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Research Article
Production of G_0 'Median' Potato on Different Media Composition and Fertilizer Method

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Abstract
Background and Objective: The G_0 'Median' potato was designed to adapt in medium-altitude land and to produce seed tuber instead of food material. This study aimed to evaluate the growth and production of G_0 'Median' potato under different media composition and fertilizer application methods in medium-altitude land. **Materials and Methods:** Two weeks old post acclimatization plantlet of G_0 'Median' potato was prepared as plant material and then arranged in a split-plot design with two factors (growing media and chemical fertilizer application method) and three replications. **Results:** The result showed that the less proportion of soil in growing media could improve the field capacity, porosity, air space and water holding capacity, resulting in more loose structures suitable for potatoes (GM_1>GM_2>GM_3). The interaction of GM_1+F_2 produced the significantly heaviest plant biomass (dry weight of plant and root). However, the best treatment was GM_2+F_2 with the highest number of tuber per plant, i.e., 6 tuber per plant. **Conclusion:** High frequency (10x) of diluted granular fertilizer by using watering method (F_2) was suitable to improve not only the number of stolon and tuber but also the quality of harvested tuber as indicated by the lower percentage of small seed tuber.

Key words: Field capacity, plant biomass, stolon, seed tuber, water holding capacity

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Competing Interest: The authors have declared that no competing interest exists.

Data Availability: All relevant data are within the paper and its supporting information files.

INTRODUCTION

Potato is one of the important horticultural commodities with an interesting history starting from its centre of origin in the Andean region into wide distribution in Europe and worldwide[1]. The cultivation of potatoes was reported to start from latitudes 65N-50S, from tropic to subtropic area and even up to 4000 m above sea level[2]. In Indonesia, this plant is widely cultivated in highland and daily used as a vegetable in their dietary menu. Moreover, the exposure of western culture in the food and beverage industry right here is triggered the demand for potatoes consumption in urban society. Thus, the boost of potato production is an interesting issue to fulfil the increasing demand on the market. However, the potato development in Indonesia faces a major constrain in form of the quality of harvested yield. The yield quality that is locally produced here is frequently reported to be lower than international standard[3]. Potatoes seed certification program is believed to be an alternative solution to provide high-quality seed potatoes for better-harvested yield quality[3]. The production of a high-quality potatoes seed is conducted by a certified plant breeder and then mass propagate by using the tissue culture method. The first generation that is derived from tissue culture is popularly known as the G_0. The tuber of G_0 potatoes is not used as raw vegetable alike commonly found in the food market, it is designed as seed tuber for planting material.

Another challenge for potato development programs is the land conversion that rapidly occurred in highland from agricultural land to non-agriculture lands, such as tourism industry or resident housing. The potatoes development, which was originally concentrated in the highlands, has begun to be shifted to be carried out in the medium-altitude land. Not all of the potatoes variety is suitable to cultivate in the medium land due to the heat stress. Heat stress from small leaves, thin stems, long stolon and tuber inhibition[4-8]. So that, the 'Median' potato is one of the assembled varieties, specifically for medium-altitude land. Earlier studies have reported the cultivation of 'Median' potato in medium-altitude land[9-12]. To achieve a maximum potential yield, a great planting material should be followed by modification of cultural practices. Previous studies have been reported the use of plant growth regulators, such as cytokinin[9] and paclobutrazol[11-13], shading net[14,15], interval watering[16], chitosan[17] and mycorrhiza[18] to improve the growth and yield of potatoes.

Additionally, modification of growing media compositions is reported to improve the production of 'G_2' potatoes in medium land[19]. The chemical fertilizer application in form of nitrogen, phosphor and potassium have also been reported to improve the quantity and quality of harvested potato yield[20-23]. However, there is still limited study regarding the fertilizer application, specifically for potatoes at medium-altitude land.

Therefore, this study aimed to evaluate the growth and production of G_0 'Median' potato under different growing media composition and fertilizer application methods in medium-altitude land.

