Jurnal Kultivasi Vol. 23 (1) April 2024
ISSN: 1412-4718, eISSN: 2581-138x

Anjarsari IRD · Febiola A · Ariyanti M · Defri I

Additional cocopeat and coconut water improves the seedling growth of robusta coffee

Abstract. Robusta coffee production can be sucessed by using high-quality seedlings that have good growth performance. One of several keys to success in seedling production is the choosing best planting medium and providing exogenous growth regulators. These include using cocopeat planting media and giving coconut water. This research aims to determine whether using cocopeat planting media and providing coconut water can increase the growth of robusta coffee seedlings. The experiment used a randomized complete group design with six treatments and four replications; each experimental unit consisted of three robusta coffee seedlings. The six tested treatments were control (topsoil 100%); cocopeat 50% + topsoil 50%; cocopeat 100%; topsoil 100% + coconut water 200 mL; cocopeat 50% + topsoil 50% + coconut water 200 mL; and cocopeat 100% + coconut water 200 mL. This study indicated that cocopeat and coconut water could increase the growth of robusta coffee seedlings. The composition of cocopeat 100% and the combination of topsoil 50% + cocopeat 50% had an improvement effect on the growth of robusta coffee seedlings.

Keywords: Cocopeat · Coconut water · Growth regulator · Nursery · Robusta coffee

Submitted: 22 July 2023, Accepted: 28 April 2024, Published: 30 April 2024
DOI: 10.24198/kultivasi.v23i1.50893

Anjarsari IRD[1]* · Febiola A[2] · Ariyanti M[1] · Defri I[3]
[1]Department of Agronomy, Faculty of Agriculture, Universitas Padjadjaran. Jl. Raya Bandung Sumedang Km. 21 Jatinangor, Sumedang 45363, Indonesia
[2]Undergraduate Program of Agrotechnology, Faculty of Agriculture, Universitas Padjadjaran. Jl. Raya Bandung Sumedang Km. 21 Jatinangor, Sumedang 45363, Indonesia
[3]Agricultural Innovation and Management Division, Faculty of Natural Resources, Prince of Songkla University, Songkhla 90110, Thailand
*Correspondence: intan.ratna@unpad.ac.id

Anjarsari IRD, Febiola A, Ariyanti M, Defri I. 2024. Additional cocopeat and coconut water improves the seedling growth of robusta coffee. Jurnal Kultivasi, 23(1): 108-116

Introduction

Robusta coffee is one of the commodities with strategic value in empowering the people's economy (Directorate General of Plantations, 2012). Robusta coffee is currently the dominant type of coffee plantation in Indonesia. One of the advantages of robusta coffee compared to Arabica coffee is that it is more resistant to pests and diseases and has a flavor that is generally not owned by other coffee producers (Sari & Ibrahim, 2020)

Indonesian Plantation Statistics (Directorate General of Plantations, 2022), mentioned robusta coffee production data in 2019 with an area of 860,438 ha producing robusta coffee of 538,171 tons. In 2020, the area and production of robusta coffee increased to 860,777 ha, producing 539,856 tons. Furthermore, in 2021 it became 870,616 ha, producing 560,466 tons. Robusta coffee area decreased in 2022 to 868,785, but production increased to 572,570 tons.

As the area of robusta coffee plantations increases, robusta coffee production also increases. Robusta coffee production can be increased with good plant growth. Plant growth starts from seedlings. The nursery is the initial stage of plant management that determines the sustainability of cultivation. It begins with planting preparation by selecting superior seeds, planting media, and maintenance, including providing growth regulators for optimal seedling growth.

Coffee nurseries generally use topsoil as a planting medium. The use of topsoil in large quantities can harm the environmental balance, and the use of topsoil as a nursery planting medium should be limited to avoid the negative impact of massive topsoil extraction (International Tropical Timber Organization, 2006). Therefore, it is necessary to find other media that are available in large quantities and easy to find but can still support the growth of coffee seedlings well. One of these media is cocopeat. Cocopeat is a planting medium made from coconut fiber. Cocopeat planting media is expected to be used as a planting medium to replace topsoil and a step in utilizing coconut plant waste. Cocopeat can bind and store water strongly and contains essential nutrients. Media directly affect root system development and function. A good-quality growing medium provides sufficient anchorage or support to the plant and serves as a reservoir for nutrients and water (Krishnapillai et al., 2020).

