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Various Planting Media And Concentrations Of Shallot Extract On The Growth Of Javanese Chili Cuttings(*Piper retrofractum* Vahl)

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Abstract

Effect of Various Planting Media and Concentration of Shallot Extract on the Growth of Java Chili Plant Cuttings (*Piper retrofractum* Vahl). Various Planting Media and Concentration of Shallot Extract on the Growth of Java Chili Plant Cuttings (*Piper Retrofractum* Vahl). The purpose of this study was to determine the composition of planting media and the concentration of shallot extract on the growth of cuttings of Javanese chili plants. This research was conducted in the experimental garden of the Faculty of Agriculture, Baturaja University, from January to April 2024. This study used a factorial completely randomized design (CRD), with 2 factors, namely: 1) comparison of planting media as many as 4 treatments, namely Soil (Control), Soil + Sand + Manure (1:1:1), Soil + Cocopeat + Manure (1:1:1), Soil + Husk Charcoal + Manure (1:1:1); 2) concentration of shallot extract as many as 4 treatments, namely; No Shallot Extract, 30% Concentration, 60% Concentration, 90% Concentration, and repeated 3 times. Observed variables: Shoot growth time, shoot length, number of leaves, root length, number of roots. The results showed that the interaction between planting media and growth hormone (shallot extract) had no significant effect on the growth parameters of Javanese chili plants. The combination of planting media soil + cocopeat + manure with 90% concentration of shallot extract gives results that tend to be better on all variables observed. The single factor treatment is a treatment that tends to be better on all observed variables. The single factor treatment of also gives results that tend to be better on all variables observed.

Keywords: Growing Media, Herbal Chili, Javanese Chili, Spices, Vine Cuttings

1. Introduction

Javanese chili (Piper retrofraetum Vahl) is native to Indonesia and became an Indonesian product precisely on the island of Java. Javanese chili is used as a spice and drink mixture. Javanese chilies can also be used for local industries and are mostly exported to Asian countries such as Singapore, China, Malaysia, India and a small portion is exported to European countries (Ramadhanty et al., 2022) (Ramadhanty, 2022).

Javanese chili cultivation in Indonesia is spread across Java, Sumatra, Bali, Nusa Tenggara and Kalimantan. The average dry Javanese chili production in Indonesia is around 1.48 tons/hectare/year. One of the areas that has the opportunity to cultivate Javanese chili is East Java with a plant area of about 4,211 Ha. The amount of production of Javanese chili fruit in dry conditions reaches 1,329 tons. While the amount of productivity of Javanese chili fruit reached 481 kg/ha (Muzakki et al., 2018).

The production of Javanese chili fruit in Lampung Province has increased the export of Javanese chili. In 2019 there were 48.9 tons, while in 2020 it reached 249 tons. Lampung province is also a regular export commodity for 12 countries including the United Arab Emirates, India, China, Nepal, Pakistan, Bangladesh, Japan, Germany, Malaysia, Vietnam, United Kingdom and Turkey (Kanafi, 2020).

Javanese chili, which belongs to the same family as pepper and kumekus, belongs to the betel nut tribe or piperacea. Javanese chili cultivation in Indonesia is still not intensive because people do not know much about Javanese chili plants. Java chili is one of the spices that has economic value and has many benefits both in terms of health and in terms of the economy (Bahruddin et al., 2021).

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Javanese chili as an ingredient to treat low blood pressure, influenza, cholera, headaches, and shortness of breath. This efficacy is inseparable from aromatic compounds or essential oils, apart from giving a pleasant aroma it also acts as an antioxidant compound. One of the main essential oils in Java Chili is terpenoids, which consists of n-octanol, linanool, terpinyl acetate, citronellyl acetate, piperine, alkaloids, saponins, foliphenols, and resins (cavisin) (Yuliatmoko & Febria, 2018).

The main benefit of Java chili fruit is a mixture of herbal medicine. In Madura, Java chili is used as a body warming drink and can also be used as a medicine such as rheumatic diseases. The chemical content of Java chili fruit (Java chili is useful as an ingredient to treat low blood pressure, influenza, cholera, headaches, and shortness of breath due to aromatic compounds or essential oils, and antioxidants. The content of Java Chili essential oil is terpenoids, which consist of n-octanol, linanool, terpinyl acetate, citronellyl acetate, piperine, alkaloids, saponins, foliphenols, and resins (cavicin). (Yuliatmoko & Febria, 2018). In Madura, Java chili is used as a body warming drink and can also be used as a medicine such as rheumatic diseases. The chemical content of Java chili fruit contains piperine spicy substances, palmitic acid, tetrahydro pipercacid, essential oils (Budianto et al., 2013).

