International Journal of Agriculture System
Vol. 13 Issue 2, December 2025
Nationally Accredited Journal Decree No. 177/E/KPT/2024
P-ISSN: 2337-9782, E-ISSN: 2580-6815. DOI: 10.20956/ijas.v13i2.6722

Optimization of Bud Set Seedling Growth in Several Sugarcane Varieties (*Saccharum officinarum* L.) using Liquid Organic Fertilizer from Coffee Grounds

Nurlina Kasim[1*], A. Hasmila[1], Kaimuddin[1], Trisnawaty AR.[2]

[1] *Department of Agronomy, Faculty of Agriculture, Hasanuddin University, Jl. Perintis Kemerdekaan Km 10, Makassar, South Sulawesi, 90245, Indonesia.*
[2] *Department of Agrotechnology, Faculty of Science and Technology, Muhammadiyah University of Sidenreng Rappang, Sidrap-91651, Indonesia.*

[*] *Corresponding author's e-mail: nina_nurlina@yahoo.com*

How to Cite: Kasim N., Hasmila, A., Kaimuddin, and AR. Trisnawaty. (2025). Optimization of Bud Set Seedling Growth in Several Sugarcane Varieties (*Saccharum officinarum* L.) using Liquid Organic Fertilizer from Coffee Grounds. *Int. J. Agr. Syst. 13*(2): 116-126.

ABSTRACT

This study aims to study and determine the growth response of several varieties of sugarcane (Saccharum officinarum L.*) on the application of coffee grounds liquid organic fertilizer (POC). This research was conducted in Gattareng Village, Salomekko District, Bone Regency, South Sulawesi from April to July 2022. The research was arranged in the form of a two-factor factorial experiment with a randomized block design (RBD) as an environmental design. The first factor is the variety which consists of three varieties namely PS 881, PS 865 and Kidang Kencana. The second factor was the POC concentration of coffee grounds which consisted of four levels, namely without POC, 15 mL/L, 30 mL/L and 45 mL/L. The results showed that the combination of the PS 865 variety with 15 mL/L POC coffee grounds gave results on the parameters of stem diameter (18.67 mm), fresh stem weight (66.50 g), stem dry weight (33.29 g) and root volume (35.33 mL). The PS 865 variety gave the best results on the parameters of plant height (34.61 cm), number of leaves (9.50), root wet weight (23.0 g), root dry weight (6.37 g) and root length (105 g). .92 cm) sugarcane seeds. POC coffee grounds 45 mL/L gave the best results on the parameters of plant height (33.67 cm), root wet weight (22.11 g), and root dry weight (5.86 g) of sugarcane seedlings.*

Keywords:
Kidang kencana; PS 881; PS 865; LOF coffee grounds; Sugarcane.

1. Introduction

Sugarcane *(Saccharum officinarum* L.*)* It is a plant that can only grow well in tropical climates and is a type of grass grown as a sugar producer from its stems. Indonesia is a tropical region with a high sugarcane production potential. Sugarcane is a strategic commodity that plays an important role in the plantation sub-sector of the national economy. In addition, the sugarcane industry is expected to impact the regional economic structure by increasing regional income (Yunus et al., 2022).

Indonesia's sugar production has trended downward between 2016 and 2020. Sugar production in 2016, which was 2.36 million tons, then decreased to 2.19 million tons in 2017. In 2018, it was recorded at 2.17 million tons, a decrease from the previous year. However, in 2019, sugar production increased to 2.23 million tons, an increase of 55,330 tons (2.55 percent) compared with 2018. In 2020, sugar production decreased by 4.52 percent to 2.13 million tons (Central Statistics Agency, 2021).

Sugarcane seed production is a key factor in sugar production. High-quality sugarcane seeds determine the success of sugarcane cultivation and produce high yields, thus increasing sugar production (Pamungkas, 2021). The preparation of planting material is one of the main technical aspects of sugarcane cultivation. Sugarcane seed propagation techniques are divided into several categories, including shoot cuttings, mules, rayungan, single bud, and tissue culture seeds. Each type of seed has its own weaknesses and advantages. One seedling method used to develop superior seeds is the bud-set technique. Bud sets are sugarcane seeds obtained from sugarcane stalks in the form of single-eye cuttings, with a cutting length of 5 cm and the eye positioned in the middle of the cutting length (Purwati and Parnidi, 2016). The advantages of the bud set technique are producing uniform growth, a greater number of tillers, saving space and costs, and it can be used to produce mule seeds in large quantities (Rukmana, 2015).

