

Effectiveness of rabbit's manure liquid organic fertilizer and application time on growth and yield of purple sweet corn

Widyana Rahmatika^{1*} and Retno Dwi Andayani¹

¹Agrotechnology Study Program, Faculty of Agriculture, Kadiri University
Kediri, East Java, Indonesia

*Corresponding author. Email: widyanaarahmatika@gmail.com

Received: December 22th, 2023 / Accepted: March 21th, 2024

ABSTRACT

Purple corn is a commodity that is not been widely cultivated in Indonesia. The nutritional value of purple corn is higher than yellow and white corn. Purple corn contains anthocyanin components that act as antioxidant compounds in the prevention of several diseases such as cancer, diabetes, cholesterol, and coronary heart disease. Purple corn can also be used as a raw material for making additional food. The objective of this study was to investigate the interaction effect of rabbit manure liquid fertilizer (LOF) concentration and application time on the growth and yield of purple sweet corn. The research was carried out at the Integrated Field Laboratory, Faculty of Agriculture, Kadiri Islamic University from September to November 2021. This factorial experiment was arranged in a randomized block design consisting of 2 factors. The first factor was the concentration of LOF (U) which consisted of 4 levels, namely U0 = 0 mL/plant, U1 = 20 mL/plant, U2 = 30 mL/plant, and U3 = 40 mL/plant. The second factor was the application time of rabbit LOF (A) involving 2 levels, namely A1 = 1 week before planting and A2 = 1 week after planting. The combination of both factors resulted in 8 treatment combinations. Each treatment was replicated 3 times. The results showed that there was no interaction between the concentration of rabbit's manure LOF and application time on the growth and yield of purple sweet corn. The concentration of LOF had a significant effect on cob weight, while the time of application had a significant effect on cob weight without cob and sweetness levels.

Keywords: dosage, purple corn, time of application

INTRODUCTION

Purple corn is a commodity that has not been widely planted in Indonesia. The nutritional value of purple corn is higher than that of other types of corn. The anthocyanin component contained in purple corn acts as an antioxidant to prevent various diseases, such as cancer, diabetes, cholesterol and coronary heart disease, and can be used as a raw material for making food additives.

Sustainability growth and produce one of them depend on soil nutrient content. Continuous use of land without proper maintenance can result in reduced nutrient content. Nutrient availability in soil can be increased by fertilization, both organic and inorganic fertilizers. The use of inorganic fertilizer without organic fertilizer could cause soil structure damage and hence reduces soil fertility (Rahmanda *et.al.*, 2018 in Kurnianta *et.al* ; 2021). Such a problem can be avoided by the application of organic fertilizer could be used. One of the organic fertilizers is Liquid Organic Fertilizer (LOF) made from rabbit urine. This LOF contains more nitrogen, phosphorus, and potassium than solid cow dung (Kristanto and Aziz, 2019).

Fertilizer application must pay attention to the right dosage and application time, if both are right then the plant will grow normally. The research results of Wardhani A, et.

All (2019) stated that the application of liquid organic fertilizer two weeks after planting gave better results than other treatments. Providing organic fertilizer before planting can provide fertility to the soil, improve soil aeration, and support the life of soil biota. The application of organic fertilizer after planting can be a balance and provide the nutrients needed by plants, especially micronutrients. Rabbit urine can be used as organic liquid fertilizer which is very beneficial for plants. Liquid fertilizer is easier for plants to use because the elements in it break down easily so the benefits are felt more quickly. Rabbit droppings can be raw material for biodigesters which are used to produce gas and effluent to increase crop yields and are used by earthworms to increase vermicompost production as organic fertilizer (organic (Nur Imran et al., 2016).

MATERIALS AND METHODS

The study was conducted in the Integrated Field Laboratory of Agriculture UNISKA Kediri, located at an altitude of 67 m above sea level from September to November 2021. The soil in the area was sandy loam with a pH 5.7. The average temperature was around 28°C and humidity was 73%.

Materials used are purple sweet corn seed, LOF of



rabbit manure, nitrogen and phosphor fertilizer, dolomites, fungicide, and polybag. The tool used is hand tractor, hoe, diesel, sickle, water splash, knife, board plot, digital scales, calipers brix refractometer, glass measuring, pH meters, and camera.

Methodology

This research uses a randomized block design with a factorial method with 2 factors. The first factor is a dose of liquid organic fertilizer (LOF) (U) consisting of 4 levels, U0 = 0 ml/ plant, U1 = 20 ml/ plant, U2 = 30 ml/ plant, and U3 = 40 ml/ plant. The second factor is the time application of

liquid manure fertilizer (A), it consists of 2 levels namely A1 = 1 week before planting and A2 = 1 week after plant. There are 8 combinations of treatment with 3 replications. Fertilization is adjusted to the treatment, namely giving organic rabbit urine fertilizer 1 week before planting and 1 week after planting. In the treatment of giving rabbit urine organic fertilizer, the fertilizer was dissolved in 200 ml of water. Follow-up fertilizer was given using urea fertilizer and phonska fertilizer which was carried out twice and applied to the plants, namely at 20 days after planting, 0.9 g urea and 1.9 g phonska, and at 35 days after planting, 0.9 g urea and 0.9 g phonska.