Besides planting media, other efforts to obtain good coffee seedling growth require nursery-stage maintenance activities, including growth regulators. Growth regulators are non-nutrient organic compounds that can support the plant growth process. One of the PGRs widely used to stimulate growth in the vegetative period is cytokinin. Cytokinins function for organ formation, delaying aging, spurring the development of side buds of dicotyledonous plants, spurring chloroplast development, and chlorophyll synthesis (Amsyahputra et al., 2016). One of the natural substances in the cytokinin group is coconut water. Coconut water can be utilized naturally because it contains hormones that spur plant growth.

The results of Singchal's research (2019), the composition of planting media consisting of 50% soil and 50% cocopeat could increase plant height and stem diameter growth in the early growth of Arabica coffee seedlings. The results of research by Rosianty et al. (2021) also show that the use of cocopeat combined with soil in a ratio of 1: 1 was the best composition for the growth of stem diameter of *Eucalyptus pellita* F. Muell.

According to Mergiana et al. (2021), Applying coconut water 200 mL/plant has the best effect on the number and width of grapevine leaves. According to Darlina et al. (2016), watering coconut water 200 mL / L of water produced the highest number of leaves, wet weight, and dry weight in pepper plants. The research results by Kasi et al. (2021) also show that applying coconut water 200ml / L was the best concentration for the growth of apple seedlings.

Based on the previous description, Cocopeat has good nutrient content, so it can replace topsoil as a planting medium, and providing coconut water can help supplement nutrients that are good for plant growth. Therefore, this study was conducted to determine the effect of additional cocopeat and coconut water on the growth of robusta coffee seedlings.

Jurnal Kultivasi Vol. 23 (1) April 2024
ISSN: 1412-4718, eISSN: 2581-138x

Material and Method

The experiment was conducted from March to May 2023 in the Ciparanje experimental garden, Faculty of Agriculture, Universitas Padjadjaran, Jatinangor, Sumedang Regency, West Java, at an altitude of 750 m above sea level, with soil order Inceptisols, and rainfall type C based on Schmidt and Ferguson (1951) classification.

The tools used in this research were a polybag 35 cm x 35 cm, hoe, machete, stationery, meter, ruler, vernier, bucket, chlorophyll meter CCM-200 Plus type, and camera. The materials used in this study were 9-month-old robusta coffee seedlings of BP 939 variety, cocopeat planting media, topsoil, coconut water, and water.

The analysis of the planting media carried out is of topsoil and cocopeat. Topsoil planting media was analyzed at the Laboratory of Soil Fertility and Plant Nutrition, Faculty of Agriculture, Universitas Padjadjaran. The results are secondary data from the soil analysis results in the Ciparanje experimental garden, Faculty of Agriculture Unpad.

Analysis of cocopeat planting media was conducted at the Soil Chemistry and Plant Nutrition Laboratory, Faculty of Agriculture, Padjadjaran University. The materials tested were cocopeat samples used as planting media in this study. The analysis was conducted to determine the content of elements present in the planting media used, such as pH, N, P, K, C, and moisture content was carried out at the Laboratory of Soil Fertility and Plant Nutrition, Faculty of Agriculture, Universitas Padjadjaran.

Analysis of coconut water content was carried out at the ICBB Laboratory of PT Biodiversity Biotechnology Indonesia.

Calculating leaf area is done using the Image J application by photographing all leaves, changing the leaf color to gray, and then clicking on the leaf object to be measured using the wand tool. The measurement results will be displayed through measures on the analysis menu (Susanti & Safrina, 2018). Chlorophyll content index was measured in plant leaves using a CCM-200 plus chlorophyll meter and expressed in Chlorophyll Content Index (CCI) units. The number of leaves, leaf area, plant height, stem diameter, and chlorophyll content index were observed from 4 weeks after planting to 12 weeks after planting at two-week intervals.

The experimental method used was a randomized block design (RBD) with eight treatment combinations. Each treatment was repeated 4 times so that there were 24 experimental units. Each experimental unit contained three plants, the total of which was 72.