Low sugarcane production is greatly influenced by the type of superior varieties cultivated. The sugarcane varieties widely cultivated include Cenning, PSBM 901, Bululawang, PS 865, PSJK 922, Kidang Kencana, PS 881, and several others. Variety selection must consider the characteristics of superior varieties, namely, high sugar production potential through high sugarcane weight and yield, stable and good productivity, high resistance to perspiration and drought, and resistance to pests and diseases (Indrawanto et al., 2010).

The selection of sugarcane varieties PS 881, PS 865, and Kidang Kencana in this study aimed to represent the diversity of genotype responses to environmental conditions and cultivation treatments while ensuring that the study results were relevant to field conditions. PS 881 was chosen because it is often used as a check variety to evaluate the performance of sugarcane clones/varieties in drylands and is suitable as a reference when assessing changes in growth and yield components due to treatments (Djumali et al., 2018). It has been reported to have agronomic performance and estimated yield in dryland agroecosystems in variety tests (Sudarto et al., 2020). PS 865 and Kidang Kencana were selected to represent superior commercial varieties with distinct physiological and adaptive bases. Both (along with PS 881) possess a gene similar to Sub1A (an indicator of potential tolerance to flooded/overwatered conditions), making it relevant for research to examine growth stability under varying environmental conditions (Arum and Avivi, 2020). Kidang Kencana is also widely used in abiotic stress studies, and its growth and yield responses have been reported to be influenced by treatments designed to increase drought tolerance (Amanah and Putra, 2018). Furthermore, land typology-based variety suitability mapping lists PS 881, PS 865, and Kidang Kencana as varieties associated with specific land suitability requirements. Therefore, the selection of these three varieties supports the research objective of obtaining more applicable conclusions across a variety of agroecosystem conditions (Basuki, 2020).

In addition to the use of superior varieties, low sugarcane production is caused by a lack of nutrients in the soil that can be absorbed by plants. Therefore, to achieve maximum production, fertilization is necessary according to the needs of the sugarcane plant (Nikmah et al., 2015). One recommended fertilization method is the use of organic fertilizers. Using organic fertilizer on plants not only provides the elements needed by plants but can also improve the soil structure. Liquid organic coffee ground fertilizer can help meet the nutritional needs of sugarcane seedlings.

The advantage of using liquid organic fertilizer derived from coffee grounds is that it is more easily absorbed by plants because the elements in it have been decomposed. Another advantage is that the nutrient content varies, namely containing macro and micro nutrients, and the absorption of nutrients is faster so that it is able to overcome nutrient deficiencies quickly. Coffee grounds contain 2.28% nitrogen, 0.06% phosphorus, and 0.6% potassium. In addition, coffee grounds contain minerals and carbohydrates that help release nitrogen as plant nutrients (Tsaniyah and Ruspeni, 2020).

The use of liquid organic fertilizers can increase the fertility of soil damaged by the continuous use of inorganic fertilizers. Liquid organic fertilizers improve soil growth and fertility (Ganefati and Sutomo, 2014). Research Results of Pramana and Hartini (2021) showed that the use of liquid organic fertilizer of coffee grounds with a concentration of 30 mL/L provides the best growth in sugarcane plants. Based on this research, it is necessary to conduct further research to determine the growth response of *bud-set seeds* of several sugarcane varieties to the POC application of coffee grounds.

2. Materials and Methods

The materials used in this study were *Effective Microorganism* 4 (EM4), molasses, water, coffee grounds, sugarcane seeds of PS 881, PS 865, and Kidang Kencana varieties, polybags measuring 25 × 30 cm, soil *(top soil),* transparent cuticle, clear solatip, permanent markers, and labels.

This study was conducted as a two-factor factorial experiment using a random group design as an environmental design. The first factor is sugarcane varieties, which consist of three varieties: PS 881, PS 865, and Kidang kencana. The second factor was the concentration of liquid organic fertilizer from coffee grounds, consisting of four levels of treatment: control (0 mL/L), 15 mL/L, 30 mL/L, and 45 mL/L. Thus, there were 12 treatment combinations, and each treatment was repeated three times, consisting of three units, resulting in 108 experimental units.

