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TRIAL OF THE USE OF MINI CUTTINGS IN SEVERAL CULTIVATION OF CANE CASSAVA PLANTS (*MANIHOT ESCULENTA* CRANTZ)

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Abstract

Cassava (Manihot esculenta Crantz) is one of the important food crops in Indonesia. This plant has the potential to increase food production and the welfare of farmers, one of the efforts to increase cassava production is to use the right cultivation method. The purpose of this study was to examine the effectiveness of using mini-cutting in the cultivation of Wands cassava. This research used an experimental method. Data collection techniques in this study were literature study and observation. The data that has been collected is then analyzed descriptively. The results showed that the percentage/growth capacity of mini/short cassava cuttings with 3-4 buds planted in the field varied depending on the variety. Cassava with stem tissue that dries quickly has a lower percentage/growth capacity compared to stem tissue that dries more slowly. The use of short cuttings (3-4 buds) and long cuttings (7-10 buds) in cassava planting did not affect vegetative growth, plant height and stem diameter, but did affect the number of branches per plant. The use of long cuttings in varieties Malang 4, Litbang UK 2 and Garuda gave better tuber yield per plot compared to short cuttings. The use of long cuttings in varieties UJ 5, UJ 3 and Adira 4 gave tuber yield per plot which tended to be the same or higher than short cuttings. The use of short cuttings and long cuttings of cassava in varieties UJ 5, UJ 3, Adira 4, Malang 4, Litbang UK2 and Garuda did not affect the starch content of the tubers produced.

Keywords: Plants, Cassava Wands, Cultivation.

1. INTRODUCTION

Cassava plants (*Manihot esculenta Crantz*) are high carbohydrate-producing plants per unit area and have an important role in food diversification (Fathima, Sanitha, Tripathi, & Muiruri, 2023). The average productivity of cassava plants nationally is currently still around 24.65 tons/ha (Bertasini, Battista, Rizzioli, Frison, & Bolzonella, 2023). With the potential productivity of superior varieties of cassava plants that can reach above 40 tons/ha, there is still a fairly high gap between real productivity in the field compared to the potential productivity of each variety (Lukurugu et al., 2023). To obtain optimal productivity in cassava cultivation, the use of high-quality seeds with five appropriate criteria which include on time, quantity, quality, price and place is an absolute requirement.

However, the obstacles that exist are the lack of availability of quality seeds at the time of planting and the high cost of transportation and storage due to the *bulky* nature of cassava seeds which require a wider space or space than seeds in the form of seeds (Sperling & Almekinders, 2023). One way that can be used to overcome this problem is saving the use of cuttings by shortening the size or reducing the number of buds from 12-15 buds measuring ± 20 cm which have been used by farmers to 3-4 buds measuring ± 5 cm. Some experimental

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results on the scale of research, the use of cuttings 1, 2 and 3 buds / mini cuttings gave results and growth that were relatively no different compared to the use of normal-sized cuttings (Travadon & Baumgartner, 2023). It is suspected that the use of mini-sized cuttings gives a different response from some varieties of cassava related to genetic traits possessed.

Previous research by Lowe et al (2022), examined the effect of growing media and parent plant density on the cuttings propagation system for tea trees, the results showed that the most productive treatment was at a high plant density in a potting mix that had the potential to produce 13,440 plants/year/m2. Overall coir appeared less productive, but the pattern of differences between treatments was similar. For highest system productivity, it is recommended to grow stock plants in a high density potting mix and modulate the temperature between 18°C and 28°C. Late spring and early summer are the best times to harvest and prepare tea tree mini cuttings in subtropical areas.

Another study by Gehlot et al (2014), examined the effect of auxins and rooting media on the induction of adventitious roots in mini cuttings, the results showed a significant effect of different auxins and rooting media on neem formation. Rooted mini cuttings were assessed for percent rooting, number of roots, root length and number of leaves. In the current findings among all auxins and rooting media, IBA (250 mg L-1) showed better results with sand in terms of rooting percent (80%), number of roots (70.63), root length (11.13) and number of leaves (5.25) per rooted mini cuttings. The formation of healthy plants after hardening off under outdoor conditions indicates that A. indica can be successfully propagated by the mini cuttings technique. The aim of this study was to examine the effectiveness of using mini cuttings in the cultivation of Wands cassava.

2. MATERIALS AND METHODS

Research on the Use of Mini Cuttings in the Cultivation of Several Varieties of Cassava Plants (*Manihot esculenta* Crantz) was conducted in the Field Station Area of the Tuha Children's Experimental Garden, BRIN located in Central Lampung. The implementation time is from March 2022 to December 2022. The study used Group Randomized Design (RAK), with variety type treatment as the first factor consisting of six levels, namely UJ 5 (A 1), UJ 3 (A 2), Adira 4 (A 3), Malang 4 (A 4), R & D UK 2 (A 5) and Garuda (A 6).

