AGRIWAR JOURNAL
MASTER OF AGRICULTURAL SCIENCE WARMADEWA UNIVERSITY
E-ISSN: 2808-1137, **P-ISSN**: 2808-1323
Vol. 4, **No.** 2, **Dec 2024**, **Page** 125-131
DOI: https://doi.org/10.22225/aj.4.2.2024.125-131

Application of Pig Manure and NPK on The Growth and Yield of Cayenne Pepper (*Capsicum Frutescens* L.)

Gede Yudi Sedana, Made Sri Yuliartini, Ketut Agung Sudewa

Agrotechnology Study Program, Faculty of Agriculture, Warmadewa University, Denpasar, Bali, Indonesia
*Corresponding author: yuliartinisri@yahoo.co.id

Abstract
This study aims to determine the effect of pig manure and NPK fertilizer doses on the growth and yield of cayenne pepper (Capsicum frutescens L.) plants. This study used a Randomized Block Design (RBD). The results of this study show that the interaction between the dose of pig manure and NPK fertilizer (PxN) has no significant effect on all observed variables. The dose of pig manure (P) had a very substantial impact on all observed variables except the harvest index variable which did not show a significant impact. The dose of NPK (N) fertilizer did not have a substantial effect on all observed variables, except for the harvest index (very considerable impact). The highest fresh weight and oven-dry weight of fruit per plant were obtained at a pig manure dose of 30 tons ha^{-1}, namely 343.39 g and 53.34 g, respectively increased by 158.95% and 66.94% compared to the lowest fresh weight and oven-dry weight of fruit obtained at a pig manure dose of 0 tons ha^{-1}, namely 132.61 g and 31.95 g, respectively. The NPK fertilizer dose treatment gave a fresh weight of fruit per plant that was not significantly different from one another.

Keywords: *Pig Manure; NPK Fertilizer; Cayenne pepper*

1. Introduction

Cayenne pepper (*Capsicum frutescens* L.) is a shrub plant with a spicy fruit flavor caused by the content of capsaicinoids. In general, chili peppers have many nutrients and vitamins, including calories, protein, fat, carbohydrates, calcium, vitamins A, B1, and vitamin C [1]. This fruit vegetable has favorable economic prospects, used for household needs, the food industry, and pharmaceuticals which are increasing rapidly in Indonesia. The main benefit of chili peppers for consumers is as a flavoring ingredient or seasoning. Besides being consumed in fresh form, chili is also needed as a raw material for several industries such as chili sauce, sauce, seasoning variations, oleoresins, dyes, and medicines (analgesics) [2].

Livestock and agricultural waste, if not utilized, will have an impact on the environment in the form of air, water, and soil pollution, become a source of disease, can spur an increase in methane gas, and also disturb aesthetics and comfort [3]. Livestock waste as the final product of the livestock business has the potential to be managed into fertilizers that can be used to improve the carrying capacity of the environment, increase crop production, increase farmers' income, and reduce the impact of pollution on the environment [4]. One type of organic fertilizer that is often found in pig manure. The potassium content in pig manure is twice as high as in cow and goat manure. Nitrogen and potassium are needed by plants to stimulate plant growth and facilitate photosynthesis [5]. The nutrient content of fresh pig manure is 0.95% N, 0.35% P, 0.40% K, and 87% water for manure in liquid form [6].

The nutrient content in manure is not too high, but this type of fertilizer has another function that can improve soil physical properties such as soil permeability, soil porosity, soil structure, water holding capacity, and soil cations [7]. According to [8], the recommended dose of organic fertilizer for cayenne pepper plants is 20 tons per ha. Based on the results of [9] the treatment of 20 tons per ha (500 g per polybag) of chicken manure can give good results on plant height, plant dry weight, root volume, fruit number, and cayenne fruit weight.

NPK fertilizer is an inorganic fertilizer that contains more than one nutrient, so it is also called compound fertilizer. NPK fertilizer contains nutrients, nitrogen, phosphorus, and potassium. Nutrients N, P, and K are essential nutrients for plants and as a limiting factor for plant growth. Increasing the dose of N fertilization in the soil can directly increase protein (N) levels and crop production, but the fulfillment of N elements without P and K will cause plants to lodge easily, sensitive to pest attacks, and reduce the quality of farm production [10]. According to research [11], states that the use of pearl NPK fertilizer can increase plant growth and accelerate plant growth. This fertilizer is very good for supporting plant growth. In addition, the advantage is that the nutrients contributed can meet the nutrient needs of plants with the best NPK dosage of 250 kg NPK ha^{-1} (45 g NPK $plot^{-1}$) for the best growth and yield [12].

