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ZPT Test and Rootone-F Against for Cuttings of *Premna serratifolia* L.

Okky Feri Ananda[1*], Antar Sofyan[1], Ronny Mulyawan[1]

[1]Program Study of Agroecotechnology, Faculty of Agriculture, Lambung Mangkurat University, Indonesia
[*]E-mail: ronny.mulyawan@ulm.ac.id

Abstract

Green grass jelly (Premna serratifolia L.) is a vine or coiled plant originating from Southeast Asia. Green grass jelly cultivation in Indonesia is still relatively low due to the difficulty of cultivating grass jelly plants, especially in terms of plant propagation. In general, propagation is done by stem cuttings. PGR that is often used is synthetic ZPT, one of which is Rootone F, but its use is less effective in terms of economy. it is necessary to substitute with ZPT derived from natural materials or from the use of household and industrial wastes such as coconut water, rice washing water, and tofu waste water. The purpose of this study was to determine the effect of soaking natural PGR in coconut water, rice washing water, and tofu waste water and to find out the best natural PGR ingredients for the growth of green grass jelly plants. This study used an experimental design used was a one-factor Completely Randomized Design (CRD), which consisted of four treatments and was repeated five times so that twenty experimental units were obtained with 3 samples each, requiring 60 plants. P1 = 0.1 gL^{-1} Rootone F (positive control), P2 = 450 ml.L^{-1} young coconut water, P3 = 450 ml.L^{-1} rice washing water, P4 = 450 ml.L^{-1} tofu dregs water. Giving ZPT has an effect on the emergence of shoots. The number of shoots parameter, ZPT had an effect on 2 weeks, 3 weeks, 4 weeks, and 5 weeks. The best treatment when the shoots appear is on rootone f. For the best number of shoots, use tofu dregs, coconut water and rootone f.

Keywords: Cuttins, Rootone F, ZPT

1. Introduction

Grass jelly is a vine or coiled plant originating from Southeast Asia. Green grass jelly (*Premna serratifolia* L.) is a type of grass jelly that has developed and has a high production value in Indonesia, especially in Java, Sumatra and Sulawesi [3,19]. In South Kalimantan, green grass jelly cultivation is still relatively low and quite difficult to find, this is due to the difficulty of grass jelly cultivation techniques, especially in terms of plant propagation and the availability of seeds [1, 16, 25].

In general, grass jelly seedling is done by stem cuttings, but the success rate is still relatively low. One of the causes of low seeding on cuttings is because the content of growth regulators (ZPT) which stimulates cuttings is still not optimal. So it is necessary to add growth regulators to increase the success of grass jelly seedling by cuttings [17, 24]. However, in terms of price, synthetic ZPT such as Rootone F is quite expensive so its use is less effective in terms of economy. Based on this, it is necessary to substitute with ZPT derived from natural materials or from the use of household and industrial waste [5, 8,18].

Various kinds of natural compounds and waste sources that can be used as natural ZPT in increasing the success of cuttings are coconut water, rice washing water, and tofu waste water. Coconut water contains nutrients and growth regulators needed for plant development and growth such as vitamin C, B vitamins, auxin hormones, gibberellins, and cytokinins. Coconut water also contains water, protein, carbohydrates, minerals, vitamins, a little fat, Ca, and P [1, 4, 20]. Rice

washing water is easy to get because most Indonesian people make rice as a staple food. Rice washing water still contains many vitamins, minerals, and other elements. Nutrients such as carbohydrates in rice washing water act as intermediaries for the formation of the hormones auxin and gibberellins which are growth stimulants [23]. Tofu waste water contains a lot of protein, fat, carbohydrates, minerals, calcium, phosphorus, and iron. These organic materials can be recycled by microbes into potential nutrients for the growth and yield of cultivated plants. The protein content of tofu waste water reaches 40-60%, carbohydrates 25-50%, and 10% fat which can be decomposed in the environment into derivative compounds [2, 11, 14]. Therefore, it is necessary to conduct research on natural ZPT of coconut water, rice washing water, and tofu waste water.

2. Material and Methods

The materials used in this study include green grass jelly stalks, young coconut water, rice washing water, tofu waste water, well water, Rootone F 0.1 g, husk charcoal, chicken manure, soil. The tools used in this study include a bucket, measuring cup, plant scissors, analytical balance, cutting knife, 20 x 25 cm polybag, ruler, stationery, camera. The experimental design used was a one-factor Completely Randomized Design (CRD), which consisted of four treatments and was repeated five times to obtain twenty experimental units of 3 samples each, requiring 60 plants. P1=0.1 gL^{-1} Rootone F (positive control), P2=450 $ml.L^{-1}$ young coconut water, P3=450 $ml.L^{-1}$ rice washing water, P4=450 $ml.L^{-1}$ tofu dregs water. This research was conducted in June – September 2021 at the Production and Greenhouse Laboratory of the Agroecotechnology Study Program, Faculty of Agriculture, Lambung Mangkurat University.