Java chili can be propagated vegetatively by means of climbing vine cuttings and soil tendrils (worm tendrils). Climbing tendrils are tendrils climbing on the stakes, but which are taken at the end. The main characteristic of this vine is that it climbs vertically and there are roots attached to the stake. Worm tendrils are tendrils that are on the surface of the soil and are creeping on the surface of the soil. These tendrils will be able to climb if they are accustomed to sticking to the adjuster (Anggia, 2022). To get high production yields, you should choose good planting material from parent trees that are considered superior, healthy, and high productivity (Nurkhasanah et al., 2013). Javanese chili plants derived from climbing vines have wider leaves and a greater number of roots compared to soil vines, while Javanese chili plants derived from soil vines are easy to obtain, especially during the rainy season and the collection of planting material does not damage the plant The success of cuttings in forming roots is influenced by the age of the plant, the growth phase, and differences in the parts of the plant used as cuttings (Wijaya, 2022).

Another factor that also determines the success of cuttings is the composition of the planting medium because the planting medium is a place for plants to grow that provides nutrients to support plant growth, good soil porosity for root growth, adequate temperature, and good soil quality. Another factor that also determines the success of cuttings is the selection and composition of planting media because planting media is a place to grow plants that provide nutrients to support plant growth, provide sufficient moisture, temperature. A good planting medium has requirements including the creation of a good air and water space so that aeration and drainage for plants are more optimal (Marliana, 2022). Good quality growing media is needed to provide sufficient nutrients to meet the needs of plants. Planting media affects success because it plays a very important role in early growth, especially in root formation (Safitri et al., 2022).

Wasfadriaynto (2016) stated that planting media affects the wet weight of pepper buds. Planting media with a mixture of soil + manure + husk charcoal produced a 37% higher shoot weight compared to soil + manure + rice husk media. While (Ismawati et al., 2022) states that the treatment of planting media composition Soil: Manure: cocopeat (1:1:1) has a high water binding ability so that the water needs for plants can be fulfilled. cococpeat planting media has a high water storage capacity and has micro pores that can inhibit water movement so that it causes higher water availability in the planting media.

According to the research results of Asrima & Zahrah (2023), planting media in the form of soil + sand + manure in a ratio of 1: 1: 1 is the best treatment for the growth of red betel cuttings. This is because manure has sufficient nutrient content, sand is able to maintain soil aeration and drainage, so it can maintain soil moisture well.

The problem that is often encountered in Java chili seedlings is that the cuttings often fail due to the absence of root growth. One of the efforts to overcome failure by not growing roots is by giving growth regulators. Giving growth regulators to stimulate and trigger the formation of cuttings roots. Auxin growth hormone is a hormone that has a greater influence than other growth hormones for root formation in stem cuttings, but this Auxin growth hormone is relatively expensive and difficult to obtain (Hartmann et al., 2014).

As a substitute for synthetic auxin, natural growth hormones such as coconut water, bamboo shoots, cow urine and shallots can be used (Prakoso, 2022). In addition to hormones from coconut water and bean sprout extract, shallot extract is also good for increasing the growth of Javanese chili cuttings, this is also stated in the results of Julian's research (2020) that giving shallot extract with a concentration of 60% is the best concentration in increasing shoot height, number of shoots, number of leaves, root length and number of roots on pepper plant cuttings.

Pata, (2021) states that the administration of growth hormone shallot extract with a concentration of 60% and 90% gives better results than the administration of shallot extract with other concentrations. The administration of growth hormone shallot extract at a concentration of 60% and 90% gives better results than the administration of shallot extract with other concentrations in pepper plants.

2. Material and Methods

The research was conducted in the experimental

garden of the Faculty of Agriculture, Baturaja University, East Baturaja District, Ogan Komering Ulu Regency (coordinate point Baturaja. OKU. South Sumatra-4.1391894,104.2040262,107m) and altitude 32-62 meters above sea level. This implementation time starts in January 2024 until April 2024. The materials used in this study are Java chili seedling cuttings, soil, sand, rice husk, cocopeat, onion extract, paranet, bamboo and wood. While the tools used in this research are Polybag, bucket, hoe, knife, fine wire or rope, scissors, ruler and stationery.

This study used a Factorial Completely Randomized Design (CRD) consisting of two treatment factors, namely the first factor of comparison of planting media as many as 4 treatments, namely; soil (control), soil + sand + manure (1: 1: 1), soil + cocopeat + manure (1: 1: 1), soil + husk charcoal + manure (1: 1) and the second factor of onion extract concentration: 1) and the second factor of shallot extract concentration as many as 4 treatments without ZPT, 30% concentration (30 ml shallot extract + 70 ml water), 60% concentration (60 ml shallot extract + 40 ml water), 90% concentration (90 ml shallot extract + 10 ml water) repeated three times, so that 16 treatment combinations were obtained and 48 experimental units were obtained.