2. Materials and Methods

This research was conducted from January to May 2024, located at P4S Sedana Sari, Banjar Mekar Sari, Selat Village, Abiansemal District, Badung Regency with an altitude of 350 meters above sea level. This research is a factorial experiment with the basic design of Randomized Block Design (RBD) with 2 factors tested. The first factor is the dose of pig manure consisting of 4 levels, namely: P0 = 0 ton ha^{-1}, P1 = 10 ton ha^{-1}, P2 = 20 ton ha^{-1}, and P3 = 30 ton ha^{-1}. The second factor is the dose of NPK fertilizer which consists of 3 levels, namely: N1 = 50 kg ha^{-1}, N2 = 100 kg ha^{-1}, and N3 = 150 kg ha^{-1}. 12 combinations were repeated 3 times so that the study required 36 plots in total. Variables observed in this study include maximum plant height, maximum number of leaves per plant, number of fruits formed per plant, total number of harvested fruits per plant, fresh weight of fruit per plant, oven-dry weight of fruit per plant, and harvest index.

The data collected were analyzed statistically with fingerprint analysis according to the research design. If a single treatment or interaction has a real to very real effect, then it is continued with a 5% LSD test. Furthermore, to determine the closeness of the relationship between variables, correlation analysis is used.

3. Results and Discussion

3.1 Results

Based on the results of the analysis, the significance of the effect of the dose of pig manure (P) and the dose of NPK fertilizer (N) and their interaction (PxN) on the observed variables is presented in Table 1.

Table 1. Significance of the effect of doses of pig manure and NPK fertilizer on all observed variables

No.	Variables	Pigs Manure (P)	NPK Fertilizer (N)	Interaction (P×N)
1.	Maximum plant height (cm)	**	ns	ns
2.	Maximum number of leaves per plant (strands)	**	ns	ns
3.	Number of fruits formed per plant (piece)	**	ns	ns
4.	Total harvested fruit per plant (piece)	**	ns	ns
5.	Fresh fruit weight per plant (g)	**	ns	ns
6.	Oven dry weight of fruit per plant (g)	**	ns	ns
7.	Harvest index (%)	ns	**	ns

Note: *= significant effect (P<0.05), **= very significant effect (P<0.01), ns= not significant (P≥0.05

Based on Table 1, shows the interaction between the dose of pig manure and NPK fertilizer (PxN) had no significant effect (P≥0.05) on all variables observed. The dose of pig manure (P) had a very significant effect (P<0.01) on maximum plant height, maximum number of leaves per plant, number of fruits formed per plant, total harvested fruits per plant, fresh weight of fruits per

DOI: https://doi.org/10.22225/aj.4.2.2024.125-131

plant, oven dry weight of fruits per plant, and had no significant effect (P≥0.05) on harvest index. The dose of NPK (N) fertilizer did not have a significant effect (P≥0.05) on the maximum plant height, maximum number of leaves per plant, number of fruits formed per plant, number of fruits harvested per plant, fresh weight of fruit per plant, and oven dry weight of fruit per plant, but had a very significant effect (P<0.01) on the harvest index (Table 1).

3.1.1 Plant Height (cm)

The highest average maximum plant height was obtained in the treatment of 30 tons ha^{-1} pig manure dose (P3) which was 100.72 cm and the lowest was obtained in the dose of 0 tons ha^{-1} pig manure (P0) which was 67.11 cm (Table 2). The average maximum plant height was higher in the treatment of NPK fertilizer dose of 150 kg ha^{-1} (N3) which was 90.33 cm which was not significantly different from the other treatments (Table 2).

Table 2. Average maximum plant height and maximum number of leaves per plant due to the effect of pig manure (P) and NPK fertilizer (N)

Dosage Treatment	Maximum plant height (cm)	Maximum number of leaves (strands)
Pig Manure (P)		
P0 (0 ton ha^{-1})	67.11 c	155.89 c
P1 (10 ton ha^{-1})	89.11 b	238.72 b
P2 (20 ton ha^{-1})	95.72 ab	250.56 ab
P3 (30 ton ha^{-1})	100.72 a	262.61 a
LSD 0.05	7.58	13.82
NPK Fertilizer (N)		
N1 (50 kg ha^{-1})	86.21 a	223.67 a
N2 (100 kg ha^{-1})	87.96 a	226.96 a
N3 (150 kg ha^{-1})	90.33 a	230.21 a
LSD 0.05	-	-

Description: The average value followed by the same treatment in the same column means that it is not significantly different in the 5% LSD test.

