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Performance of Sweet Potatoes Varieties under Different Organic Matter Levels in BRIS Soil

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ABSTRACT

Sweet potato (*Ipomoea batatas* L.) is a highly important crop, ranking fifth among tropical food crops and seventh globally. It thrives in BRIS (Beach Ridges Interspersed with Swales) soil, which is challenging for most crops to grow in but can be improved with organic matter like chicken dung. This study aimed to determine the growth, yield, and characteristics of four sweet potato varieties on BRIS soil and find the ideal amount of organic matter needed for optimal results. The four varieties, VitAto (V), Anggun 1 (A), Cameron (C), and Lembayung (L), were planted with two levels of organic matter, 5 and 10 tan/ha, for a total of eight treatments. Growth (vine length and tuber number), yield (tuber weight), and physiology (chlorophyll content) were measured using destructive analysis. Minitab software was used for data analysis and correlation analysis was performed to evaluate the relationships between growth, yield, and physiology. The study found that the new varieties with 10 tan/ha of organic matter showed better performance compared to the control. Lembayung, Cameron, and Anggun 1 had higher tuber numbers, and Lembayung had the highest tuber weight while Cameron variety exhibited vigorous vegetative growth. The optimum amount of organic matter for fast growth and high yield was found to be 10t/ha. Overall, this study provides valuable insights into improving sweet potato cultivation in BRIS soil.

Keywords: BRIS Soil, Ipomoea batatas, Sweet Potato, Organic Matter, Varieties

INTRODUCTION

Sweet potato, scientifically known as *Ipomoea batatas* (L.) Lam is a dicotyledonous plant belonging to the bindweed family (Convolvulaceae). It is a well-known food in Malaysia and most of the sweet potato produced in Malaysia is consumed as a supplementary food. Roots stem and leaves of sweet potatoes are edible with different compositions of nutrients, bioactive, non-nutrients and anti-nutrients (Wang et al., 2016). The harvested vines are also used as cattle feed. Normally, sweet potato is consumed fresh and only a limited amount is used to make sweet potato flour, which is mixed with wheat flour to bake bread and cakes (Yusoff et al., 2018).

Sweet potato has become one of the most important crops grown on Beach Ridges Interspersed with Swales (BRIS) soils, especially in Kelantan and Terengganu, as an alternative to tobacco plantations (Abdullah et al., 2020). According to the Department of Agriculture (DOA) (2023), sweet potatoes are mainly grown in Perak, Selangor and Kelantan where 53,613.8 Mt of sweet potatoes were produced in 2021. In 2020, the cultivation of sweet potatoes in Malaysia was 3,193.7 ha with a production of 54,750.36 Mt and the income gain from sweet potato production was RM 105,668,190. The BRIS area covers about 155,400 ha in Peninsular Malaysia. It extends between Kelantan, Terengganu, Pahang and a small part of Johor. The areas covered with BRIS soil in Kelantan, Terengganu and Pahang are 17,806 ha, 67,582 ha and 36,017 ha, respectively. Natural BRIS soil vegetation types such as forest, swamp and heath run parallel to the main coastal road in Terengganu, from Besut in a north-south direction to the end of Kemaman district, just a few metres from the coast (Jamilah et al., 2014).

Occupies 6% among 10 types of vegetables and cash crops for the year 2020 (DOA, 2020), this crop has been planted for commercial use with different varieties in Malaysia. In Malaysia, there are many varieties of sweet potatoes such as VitAto, Gendut, 57 Tainung, Banting, Biru Jepun, Biru Johor, CH purple, CH Red, Guan, Kuala Bikam and many more (Tan, 2015; Yusoff et al., 2018). Sweet potato variety has its specialty, such as rapid growth, which can produce high yields and have unique characteristics. Many people are planting sweet potatoes in a sandy loam because sweet potatoes grow well on a light, well-drained sandy loam or silt loam. The rich and heavy soils produce many low-quality roots, while impoverished and light sandy soils produce very few high-quality roots. BRIS is problematic in terms of physical capability classification because of its limited ability to support plant growth, poor structure, and low water retention (Rawi and Shahrudin, 2021). Yet, the BRIS soil can be treated with animal manure such as chicken dung in the right amount for it to be suitable for agricultural activities. Poultry dung is rich in nutrients and was proven to significantly increase the vegetative growth and plant physiology of pumpkins in BRIS soil (Khandaker et al., 2022). Due to the present interest in sweet potato planting activities carried out in sandy and silt loam, research on sweet potato plants in BRIS soil was conducted to identify the suitability and effect of BRIS soil in the Tembila area. Four sweet potato varieties which were VitAto, Anggun, Cameron, and Lembayung were treated with 2 different levels of organic matter (5 tan/ and 10 tan/ha) to evaluate their growth and yield performance in this soil.

From this study, the performance of different varieties of sweet potatoes that are suitable to be planted in the BRIS soil and the optimum amount of organic matter required by four varieties of sweet potatoes for fast growth and high yield will be determined so that farmers around the Tembila area can use this information as their references.

MATERIALS AND METHODS

Location

The study was conducted from March to July 2022 at the Universiti Sultan Zainal Abidin (UniSZA) Kampus Besut, which is located at Tembila, 22200 Besut, Terengganu. The soil type at the site is BRIS soil.

Experimental stem cutting

The stem cuttings of four varieties were purchased from two sources which were the Malaysia Agriculture Research and Development Institute (MARDI) Bachok and from the villagers around UniSZA Kampus Besut. Varieties that were purchased from MARDI Bachok are VitAto, Anggun 1, and Lembayung while the variety purchased from villagers around UniSZA Kampus Besut was Cameron.

Treatments

Four sweet potato varieties were evaluated together with organic matter. The organic matter used was processed chicken dung purchased from an agricultural shop locally. There were two treatments of organic matter applied. The first treatment was 5 t/ha of organic matter (labelled as OM1) and another treatment was 10 t/ha of organic matter (labelled as OM2) (Kantikowati et al., 2019). The four sweet potatoes variety factorially combined with two levels of organic matter, so the total treatments observed were eight. The eight treatments were as in Table 1.

