

Effect of Dosage and Time Interval of Application of Liquid Organic Fertilizer Gamal Leaves on Growth and Yield of Mustard Plants (*Brassica Juncea L.*)

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ABSTRACT

*The purpose of this study was to determine the effect of the dose and time interval of applying organic Gamal leaf fertilizer on the growth and yield of mustard (*Brassica juncea*L). The study was conducted from March 2019 to May 2019 at the STIPER East Kutai Agrotechnology Experimental Garden. The design used was a Completely Randomized Design (CRD), with a factorial pattern, where the treatment of giving a dose of organic Gamal leaf fertilizer consisted of 4 treatments, namely: D0 = 0 ml L-1, D1 = 40 ml L-1, D2 = 80 ml L-1, D3 = 120 ml L-1, while the time interval treatment consisted of 3 treatments, namely I1 = once every 3 days, I2 = once every 5 days, I3 = 7 days once. All treatments were repeated 3 times. Data were analyzed by analysis of variance followed by the smallest significant difference test at a significance level of 5%. The variables observed included the height of the mustard plant, the number of leaves of the mustard plant, the fresh weight per plant of the mustard greens. There was no interaction between the dosage of liquid organic fertilizer of Gamal leaves and the time interval of administration of all the variables measured. significantly to plant height (8.332), number of leaves (7.911) and fresh weight (7.027), while the time interval treatment had a significant effect only on plant height (8.076) and number of leaves (7.683).*

Keywords: *Gamal leaf, Effective dose, Trial design, Liquid Organic Fertilizer, Mustard.*

INTRODUCTION

The existence of mustard plants as a vegetable commodity is very much needed in improving community nutrition. Mustard greens contain quite complete nutrition, so when consumed it is very good for maintaining a healthy body. Mustard is a type of vegetable that is favored by the people of Indonesia. Consumers range from the lower class to the upper class. The content contained in mustard greens is protein, fat, carbohydrates, Ca, P, Fe, Vitamin A, Vitamin B, and Vitamin C (Siaga & Lakitan, 2021). One of the factors that support high mustard production is fertilization. Fertilization is the addition of nutrients to the soil so that it can be used by plants to support their nutrient needs. Nutrients are one of the factors supporting plant growth and development. The use of chemical fertilizers not only has a positive impact but also has a negative impact if it is used continuously and for a relatively long time. The negative effects given include the soil hardening quickly, the soil is less able to store water, and becomes acidic (Noviyanty & Salingkat, 2018).

Fertile soil, will grow a variety of plants well. The process of plant growth is strongly influenced by the level of soil fertility, so that plants grow well and yields are abundant. The use of organic fertilizers can be a solution in increasing soil fertility. The weakness of organic fertilizers in general is the low nutrient content and slow availability to plants (Damayanti et al, 2019). Organic fertilizers can be in solid or liquid form. The advantage of liquid organic fertilizer is that the nutrients it contains are available more quickly and are easily absorbed by plant roots. In addition to being sprinkled with liquid fertilizer, it can be used directly by spraying it on the leaves or stems of plants. One of the plants belonging to the leguminosae group that has the potential as a liquid organic fertilizer that can trigger plant growth is Gamal. According to Singh et al (2019), gamal leaves contain 3.15% N, 0.22% P, 2.65% K, 1.35% Ca, and 0.41% Mg. Gamal has advantages over other types of legumes, namely easy to cultivate, fast growth, high biomass production. Gamal also has a fairly high nitrogen content with low C/N, causing the

biomass of this plant to easily decompose. Gamal leaves used as liquid organic fertilizer have a higher nitrogen content so it is very suitable if applied to plants that produce vegetative parts as part of the plant. harvested crops.

METHOD

This research was carried out from March to May 2019, starting from land preparation to harvesting. This research took place at the Experimental Garden of the Agrotechnology Study Program, North Sangatta District, East Kutai Regency. The tools used in this study were hoe, shovel, gembor, scissors, scales, bottles, measuring cups, ruler, meter and treatment code signpost, while the materials used in this study were ballast, onion sack, mustard seed, water, polybag, topsoil, brown sugar, gamal leaf, EM-4. The design used was Completely Randomized Design (CRD), with a factorial pattern, where the treatment of giving a dose of gamal leaf organic fertilizer consisted of 4 levels: D0 = 0 mL⁻¹, D1 = 40 mL⁻¹, D2 = 80 mL⁻¹, D3 = 120 mL⁻¹, while the time interval treatment consists of 3 levels I1 = once every 3 days, I2 = once every 5 days, I3 = once every 7 days. All treatments were repeated 3 times.