Table 1. Average plant height (cm) due to liquid organic fertilizer concentration and application time at 21, 28, 35, and 42 DAP.

Treatment	Average height of plant (cm) at ...DAP			
	21	28	35	42
U0	36,57	66,44	108,68	165,47
U1	37,48	65,61	110,47	169,23
U2	36,75	65,17	110,57	170,03
U3	37,11	64,78	108,72	168,58
LSD 5%	ns	ns	ns	ns
A1	37,65	66,18	110,65	169,86
A2	36,31	64,82	108,57	166,8
LSD 5%	ns	ns	ns	ns

Note: Numbers followed by similar letters in the same column were not significantly different based on LSD p<0.05

Table 2. Average number of leaves (sheet) due to rabbit LOF concentration and application time at 21, 28, 35, and 42 DAP.

Treatment	Average number of leaves (sheet) on age ... DAP			
	21	28	35	42
U0	5,5	6,14	8,54	11,57
U1	5,63	6,31	8,83	11,69
U2	5,81	6,5	8,92	11,47
U3	5,58	6,11	8,83	11,67
LSD 5%	ns	ns	ns	ns
A1	5,61	6,35	8,87	11,70
A2	5,65	6,18	8,69	11,5
LSD 5%	ns	ns	ns	ns

Note: Numbers followed by similar letters in the same column were not significantly different based on LSD p<0.05

Table 3. Average stem diameter (mm) due to rabbit LOF concentration and application time at 21, 28, 35, and 42 DAP.

Treatment	Average stem diameter (mm) at ... DAP			
	21	28	35	42
U0	3,43	9,13	19,53	25,26
U1	3,45	9,03	20,00	25,42
U2	3,53	9,03	19,98	25,8
U3	3,50	8,85	19,93	25,40
LSD 5%	ns	ns	ns	ns
A1	3,59	9,13	19,98	25,51
A2	3,37	8,89	19,74	25,43
LSD 5%	ns	ns	ns	ns

Note: Numbers followed by similar letters in the same column were not significantly different based on LSD p<0.05

RESULTS AND DISCUSSION

Table 4. Average cob length (cm) due to the effect of rabbit LOF concentration and application time

Treatment	Cob length (cm)
U0	17,17
U1	17.57
U2	16,76
U3	16.51
LSD 5%	ns
A1	16,86
A2	17,15
LSD 5%	ns

Note: Numbers followed by similar letters in the same column were not significantly different based on LSD $p < 0.05$

Table 5. The average weight of ears without husks for planting samples (g) due to rabbit POC dose and application time at 71 days after planting.

Treatment	Cob weight (g)
U0	138.89a
U1	148,43 ab
U2	146.94 ab
U3	174.24c
LSD 5%	22,39
A1	144.08a
A2	160.17b
LSD 5%	15.83

Note: Numbers followed by similar letters in the same column were not significantly different based on LSD $p < 0.05$

Table 6. Average degree of sweetness (*brix*) due to rabbit LOF concentration and application time

Treatment	The average level of sweetness (%)
U0	14.58
U1	15,26
U2	14.92
U3	15.06
LSD 5%	ns
A1	14.55a
A2	15.36 b
LSD 5%	0.71

Note: Numbers followed by similar letters in the same column were not significantly different based on LSD $p < 0.05$

Treatment of rabbit liquid organic fertilizer and time application did not affect growth parameters, such as plant height, leave number, and stem diameter, but significantly affected yield parameters. Organic fertilizers could have reacted slowly compared to inorganic fertilizers and hence took a long time to be absorbed by plants, but in the long run, it would give better results. A similar result was found by Nur Imron (2016), that the application of rabbit LOF significantly influenced the yield of chili. Andrianto et al., (2022) also found that rabbit LOF did not affect growth parameters, but had a significant effect on the yield of chili. Further, Rachman et al., (2021) mentioned that the application of LOF only

influenced the yield of mung beans. So are the results study Fauzi (2018) and Handayani et. al. (2020), Rabbit POC application only influences on results of plant pumpkin honey and cucumber on growth parameters.

Cob weight without husk was not influenced by the interaction of liquid organic fertilizer concentration and application time, except the single factor. The best concentration was 40 mL/plant (U3), and the best time application was 1 WAP (A2).