Table 1. Treatments of four sweet potatoes variety factorially combined with two levels of organic matter

Number	Variety	Amount of OM	Label
1.	VitAto	OM1	VO1
2.	VitAto	OM2	VO2
3.	Anggun 1	OM1	AO1
4.	Anggun 1	OM2	AO2
5.	Cameron	OM1	CO1
6.	Cameron	OM2	CO2
7.	Lembayung	OM1	LO1
8.	Lembayung	OM2	LO2

Land Preparation

For the planting bed preparation, chicken dung was mixed with the soil by using a rotavator driven by a hired worker for the basal dressing. After all the planting beds were applied with chicken dung, the length of each plot will be measured at 28 feet in length. After all the OM2 positions are decided, another bag of organic manure was added to the plots and labelled as OM2 treatments. The dripping system was used for the irrigation system and the planting beds were arranged in Randomized Complete Block Design (RCBD).

Stem Cuts Transplanting

The transplanting was done by using planting pipe to ease the planting activity rather than planting using bare hands. The stem cuttings were placed at the tip of the planting pipe, then the tip of the planting pipe was pushed down at the measured spot. The distance between plants was 1 foot between rows and between plants.

Data Collection

The data collection was done every 3 weeks after planting until week 12. The method used was destructive analysis where the collected plants would be used for data collection and not be planted again. There were four data collected which were vine length, number of tubers, tuber fresh weight, and chlorophyll content. These four data were classified into three types of parameters which are physiological, yield, and growth.

Vine length

The data on vine length were collected by measuring the length of the vine from the original stem to the longest vine that the plant has (Neppl & Wehner, 2001).

Number of tubers

For the number of tubers, the data were collected by counting the number of tubers produced by the plant each time harvested.

Tuber fresh weight

The weight of the tuber collected for each sample was weighted on an electronic weighing balance to get an accurate reading. This data was needed to record the highest tuber yield for the whole growing session (Yusoff et al., 2018).

Chlorophyll content

The chlorophyll value was measured by using a SPAD meter (502, Minolta Inc., USA) (Sun et al., 2018).

Experimental Design

The design adapted was a Factorial Randomized Complete Block Design (RCBD). The reason for using RCBD was due to a lot of external factors that can affect the result for example, the natural nutrients of the soil for all plots are different, which by applying.

Data Analysis

Data on growth, tuber yield, and physiological characteristics were analysed using Minitab software version 21.1 based on 2-ways ANOVA statistical analysis. For the post-hoc analysis, the test used in this study was Tukey. Correlation analysis between growth, yield and physiology has also been performed to evaluate their relationship.

RESULTS AND DISCUSSION

Main Effect of Organic Matter on the Growth, Yield, and Physiological Parameters

Growth

The result of the effect of organic matter applied on the vine length of the sweet potato plant in Fig. 1. The vine length was observed for 12 weeks after planting with an interval of 3 weeks data collection. It showed that the vine length increased gradually from the first 3 weeks till 12 weeks after planting and sweet potatoes with OM2 (10t/ha) have higher vine length compared to the sweet potato plants with OM1 (5t/ha) with 21.36 cm increased in week 12. The tuber number produced was also observed for 12 weeks after planting with an interval of 3 weeks per data taken as shown in Fig. 2. For the first 3 weeks after planting, the sweet potato plant that was applied with OM1 is higher than the sweet potato with OM2. However, from week 6 until 12 weeks after planting, it showed that sweet potatoes with OM2 have higher tuber numbers produced compared to the sweet plants with OM1.

The growth of sweet potato in aspects of vine length and tuber production was better with the increase of organic matter applied. According to Agbede & Adekiya (2011), when poultry manure was applied, vine length tended to increase with increasing poultry manure rates from 0 to 15 t/ha for both tillage methods. This is also consistent with Michael (2020) statement that the addition of phosphorus from organic matter to the soil can promote overall plant growth, productivity, and development of biomass such as leaves and vines. Phosphorus is essential for the synthesis of nucleic acids and proteins in sweet potato plants, which are important for plant growth and development.

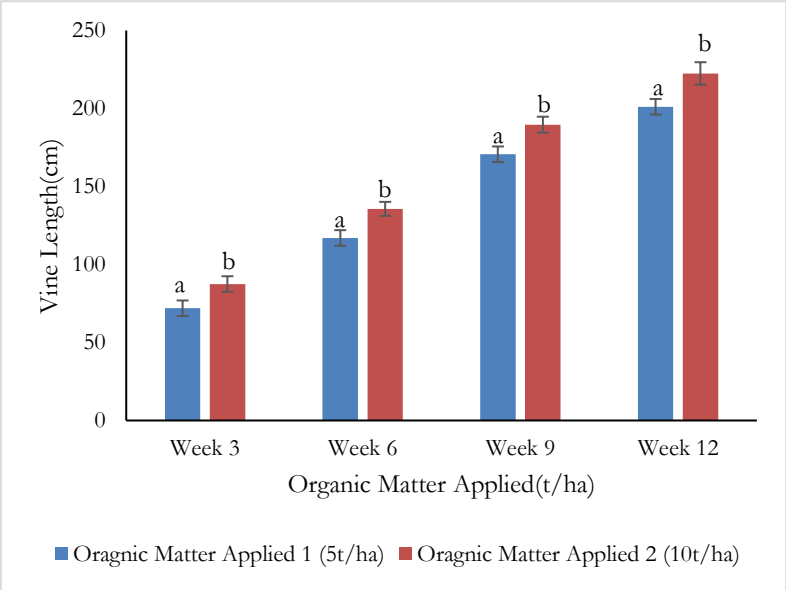

Fig. 1. Effect of organic matter applied on the vine length. Bars indicate the standard error of the mean (SEM).

