Vol. 14, No. 4 (2025): 1189 - 1198 https://doi.org/10.23960/jtepl.v14i4.1189-1198

JURNAL TEKNIK PERTANIAN LAMPUNG

ISSN 2302-559X (print) / 2549-0818 (online)
Journal homepage : https://jurnal.fp.unila.ac.id/index.php/JTP

The Effect of Rootone F Concentration and Planting Media Composition on the Growth of Fig (*Ficus carica* L.) Cuttings

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Article History:

Received : 28 November 2023
Revised : 19 May 2024
Accepted : 22 June 2024

Keywords:

Auxin,
Growth regulator,
Influence,
Nutrient,
Vegetative.

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ABSTRACT

Fig cuttings often face problems with failure of the roots to grow from the cuttings, so efforts are needed to encourage root induction by administering auxin growth regulators. Rootone F is an exogenous PGR from the auxin group which can stimulate root growth. In order for the roots to grow, develop and function well, plants need an ideal planting medium. The ideal planting medium to support good growth of plant seeds is a proportional composition of physical, chemical and biological elements. The aim of the research was to examine the combined effect of Rootone F concentration and planting media composition on the vegetative growth of fig cuttings. The research consisted of two treatment factors, namely the concentration of Rootone F (0 ppm (Control), 100 ppm, 150 ppm and 200 ppm) and the composition of the planting media (soil: husk charcoal: cow manure) with a ratio (1:1:1), (2:1:1), and (3:1:1). The best treatment combination is 150 ppm Rootone F and planting media mixed with soil: roasted husks: organic cow fertilizer with a ratio of 3:1:1 which has a significant effect on shoot length, root length, fresh weight of roots and percentage of live cuttings (%). A concentration of 100 ppm Rootone F gave the best results when the first shoots appeared (DAT), a concentration of 150 ppm Rootone F gave the best results on the number of leaves. A planting medium composition of (3:1:1) gives the best results when the first shoots appear (DAT).

1. INTRODUCTION

Fig or "tin" plant (*Ficus carica* L.) is a horticultural species originating from the Middle East and the Mediterranean regions, which is able to adapt to tropical areas. Based on data from the International Trade Center (2022), global market demand for figs has increased by 10% from year to year. According to data from the BPS (2023), the volume of fig imports in 2022 reach 1,270 tons, an increase of 18.4% compared to the previous year. The import value also increased, namely from US$ 1.2 million to US$ 1.4 million. This is caused by believe that figs can be used for traditional medicine because fig contain lots of benzaldehyde, phenol, flavonoids, terpenoids and alkaloids with antioxidant properties and can fight oncogenic cells, including stomach, liver, prostate, colon and testicular cancer (Soni *et al*., 2014). The increasing demand for figs implies that fig cultivation is still promising. This causes the demand for superior fig seeds to remain high, so efforts are needed to procure fig seeds en masse in a short time through vegetative propagation.

The process of cultivating fig stem cuttings takes a long time but the success rate is relatively low. An important aspect in the seed propagation process is the application of the auxin hormone and choosing the right planting media composition. This is in line with research by Herliana *et al*. (2020) that auxin Plant Growth Regulator (PGR) and sustainable planting media composition are required to obtain seedlings with sturdy and strong roots. PGR is a chemical hormone applied exogenously to stimulate growth. PGRs for root growth usually contain auxin. The auxin

hormone functions in cell elongation, formation of root primordia and respiration. Rootone F is an exogenous PGR from the auxin group which can stimulate root growth. According to Najoan *et al*. (2022), a Rootone F concentration of 50 mg/1.5 liter produced optimal results for rooting stem cuttings of vanilla (*Vanilla planifolia* Andrew), as indicated by significantly different root dry weight, root quantity, and root length.