MATERIALS AND METHODS

Study site: The experiment was held between August-November 2020 in a screenhouse of Ciparanje Experimental Garden (±752 m above sea level), Faculty of Agriculture, Universitas Padjadjaran, Sumedang, West Java Province, Indonesia.

Experimental procedure: The experiment was arranged in a split-plot design with two factors tested, i.e., growing media composition and fertilizer application method. The first factor of growing media composition was consisted of three treatments (Fig. 1), while the second factor of the chemical fertilizer application method also consisted of three treatments (Table 1), thus nine combination treatments were replicated three times resulting in 27 experimental units. There were three polybags for every experimental unit and there were four plants placed in every polybag. In total, there were 324 plants arranged in 9 combination treatments. Two weeks old post acclimatization plantlet of G_0 'Median' potato was prepared as plant material for the present study.

Growing media were prepared based on the combination treatment two weeks before cultivation. The final weight of each growing media was 15 kg per polybag (size 50×50 cm). The soil was obtained from the nearby environment that was categorized as inceptisol. The addition of rice husk charcoal, cocopeat and compost into inceptisol soil followed the proportion in Fig. 1 and then well mixed and placed inside a polybag. There was fungicide administration of as much as 40 g m^2 for eliminating the potential attack from fungi pathogen. Two weeks later, the plantlet was planted into a polybag with a planting distance of 10×10 cm, because there were four plants in a single poly bag. Although there was different application method of fertilizer, the dose of applied fertilizer was similar, i.e., 30 g per polybag. The applied fertilizer was compound fertilizer of nitrogen-phosphor-potassium or popularly known as NPK (Yara Mutiara, 16 N:16 P:16 K). The detail of fertilizer application as depicted in Table 1.

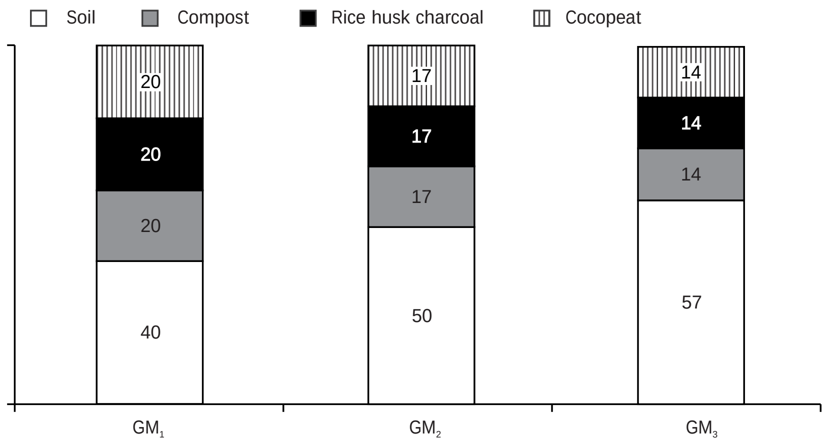

Fig. 1: Three different growing media compositions for G_0 'Median' potato
GM_1: Growth media 1, GM_2: Growth media 2 and GM_3: Growth media 3

Table 1: Three chemical fertilizer methods were applied in G_0 'Median' potato

Codes	Treatments	Day (DAP)	Dose (g)
F_1	Twice application of granular fertilizer by using spot placement method	10	15
		20	15
F_2	Ten times application of diluted granular fertilizer (3-gram fertilizer per 1 L water) by using a watering method	10	3
		17	3
		24	3
		31	3
		38	3
		45	3
		52	3
		59	3
		66	3
		73	3
F_3	One time application of granular fertilizer (by using spot placement method) was combined with five times application of diluted granular fertilizer (by using the watering method)	10	15
		17	3
		24	3
		31	3
		38	3
		45	3

DAP: Days after planting

During the growing period, the nearby soil surface was flipped up to cover the base of the plant stem, to impede the greening of stolon due to sunlight exposure. The plant was supported by bamboo trellis three weeks after planting. Flower removal was conducted by handpicking 60 Days After Planting (DAP). The harvesting was scheduled in the morning at 84 DAP as indicated by the coloration of leaves turn to yellowish-green and the stem getting dry. Additionally, the presence of weeds, pests and disease was controlled by using manual hand weeding and spraying of pesticide, if only their presence damaged the plant seriously and reduced the yield deeply.

