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The Effect of Applying Organic Skin and Coconut Dregs Compost on The Growth and Yield of Purple Eggplant Plants Fertilizer of Red Onion (*Solanum melongena* L.)

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ABSTRACT

Eggplant (*Solanum melongena* L.), a member of the Solanaceae family, is a food plant that offers various health benefits, such as its potential anti-cancer effects and its ability to impact cholesterol levels. This research aimed to investigate the impact of coconut dregs compost and liquid organic fertilizer derived from onion skin on the growth and productivity of purple eggplant plants, specifically regarding plant height, flowering duration, time to harvest, and fruit yield. The research was conducted at Pensiunea Indah Housing Road in the Bakaran Batu District, Labuhanbatu Regency, from March to May 2024. The study methodology used two components of a factorial randomized block design (RAK). Factor 1 encompasses four tiers of utilizing organic fertilizer derived from shallot skins, including a control group and applications of 100. 200. and 300 ml per individual plant. Factor 2 comprises four different levels of coconut dregs compost: a control group and 75, 150, and 225 grams per plant. The study's findings indicated that the application of coconut dregs compost and liquid organic fertilizer derived from onion skins had a notable impact on the height of the plants, the age at which they started flowering, the duration of the harvest, and the quantity of Fruit produced. The ideal method for achieving optimal results in cultivating purple eggplant plants involves the application of a liquid organic fertilizer derived from a combination of composted onion peels and coconut dregs at dosages of 300 ml and 225 g. This specific blend has been found to enhance plant height, prolong bloom and harvest times, and increase fruit yield.

Keywords: *Coconut Dregs Compost, Increasing the Growth, Organic Fertilizer of Red Onion Skin, Plant Productions, Purple Eggplant*

1. INTRODUCTION

Because of its delectable flavor, the purple eggplant (*Solanum melongena* L.) is a popular and beloved vegetable, particularly when consumed in raw form or in small portions. As the population grows, there is a corresponding growth in the demand for eggplant. Hence, it is necessary to enhance the production output. Raising eggplant yields is crucial for enhancing agricultural productivity, serving as a food source, and contributing to individuals' well-being and financial stability. The primary issue encountered in terrestrial environments is the significant soil degradation attributed to applying chemical fertilizers. Improving eggplant crop yields can be attained by planting soil enriched with organic matter and the appropriate application of inorganic fertilizers. Adding organic matter following the application of inorganic fertilizers can lead to increased crop yields.

Food plants belonging to the Solanaceae family encompass the eggplant plant (Solanum melongena L.), which offers various health advantages, such as reducing cholesterol levels and serving as an anti-cancer agent. According to Faisal (2012), the average eggplant contains vitamin A (4.78%), vitamin C (12.8%), ash content (5.8%), carbohydrates (28.7%), protein (34.8%), water (86.1%), iron (6.8%), and calcium (70.2%). Additionally, the purple eggplant is reported to have the following nutritional components: water (81.6%), iron (12.5%), calcium content (75%), ash content (3.9%), carbohydrates (28.7%), protein (34.8%), and vitamin A (4.8%) as stated by Rukmana (1999)

India and Sri Lanka are both recognized as the birthplaces of eggplant plants (Uzo, Penegrime, & Williams, 1991). The earliest documented record of eggplant can be found in the ancient Chinese scientific treatise Qi Min Yao Shu, which dates back to 544 AD. The introduction of the eggplant plant to Europe during the early Middle Ages was attributed to Arabs who brought it via the Mediterranean Sea, leading to the adoption of the word "eggplant" from Arabic and North African languages. The scientific name for eggplant is *Solanum melongena* (MacGillivray, 2009).

Enhancing suitable cultural practices, managing the environment, and choosing high-quality plant materials are methods to cultivate purple eggplants following the anticipated yield potential. Furthermore, obtaining the correct seeds is a crucial growth factor, sustaining consistent yields. Robust plants and maximum yield potential can be attained through the utilization of quality seeds (Sunarjono, 2008).

Microorganisms break down organic material to produce organic fertilizer, which supplies essential nutrients for plant growth. This fertilizer is crucial in enhancing soil productivity and effectiveness by maintaining the soil's physical, chemical, and biological properties.

Another method of reducing waste in society is converting waste into organic fertilizer. Sumantri (2013) states that waste management necessitates a specific energy level, which varies depending on the size and complexity of the waste issue being addressed. The pervasive nature of littering within society has rendered its eradication a formidable challenge. The lack of sanitary amenities in public areas, such as accessible waste receptacles, further complicates efforts to eliminate this unfavorable behavior. This study aims to assess the influence of shallot skin POC and coconut dregs compost on purple eggplant plants' growth and productivity and to explore these fertilizers' potential synergistic effects on plant development.