The roots of plants function to absorb water and nutrients. In order for the roots to grow and develop and function well, you need an ideal planting medium. The ideal planting medium to support the good growth of plant seeds is a proportional composition of physical, chemical and biological elements, which means that the composition of the ideal planting medium is a planting medium that can hold water firmly, has a porous structure, and can provide nutrients from the decomposition process of existing organic materials in a slow release manner. Types of mixtures that can be used as planting media include soil, roasted husks and organic cow fertilizer. Soil provides space for microorganisms to live (Purba *et al*., 2021). Burnt husks have the ability to retain water, are not easily damaged, and are not easily infected by bacteria and pathogens. Using burnt husks can also increase nutrients and make the soil more porous (Habibi, 2019). Cow organic fertilizer is able to increase soil aggregates, creating a conducive environment for root growth (Khan *et al*., 2021). Research by Mariana & Abdullah (2020) showed that a mixture of planting media in the form of rice husks charcoal, sand and manure in a ratio of (1:1:1) produced the best branch length, shoot weight, root length and number of roots in dragon fruit plant cuttings, which were significantly different compared to the control. This research aims to determine the effect of the combination of Rootone F concentration and planting media composition on the success and vegetative growth of fig plant cuttings.

2. MATERIALS AND METHODS

The experiment was carried out in Benowo, Surabaya City, East Java, which has an altitude of 11-16 m above sea level with an average temperature of 25°C-33°C, and an average humidity of 70%-95%. The research was carried out for 3 months from January to April 2024. The equipment and materials needed during the research were 18 cm × 18 cm polybags, cutting scissors, a shovel, 10 cm long parent cuttings originating from fig orchards in Bangkingan, Surabaya, garden soil, husk charcoal, cow manure, Rootone F, water and the pesticide Benomil.

2.1. Design of Experiment

The experiment was performed using a Randomized Group Design. The first factor is the concentration of Rootone F consisting of 4 levels, namely: K0 = No Rootone F (control), K1 = 100 ppm, K1 = 150 ppm, and K1 = 200 ppm. The second factor is the composition of the planting media consisting of 3 levels as follows: M1 = Soil + husk charcoal + cow organic fertilizer at a volume ratio (1:1:1), M2 = Soil + husk charcoal + cow organic fertilizer at (2:1:1), and M3 = Soil + husk charcoal + organic cow fertilizer (3:1:1). All 12 combinations were repeated 3 times, resulted in the total of 36 experimental units. Ten (10) sample plant cuttings were provided per experimental unit so that the total plant cuttings used for research were 360. The experiment was executed with the following steps.

- *Preparation of nursery*: Nursery land was made in form a green house as a plastic house sizing of 2 m × 6 m, with wood/bamboo frame and 75% paranet. Each main pillar of the framework used nails, bolts and ropes to tie the parts together. Paranet was used throughout the nursery as shade.
- *Preparation of hoods*: Three units of hood were set up using bamboo sticks of thickness 2 cm and length 250 cm, which was stuck into the ground and bent to form a semi-circular framework. The frames were provided at the ends, middle and corners, then covered them with a plastic sheet to form hoods.
- *Preparation of Rootone F solution*: The Rootone F growth regulator was weighed using an analytical balance according to designed treatments, namely 100 mg, 150 mg and 200 mg. Each of them was separately dissolved using 1 liter of tap water. Each solution was stirred until evenly mixed (homogeneous). Each solution was put into tray sizing of 32 cm × 24 cm according to designed treatments.
- *Preparation of stem cuttings*: The cuttings were taken from a 2-year old parent fig plant that is productive producing fruits. Stem cutting was carried out at the middle of the selected stem by cutting horizontally at the tip and cutting angle 45° at the base with the aim of expanding root growth. Cutting was conducted using sharp and clean pruning

shears. The stem cuttings were about 10 cm with a diameter of 1.5 cm with buds. The cutting stems were soaked at 2 cm depth from the base (bottom) of the cuttings in a tray for 3 h, then drained (Mulyani & Ismail, 2015).