While the length of cuttings as the second factor consists of two levels, namely *mini / short cuttings measuring ± 5 cm with 3-4 buds (B1) and* normal / long cuttings measuring ± 25 cm with 10-12 buds (B2). The selection of seed sources was taken from cassava plants aged 9-10 months varieties UJ5, UJ 3, Adira IV, Malang 4, R & D UK 2 and Garuda. The criteria for seedlings should be healthy with a diameter of 6-7 cm. Furthermore, it is cut according to the size variation to be tested, namely mini cuttings of 3-4 buds (length -/+ 5 cm) and normal cuttings of 10-12 buds (length -/+ 25 cm). Seedlings are cut using a saw to size in the amount of 1000 cuttings for each variety. Planting was carried out as many as 3 repetitions with 12 combinations of treatments so that the number of plots was 36 with an area per plot measuring 22 m x 15 m (330 m 2). The equipment used in activities is in the form of hoes, coreds, knapsack sprayers, saws, machetes, raffia ropes, meters, scales, buckets, sacks and others.

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The fertilization is given at a dose of 200 kg Urea / ha, 125 kg SP 36 / ha and 150 kg KCl / ha. Organic fertilization I carried out at the age of 1 month is given with a dose of Urea fertilizer as much as 125 kg / ha, SP 36 as much as 75 kg / ha and KCl as much as 75 kg / ha.

While the rest, namely Urea as much as 75 kg, Sp 36 as much as 50 kg and KCl as much as 75 kg given at the age of 4 months. Plant maintenance in the form of weed weeding is carried out 3 times, namely the first weeding at the age of 1 month, the second weeding at the age of 2-3 months and the third weed weeding is carried out according to the intensity of weed growth. At the age of 5 or 6 months, chemical weed control using systemic herbicides is carried out.

The implementation of observations to determine the response of plant growth is carried out on several parameters as follows:

1. *Percentage of Seedling Growth in the Field (Growing Power)*

The percentage of seedling growth in the field is observed by calculating the number of seedlings/cuttings growing in the field divided by the number of seedlings/cuttings planted. Observation of the growth power of seedlings was carried out when the plants were 2 MST old.

2. *Plant Height*

Plant height is measured from the base of the stem to the highest growing point, carried out monthly until the plant age is 9 months, starting from the plant age of 6 BST (Months After Planting). Observations were made on 10 randomly selected sample plants from each treatment plot.

3. *Rod Diameter*

Observation of stem diameter is carried out every month from the age of 6 BST to the age of 9 BST by measuring the diameter of the stem at a height of 10 cm from the place of emergence / base of the stem using a caliper. Observations on 10 sample plants were randomly drawn from each treatment.

4. *Number of Shoots/Branches per plant*

Observations are carried out by counting the number of shoots / branches that grow on plants, starting from the age of 6 BST to the age of 9 BST with a period of every month. Observations on 10 sample plants were randomly drawn from each treatment

5. *Tuber Weight per Plant*

Observations were made at the harvest age of 9 BST by weighing the weight of tubers per plant. Observations on 10 sample plants were randomly drawn from each treatment.

6. Number of Tubers per Plant

Observations were made at the harvest age of 9 BST by counting the number of tubers per plant. Observations on 10 sample plants were randomly drawn from each treatment

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7. Tuber Production per Plot.

Tuber production per plot is carried out by weighing the yield of tubers per experimental plot at the harvest age of 9 BST.

8. Starch content of tubers.

Measurement of starch content values is carried out on tuber yields per plot with *the specific gravity* method which is calculated using the Sungzikaw starch content equation (Sulieman, 2023).

3. RESULTS AND DISCUSSION

Analisis datanya mungkin lebih tajam lagi, ada perbandingan dengan penelitian yang sejenis
One important factor that determines the level of crop yield is seeds. Seeds/seeds together with other means of production such as fertilizer, water, light, climate determine the level of yield/productivity of crops. According to Weissmann, Yadav, Seth, & Udaya Bhaskar (2023), the criteria for quality seeds or seeds include three aspects, namely genetic quality is the appearance of pure seeds from certain varieties and shows the genetic identity of the parent plant, then physiological quality, namely the ability of viability of seeds which includes germination and seed growing strength, then the physical quality of seeds is the appearance of seeds in prime seen physically such as homogeneous sizes, pithy, clean from mixtures and free of pests and diseases. In cassava cultivation, generally the seeds used are stem cuttings measuring 20-30 cm with 12-15 buds, coming from plants aged 8-12 months (Helgason & Storgaard, 2023).

Obstacles in providing quality cassava seeds are the limited number at the time of planting and expensive transportation and storage costs due to the bulky physique of cassava seeds. The need for cassava seedlings for monoculture cultivation is 10,000-15,000 cuttings / ha depending on the planting distance applied. If the cassava cuttings used are ± 20 cm in size, then one cassava stick with a size of 1-2 m that is used as a seedling is obtained 5-10 cuttings (Maryana & Suwardi, 2023). Thus, for planting an area of 1 ha, as many as 1000 to 2000 cassava stalks are needed to meet the needs of cuttings with a population of 10,000-15,000 plants per ha. This amount, of course, for planting on a fairly wide scale requires planting material and the cost of transporting seedlings is quite expensive (Prieto, Pino, & Cabeza, 2023). Research / Trial of the Use of Mini Cuttings in the Cultivation of Several Varieties of Cassava Plants (*Manihot esculenta* Crantz) was carried out in the Field Station Area of the Tuha Children's Experimental Garden, BRIN located in Central Lampung. The implementation time is from March 2022 to December 2022.

