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Root Growth in Single Shoots Tabah Bamboo Eye Cuttings (*Gigantochloa nigrociliata* Kurz) Using Auksin IBA (*Indole Butyric Acid*) and Growing Media

Abdul Jafar Maring[1]*, Mansur Ma'shum[1], Bambang Budi Santoso[2]

[1] Master Program of Dry Land Agriculture, Mataram University, Indonesia
[2] Agroecotechnology Study Program, Faculty of Agriculture, University of Mataram, Indonesia.

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Abstract: Tabah Bamboo has potential that needs to be developed both in the food sector, industry and environment. This type can be processed into food ingredients worth exporting, especially bamboo shoots. To meet the needs of raw materials need to multiply plants in the field through nurseries one of them using stem cuttings. Root growth is an indicator of the success of nurseries using cuttings. The research was conducted at KHDTK Rarung, Central Lombok from October 2020 until January 2021. The purpose of the study was to determine the influence of concentration IBA (*Indole Butyric Acid*), growing media, and long soaking cuttings in the solution of IBA concentration on the growth of cutting roots. The results showed that the best root emergence time occurred in a combined concentration of 400mg.1^{-l} IBA and soil media +cocopeat + manure. Each factor independently has a noticeable effect on the number of roots. Concentration of 400mg.1^{-l} IBA, soaking length of 1 hour, and soil media+cocopeat+manure result in a better number of roots. Combination concentration of 400mg.1^{-l} IBA and a 1-hour soaking length result in better root length at 43 hst, while a combined concentration of 400mg.1^{-l} IBA and soil media + cocopeat + manure produce better root length at the age of 50 hst and 57 hst. Combination concentration of 400mg.1^{-l} IBA, soaking length cuttings 1 hour, and soil media + cocopeat + manure produce fresh weight and dry roots best.

Keywords: Concentration of IBA; Cocopeat; Manure; Soaking Cuttings

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INTRODUCTION

Bamboo is an economic value plant and is known as a multipurpose plant. For the community, bamboo is widely known and has an important role in daily life because some basic human needs using raw materials from bamboo ranging from household appliances, handicrafts, art tools, foodstuffs from bamboo shoots, and others (Yeriko et al., 2018). Bamboo is expected to be used as a substitution of commercial wood raw materials because commercial wood production is decreasing and the price is relatively expensive, while bamboo has the advantage of easy to process, tenacious, high elasticity, easy to form, and relatively cheap price compared to wood (Effendi, 2015). Because of its wide utilization, the commodities of bamboo processed products are now increasingly in demand in the market both domestic and export markets (Encep, 2017).

Propagation of bamboo vegetatively or commonly called asexual has been done a lot of one of them using stem cuttings. This method is more beneficial compared to seed multiplication (sexual) because the plant is larger faster, quickly produces, and has the same properties as its mother (Sungjemrenla et al.,

* Corresponding Author: m_arsyad288@unm.ac.id

2016). Propagation of bamboo with asexual can be done by the method of stem cuttings that can be taken from the mother (Tooba et al., 2013). Seedlings derived from stem cuttings can usually grow faster compared to seedlings derived from seeds (Santoso et al., 2020).

One type of bamboo that has the potential to be developed is stoic bamboo. This type has many benefits including bamboo shoot parts that can be processed into food products, woven handicrafts, angklung musical instruments, and for Balinese people used as penjor poles for traditional and religious ceremonies (Widjaja, 2005). Some other derivative products of stoic bamboo such as bamboo leaves have the potential to be developed as raw materials for making tea that can produce drinks with various benefits (Purnama et al., 2020).

On the other hand, the cultivation of bamboo stoic, especially in nurseries, is still very minimal and has not given maximum results. Some of the weaknesses are: (1) Nurseries use weevil/rhizomes that only get one seed from the stem of the mother; (2) Cutting materials that are often used amount to 2-4 buds that result in the waste of cuttings; and (3) Nurseries are carried out through the stages of bedeng sow which will complicate when transferring cuttings from bedeng sow to polybag, can even result in stress and death due to root disorders. The use of cuttings with single bud eyes and directly sown on the polybag media without going through the bedeng sow seems to be able to reduce some of these obstacles. Another advantage of using single cuttings is to produce more seedlings than using cuttings 2 - 4 shoots.