- *Preparation of planting media*: The planting media consisted of soil, husk charcoal, and cow manure mixed thoroughly using a spatula. Three different volume ratios of (soil:charcoal:manure) were prepared, namely M1 (1:1:1), M2 (2:1:1), and M3 (3:1:1). Each planting media composition was stirred evenly and then placed in a polybag measuring of 18 cm × 18 cm. Alvaboard labeling on the polybags was done one day before planting the cuttings. The aim of labeling is to differentiate the treatment and make it easy for observation.
- *Planting cuttings*: Planting was done in the morning by sticking the base of the stem cuttings into the planting medium to a depth of 5 cm. The surface of the media was gently pressed so that the cutting material stands upright and sturdy, and make sure that the cuttings do not wobble. Each cutting was then covered using clear transparent plastic sack to maintain the humidity of the planting medium so that the cuttings can grow roots and shoots. The polybags were placed according to the experimental plan.
- *Cutting maintenance*: Watering was done two to three times a week using a handsprayer. Watering is done in the afternoon so that it does not evaporate easily or can be adjusted to conditions. No watering was done if the planting medium was still moist, to avoid rot in the plants. The nursery area was also watered so that the soil moisture inside the greenhouse was maintained. In addition, monitoring of pests was carried out at every observation by controlling mechanically, such as picking up pests and diseases by hand. Pest and disease control was also done by spraying using a handsprayer pesticide Benomil at a dose of 0.5 g dissolved in 1 liter of water.

2.2. Measurement and Date Analysis

Relevant measurement included percentage of success (live) cuttings, time of first shoot appearance, number of shoots, shoot length, number of leaves, root length, root volume, and root weight. All collected data was statistically analyzed using ANOVA (analysis of variance) and Tukey HSD (honestly significant difference) test at confidence level 95%.

3. RESULTS AND DISCUSSION

3.1. Percentage of Live Cuttings (%)

Figure 1 shows some of success (live) cuttings of fig plant. Analysis of variance of the collected data showed that the combination of Rootone F concentration and planting media composition provided a significant interaction for the percentage of live cuttings of fig plants. The single factor of Rootone F concentration treatment had a significant influence on the percentage of live cuttings aged 12 WAP (Week after Planting), while the single factor of the composition of the planting media also had a significant influence on the percentage of live cuttings of fig plants. According to Table 1, the combination of a concentration of 150 ppm Rootone F and a planting media composition ratio of (3:1:1) (K2M3) gave the best average results for the percentage of live cuttings of fig plants, namely 86.67%.

Figure 1. Some success of fig plant cuttings

Table 1. Combined effect of Rootone F concentration and planting media composition on the percentage of live fig cuttings

Rootone F Concentration	Planting Media Composition (Soil: Burnt Husk: Organic Cow Fertilizer)		
	M1 (1:1:1)	M2 (2:1:1)	M3 (3:1:1)
K0 (Control)	36.67 a	36.67 a	36.67 a
K1 (100 ppm)	50.00 a	56.67 ab	60.00 ab
K2 (150 ppm)	36.67 a	53.33 a	86.67 b
K3 (200 ppm)	50.00 a	63.33 ab	66.67 ab
HSD 5%		32.28	

Note: Numbers accompanied by the same letters indicate that they are not significantly different in the 5% HSD test

In contrast, the lowest percentage of live cuttings was found in the combination of control treatment and planting media composition with a ratio of (1:1:1) (K0M1), namely 36.67%. In the opinion of Roiful & Ari (2018), the exogenous hormone auxin at appropriate concentrations can stimulate plant growth, especially at the base of the roots. Exogenous auxin is able to strengthen and activate phytohormones in plants, thereby encouraging early growth in cuttings. Meanwhile, providing a good planting media composition is proportional in terms of chemistry, physics and biology. Soil functions as a medium in which plants grow and provides living space for microorganisms as a source of basic nutrients providing essential minerals such as nitrogen, phosphorus and potassium, as well as micro elements, physical support for strong structures to support plant roots, water capillarity because soil has good water holding capacity but is not too saturated when combined with other materials (Purba *et al*., 2021). Burnt husks consist of organic components and inorganic components. Organic components include cellulose, protein, fat, fiber, lignin, pentose, and hemicellulose, while inorganic components are found in husk ash (Kurniastuti, 2017). Burnt husk increases the nutrient content of the soil because it contains SiO_2 or silica (52%), C or carbon (31%), K or potassium (0.3%), N (0.18%), calcium (0.14%), P or phosphorus (0.08%), Ca or calcium (0.14%), Cu, MgO, MnO, K_2O, Fe_2O_3, CaO and in small amounts, as well as various organic materials. The carbon content (C) makes the planting media loose (Sasmita & Haryanto, 2021). The use of burnt husks can reduce the loss of N, P and K elements due to washing (Beusch *et al*., 2019). Cow organic fertilizer has a high fiber content, such as cellulose, which is reflected in the C/N ratio, namely ≥ 20. This fertilizer contains nutrients with organic compounds 16%, nitrogen (N) 0.30%, phosphate (P_2O_5) 0.20%, calcium oxide (CaO) 0.20% and potassium (K_2O) 0.15%, (Sasmita & Haryanto, 2021).