Observation of the growing power of seedlings was carried out 2 weeks after planting, by making direct visual observations in the field. While the observation of plant tuber growth and yield includes vegetative growth parameters, production parameters and tuber quality / starch content carried out from the plant age of 5 BST (Months After Planting) to the time of harvest age 9 BST. The following are the results of observations of the growth power parameters of short cuttings and long cuttings seedlings and vegetative growth parameters of plants and the

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results of tuber production that has been carried out (Joseph, Roland, Georges, Bakari, & Simon-Pierre, 2023).

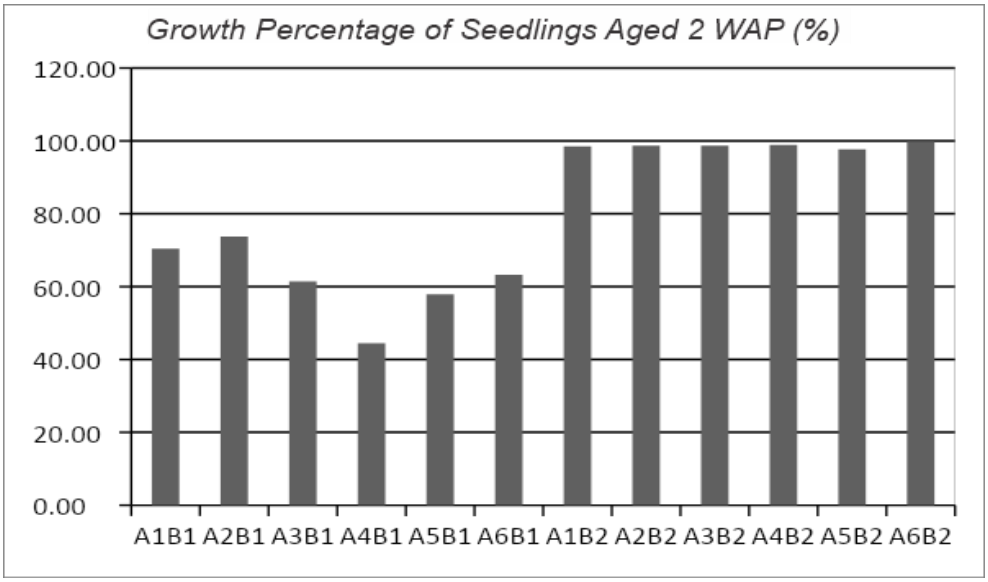
Table 1: Observed percentage of seedlings growing at the age of 2 MST (%)

TREATMENT	Deuteronomy			Average
	I	II	III	
A1B1	70,22	73,04	68,12	70,46
A2B1	69,08	75,36	76,81	73,75
A3B1	57,97	63,32	62,9	61,40
A4B1	40,84	46,38	46,09	44,44
A5B1	44,06	64,06	65,51	57,88
A6B1	53,19	63,77	72,75	63,24
A1B2	99,71	99,42	96,25	98,46
A2B2	99,42	98,26	98,26	98,65
A3B2	100	96,23	100	98,74
A4B2	99,71	98,84	98,26	98,94
A5B2	98,84	95,94	98,26	97,68
A6B2	99,71	100	99,71	99,81

Information:

A1=UJ5; A2=UJ3; A3=Adira IV; A4=Malang 4; A5=Litbang UK2; A 6=Garuda

B 1= Short cuttings of 2-3 buds; B 2= Long cuttings of 6-9 buds



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Based on the data and diagram image above, it appears that six (6) varieties planted using long cuttings (B2) have a higher percentage of growing seedlings compared to short cuttings (B1). The percentage of growing long cuttings (B2) on average reaches 98%. The lowest percentage grew in the use of short cuttings (Korkiakoski et al., 2023) the lowest was in the Malang 4 (A4) variety by 44.4% while the highest in the UJ 3 (A2) variety by 73.75%, followed by the UJ 5 (A1) variety by 70.4%, the Garuda variety (A6) by 63.24%, the Adira 4 (A3) variety by 61.4%, the UK 2 (A5) R&D variety by 57.88%. The low percentage of growing seedlings of short cuttings is closely related to the condition of cuttings (stem tissue) which have low water content so that they dry faster when planted in the field. In this case, cassava varieties Malang 4 are classified as types of cuttings whose stem tissue dries faster when in the field, while varieties UJ 3 and UJ 5 have stem tissue that dries slower so that it is better able to survive and grow better even with short cuttings size. The following is a further explanation of the results:

Higher growth percentage of long cuttings (B2) compared to short cuttings (B1)

1. The higher growth percentage of long cuttings (B2) compared to short cuttings (B1) can be explained by several factors, including:

a. Higher water content.

   Long cuttings (B2) have a higher water content than short cuttings (B1). This is because long cuttings (B2) have a larger surface area so that they absorb water more easily.

b. Lower transpiration ability

   Long cuttings (B2) have lower transpiration ability than short cuttings (B1). This is because long cuttings (B2) have a larger surface area so that evaporation of water through the leaves is slower.

c. Higher photosynthetic ability

   Long cuttings (B2) have a higher photosynthetic ability than short cuttings (B1). This is because the long cuttings (B2) have a larger surface area so that more sunlight can be captured.