The treatments are arranged as follows: A = control (topsoil 100%), B = cocopeat 50% dan topsoil 50%, C = cocopeat 100%, D = topsoil 100% + coconut water 200 mL, E = cocopeat 50% dan top soil 50% + coconut water 200 mL F = cocopeat 100% + coconut water 200 mL. Data were analyzed using analysis of variance (ANOVA) for the F test at a 95% confidence level. Duncan's multiple range test was conducted at a 95% confidence level if there were differences between treatments.

Result and Discussion

Environmental observation. Environmental observations, including weather, are also useful for identifying climatic conditions that affect the development and maintenance of coffee nurseries to be optimized. temperature and rainfall data were obtained from the Ciparanje weather station, Faculty of Agriculture, Universitas Padjadjaran. The average temperature during the study ranged from 22.7^{o}C-23.7^{o}C, with the highest temperature of 23.7^{o}C in April 2023 and the lowest at 22.7^{o}C in February 2023. This is the optimal temperature for robusta coffee growth, which ranges from 22-25^{o}C. (Djaenudin et al., 2011). Air temperatures of more than 25oC cause the rate of photosynthesis to decrease, and the leaves become damaged, starting with chlorosis, and vice versa at temperatures that are too low (less than 20^{o}C) can disrupt the physiological activities of the leaves so that the color turns yellowish starting from the edges of the leaves. (Pujiyanto, 1999).

The average rainfall during the study ranged from 105.50-238.0mm/month, classified as a wet month. The highest rainfall occurred in April 2023 at 238 mm/month, while the lowest occurred in February 2023 at 105.50 mm/month. This is by the optimal rainfall for Robusta coffee growth, ranging from 100-250 mm/month to around 2000-3000 mm/year (Djaenudin et al., 2011).

Analysis of Soil, cocopeat, and coconut water. The results of the soil analysis. The test

results showed that the pH of the topsoil planting media included slightly acidic criteria, low N-total, and K_2O. The pH level and nutrient content of N, P, and K contained in cocopeat planting media are better than in topsoil planting media. C-organic content in cocopeat showed higher results.

Table 1. Average Daily Temperature, Relative Humidity, Total Rainfall, Evaporation, and Sunlight Intensity during Research Period

Month	Daily temperature (°C)	Relative Humidity (%)	Total Rainfall (mm/month)	Evaporation (mm/month)	Light intensity (%)
February	22.70	91.00	105.50	2.80	26.00
March	22.90	88.00	132.50	3.30	74.00
April	23.70	88.00	238.00	3.10	79.00
May	23.00	88.00	139.00	3.70	75.00

Source: Weather Station of Ciparanje Experimental Farm, Faculty of Agriculture Unpad, 2023

Table 2. Soil Analysis

No	Parameter	Unit	Result
1	pH: H_2O	-	5.96
2	N-total	%	0.12
3	P_2O_5 HCl 25%	mg/100g	60.65
4	P_2O_5	ppm	10.70
5	K_2O HCl 25%	mg/100g	11.60
6	K-dd	$cmol.kg^{-1}$	1.48

Source: Laboratory of Soil Fertility and Plant Nutrition, Faculty of Agriculture, Universitas Padjadjaran, 2023

The results of cocopeat planting media (Table 3) showed that the pH of the topsoil planting media included slightly acidic criteria, low N-total, and K2O. The pH level and nutrient content of N, P, and K contained in the cocopeat planting media are better than the topsoil planting media. The C-organic content of cocopeat showed higher results. Based on the topsoil and cocopeat analysis test results, it can be concluded that cocopeat can be used as an alternative planting media mixture.

The analysis of coconut water showed that total N was 0.01%, P_2O_5 was 0.03%, K_2O was 0.21%, calcium (Ca) was 200.00 mg/L, magnesium (Mg) was 99.50 mg/L, pH was 3.8, sodium (Na) was 365.00 mg/L, cytokinin in the form of kinetin was 17.552 mg/L, and cytokinin in the form of zeatin was 14.973 mg/L (Table 4). The results of several studies show that coconut water is rich in potassium, minerals including calcium (Ca), sodium (Na), magnesium (Mg), ferrum (Fe), cuprum (Cu), sulfur (S), sugar, and protein. The mineral content is the growth hormone that plants need. In addition to being rich in minerals, coconut water also contains two natural hormones, auxin, and cytokinin, which play a role in supporting cell division (Tiwery, 2014).