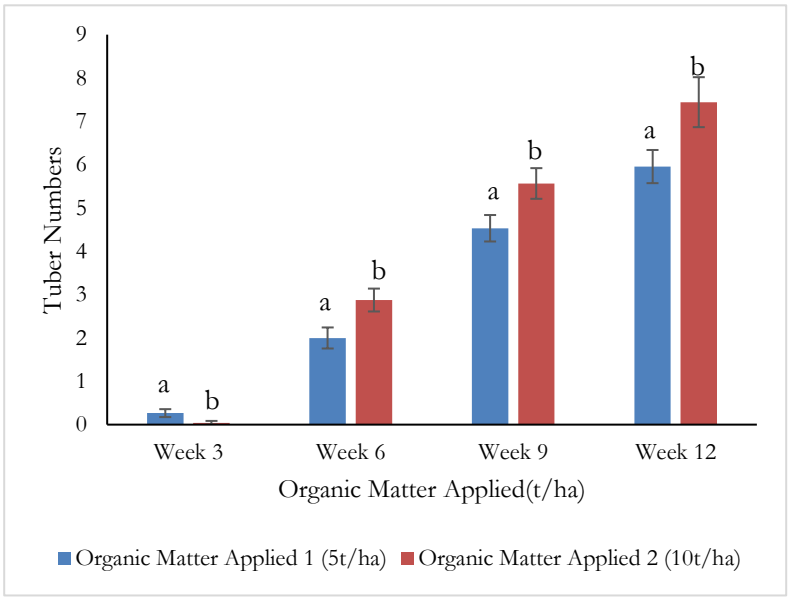

Fig. 2. Effect of organic matter applied on tuber numbers. Bars indicate the standard error of the mean (SEM).

Yield

The result of the main effect of organic matter applied on the tuber fresh weight of the sweet potato plant at 12 weeks after planting is shown in Fig 3. It shows that there is a significant difference in tuber fresh weight between sweet potato with OM2 and sweet potato with OM1. Doubling the amount of organic fertiliser had increased the sweet potato yield around 30% on week 12 after planting.

This result can be supported by Michael (2020) who stated that the addition of OM increases the nutrient content of the soil, which improves microbial activity and makes the soil conducive to plant root growth, improving biomass productivity and yield. According to recent research published by Dias et al. (2021), the utilisation of organic fertilisation at the beginning of sweet potato cultivation has been shown to confer significant benefits in terms of crop yield attributed to the improved availability of crucial nutrients, such as nitrogen, phosphorus, potassium, calcium, magnesium, and organic carbon, which are essential for plant growth and development.

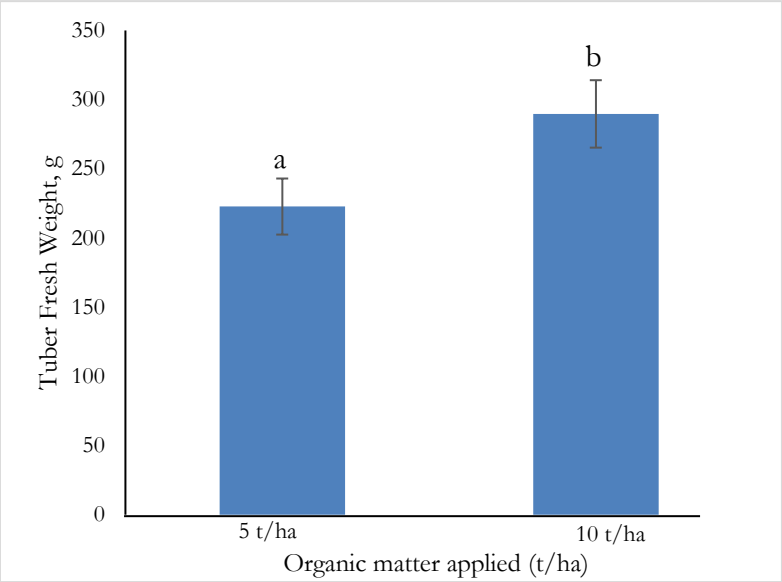

Fig. 3. Main effect of organic matter applied on tuber fresh weight on Week 12. Bars indicate the standard error of the mean (SEM).

Physiological

The result of the effect of organic matter applied on the chlorophyll content of the sweet potatoes plant 12 weeks after planting can be seen in Fig. 4. Based on the statistical analysis, it shows that there is no significant difference in chlorophyll content between sweet potato with OM2 and sweet potato with OM1 as the weeks progressed. The same result was also reported by Bakti et al., (2020), where the chlorophyll content was not significantly different.

However, from the Fig. 4, the chlorophyll content became declined over the weeks. The results were in consistent to the result reported by Liu et al., (2020) where the highest value of chlorophyll content at the S2 stage, which was the tuber expansion or enlargement stage, and then decreased gradually to the S4 stage which the tuber ripening stage due to the tuber enlargement in the tuber formation phase.

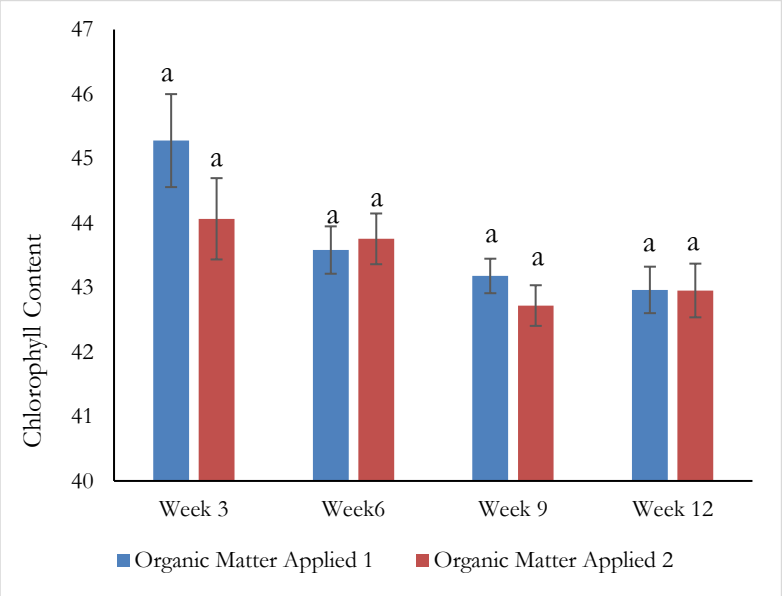

Fig. 4. Effect of organic matter applied on chlorophyll content. Bars indicate the standard error of the mean (SEM).

