

The Effect of Soaking Coconut and Atonic Water as a Growth Regulatory Substances on the Growth of Patchouli Plant Cuttings (*Pogostemon cablin* Benth)

Yuanita; F.Silvi Dwi Mentari; Roby; Daryono; Nur Hidayat;
Riama Rita Manullang; Faradilla; La Mudi; Zainal Abidin; Haryatie Sarie

Polytechnic Agricultural State Samarinda
Long Mountain Campus Jl. Samratulangi Samarinda 75131 telp. 0541-260421/fax 0541-260680

Abstract:- Patchouli plants can be planted vegetatively, one of which is stem or branch cuttings. To multiply patchouli cuttings vegetatively, you can use coconut water and Atonik as natural growth regulators. Coconut water and Atonik are very easy to obtain and are used as natural growth regulators which can function as a plant growth booster, have harvest power, improve quality, increase plant yields, increase the photosynthesis process, increase protein synthesis and also increase the absorption of nutrients from within.

The aim of this research was to determine the effect of providing appropriate growth regulators from coconut water and Atonik on the growth of patchouli plant cuttings. The place and time of this research was carried out at Los Shadows, Agronomy Laboratory, Plantation Plant Cultivation Study Program, Polytechnic Agricultural State Samarinda . This research was conducted for 4 months starting from November 2021 to February 2022. The method used was a Complete Random Treatment with 3 treatments, namely immersion using water for 10 minutes (P0), treatment using 1000 ml coconut water for 10 minutes (P1) , treatment using atonic 10 ml/ 990 ml water for 10 minutes (P2).

The research results showed that the use of atonic growth regulator as a soaking agent intreatment P2 with a dose of 10 ml with a mixture of 990 ml of water and a soaking time of 10 minutes showed the success of cuttings with a greater number of shoots and roots compa.red to treatments P0 and P1. The P2 treatment showed the highest average number of shoots and roots with immersion in the atonic growth regulator with an average growth of 3.4 shoots in the first month and 8.5 in the second month, as well as an average number of roots of 9.2. beginning of planting until the end of the research.

The results of the research showed that the use of the atonic soaking agent in the P2 treatment with a dose of 10 ml with a mixture of 990 ml of water and a soaking time of 10 minutes showed the success of cuttings with a greater number of shoots and roots. compared to treatments P0 and P1. The P2 treatment with atonic growth regulator soaking showed the highest average number of shoots, namely 3.4 shoots in month 1 and 8.5 shoots in month 2, 12.0 shoots. Meanwhile, the number of root was 10.4 in month 3 land.

Keywords:- Coconut Water, Atonik, Patchouli Cuttings

I. INTRODUCTION

The patchouli plant (*Pogostemon cablin* Benth) is a plant that produces essential oil, which has good prospects even though the price is relatively high and until now the oil cannot be imitated (synthesized). Patchouli oil makes a large contribution to the country's foreign exchange earnings among other essential oils. However, patchouli oil production in Indonesia is still limited and production is not optimal. Patchouli oil is a non-oil and gas export commodity. This patchouli oil is already popular internationally, but it is not yet well known in Indonesia and there are still few who plant or garden patchouli. even though patchouli oil is a promising business prospect because at the international level patchouli oil is of interest to several countries. The world need for essential oils derived from patchouli plants is currently around 600-800 ton/year (Krismawati, 2005)

Conventional patchouli plant propagation can be done through vegetative propagation, one of which is by stem or branch cuttings and shoot cuttings. Stem or branch cuttings are taken from wilted stems or branches. The cuttings can be planted directly in the field or rooted first. Planted cuttings usually contain a minimum of 4 segments. To increase root development in patchouli stem cuttings, you must pay attention to quantity and concentration in order to obtain a good root system in a relatively short time (Asman, 1996).