2. Low percentage of short cuttings seedlings (B1)

The low percentage of short cuttings (B1) was caused by several factors, including:

a. Low moisture content

   Short cuttings (B1) have a lower moisture content than long cuttings (B2). This is because short cuttings (B1) have a smaller surface area, making it more difficult to absorb water.

b. Higher transpiration ability

   Short cuttings (B1) have a higher transpiration ability than long cuttings (B2). This is because short cuttings (B1) have a smaller surface area so that water evaporation through the leaves becomes faster.

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c. Lower photosynthetic ability

Short cuttings (B1) have lower photosynthetic ability compared to long cuttings (B2). This is because short cuttings (B1) have a smaller surface area so that less sunlight can be captured.

3. Malang 4 cassava variety has stem tissue that dries faster

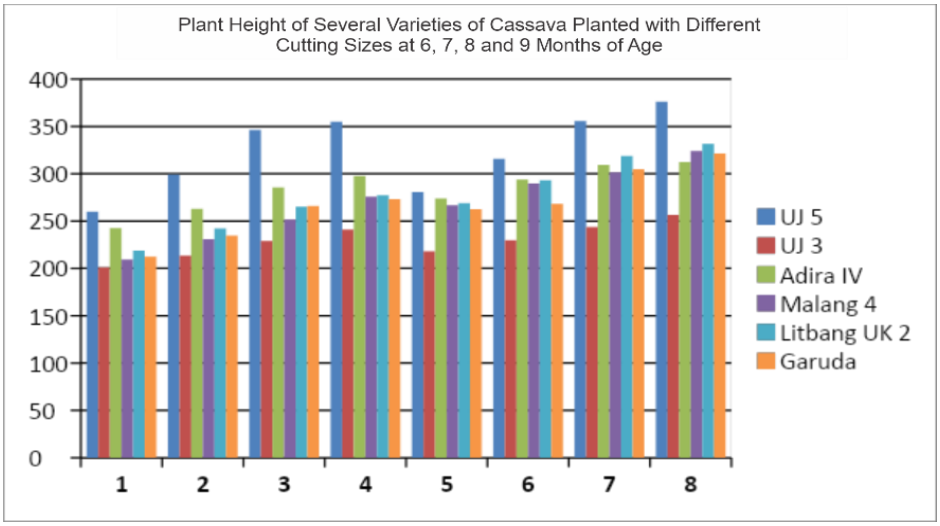
Malang 4 cassava varieties have stem tissue that dries faster than UJ 3 and UJ 5 cassava varieties. This is because Malang 4 cassava varieties have a higher cellulose content than UJ 3 and UJ 5 cassava varieties. Cellulose is the main constituent component of cell walls that play a role in maintaining plant structure and strength. Based on the results of this study, it can be concluded that the use of long cuttings (B2) is more effective in increasing the growth percentage of cassava seedlings compared to short cuttings (B1). In addition, the selection of cassava varieties that have stem tissue that dries more slowly can also increase the percentage of cassava seedlings growing.

Table 2: Plant Height of Some Cassava Varieties Planted with Different Cuttings Size at Different Stadia Age (cm)

Jenis Varietas	Setek Pendek (B 1)				Long Cuttings (B 2)			
	6 BST	7 BST	8 BST	9 BST	6 BST	7 BST	8 BST	9 BST
UJ 5 (A1)	260,1	299,1	346,2	354,9	280,5	315,7	355,9	376,3
UJ 3 (A2)	201,0	213,5	228,9	241,2	218,1	229,9	243,7	256,7
Adira IV (A3)	242,4	263,1	285,5	297,6	273,9	293,9	309,3	312,5
Malang 4 (A4)	209,3	230,9	251,6	275,9	266,9	289,6	301,6	324,1
Litbang UK 2 (A5)	218,7	242,3	265,1	277,2	269,1	293,1	318,9	331,5
Garuda (A6)	212,3	234,7	266,0	273,3	262,5	268,3	304,8	321,4

Information:

A1=UJ5; A2=UJ3; A3= Adira IV; A4=Malang 4; A5=R&D UK2; A 6=Garuda B 1= Short cuttings 2-3 buds; B 2= Long cuttings of 6-9 buds



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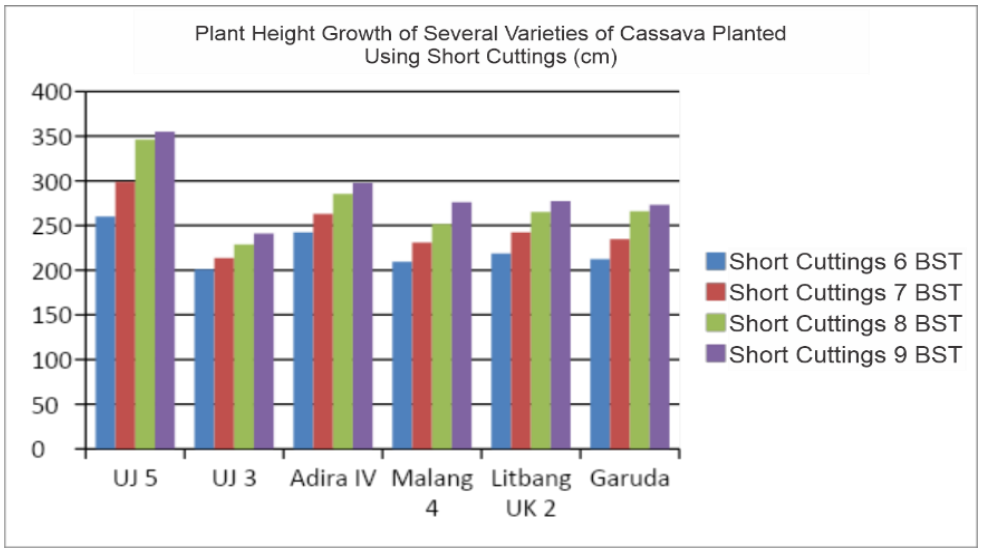