3.1.2 Number of leaves (strands)

The highest average maximum number of leaves was obtained in the treatment of 30 tons ha^{-1} pig manure dose (P3) which was 262.61 strands and the lowest was obtained in the dose of 0 tons ha^{-1} pig manure (P0) which was 155.89 strands (Table 2). The average maximum number of leaves was higher in the treatment of NPK fertilizer dose of 150 kg ha^{-1} (N3) which was 230.21 strands which was not significantly different from the other treatments (Table 2).

3.1.3 Number of fruits formed per plant (piece)

The highest average number of fruits formed per plant was obtained in the treatment of 30 tons ha^{-1} pig manure dose (P3) which was 147.28 (piece) and the lowest was obtained in the dose of 0 tons ha^{-1} pig manure (P0) which was 89.61 (piece). The average number of fruits formed per plant was higher in the treatment of NPK fertilizer dose of 100 kg ha^{-1} (N2) which was 124.00 (piece) which was not significantly different from the other treatments (Table 3).

Table 3. The average number of fruits formed per plant and total harvested fruits per plant due to the effect of pig manure (P) and NPK fertilizer (N)

Dosage Treatment	Number of fruits formed per plant (piece)	Total number of harvested fruits per plant (piece)
Pig Manure (P)		
P0 (0 ton ha^{-1})	89.61 c	73.44 c
P1 (10 ton ha^{-1})	124.28 b	101.78 b
P2 (20 ton ha^{-1})	128.06 b	105.04 b
P3 (30 ton ha^{-1})	147.28 a	127.28 a

DOI: https://doi.org/10.22225/aj.4.2.2024.125-131

LSD 0.05	14.76	13.34
NPK Fertilizer (N)		
N1 (50 kg ha^{-1})	120.92 a	97.63 a
N2 (100 kg ha^{-1})	124.00 a	105.25 a
N3 (150 kg ha^{-1})	122.00 a	103.46 a
LSD 0.05	-	-

Description: The average value followed by the same treatment in the same column means that it is not significantly different in the 5% LSD test.

3.1.4 Total number of fruits harvested per plant (piece)

The highest average number of total harvested fruits per plant was obtained in the treatment of 30 tons ha^{-1} pig manure dose (P3) which was 127.28 (piece) and the lowest was obtained in the dose of 0 tons ha^{-1} pig manure (P0) which was 73.44 (piece). The average number of total harvested fruits per plant was higher in the treatment of NPK fertilizer dose of 100 kg ha^{-1} (N2) at 105.25 which was not significantly different from the other treatments (Table 3).

3.1.5 Fresh Fruit Weight Per Plant (g)

The highest average fresh weight of fruit per plant was obtained in the treatment of pig manure dose of 30 tons ha^{-1} (P3) which was 343.39 g which increased by 158.95% compared to the lowest average fresh weight of fruit per plant obtained in the dose of pig manure 0 tons ha^{-1} (P0) which was 132.61 g. The average fresh weight of fruit per plant was higher in the treatment of NPK fertilizer dose of 150 kg ha^{-1} (N3) which was 238.96 g which was not significantly different from the other treatments (Table 4).

3.1.6 Oven dry weight of fruit per plant (g)

The highest average oven-dry weight of fruit per plant was obtained in the treatment of 30 tons ha^{-1} pig manure dose (P3) which was 53.34 g, an increase of 66.94% compared to the lowest oven-dry weight of fruit obtained in the dose of 0 tons ha^{-1} pig manure (P0) which was 31.95 g. The average oven-dry weight of fruit per plant was higher in the treatment of 50 kg ha^{-1} NPK fertilizer dose (N1) at 42.44 g which was not significantly different from the other treatments (Table 4).