Addressing the urgent need for patchouli seeds requires an effort. One way to meet the needs of consumers for superior and good patchouli seeds is to use seeds from vegetative propagation using cuttings. The cuttings on patchouli plants come from the middle base and standard shoots. In order for the seeds/cuttings to grow well (healthy, fast and uniform) the seeds/cuttings must be produced using good procedures. Plant propagation is done by cuttings from parent trees that are more than one year old. The best cuttings are taken from young branches that are already woody. The cuttings are 20-30 cm long and have a minimum of three buds. Planting seeds can be done directly, it can also be done using cuttings first, depending on weather conditions, soil fertility and seed supply. To differentiate root growth, it is best to sow the cuttings first for 3-4 weeks, then move them to the field. This method also saves on the use of seeds. Direct planting requires 2-3 times more seeds compared to seedbeds (Kardinan and Maulidi, 2004).

Plant growth regulators are non-nutrient organic compounds (Nutrein), which in small amounts can support, inhibit and change plant physiological processes. Growth regulators consist of auxin which has the ability to support cell elongation, ethylene which plays a role in the fruit ripening process and abscisic acid. The effectiveness of growth regulators in plants is influenced by the concentration given because differences in concentration will cause differences in the activity of growth regulators determined by the species of cutting material used (Abidin, 2003).

Various natural ingredients that can be used as substitutes for growth regulators include coconut water (Seswita, 2010). Coconut water contains amino acids, organic acids, nucleic acids, purine, sugar, vitamin and mineral (Netty, 2002). Coconut water is an organic compound that contains 1,3 diphenylurea, zeatin, zeatin glucoside, zeatin riboside, high level of K and Cl, sucrose, fructose, glucose, protein, carbohydrate, mineral, vitamin, a little fat, Ca and P and kinetin (Barciszewski et al. 2007).

The use of growth regulators in vegetative plant propagation (cutting technique) can speed up the emergence of root and speed up growth. Currently, there are various types of growth regulators, one of which is atonic growth regulators (Rahardja and Wiryanta, 2003).

According to Rahardja and Wiryanta (2003), the use of growth regulators in vegetative plant propagation using cuttings can speed up root emergence and plant growth. Currently, there are various types of growth regulators, one of which is atonic. The elements contained in atonic are S, B, Fe, Mn, Zn, Cu, Mo in small amounts. Apart from that, atonic also contains the active ingredients sodium ortho-nitrophenol 0.2%, sodium 2-4 dinitrophenol 0.05%, sodium para-nitrophenol 3.0% and sodium 5 nitroquicol 1.0%.

The purpose of this research is to find out the correct soaking time using coconut water and atonic growth regulators, to find out the highest number of shoots and roots with coconut water and atonic growth regulators on the growth of patchouli cuttings.

II. RESEARCH METHODS

A. Time and Place

➤ Research Time

This research was carried out for 3 month, namely in February 2022 April 2022

➤ Research Place

This research was carried out at the Lost Shadow Agronomy Laboratory for Plantation Plantation at the Samarinda State Agricultural Polytechnic

B. Tool and Material

➤ Tool

The tools used are cutting scissors, hoe, measuring cup, goblet, gembor, bucket, camera and stationery.

➤ Material

The materials used are top soil, water, polybag, coconut water, patchouli cuttings, and atonic.

C. Research Treatment

This research used soaking treatment with coconut water and atonic growth regulator on patchouli cuttings with 3 treatments. Each treatment consisted of 10 patchouli plant cuttings. So the number of patchouli plant cuttings observed was 30 patchouli plant cuttings, with coconut water and atonic as growth regulators. The 3 levels of treatment for this research consist of:

- P0 = Water without growth regulators 1000 ml P1 = Coconut water with a dose of 990 ml
- P2 = Atonik with a dose of 10 ml / 990 ml of water

D. Research Procedure

➤ Plant Aerial Preparation.

The area used in this research has sufficient protection against sunlight, is close to water sources and is easy to monitor. The area used is clean and flat, to make it easier to arrange polybags for the seedbed

➤ Preparation of Planting Media

The planting medium used is top soil. Before placing it in a polybag, the planting medium must be sifted first to clean it of roots, twigs, stones and gravel and to avoid lumps. Once clean, put it in a 20 x 20 cm polybag.

