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Application of Potassium Fertilizer And Organic Fertilizer For Rabbits On The Growth And Results Of Okra (*Albemoschus Esculentus* L)

Mukhtar Yusuf*, Fitria, Risnawati, Rini Susanti, M Alqamari, Hadriman Khair, Alridiwirsah,
Fakultas Pertanian Universitas Muhammadiyah Sumatera Utara
Jl. Kapten Muchtar Basri No.3, Glugur Darat II, Kec. Medan Tim., Kota Medan, Sumatera Utara
*email: mukhtaryusuf@umsu.ac.id

ABSTRACT

Okra (*Albemoschus esculentus* L) is a fruit-shaped vegetable crop and is a potential crop because it has business opportunities. Okra production is still low and has not been able to meet the needs of one of the problems, namely inappropriate fertilization. It is necessary to conduct research that aims to determine the effect of Potassium fertilizer and organic rabbit fertilizer on the growth and yield of okra. The research location is in Sampali Village, Percut Sei Tuan District, DeliSerdang Regency, North Sumatra Province. When the research was carried out in February-May 2021, the materials used were okra seeds, potash fertilizer and rabbit manure. The research method used a factorial Randomized Block Design (RBD) with two treatments and three replications of Potassium (K), namely: K0: without K fertilizer, K1: 5 g/plot, K2: 7.5 g/plot, K3: 15 g/plot while rabbit organic fertilizer (P), namely: P0: without rabbit organic fertilizer, P1: 1 kg/plot, P2: 1.5 kg/plot, P3: 2 kg/plot. The results showed that for observation the number of fruits per plant had no significant effect but gave the best results on Potassium 15 g/plot and organic fertilizer for rabbits P3: 2 kg/plot while Potassium fertilizer had a significant effect on stem diameter and flowering age while organic fertilizer for rabbits had a significant effect on plant height this is because Potassium fertilizer functions to strengthen stems, physiological processes, formation of flowers and fruit. While rabbit organic fertilizer contains nitrogen which plays a role in the vegetative phase for plant growth.

***Keywords*:** Potassium, Rabbit Organic Fertilizer, Okra, Percut Seituan

1. INTRODUCTION

The okra plant (*Abelmoschus esculentus* L.) is a vegetable plant that grows in the tropics and subtropics, is classified as rare, especially only in a few places because this plant is only an intercropping plant. Okra is native to the tropics, originating from Africa and is now widely cultivated in various countries with tropical and subtropical climates (Tong, 2016). Okra also contains a lot of fat, carbohydrate protein, minerals and vitamins, even the mucus from okra fruit is also widely used as an industrial ingredient in the medical or health sector (Benchasri, 2012).

The largest okra producing country in the world is India, based on statistical data for 2010-2011 that 73% of world okra production comes from India, which has a planting area of 498,000 hectares with a total production of 5,784,000 tons, and a productivity of 11.6 tons ha-1. The productivity of okra in the world has only reached 6.9 tons ha-1 (Vanitha, et al., 2013). almost all parts of the plant can be used because it is known as a multipurpose plant from the stems, leaves and fruit. Okra fruit can be used as a vegetable which can be consumed by boiling, frying, or slicing and consuming it directly. Young okra fruit contains 85.70% water content; protein 8.30%; fat 2.05%; 1.4% carbohydrates and 38.9% calories per 100 g (Simanjuntak & Gulton, 2018).

In the global era, there has been an increase in the need for okra, but okra production in Indonesia is still low due to the limited availability of okra seeds and the lack of public knowledge about okra cultivation. In several tropical countries, okra production has not been able to reach optimum (2 – 3 tonnes/ha) and high quality, due to continued decline in soil fertility (Arifah et al., 2019). According to Haris and Krestiani, (2009) stated that potassium is one of the macro nutrients needed for plant growth.

Potassium in plants plays a role in physiological functions, including carbohydrate metabolism, enzyme activity, osmotic regulation, water use efficiency, nitrogen uptake, protein synthesis, and assimilate translocation. Potassium also functions in the process of forming sugar and starch, sugar translocation, enzyme activity and stomata movement. Potassium in the soil is often found as a limiting factor, because potassium is a mobile nutrient and is very sensitive to leaching, especially in tropical areas with high rainfall.