Production of natural ZPT, coconut water, rice washing water and tofu waste water can be directly used as natural ZPT, all we do is reduce the concentration of each natural ingredient used as ZPT from 100% to 45% by mixing 450 ml of water with natural ZPT ingredients with 550 L well water. Preparation of nursery media begins with preparing chicken manure, husk charcoal and soil as nursery media and polybags as nursery media. Fill polybags with chicken manure, husk charcoal and soil in a ratio of 1:1:1 as much as 1 $Kg.polybag^{-1}$. The selection of green grass jelly seeds is done by selecting grass jelly stems that are not too old and not too young (Stem is not hard, dark green not brown, has a leaf book of at least two strands. Then cut the stem to separate it from the parent using clean, sharp plant shears. Cut the stem with a length of 20 cm consisting of 2 stem books. Seedlings ready to be treated, soaking the seeds in ZPT solution. Soaking the seeds into PGR was done by first mixing 450 ml of pure PGR solution into 550 ml of well water in order to obtain a 45% solution concentration. The solution with a concentration of 45% was put into the treatment container. Soak the base of the stem that has passed the selection into the PGR solution, let stand for 24 hours so that the compounds in the PGR seep into the stem tissue. The nursery begins with planting seeds that have been soaked for 15 minutes into the nursery media. Immerse the base of the stem into the nursery medium to a depth of 4 cm. Then place the nursery polybag in the shade or not in direct sunlight and do watering every afternoon until the cuttings grow. The growth of cuttings is characterized by the emergence of new roots, shoots and leaves.

Observations were made with reference to the following parameters, the time of shoot emergence and number of leaves. Data analysis begins with a homogeneity test to determine whether the data is homogeneous or not, followed by the Repeated Measure ANOVA test to see the average difference. Then test Duncan's Multiple Range Test (DMRT) to see if the data is significantly different or very significant at the 5% real test level.

3. Results and Discussion

3.1 *The time of shoot emergence*

The time of emergence of grass jelly cuttings is presented in the form of a simple table based on the results of observations for 5 weeks as follows.

Table 1. Shooting Time

Treatment	Replace	Day to
Rootone F (P1)	1	**3**
	2	5
	3	6
	4	7
	5	**4**
Young coconut water (P2)	1	7
	2	8
	3	7
	4	8
	5	5
Rice washing water	1	8
	2	6
	3	7
	4	7
	5	5
Tofu Dregs Water	1	7
	2	**4**
	3	6
	4	7
	5	8

The results of observations on the emergence of shoots showed that the P1 (Rootone F) treatment appeared on average in the 3 DAP to 7 DAP time. Then followed by the P4 treatment (Tofu Dregs Water) which showed the time of shoot emergence in the range of 4 DAP to 8 DAP. Meanwhile, treatments P2 (Young coconut water) and P3 (Rice washing water) showed almost the same time when shoots appeared, namely in the 5 DAP to 8 DAP timeframe.

Based on the results of observations that have been carried out, it shows that the natural ZPT treatment has an effect on the time of shoot emergence (Table 1). The best treatment was seen in P1 (Rootone F) with a susceptible time of budding between 3 DAP to 7 DAP on the average time of shoot emergence on day 5, but the P1 (Rootone F) treatment acted as a positive control so that the most influential treatment data was which is closer to or exceeds the outcome data than the positive control. The closest treatment was P4 (Tofu Dregs Water) with a susceptible time of germination between 4 DAP to 8 DAP at the average time of sprouting on the 6.4 day. This is presumably because in ZPT tofu waste water contains many nutrients, especially nitrogen (N). The nitrogen content greatly affects the growth of shoots, that nitrogen has a role in supporting the easy formation of shoots in plants [18, 21].

The rapid formation of shoots in the P4 (Tofu Dregs Water) treatment was strongly influenced by the nitrogen content. Stated that in tofu waste liquid waste there are organic materials such as nitrogen (N) for the growth of shoots, stems, and leaves; phosphorus (F) to stimulate root, fruit, and seed growth; and potassium (K) to increase plant resistance to pests and diseases that plants need. In addition to the nitrogen (N) content, the emergence of shoots was faster in the P4 (Tofu Dregs Water) treatment, it was also suspected that the phosphorus (F) content was very instrumental in stimulating root growth. The faster the roots grow, the faster the time for shoots to appear. The chemical elements in 100 ml of tofu liquid waste are 4.9 grams of water, 17.4 grams of protein, 19 mg of calcium, 29 mg of phosphorus and 4 mg of iron [7, 12, 22].