An indicator of success in breeding using stem cuttings is the growth of roots. Root formation problems are a major problem of vegetative propagation (Rabeatul et al., 2017). The roots can be stimulated using hormones or growth regulators (ZPT) from the auksin group namely Indole Acetic Acid (IAA), Indole Butyric Acid (IBA), and Naphthalene Acetic Acid (NAA). But of all these types of auksin chemical properties, IBA is more stable, mobility in plants is low, the influence is long on plants and this hormone remains in the given place and does not spread in other parts of the cuttings so it will not affect other parts (Santoso, 2011). The use of IBA auksin is often used because it causes the formation of roots more suffocation, stronger rooting system, compact, faster, and longer root formation (Rahardianti, 2005).

The success of using ZPT depends also on the concentration and length of immersion of cuttings in the ZPT solution. This is because ZPT is an organic compound and not a nutrient in which in certain concentrations can encourage, or inhibit the development of plants (Leovici, et al., 2014). Similarly, with the length of immersion of cuttings in auksin solution, the time interval is one of the successes in the use of ZPT (Santoso, 2011). One of the methods used to measure the amount of auksin that can be absorbed by cuttings material is by the old method of soaking cuttings (Chairunnisak et al., 2015). The results showed that IBA with a concentration of 400 mg.1-^{l} or 400 ppm can stimulate the growth of petung bamboo cuttings root (Sumiasri et al., 2001). In the nursery of bamboo branch cuttings petung giving IBA with a concentration of 200 mg.1-l is very effective to spur the growth of bamboo roots petung (Erviana, et al., 2016). The concentration of IBA in bamboo rope nurseries has a noticeable influence on the length of the roots (Syamsani et al., 2019). Long soaking cuttings on IBA auksin for 3 hours is excellent for the growth of red betel cuttings (Budianto et al., 2013).

The success of the nursery is influenced also by the growing medium as the place where the plant grows and develops. General requirements of good growing media include having light properties, cheap, easy to obtain, loose, and able to provide nutrients for plants (Herdiana, 2008). The type of media that is commonly used is ground media but tends to solidify so it needs to be combined with other media to get good and fertile media (Rasmani et al., 2018). The use of coconut fiber media (cocopeat) enriched with cow manure provides good results and increases the percentage of plant life compared to soil media (Dalimonthe, 2013). Manure serves as a supplier of nutrients needed by plants while cocopeat has a high-water absorption between 6-8 times its dry weight so that it saves water and nutrients, supporting the rapid growth of roots (Tyas, 2000).

In connection with the description, the concentration and variety of media and the length of immersion of cuttings in the IBA solution need to be studied to obtain good bamboo seedlings. The purpose of this study is to find out the influence of IBA concentration, the combination of growing media, and long soaking of cuttings in IBA solution on root growth in stoic bamboo cuttings.

METHOD

The research was conducted from November 2020 to January 2021 in Rarung Forest Area with Special Purpose (KHDTK), Central Lombok. The materials required in the study are Soil/topsoil (Neutral pH), cow

manure (C/N ratio 18.55), cocopeat (Neutral pH), stoic bamboo cuttings one eye bud, Auksin IBA, and alcohol 70%. Test results of several parameters on the media grow as follows:

Table 1. Test results of several parameters on the media grow

Parameter	Unit	Test Results		
		Soil	Manure	Cocopeat
C-Organic	%	2.28	10.76	52.47
pH-H2O	-	6.61	7.12	6.73
N-Total	%	0.21	0.58	0.49
K Total	%	0.33	1.24	1.38

Soil laboratory analysis data of BPTP NTB.

