# EFFECTS OF COCONUT WATER SOAKING TIME ON COCOA (*Theobroma Cacao* L.) SEED

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**ABSTRACT**

The cocoa problem in Indonesia was that around 50% of cocoa are old plant, they need more superior seeds to rehabilitation and replanting. The aim of this study was to evaluate effects of coconut water soaking time on cocoa (*Theobroma cacao* L.) seed. This study was conducted in Laboratory, Politeknik Pembangunan Pertanian, Medan. The study used completely randomized design non factorial. It was soaked time were P1 (6 hours), P2 (12 hours) and P3 (18 hours). The results indicated that germination and growth of cocoa seed showed significant effect on plant height, number of leaf, stem diameter. Therefore, the objective of this study was to determine the combination of soaking time seed and germination time of cocoa seeds to improve its nutritional values.

***Keywords*** *:Theobroma Cacao, Soaking Time, Seed.*

## A. INTRODUCTION

Cocoa is one of the export commodities that is able to contribute to efforts to increase Indonesia's foreign exchange. Cocoa commodities ranked third in plantation sector exports in contributing to foreign exchange, after CPO and rubber commodities. In 2006 cocoa exports reached US $ 975 million, an increase of 24.2% compared to the previous year and in 2009 also increased to US $ 1,719 million or an increase of 35.6% (Suryani dan Zulfebriansyah, 2007).

To improve root development and growth of shoots, a material that can stimulate it is needed, one of which is using coconut water. Coconut water is one of the natural ingredients, it contains hormones such as cytokinin 5.8 mg / l, auxin 0.07 mg / l and very little giberelin and other compounds that can stimulate germination and growth (Bey, Syafii dan Sutrisna, 2006) .

Azwar (2008), coconut water turned out to have benefits for increasing plant growth. The results showed that coconut water is rich in potassium up to 17%. Besides being rich in minerals, coconut water also contains sugar from 1.7 to 2.6% and protein 0.07 to 0.55%. Other minerals include sodium (Na), calcium (Ca), magnesium (Mg), ferum (Fe), cuprum (Cu), phosphorus (P) and sulfur (S). Besides being rich in minerals, coconut water also contains various kinds of vitamins such as citric acid, nicotinic acid, pantotenal acid, folic acid, niacin, riboflavin, and thiamin. There are also 2 natural hormones, namely auxin and cytokinin as a support for coconut embryo cell division.

## B. MATERIALS AND METHODS

In order to study the effects of coconut water soaking time on cocoa (*Theobroma cacao* L.) seed an experiment was conducted in Laboratory, Politeknik Pembangunan Pertanian, Medan. The research used used completely randomized design non factorial. It was soaked time were P1 (6 hours), P2 (12 hours) and P3 (18 hours). The seeds was used in this research comes from Pusat Penelitian Kelapa Sawit, Medan.

## C. RESULTS AND DISCUSSION

Coconut water soaking time showed significant effect on the growth variables of cocoa (*Theobroma cacao* L.) seed such as plant height, number of leaf, stem diameter (Table 1). Coconut water soaking time markedly better effect on cocoa seed

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Table 1. Average Of Effects Of Coconut Water Soaking Time On Cocoa (*Theobroma Cacao* L.) Seed

| Treatment<br>Coconut Water Soaking Time | Plant Height<br>4 WAP | Number of Leaf<br>4 WAP | Stem Diameter<br>4 WAP |
|---|---|---|---|
| P1 | 16,83b | 4,67b | 0,35b |
| P2 | 20,50a | 6,33a | 0,42a |
| P3 | 18,50ab | 5,67ab | 0,37ab |

Means values in a column and row followed by unlike letter (s) are significantly different at 5% level using BNT test

The average growth in plant height had increased and there were some significant increases in average plant height as was the case in the p2 treatment. According to Grardner (1991), young coconut water contains a lot of auxin and cytokinin hormones. Because auxin and cytokines are produced in meristematic tissue that actively divides. This statement is reinforced by the opinion of Vigliar (2006) who said that, mineral content, vitamins, sucrose, and growth regulators induced in coconut water will decrease along with increasing age of the coconut. Root efficiency in nutrient absorption and water greatly affect total plant weight. In this case root length, root weight and root distribution affect the weight per plant. According to Sitompul and Guritno (1995), the wider surface area of the roots will increase nutrient elements so that plants grow well.

Giving water through immersion is one effort that can be done to accelerate the emergence of sprouts, but excessive soaking will have unfavorable effects, which can cause damaged and rotten seeds (Angadi and Entz, 2002). The size of the diameter in the stem is caused by cell activity continues to grow in length so that the diameter of the stem.

In this observation also greatly influenced by several factors both from internal factors (seed size, seed weight, seed maturity) and external factors (water, temperature, light, oxygen, and planting media). Coconut water is an organic compound that contains many substances that are good for growth such as minerals, proteins, vitamins zeatin, high levels of K and Cl, sucrose, fructose, and many more contained in coconut water. Cocoa seeds soaked with coconut water should have broader leaves because the cytokinin content in coconut water can affect the development of leaf buds. However, the results of our study showed a different thing, soaking cocoa seeds with distilled water has a greater leaf area than immersion treatment with coconut water.

Coconut water is one part of the plant that can be used to increase plant growth. Coconut water is often disposed of by the community because it is assumed that there is no benefit other than being used as a drink. The results showed that coconut water is rich in vitamins, minerals. Besides being rich in minerals, coconut water also contains 2 natural hormones namely auxin and cytokinin which act as supporters of cell division (Suryanto, 2009).

Sulistyani et al (2014), soaking cocoa beans with water for 24 hours was proven to increase radicular growth to 3.69 mm compared to seeds that were not soaked. Soaking with water will speed up the process of imbibition on the seeds. After the seeds absorb water and achieve optimum imbibition, the seed coat will become soft and facilitate the entry of oxygen into the seeds. Water itself is needed in the process of softening the seed coat, embryo development and enlargement of cells at the point of growth, activation and transport of enzymes, reshuffle food reserves and regulate the balance of growth regulators. While oxygen is needed by the seeds for the process of respiration which will further release carbon dioxide, water and energy.

The same thing also happened to the addition of the average number of leaves can be seen clearly in the table that the average growth in all treatments has increased and there are some significant increases in the average number of leaves as happened in the P2 treatment caused by the treatment of cacao immersion in coconut water with a long immersion for 12 hours. The same thing also happened to the addition of the average height of plants can be seen clearly in the table that the average growth in all treatments has increased and there are some significant increases in the average height of plants as it did in P2 treatment caused by the long treatment of cacao immersion in water coconut. The use of coconut water is evident from the results of several studies that have been conducted. Siahaan's research (2004) shows that the use of young coconut water as PGR can increase the growth and production of red chili. Other studies have shown this hormone product from coconut water can increase soybean yield by 64%, peanuts by 15% and vegetables by 20-30%, and can stimulate flowering in orchids such as dendrobium and phalaenopsis. Research by Ratnawati et al., (2013) shows that soaking cacao seeds (Theobroma cacao, L.) with young coconut water influences seed height and leaf area where immersion for 6 hours provides the best growth of cacao seedlings.

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