Main Effect of Varieties on Growth, Yield, and Physiological

Growth

The result of the effect of varieties on the vine length of the sweet potato plant is shown in Fig. 5. The vine length for all varieties generally increases throughout the weeks. In the first 3 weeks after planting, Cameron varieties show significant differences towards others while Anggun and Lembayung varieties did not show significant differences with Vitato varieties (control). On week 6, Cameron varieties showed a significant difference towards Anggun varieties, but it was not significantly different between Vitato varieties (control) and Lembayung varieties. Vitato varieties (control) showed a significant difference between Anggun varieties but not for Cameron and Lembayung varieties. On week 12, Cameron varieties and Vitato varieties (control) were significantly different from Anggun varieties. However, they are not significantly different from each other and towards Lembayung varieties.

All varieties show different performances in vine length which makes them comparable. The same cases also happen (Hira, 2014) where the vine length of PSP-21 is significantly longer compared to other varieties.

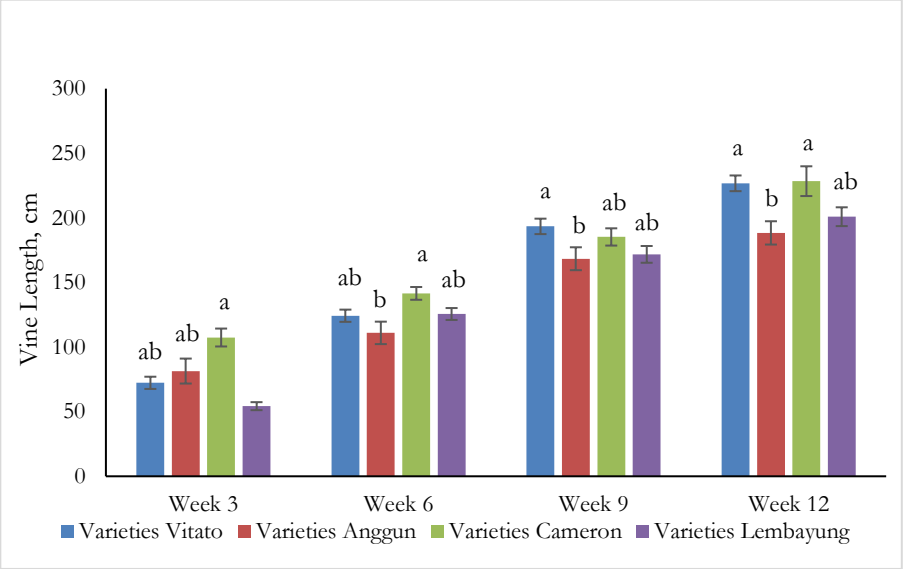

Fig. 5. Effect of varieties on vine length. Bars indicate the standard error of the mean (SEM).

The effect of varieties on the number of tubers produced by the sweet potato plant for 12 weeks after planting can be seen in Fig. 6. The bar indicates the standard error of the mean (SEM). It shows that at 3 weeks after planting, Cameron varieties show significant differences between Anggun varieties and Lembayung varieties but not to Vitato varieties (control). For week 6, the Cameron varieties and Lembayung varieties did not show significant differences from each other but also to Vitato varieties (control), but they are significantly different from the Anggun varieties. In week 9, Cameron varieties were significantly different from Anggun varieties but not significantly different from Lembayung varieties and Vitato varieties (control). On 12 weeks after planting, the number of tubers for Lembayung significantly differed towards Vitato varieties (control). The highest number of tubers was observed in week 12 for the Lembayung varieties, while the lowest was observed in the Vitato varieties. The newly introduced varieties of Lembayung, Cameron, and Angun 1 showed a higher number of tubers compared to the common variety of Vitato, making them suitable for the fresh consumptions market.

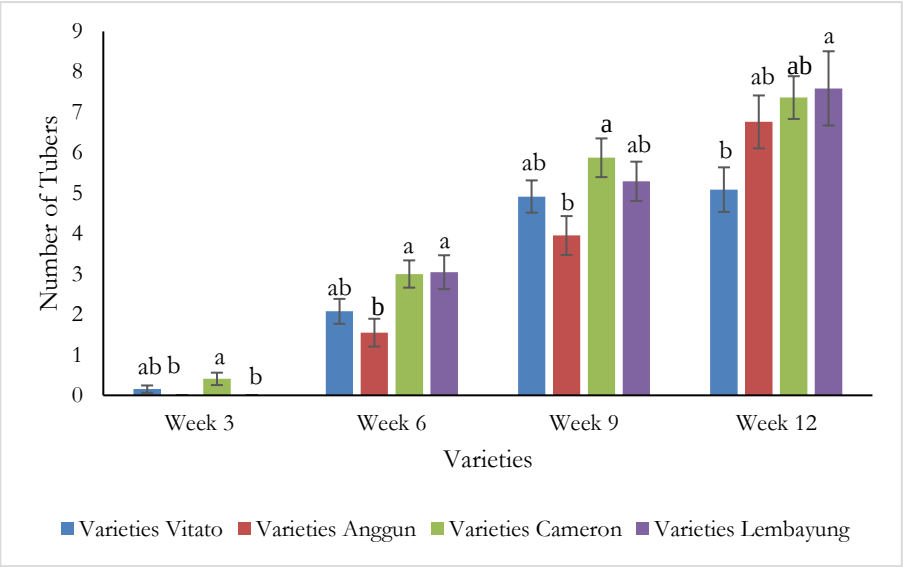

Fig. 6. Effect of varieties on the number of tubers. Bars indicate the standard error of the mean (SEM).

Yield

The above figure shows the result of the effect of varieties on the tuber fresh weight of the sweet potatoes plant on week 12 after planting. From the Fig. 7, Lembayung varieties show a significant difference for Anggun varieties but not for the Cameron variety and Vitato varieties (control). The fresh-weight tuber for the Lembayung variety was the highest, followed by the Cameron variety, Vitato variety, and lastly Anggun variety.

