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Cauliflower (*Brassica oleracea* var. botrytis L) Growth and Yield Response by providing Kasgot Fertilizer and NPK on Ultisol Soil

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Abstract

The development of cauliflower cultivation (*Brassica oleracea* var. botrytis L.) on marginal land necessitates implementing appropriate cultivation techniques to enhance plant growth and production. In this context, applying organic fertilizers, such as Kasgot and NPK fertilizers, is anticipated to improve the productivity of cauliflower in Riau Province. This study aims to evaluate the effects of Kasgot and NPK fertilizers on the growth and production of cauliflower cultivated on Ultisol Soil. The research was conducted at the UIR Experimental Garden in Pekanbaru from August to December 2024. A Completely Randomized Design (CRD) Factorial was employed for this study. The first factor examined was the dosage of Kasgot fertilizer (K), which included four treatment levels: no Kasgot fertilizer, and Kasgot fertilizer at 100 g, 200 g, and 300 g per polybag. The second factor examined was the NPK fertilizer (N) dose, which included five treatment levels: no NPK, and NPK fertilizer at 3.75 g, 7.5 g, 11.25 g, and 15 g per polybag. Each experimental unit was replicated three times. The results indicated that the data collected, including plant height, age of flower formation, relative growth rate, flower weight per plant, flower diameter, and root volume, were significantly influenced by the interaction between phosphorus fertilizer and NPK fertilizer. The combination of 300 g of Kasgot fertilizer per polybag and 7.25 g of NPK per polybag proved to be the most effective in enhancing the relative growth rate, flower weight per plant, and flower diameter in cauliflower.

Keywords: *Brassica oleraceae*, BSF, Inorganic, Marginal, Organic

1. Introduction

Cauliflower (Brassica oleracea var. botrytis L.) is a horticultural plant with significant economic potential and numerous health benefits. Cultivation of cauliflower is expanding beyond highland areas to include lowland regions, such as Riau. However, according to data from the Badan Pusat Statistik Riau (2024), cauliflower production in Riau is only about 5 tons, in stark contrast to the total production in the West Sumatra region, which reached 10,236 tons. This data indicates that cauliflower production in Riau Province remains very low, highlighting the need for efforts to enhance its cultivation.

As is well known, the land conditions in Riau are predominantly characterized by marginal land, particularly PMK land. The Badan Pusat Statistik Riau (2017) states that red-yellow podzolic soil spans 2.2 million hectares. Low acidity, organic matter, and nutrient levels characterize red-yellow podzolic soil. Therefore, improvement efforts are necessary if this land is to be utilized for agriculture, including applying fertilizers. According to Kaya et al. (2017) and Aritonang and Surtinah (2018), organic fertilizer on red-yellow podzolic soil can significantly enhance plant growth and yield.

Cassava fertilizer comes from the digestive waste produced by Black Soldier Fly (BSF) maggot larvae. Organic cassava fertilizer or BSF fly larva residue contains macro and micronutrients that plants need. The content contained in Kasgot in the form of N 3.276%, P 3.387%, K 9.74%, C-organic 40.95%, and C/N ratio 12.50%, the content is very good for plant growth, so that it can be used as a fertilizer that fertilizes the soil (Muhadat, 2021). Kare et al. (2023) stated that the provision of Kasgot fertilizer can increase the growth and production of pak choy plants. However, there has not been much research on Kasgot fertilizer for cauliflower plants.

In addition to providing organic fertilizer, inorganic

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fertilizer needs to be added because the content of organic fertilizer Kasgot is still low, so that to increase the production of cauliflower in red-yellow podzolic land, the addition of inorganic fertilizer is needed. Inorganic fertilizer has advantages in faster absorption into plants and increasing crop yields. Combining organic and inorganic fertilizers can contribute positively to the balance of plant nutrients and improve soil fertility (Putro et al., 2016).

One of the inorganic fertilizers that can be utilized is NPK fertilizer. NPK fertilizer is included in the compound fertilizers category, containing three macronutrients and two micronutrients: nitrogen, phosphorus, potassium, calcium, and magnesium. This fertilizer has hygroscopic properties (easily soluble) so that plants can absorb well, and its nature is neutral (Hidayatullah et al., 2020). Baharuddin et al. (2021)conducted previous research with shade and NPK fertilizer application on cauliflower plants. However, in this study, emphasizing nutrient-poor soil, such as red-yellow podzolic, has not been discussed much in the research examining the correct dose of NPK fertilizer on cauliflower plants on red-yellow podzolic soil.