3.2. Time of First Shoot Appearance

Based on data analysis, the concentration of Rootone F and the composition of the planting medium showed that there was no significant interaction between the time the first shoots appeared from fig cuttings. However, the single factor of Rootone F concentration and the composition of the growing medium significantly influenced the time when the first shoots appeared on fig cuttings. Table 2 shows that concentration of Rootone F has a significant impact on the emergence time of the first shoots of fig cuttings. The average time for the first shoot to appear was fastest due to the treatment with a concentration of 150 ppm Rootone F (K2) with 5.45 DAP (day after planting) but was not significantly different from a concentration of 100 ppm and 200 ppm. Meanwhile, the time for the first shoot to appear from fig cuttings was the slowest in the control treatment (K0), namely 7.26 days. There was an acceleration in the time for the first shoots to emerge from fig cuttings by treatment with a concentration of Rootone F of 150 mg/l, namely 2 days compared to the control (without Rootone F). According to Rohma & Jazilah (2019), apart from containing auxin, Rootone F also contains cytokinins which can stimulate the formation of shoots in cuttings.

Table 2. Correlation of Rootone F concentration and planting media composition on the first time shoot emergence (DAP)

Rootone F Concentration	First shoot appear (DAP)	Planting Media Composition	First shoot appear (DAP)
K_0 (Kontrol)	7.26 b	M_1 (1:1:1)	6.81 b
K_1 (100 ppm)	5.67 a	M_2 (2:1:1)	5.53 a
K_2 (150 ppm)	5.45 a	M_3 (3:1:1)	5.61 a
K_3 (200 ppm)	5.56 a		
HSD 5%	1.16	HSD 5%	1.00

Note: Numbers accompanied by letters in the same column are not significantly different in the 5% HSD test. DAP = day after planting

Table 2 also shows that the planting media composition resulted in the fastest average time for the first shoots to emerge from fig cuttings, which was found in the treatment with a planting media composition of 2:1:1 (M2), namely 5.53 days, but it was not significantly different from the planting media composition treatment 3. On the other hand, the slowest average time for the first shoots to emerge from fig cuttings occurred in the treatment with a planting media composition of 1:1:1 (M1), namely 6.81 days. The occurrence of shoot growth is influenced by the cutting material contained in the fig plant. The beginning of root growth is when the cuttings form shoots for root growth, then the roots will trigger the growth of the cuttings into seedlings. The recommended cuttings of fig plants are from productive parents that produce fruit so that the seeds can grow to the end. Root growth is greatly stimulated by the type of planting medium which acts as a support and nutrient absorber. This is because the composition of the planting media determines the availability of water, oxygen, nutrients and the optimal physical environment for plant development. The ideal planting medium must be proportional to good physical, chemical and biological properties, competent to hold water, control excess water (drainage), and provide air circulation. Apart from that, the planting medium must be able to retain moisture in the roots (Mariana, 2017).

3.3. Number of Shoots

Based on data processing, it shows that a single factor, namely the concentration of Rootone F auxin and the composition of the planting medium, does not significantly influence the number of shoots from fig cuttings. Table 3 indicates that the treatment of 200 ppm Rootone F (K3) had the highest average number of shoots from fig cuttings, namely 2.33 compared to the control (K0). According to Silviana *et al*. (2022), application of Rootone F do not affect significantly the number of shoots because Rootone F is specifically designed to stimulate root growth through the hormone IBA (indole-3-butyric acid). Shoot growth is more affected by other hormones such as cytokines. Therefore, variations in the number of shoots do not have a significant correlation to root formation induced by Rootone F.