The research used a Factorial Group Randomized Design with (split split-plot design) using 5 replays. The main plot is the concentration of IBA consists of 200 mg.1-l IBA and 400 mg.1-l IBA. Anak petak is a growing medium consisting of soil (topsoil), soil +Manure comparison 1:1 (v/v) and soil + cocopeat comparison 1:1 (v/v), soil +cocopeat +manure comparison 1:1:1 (v/v). Children tile is long soaking cuttings on IBA solution consists of without immersion, soaking cuttings for 1 hour, soaking cuttings for 2 hours, soaking cuttings for 3 hours. Treatment in tile children and tile children is a combination of growing media factors and long soaking cuttings in an aqueous concentration solution, then arranged in a tile of IBA concentration as the main tile. Each replay requires = 224 cuttings. Total cuttings needed as much as 224 cuttings x 5 replays = 1,120 cuttings.

The measured parameter is 1). Root growth time (hst), Observations are made at the time of the appearance of the root, 2). The number of roots (strands), counting the number of roots that appear, 3). Root length (cm), measuring the length of the root that appears, 4). Fresh root weight (gram), weighing fresh roots using digital/analytical scales. 4). Dry root weight (gram), weighing roots that have been oven for 48 hours at 70°C until constant using digital/analytical scales. All observations are made periodically 4 times every 7 days except the observation of root growth time made only once observation.

Observational data analyzed its diversity (Anova). If there is a noticeable difference, a follow-up test using Duncan's New Multiple Range Test (DMRT) is conducted at a test level of 5% to determine the relationship between the treatment

RESULT AND DISCUSSION

The results showed that the concentration of IBA, growing media, and long soaking cuttings independently had a real effect on the number of roots while the combination between factors had no real effect on the number of roots. The combination of two factors between the concentration of IBA and the growing medium has a noticeable effect on the time the root appears and the length of the root while the combination of three factors between the concentration of IBA, the growing medium, and the length of immersion have a noticeable effect on the fresh weight of the root and dry the root.

Number of Roots

The results showed that there was no combination of treatments on the number of roots, but each factor independently had a real effect on the number of roots. A concentration of 400 mg.1-l of IBA is a better concentration of rooting induces. More root counts occur at 400 mg.1-l compared to 200 mg.1-l (Table 1). Similarly, in the medium of growing soil + cocopeat + manure is a better medium than other growing media (Table 2) and the long-time soaking cuttings for 1 hour is the best time compared to other immersion lengths (Table 3).

A concentration of 400 mg.1-l of IBA provides sufficient exogenous auksin requirements in the seeding of the root count, while a concentration of 200 mg.1-l IBA allegedly still very little in helping to stimulate the growth of the number of roots in bamboo stoic. Administration of Auksin at the right concentration level can activate cells to grow faster so that shoots and roots form faster (Suprapto, 2004). In accordance the research conducted by Sumiasri *et al*., (2001), on bamboo petung shows that IBA concentration of 400 mg.1-l can stimulate the growth of roots of bamboo petung cuttings.

Table 2. The average number of roots in IBA concentration

IBA Concentration	Number of Roots (Sheet)			
	43 hst	50 hst	57 hst	64 hst
200 mg.1^{-1} IBA	3.37 b	6.70 b	9.23 b	11.71 b
400 mg.1^{-1} IBA	3.77 a	7.77 a	10.47 a	12.64 a

Information: The numbers followed by the same letters in the same column do not differ markedly according to the DMRT advanced test at a rate of 5%.

Stem cuttings grown in the growing media mix of soil media, manure and cocopeat have an average value of more root count than in other media (Table 2). It is suspected that the combination of manure and cocopeat is very helpful to maintain moisture in the media and provide adequate nutrition needed by the roots in the growth period. Manure serves as a supplier of nutrients needed by plants (Setiawan, 2010).