Each unit has 5 plants and 3 plant samples.The data taken are; Shoot Growth Time (Days), Shoot Length (cm), Number of leaves (strands), Root Length (cm), Number of Roots (strands) The data obtained are calculated on average, then the analysis of variance using the F test at a real level of 5%. If based on the F test the treatment has a real effect, then the Smallest Real Difference test (BNT) at 5% level is carried out. Calculations using microsoft office excel. For more details, we can see in Figure 1.

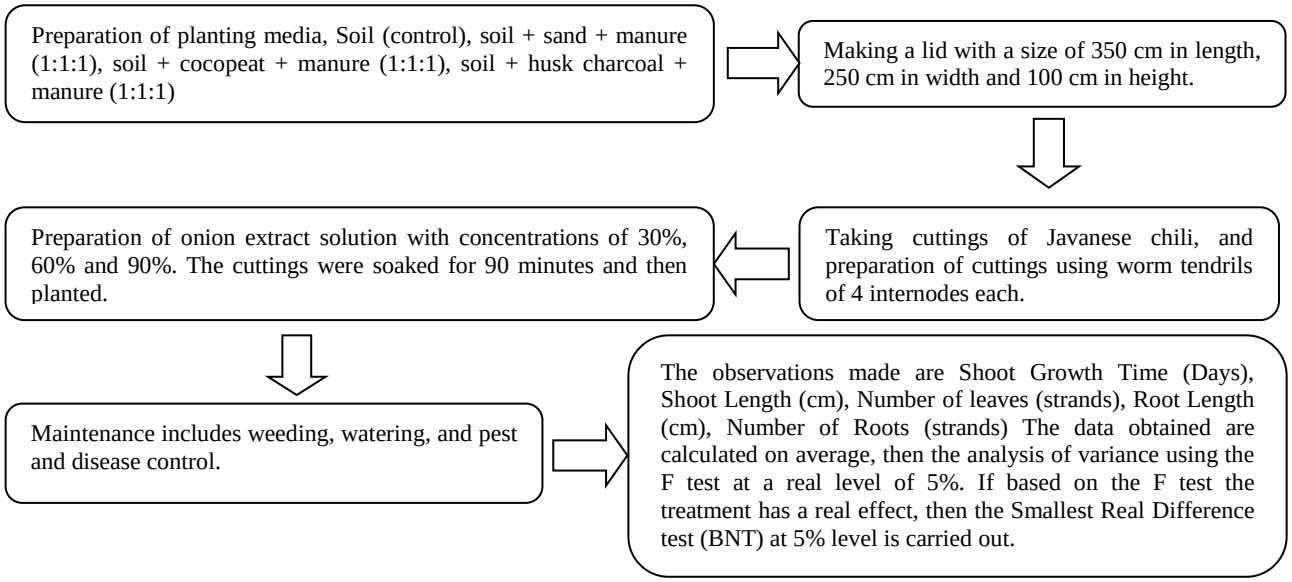

Figure 1. Flow chart of the research process

3. Results and Discussion

The results of the F test analysis in Table 1, show that the interaction of the composition of planting media and the concentration of shallot extract on the growth of Javanese chili cuttings has no significant effect on all observed variables, namely shoot growth time (hst), shoot length (cm), number of leaves (strands), root length (cm), number of roots (strands).

Table 1. Results of analysis of variance (5% F test) of the composition of planting media and the concentration of shallot extract on all observed variables

Variables	Interaksion		Media	Plant (M)	ZPT (z)		KK %
	F.Tab	F Hit	F.Tab	F.Hit	F.Tab	F Hit	
1. Shoot Growth Time (days)	2.21	0.79 tn	2.92	1.24 tn	2.92	0.41 tn	0.80
2. Shoot Length (cm)	2.21	0.48 tn	2.92	1.34 tn	2.92	1.23 tn	1.74
3. Number of Leaves (strands)	2.21	0.33 tn	2.92	1.73 tn	2.92	0.13 tn	0.91
4. Root Length (cm)	2.21	0.54 tn	2.92	3.58 *	2.92	0.03 tn	1.41
5. Number of Roots (strands)	2.21	0.47 tn	2.92	0.20 tn	2.92	0.46 tn	1.88

Notes: *: real effect; tn: no significant effect

Based on table 1, it can generally be concluded that the interaction between planting media and growth hormones has no significant effect on the growth parameters of Javanese chili plants. The treatment combination is said to interact if it affects plant growth. Vice versa, if it does not interact then the treatment gives the same effect (not real) on plant growth. It is suspected that the interaction between planting media and the concentration of shallot extract has

not been able to affect the growth and development of Javanese chili cuttings, because in the process of growth the cuttings still utilize the food reserves stored in the cutting material. In agreement with Sari et al, (2020) which states that the growth of cuttings is also determined by the content of hormones in plants, especially auxin and cytokinin hormones. Basically, plants that already have enough growth regulators in the form of endogenous auxin and cytokinin hormones, so the provision of exogenous auxin and cytokinin growth regulators tends not to respond too much.