A study examines the effectiveness of Kasgot and NPK fertilizers in increasing the growth and yield of cauliflower. Kasgot fertilizer can increase the fertility of low red-yellow podzolic soil, and NPK fertilizer is expected to increase cauliflower production. This study aims to determine cauliflower plants' growth response and production regarding providing Kasgot fertilizer and NPK on red-yellow podzolic soil.

2. Material and Methods

This study was conducted at the Experimental Garden of the Faculty of Agriculture, Islamic University of Riau, Pekanbaru City 0°26'54.7"N 101°27'37.6"E with an altitude of 35 meters above sea level. The research took place from September to December 20 24.

This study was conducted using a factorial Completely Randomized Design (CRD). The first factor was the dose of Kasgot (K), consisting of four treatment levels: 0, 1 00, 2 00, and 3 00 g / polybag, while the second factor is NPK (N) with five treatment levels: 0, 3.75, 7.5, 11.25, and 15 g/polybag. Each experimental unit was repeated three times, so that there were a total of 48 experimental units.

The implementation of the research activities is presented in Figure 1. The implementation began with the seeding of Larissa variety of cauliflower in a mixture of media consisting of soil, manure, and rice husk charcoal with a ratio of 1:1:1 (v). The seeding process was carried out for 28 days. Red-yellow podzolic soil was used as a planting medium and put into a 40 cm x 50 cm polybag. Previously, the media was added 50 g of dolomite/polybag and given Kasgot 1 week before planting according to the treatment dose. Then the cauliflower seedlings aged 28 days after sowing (hss) were planted with 1 seedling/polybag. Next, give NPK fertilizer gradually at planting and 21 DAP, with half the treatment dose for each.

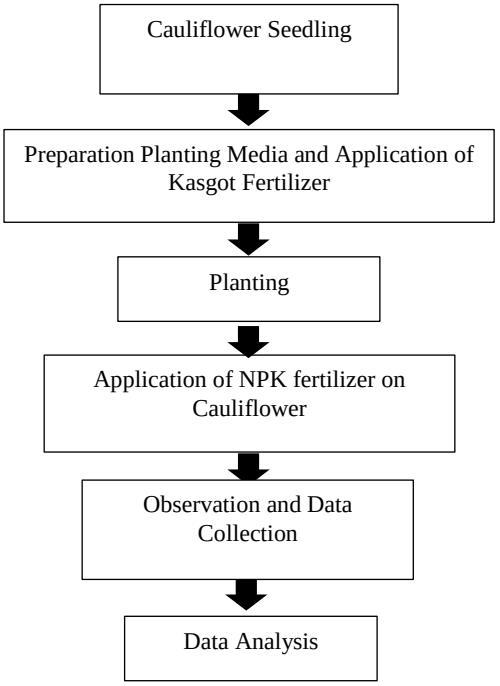

Figure 1. Research Implementation Flowchart

Maintenance carried out includes activities such as watering, weeding, and controlling plant pests and diseases (HPT). Harvesting occurs when the cauliflower flowers look dense and the outer leaves wilted. The observation parameters include: plant height, relative growth rate, age of flower formation, flower weight per plant, flower diameter, and root volume.

The collected data were then analyzed using statistical processing software R Studio version 4.2.2 with the analysis of variance (ANOVA) method. Further Honestly Significant Difference (HSD) testing was carried out if the calculated F value exceeded the F table value at a significance level of 5%.

3. Results and Discussion

3.1. Plant Height

The results of the variance analysis showed that the use of Kasgot fertilizer and NPK fertilizer, and their interactions, had a significant effect on the height of cauliflower plants. Figure 2 shows that the provision of Kasgot fertilizer of 300 g/ polybag and NPK fertilizer of 7.5, 11.25, and 15 g/polybag can significantly increase plant height, reaching 112.27%, 126.40%, and 126.62%, respectively, compared to the control at 35 DAP.

The increase in the height of cauliflower plants given 300 g/polybag of Kasgot and 7.5-15 g/polybag of NPK showed that the provision of organic Kasgot and NPK fertilizers was able to increase the availability of higher nutrients, which encouraged higher vegetative growth in plants receiving higher doses of Kasgot and NPK

fertilizers. The use of organic fertilizers in the soil contributes to improving the soil's physical, chemical, and biological characteristics, thus supporting plant growth and development. Furthermore, NPK fertilizer can meet the needs of N, P, and K nutrients plants (Kustiawan et al., 2024). These results align with the studies conducted (Nasution et al., 2024) and (Zahrah et al., 2024), which state that providing organic fertilizer combined with NPK can increase plant height.