Measured variables: This study measured screenhouse microclimates, physical characteristics of growing media, leaf nutrient status, plant growth, plant production and yield quality. Observed microclimates were daily relative humidity (Rh) and temperature that were measured by using thermo-hygrometer at 08.00 am (morning), 01.00 pm (afternoon) and 05.00 pm (evening) and expressed in % for relative humidity and for temperature. Physical characteristics of growing media have consisted of several variables, such as field capacity (%), density (kg L^{-1}), porosity (%), air space (%), water holding capacity (%). The formula to measure both microclimates and physical characteristics of growing media were described below:

- Daily temperature (°C) = [(2×morning temperature) +afternoon temperature+evening temperature]:4
- Daily relative humidity (%) = [(2×morning Rh)+afternoon Rh+evening Rh]:4

- $$\text{Field capacity (\%)} = \frac{\text{Fresh weight of media} - \text{Dry weight of media}}{\text{Dry weight of media}} \times 100\%$$

- Porosity (%) = (Irrigation water volume: Media volume)×100%
- Air space (%) = (Gravitational water volume: Media volume) 100%
- Water holding capacity (%) = Porosity (%)-air space (%)

The present study also measured leaf nutrient status, specifically Nitrogen (N), Phosphor (P) and Potassium (K). Leaf N status was measured at 8 Weeks After Planting (WAP) by using the Kjeldahl method and expressed in %. Leaf P and K status were also measured at 8 WAP by using Atomic Absorption Spectrometry (AAS) instrument and expressed in %. Plant growth was measured in terms of leaf area and leaf area index at 7 WAP, plant height (cm) and Chlorophyll Content Index (CCI) at 8 WAP. Leaf area was measured by using the gravimetric method, while leaf area index was the ratio of leaf area to planting distance. Plant height was measured by roll meter, while CCI was determined by chlorophyll concentration meter (Apogee). At 8 WAP, both plant and root dry weight were measured by using the oven method for 2 days, at ±80°C. Root volume was measured by using a measuring cylinder. The number of tuber per plant, tuber formed stolon (%), the number of stolon per plant, tuber weight and seed tuber class (%) were determined at 8 WAP. The tuber formed stolon (%) and seed tuber class (%) was calculated as below:

- Tuber formed stolon (%) = (The number of tuber per plant: The number of stolon per plant)×100%
- Seed tuber class (%) =(The number of tuber per class found per plant : Total tuber found per plant)×100%
  Note: Tuber classification are small (<5 g); medium (5-20 g); and Large (>20 g)

Data analysis: All harvested data in the present study were analyzed by using an analysis of variance (ANOVA). If there was a significant result found, the analysis would be continued by using Duncan Multiple Range Test (DMRT) test at the α 5% level. Statistical analysis in the present study was performed in statistical software, i.e., Statistical Programs for Social Studies (SPSS).

RESULTS AND DISCUSSION

This study was conducted in medium-altitude land for about (±752 m asl), while most of the potato cultivation in Indonesia was held in high-altitude land (above 1000 m asl). Thus, the microclimates became important variables to observe, to clarify whether the medium-altitude microclimates could damage the plant growth and yield. The microclimate condition in Table 2, showed that the average daily temperature during the experiment was 23.4°C, with the lowest and the highest daily temperature in August and September, respectively. The average daily relative humidity during the experiment was 82.5% with the lowest and the highest daily relative humidity in September and November, respectively. That average temperature exceeded the optimum range, i.e., 15-20°C, while the relative humidity was still suitable for potatoes. Previous reports stated that overheat conditions could damage the potato plant leading to the high risk of growth inhibition and yield reduction[24,25]. Although there was an increase in the photosynthetic rate, the moderately elevated temperature caused the reduction of potato tuber yield[26].