Based on the results of the analysis (Table 1), it can be seen that the treatment of planting media on the variables of shoot growth time, shoot length, number of leaves, number of roots has no significant effect. This is thought to be because various kinds of planting media tend to improve the physical properties of the soil that spur growth. Murbandono (2005) stated that a mixed media of raw husk, husk charcoal, compost and cow manure can be useful to loosen, increase porosity, aeration and facilitate plant root growth. Husk charcoal has properties that are easy to bind water, not easy to clot, lightweight, sterile and has good porosity, but the root length variable has a real effect. It is suspected that the planting media used with a balanced composition can create good growing conditions for rooting Javanese chili cuttings. According to Catur et al (2023) Good cuttings media are media that have sufficient porosity, good aeration, good drainage, high water binding capacity, and are free of pathogens. This planting medium serves as a barrier to the availability of nutrients in the cuttings during the root growth period and maintains the humidity of the planting medium.

While the treatment of shallot extract has no significant effect on all observed variables, namely shoot growth time, shoot length, number of leaves, number of roots. It can be concluded that the concentration of shallot extract has not been able to affect the growth of Javanese chili cuttings. It is suspected that the Javanese chili cuttings used still utilize the endogenous hormones contained therein and the addition of exogenous hormones has not been able to affect the growth of Javanese chili cuttings.

In table 2, the average results of the M2Z2 treatment combination show the highest average in the variable shoot length (18.11cm), in the M2Z3 treatment shows the highest average in the variable number of leaves (6.22 strands) and the number of roots (5.67 strands). The combination of M1Z3 has the highest average in the variable root length (8.06 cm).

Table 2. Average Results of the Effect of Growth of Java Chili Cuttings (*Piper retrofractum* Vahl) on the Combination of Planting Media and Concentration of Shallot Extract on All Variables of Interest

Treatment	Shoot Growth Time (days)	Shoot Length (cm)	Number of Leaves (strands)	Root Length (cm)	Number of Roots (strands)
M0Z0	7.00 ± 0,48	10.28 ± 1,93	4.44 ± 0,54	6.39 ± 0,91	4.56 ± 0,72
M0Z1	7.00 ± 0,48	12.39 ± 1,93	5.00 ± 0,54	5.56 ± 0,91	4.78 ± 0,72
M0Z2	7.00 ± 0,48	12.88 ± 1,93	4.89 ± 0,54	5.39 ± 0,91	4.55 ± 0,72
M0Z3	7.00 ± 0,48	12.33 ± 1,93	5.33 ± 0,54	5.22 ± 0,91	3.56 ± 0,72
M1Z0	8.67 ± 0,48	13.83 ± 1,93	5.56 ± 0,54	6.28 ± 0,91	4.33 ± 0,72
M1Z1	7.00 ± 0,48	14.67 ± 1,93	6.00 ± 0,54	6.61 ± 0,91	4.00 ± 0,72
M1Z2	7.00 ± 0,48	14.44 ± 1,93	6.33 ± 0,54	6.44 ± 0,91	5.11 ± 0,72
M1Z3	8.00 ± 0,48	9.83 ± 1,93	5.00 ± 0,54	8.06 ± 0,91	3.89 ± 0,72
M2Z0	7.00 ± 0,48	13.17 ± 1,93	5.78 ± 0,54	6.89 ± 0,91	2.78 ± 0,72
M2Z1	7.67 ± 0,48	14.28 ± 1,93	6.22 ± 0,54	7.33 ± 0,91	4.67 ± 0,72
M2Z2	7.00 ± 0,48	18.11 ± 1,93	5.78 ± 0,54	7.89 ± 0,91	4.67 ± 0,72
M2Z3	7.00 ± 0,48	14.39 ± 1,93	6.22 ± 0,54	7.72 ± 0,91	5.67 ± 0,72
M3Z0	7.00 ± 0,48	13.89 ± 1,93	6.00 ± 0,54	7.55 ± 0,91	3.22 ± 0,72
M3Z1	7.33 ± 0,48	14.72 ± 1,93	5.67 ± 0,54	7.72 ± 0,91	3.78 ± 0,72
M3Z2	7.00 ± 0,48	13.66 ± 1,93	5.67 ± 0,54	7.50 ± 0,91	4.11 ± 0,72
M3Z3	7.00 ± 0,48	11.94 ± 1,93	5.56 ± 0,54	6.79 ± 0,91	4.44 ± 0,72