Table 4. Average fresh weight of fruit per plant, oven-dry weight of fruit per plant, and harvest index due to the effect of pig manure (P) and NPK fertilizer (N)

Dosage Treatment	Fresh weight of fruit per plant (g)	Oven dry weight of fruit per plant (g)	Harvest Indeks (%)
Pig Manure (P)			
P0 (0 ton ha^{-1})	132.61 c	31.95 c	41.41 a
P1 (10 ton ha^{-1})	235.72 b	40.35 b	33.53 b
P2 (20 ton ha^{-1})	243.89 b	40.91 b	35.32 b
P3 (30 ton ha^{-1})	343.39 a	53.34 a	35.25 b
LSD 0.05	24.66	6.75	-
NPK Fertilizer (N)			
N1 (50 kg ha^{-1})	238.79 a	42.44 a	41.52 a
N2 (100 kg ha^{-1})	238.96 a	41.83 a	36.60 a
N3 (150 kg ha^{-1})	238.96 a	40.63 a	31.02 a
LSD 0.05	-	-	10.75

Description: The average value followed by the same treatment in the same column means that it is not significantly different in the 5% LSD test.

3.1.7 Harvest Indeks (%)

The highest average harvest index was obtained in the treatment of pig manure dose without treatment (P0) which was 41.41 and the lowest was obtained in the dose of pig manure 10 tons ha^{-1} (P1) which was 33.53%. The highest average harvest index was found in the treatment of

DOI: https://doi.org/10.22225/aj.4.2.2024.125-131

50 kg ha^{-1} NPK fertilizer dose (N1) which was 41.52 and the lowest was found in the 150 kg ha^{-1} NPK fertilizer dose (N3) which was 31.02% (Table 4).

3.2 Discussion

The highest oven-dry weight of fruit per plant was obtained in the treatment of 30 tons ha^{-1} pig manure dose (P3) which was 53.34 g, an increase of 66.94% compared to the lowest oven-dry weight of fruit obtained at 0 tons ha^{-1} pig manure dose (P0). The high oven-dry weight of fruit per plant was supported by the fresh weight of fruit per plant (0.990**), total harvested fruit per plant (0.949**), number of fruits formed per plant (0.949**), the maximum number of leaves per plant (0.840*), and maximum plant height (0.878**).

The highest fresh weight of fruit per plant was obtained in the treatment of 30 tons ha^{-1} pig manure dose (P3) which was 343.39 g which increased by 158.95% compared to the lowest fresh weight of fruit per plant obtained in the dose of 0 tons ha^{-1} pig manure (P0) which was 132.61g. The high fresh weight of fruits per plant was supported by maximum plant height (0.936**), maximum number of leaves per plant (0.909**), number of fruits formed per plant (0.984**), total harvested fruits per plant (0.984**), and oven dry weight of fruits (0.949**).

The high oven-dry weight of fruit per plant and fresh weight of fruit in small chili plants at a dose of 30 tons ha-^{1} of pig manure is due to pig manure able to improve the physical, chemical, and biological properties of the soil so that nutrients become available and can be absorbed by plants; in addition, pig manure contains nutrients Nitrogen 0.570% (very high), available P 710.82 ppm (very high) and available K 1086.03 ppm (very high). The high nutrient content in pig manure indicates that pig manure is very appropriate as a fertilizer for plants.

Some research results that apply manure to chili plants show positive results. The application of chicken manure 30 tons ha^{-1} can increase the maximum plant height, the maximum number of leaves per plant, the number of fruits formed per plant, the total number of harvested fruits per plant, the fresh weight of fruit per plant, the oven dry weight of fruit per plant, the fresh weight of stalks, the oven dry weight of stalks [13]. Likewise, the use of types of manure in red chilies such as chicken manure affects the production of red chili plants [14]. Manure is solid and liquid manure from livestock, both ruminants and poultry. The advantage of manure does not lie in the nutrient content because manure has a low nutrient content. The advantage is that manure can increase humus, improve soil structure, and increase the life of decomposing microorganisms [15]. Pig manure contains several nutrients that are higher than other livestock wastes such as sheep, horses, and cows. Pig manure is very good as fertilizer for crops, especially vegetables, and seeds, but it takes a long time to decompose [16]. Pig manure in solid or liquid form contains macro and micronutrients needed by plants. According to [17], macronutrients consist of nitrogen (N), phosphorus (P), and potassium (K) while micronutrients consist of iron (Fe), zinc (Zn), manganese (Mn), copper (Cu), chlorine (Cl), calcium (Ca), magnesium (Mg), and sulfur (S) contained in livestock manure. Phosphorus nutrients are mostly found in solid manure, while nitrogen and potassium nutrients are found in liquid manure. Pig manure can be decomposed quickly when assisted by microbes including lactic acid bacteria Lactobacillus Sp, EM4, photosynthetic bacteria, and Streptomyces sp. One activator that can be used is Effective Microorganisms (EM4). EM4 is a group of microorganisms that can accelerate the composting process, and improve soil quality. This microbe has a good effect on the quality of pig manure, while the availability of nutrients in the fertilizer is strongly influenced by the length of incubation time required by bacteria to degrade pig manure into manure that is ready to be applied to plants [18]. The application of organic fertilizers into the soil is not only used as a source of macro, micro, and organic acids, but also acts as a soil improver for long-term physical, chemical, and biological soil fertility.