Therefore, the present experiment used a cultivar that was specifically designed for medium-altitude conditions, namely 'Median'. 'Median' potato was previously reported to have good growth and produce tuber in medium-altitude condition[9,11-12]. In addition to cultivar, another factor determining the success of potato plantation in medium-altitude land was culture practice, including growing media and fertilizer application.

The modification of growing media in the present experiment was proved to show variation in terms of physical characteristics. The growing media was composed of cocopeat, rice husk charcoal, compost and soil. In general, the highest proportion of soil contributing to growing media was followed by the decrease of field capacity, porosity, air space

Table 2: Microclimate data in study site from August to November 2020

Month	Temperature (°C)	Relative humidity (%)	Maximum temperature (°C)	Minimum temperature (°C)
August	23.0	81	29.0	12.3
September	24.0	79	30.0	13.6
October	23.3	85	28.4	14.2
November	23.3	85	28.7	13.6
Mean	23.4	82.5	29.0	13.4

Table 3: Physical characteristics of growing media for cultivation of G_0 'Median' potato

Treatments	Field capacity (%)	Porosity (%)	Airspace (%)	Water holding capacity (%)
GM_1	21.3	0.31	0.12	19
GM_2	19.3	0.31	0.13	18
GM_3	9.3	0.21	0.08	13

GM_1: 20% cocopeat, 20% rice husk charcoal, 20% compost and 40% soil, GM_2: 17% cocopeat, 17% rice husk charcoal, 17% compost and 50% soil and GM_3:14% cocopeat, 14% rice husk charcoal, 14% compost and 57% soil

Table 4: Interaction of growing media and chemical fertilizer application on leaf nutrient status of G_0 'Median' potato

Growing media	Chemical fertilizer application	Nitrogen (%)	Phosphor (%)	Potassium (%)
GM_1	F_1	3.54	1.18	2.13
	F_2	4.36	1.20	3.78
	F_3	3.92	1.33	2.05
GM_2	F_1	3.83	0.86	1.77
	F_2	4.53	1.45	3.73
	F_3	3.86	1.29	2.20
GM_3	F_1	3.69	0.96	2.22
	F_2	4.53	1.31	2.92
	F_3	3.82	1.66	2.15

GM_1: 20% cocopeat, 20% rice husk charcoal, 20% compost and 40% soil, GM_2: 17% cocopeat, 17% rice husk charcoal, 17% compost and 50% soil and GM_3:14% cocopeat, 14% rice husk charcoal, 14% compost and 57% soil, F_1: Twice application of granular fertilizer by using spot placement method, F_2: Ten times application of diluted granular fertilizer (3-gram fertilizer per 1 L water) by using the watering method and F_3: Once the application of granular fertilizer by using spot placement method was combined with five times application of diluted granular fertilizer by using the watering method

Table 5: Effect of growing media and chemical fertilizer application on the growth of G_0 'Median' potato

Treatments	Plant height (cm)	Leaf area (cm^2)	Leaf area index	Chlorophyll content index (CCI)
GM_1	16.60	77.94	0.77	39.84
GM_2	16.08	64.01	0.63	49.07
GM_3	16.57	64.86	0.64	42.61
F_1	13.05^a	54.44^a	0.53^a	34.32^a
F_2	22.29^b	104.95^b	1.04^b	53.85^c
F_3	13.92^a	47.43^a	0.47^a	43.35^b

GM_1: 20% cocopeat, 20% rice husk charcoal, 20% compost and 40% soil, GM_2: 17% cocopeat, 17% rice husk charcoal, 17% compost and 50% soil and GM_3: 14% cocopeat, 14% rice husk charcoal, 14% compost and 57% soil, F_1: Twice application of granular fertilizer by using spot placement method, F_2: Ten times application of diluted granular fertilizer (3-gram fertilizer per 1 L water) by using the watering method and F_3: Once the application of granular fertilizer by using spot placement method was combined with five times application of diluted granular fertilizer by using the watering method. The mean followed by a different alphabet is significantly different based on the DMRT test at α 5%

and water holding capacity (Table 3), leading to less suitability for potatoes because less loose growing media could impede the development of root including tuber. The low proportion of soil as found in GM_1 and GM_2 was showed the opposite result to GM_3, i.e., more loose structure of media leading to have the favourable effect of potato root and tuber development.