Table 3. Analysis of Cocopeat Planting Media

No	Parameters	Unit	Result
1	Organic - C	%	56.02
2	C/N	-	72.75
3	Moisture Content	%	80.74
4	pH	-	7.72
5	N	%	0.77
6	P_2O_5	%	23.31
7	K_2O	%	3.92

Source: Laboratory of Soil Fertility and Plant Nutrition, Faculty of Agriculture, Padjadjaran University, 2023

Table 4. Analysis of coconut water

No	Parameters	Unit	result
1	N Total	%	0.01
2	P_2O_5 Total	%	0.03
3	K_2O Total	%	0.21
4	Calsium (Ca)	mg/L	200.00
5	Magnesium (Mg)	mg/L	99.50
6	pH	-	3.8
7	Natrium (Na)	mg/L	365.00
8	cytokinin		
	Kinetin	mg/L	17.552
	Zeatin	mg/L	14.973

Source: ICBB Laboratory - PT Biodiversitas Biotechnology Indonesia, 2023

Number of Leaves. Based on the results of the F test at the 95% confidence level, it shows that treatment E (cocopeat 50% and topsoil 50% + coconut water 200 mL) is a treatment that gives a better effect than the other treatments, but not significantly different from treatment B (cocopeat 50% and topsoil 50%), treatment D (topsoil 100% + coconut water 200 mL), and treatment F (cocopeat + coconut water 200 mL) at the age of 4 weeks after planting. At the age of 6-12 weeks after planting, treatment E (cocopeat 50% and topsoil 50% + coconut water 200 mL) was significantly different from treatment A (control), treatment B (cocopeat 50% and topsoil 50%), and treatment C (cocopeat 100%) (Table 5).

Jurnal Kultivasi Vol. 23 (1) April 2024
ISSN: 1412-4718, eISSN: 2581-138x

Table 5. Effect of the Combination of Planting Media and Coconut Water on the Number of Leaves of Robusta Coffee Seedlings at 4 - 12 WAP

Treatment	Number of Leaves				
	4 WAP	6 WAP	8 WAP	10 WAP	12 WAP
A = control (topsoil 100%)	7.67 a	8.08 a	9.00 a	9.17 a	9.50 a
B = cocopeat 50% + topsoil 50%	8.50 ab	8.58 a	9.67 a	10.08 a	10.75 a
C = cocopeat 100%	7.75 a	8.09 a	8.92 a	9.25 a	10.25 a
D = top soil 100% + coconut wat 200 mL	9.67 ab	9.84 ab	11.09 ab	11.25 ab	12.42 ab
E = cocopeat 50% + topsoil 50% + coconut water 200 mL	10.50 b	11.84 b	12.67 b	13.17 b	14.67 b
F = cocopeat 100% + coconut water 200 mL	9.34 ab	9.75 ab	10.25 ab	10.25 b	12.08 ab

Note : WAP = Week after planting. Mean followed by different letters within the similar column was significantly different based on Duncan multiple range test at the 5% level.

Table 6. Effect of the Combination of Planting Media and Coconut Water on the Leaf Area of Robusta Coffee Seedlings at 4 - 12 WAP

treatment	Leaf area index				
	4 WAP	6 WAP	8 WAP	10 WAP	12 WAP
A = control (topsoil 100%)	35.08 a	34.87 a	40.13 a	43.52 a	46.20 a
B = cocopeat 50% + topsoil 50%	44.49 b	44.66 c	50.83 b	49.94 ab	55.04 b
C = cocopeat 100%	65.44 c	64.16 d	80.51 c	84.66 c	88.17 c
D = top soil 100% + coconut water 200 mL	38.16 a	37.44 ab	44.58 ab	45.67 ab	50.38 ab
E = cocopeat 50% + topsoil 50% + coconut water 200 mL	45.33 b	42.01 bc	47.93 b	50.70 b	54.61 b
F = cocopeat 100% + coconut water 200 mL	67.28 c	65.92 d	76.51 c	84.44 c	82.83 c

Note : WAP = Week after planting. Mean followed by different letters within the similar column was significantly different based on Duncan multiple range test at the 5% level.