RESULT AND DISCUSSION

The results of the variance of dose treatment and the time interval of giving POC of gamal leaves showed that there was no interaction on the height of the mustard plant. It was seen that each treatment showed a significant difference in plant height. The POC dose treatment resulted in the highest plant height at 120 mL⁻¹ with a value of 8.332 cm, while the lowest at a dose of 0 mL⁻¹ with a value of 7.049 cm. , so that the provision of nutrients in large quantities will give the best plant response. The provision of high organic matter can add essential nutrients and can also increase the availability of nutrients in the soil for plants, especially nutrient N which has the main function for vegetative development of plants such as plant height growth. plant height in the treatment given liquid organic fertilizer of 120 mL⁻¹ gamal leaves, it is suspected that the liquid organic fertilizer contains nutrients that are needed by plants to improve soil structure, especially water absorption capacity and nutrient supply. Water is needed in physiological and metabolic processes in plants that will trigger plant growth and height. The higher the concentration of liquid organic fertilizer, the better the condition of the soil, so that the absorption process of macro nutrients (N, P, K) which plays a role in the process of plant cell development is increasing, one of which is plant height. Singh et al., (2019) stated that the function of organic matter is to increase water holding capacity and improve soil structure.

The time interval treatment for giving POC gamal leaves resulted in the highest plant height at intervals of 3 days with a value of 8.076 cm, while the lowest yield was at intervals of 5 days with a value of 7.522 cm. This was due to the ability of organic matter from liquid organic fertilizer to improve gamal leaves. soil structure so that root uptake goes well. Roots in the soil can easily intercept every pore in the soil. The water bound by organic matter will be absorbed by the roots, then the water is used as a nutrient solvent as well as cell elongation and division which will result in increased plant height. Organic matter is a direct source of N, P, K, macroelements and other essential nutrients (Ashfaque & Inam, 2019). Nutrients in organic matter will stimulate the development of vegetative organs during growth, both roots, stems and leaves.

The results of the different dose treatments and the time interval for giving Gamal Leaf POC showed that there was no interaction with the number of mustard leaves. The dose treatment had a significant effect, while the time interval treatment had an effect on the average number of leaves of the mustard plant. The POC dose treatment resulted in the highest number of plant leaves at 120 mL⁻¹ with a value of 7,911 strands, while the lowest dose was at 0 mL⁻¹ with a value of 7,110 strands. This is due to the availability of high levels of N in the growth process, which can stimulate the process of photosynthesis, thereby accelerating vegetative growth. Ashfaque and Inam (2020) that the nutrient N is needed for the formation of chlorophyll which is needed in the photosynthesis process and stimulates the vegetative growth of plants. According to Noviyanty and Salingkat (2018) the use of nitrogen fertilizers plays a prominent role in the vegetative parts of plants (leaves and shoots). The use of the right dose will further optimize the shoot yield of the mustard plant. Gamal leaves when used as organic fertilizer have a higher nitrogen content so they are very suitable when applied to plants that produce vegetative parts as part of the harvested plants. Mustard plant is an indicator plant that is able to provide a better response and its nutrient needs can be met by the form and nutrient diversity of the Gamal leaf organic fertilizer (Baydhowi et al, 2020).

The time interval treatment for POC administration resulted in the highest number of plant leaves

at intervals of 3 days with a value of 7.683 strands, while the lowest yield was at intervals of 5 days with a value of 7.437 strands. This is because the need for N nutrients for mustard plants is sufficient in a short time so that leaf growth is getting better, in the presence of nitrogen which can accelerate the photosynthesis process so that the formation of leaf organs becomes faster. Wahyudin and Irwan (2019) said that the abundance of nitrogen also encourages rapid growth including the development of leaves, stems are larger and dark green and encourages vegetative growth above the ground.