2. MATERIAL AND METHODS

2.1 Research site

This research was conducted on Jalan Perumahan Infrastruktur Indah, Bakaran Batu District, Labuhanbatu Regency, North Sumatra, 2°05'04.2"N 99°50'57.5"E.

2.2 Tools and Material

Research equipment includes purple eggplant seeds, shallot skins, coconut husk waste, washed rice, EM4, clean water, and a baby bag for seeding.

Some items used are a hoe, measuring tape, machete, plastic rope, scissors, shovel, measuring cup, bucket/container, analog scale, label paper, bamboo for support and stakes, spray gun, and writing tools.

2.3 Research Method

This research used two components of the Randomized Block Design (RAK) technique four times. Factors 1 and 2 each have four levels of treatment, namely shallot POC and coconut dregs compost, namely:

First-factor shallot skin poc: onion skin POC 0. 100, 200, and 300 ml/plant, the second-factor coconut dregs compost: coconut dregs compost 0. 75, 150, and 225 g/plant.

2.4 Research Procedure

2.4.1 Land Sanitation

Using tripe machetes and hoes, the research area was physically cleaned of bushes and other vegetation to prepare the research location, making it easier to arrange the polybags. Next, the polybags are arranged in an area of land that is clean of bushes and grass. Before planting seeds into polybags, fill the planting medium using topsoil. Before sowing, choosing good seeds to reduce germination failure is very important. After sowing, the seeds germinate, which is 25-30 days old, and then the seeds can be transferred into polybags or at the planting stage.

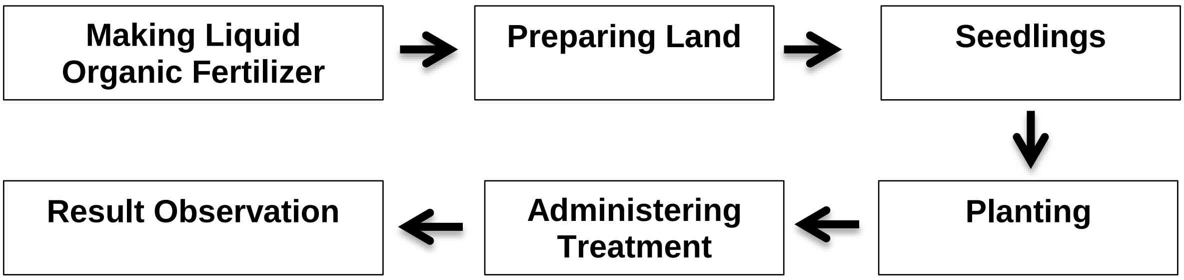

Figure 1. Research Flow Diagram

2.4.2 Administering Treatment

Using compost made from shallot skins and coconut husks as the base fertilizer, the POC treatment is carried out by scattering compost and POC at the specified dosage according to the experimental design on the polybag soil surface. The fertilizer application starts from the second week by measuring with an analog scale and using a measuring cup.

2.4.3 Maintenance

Watering is the first care performed. Doing it twice daily, in the morning and evening, keeps the plant's water supply stable. Using your hands, pick out the weeds growing in the polybags and remove them. This is done so that eggplant plants can develop without being hindered by weeds. Pesticides are sprayed to control pests. Meanwhile, physical efforts are made to handle this disease, such as cutting off infected eggplant leaves and burning them to stop the spread of the disease.

2.5 Observation Parameters

2.5.1 Plant Height (cm)

Using measuring instruments, plant height is determined in centimeters (cm), starting from the stem's base to the plant's highest growth point. Initial observations were made 2 weeks after planting, and observations were made at 2 WAP, 4 WAP, and 6 MST.

2.5.2 Flowering Age (days)

Measuring a plant's blooming age involves recording the days since the plant first bloomed. Observations are made once half of the experimental units, or plots, have developed flowers.

2.5.3 Harvest Age (days)

Finding the number of days after planting will produce the age of the first harvest after 50% of the population per experimental unit has met the characteristics for harvest. Eggplant plants are usually harvested when the plants are 70-75 days after planting.

2.5.4 Number of Fruits (Fruits)

Counting each Fruit collected at the first harvest and for each unit of experimental plant or sample plant allows observation of fruit quantity.