Table 3. The average number of roots in the media grows

Growing Media	Number of Roots (Sheet)			
	43 hst	50 hst	57 hst	64 hst
Soil	3.37 c	6.55 c	9.25 b	12.12 b
Soil + Manure	3.62 bc	7.10 b	9.90 a	11.72 b
Soil + cocopeat	3.50 cd	7.12 b	9.90 a	11.82 b
Soil + cocopeat + Manure	3.80 a	7.67 a	10.37 a	13.02 a

Information: The numbers followed by the same letter in the same column do not differ markedly according to DMRT advanced test at 5% level.

The advantages of cocopeat as a medium grow because it can bind water and contains essential nutrients (Prayogi, 2007). In line with Artha's statement (2014), the advantages of cocopeat media are good in storing water, high water absorption, fattening the soil with a neutral pH, the frequency of fertilization can be reduced and in cocopeat also contained nutrients from nature that are needed by plants and support the growth of roots quickly. Research conducted susilawati (2007), showed that a mixture of coconut powder (cocopeat), soil, and compost with a ratio of 3: 2: 1 produces a lot of root fibers compared to other treatments.

Table 4. The average number of roots at long soaking cuttings

Length of Soaking	Number of Roots (Sheet)			
	43 hst	50 hst	57 hst	64 hst
Without soaking	3.40 b	6.67 b	9.27 b	11.37 b
Soaking for 1 hour	4.25 a	8.17 a	11.47 a	13.92 a
Soaking for 2 hour	3.35 b	6.70 b	9.35 b	11.80 b
Soaking for 3 hour	3.30 b	6.90 b	9.32 b	11.60 b

Information: The numbers followed by the same letter in the same column do not differ markedly according to DMRT advanced test at 5% level.

Cuttings soaked for 1 hour have an average value of more root count than other long soaking times (table 3). These results showed that soaking cuttings for 1 hour in a solution of IBA concentration was very good to induce stoic bamboo cuttings in response to the growth of the number of roots. The longer it is soaked the more auksin solution absorbed by stem cuttings that will give bad results in plant growth. In line with Leovici et al.,(2014), the administration of ZPT should not be excessive because it will inhibit the rate of growth. The appropriate absorption of auksin will give a good influence on plant growth. If the concentration is high then it only takes a short time, if soaked for a long time it will be excessive and result in the growth of cuttings decreased (Mulyani dan Ismail, 2015)

Rooth Length

The results showed that the combination of IBA concentration and long soaking cuttings had a real effect on the length of the roots. The combination occurs at the age of cuttings 43 hst while at other ages have no noticeable effect (Table 4). The root length is better to occur at a combined concentration of 400 mg.1^{-1} IBA and a 1-hour soaking length resulting in an average root length of 4.50cm (43 hst), 14.20cm (50 hst), 18.9cm (57 hst), and 30.00cm (64 hst). It is suspected that the IBA function only serves to help

encourage the formation of roots, furthermore the function of the growing media plays more role in the development of the root including the length of the root is absorbed nutrients in the growing media. According to the opinion of Adriana, et al., 2014 that the longer the roots are produced, the greater the plant absorbs the nutrients contained in the growing media. At a concentration of 400 mg.1-l IBA and a soaking length of 1 hour are enough to help encourage the formation of roots. At low levels of regulatory substances growing will encourage growth, while at higher levels will inhibit growth, poison, and even turn off plants (Supriyanto & Saepulah, 2014).

Table 5. Average root length combination of IBA concentration and length of soaking

IBA Concentration X Length of Soaking		Rooth Length (cm)			
		43 hst	50 hst	57 hst	64 hst
200 mg.1-l IBA	Without Soaking	3.60 cd	10.37	14.65	21.69
	Soaking for 1 hour	4.09 b	13.03	17.95	26.70
	Soaking for 2 hour	3.72 bcd	11.53	15.99	24.22
	Soaking for 3 hour	4.02 bc	11.36	15.39	22.78
400 mg.1-l IBA	Without Soaking	3.36 d	11.40	15.59	23.30
	Soaking for 1 hour	4.50 a	14.20	18.91	30.00
	Soaking for 2 hour	3.99 bc	12.46	16.50	26.57
	Soaking for 3 hour	3.64 cd	12.92	16.61	24.74

Information: The numbers followed by the same letter in the same column do not differ markedly according to DMRT advanced test at 5% level.