This shows that providing coconut water affects the growth of the number of leaves on robusta coffee seedlings. Coconut water given to experimental plants contains calcium (Ca) at 200.00 mg/L, cytokinin in zeatin at 14.97 mg/L, and zeatin at 14.97 mg/L. The element Ca is used to stimulate leaf growth. Based on the analysis of coconut water used in this study, it contains cytokinin, which affects the formation of buds that will develop into leaves. (Amsyahputra et al., 2016). The combination of planting media consisting of topsoil and cocopeat showed better results in the growth of the number of leaves. It is suspected that the combination of topsoil and cocopeat can provide sufficient nutrients for the growth of the number of leaves.

Leaf Area. The results of leaf area measurements tested by F at the 95% confidence level showed that treatment C (100% cocopeat) and treatment F (100% cocopeat + 200 mL coconut water) gave the same effect better than other treatments on the leaf area of robusta coffee seedlings. Treatments that used the same planting media showed results that were not significantly different. Treatments using cocopeat planting media showed the highest results. They were significantly different from treatments using other planting media, such as treatment C (cocopeat 100%) and treatment F (cocopeat + coconut water 200 mL) significantly different from treatment A (topsoil 100%), treatment B (cocopeat 50% and topsoil 50%), treatment D (topsoil 100% + coconut water 200 mL), and treatment E (cocopeat 50% and topsoil 50% + coconut water 200 mL) (Table 6).

It is suspected that the cocopeat planting media used contains nutrients carbon (C), hydrogen (H), oxygen (O), nitrogen (N), and Mg, which play a role in the formation of chlorophyll and are useful in the photosynthesis process. Photosynthate will be metabolized into various organic compounds that play a role in cell formation, increasing leaf area. The N and Mg play a role in the photosynthesis process; if the photosynthesis process increases, it will produce carbohydrates and other compounds used by plants for growth, one of which is the growth of plant leaf area (Andri et al., 2017). Cocopeat can provide nutrients such as magnesium (Mg), potassium (K2O), and phosphorus (P) needed by plants. Cocopeat also contains zinc (Zn), which increases root growth and leaf expansion.

ISSN: 1412-4718, eISSN: 2581-138x

Plant height. The mean of plant height tested by F at the 95% confidence level showed that treatment E (cocopeat 50% and topsoil 50% + coconut water 200 mL) and treatment B (cocopeat 50% and topsoil 50%) were treatments that gave a better effect than the other treatments. This shows that the treatment that uses a combination of planting media between topsoil and cocopeat is a treatment that gives a better effect on plant height parameters. This is also in line with research by Singchal (2019), which showed that the composition of planting media consisting of 50% soil and 50% cocopeat can increase the growth of coffee plant height (Table 7 and Fig 1)

Cocopeat can improve soil chemicals and physical properties by increasing the availability of macro and micronutrients and improving soil structure, water storage, and air exchange (soil aeration). Ramadhan (2017) showed that using 25% and 50% cocopeat combined with soil in the growing media of marine senton seedlings is the best composition for plant height growth. Table 7 shows that treatment E (cocopeat 50% and topsoil 50% + coconut water 200 mL) is a treatment that gives a better effect than the other treatments. The provision of coconut water showed better results. The auxin and cytokinin content in coconut water plays an important role in cell division and helps the formation of buds and stem elongation. Auxin will spur cells to divide rapidly and develop into buds and stems (Pamungkas et al., 2009).

Stem Diameter. The results of stem diameter measurements tested by F at the 95% confidence level showed that treatment B (cocopeat 50% and topsoil 50%) was a treatment that gave a better effect than the other treatments but was not significantly different from treatment E (cocopeat 50% and topsoil 50% + coconut water 200 mL) and F (cocopeat + coconut water 200 mL) (Table 8). This is in line with Singchal (2019), who states that the composition of planting media, 50% soil and 50% cocopeat, increases Arabica coffee plants' stem diameter growth.