The application of liquid organic fertilizer to coffee grounds was carried out in the 3rd, 5th, and 7th weeks of MST by spraying 50 mL/plant on the plant in the first application, then 100 mL/plant in the second application, and 150 mL/plant in the third application.

3. Results and Discussion

3.1. Plant Height

The results of the analysis of the height of sugarcane plants showed that there was no interaction, but the treatment of varieties had a significant effect, and the treatment of liquid organic fertilizer of coffee grounds had a significant effect on the height of the plant. Figure 1 shows that the tallest sugarcane plant seedlings were found in the PS 865 variety, measuring 34.61 cm, which was significantly different from the other treatments. Meanwhile, in the POC treatment, the coffee grounds that gave the best results were at a concentration of 45 mL/L, which was 33.65 cm and was not significantly different from the 30 mL/L treatment, but it was significantly different from the 15 mL/L treatment and the control group.

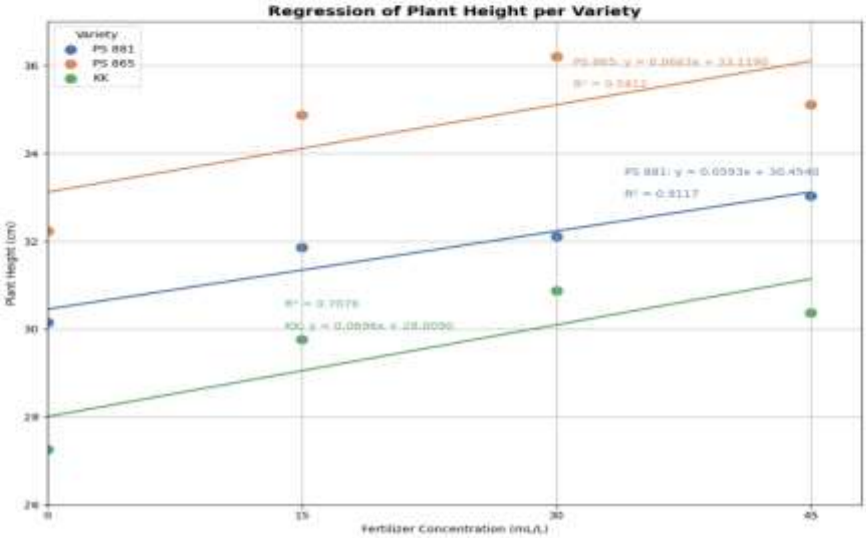

Figure 1. Graph of plant height (cm) in the variety and liquid organic fertilizer from coffee grounds treatments

Based on the research, it was obtained that the PS 865 variety gave the highest yield to the plant height parameter, which was 34.61 cm. It is agronomically suspected that the PS 865 variety has superior genetic traits compared to other varieties, even though it is grown with the same planting medium. This is in accordance with the opinion of Prihartono et al. (2016), who stated that plant height is influenced by the genetic traits of the variety. When sugarcane plants are in the active vegetative growth phase, nutrient absorption is more active.

POC treatment of coffee grounds at a concentration of 45 mL/L yielded the best results for plant height (33.67 cm). Liquid organic fertilizer of coffee grounds promotes the growth of sugarcane plants, because Liquid organic fertilizer of coffee grounds contains nutrients N, P and K. This is in accordance with the opinion of Prayogo et al. (2016), who stated that to produce optimal growth in sugarcane plants, sugarcane plants need sufficient fertilizer input is required so that the nutrient content can be met and production is optimal.

Research results from Hachicha et al. (2014) and Kasongo et al., (2011) added that coffee grounds are known to contain nitrogen (N) ranging from 1.5–2.8%, phosphorus (P) 0.06–0.3%, and potassium (K) 1.3–2.4%, as well as microelements such as Mg, Ca, Fe, and Zn. The relatively high nitrogen content plays an important role in the formation of chlorophyll, increasing photosynthetic activity, cell division, and elongation, thus directly encouraging the growth of vegetative plants, especially tall plants.

In addition to macronutrients, coffee ground organic fertilizers (POC) also contain organic compounds such as humic and fulvic acids, which increase nutrient availability in the soil and improve soil microbial activity. Humic acid increases the permeability of root cell membranes, resulting in more efficient nitrogen and phosphorus uptake, particularly during the active vegetative phase of sugarcane plants. During this phase, sugarcane requires an adequate nitrogen supply to support rapid stem and leaf growth (Taiz et al., 2015).