Notes: M0: soil (control), M1: soil + sand + manure (1:1:1), M2: soil + cocopeat + manure (1:1:1), M3: soil + husk charcoal + manure (1:1:1), Z0 = without ZPT, Z1: 30% concentration (30 ml shallot extract + 70 ml water), Z2: 60% concentration (60 ml shallot extract + 40 ml water), Z3: 90% concentration (90 ml shallot extract + 10 ml water).

In tabulation table 2, the treatment combination M1Z0 has the highest average value on the variable budding time (Figure 2). But the variable length of buds has the highest average in the combination M2Z2 (Figure 3). In the variable number of leaves, the highest average is in the M1Z2 combination (Figure 4). While the highest average number of roots in the combination of M2Z3 (Figure 5).

Based on Figure 2, the combination in all treatments has an almost uniform average. It is suspected that the combination of all treatments affects the growth of shoots on Javanese chili cuttings. Catur et al, (2023) stated that the percentage of live cuttings of herbal chili plant seedlings was 100%, which means that the herbal chili cuttings were all alive at 7 hst and 14 hst. According to Hayati et al (2022) natural auxin treatment that works to stimulate the growth process of cuttings and is supported by a combination of planting media so that plants can normally get nutrients from natural auxins and food sources from planting media. Growth regulators consist of cytokinins and auxins. Auxins have multiple roles depending on the chemical structure, concentration, and plant tissue being treated. In general, auxins are used to

induce the formation of callus, suspension culture, and roots, namely by spurring cell elongation and division in the cambium tissue. To spur the formation of embryogenic callus and somatic embryo structures, auxin is often required in relatively high concentrations (Lestari, 2011). In the M1Z0 treatment is the treatment with the longest average that spurs shoot growth (8.67 days), because to help the growth of shoots on cuttings, growth regulators are needed in order to accelerate the process of root growth and the emergence of shoots on cuttings, the addition of auxin at a concentration that can stimulate endogenous auxin activity in the cutting material so as to stimulate the growth of shoots on cuttings (Sholeha et al., 2023).

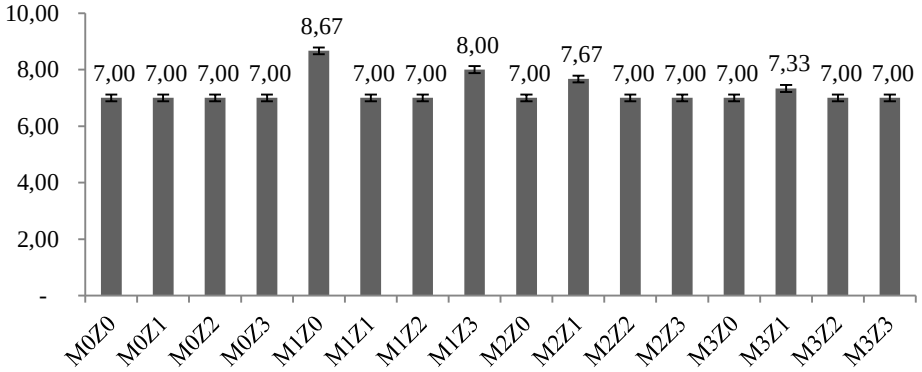

Figure 2. The effect of planting media and shallot extract on the variable of shoot growth time (day)

Good cuttings media are media that have sufficient porosity, good airase, good drainage, high water binding capacity, and are free of pathogens. The media in these cuttings serves as anchoring cuttings during the root growth period, maintaining humidity, and facilitating air penetration. Plant growth is strongly influenced by the condition of the growing media which is also called the adaptation factor, where there are many physical factors from the media that affect plant growth, including aeration, soil water content (aldi et al, 2017).