Table 3. Correlation of number of shoots due to Rootone F concentration and planting media composition

Treatment	Week after planting (WAP) observation					
	2	4	6	8	10	12
Rootone F Concentration						
K0 (Kontrol)	1.48	1.48	1.48	1.96	1.96	1.96
K1 (100 mg/l)	1.59	1.59	1.59	2.15	2.15	2.15
K2 (150 mg/l)	1.85	1.85	1.85	2.59	2.59	2.59
K3 (200 mg/l)	1.96	1.96	1.96	2.33	2.33	2.33
HSD 5%	not significant	not significant	not significant	not significant	not significant	not significant
Planting Media Composition						
M1 (1:1:1)	1.72	1.72	1.72	2.03	2.03	2.03
M2 (2:1:1)	1.56	1.56	1.56	2.08	2.08	2.08
M3 (3:1:1)	1.89	1.89	1.89	2.67	2.67	2.67
HSD 5%	not significant	not significant	not significant	not significant	not significant	not significant

The data in table 3 also indicates that according to statistical analysis the composition of the planting media did not have a significant effect on the number of fig shoots at all ages of observation. However, a planting media composition with a ratio of 3:1:1 (M3), namely 2.67, produced the highest average number of shoots from fig cuttings when compared with other planting media compositions. Darise *et al*. (2023) stated that planting media containing organic fertilizer, soil and rice husk charcoal influenced growth parameters such as number of leaves and shoot length, but did not affect the number of shoots. This is caused by environmental factors such as non-uniform temperature and humidity or plant genetic factors which are more dominant in determining the number of shoots that develop.

3.4. Shoot Length (cm)

The average results show that there is a real interaction due to the combination of Rootone F concentration and the composition of the planting medium (Table 4). The single factor of Rootone F concentration has a significant effect on the shoot length of fig plants, as well as providing individual planting media compositions also has a significant effect

on the length of fig plants. Shoot length shows that giving an ideal concentration of Rootone F can increase physiological mechanisms in cells such as cell division and cell elongation (Mulyani & Ismail, 2015). This is in line with the opinion of Roiful & Ari (2018), applying the hormone auxin from outside in an ideal dose can stimulate the growth of cuttings, namely the root tip. This is because auxin applied from outside is able to optimize and stimulate phytohormones in plants so that it can stimulate the initial growth of cuttings. According to Najoan *et al*. (2022) if the root system is good, it will increase root growth and development so that shoot length activity and root fresh weight can increase.

Table 4. Shoot length (cm) of fig cuttings at 12 WAP due to combination of Rootone F concentration and planting media composition

Treatment	**Rootone F Concentration**			
Planting Media Composition	**K_0 (Control)**	**K_1 (100 mg/l)**	**K_2 (150 mg/l)**	**K_3 (200 mg/l)**
M_1 (1:1:1)	6. 20 a	6.93 ab	7.27 ab	6.78 a
M_2 (2:1:1)	6.40 a	6.92 ab	6.94 ab	8.21 ab
M_3 (3:1:1)	6.70 ab	7.13 ab	10.58 b	9.19 b
HSD 5%		2.55		

Note: Numbers accompanied by letters in the same column are not significantly different in the 5% HSD test

The results of the variance analysis in Table 4 show that the combination of a concentration of 150 ppm Rootone F and a planting media composition ratio of 3:1:1 (K2M3) produces the best average shoot length for fig plants, namely 10.58 cm. According to Mukhtar (2019), a concentration of 150 ppm Rootone F and a planting media composition of a combination of soil, roasted husks, and cow manure with a ratio of 3:1:1 provide a significant interaction with the shoot length of the *Balanites aegyptiaca* plant because this combination is optimal in providing an environment that supports shoot growth. Rootone F contains the IBA hormone which stimulates root formation, while the composition of the growing medium provides the balance of nutrients and aeration necessary for the growth of longer shoots.