➤ Preparation of Plant Material

The cuttings used in this research were patchouli cuttings of the Aceh patchouli type. About 2 years old, healthy, 1.5 m tall, has many branches and lush leaves. For research material, the stems are cut into pieces measuring 10 cm and having 3-4 segments. The location for taking cuttings is in the Palaran sub-district area, Jln. Ampera II RT, 17 Ward Bukuan Palaran

➤ Administration of Growth Regulators

To give water without growth regulator coconut water and atonic are first measured according to the treatment, 1000 ml is given for water and coconut water without any mixture, while for atonic 10 ml is mixed with 990 ml of water and soaked for 10 minutes for each treatment.

➤ Planting

Planting using 30 polybag measuring 20 x 20 cm that have been provided, before planting in the polybags, water them until the polybags are wet, then fill them with sifted soil, then make a planting hole using iron/wood in the middle of the polybags 3-5 cm deep, cuttings. planted one by one in each polybag, then the planting medium is carefully compacted and arranged at a distance of 10 cm

➤ Plant Maintenance

• Sprinkling

Watering is carried out until the planting medium becomes moist, the watering time is adjusted to the condition of the soil, if the soil is still wet/damp, watering is not carried out.

• Weed Control

Weed control in polybags is carried out using a manual system using hands, namely pulling out grass. Weed control time is adjusted to field conditions.

E. Completion

Research results include observations:

➤ Number of Shoot

The number of shoots was calculated by counting the number of shoots from each treatment. Observations of the number of shoot was carried out every month, namely month 1, month 2 and month 3.

➤ Number of Roots

Counting the number of roots growing on patchouli plant cuttings was carried out at the end of the research, namely month 3.

III. RESULTS AND DISCUSSION

A. Results

➤ Number of Shoots (Months)

Based on the results of research observations, the number of shoots from patchouli cuttings in different treatments showed different results, the data can be seen in Table 1 below:

Table 1. Average Data on the Number of Shoots in the Growth of Patchouli Cuttings by Soaking in Coconut Water and Atonik

Treatment	Average Number of Shoots		
	Month 1	Month 2	Month 3
P0	2.5a	4.0a	6.5a
P1	2.8a	5.8b	8.6b
P2	3.5b	8.6c	12.0c

From table 1, it shows that the P2 treatment, namely with Atonik soaking, shows that the P2 treatment is more effective with an average growth of 3.5 shoots in the first month, 8.6 shoots in the 2 month and 13.0 shoots in the 3 month, the highest average number average shoots were compared with treatments P0 and P1 by soaking in water without growth regulator and coconut water. The P1 treatment produced an average of 2.8 shoots in the 1 month, 5.8 shoots in the 2 month and 8.6 shoots in the 3 month with the soaking treatment using coconut water, which shows that the P1 treatment was more effective. from treatment P0. Treatment P0 produced the lowest average number of shoots or was less effective compared to treatments P1 and P2 from 2 months of research with soaking treatment using water without growth regulator.

According to Muslimah et al (2015), the influence of growth regulator auxin on the emergence of shoots can stimulate cell division and elongation in a tissue which can encourage the formation of shoots. This is in accordance with the opinion of Delcheh et al (2014), auxin can regulate the development of cell tissue and is able to stimulate the formation of shoots. Based on the number of shoots in the P0 treatment, it was influenced by the soaking material factor. Soaking in the P0 treatment only uses water that does not contain the growth regulator auxin which does not accelerate the growth of patchouli cuttings. According to Panjaitan et al (2014), the process of forming new cells and tissues can be assisted by administering or adding exogenous growth regulators.

➤ Number of Roots

In the P2 treatment with atonic soaking material, the highest shoot yield was shown. This success was influenced by material factors and the length of time the cuttings were soaked. According to Darlina (2016), atonic is a growth regulator that contains auxin which can increase the plant's ability to grow. This is supported by the statement of Hidayanto et.al (2003), namely that the aromatic nitro compound ($C_6H_4NO_2$) found in atonic functions to stimulate plant growth, namely shoots. Based on research, it can be seen that in the P0 treatment, the number of shoots produced is the smallest, this is caused by the soaking material factor. The length of soaking time at P0 is 10 minutes.