Table 5. Average root length in the combination of IBA concentration and growing media

IBA Concentration X Growing Media		Rooth Length (cm)			
		43 hst	50 hst	57 hst	64 hst
200 mg.1-l IBA	Soil	3.90	11.37 c	15.98 c	22.89
	Soil + manure	3.80	11.76	16.13 bc	24.01
	Soil + cocopeat	3.86	11.36 c	15.99 c	23.48
	Soil + cocopeat + manure	3.86	11.80 c	15.87 c	25.01
400 mg.1-l IBA	Soil	3.84	12.41 bc	15.74 c	25.25
	Soil + manure	3.70	11.78 c	16.53 bc	25.74
	Soil + cocopeat	3.80	13.21 ab	17.42 ab	25.65
	Soil + cocopeat + manure	4.15	13.58 a	17.91 a	27.97

Information: The numbers followed by the same letters in the same column do not differ markedly according to the DMRT advanced test at a rate of 5%.

The combination of IBA concentration and growing media also had a noticeable effect on root length at 50 hst and 57 hst, while at 43 hst and 64 hst the combination had no noticeable effect (Table 5). The length of the root is better to occur in a combination of concentrations of 400 mg.1-l IBA and soil media +cocopeat + manure namely, 4.15 (43 hst), 13.58 (50 hst), 17.91 (57 hst), 27.97 (64 hst). The longer the roots will make it easier for plants to absorb nutrients in the soil and support plants to stay upright. This is following the statement of Erliandi, et al., (2015) technical work of auksin is very active to accelerate and multiply the discharge of roots that serve for the absorption of water and nutrients in the soil and roots formed due to the division and lengthening of cells in the root tip. In addition, the presence of cocopeat in the media helps to fatten the soil so that the roots absorb nutrients in it more easily as said by Artha (2014).

Raising Time of The Rooth

The combination of concentration of IBA and growing media has a real effect on the time the roots appear. The fastest root emergence time occurs in a combination of concentrations of 400 mg.1-l IBA and soil mixture media + cocopeat + manure that is 40.7 hst, while the late time of the appearance of roots occurs in a combination of concentrations of 200 mg.1-l IBA and soil media that is 42.8 hst (Table 7).

Table 7. Average time appears root on a combination of concentration of IBA and growing media

IBA Concentration X Growing Media	Raising Time of The Rooth (hst)
200 mg.1^{-l} IBA Soil	42.8 d
Soil + Manure	41.4 ab
Soil + cocopeat	41.3 ab
Soil + cocopeat + manure	41.8 bc
400 mg.1^{-l} IBA Soil	41.5 bc
Soil + Manure	42.2 cd
Soil + cocopeat	41.3 ab
Soil + cocopeat + manure	40.7 a

Information: The numbers followed by the same letters in the same column do not differ markedly according to the DMRT advanced test at a rate of 5%.

The initial growth of root formation is started by the metabolism of nutrient reserves in the form of carbohydrates that produce energy that further encourages cell division and forms new cells in the tissues (Kastono, et al., 2005). Administration of auksin at the right concentration level can activate cells to develop faster so that buds and roots form faster (Suprapto, 2004). Sumiarsih research results, et al., (2001) on bamboo petung showed that IBA with a concentration of 400 mg.1^{-l} can stimulate the growth of bamboo petung cutting root. It is suspected that the addition of manure and cocopeat helps the growth of roots faster. Manure serves as a supplier of nutrients needed by plants (Setiawan, 2010) while cocopeat with high water absorption supports the rapid growth of roots (Tyas, 2000).