3.5. Number of Leaves (pieces)

Table 5 shows that single factor concentration of Rootone F has a significant difference for the number of leaves aged 2, 4 and 12 WAP. The average number of leaves from fig cuttings was highest at a Rootone F concentration of 100 ppm (K1), showing the highest number of leaves from fig cuttings with a total of 2.59 and 4.59, respectively. At the age of 12 WAP, a concentration of 150 ppm Rootone F (K2) had the highest number of leaves, namely 13.44 pieces. According to Winarso *et al*. (2022), growth regulators influence auxin stimulation in various plant tissues. A strong stimulus occurs in the apical meristem and coleoptile cells. The composition of the planting media has no significant effect on the number of leaves. This is because the composition of the mixture of soil, husk charcoal and cow manure already has a proportional structure in terms of physical, chemical and biological aspects to encourage leaf growth so that the parameter of the number of leaves of fig cuttings does not have a significant influence (Silviana *et al*., 2022).

Table 5. Number of leaves in fig plant cuttings due to Rootone F concentration and planting media composition

Treatment	**Week after planting (WAP) observation**					
	2	**4**	**6**	**8**	**10**	**12**
Rootone F Concentration						
K0 (Control)	1.67 a	3.22 a	5.48	7.7	9.89	12.00 a
K1 (100 mg/l)	2.59 b	4.59 b	6.89	8.96	11.04	13.19 a
K2 (150 mg/l)	2.52 a	3.85 ab	5.92	8.67	11	13.44 b
K3 (200 mg/l)	3.00 b	4.44 ab	6.42	8.81	10.74	13.33 b
HSD 5%	0.86	1.21	not significant	not significant	not significant	1.29
Planting Media Composition						
M1 (1:1:1)	2.08	3.61	5.67	8	10.17	12.39
M2 (2:1:1)	2.47	4.11	6.25	8.5	10.75	13.25
M3 (3:1:1)	2.78	4.36	6.64	9.11	11.08	13.33
HSD 5%	not significant	not significant	not significant	not significant	not significant	not significant

Note: Numbers accompanied by letters in the same column are not significantly different in the 5% HSD test.

The number of leaves is a parameter of plant vegetative growth that can be used as supporting research to articulate the ongoing plant growth process (Tasnudin & Kadekoh, 2019). The number of leaf cuttings can stimulate faster vegetative growth specifically for the roots of the cuttings, this is because the results of photosynthesis in the leaves will trigger the formation of roots in the cuttings (Sari *et al*., 2019). In the average results of treatment data analysis, the combination of Rootone F concentration and planting media composition, the interaction was not significant. The single factor Rootone F concentration had a significant effect on the number of leaves of cuttings at 2.4 and 12 WAP. Meanwhile, the single factor of planting media composition had no significant effect on the number of leaves at all ages.

3.6. Root Length (cm)

Figure 2 shows roots of fig cuttings that successfully live or develop. Analytical data processing (table 6) shows that the combination of Rootone F concentration and planting media composition has a significant interaction between the root length of fig plants. The influence of the length of the cutting roots can trigger the plant to absorb nutrient elements in the soil, growth speed, and plant stability. Cuttings with longer roots generally have the best chance of maintaining survival and growing healthily because they can more quickly access the resources needed for growth (Ramadhanti & Susanto, 2024).