In treatment P1, the soaking material used, namely coconut water, showed a greater number of shoots compared to treatment P0. Coconut water contains 8 types of mineral elements (K, P, Na, Ca, S, Fe, Mg, and Cl), 6 types of elements of which are much needed macro nutrients for plants, namely (K, P, Mg, Ca, S, and Fe) the rest are micronutrients (Na and Cl), and contain vitamins, amino acids, phosphorus nucleic acids, auxin growth substances and gibberellic acid which function as stimulants of the tissue proliferation process, facilitating metabolism and respiration processes Widiastoety and Santi (1997). Therefore, coconut water can help the process of cell division and cell differentiation. This causes the plant to grow quickly.

Based on the results of research observations, the number of roots in patchouli plant cuttings showed different results for each treatment given. It can be seen in table 2 below: Table 1. Average Number of Roots in the Growth of Patchouli Cuttings by Soaking in Coconut Water and Atonic

Table 2 The Number of Roots in Patchouli Plant Cuttings Showed Different Results for each Treatment

Treatment	Average Number of Roots
P0	6.8a
P1	8.5b
P2	10.4c

From table 2, the P2 treatment shows that the average number of roots is the highest compared to the other P1 and P0 treatments, namely 10.4 during the 3 months of research. Observations at the P1 level showed an average number of roots, namely 8.5, while treatment P0 showed the lowest number of roots compared to other treatments with an average number of roots, namely 6.8.

Based on research, the P2 treatment with Atonik growth regulator soaking material showed the highest number of roots compared to the P0 and P1 treatments. According to Lestari (2011), atonic is a type of growth regulator that diffuses easily and is good for the process of emergence of shoots and roots. This is supported by the statement (Ardaka, 2011) which

states that atonik is a growth regulator that stimulates synthetic growth which functions to stimulate root growth, which activates the absorption of nutrients and increases the release of buds or shoots which can improve the quality of plant results in plant growth. Atonic is included in the auxin group which contains the active ingredients sodium ortho-nitrophenol, sodium para-nitrophenol, sodium 2-4 dinitrophenol, and sodium 5-nitroguaiacol.

Treatment P1 with coconut water soaking material showed a greater number of roots compared to treatment P0. According to Juswardi (1998), young coconut water contains organic compounds such as vitamin C, vitamin B, the hormone auxin, gibberellins and cytokinins at 5.8 mg/l which can accelerate plant growth. According to Martana et al (2020), the addition of auxin in coconut water has no effect on root formation because the auxin contained in plants is still sufficient when the number of roots increases.

Treatment P0 which used water immersion without growth regulator showed the lowest number of roots among the other 2 treatments, namely P1 and P2 which used coconut water and atonic, this was due to the absence of the growth regulator auxin which can accelerate the growth of patchouli plant cuttings and cannot increase root and shoot development. According to Karimi et al (2014), rooting success is influenced by the level of tissue sensitivity in responding to exogenous auxin so that rooting responses will vary.

IV. CONCLUSION

- The use of Atonik growth regulator as a soaking agent in treatment P2 with a dose of 10 ml mixed with 1000 ml water and a soaking time of 10 minutes showed the success of cuttings with a greater number of shoots and roots compared to treatments P0 and P1.
- In treatment P2, atonic growth regulators were used with the fastest number of shoots and the highest number of roots

REFERENCES

- [1]. Asman, 1996. Patchouli Monograph of the Airlangga Spice and Medicinal Crops Research Institute. Bogor.
- [2]. Abidin, Z. 2003. Basic Knowledge About Growth Regulatory Substances. Bandung. Member Space IKPI.
- [3]. Ardaka, I. M. 2011. The influence of the number of segments and growth regulators on the growth of Pranajiwa cuttings (*Euchresta horsfieldi* (Lesch.) Benth. J. Plantation Forest Research
- [4]. Barciszewski J, Massino F, Clark BFC (2007) Kinetin- A multiactive molecule. *Int J Biol Macromol.* 40:182–192