2.5.5 Data Analysis

Data analysis used analysis of variance (ANOVA) and continued with the DMRT (Duncan Multiple Rane Test) follow-up tests carried out at the 5% level using the IBM SPSS Application SPSS Statistics is version 29.

3. RESULT AND DISCUSSION

3.1 Plant Height (cm)

Continuation of the DMRT (Duncan Multiple Range Test) was performed at the 5% level following the results of the variance analysis (ANOVA) with a Randomized Complete Block Design factorial, showing that the application of POC from shallot skins and compost of coconut husks had a significant effect, differing at 2 WAP, 4 WAP, and 6 WAP (Table 1).

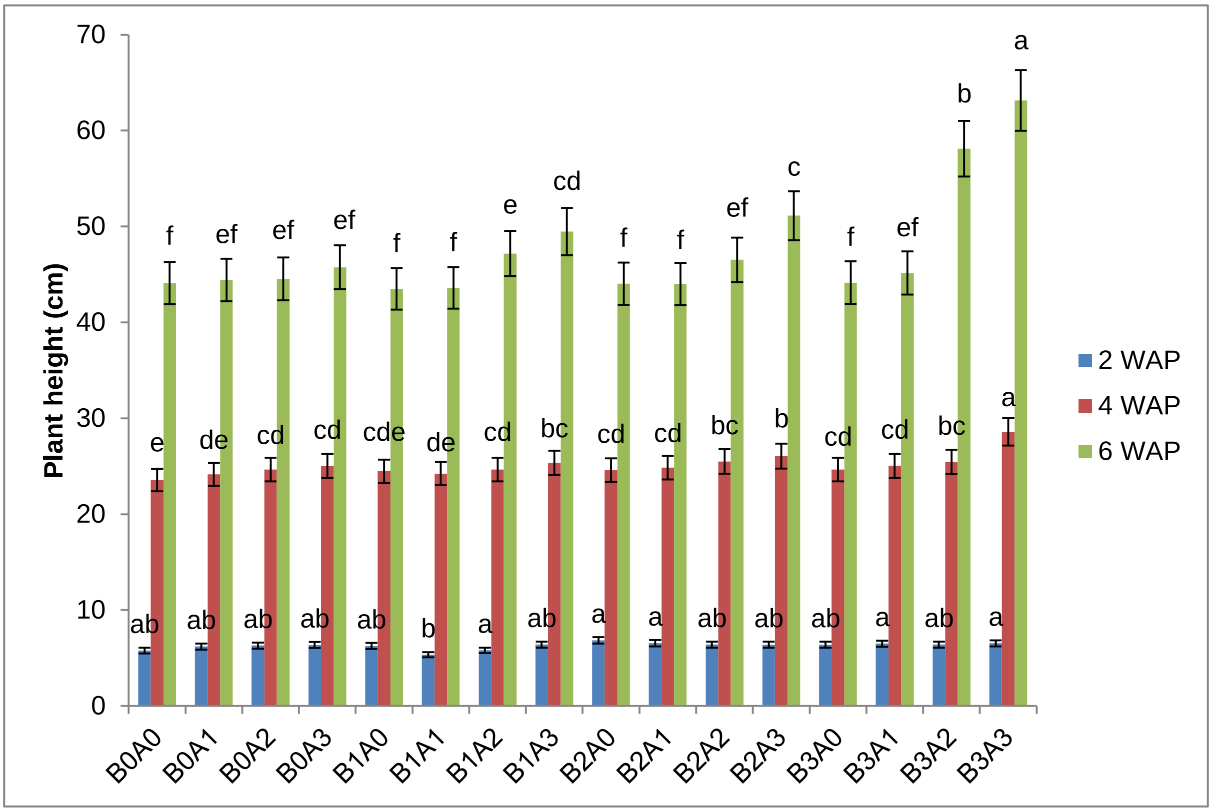

Figure 2. Average plant height 2. 4 and 6 weeks after planting B0 (onion skin POC 0), B1 (onion skin POC 100 ml/plant), B2 (onion skin POC 100 ml/plant), B3 (onion skin POC 300 ml/plant), A0 (coconut pulp compost 0), A1 (coconut pulp compost 75 g/plant), A2 (coconut pulp compost 150 g/plant) and A3 (coconut pulp compost 225 g/plant).