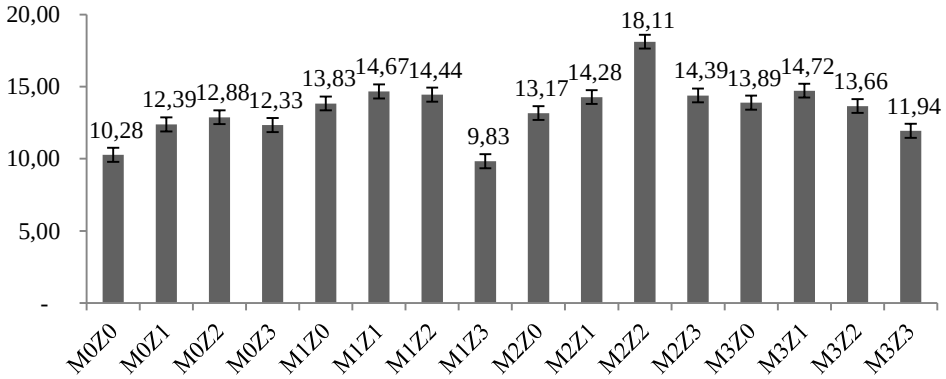

Figure 3. Effect of planting media and shallot extract on shoot length variable (cm)

Based on Figure 3, the M2Z2 treatment combination is the treatment with the highest mean value (18.11) and the M1Z3 treatment combination is the treatment with the lowest mean value (9.83).

Cocopeat is very good to use as a planting medium because it can absorb water and loosen the soil. In addition, with the availability of water, plants are able to utilize the nutrients available in the planting media, which also supports root growth. Irawan and Kafiar (2015) explained that the water content of cocopeat media is higher than other planting media such as husk charcoal and soil. Cocopeat has the ability to absorb water and loosen the soil. Cocopeat can retain the water content and chemical elements of fertilizers and neutralize soil acidity. Because of these properties, cocopeat can be used as a good medium for plant growth (Wasfadriaynto, 2016).

Excessive application of growth hormones can inhibit root formation, while concentrations that are too low are not effective in stimulating root formation (Rahayu and Riendriasari, 2016). Therefore, a combination of growth hormones with the right dosage will help the growth process in cuttings.

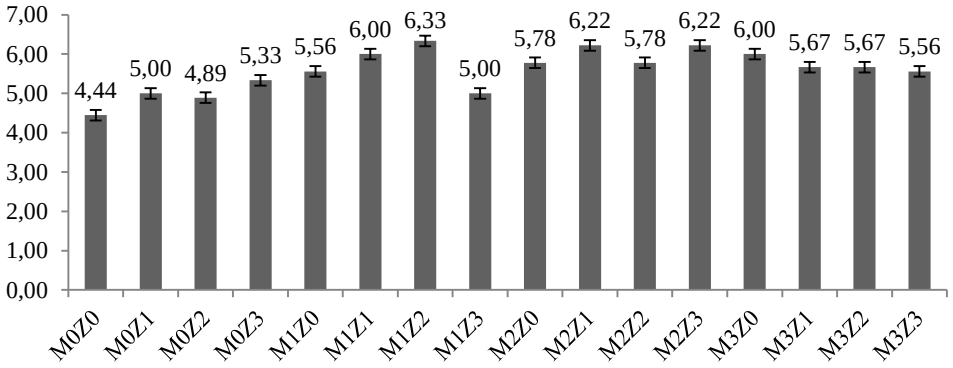

Figure 4. The effect of planting media and shallot extract on the variable number of leaves

Based on the results in Figure 4, the M1Z2 treatment combination is the treatment with the highest mean value (6.33 strands), this is thought to be a combination of planting media and growth hormones that are balanced so that they can help the growth of cuttings. The variable is the treatment with the lowest mean value (5.00).

Sand is often used as a mixture of media for seeding, growing plant seedlings and rooting stem cuttings because sand has large pores, so the sand is easily wet and dry by the evaporation process. Planting media with sand texture is very easy to process, this type of soil has good aeration (availability of air cavities) and drainage, but has a relatively small cumulative surface area, so the ability to store water is very low or the soil dries faster (Dewi et al, 2020).

The M1Z3 treatment combination has a low average. This is because the sand-textured planting media has quite large pores and this sand media mixture is easily wet and dry, if the media conditions are too dry, the growth of the cuttings is not optimal and if the planting media is too humid, rotting of the roots can occur. Growth hormones will be effective at certain concentrations. If the concentration used is too high, it can damage the cuttings because cell division and callus will be excessive so that it inhibits the growth of flowers and roots, whereas if the concentration used is below the optimum, the growth hormone is ineffective (Hariani et al, 2018).