3.2 *Number of shoots*

The results of the analysis of variance showed that the data on the number of shoots were homogeneous and could be further tested. Based on the results of the analysis of variance ANOVA showed that immersion into natural ZPT had an effect on the parameters of the number of shoots of green grass jelly cuttings.

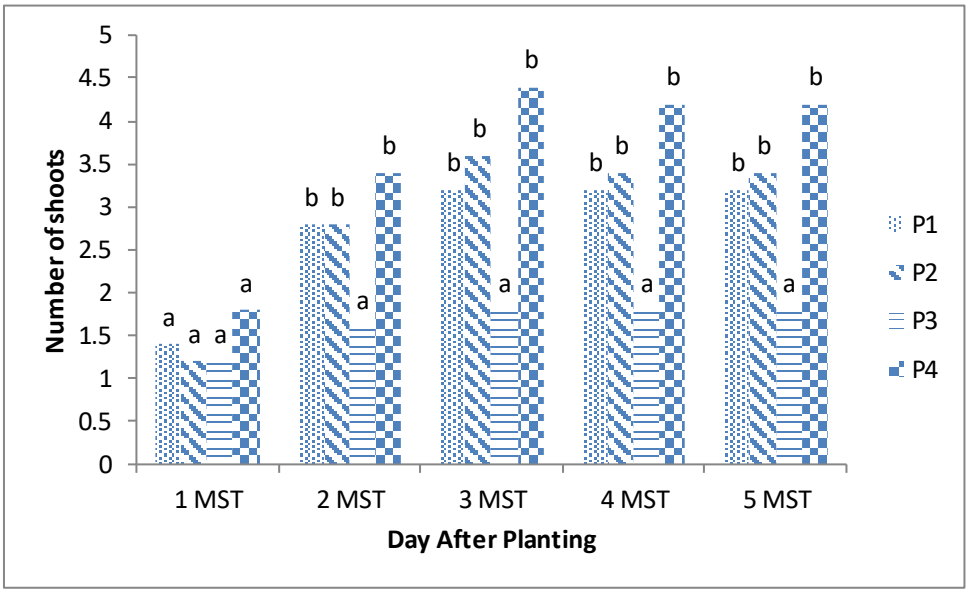

Figure 1. Number of shoots

Note: The average value in the table followed by the same letter shows no significant difference based on the DMRT test at the 5% level

DMRT test results at 5% level in the treatment, P1, P2 and P4 were not significantly different, but significantly different from treatment P3 on the number of cuttings shoots green grass jelly. Based on the results of observations on the number of shoots of green grass jelly cuttings, treatment P4 showed the highest yield, while in treatment P3 the lowest yield was shown.

Based on the results of observations that have been carried out, it shows that the natural ZPT treatment has an effect on the number of shoots (Table). The best treatment for the number of shoots was found in the P4 (Tofu Dregs Water) treatment, with an average number of shoots appearing 3.6. Similar to the previous explanation, it is also suspected that the number of shoots in tofu waste water contains sufficient nitrogen (N) and carbohydrates, thus helping the addition of photosynthate to plant stems which will have a good impact on the development of shoots available for plants [8]. Plant cuttings require photosynthesis or food ingredients, especially carbohydrates and nitrogen, these two materials greatly affect shoot growth, especially nitrogen elements [4,13,15].

Apart from the photosynthetic content, another factor that is no less important in supporting the growth of the large number of shoots is the content of nutrients such as phosphorus (F) and potassium (K). Phosphorus (F) serves to stimulate the growth of roots, fruit, and seeds and potassium (K) serves to increase plant resistance to pests and diseases that plants need [3,6,10]. Potassium plays a role in the synthesis of proteins and carbohydrates, helps plant antibodies against disease and drought and is an activator of a large number of enzymes that are important for photosynthesis and respiration [6,7,9].

4. Conclusion

Giving ZPT has an effect on cutting of Green grass jelly for shooting time and number of shoots. The Shoting time, rootone F tend to be faster. The number of shoots, ZPT had an effect on 2 weeks, 3 weeks, 4 weeks, and 5 weeks. The best treatment when the shoots appear is on rootone F. For the best number of shoots, use tofu dregs, coconut water and rootone f.

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