Based on the results of additional testing, purple eggplant plants grew the highest in B2A0 treatment at the age of 2 weeks after planting (6.85 cm), while in B1A1 treatment, the lowest plant height growth (5.33 cm) reached full growth at the age of 4 weeks after planting. The B3A3 treatment had the largest plant height growth (63.15 cm) 6 weeks after planting, while the B1A0 treatment had the lowest (34.5). The B0A0 treatment had the lowest plant height (23.55 cm), while the B3A3 treatment had the largest plant height (28,65 cm).

Adding organic fertilizer or compost made from coconut dregs can improve soil structure and biological activity, making it easier for plants to absorb nutrients. Rodiah (2013) supports this, stating that adding organic material can help improve soil structure by providing nutrients and encouraging microorganisms. Likewise, as Makiyah (2013) states, if all the necessary nutrients are available in sufficient quantities and in such a way that plants can absorb them, then the plants will grow healthily.

3.2 Flowering Age (days)

The growth age of purple eggplant plants varies greatly depending on whether they receive red onion skin POC or coconut husk compost, based on the findings of the analysis of variance (ANOVA) using a factorial randomized block design (Table 2).

Table 2. Average Flowering Age

Poc red onion skin	Coconut dregs fertilizer			
	A0	A1	A2	A3
B0	35,75a	32.25ab	32.5bc	32bcd
B1	33,25bc	32cd	32bcd	31cd
B2	33,75ab	32.75bc	32bcd	30.75cd
B3	32.25bcd	32bcd	32.5bc	29,75d

Notes: "Numbers followed by different letters in the same column indicate significantly different based on the 5% DMRT test."

Table 2 shows that the fastest flowering age occurred in the B3A3 treatment (300ml POC of shallot peel and 225g coconut dregs compost) with a flowering age of 29.75 days, and the slowest flowering age occurred in the B0A0 treatment (0ml POC of shallot peel and 0g coconut dregs compost) namely 35.75 days.

Because the phosphate element is in balance according to plant needs, it can be well absorbed by the roots of eggplant plants and accelerate the appearance of flowers, so B3A3 treatment produces a fast blooming period. According to Lingga and Marsono (2013), plants need fertilizer containing phosphorus because photosynthesis is very dependent on this mineral, especially during the flowering period.

According to Oktavianni and Koesriharti (2019), Element P is a source of ATP energy needed for metabolic functions. Therefore, metabolic processes, including photosynthesis, cannot occur without ATP energy. In addition, as stated by Rahmad and Sulhaswardi (2013), the supply of P nutrition can encourage growth due to cell division and development.

3.3 Harvest Age (days)

The harvest age of purple eggplant plants varies greatly depending on whether they receive POC red onion skin or coconut husk compost, according to the analysis of variance (ANOVA) using a Factorial Randomized Complete Block Design (Table 3).

Fertilizers can be given to eggplant plants to increase their nutritional needs and accelerate harvest time. According to Leo Noza et al. (2014), P can increase growth until harvest time by participating in respiration, photosynthesis, and plant metabolic activities. Furthermore, according to Winarso (2005), phosphorus plays an important role in photosynthesis and energy provision, as well as in growth and yield production.