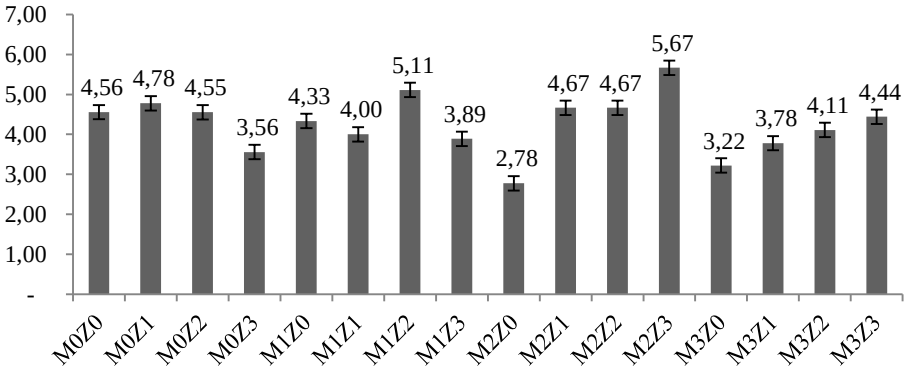

Figure 5. The effect of planting media and shallot extract on the variable number of roots

Based on the results in Figure 5, the treatment combination M2Z3 (soil 1: cocopeat 1: manure + 90% shallot extract) is the treatment with the highest mean value (5.67) this is thought to be a combination of planting media and growth hormones that are balanced can help growth in cuttings. An indicator of the success of cuttings is the growth of roots, rapid root growth and a large number of roots can allow the source of cuttings material to obtain nutrients. The advantage of using growth hormones in cuttings is to improve the root system, and accelerate the process of releasing the number of roots for new plants (Tripama et al, 2022). However, if there is enough endogenous ZPT in the cutting material, then the addition of exogenous growth hormones is not necessary. Conversely, if the cutting material is lacking endogenous growth hormones, then the success of grafting is largely determined by the addition of exogenous growth hormones (Apriliani et al, 2015).

Cocopeat planting media also provides advantages because of its ability to increase soil porosity and will hold more air and water so that circulation and drainage in the media will be better maintained (Aziza et al, 2021). in the M2Z0 treatment combination is the treatment with the lowest mean value (2.78). It is suspected that the interaction of planting media without hormones does not have a significant effect because even though the planting

media used contains sufficient nutrients but without the help of growth hormones, root formation will not be optimal.

The results of the 5% BNT test (table 3) of planting media treatment on the variable root length showed that M3 was not significantly different from the M1 and M0 treatments but significantly different from the M2 treatment.

Table 3. The average results and BNT results of the effect of various planting media on the growth of Javanese chili cuttings (*Piper retrofractum* vahl)

Variables	Treatment Mean				BNT 5%
	MO	M1	M2	M3	
1. Shoot Growth Time (days)	7.00 ± 3,46	7.67 ± 3,89	7.17 ± 4,69	7.08 ± 4,20	
2. Shoot Length (cm)	11.97 ± 3,46	13.20 ± 3,89	14.99 ± 4,69	13.55 ± 4,20	
3. Number of Leaves (strands)	4.92 ± 3,46	5.72 ± 3,89	6.00 ± 4,69	5.72 ± 4,20	0.28
4. Root Length (cm)	5.64 a ± 3,46	6.85 b ± 3,89	7.46 c ± 4,69	7.39c ± 4,20	
5. Number of Roots (strands)	4.36 ± 3,46	4.33 ± 3,89	4.44 ± 4,69	3.89 ± 4,20	

Notes: M0: soil (control) M1= soil + sand + manure (1:1:1), M2: soil + cocopeat + manure (1:1:1), M3: soil + husk charcoal + manure (1:1:1).

Based on table 3, it can be concluded that the M2 treatment is a treatment that tends to be better for the growth of Javanese chili plants. It is suspected that the M2 treatment is a mixture of planting media that can provide a good response in the growth of Javanese chili cuttings. The use of planting media is an important aspect in the growth of cuttings because it is needed as a means of providing nutrients, moisture, and optimal temperature.

Planting media is one of the external factors that affect the success of cuttings seedlings because it plays a role in early growth (Aldi et al., 2017). Rooting will support plant metabolism because the absorption of water and nutrients by the roots is utilized for the growth of planting media is very influential on plant growth. In this study, planting media was used with the composition of soil, manure, and sand in several comparisons. Drainage and aeration in the dominant sandy soil texture is quite good, but this soil texture tends to easily release nutrients needed by plants. For good plant growth, soil with good aeration, drainage, and the ability to store water and nutrients must have a balanced component of sand, dust, and clay.So that plants are able to grow in optimal conditions (Tatik et al., 2014).

Cocopeat is a fine powder produced from crushed coconut fiber. Cocopeat is good to use because it can absorb water and loosen the soil. The advantages of coconut husk powder as a planting medium are that it has the ability to bind water and store water strongly, coconut husk powder contains essential nutrients, such as calcium (Ca), magnesium (Mg), potassium (K), sodium (Na), and phosphorus (P) and can neutralize soil acidity (Mariana, 2017). The availability of water and nutrients in cocopeat can be utilized by plants so that plant growth is faster.