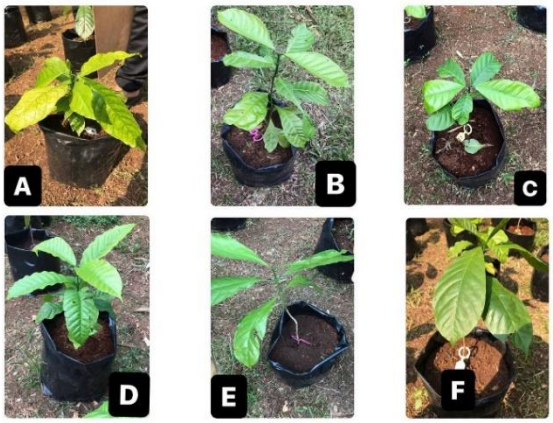

Figure 1. Morphological comparison of robusta coffee plant height as the effect of the combination of planting media and coconut water

The availability of K element in the planting media influences stem diameter growth. The K element plays a role in accelerating the growth of meristematic tissues, especially in the stem of the plant, as well as strengthening the stem so that it does not easily fall over. According to Leiwakabessy (1998), the K element plays a very important role in increasing the diameter of the plant stem, especially in its network that connects the roots and leaves. Lack of K element can inhibit the process of stem circumference enlargement. The K element in the cocopeat planting media contains 3.92% K (Table 3).

Table 7. Effect of the Combination of Planting Media and Coconut Water on the Plant Height of Robusta Coffee Seedlings at 4 – 12 WAP.

Treatment	Plant height (cm)				
	4 WAP	6 WAP	8 WAP	10 WAP	12 WAP
A = control (topsoil 100%)	22.80 a	23.50 a	24.29 a	25.08 a	26.00 a
B = cocopeat 50% + topsoil 50%	35.29 c	36.50 c	37.75 c	39.81 c	41.18 c
C = cocopeat 100%	24.67 ab	25.29 ab	26.09 ab	26.67 ab	26.88 a
D = top soil 100% + coconut water 200 mL	22.45 a	23.63 a	25.92 a	28.63 ab	30.44 ab
E = cocopeat 50% + topsoil 50% + coconut water 200 mL	37.54 c	38.92 c	39.96 c	40.63 c	41.59 c
F = cocopeat 100% + coconut water 200 mL	28.00 b	30.21 b	31.33 b	32.33 b	33.31 b

Note : WAP = Week after planting. Mean followed by different letters within the similar column was significantly different based on Duncan multiple range test at the 5% level.

ISSN: 1412-4718, eISSN: 2581-138x

Table 8. Effect of the Combination of Planting Media and Coconut Water on the Stem Diameter of Robusta Coffee Seedlings at 4 - 12WAP.

Treatmet	Diameter of stem				
	4 WAP	6 WAP	8 WAP	10 WAP	12 WAP
A = control (topsoil 100%)	2.50 a	2.69 a	3.04 a	3.36 a	3.59 a
B = cocopea*t* 50% + *topsoil* 50%	4.67 c	4.89 c	5.24 c	5.74 b	7.03 d
C = cocopeat 100%	3.31 ab	3.54 ab	3.74 ab	3.98 a	4.23 ab
D = top soil 100% + coconut wat 200 mL	3.00 a	3.23 a	3.64 a	3.89 a	4.37 abc
E = cocopeat 50% + topsoil 50% + coconut water 200 mL	4.37 bc	4.77 bc	5.07 c	5.45 b	5.93 cd
F = cocopeat 100% + coconut water 200 mL	4.35 bc	4.64 bc	4.88 bc	5.17 b	5.48 bcd

Note : WAP = Week after planting. Mean followed by different letters within the similar column was significantly different based on Duncan multiple range test at the 5% level.

Another element that affects the growth of stem diameter of robusta coffee seedlings is the availability of P nutrients in the planting media. Cocopeat contains 23.31% P (Table 3). These nutrients play a role in helping the formation of plant organs, with the formation of carbohydrates that run well, and the translocation of starch to the stem will be smoother so that it forms a good stem diameter. Leiwakabessy (1998) stated that K and P elements play a very important role in increasing the diameter of the plant stem, especially in its role as a network that connects the roots and leaves. The availability of nutrients in cocopeat planting media helps in the growth of stem diameter of robusta coffee seedlings. The larger the stem diameter of plant seedlings, the better the plant growth.