Several things can affect the performance of sweet potato plants including environmental factors. The statement also agreed by Bakti et al., (2020) who stated that the vegetative growth of sweet potatoes is strongly influenced by environmental factors. However, the sweet potatoes were planted in the same field, which means there is another factor still affecting the performance of the sweet potatoes plant which is the most possibility is genetic characteristic for each variety. The genetic characteristic of the varieties also plays a role in the performance including yield (Darko et al., 2020).

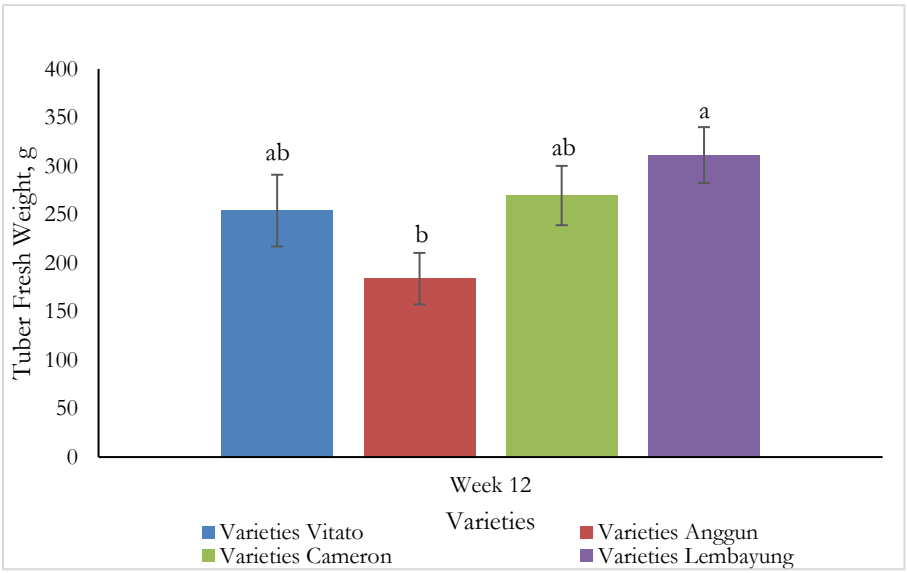

Fig. 7. Effect of varieties on tuber fresh weight. Bars indicate the standard error of the mean (SEM).

Physiological

The result of the effect of varieties on the chlorophyll content of the sweet potatoes plant is presented in Fig. 8. Bars indicate the standard error of the mean (SEM). In the first 6 weeks after planting, there were significant differences among four varieties, especially between Lembayung varieties towards Vitato varieties (control) and Cameron varieties. However, begin week 9 till week 12 there was no significant difference between the four varieties.

The chlorophyll content is a suitable indicator for evaluating nitrogen uptake in plants. The lack of significant difference in chlorophyll content between the four varieties in the study may be due to the sandy composition of the soil in the Tembila area, which makes it difficult for the plants to absorb nutrients. The assertion is supported by Darko et al., (2020), who found that the chlorophyll content depends on the plant's access to nitrogen.

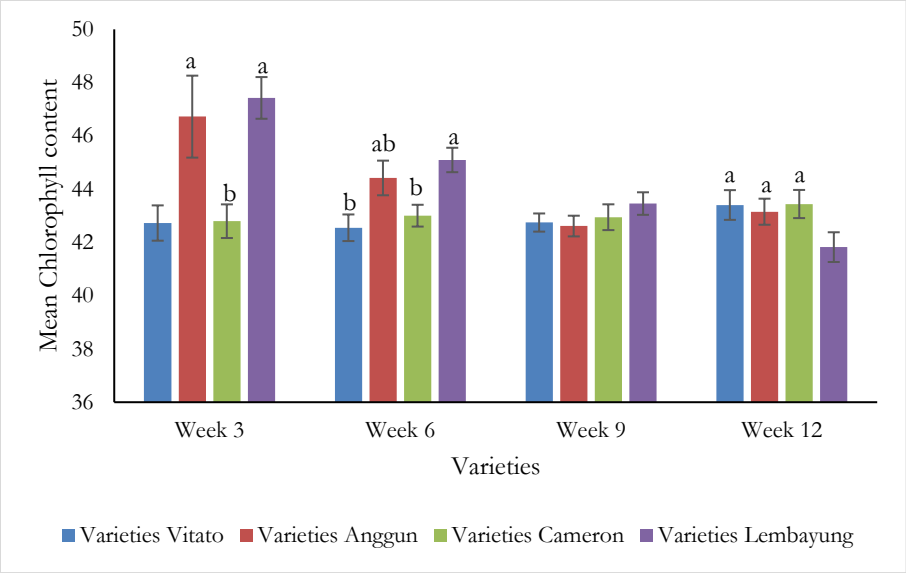

Fig. 8. Effect of varieties on chlorophyll content. Bars indicate the standard error of the mean (SEM).

Interaction Plot Between Organic Matter Applied, t/ha and varieties on Growth, Yield, and Physiological

Growth

The above figure shows the result of the interaction plot between organic matter applied and varieties on the vine length of the sweet potato plant on week 12 after planting. From the Fig. 9, an interaction plot shows the relationship between two amounts of organic matter, OM1, OM2 and four varieties of sweet potato, Vitato, Anggun, Cameron, and Lembayung and their effect on vine length. Lembayung has the highest slope compared to others, which means that this variety is more responsive to changes in the amount of organic matter. Lembayung varieties are more strongly influenced by changes in the amount of organic matter in terms of vine length. A higher slope indicates a stronger relationship between the amount of organic matter and vine length for this variety compared to the other varieties. This relationship could suggest that increasing the amount of organic matter could result in a proportionately larger increase in vine length for this particular variety.

The result of the interaction plot between organic matter applied and varieties on a number of tubers of the sweet potatoes plant on week 12 after planting can be seen in Fig. 10. From this figure, an interaction plot shows the relationship between two amounts of organic matter, OM1, OM2 and four sweet potato varieties, Vitato, Anggun, Cameron, Lembayung, and their effects on the number of tubers. Lembayung has the highest slope compared to the other varieties, which means that this variety is more sensitive to changes in the amount of organic matter. In terms of the number of tubers, the Lembayung variety is more affected by changes in the amount of organic matter. A higher slope indicates a stronger relationship between the amount of organic matter and the number of tubers in this cultivar compared to the other cultivars. This relationship could indicate that an increase in the amount of organic matter in this cultivar could lead to a proportionally greater increase in the number of tubers.