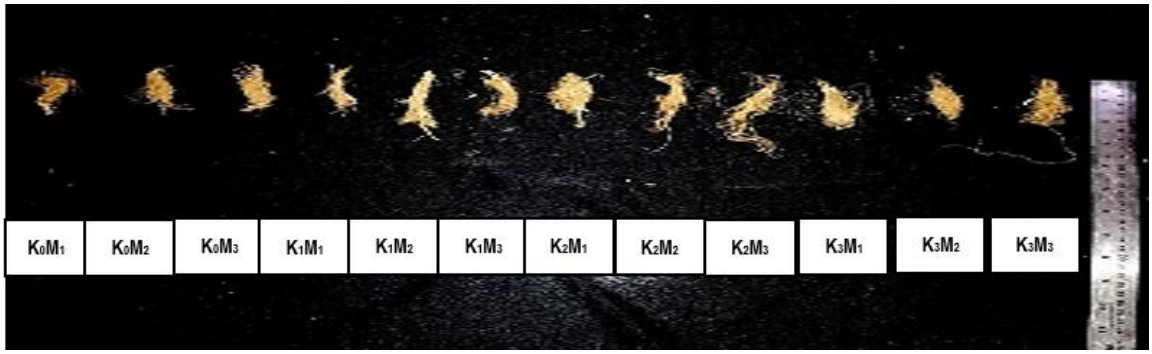

Figure 2. Root length of fig plant cuttings. [Note: K0 = Control; K1 = 100 mg/L Rootone F; K2 = 150 mg/L Rootone F; M1 = Planting Media Composition (1:1:1); M2 = Planting Media Composition (2:1:1); M3 = Planting Media Composition (3:1:1)]

Table 6. Effect of combination of Rootone F concentration and planting media composition on root length (cm) of fig plant cuttings

Treatment	**Rootone F Concentration**			
Planting Media Composition	**K_0 (Control)**	**K_1 (100 mg/l)**	**K_2 (150 mg/l)**	**K_3 (200 mg/l)**
M_1 (1:1:1)	6.37 a	6.43 a	7.33 ab	4.53 a
M_2 (2:1:1)	6.67 a	8.23 ab	8.33 ab	6.13 a
M_3 (3:1:1)	6.67 a	7.33 ab	12.87 b	6.57 a
HSD 5%		6.00		

Note: Numbers accompanied by the same letters in a column are not significantly different in the 5% HSD test

Table 6 implies that K2M3, the combination of a concentration of 150 ppm Rootone F and a planting media composition of (3:1:1), produces the best average length, namely 12.87 cm. In contrast, the smallest average shoot length of fig plants was found in (K3M1), combination of 200 ppm Rootone F concentration and planting media composition with a ratio of (1:1:1), namely 4.53 cm. According to Mulyani & Ismail (2015), Rootone F with optimal concentration causes the cell division process to accelerate so that cuttings grow optimally. Too high concentrations can cause phytotoxicity that damage plant tissue, including roots and cuttings. This can inhibit cell division and elongation necessary for root formation. Appropriate planting media is also an important factor, because planting media can influence the success of plant breeding. According to Megawati & Tambing (2021), apart from choosing the right auxin hormone, variations in appropriate planting media are also needed to deal with early growth problems in cuttings. Planting media is said to be ideal, namely media with soil pore space, so that it can absorb water effectively.

3.7. Root Volume (ml)

Based on the data analysis of the research results, there was no significant interaction due to the combination of Rootone F concentration and planting media composition for root volume. The single factor of Rootone F concentration had no significant effect on the root volume of fig cuttings, nor did the single factor of the composition of the growing media have a significant influence on the root volume parameters of fig cuttings. Table 7 indicates that a single factor with a Rootone F concentration of 150 ppm (K_2) tends to give the highest average root volume, namely 2.37 ml, although it is not significantly different from the control treatment, a concentration of 100 ppm Rootone F and a concentration of 200 ppm Rootone F. Meanwhile, a single treatment with a planting media composition of a mixture of soil: husk charcoal: cow manure in a ratio of 3:1:1 (M_3) tends to give a higher average, namely 2.47 ml, but not significantly different compared to the planting media ratios of 1:1:1 and 2:1:1. This is because soil has the best function and structure, soil functions as a place to support upright root growth, a place for microorganisms to live, and a provider of macro and micro nutrients so that soil with a higher composition is able to increase root volume. However, a Rootone F concentration of 150 ppm caused an increase in root volume of 23% compared to the control treatment. This is according to Widiwurjani *et al.* (2023), the application of Rootone F at a certain concentration is effective up to a certain optimum point. When reaching the optimum point, the effect of Rootone F does not increase or even decreases, because it does not show significant interactions with various planting media compositions. These experiments show that concentrations of hormones such as Rootone F have the potential to increase root elongation until they reach an optimal point, after which their efficacy decreases.