The potassium in POC also plays a crucial role in regulating cell osmotic pressure, enzyme activation, and the translocation of photosynthetic products from leaves to growth organs. Optimal potassium availability allows for stronger stem growth and better internodal elongation, thus contributing to increased sugarcane plant height. Therefore, the combination of N, P, and K in coffee grounds POC at a concentration of 45 mL/L is thought to create optimal nutritional conditions for the vegetative growth of sugarcane plants, even when using the same growing medium

3.2. Number of Leaves

The results of the variety fingerprint analysis showed that there was no interaction, but the treatment of varieties had a real effect, while the treatment of liquid organic fertilizer was coffee grounds and had no real effect on the number of sugarcane seedlings. Figure 2 shows that the average number of sugarcane seedling leaves in the treatment of the highest variety, namely the PS 865 variety, was 9.50 pieces and was significantly different from other treatments.

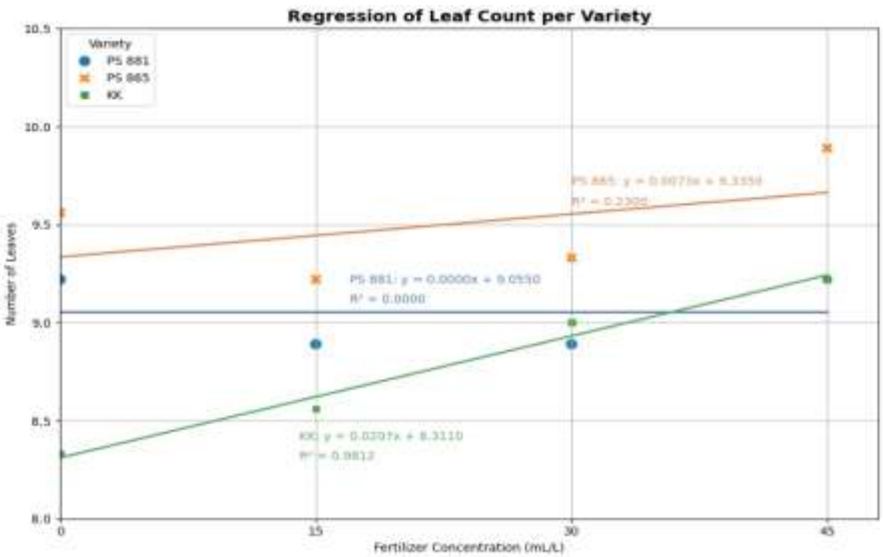

Figure 2. Graph of leaves number (blades) in the variety and liquid organic fertilizer from coffee grounds treatments

Based on the research, it was obtained that the PS 865 variety gave the highest results for the number of leaves parameter, which was 9.50 leaves. The increase in the number of leaves of sugarcane plants cannot be separated from the genetic nature of sugarcane varieties, where there is a cell lengthening activity that stimulates the speed of leaf formation as an organ of photosynthesis. The number of leaves is related to photosynthetic activity, where a large number of leaves allows the formation of more photosynthates to support the growth of sugarcane seedlings. According to Suhesti (2019), the number of leaves in sugarcane plants is controlled by two factors: the speed of leaf formation and the longevity of each leaf.

3.3. Stem Diameter

The results of the analysis showed an interaction between the treatment of varieties and liquid organic fertilizers of coffee grounds on the diameter of the stem. The treatment of varieties had a significant effect, and the treatment of POC of coffee grounds had no significant effect on the diameter of sugarcane seedling stems. Figure 3 shows that the average diameter of sugarcane seedling stems was highest in the combination of variety treatment, namely the PS 865 variety with the application of 15 mL/L coffee grounds liquid organic fertilizer, which was 18.67 mm and was not significantly different from other treatments.

The dominant effect of variety compared to coffee grounds POC on stem diameter is thought to be related to the genetic characteristics of the PS 865 variety, which has better stem growth vigor during the seedling stage. The insignificant effect of coffee ground POC alone indicates that the nutrients contained in POC cannot directly contribute to stem diameter enlargement without being supported by the genetic potential of a responsive variety. This finding strengthens the results of the analysis of variance, which showed that the genetic factor of variety is the main determinant of the formation of stem diameter of sugarcane seedlings in this study.