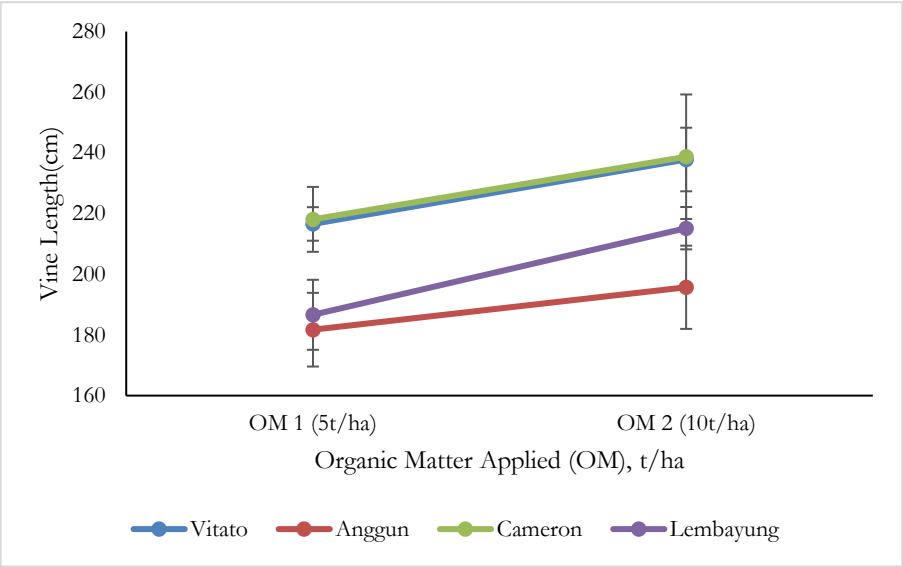

Fig. 9. Interaction plot between organic matter applied and varieties on vine length. Bars indicate the standard error of the mean (SEM).

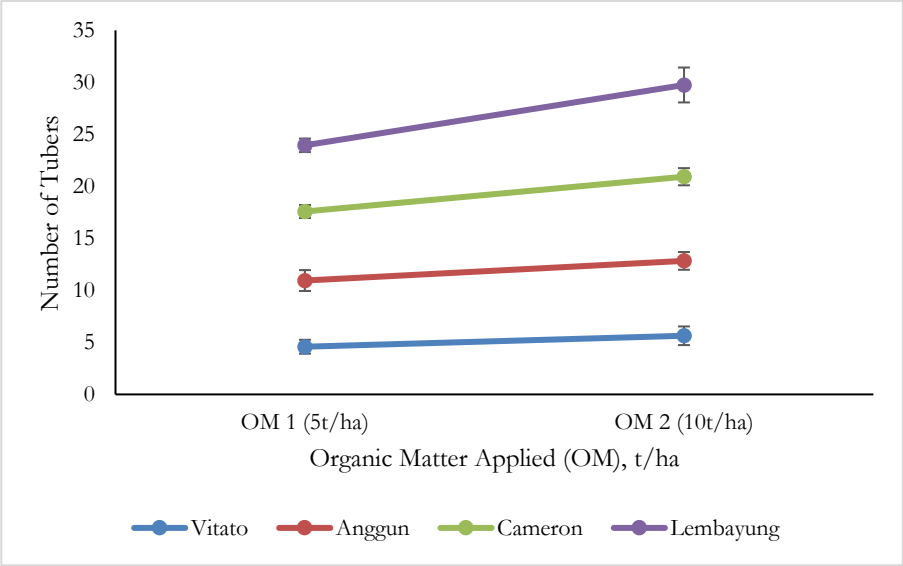

Fig. 10. Interaction plot between organic matter applied and varieties on number of tubers. Bars indicate the standard error of the mean (SEM).

Yield

The result of the interaction plot between organic matter applied and varieties towards the fresh weight of the sweet potatoes plant on week 12 after planting can be seen in Fig. 11. The interaction plot between organic matter and varieties towards tuber fresh weight showed significant differences among the four sweet potato varieties, Vitato, Anggun, Cameron, and Lembayung. At OM1 with 5 t/ha, Vitato had the highest tuber fresh weight, followed by Cameron. On the other hand, Anggun had the lowest tuber fresh weight at 172.89 g. At OM2 with 10 t/ha, Lembayung showed the highest tuber fresh weight, while Anggun still had the lowest tuber fresh weight.

The interaction between Cameron and Vitato at OM1 was remarkable, with Cameron having the highest slope among all varieties. This indicates that Cameron is the most sensitive to changes in organic matter in terms of fresh tuber weight. On the other hand, Anggun showed the lowest slope, indicating that it is less affected by changes in organic matter.

These results suggest that the application of higher levels of organic matter could lead to an increase in tuber fresh weight for all sweet potato varieties, particularly for Cameron and Lembayung.