Table 7. Correlation of root volume of fig plant cuttings due to Rootone F concentration and planting media composition

Rootone F Concentration	Root Volume (ml)	Planting Media Composition	Root Volume (ml)
K_0 (Kontrol)	1.82	M_1 (1:1:1)	1.71
K_1 (100 ppm)	1.92	M_2 (2:1:1)	1.89
K_2 (150 ppm)	2.37	M_3 (3:1:1)	2.47
K_3 (200 ppm)	1.98		
HSD 5%	not significant	HSD 5%	not significant

3.8. Fresh Root Weight

The data processing study analyzed the combination of variance due to the concentration of Rootone F and the composition of the planting media, there was a significant interaction for the fresh weight of fig plant roots. The single factor of Rootone F concentration had a significant influence on the fresh weight of fig plant roots, while the single factor of planting media composition also showed a significant influence on the fresh weight of fig plant cutting roots.

Table 8. Effect of combination of Rootone F concentration and planting media composition on the fresh weight (g) of fig plant roots

Treatment	Rootone F Concentration			
Planting Media Composition	K_0 (Control)	K_1 (100 mg/l)	K_2 (150 mg/l)	K_3 (200 mg/l)
M_1 (1:1:1)	1.30 a	1.50 a	2.23 a	2.17 a
M_2 (2:1:1)	1.07 a	2.73 ab	2.33 ab	1.90 a
M_3 (3:1:1)	1.33 a	2.50 ab	4.93 b	3.10 ab
HSD 5%		2.67		

Note: Numbers accompanied by the same letters are not significantly different in the 5% HSD test

The results of the study in Table 8. The combination of giving a concentration of 150 ppm Rootone F and a planting media composition ratio of 3:1:1 (K2M3) gave the best average results for the fresh weight of fig plant roots, namely 4.93 grams. In contrast, the smallest wet root weight was found in the combination of control treatment and planting media composition with a ratio of 1:1:1 (K0M1), namely 1.50 grams. Rootone F contains IBA compounds. According to research conducted by Shekhawat & Manokari (2016), the IBA hormone content accelerates the translocation and movement of photosynthate to the shoots, as well as increasing root growth and development. According to Parmila *et al.* (2018), PGR not only affects root length but also increases the number of lateral roots.

This has an impact on increasing root weight, because longer roots make it easier for plants to absorb nutrients. Also, the appropriate composition of planting media according to Sugianto & Jayanti (2021), plant growth and yield are influenced by the type and composition of organic material. The planting medium is said to be optimal, consisting of a mixture of roasted husks, organic cow fertilizer and soil rich in various organic nutrients. Soil has a denser structure and is able to hold moisture longer than other materials such as charcoal or sand. This is very useful in maintaining stable humidity, which supports the root growth process and reduces drought stress.

4. CONCLUSION

The optimal combination of Rootone F concentration and planting media composition for vegetative growth of fig cuttings is a Rootone F concentration of 150 ppm and a planting media composition with a ratio of (3:1:1) soil + husk charcoal + cow manure has a significant effect on the percentage of live cuttings (86.87%), shoot length (10.58 cm), root length (12.87 cm) and fresh root weight (4.93 g). A concentration of 150 ppm Rootone F showed the best effect on the time the first shoot appeared (5.45 days) and the number of leaves at 12 WAP (13.44 strands). It is recommended that this research be carried out during dry times and by adding research parameters such as fresh weight of shoots, dry weight of shoots and number of roots.

ACKNOWLEDGMENT

I would like to express my deepest gratitude to Mrs. Endang who has given permission and support to carry out this experiment on her land. I would also like to express my thanks to Mrs. Silviana who has provided quality fig cuttings for the purposes of this research. In addition, I would also like to express my deep appreciation to the two anonymous reviewers who have provided very significant comments, suggestions and improvements to improve the quality of this paper. Input from reviewers is very helpful in clarifying and improving several aspects of existing research.

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