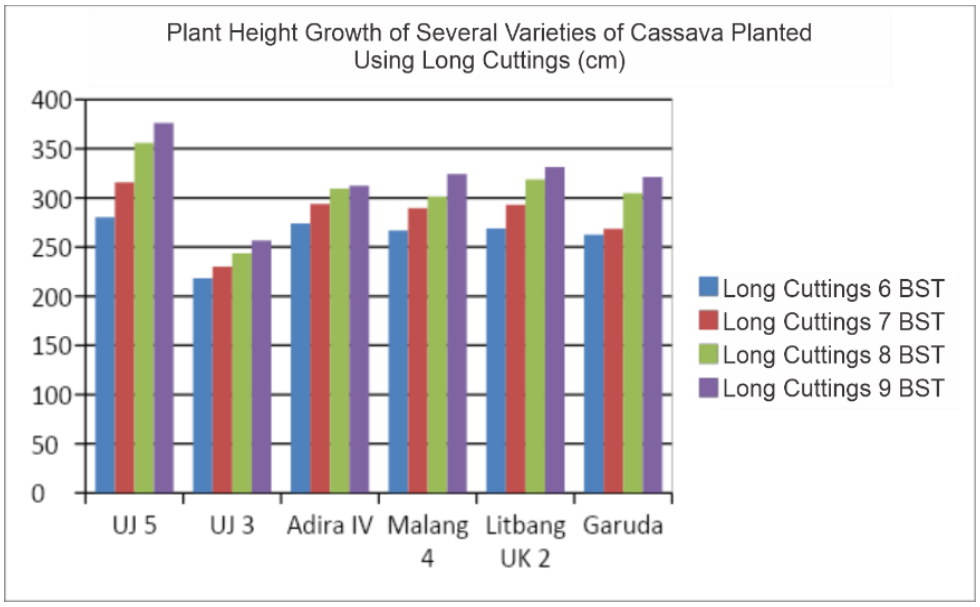

In the plant height parameter, it can be seen that the use of short cuttings (B1) and long cuttings (B2) has no effect on plant height in the 6 (six) varieties planted. This can be seen from the table and diagram above. Based on the table, the average plant height of UJ 5 (A1) varieties planted using short cuttings (B1) is 150 cm, while the average plant height of UJ 5 (A1) varieties planted using long cuttings (B2) is 152 cm. The difference in plant height was not statistically significant.

The same thing also happened to other varieties. The average plant height of UJ 3 (A2) varieties planted using short cuttings (B1) is 138 cm, while the average plant height of UJ 3 (A2) varieties planted using long cuttings (B2) is 140 cm. The difference in plant height is also not statistically significant. Based on the diagram, it can be seen that the plant height of UJ 5 (A1)

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varieties planted using short cuttings (B1) and long cuttings (B2) are in the same range. This indicates that the size of the cuttings has no effect on the growth of plant height of UJ 5 (A1) (Konan et al., 2023).

Based on the results of this study, it can be concluded that the size of the cuttings planted does not affect the growth of plant height of the 6 (six) cassava varieties above. However, there are several other factors that can affect the growth of cassava plant height, among others:

1. Variety

   Cassava varieties have a significant influence on plant height growth. Varieties that have high growth potential will produce taller plants.

2. Cuttings quality

   The quality of cuttings also affects the growth of plant height. Healthy and fresh cuttings will produce taller plants.

3. Plant maintenance

   Good plant maintenance, such as fertilization, watering, and pest and disease control, can also increase plant height growth.

Table 3: Vegetative Growth of Some Cassava Varieties at Harvest Grown Using Short Cuttings and Long Cuttings

Treatment	Observation Parameters		
	Plant Height at Harvest (cm)	Stem diameter at harvest (cm)	Number of Branches
A1B1	354.9	3,19	3,1
A2B1	241.2	2,45	3,3
A3B1	297.6	2,77	3,8
A4B1	275.9	2,96	3,9
A5B1	277.2	2,77	4,2
A6B1	273.3	2,86	2,9
A1B2	376.3	2,87	2,3
A2B2	256.7	2,43	2,5
A3B2	312.5	2,40	3,3
A4B2	324.1	2,54	2,7
A5B2	331.5	2,52	3,1
A6B2	321.4	2,35	2,5

Information:

A1=UJ5; A2=UJ3; A3=Adira IV; A4=Malang 4; A5=Litbang UK2; A 6=Garuda

B 1= Short cuttings of 2-3 buds; B 2= Long cuttings of 6-9 buds

Similarly, the size of the diameter of the stem of the plant as shown in Table 3 above tends not to be influenced by the size of the cuttings planted (Lapierre, De Ronne, Boulanger, & Torkamaneh, 2023). However, in contrast to the number of plant branches, it appears that the use of short cuttings (B1) provides more growth in the number of branches per plant compared to long cuttings (B2) in all varieties tested