Based on the results analysis laboratory, POC rabbit contains Nitrogen 0,05%. The benefits of fertilizer organic in developing the fertility of soil are to provide both macro and micronutrients, improve soil structure, so that the soil becomes light to cultivate and easily penetrated by roots, and improve its water-holding capacity, as the result the soil has better ability to provide water and permeability. In sandy soil permeability decreases while in clay soils it increases., increasing CEC (cation exchange capacity) on sandy soil so that the soil can bind cations higher, so nutrients are not easy to leach, repair life biology, so that capable increase process organic matter decomposition as well as increasing *the buffering capacity* against changes in nature land. Nutrient in organic fertilizer is released slowly, opposite to inorganic fertilizer releasing nutrients fast and soon become available for plants. Therefore, liquid organic fertilizer treatment in this research only affected yield. this follows the result of Budi et. al. (2014) which states fertilizer organic is not available immediately for plants, so the absorbed mechanism by plants must collaborate with microorganisms. Rabbit liquid organic fertilizer can complete plant nutrient needs, both macronutrients and micronutrients, it has another advantage of repairing soil structure and increasing porosity which can increase the ability of land to hold water. Weight data cob corn show results best exist in the treatment of the highest liquid organic fertilizer dose, following This chart connection liquid organic fertilizer dose of rabbit and corn weight.

Corn cob weight is affected by the amount of nutrients absorbed by plants, absorption of nutrients by plants is also affected by the ability to land in holding water, so rabbit liquid organic fertilizer application can increase the weight of cob. In this following opinion, Nurdiana (2022) stated the role of water for plants as a component important in the process of photosynthesis and respiration plant. The absorption process is very related tight with the root system.

Content nutrients P, and Ca in bio urine rabbits are capable of fulfilling growth roots so that roots have a good ability to absorb water and nutrients. Chart on show y value = $10.45x + 136.43$ as well value $R^2 = 0.78$. Can explained that every increase in uptake of rabbit POC dosage 1 ml/plant so will raise heavy cob corn of 10.45 grams if with treatment and weight cob of 136.43 grams if without treatment, meanwhile, the value of R^2 indicates the percentage influence treatment ie by 78%. The time of application of rabbit urine liquid organic fertilizer has a significant effect on the weight of corn cobs and sweetness levels. The best treatment is application 1 week after planting. In line with the research results of Purba et. al. (2019), the treatment of giving rabbit urine liquid organic fertilizer 7 days after planting showed the highest wet

weight of green eggplant compared to other treatments. Application time is one of the keys that can influence the success of plants, through the right application time there will be synchronization between the plant and the nutrients it needs, meaning that when the plant needs nutrients, the

nutrients are available and can be absorbed by the plant. The application time one week after planting is the right time, as proven by the weight of corn cobs showing the highest when applied one week after planting.

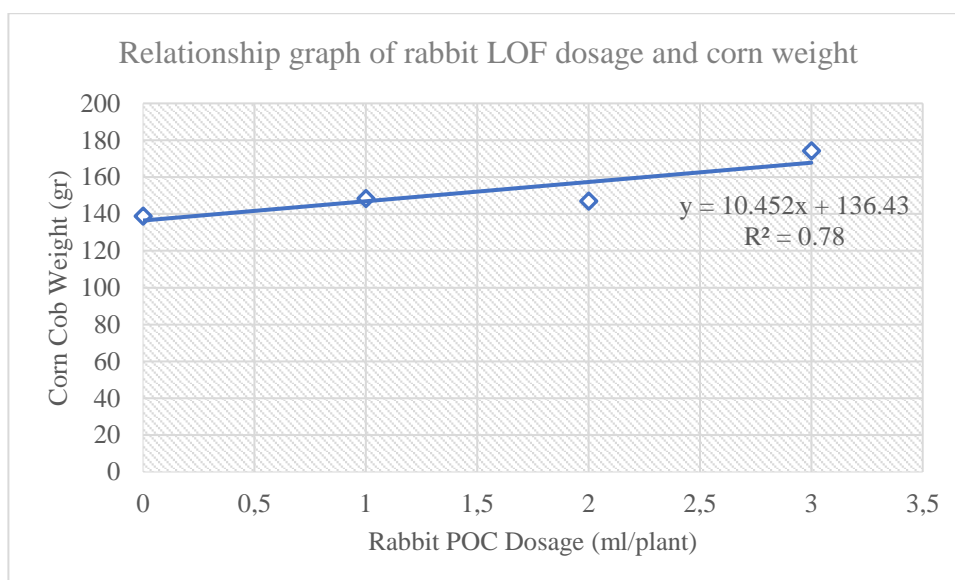


Figure 1. Graph connection rabbit LOF dosage and weight cob corn

CONCLUSION

There is no interaction between rabbit LOF dosage And time application to the growth And production of purple sweet corn. The treatment rabbit LOF showed a significant effect on the corn weight without husks. time application o f rabbit LOC shows a significant effect on cob weight parameters without husks and sweetness.

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