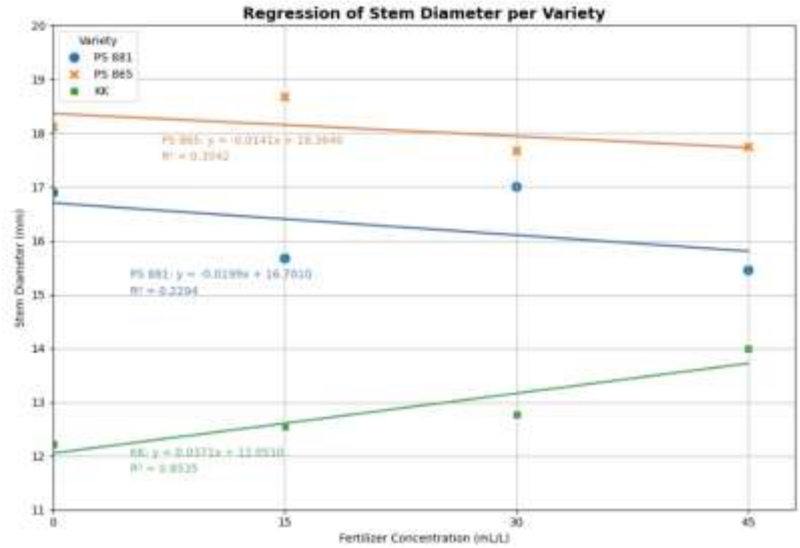

Figure 3. Graph of stem diameter (mm) in the variety and liquid organic fertilizer from coffee grounds treatments

Figure 3 shows the regression equation: y = −0.0141x + 18.364 with R^2 = 0.3542. (orange line) means that the stem diameter of PS 865 tends to be high and relatively stable at all doses, with a very small decreasing trend as the concentration increases. The moderate R^2 value indicates that the diameter variation is not fully explained by the POC dose; it is likely more influenced by genetic factors/variety vigor. The regression equation was y = −0.0199x + 16.701, with R^2 = 0.2294. The effect of POC concentration (x) on the stem diameter of PS 881 (y) also showed a decreasing trend, but this relationship was weak (low R^2 value). This indicates that the response of PS 881 to POC is inconsistent, possibly due to physiological variations, environmental factors, or seed diversity. Meanwhile, the regression equation y = +0.0371x + 12.051 with R^2 = 0.8535 (green line) shows that the stem diameter of Kindang Kencana (KK) increases with the increase in POC concentration, and the relationship is very strong (high R^2). This indicates that in the KK variety, coffee grounds POC plays a more significant role in encouraging stem enlargement.

In Figure 3, the response of stem diameter to the concentration of coffee grounds organic fertilizer (POC) differed between varieties. The KK variety showed a consistent increase in diameter with increasing concentration (y = 0.0371x + 12.051; R^2 = 0.8535), indicating that POC strongly contributes to stem enlargement in this variety. This is because the liquid organic fertilizer from coffee grounds contains N, P, and K, which support the growth of several varieties of sugarcane seedlings. This is in accordance with Isnaini et al. (2015), who stated that the use of liquid organic fertilizer on sugarcane plants results in better vegetative growth of plants compared to sugarcane plants without treatment, because the nutrients needed for plant growth and development can be obtained from liquid organic fertilizer from coffee grounds. In contrast, PS 865 and PS 881 tended to be stable or decreased slightly (PS 865: y = −0.0141x + 18.364; R^2 = 0.3542; PS 881: y = −0.0199x + 16.701; R^2 = 0.2294), which indicates that the effect of POC on diameter is less consistent and more influenced by genetic factors. Functionally, this change in stem diameter is potentially related to plant height and stem weight. An increase in the diameter of (KK) is likely followed by an increase in the stem fresh weight because larger stems add fresh mass. In PS 865, the diameter was relatively high at all doses, so that stem fresh weight tended to be determined by variety vigor and plant height growth. Thus, the relationship between plant height, stem diameter, and stem fresh weight illustrates the differences in growth allocation patterns between varieties, which supports the interaction of varieties with POC.

3.4. Wet Weight Steam

The variety-based fingerprint analysis showed an interaction between the coffee variety and liquid organic fertilizer treatment on wet stem weight. Figure 4 shows that the average wet weight of sugarcane seedlings in the combination of variety treatment and POC of coffee grounds was the highest for the PS 865 variety with a concentration of 15 mL/L, which was 66.50 g and was significantly different from other treatments.