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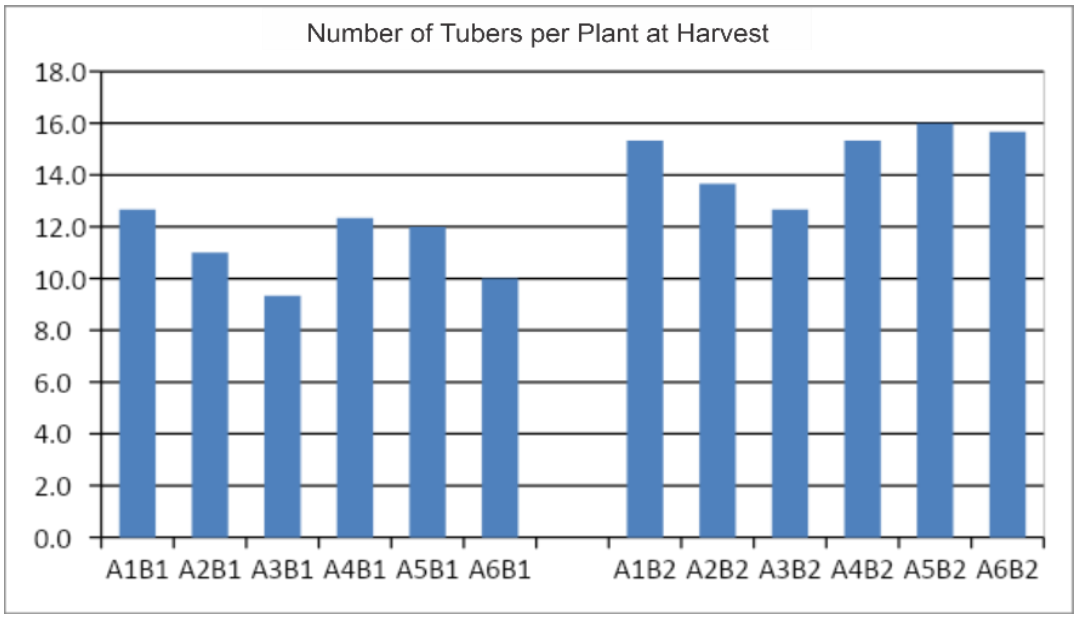
Table 4: Number and Size of Tubers Some Cassava Varieties Grown Using Short Cuttings and Long Cuttings

Treatment	Parameter Pengamatan				
	Number of tubers/tan	Weight of tuber / plant (cm)	Diameter umbi/tan. (cm)	Panjang umbi/tan. (cm)	Tuber/tan range. (cm)
A1B1	12,7	6,86	5,1	32,5	103,0
A2B1	11,0	5,72	5,4	30,8	74,0
A3B1	9,3	6,85	5,8	31,5	92,0
A4B1	12,3	10,35	6,1	32,4	88,0
A5B1	12,0	7,27	5,9	28,0	69,3
A6B1	10,0	8,02	5,5	39,2	107,3
A1B2	15,3	4,53	3,8	24,1	85,3
A2B2	13,7	5,04	5,1	22,7	70,7
A3B2	12,7	5,12	5,2	20,9	62,0
A4B2	15,3	5,65	5,6	23,6	66,0
A5B2	16,0	6,97	5,6	23,1	65,7
A6B2	15,7	5,63	4,7	23,0	71,3

Information:

A1=UJ5; A2=UJ3; A3=Adira IV; A4=Malang 4; A5=Litbang UK2; A 6=Garuda

B 1= Short cuttings of 2-3 buds; B 2= Long cuttings of 6-9 buds



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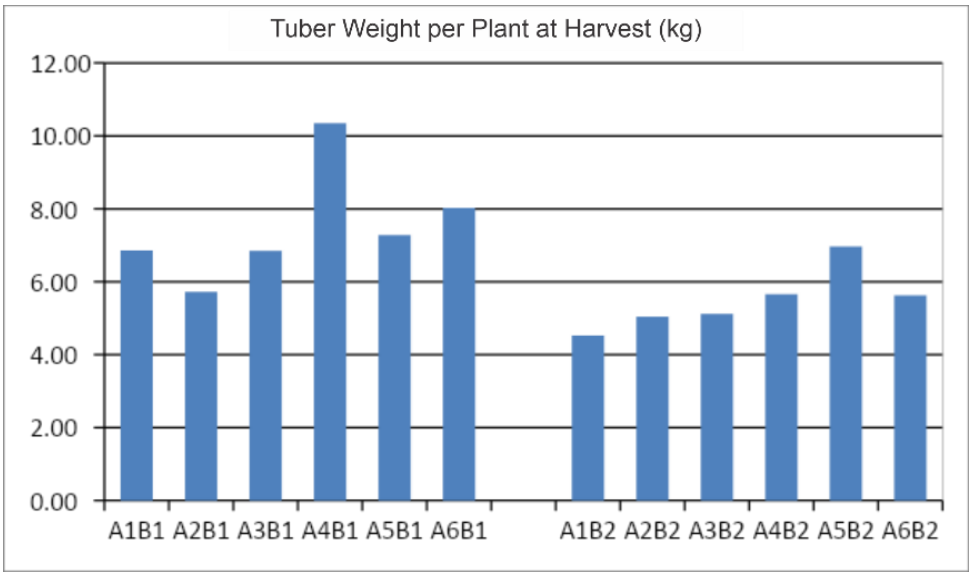

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B 1= Short cuttings of 2-3 buds; B 2= Long cuttings of 6-9 buds

In Table 4 and the diagram can be seen the effect of short cuttings (B1) and long cuttings (B2) on planting trials of 6 (six) varieties of cassava which include parameters of the number of tubers, tuber weight, tuber length, tuber diameter and plant tuber range. Shown in the diagram above, the parameters of the number of tubers of each variety tend to be more in the treatment of long cuttings (B2) than short cuttings (B1), but on the contrary, in the weight of tubers per plant, it can be seen that the use of short cuttings (B1) gives higher tuber weight results compared to long cuttings (B2).