- [5]. Darlina, Hasanuddin dan Hafnati R. 2016. The Effect of Watering Coconut Water (*Cocos nucifera* L.) on the Vegetative Growth of Pepper (*Piper nigrum* L.). Biology Education Student Scientific Journal
- [6]. Delcheh, K. S., B. Kashefi, & R. Mohammadhassan. 2014. A review optimization of tissue culture medium medicinal plant: thyme. International Journal of Farming and Allied Sciences. 3 (9): 10151019
- [7]. Elik Murni NN., Y. Agung N., Trianitasari. 2010. Growth of Patchouli Cuttings (*Pogostemon cablin* Benth.) on Various Growth Media Compositions and Watering Doses of Coconut Water Waste. Widyagama University. Malang
- [8]. Hidayanto, M., S. Nurjanah dan F. Yosita. 2003. Effect of Root Cutting Length and Sodium Nitrophenol Concentration in Breadfruit (*Artocarpus communis* F.) Assessment and Development of Agricultural Technology. 6(2) : 154-160
- [9]. Juswardi. 1998. Effect of Giving Young Coconut Water on the Growth and Production of Mung Bean Variety 129 (*Phaseolus radiatus* L.). FMIPA Unand. Padang
- [10]. Kardinan, dan Maludi., 2004. Get to know more closely the fragrant plant patchouli for the perfume and cosmetics industry. Agromedia Library. Jakarta.
- [11]. Karimi, M., A. Berrichi, dan A. Boukroute. 2014. Study of vegetative propagation by cuttings of *Tymus saureioides*. J. Mater. Environ. Sci., 5 (4) : 1320 – 1325
- [12]. Kusumo, S. 1984. Plant Growth Regulators. CV Yasaguna. Jakarta
- [13]. Krismawati, A. 2005. Patchouli and its Development Potential in Central Kalimantan Become a Pioneer Commodity. PT DKS Sinartani. Kalimantan Tengah
- [14]. Lestari, L. 2011. Study of Atonik ZPT in Various Concentrations and Spraying Intervals on the productivity of Shallot Plants (*Allium ascalancium* L.). Manipulation
- [15]. Netty, W. 2002. Optimization of Medium for Multiplication of Canna Shoots (*Canna hybrida* Hort). With the Addition of Cytokinin. J. Bioscience and Biotechnology. Indonesia
- [16]. Nuryani, A Emmyzar, MS. Agus, Wahyudi. 2007. Superior Technology for Patchouli Plants, Seeds and Supporting Cultivation of Superior Varieties. Center for Plantation Research and Development. Bogor.
- [17]. Martana, S. B., Sofyadi, E., L., S. N. W., & Program. (2020). Growth of Shoots and Roots of Rose Plant Cuttings (*Rosa* sp.) Due to Coconut Water Concentration. Agricultural Scientific Journal, 8(1), 31–36 <https://doi.org/10.35138>
- [18]. Muslimah, Y., Jalil, M., Hadiano, W., Sarwanidas, T., & Hasan, A. (2015). Effect of shallot extract concentration and planting media on the growth of mucuna (*Mucuna bracteata*) cuttings. Sustainable Agrotek Journal, 1(1), 47-54
- [19]. Panjaitan, L.R.H., Ginting, J. & Haryanti. 2014. Growth response of various stem diameter sizes of bougainvillea (*Bougainvillea spectabilis* Willd.) cuttings to the application of growth regulators. Online Journal of Agroecotechnology. 2(4) : 1384–1390
- [20]. Rahardja, P.C., dan Wiryanta, W. 2003. Various ways to multiply plants. Jakarta: Agromedia Pustaka.
- [21]. Seswita, D. 2010. Use of Coconut Water as a Growth Effect on Multiplication of Temulawak Shoots (*Curcuma xanthorrhiza* Roxb.). In Vitro Littri Journal, 16(4).
- [22]. Surdayani, T. 2004. Cultivation and Refining of Patchouli. Self- help distributor. Jakarta
- [22]. Widiastoety, D. dan Santi. A 1997. The Effect of Coconut Water on the Formation of Protocom like Bodies (PLBS) from Vanda Orchids in Liquid Medium. J Hort.