The addition of husk charcoal to the growing media will be beneficial, including streamlining fertilization because in addition to improving soil properties (porosity, aerase), husk charcoal also functions as a nutrient binder (when excess nutrients) that plants will use when nutrient deficiencies, then the nutrients are released slowly according to plant needs (Kolo & Tri, 2016).

Based on table 4, the average results of shallot extract concentration treatment Z1 treatment shows the highest average on the number of leaves (5.72 strands). Z2 treatment shows the highest average on shoot growth time (7.00 days) and shoot length (14.77 cm). in Z3 treatment the highest average is on root length (6.95 cm).

Table 4. The average results of the effect of shallot extract concentration on the growth of Javanese chili (*Piper retrofractum* vahl) cuttings

Variables	Treatment Mean			
	ZO	Z1	Z2	Z3
1. Shoot Growth Time (days)	7.42 ± 3,43	7.25 ± 3,75	7.00 ± 4,03	7.25 ± 2,96
2. Shoot Length (cm)	12.79 ± 3,43	14.01 ± 3,75	14.77 ± 4,03	12.13 ± 2,96
3. Number of Leaves (strands)	5.44 ± 3,43	5.72 ± 3,75	5.67 ± 4,03	5.53 ± 2,96
4. Root Length (cm)	6.78 ± 3,43	6.81 ± 3,75	6.81 ± 4,03	6.95 ± 2,96
5. Number of Roots (strands)	3.72 ± 3,43	4.31 ± 3,75	4.61 ± 4,03	4.39 ± 2,96

Notes: Z0: without ZPT, Z1: 30% concentration (30 ml shallot extract + 70 ml water), Z2: 60% concentration (60 ml shallot extract + 40 ml water), Z3: 90% concentration (90 ml of shallot extract + 10 ml of water)

Based on table 4 above, it can be concluded that the treatment of Z2 (60% concentration) is a treatment that tends to be better for the growth of Java cuttings. It is suspected that the treatment of 60% shallot extract concentration is better in supporting the growth of Javanese chili cuttings.

Shallot is one of the plants that can be used as a natural growth hormone, because shallots contain the hormone auxin which is able to increase cell pressure and increase protein synthesis, so that cells will experience elongation. The concentration level of shallot extract shows different effectiveness on the success of cuttings for each different plant species. Concentrations of shallot extract that are too low or too high can cause stunted growth of cuttings, while

the appropriate concentration can maximize the growth of cuttings (Rahmani et al., 2022).

The content of auxin hormones in cuttings that are still sufficient can affect root growth in plant cuttings. According to Martana et al (2020), the addition of exogenous auxin has no effect on root formation because the endogenous auxin contained in the plant is still sufficient. The use of growth hormones is more profitable than synthetic growth regulators because the ingredients for natural growth regulators are cheaper and also easy to obtain, do not contain chemicals so that they are more environmentally friendly and their effect is not much different from synthetic growth regulators.

Based on the research hypothesis, it is suspected that the best treatment of planting media is M1 (soil 1: sand 1: manure 1) but based on the results of the study obtained, namely the best treatment on planting media M2 (soil 1: cocopeat 1: manure 1). It is suspected that the M1 planting media with sand texture is very easy to process, this type of soil has aeration (availability of air cavities) and good drainage, but tends to easily release nutrients needed by plants and the ability to store water is very low or the soil dries faster.

Based on the hypothesis that the Z2 treatment of 60% shallot extract is the best treatment, this is answered that the Z2 treatment shows results that tend to be better than the other treatments. Based on the hypothesis that the combination of planting media treatment of soil 1: sand 1: manure with zpt shallot extract is the best treatment, this is not answered from the results of the research that has been done. It is suspected that M1 which has a sand texture easily releases nutrients and a faster drying soil texture combined with shallot extract zpt does not have an effect on the growth of Javanese chili cuttings.

Figure 6. Plants treated with M1Z0 (left) and M2Z3 (right)

4. Conclusion

Based on the results of research on the Effect of Various Planting Media and Concentrations of Shallot Extract on the Growth of Javanese Chili Plants (*Piper retrofractum* vahl) which has been carried out shows the results that:

1. The combination of soil + cocopeat + manure treatment with a concentration of 90% is a treatment that tends to be better for the growth of Javanese chili cuttings.
2. The soil + cocopeat + manure treatment is the best treatment for the growth of Javanese chili plants.
3. The treatment of 60% concentration is a treatment that tends to be better for the growth of Javanese chili cuttings.

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