The highest tuber weight in the use of short cuttings in the Malang 4 (A4) variety was 10.35 kg / plant, then followed by the Garuda variety (A6) with a tuber weight of 8.02 kg / plant and other varieties that did not seem much different in weight. The achievement of the highest average tuber weight in the use of short cuttings compared to the use of long cuttings is closely related to the plant population in short cuttings plots which is less (growth power 44.4% to 60%) than long cuttings (seedling growth power 98%) so that there is relatively no growth competition between plants. Thus, the lower the percentage of growing cuttings, the plant population per plot becomes less so that better growth per plant is obtained and produces higher tuber weight as well as short cuttings of the Malang 4 variety (A4B1) with a weight of 10.35 kg / plant.

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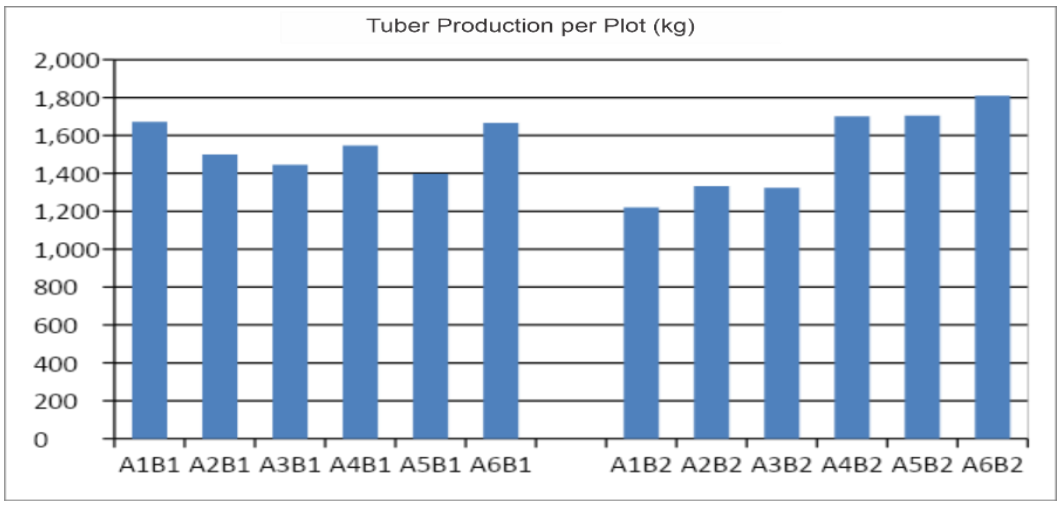
Table 5: Measurement of Tuber Yield of Several Varieties of Cassava Grown Using Short Cuttings and Long Cuttings

Treatment	Observation Parameters		
	Tuber Production / Plot (kg)	Tuber Production / Ha (tons)	Kadar Pati Umbi (%)
A1B1	1.672	50.657	24,75
A2B1	1.499	45.434	22,54
A3B1	1.444	43.768	25,96
A4B1	1.546	46.848	26,25
A5B1	1.399	42.384	24,57
A6B1	1.667	50.525	25,42
A1B2	1.220	36.960	25,08
A2B2	1.332	40.364	22,28
A3B2	1.324	40.111	25,86
A4B2	1.701	51.535	25,40
A5B2	1.705	51.657	24,89
A6B2	1.809	54.818	24,91

Information:

A1=UJ5; A2=UJ3; A3=Adira IV; A4=Malang 4; A5=Litbang UK2; A 6=Garuda

B 1= Short cuttings of 2-3 buds; B 2= Long cuttings of 6-9 buds



Information:

A1=UJ5; A2=UJ3; A3=Adira IV; A4=Malang 4; A5=Litbang UK2; A 6=Garuda

B 1= Short cuttings of 2-3 buds; B 2= Long cuttings of 6-9 buds

In Table 5 and the tuber production diagram per plot, we can see the difference in yield between the use of short cuttings (A1) and long cuttings (A2) of each planted variety. Planting short cuttings of the Malang 4 (A4B1) variety which gives an increased tuber weight of 10.35 kg / plant gives a production yield per plot of 1 546 kg, lower than the Malang variety 4 long cuttings (A4B2) with a yield of 1 701 kg. In the table and diagram above, it can also be seen