Figure 4. Graph of wet weight stem (g) in the variety and liquid organic fertilizer from coffee grounds treatments

Based on the research conducted, it was found that the combination of variety treatment and POC of coffee grounds in sugarcane nurseries gave the best results in terms of stem wet weight and stem dry weight. The combination of PS 865 variety treatment with POC treatment of 15 mL/L coffee grounds provided the best growth. This is because the PS 865 variety is suspected to have superior genetic traits, and with a concentration of 15 mL/L, it can support seed growth, as seen from the better response of seed growth on several observation parameters compared to other treatments. In addition, the PS 865 variety is resistant to limited soil fertility. This is in accordance with the opinion of Rifimaro et al. (2022), who stated that the growth of each sugarcane variety is influenced by internal factors, namely genetic and external traits, namely temperature, light, water, and nutrients.

3.5. Root Volume

The results of the variety-based fingerprint analysis showed an interaction between the treatment of varieties with liquid organic fertilizer of coffee grounds on the volume of the roots. Figure 5 shows that the average volume of sugarcane seedlings in the treatment of the highest variety, namely the PS 865 variety with liquid organic fertilizer treatment of 45 mL/L, which is 35.33 mL, and was not significantly different from other treatments.

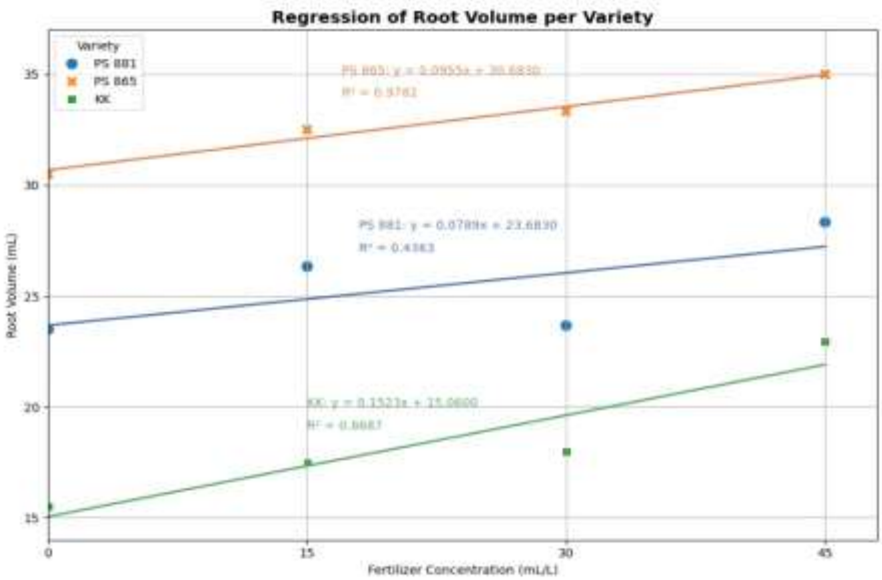

Figure 5. Graph of root volume (mL) in the variety and liquid organic fertilizer from coffee grounds treatments

Based on the above results, the combination of the PS 865 variety and 45 mL/L POC coffee grounds yielded the best results for root volume parameters. The PS 865 variety is suspected to have superior genetic traits compared to other varieties, so that by giving POC at a concentration of 45 mL/L can support seed growth and can be seen from a better seed growth response. This means that the substances or nutrients absorbed by the roots were met. This is in accordance with the opinion of Rifimaro et al. (2022), who stated that the growth of each sugarcane variety is influenced by internal factors, namely genetic and external traits, namely temperature, light, water, and nutrients. According to Jane et al. (2020), each variety has different genetic traits. According to Suhesti (2019), the growth of the entire root system indicates a major growth period. The higher the root volume of a plant, the more nutrients are absorbed by the plant, allowing it to grow

ISSN: 2337-9782, **E-ISSN:** 2580-6815

properly. Prayogo et al., (2016) stated that to produce optimal growth in sugarcane plants, sugarcane plants need sufficient fertilizer input so that the nutrient content can be met and production is optimal.

3.6. Shoots Number

The results of the variety-based analysis showed no interaction between the treatment of varieties and POC of coffee grounds, and the treatment of varieties did not have a real effect. However, the liquid organic fertilizer derived from coffee grounds had a significant effect on the number of sugarcane seedlings. Figure 6 shows that the average number of sugarcane seedlings in the POC treatment of coffee grounds was the highest at 30 mL/L which was 1.26 and was significantly different from other treatments.