Fresh Weight and Dry Roots

The results of this study also showed that the combination of concentration of IBA, growing media, and long soaking had a real effect on the weight of fresh and dry roots. The average result shows that the weight of fresh roots and dried roots is better to occur in a combination of concentrations of 400 mg.1^{-l} IBA, soil media + cocopeat + manure, and length of soaking cuttings for 1 hour (Table 8 and Table 9).

Table 8. Average fresh root in a combination of concentration of IBA, growing media, and length of soaking

IBA Concentration x Media x Length of soaking			Fresh Root Weight (gram)								
			43 hst			50 hst			57 hst		64 hst
200 mg.1^{-l} IBA	Soil	Without Soaking	0.41	g		0.78	jk	1.07	l	1.25	l
		Soaking for 1 hour	0.49	defg		0.94	hijk	1.25	jkl	1.35	kl
		Soaking for 2 hour	0.47	defg	0.82		ijk	1.15	kl	1.24	l
		Soaking for 3 hour	0.46	defg	0.74		K	1.11	L	1.27	l
200 mg.1-l IBA	Soil+Manure	Without Soaking	0.43	Fg	0.82		ijk	1.28	ijkl	1.55	jkl
		Soaking for 1 hour	0.73	abc	1.43		bcd	2.12	bcd	2.79	bc
		Soaking for 2 hour	0.50	defg	0.80		ijk	1.54	ghijk	2.10	fghi
		Soaking for 3 hour	0.40	g	0.99		ghijk	1.42	hijkl	1.74	ijk
200 mg.1^{-l} IBA	Soil + cocopeat	Without Soaking	0.48	defg	1.07		fghij	1.51	ghijk	1.89	hij
		Soaking for 1 hour	0.76	ab	1.50		bc	2.06	bcde	2.66	bcd
		Soaking for 2 hour	0.46	defg	1.15		defgh	1.58	ghij	1.88	hij
		Soaking for 3 hour	0.43	fg	1.04		fghij	1.59	ghij	1.96	hij
200 mg.1^{-l} IBA	Soil + cocopeat + Manure	Without Soaking	0.46	defg	1.08		efghij	1.66	efghij	2.20	defghi
		Soaking for 1 hour	0.62	bcde	1.37		bcde	1.89	bcdefg	2.47	bcdefg
		Soaking for 2 hour	0.40	g	1.08		efghij	1.78	defgh	2.06	fghi
		Soaking for 3 hour	0.50	defg	1.17		defgh	1.70	efghi	2.19	defghi
400 mg.1^{-l} IBA	Soil	Without Soaking	0.48	defg	1.08		efghij	1.59	ghij	2.15	efghi
		Soaking for 1 hour	0.74	abc	1.51		bc	2.04	bcdef	2.86	b
		Soaking for 2 hour	0.47	defg	1.23		cdefgh	1.56	ghij	2.36	cdefgh
		Soaking for 3 hour	0.49	defg	1.33		bcdef	1.63	fghij	2.32	cdefgh
400 mg.1^{-l} IBA	Soil+Manure	Without Soaking	0.41	defg	1.06		fghij	1.79	defgh	2.15	efghi
		Soaking for 1 hour	0.66	bcd	1.60		ab	2.21	bc	2.64	bcde
		Soaking for 2 hour	0.48	defg	1.28		cdefg	1.89	bcdefg	2.20	defghi
		Soaking for 3 hour	0.58	bcdef	1.17		defgh	1.85	bcdefg	2.30	defgh
400 mg.1^{-l} IBA	Soil + cocopeat	Without Soaking	0.45	efg	1.09		efghi	1.76	defgh	2.25	defgh
		Soaking for 1 hour	0.65	bcde	1.62		ab	2.26	b	2.88	b
		Soaking for 2 hour	0.42	fg	1.19		defgh	1.83	cdefgh	2.27	defgh
		Soaking for 3 hour	0.49	defg	1.27		cdefg	1.69	efghi	2.10	fghi