The higher fresh weight of fruit per plant was obtained in the treatment of NPK fertilizer dose of 150 kg ha^{-1} (N3) which was 238.96 which was not significantly different from the other treatments. The high fresh weight of fruit per plant was supported by the maximum plant height (0.819*), the maximum number of leaves per plant (0.868*), the number of fruits formed per plant (0.769*), the total number of harvested fruits per plant (0.769*).

Giving a dose of NPK fertilizer (N) 150 kg ha^{-1} gives positive results on the growth of cayenne pepper plants, namely more on the fresh weight of stalks and dry weight of oven stalks. Pearl

DOI: https://doi.org/10.22225/aj.4.2.2024.125-131

NPK fertilizer (16:16:16) is one of the compound inorganic fertilizers that have macronutrients N, P, and K each 16% [19]. This fertilizer is very good for supporting plant growth. N, P, and K are important factors and must be available to plants because they function as metabolic and biochemical processes of plant cells. N, P, and K are important factors and must be available to plants because they function as metabolic and biochemical processes of plant cells. Nitrogen is used as a builder of nucleic acids, proteins, enzymes, and chlorophyll. Phosphorus is used as a builder of nucleic acids, phospholipids, enzymes, proteins, and metabolic compounds that are part of ATP and important in energy transfer. Potassium is used as a regulator of ion balance - cell ions that function in regulating various metabolic mechanisms such as photosynthesis. For this reason, giving doses of N, P, and K fertilizers will have a good effect on plant growth and yield [20]. The function of NPK Pearl nutrients for plants is Nitrogen (N) to stimulate overall growth, especially stems, branches, and leaves, plays a role in the formation of green leaves which are very useful in photosynthesis, forming proteins, fats, and various organic compounds, Phosphorus (P) which stimulates root growth, especially the roots of seeds and young plants as raw material for the formation of certain proteins, helps assimilation and respiration, accelerates fruit ripening, potassium (K) helps the formation of proteins and carbohydrates, strengthens leaves, flowers, and fruit so that they do not fall easily [21].

4. Conclusion

The interaction between the dose of pig manure and NPK fertilizer had no significant effect on all variables observed. The highest fresh weight and oven dry weight of fruit per plant were obtained at a dose of 30 tons ha^{-1} of pig manure, which were 343.39 g and 53.34 g, an increase of 158.95% and 66.94% compared to the lowest fresh weight and oven dry weight of fruit obtained at a dose of 0 tons ha^{-1} of pig manure, which were 132.61 g and 31.95 g, respectively. The treatment of NPK fertilizer doses gave fresh weight per plant which was not significantly different from one another. The highest fresh weight and oven dry weight of fresh fruit were found in the treatment of NPK fertilizer dose of 150 kg ha^{-1} which were 375.83 g and 96.46 g which increased by 24.58% and 48.56% compared to the lowest fresh weight and oven dry weight of fresh fruit obtained at the dose of NPK fertilizer of 50 kg ha^{-1} which were 301.67 g and 64.93g respectively.

Reference

[1] Rukmana, R. (2002). *Usaha Tani cabai Hibrida Sistem Mulsa Plastik*.Yogyakarta: Kanisius

[2] Hilmayanti, I., Dewi, W., Murdaningsih, M. R., Rostini, N., & Setiamihardja, R. (2006). Pewarisan karakter umur berbunga dan ukuran buah cabai merah (*Capsicum annuum* L.). Zuriat, 17(1), 86-93.