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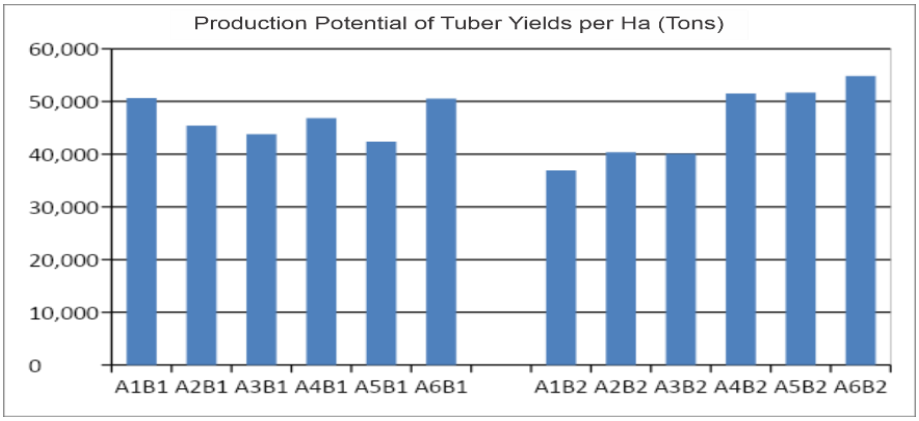
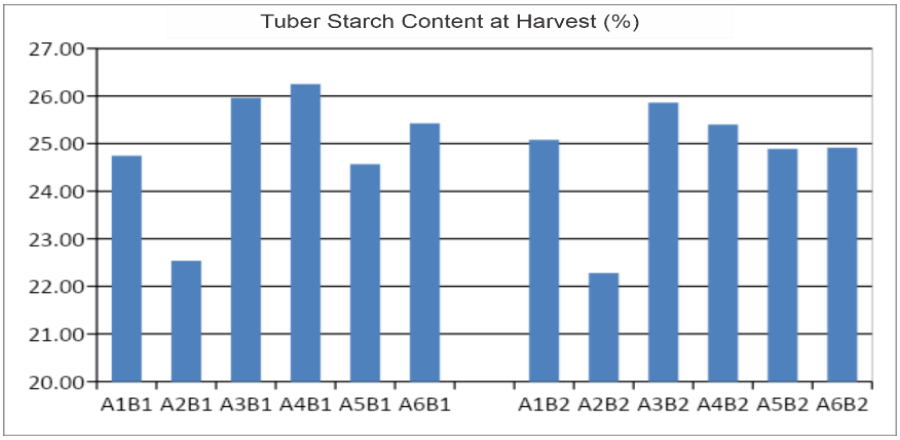
that the use of long cuttings (B2) provides better tuber production compared to the use of short cuttings in Malang 4 (A4), R & D UK2 (A5) and Garuda (A6) varieties. But on the contrary, the use of short cuttings (B1) in varieties UJ 5 (A1), UJ 3 (A2) and Adira 4 (A3) gives the same or tends to be higher tuber production compared to the use of long cuttings (B2). Shown in the table above, the UJ 5 variety with short cuttings and a growth power of 70.4% (A1B1) produces higher production with a tuber weight per plot of 1 672 kg or equivalent to productivity of 50.66 tons / ha, compared to long cuttings of the UJ 5 variety 98.46% growth power (A1B2) with a production per plot of 1 220 kg or equivalent to productivity 36.96 tons/ha. Thus, it can be explained that the use of short cuttings (B1) with a growth power above 65% provides better production per plot compared to the use of long cuttings (B2).



Information:

A1=UJ5; A2=UJ3; A3=Adira IV; A4=Malang 4; A5=Litbang UK2; A 6=Garuda

B1= Short cuttings of 2-3 buds; B2= Long cuttings of 6-9 buds



Information:

A1=UJ5; A2=UJ3; A3=Adira IV; A4=Malang 4; A5=Litbang UK2; A 6=Garuda

B 1= Short cuttings of 2-3 buds; B 2= Long cuttings of 6-9 buds

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Based on the observation data listed in Table 5 and the diagram of tuber starch content above, measured at harvest, it can be seen that the use of short cuttings (A1) and long cuttings (A2) in several varieties of cassava tested has no significant / real effect. From the measurement results, the starch content of tubers from 6 (six) varieties planted was in the range of 22.54% - 26.25% for short cuttings and 22.28% - 25.86% for long cuttings. The lowest tuber starch content was -/+ 22% in the UJ 3 (A2) variety and the highest in the Adira 4 (A3) and Malang 4 (A4) varieties in the -/+ 25% range. Thus, it can be explained that the starch content of tubers is genetic from each cassava variety so that it is not influenced by the size of the cuttings planted in this study.

4. CONCLUSION

Some of the conclusions produced from this study are as follows: The percentage / growth power of mini / short cassava cuttings with the number of 3-4 buds planted in the field varies depending on the variety. Cassava with stem tissue that dries quickly has a lower percentage / growth power than slower drying stem tissue. The use of short cuttings (3-4 buds) and long cuttings (7-10 buds) in cassava plantings has no effect on vegetative growth, plant height and stem diameter, but has an effect on the number of branches per plant. Using long cuttings in Malang 4, R & D UK 2 and Garuda varieties provides better tuber yields per plot than using short cuttings. The use of long cuttings in varieties UJ 5, UJ 3 and Adira 4 gives tuber production yields per plot that tend to be equal to or higher than short cuttings. The use of short cuttings and long cuttings of cassava in varieties UJ 5, UJ 3, Adira 4, Malang 4, R & D UK2 and Garuda has no effect on the starch content of the tubers produced.

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