The results of the variance of dose treatment and the time interval of giving Gamal Leaf POC showed no interaction on the average fresh weight per mustard plant. The dose treatment had a significant effect, while the time interval treatment had no significant effect on the average fresh weight per mustard plant. The average fresh weight of mustard greens can be seen in Table 3. The POC dose treatment resulted in the highest fresh weight per plant at 120 mL⁻¹ with a value of 7.027 grams, while the lowest dose was at 0 mL⁻¹ with a value of 3.569 grams. The time interval treatment of POC administration resulted in the highest fresh weight per plant at intervals of 3 days with a value of 5.666 grams, while the lowest yields at treatment intervals of 7 days with a value of 5.155 grams. It is suspected that the application of liquid organic fertilizer of Gamal leaves which has sufficient N content can stimulate better vegetative growth so that it affects the yield of mustard plants. Dhanidkk., (2013) stated that the presence of nitrogen can accelerate the process of photosynthesis so that the formation of leaf organs becomes faster. Sufficient N nutrients can stimulate plant vegetative growth. Siaga and Lakitan (2021) also states that plants that do not receive nutrient N in accordance with their nutrient needs will grow stunted and form small leaves, whereas plants that receive nutrient N in accordance with their needs will grow tall and form leaves wide. The higher the plant height and the number of leaves, the higher the fresh weight of the plant. Vice versa, when plant growth is inhibited, the fresh weight of the plant will be low. Hi, agree with Damayanti et al, (2019) which states that the fresh weight of the plant is influenced by plant height and number of leaves, the taller the plant and the greater the number of leaves, the fresh weight of the plant will be higher.

CONCLUSIONS

If a plant is in the reproductive phase of plant development, then the carbohydrates resulting from photosynthesis that occur in the leaves are not entirely used for plant growth, but are stored (hoarded) for the development of flowers, seeds, fruit or other supplies. Treatment intervals 3 days once showed the most effective treatment compared to other treatments based on the yield of fresh weight per plant at harvest in accordance with consumer expectations, namely the more fresh weight consumption per mustard plant produced. Treatment with a dose of 120 mL L⁻¹ and a time interval of 3 days POC of gamal leaves had no interaction, and gave a good effect on growth in height, number of leaves and weight per mustard plant.

REFERENCES

- Ashfaque, F., & Inam, A. (2019). Interactive effect of potassium and flyash: a soil conditioner on metal accumulation, physiological and biochemical traits of mustard (*Brassica juncea* L.). *Environmental Science and Pollution Research*, 26(8), 7847-7862.
- Ashfaque, F., & Inam, A. (2020). Accumulation of metals, antioxidant activity, growth and yield attributes of mustard (*Brassica juncea* L.) grown on soil amendments with fly ash together with inorganic nitrogen fertilizer. *Acta Physiologiae Plantarum*, 42(9), 1-13.
- Baydhowi, I. A., Wasito, W., & Mardiana, Y. (2020). Pengaruh Dosis Pupuk Organik Dan Pemberian Pupuk Pelengkap Cair Terhadap Pertumbuhan Dan Produksi Tanaman Sawi (*Brassica rapa* var *parachinensis* L.). *Jurnal Ilmiah Hijau Cendekia*, 5(2), 82-87.
- Damayanti, N. S., Widjajanto, D. W., & Sutarno, S. (2019). Pertumbuhan dan produksi tanaman sawi Pakcoy (*Brassica rapa* l.) akibat dibudidayakan pada berbagai media tanam dan dosis pupuk organik. *Journal of Agro Complex*, 3(3), 142-150.
- Noviyanty, A., & Salingkat, C. A. (2018). The effect of application of rice dishwater and manure as organic fertilizer to the growth of mustard (*Brassica Juncea* L.). *AGROLAND The Agricultural Sciences Journal (e-Journal)*, 5(2), 74-82.
- Siaga, E., & Lakitan, B. (2021). Budi daya Terapung Tanaman Sawi Hijau dengan Perbedaan Dosis Pupuk NPK, Ukuran Polibag, dan Waktu Pemupukan. *Jurnal Ilmu Pertanian Indonesia*, 26(1), 136-142.

- Singh, J., Varma, S. K., Bhatia, J. N., & Raj, L. (2019). Effect of different soil moisture regimes and salinity level on growth and yield in mustard. *Indian Journal of Agricultural Research*, 53(4), 488-491.
- Wahyudin, A., & Irwan, A. W. (2019). Pengaruh dosis kascing dan bioaktivator terhadap pertumbuhan dan hasil tanaman sawi (*Brassica juncea* L.) yang dibudidayakan secara organik. *Kultivasi*, 18(2), 899-902.