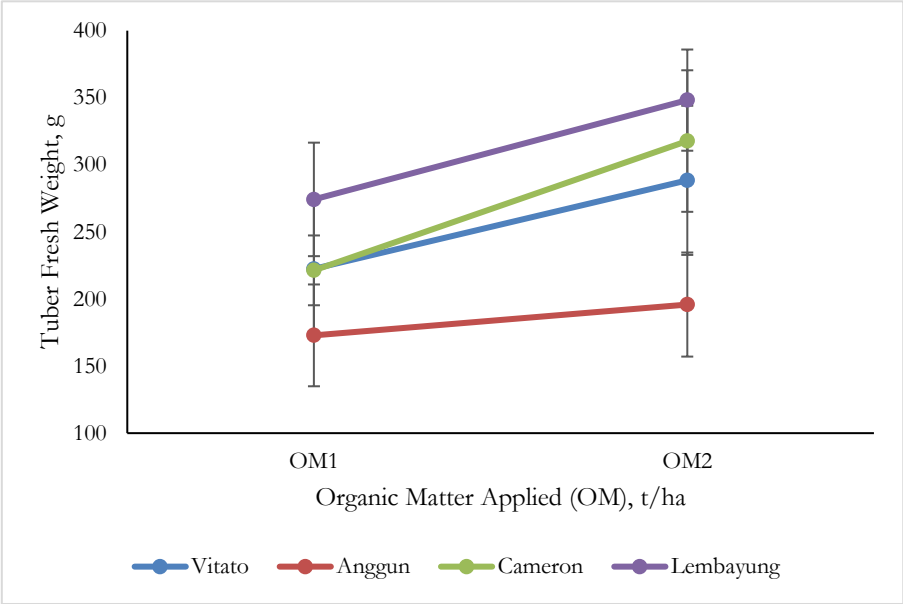

Fig. 11. Interaction plot between organic matter applied and varieties on tuber fresh weight. The bars indicate the standard error of the mean (SEM).

Physiological

The above figure shows the result of the interaction diagram between the applied organic matter and the varieties in relation to the chlorophyll content of the sweet potato plants on week 12 after planting. From the Fig. 12, the interaction plot between organic matter and varieties towards chlorophyll content showed differences among four sweet potato varieties, Vitato, Anggun, Cameron, and Lembayung. The results showed that at OM1 at 5 t/ha, the mean chlorophyll content was relatively similar for all varieties. However, at OM2 at 10 t/ha, the mean chlorophyll content decreased slightly for all cultivars.

The analysis of the slopes showed that Vitato and Cameron had a negative slope, which means that their chlorophyll content decreased with an increasing amount of organic matter. On the other hand, Lembayung exhibited the highest slope, indicating that chlorophyll content was most sensitive to changes in organic matter. In addition, the intercept of Vitato with Cameron and Anggun showed that the fresh weight of tubers was relatively similar regardless of the amount of organic matter applied. These results indicate that the application of higher amounts of organic matter did not significantly affect the chlorophyll content of the sweet potato cultivars, except for Lembayung, where the chlorophyll content decreased with an increase in organic matter.

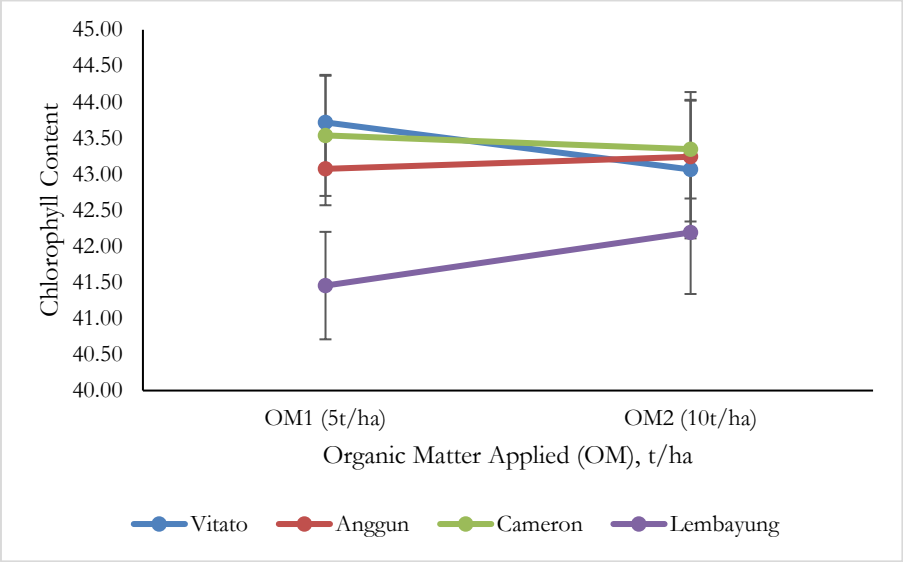

Fig. 12. Interaction plot between organic matter applied on chlorophyll content. The bars indicate the standard error of the mean (SEM).

CONCLUSION

In conclusion, the growth, yield and physiological characteristics of four sweet potato varieties were evaluated on BRIS soil. The results showed that Lembayung, Cameron and Angun 1 had higher tuber numbers compared to Vitato, while Cameron variety had vigorous vegetative growth and Lembayung variety had the highest tuber weight. The chlorophyll content was found to be highest in the first 6 weeks and decreased later as the tuber enlargement occurred. Additionally, the study concluded that the optimum amount of organic matter required for fast growth and high yield was found to be OM2 (10t/ha), which showed better plant growth compared to OM1 while Lembayung and Cameron varieties were found to be more responsive to organic matter than the Vitato variety.

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REFERENCES

Abdullah, A., Karim, N., Jusoh, M., Mail, M., Ayub, K., & Rahman, N. (2020). Design and development of a new mechanization system for sweet potato planting material production. *International Journal of Agriculture, Forestry and Plantation, 10,* 338-344.

Agbede, T. M., & Adekiya, A. O. (2011). Evaluation of sweet potato (Ipomoea batatas L.) Performance and soil properties under tillage methods and poultry manure levels. *Emirates Journal of Food and Agriculture, 23*(2), 164–177. https://doi.org/10.9755/ejfa.v23i2.6454

Bakti, D., Rosmayati, ., & Rahmawati, N. (2020). Evaluation of vegetative growth and total chlorophyll of four sweet potato genotypes in the highland and lowland. Proceedings of the International Conference of Science, Technology, Engineering, Environmental and Ramification Researches, 2018, 93–97. https://doi.org/10.5220/0010097200930097

Bovell-Benjamin, A. C. (2007). Sweet Potato: a review of its past, present, and future role in human nutrition. *Advances in Food and Nutrition Research, 52*(06), 1–59. https://doi.org/10.1016/S1043-4526(06)52001-7

Brandenberger, L., Hu, B., & Damicone, J. (n.d.). Extension vegetable crops eric rebek extension entomologist production requirements. Retrieved May 18, 2022, from https://agriculture.okstate.edu/departments-programs/

Darko, C., Yeboah, S., Amoah, A., Opoku, A., & Berchie, J. N. (2020). Productivity of sweet potato (*Ipomoea batatas* (L) Lam) as influenced by fertilizer application in different agro-ecologies in Ghana. *Scientific African, 10*, e00560. https://doi.org/10.1016/j.sciaf.2020.e00560

Dias, E. D. S., Monteiro Neto, J. L. L., Dresch, B. L., Rodrigues, R. O., Araújo, W. F., Chagas, E. A., ... & Abanto-Rodríguez, C. (2021). Organic fertilization for the beginning of sweet potato (*Ipomoea batatas* L.) cultivation in savanna soils. Revista Chapingo. *Serie horticultura, 27*(1), 27-42.