Leaf Chlorophyll Index. Based on the results of the F test at the 95% confidence level, treatment C (100% cocopeat) significantly affected the chlorophyll index of robusta coffee seedlings. Treatment C (100% cocopeat) is the treatment that gives the best effect on the chlorophyll index parameter of the leaves. At the age of 4 weeks after planting, six weeks after planting, and 10 weeks after planting, the treatment using topsoil and the combination of planting media gave results that were not significantly different, while at the age of 8 weeks after planting and 12 weeks after planting, the treatment using the combination of planting media gave significantly different results (Table 9 and Fig.2).

The structure of the planting media produced by using cocopeat planting media spurs the process of cell division and elongation in plant organs, one of which is the growth of the leaf area. According to Musyarofah et al.. (2007), leaf chlorophyll content is also influenced by a plant's morphological and anatomical structure. According to Rahhutami et al. (2021), chlorophyll, in the form of green leaf substance, occurs in the leaves with the help of sunlight and is called the process of photosynthesis. The magnesium (Mg) helps the formation of chlorophyll in the leaves, and this nutrient is containing in cocopeat planting media.

Table 9. Effect of Combination of Planting Media and Coconut Water on Average Leaf Chlorophyll Index

Treatment	Leaf chlorophyll index (CCI)				
	4 WAP	6 WAP	8 WAP	10 WAP	12 WAP
A = control (topsoil 100%)	14.79 a	16.33 a	17.97 a	19.87 a	20.85 a
B = cocopeat 50% + topsoil 50%	20.10 bc	21.23 bc	22.15 bc	23.25 ab	23.73 ab
C = cocopeat 100%	33.31 d	34.73 d	36.10 e	37.65 c	38.31 d
D = top soil 100% + coconut wat 200 mL	16.96 ab	17.60 ab	18.85 ab	19.52 a	21.45 a
E = cocopeat 50% + topsoil 50% + coconut water 200 mL	23.60 c	24.83 c	26.17 d	27.42 b	30.73 c
F = cocopeat 100% + coconut water 200 mL	22.07 c	23.55 c	25.00 cd	26.10 b	28.24 bc

Note : WAP = Week after planting. Mean followed by different letters within the similar column was significantly different based on Duncan multiple range test at the 5% level.

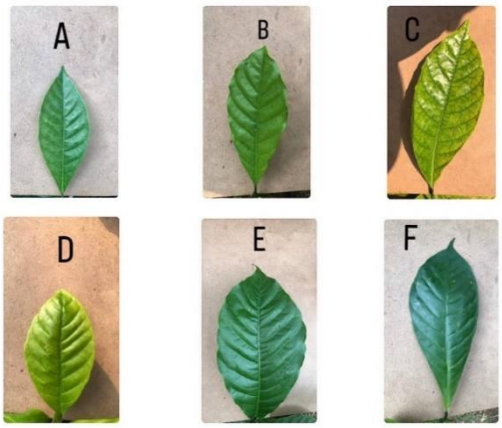

Figure 2. Leaf appearance comparison of robusta coffee as the effect of the combination of planting media and coconut water

Conclusion

Using cocopeat and coconut water could improve the growth of robusta coffee seedlings. The combination of topsoil 50% + cocopeat 50% had a better effect on the growth of the number of leaves, plant height, and stem diameter, while the composition of 100% cocopeat had a better effect on the growth of leaf area and chlorophyll index of robusta coffee seedlings.

References

Amsyahputra A, Adiwirman, Nurbaiti. 2016. Giving various concentrations of coconut water to robusta coffee (*Coffea canephora* Pierre) Seedlings. JOM Faperta, 3(2): 1–12.

Andri S, Nelvia, Saputra SI. 2017. Providing empty bunches compost and cocopeat in Ultisol subsoil on the growth of oil palm seedlings (*Elaeis guineensis* Jacq.) in pre nursery. J. Agroteknologi, 7(1): 1–7.