[3] Nenobesi, D. (2017). Pemanfaatan limbah padat kompos kotoran ternak dalam meningkatkan daya dukung lingkungan dan biomassa tanaman kacang hijau (*Vigna radiata* L.). *Jurnal Pangan*, 26(1), 43-56.

[4] Nugraha, S. P. (2013). Pemanfaatan kotoran sapi menjadi pupuk organik. *AJIE (Asian Journal of Innovation and Entrepreneurship)*, 2(03), 193-197.

[5] Mulyati, R. S.,Tejowulan, dan Octarina, V.A. (2007). Respon Tanaman Tomat terhadap Pemberian Pupuk Kandang Ayam dan Urea terhadap Pertumbuhan dan Serapan N. *Agroteksos*, 17(1).

[6] Kartadisastra, H. R. (2001). *Penyediaan dan Pengelolaan Pakan Ternak Ruminansia*. Kanisius, Yogyakarta.

[7] Roidah, I.S., (2013). Manfaat Penggunaan Pupuk Organik untuk Kesuburan Tanah. *Jurnal Universitas Tulungagung Bonorowo* (1):130-42.

[8] Setiadi (2008). *Dosis Pupuk Organik Pada Tanaman Cabai*. Penebar Swadaya. Jakarta.

[9] Simanungkalit, E. 2012. Pengaruh Dosis Pupuk Kandang Kotoran Ayam Terhadap Pertumbuhan Dan Hasil Cabai Rawit Di Tanah Gambut. *Skripsi*. Universitas Tanjungpura, Pontianak. Tidak dipublikasikan.

[10] Tuherkih, E. & Sipahutar, I. A. (2008). Pengaruh Pupuk NPK Majemuk (16:16:15) terhadap pertumbuhan dan hasil jagung (*Zea mays* L.) di Tanah Inceptisols. Bogor: *Balai Penelitian Tanah*.

[11] Fiolita, V., Muin, A., Fahrizal, (2017). Penggunaan Pupuk NPK Mutiara Untuk Peningkatan Pertumbuhan Tanaman Gaharu (*Aquilaria* sp), Pada Lahan Terbuka di Tanah Ultisol. *Jurnal Hutan Lestari*, 5 (3): 850 – 857.

[12] Wijaya, A. (2011). Kacang Tanah Dosis Pemberian Pupuk NPK 250 kg/ha https://balitkabi.litbang.pertanian.go.id.

DOI: https://doi.org/10.22225/aj.4.2.2024.125-131

[13] Tarihoran, M., Barunawati, N., & Roviq, M. (2019). Pengaruh Pupuk Kotoran Kambing dan Waktu Aplikasi PGPR (Plant Growth Promoting Rhizobacteria) terhadap Pertumbuhan dan Hasil Tanaman Cabai Rawit (*Capsicum frutescens* L.). *Jurnal Produksi Tanaman*, 7(7). 1181-1189.
[14] Marlina, N. (2010). Pemanfaatan jenis pupuk kandang pada cabai merah (*Capsicum annum* L.). *Jurnal Embrio*, 3(2): 105-109
[15] Zulkarnain, Z. (2009). *Dasar-dasar hortikultura*. PT Bumi Aksara.
[16] Wikifarmer. (n.d.). *Maize Water Requirements and Irrigation Systems.* Retrieved October 18, 2022, from https://wikifarmer.com/maize-water-requirements-and-irrigation-systems/
[17] Musnamar, E. I. (2003). *Pupuk Organik*. Penebar Swadaya. Jakarta.
[18] Siburian, R. (2008). Pengaruh konsentrasi dan waktu inkubasi EM4 terhadap kualitas kimia kompos. *Jurnal Bumi Lestari*, 8(1), 1-15.
[19] Fahmi, N. (2014). Pengaruh Pupuk Organik dan norganik Terhadap Pertumbuhan DanHasil Kedelai (*Glycine Max* L.) Merril). *J. Floratek* 9: 53-62.
[20] Firmansyah, I., Syakir, M., dan Lukman, L. (2017). Pengaruh Kombinasi Dosis Pupuk N, P, dan K terhadap Pertumbuhan dan Hasil Tanaman Terung (*Solanum melongena* L.), 27(1), 69–78.
[21] Lingga dan Marsono. (2011). *Petunjuk Penggunaan Pupuk*. Penebar Swadaya. Jakarta.

DOI: https://doi.org/10.22225/aj.4.2.2024.125-131