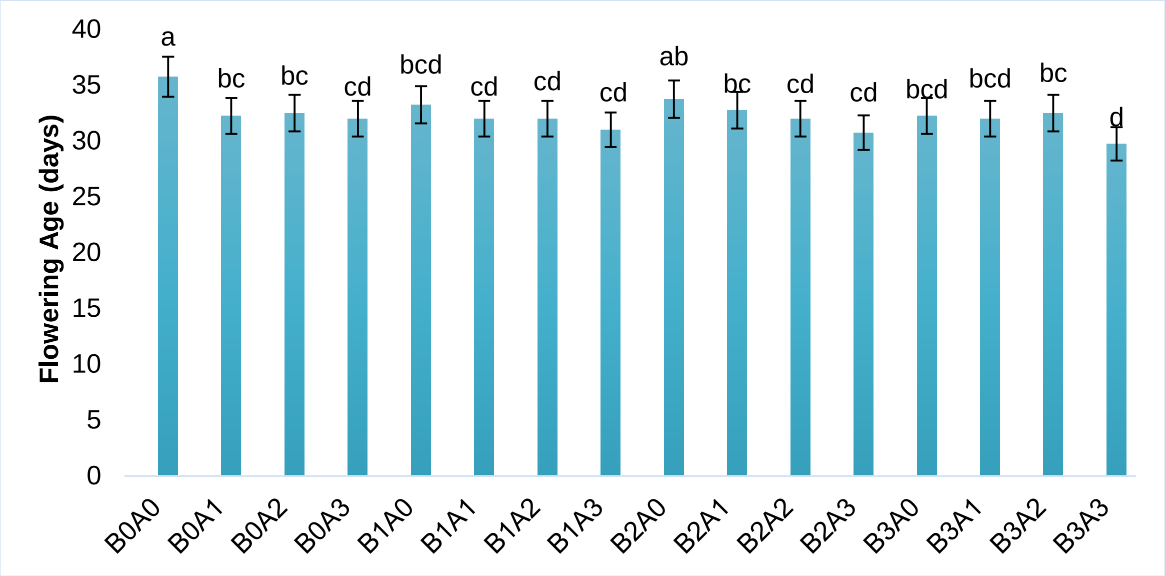

Figure 3. Average flowering age, B0 (onion skin POC 0), B1 (onion skin POC 100 ml/plant), B2 (onion skin POC 100 ml/plant), B3 (onion skin POC 300 ml/plant), A0 (Coconut pulp compost 0), A1 (Coconut pulp compost 75 g/plant), A2 (Coconut pulp compost 150 g/plant) and A3 (Coconut pulp compost 225 g/plant).

Table 3. Average Harvest Age

Poc red onion skin	Coconut dregs fertilizer			
	A0	A1	A2	A3
B0	63,75ab	65a	62.5ab	63,75ab
B1	65a	61.25ab	62.5ab	60b
B2	62.5ab	61.25ab	62.5ab	61.25ab
B3	62.25ab	61.25ab	60b	60b

Notes: "Numbers followed by different letters in the same column indicate significantly different based on the 5% DMRT test."Table 3. Shows that the provision of shallot skin poc and coconut pulp compost with B1A3, B3A2, and B3A3 treatments is the fastest harvest age with a harvest age of 60 days, and the longest harvest age is with the B0A1 and B1A0 treatments with a harvest age of 65 days.

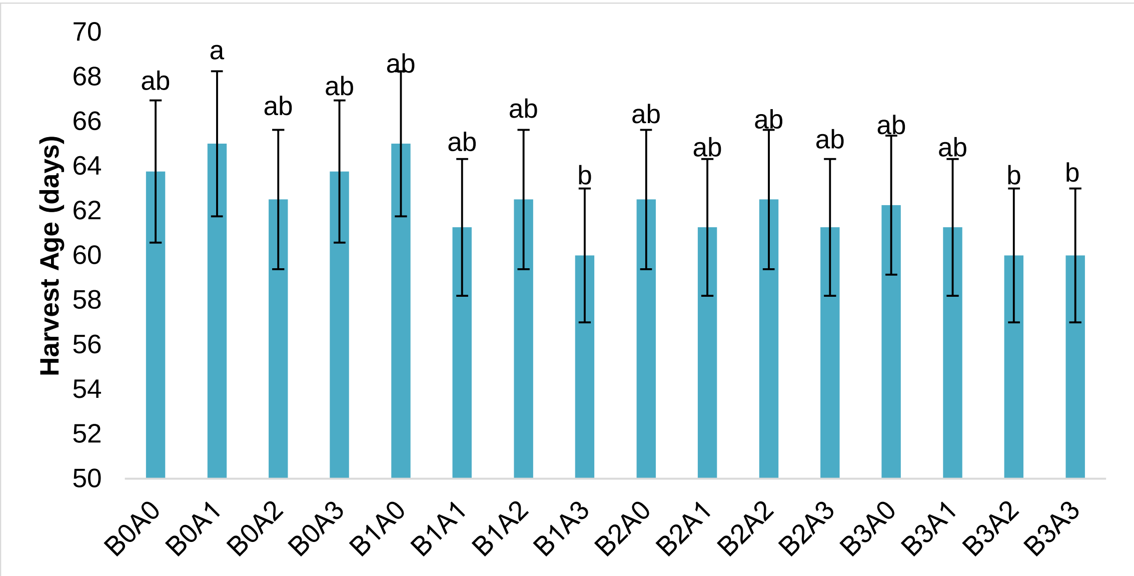

Figure 4. Average age of harvest, B0 (onion skin POC 0), B1 (onion skin POC 100 ml/plant), B2 (onion skin POC 100 ml/plant), B3 (onion skin POC 300 ml/plant), A0 (Coconut pulp compost 0), A1 (Coconut pulp compost 75 g/plant), A2 (Coconut pulp compost 150 g/plant) and A3 (Coconut pulp compost 225 g/plant).

3.4 Number of Fruits (Fruit)

Based on the results of the analysis of variance (ANOVA) with a factorial randomized block design, it shows that the application of POC red onion skin and coconut husk compost significantly differs in their effect on the number of fruits of purple eggplant plants (Table 4).