The result of a present experiment in Table 4 showed that: (i) The range of leaf nutrient content in 'Median' potato plant cultivated under screenhouse condition in medium-altitude land was 3.54-4.53% for N, 0.86-1.66% for P and 1.77-3.78% for K, (ii) The higher leaf N content was found in both GM_3 and GM_2 media that combined with F_2 fertilizer treatment, while plants grown in GM_1 combined with F_1 fertilization treatment showed an opposite result, (iii) The lower and higher leaf P content were found in combination treatment of GM_3+F_3 and GM_2+F_1, respectively, (iv) The leaf K content tended to be higher in GM_1+F_2, while plants grown in GM_2 combined with F_1 fertilization treatment showed an opposite result. The variation of leaf nutrient content might associate with the growth and subsequent yield of potato, since N, P, K were three main macro essential elements for supporting the growth and yield of potato[21-23,27,28].

The growth of 'Median' potato that represented by the plant height, leaf area, leaf area index and CCI was significantly affected by fertilizer application rather than growing media composition. Based on Table 5, the F_2 was determined as the best treatment, since this fertilizer application method was able to support the achievement of highest plant, widest leaf, highest leaf area index and CCI. It was likely proved that the way of fertilization in F_2 was suitable for 'Median' potato. The regular application, once a week, in form of 3 g diluted fertilizer ensured the high availability and sustainability of nutrients leading to improve the growth of the potato. The improvement of growth performances as caused by this treatment might compensate for the potential of growth

Table 6: Interaction effect of growing media and chemical fertilizer application on the dry weight of G_0 'Median' potato at 8 weeks after planting

Growing media	Chemical fertilizer application	Plant dry weight (g)	Root dry weight (g)
GM_1	F_1	1.26^{Aa}	0.08^{Aa}
	F_2	3.90^{Bb}	0.35^{Bb}
	F_3	1.58^{Aa}	0.10^{Aa}
GM_2	F_1	1.03^{Aa}	0.07^{Aa}
	F_2	1.94^{Ba}	0.13^{Ba}
	F_3	2.22^{Ba}	0.13^{Ba}
GM_3	F_1	0.86^{Aa}	0.08^{Aa}
	F_2	1.69^{Aa}	0.18^{Ba}
	F_3	1.63^{Aa}	0.08^{Aa}

GM_1: 20% cocopeat, 20% rice husk charcoal, 20% compost and 40% soil, GM_2: 17% cocopeat, 17% rice husk charcoal, 17% compost and 50% soil and GM_3: 14% cocopeat, 14% rice husk charcoal, 14% compost and 57% soil, F_1: Twice application of granular fertilizer by using spot placement method, F_2: Ten times application of diluted granular fertilizer (3-gram fertilizer per 1 L water) by using the watering method and F_3: Once the application of granular fertilizer by using spot placement method was combined with five times application of diluted granular fertilizer by using the watering method. The mean followed by different lowercase alphabet is significantly different among fertilizer treatment based on the DMRT test at α 5%. The mean followed by different capital alphabet is significantly different among growing media treatment based on the DMRT test at α 5%

Table 7: Effect of growing media and chemical fertilizer application on tuber and stolon of G_0 'Median' potato

Growing media	Chemical fertilizer application	The number of tuber per plant	Tuber formed stolon (%)
GM_1	F_1	4.58^{Aa}	194.97^{Ba}
	F_2	5.66^{Aa}	62.43^{Aa}
	F_3	4.50^{Aa}	145.01^{ABa}
GM_2	F_1	4.50^{Ba}	165.90^{Ba}
	F_2	6.00^{Ca}	64.77^{Aa}
	F_3	4.00^{Aa}	87.62^{Aa}
GM_3	F_1	4.66^{Aa}	92.67^{Aa}
	F_2	4.83^{Aa}	89.89^{Aa}
	F_3	5.41^{Ba}	197.63^{Ba}