IBA Concentration x Media x Length of soaking			Fresh Root Weight (gram)								
			43 hst			50 hst			57 hst		64 hst
400 mg.1^{-l} IBA	Soil + cocopeat + Manure	Without Soaking	0.55	cdefg	1.26	cdefg	1.50	ghijk	2.03	ghi
		Soaking for 1 hour	0.90	a	1.82	a	2.89	a	3.84	a
		Soaking for 2 hour	0.70	bc	1.50	bc	2.22	bc	2.55	bcdef
		Soaking for 3 hour	0.57	cdefg	1.42	bcd	2.07	bcde	2.66	bcd

Information: The numbers followed by the same letters in the same column do not differ markedly according to the DMRT advanced test at a rate of 5%.

It is suspected that at the number and length of roots concentration of 400 mg.1^{-l} IBA, soaking length for 1 hour and composition of soil media + cocopeat + manure give better results. With the increasing number and length of roots, the fresh weight of the roots is increasing. Because basically, the root is one of the plant organs used to store water and biomass from the soil which will then be distributed to the plant which will later be used for metabolic processes in the plant itself. Fahrudin (2009), stated that if the rooting of the plant is good then the growth of other parts of the plant will develop well because good rooting can absorb the nutrients needed by plants.

Table 9. Average dry root weight in a combination of IBA concentration, growing media and soaking length

IBA Concentration x Media x Length of Soaking			Root Dry Weight (gram)								
			43 hst			50 hst			57 hst		64 hst
200 mg.1^{-l} IBA	Soil	Without Soaking	0.18	f		0.43	0.66	k	0.88	kl
		Soaking for 1 hour	0.22	ef		0.55	0.83	ijk	0.97	jkl
		Soaking for 2 hour	0.22	ef		0.50	0.71	jk	0.84	l
		Soaking for 3 hour	0.23	ef		0.38	0.72	jk	0.86	l
200 mg.1^{-l} IBA	Soil+Manure	Without Soaking	0.22	ef		0.45	0.94	hijk	1.15	ijkl
		Soaking for 1 hour	0.39	b		1.03	1.68	bcde	2.20	bc
		Soaking for 2 hour	0.26	def		0.52	1.14	fghij	1.54	fghi
		Soaking for 3 hour	0.20	ef		0.73	1.21	efghi	1.35	hijk
200 mg.1^{-l} IBA	Soil + cocopeat	Without Soaking	0.27	cde		0.72	1.07	ghijk	1.40	hij
		Soaking for 1 hour	0.39	b		0.94	1.59	bcdef	2.16	bbcde
		Soaking for 2 hour	0.21	ef		0.72	1.17	fghij	1.69	cdefgh
		Soaking for 3 hour	0.22	e		0.63	1.17	Fghij	1.47	ghi
200 mg.1^{-l} IBA	Soil + cocopeat + Manure	Without Soaking	0.22	ef		0.74	1.38	bcdefgh	1.72	cdefgh
		Soaking for 1 hour	0.28	cd		0.94	1.42	bcdefgh	2.00	bcdefg
		Soaking for 2 hour	0.20	ef		0.79	1.35	bcdefgh	1.58	fghi
		Soaking for 3 hour	0.23	ef		0.89	1.34	bcdefgh	1.66	defghi
400 mg.1^{-l} IBA	Soil	Without Soaking	0.26	def		0.64	1.10	ghijk	1.64	efghi
		Soaking for 1 hour	0.40	b		1.05	1.61	bcdef	2.22	bc
		Soaking for 2 hour	0.23	ef		0.88	1.25	defghi	1.83	bcdefgh
		Soaking for 3 hour	0.24	ef		0.94	1.25	defghi	1.83	bcdefgh
400 mg.1^{-l} IBA	Soil+Manure	Without Soaking	0.22	ef		0.69	1.42	bcdefgh	1.66	defghi
		Soaking for 1 hour	0.30	bcd		1.17	1.72	bcd	2.17	bcd
		Soaking for 2 hour	0.24	ef		0.97	1.60	bcdef	1.70	cdefgh
		Soaking for 3 hour	0.27	cde		0.96	1.42	bcdefgh	1.81	bcdefgh
400 mg.1^{-l} IBA	Soil + cocopeat	Without Soaking	0.21	ef		1.09	1.32	cdefgh	1.76	cdefgh
		Soaking for 1 hour	0.32	bc		1.16	1.80	b	2.29	b
		Soaking for 2 hour	0.22	ef		0.79	1.45	bcdefg	1.74	cdefgh
		Soaking for 3 hour	0.24	ef		0.85	1.27	defghi	1.65	defghi
400 mg.1^{-l} IBA	Soil + cocopeat + Manure	Without Soaking	0.25	ef		0.85	1.03	ghijk	1.55	fghi
		Soaking for 1 hour	0.56	a		1.35	2.41	a	3.27	a
		Soaking for 2 hour	0.39	b		1.14	1.79	bc	2.07	bcdef
		Soaking for 3 hour	0.30	bcd		1.08	1.66	bcde	2.15	bcde