Potassium is absorbed by plants in large enough quantities or sometimes can exceed the amount of nitrogen. Potassium is especially needed by okra plants in the generative phase where the formation and development of flower buds, flowers, fruits and seeds. The results of the study by giving potassium did not affect the vegetative phase such as the variable plant height, stem diameter, and number of leaves, but in the generative phase, namely the application of potassium fertilizer alone showed an increase in seed weight per plant. This is because the element potassium plays an important role in the translocation of carbohydrates, so that an increase in the dose of potassium given increases the translocation of carbohydrates which in turn can increase the size and weight of the seeds. Apart from that, with the very limited availability of okra seeds in agricultural shops, it is also necessary to do research to produce okra seeds or seeds by applying good

cultivation techniques (Irianto et al., 2020).

Rabbit organic fertilizer is one of the solid organic fertilizers, which can add nutrients to the soil, can also add humus, improve soil aggregates and encourage the life of soil microorganisms. Manure also affects the color of the soil so it becomes darker and plays an important role in soil consistency. Research conducted by the Livestock Research Institute (Balitnak) in Ciawi, Bogor district, in 2005 showed that rabbit manure contained elements N, P, K of 2.72%, 1.1% and 0.5% compared to the manure of other livestock such as cows. , buffalo, sheep, horses, even chickens (Sumarni, S. et al, 2015) Fresh weight of pods per plant with a dose of 5 tons/ha of rabbit manure gave the highest value of 693.35 g due to the high nutrient content in organic fertilizers Rabbits have the property of being readily available so they can be well absorbed by plants.

The availability of nutrients contained in rabbit manure is available for the generative period of long bean plants because the process of releasing nutrients in organic matter takes a long time. The high maximum number of leaves at the dose of rabbit manure of 10 tons/ha (D2) was 29.76 strands, this is because rabbit manure has many advantages compared to synthetic fertilizers. In addition to the content of nitrogen (N), phosphorus (P) and potassium (K) which is quite high in rabbit manure contains high nutrients (Astari *et al*., 2019)

The use of organic fertilizers shows the best results because it provides the macro nutrients even in small amounts and the micro nutrients needed by plants. Rabbit manure provides the highest growth variable for bacilli (Ocimum basilicum) compared to urea and rumen (Cabanillas, et al., 2012). Manure from rabbits contains 4.4% organic matter, 461 ppm nitrate, 617.9 ppm phosphate, 180 ppm sulfate, Ca+ , Mg 9.2 (me 100 g-1) (Iwan H., et al., 2020) The effect of each treatment gives results different, because reducing the dose of fertilizer affects plant growth so that the results obtained are not as good as in the treatment with the highest dose, namely the treatment with a dose of 75% N, P, K that the continuity of seed formation is affected by assimilation from photosynthesis and remobilization of nutrients.

The role of nitrogen and phosphorus nutrients is translocated in the early generative phase and is supported by potassium nutrients in seed development (Ru Minta et al., 2017). The flowering age of okra plants with the application of NPK fertilizer forms a negative linear relationship with the equation $\hat{Y} = 35.01 – 0.18x$ with a value of r = 0.99. Based on this equation, it can be seen that the age of flowering of okra plants will be faster as the level of NPK fertilizer is increased

Based on the background above, there has been no research using okra plants in potassium treatment with rabbit organic fertilizer, so the authors are interested in conducting a study entitled Application of Potassium Fertilizer and Rabbit Organic Fertilizer on the Growth and Yield of Okra (*Albemoschus Esculentus* L)

2. MATERIALS AND METHODS

The research was conducted in Sampali Village, Percut Sei Tuan District, Deli Serdang Regency at coordinates N: 98022'33.2 "E: 02034'44" with an altitude of 38 meters above sea level. This

research was conducted from February to May 2021. The materials used in this research were okra seeds, Potassium fertilizer and organic rabbit fertilizer. The tools used were hoes, polybags and tape measure, wood, caliper, camera. This research method was carried out using a factorial Randomized Block Design (RBD) consisting of two treatment factors and the first three replications of the treatment of potassium fertilizer (K) with four levels, namely K0: no treatment, K1: 5 g/plot, K2: 7.5 g/plot K3: 15 g/plot. Second, the treatment of organic fertilizer for rabbits (P) with 4 levels, namely: P0: without treatment, P1: 1 kg/plot, P2: 1.5 kg/plot, P3: 2 kg/plot. The treatments observed were plant height, stem diameter, flowering age and number of fruits per plant. Numbers followed by different letters in the same column represent significantly different according to the 5% DMRT test. Observations were made when the plants were 3.4 and 5 weeks after planting

3. RESULTS AND DISCUSSION

Plant height

The results and variance showed that the application of Potassium fertilizer had no significant effect on the height of the okra plants at the age of 3.4 and 5 WAP, while the application of organic fertilizer for rabbits had a significant effect at the age of 5 weeks. After planting, the average height of the okra plants at the age of 3, 4 and 5 MST with Potassium fertilizer and rabbit organic fertilizer can be seen in table 1.