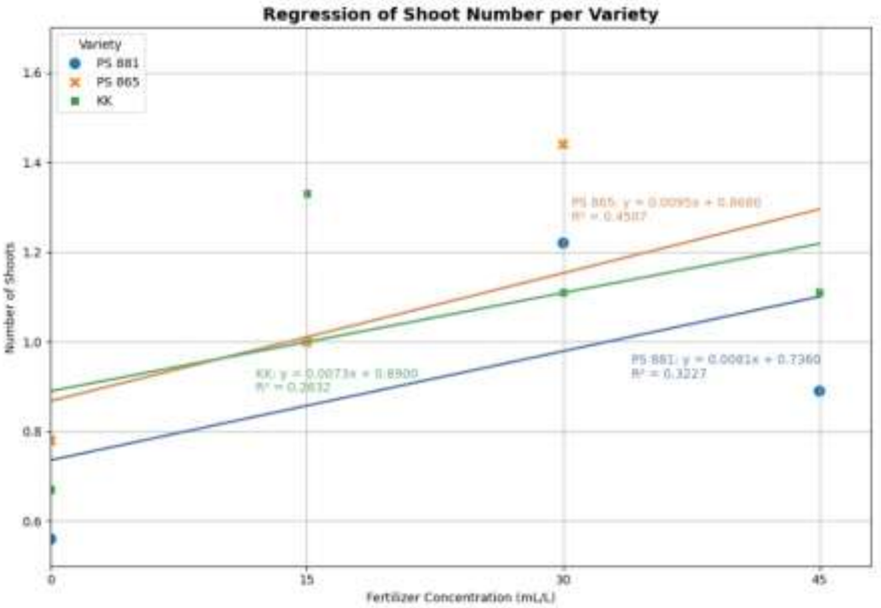

Figure 6. Graph of shoots number in the variety and liquid organic fertilizer from coffee grounds treatments

Based on research, it was obtained that the POC treatment of coffee grounds with a concentration of 30 mL/L gave an average more number of saplings than other concentrations. This shows that the germination phase in sugarcane plants is influenced by both genetic and environmental factors. Apart from these two factors, the sufficiency of nutrients needed by sugarcane plants in the soil can also trigger the emergence of new saplings. According to Prihartono et al. (2016), the germination phase takes place when sugarcane is 3-4 months old, and the tendency to shoot formation is influenced by internal factors such as genetic traits that are undermined by plants as special characteristics of each variety and external factors such as light, water, nutrients, and others.

4. Conclusions

Based on the results of the research obtained, it can be concluded that the combination of PS 865 variety treatment with POC treatment of 15 mL/L coffee grounds provides the best results for stem diameter, stem wet weight, stem dry weight, and root volume.

The PS 865 variety provided the best results for plant height, number of leaves, wet weight of the roots, and dry weight of the roots. POC coffee grounds with a concentration of 45 mL/L yielded the best results for plant height, root wet weight, and root dry weight.

References

Amanah, D.M., and S.M. Putra. (2018). The effect of biostimulants on drought tolerance and growth of Kidang Kencana variety of sugarcane in a greenhouse. Menara Perkebunan, 86(1). https://doi.org/10.22302/iribb.jur.mp.v1i1.287.

Arum, A.P., and S. Avivi. (2020). Identification of Sub1A gene in waterlogging-resistant sugarcane varieties. *Agriprima Journal of Applied Agricultural Sciences*, 4(2), 119–127. https://doi.org/10.25047/agriprima.v4i2.373.

Basuki, B. (2020). Mapping of land typology and suitability of sugarcane variety maturity types in Jatiroto, Lumajang, Indonesia. Tobacco, Fiber and Industrial Oil Crops Bulletin, 12(1): 34–44.

Central Statistics Agency (CSA). (2021). Distribution of Indonesian Granulated Sugar Commodity Trade in 2021. Jakarta.

Djumali, Heliyanto, B., and A.D. Khuluq. (2018). Evaluation of potential sugarcane clones in dryland areas. *Indonesian Journal of Agronomy*, 46(3): 328–336. https://doi.org/10.24831/jai.v46i3.21082

Ganefati, S.P., and Sutomo. (2014). Urinoir Model as a Liquid Organic Fertilizer Producer of Nitrogen (N), Phosphate (P), and Potassium (K). *International Journal Public Health Science,* 3 (1): 23–28.