Darlina HR. 2016. Effect of watering coconut water (*Cocos nucifera* L.) on vegetative growth of pepper (*Piper nigrum* L.). J. Ilmiah Mahasiswa Pendidikan Biologi Unsyiah, 1(1): 20–28.

Directorate General of Plantations. 2012. Concepts and Policy Strategies for Coffee Plantation Development in Indonesia [internet]. Available at https://repository.pertanian.go.id. Accessed 23/12/2022.

Directorate General of Plantations. 2022. National Plantation Statistics 2020-2022. Available at https://ditjenbun.pertanian.go.id/?publikasi=buku-statistik-perkebunan- 2020-2022. Accessed 29/09/2023.

Djaenudin D, Marwan H, Subagyo H, Hidayat A. 2011. Petunjuk Teknis Evaluasi Lahan untuk Komoditas Pertanian. Balai Besar Litbang Sumberdaya Lahan Pertanian, Badan Litbang Pertanian. Bogor.

International Tropical Timber Organization. 2006. Status of Tropical Forest Management 2005. Available online at https://www.itto.int/sfm/2005 . Accessed on 15/12/2022.

Kasi PD, Cambaba S, Sanggola W. 2021. Application of corn extract and coconut water as natural growth regulators in the initial growth of apple seedlings. Perbal, 9(3): 195-201.

Krishnapillai MV, Young-uhk S, Friday JB, Haase DL. 2020. Locally produced cocopeat growing media for container plant production. J. Tree Planters' Notes, 63(1): 29–38.

Leiwakabessy F. 1998. Kesuburan Tanah. Pertanian Institut Pertanian Bogor.

Mergiana A, Gresinta E, Yulistiana. 2021. Effectiveness of old coconut water (*Cocos nucifera* L.) on the growth of green grape (Vitis vinifera L.) var. Jestro Ag-86. Proceedings of the National Science Seminar, 2(1): 516–521.

Musyarofah N, Susanto S, Aziz SA, Kartosoewarno S. 2007. Response of Centella asiatica L. to natural fertilizer application in the shade. Bul. Agron., 224(35): 217–224.

Pamungkas FT, Darmanti S, Raharjo B. 2009. Effect of concentration and length of soaking in Bacillus SP.2 DUCC-BR-K1.3 culture supernatant on the growth of cuttings. Journal Sains and Mathma., 17(3): 131–140.

Pujiyanto. 1999. Field School Materials: Coffee. Indonesian Coffee and Cocoa Research Center. Jember.

Rahhutami R, Handini AS, Astutik D. 2021. Pakcoy Growth Response to Humic Acid and Trichoderma in Palm Oil Frond Planting Media. J. Kultivasi, 20(2): 97–104.

Ramadhan D. 2017. Use of coconut peat as a growing media for Paraserianthes falcataria and Inttsia palembanica. [Thesis].

Jurnal Kultivasi Vol. 23 (1) April 2024
ISSN: 1412-4718, eISSN: 2581-138x

Universitas Lampung.

Rosianty Y, Lensari D, Monita RM. 2021. Growth of seedlings Eucalyptus pelita F. Muell using various planting media. Sylva Jurnal Penelitian Ilmu-Ilmu Kehutanan, 10(2): 26–31.

Sari M, Ibrahim D. 2020. Morphological, anatomy and physiological characteristics of seven superior clones of robusta coffee. J. Tanaman Industri Dan Penyegar (JTIDP), 7(2): 73–82.

Singchal ER. 2019. The effect of cocopeat planting media and young coconut water on the initial growth of arabica coffee (*Coffea arabica* L.) seedlings. [Thesis]. Universitas Gajah Mada.

Susanti D, Safrina D. 2018. Identification of specific leaf area and leaf area index of Centella asiatica (L.) Urb. in Karangpandan, Karanganyar, Central Java. Balai Besar Penelitian Dan Pengembangan Tanaman Obat Dan Obat Tradisional, 11(1): 11–17.

Tiwery RR. 2014. The effect of using coconut water (*Cocos nucifera*) on the growth of mustard plants (Brassica juncea L.). J. Biopendix, 1(1) : 86-94.