Department of Agriculture. (2023). Statistik Tanaman Sayur-Sayuran Dan Tanaman Ladang Malaysia 2021. Jabatan Pertanian Semenanjung Malaysia. https://www.doa.gov.my/doa/resources/aktiviti_sumber/sumber_awam/maklumat_pertanian/perangkaan_tanaman/statistik_tanaman_sayur_tanaman_kontan_2021.pdf

Department of Agriculture. (2020). Statistik Tanaman Sayur-Sayuran Dan Tanaman Ladang Malaysia 2019. Jabatan Pertanian Semenanjung Malaysia. http://www.doa.gov.my/index/resources/aktiviti_sumber/sumber_awam/maklumat_pertanian/perangkaan_tanaman/perangkaan_sayur_tnmn_ladang_2017.pdf

Ferreira, C. C., Brunner, P. K. C., Lobato, A. C. N., Negreiros, T. M. N., Soares, D. O. P., & Castro, A. P. de. (2020). Chicken manure: an alternative in increasing production of sweet potato (*Ipomoea batatas*). *Journal of Agricultural Science, 12*(10), 141. https://doi.org/10.5539/jas.v12n10p141

Nedunchezhiyan, M. (2014). Performance of sweet potato varieties and their nutritional profile under Punjab conditions. *Journal of Root Crops, 40*(2), 70-73.

Ishaq, U. M., Umara, B., Armanto, H. M. E., & Adzemi, M. A. (2014). BRIS soil suitability assessment on sweet potato in Merang- Terengganu region of Malaysia. *Journal of Biology, Agriculture and Healthcare, 4*(7), 11–19.

Jamilah, M. S., Nur-Faiezah, A. G., Kehirah, A. S., Mariam, M. N. S., & Razali, M. S. (2014). Woody plants on dune landscape of Terengganu, peninsular Malaysia. *Journal of Tropical Forest Science*, 26(2), 267–274.

Kantikowati, E., Yusdian, Y., & Suryani, C. (2019). Chicken manure and biofertilizer for increasing growth and yield of potato (*Solanum tuberosum* L.) of Granola varieties. In IOP Conference Series: Earth and Environmental Science (Vol. 393, No. 1, p. 012017). IOP Publishing.

Khandaker, M. M., Azani, S., Majrashi, A., Alenazi, M. M., Saifuddin, M., Mohd, K. S., & Adnan, A. F. M. (2022). Morphophysiology, growth indices, and fruiting of pumpkin in response to organic amendments. *Semina: Ciências Agrárias, 43*(3), 1211-1236.

Liu, N., Qiao, L., Xing, Z., Li, M., Sun, H., Zhang, J., & Zhang, Y. (2020). Detection of chlorophyll content in growth potato based on spectral variable analysis. *Spectroscopy Letters, 53*(6), 476–488. https://doi.org/10.1080/00387010.2020.1772827

Mais, A., & Brennan, C. S. (2008). Characterisation of flour, starch and fibre obtained from sweet potato (kumara) tubers, and their utilisation in biscuit production. *International Journal of Food Science and Technology, 43*(2), 373–379. https://doi.org/10.1111/j.1365-2621.2007.01652.x

Michael, P. S. (2020). Soil fertility status and sweet potato cultivation in composted mounds under humid lowland tropical climatic conditions. *SAINS TANAH-Journal of Soil Science and Agroclimatology, 17*(2), 144-151.

Mohd Hanim, A. B., Chin, N. L., & Yusof, Y. A. (2014). Physico-chemical and flowability characteristics of a new variety of Malaysian sweet potato, VitAto Flour. *International Food Research Journal, 21*(5), 2099–2107.

Motes, J. E., & Criswell, J. T. (2000). Sweet Potato Production Oklahoma. Hla-6022, April, 4 pp.

Motsa, N. M., Modi, A. T., & Mabhaudhi, T. (2015). Sweet potato (Ipomoea batatas L.) as a drought tolerant and food security crop. *South African Journal of Science, 111*(11-12), 1-8. https://doi.org/10.17159/sajs.2015/20140252

Neppl, G. P., & Wehner, T. C. (2001). Vine length of a diverse set of watermelon cultivars. *Report-Cucurbit Genetics Cooperative, 24*, 65-67.

Rawi, N. H. Z., & Shahrudin, R. (2021). Species Richness and Soil Properties in Nepenthes Habitat at Bris Ecosystem in Setiu, Terengganu. *Universiti Malaysia Terengganu Journal of Undergraduate Research, 3*(4), 67-72.

Sun, Z., Sun, H., Li, M., Chen, L., Liu, H., & Wu, Y. (2018). Nutrient content monitoring of potato plant based on spectrum device. *IFAC-PapersOnLine, 51*(17), 871-875.

Tan. (2015). Sweetpotato Ipomoea batatas a great health food. *Utar Agriculture Science Journal, 1*(3), 15–28.

Wang, S., Nie, S., & Zhu, F. (2016). Chemical constituents and health effects of sweet potato. *Food Research International, 89*, 90–116. https://doi.org/10.1016/j.foodres.2016.08.032

Yusoff, M. M., Abdullah, S. N., Halim, M. R. A., Shari, E. S., Ismail, N. A., & Yusoff, M. M. (2018). Growth and yield performance of five purple sweet potato (Ipomoea batatas) accessions on colluvium soil. *Pertanika Journal of Tropical Agricultural Science, 41*(3), 975–986.

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