GM_1: 20% cocopeat, 20% rice husk charcoal, 20% compost and 40% soil, GM_2: 17% cocopeat, 17% rice husk charcoal, 17% compost and 50% soil and GM_3:14% cocopeat, 14% rice husk charcoal, 14% compost and 57% soil, F_1: Twice application of granular fertilizer by using spot placement method, F_2: Ten times application of diluted granular fertilizer (3-gram fertilizer per 1 L water) by using the watering method and F_3: Once the application of granular fertilizer by using spot placement method was combined with five times application of diluted granular fertilizer by using the watering method. The mean followed by different lowercase alphabet is significantly different among fertilizer treatment based on the DMRT test at α 5%. The mean followed by different capital alphabet is significantly different among growing media treatment based on the DMRT test at α 5%

inhibition that occurred due to the shifting of potato cultivation from highland to medium land. The heat stress on potatoes was reported to reduce the leaf size[29] and leaf area[30], form a thinner petiole[31] and then constrain potato production[32]. Leaf chlorophyll content was reported to be an important variable since this result related to the rate of plant photosynthetic rate[33].

In terms of plant biomass, the present study showed a significant difference of plant dry weight in response to growing media and chemical fertilizer application. The plant dry weight of 'Median' potato was varied, from 0.86-3.90 g. The heaviest plant biomass was recorded in GM_1+F_2, for about 3.9 g, while the GM_3+F_1 showed an opposite result (Table 6). There was an increase of about 354% in best treatment as compared to the worst result. It was implied that the lower the soil contribution on that growing media, the higher proportion of compost (organic fertilizer), rice husk charcoal (soil ameliorant) and cocopeat, the heavier plant biomass resulted. That media was reported to have looser physical characteristics, higher water holding capacity (Table 3) and then better growth response (Table 4). Fertilization in terms of ten times application of diluted granular fertilizer (3 g L^{-1}) by using the watering method was more effective to produce heavier biomass of 'Median' potato rather than other fertilization treatments.

Similar to plant dry weight, the root dry weight was also significantly affected by the combination treatment of growing media and fertilizer application method. Plants grown with a combination of GM_1+F_2 treatments produced the highest root dry weight compared to others, i.e., 0.35 g. In contrast, the combination of GM_2+F_1 treatment tended to have a lower root dry weight for only 0.07 g (Table 6). The GM_1 possessed a looser media structure that support the rapid growth of the root, stolon and tuber of the potato. The loose structure of growing media supported the optimum growth of tuber[34]. The larger canopy was associated with the higher capacity to support greater yield[35].

The improvement of growth response, leading to the increase of plant biomass was an indicator that our tested treatment could gain a higher yield. The result in Table 7

Table 8: Effect of growing media and chemical fertilizer application on the number of stolon, tuber weight and seed tuber class of G_0 'Median' potato

Treatments	The number of stolon per plant	Tuber weight (g per plant)	Seed tuber class (%)		
			Small	Medium	Large
GM_1	5.08	19.21	82.54	18.06	0.76
GM_2	5.06	21.73	80.86	17.44	0.57
GM_3	4.19	24.31	79.07	20.58	0.00
F_1	3.38^a	18.24	85.26^b	13.84^a	0.00
F_2	7.40^b	24.55	77.60^a	21.85^b	1.34
F_3	3.55^a	20.24	79.61^a	20.38^b	1.34

GM_1: 20% cocopeat, 20% rice husk charcoal, 20% compost and 40% soil, GM_2: 17% cocopeat, 17% rice husk charcoal, 17% compost and 50% soil and GM_3: 14% cocopeat, 14% rice husk charcoal, 14% compost and 57% soil, F_1: Twice application of granular fertilizer by using spot placement method, F_2: Ten times application of diluted granular fertilizer (3-gram fertilizer per 1 L water) by using the watering method and F_3: Once the application of granular fertilizer by using spot placement method was combined with five times application of diluted granular fertilizer by using the watering method. The mean followed by a different alphabet is significantly different based on the DMRT test at α 5%

showed that there was a significant improvement in tuber number per plant. A combination of GM_2+F_2 was determined as the best treatment, with 6 harvested tuber per plant. In similar growing media, i.e., GM_2, the variation of chemical fertilizer application method could differ the final result of tuber number, for example, the plant on GM_2+F_1 and GM_2+F_3 only produced 4.5 and 4.0 tuber, respectively (Table 7).