Information: The numbers followed by the same letters in the same column do not differ markedly according to the DMRT advanced test at a rate of 5%.

Healthy roots are roots that can absorb water and nutrients well. A good rooting system will be able to absorb water and nutrients which are the most important part of the process of assimilation formation, as a result, will be able to produce dry weight of oven roots, stems, and leaves as well as total oven-dry weight per plant (Mudiana and Lugrayasa, 2001).

The weight of the root depends heavily on the number and length of the root and will indicate the relationship between the two, the more the number and length of the root the more the root weight will be. Following the opinion of Suyati, Mukarlina, and Rizalinda (2013), that the increasing number and length of roots leads to increased absorption of nutrients so that the accumulation of photosynthate and nutrients is getting higher and increasing the weight of wet and dry plants. It is suspected that the addition of cocopeat and manure to the soil media, can infringe the soil, store water in the growing medium while containing essential nutrients for plants. The advantages of cocopeat as a medium grow because it can bind water and contains essential nutrients (Prayogi, 2007). Research conducted susilawati (2007), showed that a mixture of coconut powder (cocopeat), soil, and compost with a ratio of 3: 2: 1 produces a lot of root fibers compared to other treatments.

To find out the condition of the seedlings as a whole tested the ratio of the root header. The goal is to measure the quality of seedlings ready to plant in the field by comparing the dry weight of the header and roots. Based on the results of the study there was no combination between treatments but independently the media grew a real effect on the ratio of the root header (table 9) while the concentration of IBA and length of immersion had no real effect.

Table 10. The average root header ratio on media grows

Growing Media	Root Ratio
Soil	0.75 b
Soil + Manure	0.81 b
Soil + cocopeat	0.78 b
Soil + cocopeat + Manure	0.93 a

Information: The numbers followed by the same letters in the same column do not differ markedly according to the DMRT advanced test at a rate of 5%.

The best header ratio value that occurs in soil mix media +cocopeat + manure is 0.93. This indicates that there is a balance between the header and root growth. Other growing media also showed a value that is not too far from the number one. The lower or closer to the number one, the ratio value reflects the best value. The role of roots in plant growth is as important as the title. The header serves to provide carbohydrates through the process of photosynthesis while the roots serve to provide the necessary nutrients in the metabolism of plants (Firduas, *et al*., 2013).

CONCLUSION

The concentration of IBA, growing medium, and long soaking cuttings independently have a real impact on the number of roots, and the combination of concentration of IBA, growing medium and long soaking cuttings has a noticeable effect on the fresh weight of the roots and the dry weight of the roots. Concentrations of 400 mg.1-^{l} IBA, soil media+cocopeat+manure, and 1-hour soaking duration both independently and in combination resulted in better value in each root growth observation. Therefore, to do nursery bamboo stem cuttings stoic using a single bud eye should use auksin IBA with a concentration of 400 mg.1-^{l}, soil media + cocopeat + manure, and soaking cuttings for 1 hour in the solution IBA.

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