Table 4. Average numbers of Fruit

Poc red onion skin	Coconut dregs fertilizer			
	A0	A1	A2	A3
B0	1.5ab	2ab	1b	2ab
B1	1.75ab	2ab	1.75ab	2.5a
B2	2.25a	1.75ab	2ab	2.25a
B3	1.75ab	2.25a	1.5ab	2.5a

Notes: "Numbers followed by different letters in the same column indicate significantly different based on the 5% DMRT test

In Table 4, it can be explained that when giving shallot skin POC and coconut dregs compost, the highest number of Fruit on the plants was found in treatments B1A3 (100ml POC shallot skin + 225g coconut dregs compost) and B3A3 (300ml POC shallot skin + 225g coconut dregs compost) with an average of 2.5 pieces. This is due to the nutrients that are fulfilled during the fruit formation. This is also in line with Onggo's (2001) statement that optimal plant development requires full use of nutrients because partial use of nutrients changes the balance of elements that can be absorbed and reduces the efficiency of nutrient absorption. Meanwhile, the lowest number of fruits was found in the B0A2 treatment (0ml POC of shallot peel + 150 g coconut dregs compost) with an average number of 1 fruit.

According to Muldiana and Rosdiana (2017), plants that receive the least fertilizer tend to have less nutrient availability, making it difficult for plants to meet their needs, especially in fruit production.

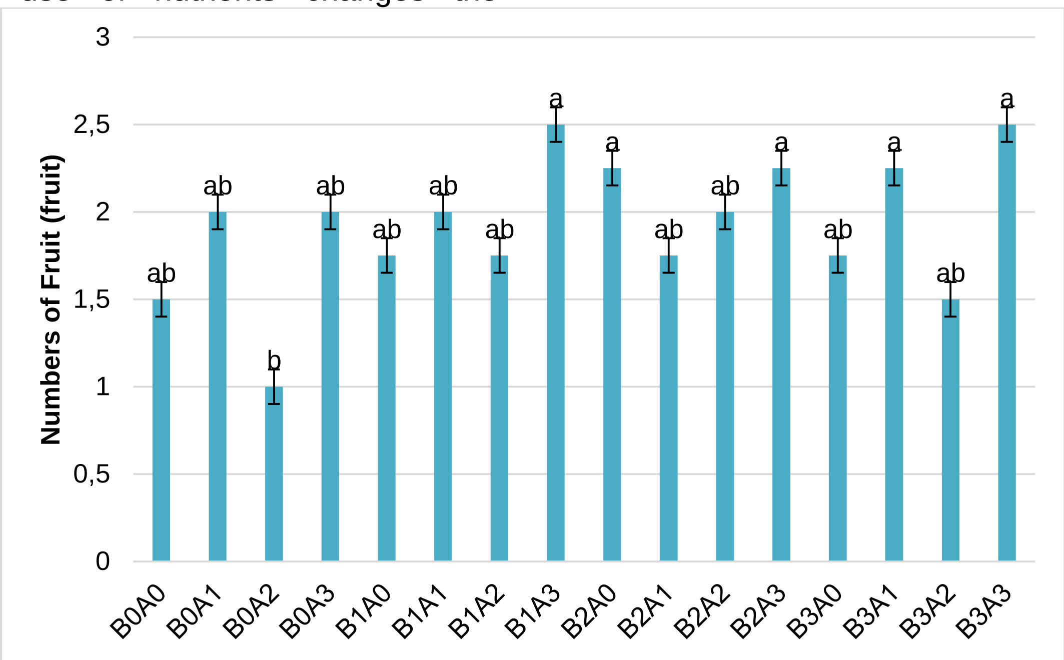

Figure 5. The average number of Fruit, B0 (onion skin POC 0), B1 (onion skin POC 100 ml/plant), B2 (onion skin POC 100 ml/plant), B3 (onion skin POC 300 ml/plant), A0 (Coconut pulp compost 0), A1 (Coconut pulp compost 75 g/plant), A2 (Coconut pulp compost 150 g/plant) and A3 (Coconut pulp compost 225 g/plant).

4. CONCLUSION

Based on the research, it can be concluded that applying POC from red onion skins and compost from coconut husks can enhance the vegetative and generative growth of purple eggplant plants. The best growth of purple eggplant plants is observed at treatment dose B3A3, which consists of 300ml of POC from red onion skins and 225g of compost from coconut husks per plant.

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