Potato tuber was developed in a certain spot of stolon, an enlargement structure of potato stem, thus the potato was categorized as stem tuber instead of root tuber plant. Tuber formed stolon was significantly affected by the interaction of growing media and fertilizer application treatment. With the same number of tubers, the more stolon formed by potato, the lower percentage of tuber formed stolon. The highest number of tubers previously reported in GM_2+F_2 was followed by the lower tuber formed stolon as compared to GM_2+F_1 and GM_2+F_3. Not only occurred in GM_2, a similar pattern of lowering tuber formed stolon as caused by F_2 was also recorded in GM_1 and GM_3 (Table 7). The high-frequency application of diluted fertilizer, like F_2, was proved to boost the formation of stolon in G_0 'Median' potato. The number of stolon in plants treated with a high frequency of diluted fertilizer was 7.4 stolon (F_2), it was significantly higher rather than the less frequency fertilizer application of F_1 and F_3 that could only produce nor more than 4 stolon (Table 8). However, the number of stolon was not significantly affected by the growing media.

Individual tuber weight was not significantly different among growing media or fertilizer treatment. The weight of individual G_0 'Median' potato was varied from 18.24-24.55 g per plant. Aside from the quantity, the present experiment also measured the quality of the G_0 'Median' potato tuber as indicated by the grading of the harvested tuber. In general, the G_0 potato was prepared as planting material or seed tuber, rather than food consumption interest. The more seed tuber harvested, the more income farmer obtained. In the case of quality, the classification made according to tuber size showed a significant variation in the percentage of small and medium seed tuber in response to fertilizer application. The F_2 treatment produced a significant lower small seed tuber, followed by a significant higher medium seed tuber compared to other fertilizer treatments (Table 8). Ten times application of diluted granular fertilizer (3 g fertilizer per 1 L water) by using the watering method was suitable to improve not only the number of stolon, tuber but also the quality of harvested tuber. However, the limitation of the present study in terms of low tuber formed stolon was still open an opportunity for future research regarding culture practice modification to stimulate more productive stolon.

This study implied that culture practice modification highly influenced the yield of potatoes. Application of Ten times application of diluted granular fertilizer (3-gram fertilizer per 1 L water) by using the watering method combined with modification growing media that composed of 17% cocopeat, 17% rice husk charcoal, 17% compost and 50% soil resulted in significant yield improvement of the G_0 'Median' potato. However, the limitation of the present study is the lack of information on the effect of growing media and fertilizer on subsequent potato generations, i.e., G_1, G_2, G_3 and G_4. Thus, present study opens an opportunity for future research in G_1-G_4 potato production.

CONCLUSION

The modification of growing media was done by mixing the soil, cocopeat, rice husk charcoal and compost. The less proportion of soil in growing media could improve the field capacity, porosity, air space and water holding capacity, resulting in a looser structure suitable for potatoes. The interaction of GM_1+F_2 produced the significantly heaviest plant biomass (dry weight of plant and root). However, the best treatment was GM_2+F_2 with the highest number of tubers per plant, i.e., 6 tuber per plant. High frequency (10x) of diluted granular fertilizer by using the watering method was suitable to improve not only the number of stolon and tuber but also the quality of harvested tuber as indicated by the lower percentage of small seed tuber.

SIGNIFICANCE STATEMENT

This study discovered the positive effect of growing media and fertilizer application modification on the production of G_0 'Median' potato that can be beneficial for both farmers and scientists. This study will help the researchers to uncover the critical areas of G_0 'Median' potato production that many researchers were not able to explore. Thus, a new theory on the combination of growing media and fertilizer application modification may be arrived at.

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