Table 1. Okra plant height in K fertilizer treatment and rabbit organic fertilizer at age 3, 4 and 5 (MST)

Potassium	Observation		
	3MST	4 MST	5MST
		.....cm.....	
Control	6,10	13,51	30,20
5 g/plot	6,23	13,52	33,22
7,5 g/plot	6,21	13,72	32,12
15 g/plot	6,25	13,71	32,52

Rabbit Manure as a Fertilizer	Observation		
	3MST	4 MST	5MST
		.....cm.....	
Control	6,20	13,52	31,21a
1 kg/plot	6,53	13,87	32,22b
1,5 kg/plot	6,37	13,81	33,24b
2 kg/plot	6,41	13,97	34,42b

Information : Numbers followed by different letters in the same column represent significantly different according to the 5% DMRT test

Based on the above table shows that the application of Potassium fertilizer has no significant effect on plant height K0: without potassium fertilizer, K1: 5 g/plot, K2: 7.5 g/plot K3: 15 g/plot. But it had a significant effect on the treatment of organic fertilizer for rabbits, namely: P0: without treatment, P1: 1 kg/plot, P2: 1.5 kg/plot, P3: 2 kg/plot. That organic fertilizer for rabbits during the observation of 5 weeks after planting, by giving P3: 2 kg/plot showed a better plant height of 34.42 cm and the lowest without treatment P0: 31.21 cm, this is because

rabbit organic fertilizer contains nitrogen nutrients which is useful for the vegetative growth phase, especially plant height while the highest potassium is at K1: 5 g/plot with an average of 33.22 cm while the lowest K3: 15 kg/plot is 32.52 cm. real and very real for all outcome variables (Alfian and Purnamawati, 2019)

Stem diameter

The results of the study and variance showed that the application of Potassium fertilizer had a significant effect on the diameter of the okra plant stems at the age of 5 WAP, while the application of organic fertilizer for rabbits had no significant effect at the ages of 3, 4 and 5 MST, the average diameter of the okra plant stems at the age of 3, 4 and 5 MST with Potassium fertilizer and rabbit organic fertilizer can be seen in table 2.

Table 2. Stem diameter of okra plants treated with Potassium fertilizer and rabbit organic fertilizer at age 3, 4 and 5 (MST)

Potassium	Observation		
	3MST	4 MST	5MST
		.....mm.....	
K0	2,21	4,09	5, 69a
K1	2,27	4,12	5, 91b
K2	2,32	4,18	6,14b
K3	2,41	4,20	6,21c

Information : Numbers followed by different letters in the same column represent significantly different according to the 5% DMRT test

Rabbit Manure as a Fertilizer	Observation		
	3MST	4 MST	5MST
		.....mm.....	
P0	2,21	4,08	6,09
P1	2,34	4,02	6,10
P2	2,32	4,18	6,14
P3	2,37	4,32	7,12

Based on table 2 above, it shows that the application of potassium fertilizer has a significant effect on stem diameter at 5 weeks after planting (MST) K0: without potassium fertilizer, K1: 5 g/plot, K2: 7.5 g/plot K3: 15 g/plot. But it had no significant effect on the treatment of organic fertilizer for rabbits, namely: P0: without treatment, P1: 1 kg/plot, P2: 1.5 kg/plot, P3: 2 kg/plot. Administration of potassium K3: 15 g/plot showed a larger stem dimeter of 6.21 mm and the lowest K0 was 5.69 mm. in it are carbohydrate metabolism, enzyme activity, osmotic regulation, water use efficiency, nitrogen uptake, protein synthesis, and assimilates translocation. Potassium also functions in the process of forming sugar and starch, sugar translocation, enzyme activity and stomata movement. Potassium in the soil is often found as a limiting factor, because potassium is a mobile nutrient and is very sensitive to leaching, especially in tropical areas with high rainfall. In line according to Damanik et al. (2010) stated that the element that plays the most role in maintaining the balance of nutrient absorption is potassium. Potassium is absorbed by plants in large enough quantities or

sometimes can exceed the amount of nitrogen.