Hachicha, R., O. Rekik, S. Hachicha, S. Woodward, and T. Mechichi. (2014). Coffee pulp compost: Nutrient composition and agronomic value. *Waste Management*, 34(2): 265–272. https://doi.org/10.1016/j.wasman.2013.11.006.

Indrawanto, C., S. Purwono, S. Muhammad, and W. Rumini. (2010). *Sugarcane Cultivation and Post-Harvest*. Eska Media. Jakarta.

Isnaini, J.L., Sunniati and Asnawati. (2015). Growth of Sugarcane Cuttings (*Saccharum officinarum* L.) in Various Concentrations of Liquid Organic Fertilizer Solution. *Jurnal Agrokompleks,* 14(1): 46–49.

Jane, S.A., A.F. Felipe, M.S. Edilson, A. Joel, J.F. Tales, V.P. Guilherme. (2020). Adjusting the Growth Curve of Sugarcane Varieties using Nonlinear Models. *Ciencia Rural, Santa Maria*, 50(3): 1-10.

Kasongo, R.K., A. Verdoodt, P. Kanyankagote, G. Baert, and E. Van Ranst. (2011). Coffee waste as an organic fertilizer: Effects on soil properties and crop growth. *Agriculture, Ecosystems and Environment*, 141 (3–4), 349–356. https://doi.org/10.1016/j.agee.2011.03.006.

Nikmah, N.L., A.W. Ketut, and Setiyono. (2015). Vegetative Growth Response and Sugar Content of Sugar Cane (*Saccharum officinarum* L.) to Nitrogen Supply. *Berkala Ilmiah Pertanian,* 1(1): 1–5.

Pamungkas, S.S.T. 2021. Utilization of Mediterranean as a Seeding Medium for Sugarcane Budset (*Saccharum officinarum* L.) Bululawang Variety with the Addition of Manure at Different Doses. *Mediagro Journal* 17(2): 107–119.

Pramana, W.B., and Hartini. (2021). Effect of Dosage and Time of Coffee Grounds POC Application on the Growth of Bud Set Sugarcane Seeds of the Cenning Variety. *Agrotekma*, 5(2): 93–101.

Prayogo, S.A., M. Minwal, and N. Amir. (2016). Effect of Organic Fertilizer Types and Planting Systems on the Growth of Sugarcane Seedlings (*Saccharum officinarum* L). Klorofil: *Jurnal Penelitian Ilmu-Ilmu Pertanian*, 11(1): 51-55.

Prihartono, A., S. Alberrtus, and A. Abdul. (2016). Vegetative Growth Response of Several Sugarcane Varieties (*Saccharum officinarum* L.) to Arbuscular Mycorrhiza Application. *Junal AIP*. 4(1): 12–20.

Purwati, R.D., and Parnidi, (2016). *Procurement of Quality Sugarcane Seeds*. Sweetener and Fiber Crop Research Center. Malang

Rifimaro, S., B. Setyo, and N.L. Wiharyanti. (2022). Vegetative Growth of 9 Clones of Sugarcane (*Saccharum officinarum* L.) Keprasan Satu with Liquid Organic Fertilizer Application in Gresik. *J Agroplantae*, 11(2): 101-116.

Rukmana, R.H. 2015. Sky-High Profits from Sugarcane Agribusiness. Yokyakarta. Lilypublisher.

Sudarto, Y.G. Buludan, and S.K. Utami. (2020). Study of several sugarcane varieties in dryland agroecosystems in Dompu Regency, West Nusa Tenggara. *Crop Agro*, 13(1).

Suhesti, E. (2019). Sugarcane (*Saccharum officinarum* L.) Plant Growth by Single Bud Planting Method on Different Eye Numbers and Varieties. CV. Convident. Cirebon.: 21-38.

Taiz, L., E. Zeiger, I.M. Moller, and A. Murphy. (2015). Plant Physiology and Development. Sinauer Associates.

Tsaniyah, I, and D. Ruspeni. (2020). The Effect of Providing Coffee Grounds as Organic Fertilizer on the Growth of Chili Plants (*Capsicum frutescens). Jurnal Pedago Biologi*, 8(1): 58-63.

Yunus, M., J. Muhammad, and S. Abdullah. (2022). Ficus Press: Makassar.