Error	80.000	32	2.500 <sup>c</sup>		

a. MS (Group)

b. MS (P \* Group)

c. MS (Error)

With 5% level ( $\alpha = 0,05$ )



Figure 1 Chrysanthemum shootlet (*Dendranthema grandiflora*)

The results showed that there was no significant difference between treatment media. This is because all media groups, both MS media and artificial media contains macro and micro nutrients, also enough vitamins for the growth of chrysanthemum shootlet.

According to Ref. [2], MS media is a common medium used in tissue culture. By in vitro, the use of MS media can be replaced by artificial media, such as *Growmore*. *Growmore* is a soluble leaf fertilizer, so that the nutrients contained can be absorbed by the plant effectively [8]. Therefore, *Growmore* media can also be used for initiation of chrysanthemum shootlet. The results of research by Ref. [5] also showed that *Dendrobium* orchid shootlet can grow well on alternative media using *Growmore* fertilizer by in vitro.

According to Ref. [9], cytokinin in large enough quantities is needed to stimulate the growth of aksilar shootlet. Increasing the concentration of coconut water in the medium may increase the exogenous cytokinin hormone levels that may affect cell division and organogenesis [10]. The treatment of coconut

water in this study did not give a real effect on the time of emergence of chrysanthemum shootlet. This shows that the activity of endogenous cytokinin hormone on eksplan already able to induce the emergence of chrysanthemum shootlet.

## CONCLUSION

The use of MS media and artificial media (*Growmore*) in initiation of chrysanthemum shootlet (*Dendranthema grandiflora*) showed no significant difference. Artificial media (*Growmore*) can be used as an alternative medium for chrysanthemum plants (*Dendranthema grandiflora*).

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