Flowering Age

The results and variance showed that the application of Potassium fertilizer had a significant effect on the flowering age of okra plants. Meanwhile, the application of organic fertilizer for rabbits had no significant effect on all treatment observations. .

Table 3. Age of flowering of okra plants on Potassium and Rabbit Organic Fertilizer treatment

Potassium	Rabbit Manure as a Fertilizer (kg/plot)				Average
	P0	P1	P2	P3	
			.....hari.....		
K0	34,22	34,00	34,02	34,32	34,18a
K1	34,33	33,00	33,33	33,23	33,47b
K2	33,34	33,01	32,05	33,56	32,99c
K3	33,11	33,04	33,27	33,34	33,19b
Average	33,75	33,26	33,16	33,61	

Information : Numbers followed by different letters in the same column represent significantly different according to the 5% DMRT test

Based on table 3 above, it shows that the application of Potassium fertilizer has a significant effect on the flowering age K0: without potassium fertilizer, K1: 5 g/plot, K2: 7.5 g/plot K3: 15 g/plot. But it had no significant effect on the treatment of organic fertilizer for rabbits, namely: P0: without treatment, P1: 1 kg/plot, P2: 1.5 kg/plot, P3: 2 kg/plot. Giving potassium K3: 15 g/plot this shows a faster flowering age of about 34 days compared to the other K2 only 32 days this is because physiologically potassium also increases the acceleration of flowering but without treatment it also produces flowers faster due to environmental factors. optimal for flowering Potassium is especially needed by okra plants in the generative phase where the formation and development of flower buds, flowers, fruits, and seeds. This is in line with the results of research where the application of potassium did not affect the vegetative phase such as the variables of plant height, stem diameter, and number of leaves, but in the generative phase, namely the application of potassium fertilizer alone showed an increase in seed weight per plant and the number of large seeds, whereas on the number of fruit (pods) per plant, the number of large seeds, and the ratio of the number of large seeds to small seeds had no effect. The results of research by Nugraheni and Paiman (2010) on tomato plants that a rabbit urine concentration of 3000 ppm can increase plant vegetative growth, namely plant fresh weight, dry weight of plants, dry weight of leaves and dry weight of stems, but has no effect on plant generative growth

Number of Fruits per Plant

The results and variance showed that the application of Potassium fertilizer and organic fertilizer for rabbits had no significant effect on the number of fruits per plant.

Table 4. Number of Fruits per Plant in the treatment of Potassium Fertilizer and Rabbit Organic Fertilizer

Potassium	Rabbit Manure as a Fertilizer (kg/plot)				Average
	P0	P1	P2	P3	
			.....kg.....		
K0	7,23	7,24	7,45	7,82	7,43
K1	7,71	7,76	7,77	7,91	7,78
K2	7,92	7,82	7,98	7,93	7,89
K3	8,92	8,12	8,21	8,47	8,42
Average	7.94	7,75	7,85	8,03	

Based on table 4 above, it shows that the application of Potassium fertilizer and organic fertilizer for rabbits had no significant effect on the number of fruits per plant K0: without potassium fertilizer, K1: 5 g/plot, K2: 7.5 g/plot K3: 15 g/plot. The treatment of organic fertilizer for rabbits, namely: P0: without treatment, P1: 1 kg/plot, P2: 1.5 kg/plot, P3: 2 kg/plot. This can be seen from K3 giving potassium 15 g/plot producing the optimal number of fruits per plant 8.42 kg and the lowest being 7.43 kg without treatment as well as the highest rabbit organic fertilizer at P3 of 8.03 and the lowest at P1 with a dose of 1, 5 kg/plot is 7.75 kg so that the results of research by Rinekso et al, (2011) cattle urine from Jatibarang which has been fermented for 15 days

However, rabbit urine has advantages compared to cow urine so that it does not disturb the environment and has a good effect on the growth of cocoa seedlings in particular.

4. CONCLUSION

Organic fertilizer for rabbits treated at 7.5 g/plot Plant height was 34.42 cm at 5 WAP for stem diameter. Potassium fertilizer had a significant effect on 2 kg/plot at 5 MST. .5 g/plot flowering age 32 HST highest yield was treated with potassium and 15 g/plot organic rabbit fertilizer.

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