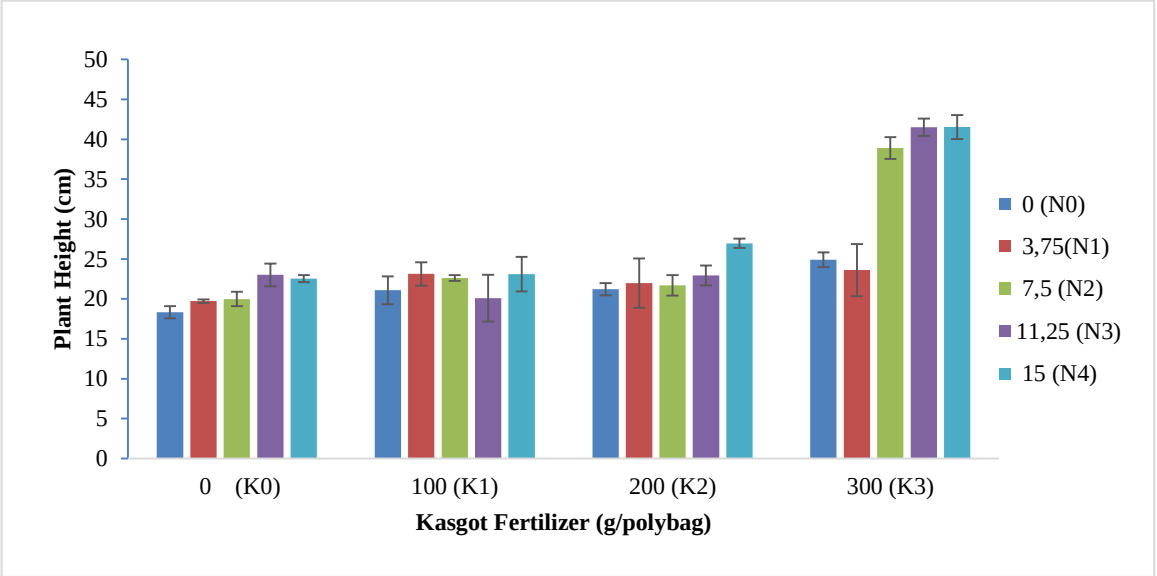

Figure 2. Histogram of the average height of cauliflower plants (cm) after administration of Kasgot fertilizer and NPK at the age of 3-5 DAP

Hartatik et al. (2015) stated that the process of forming roots, branches, stems, and the presence of the required macro and micronutrients, such as nitrogen, phosphorus, potassium, calcium, and magnesium influences leaves in plants. The growth of cauliflower plants is highly influenced by the supply of nutrients, especially nitrogen nutrients, which are needed for vegetative growth of plants. The provision of N, P, and K as an addition to organic materials can increase the amount of nitrogen compounds available to plants from both organic and inorganic sources, leading to increased leaves. Hence, photosynthesiis better (Kumar et al., 2024). This study produced higher plant heights than studies (Fransiska et al., 2017) using 250 kg/ha NPK fertilizer.

3.2. Age The formation of Flower

The results of the variance analysis show that the application of Kasgot fertilizer and NPK fertilizer and their interactions significantly affect the age of flower formation, as shown in Table 1. The results show that the application of Kasgot fertilizer at a dose of 3.00 g/polybag and NPK 7.5 g/polybag (K3N2) and the treatment of Kasgot fertilizer at a dose of 3.00 g/polybag and NPK 11.25 g/polybag (K3N3) can accelerate the age of flower formation amounted to 38.08% and 37.41% compared to controls. Treatment without giving cashgot, and without NPK (K0N0) gave the oldest flower formation age of 48.33 days after planting.

Table 1. Average age of cauliflower flower formation with the provision of Kasgot fertilizer and NPK fertilizer (DAP)

Kasgot Fertilizer (g/polybag)	NPK (g/polybag)					Average
	0 (N0)	3.75(N1)	7.5 (N2)	11.25 (N3)	15 (N4)	
0 (K0)	48.33 ±3.82 a	40.00 ±1.00 bc	41.50 ±1.80 b	38.67 ±0.58 bcd	38.00 ±0.03 bcd	41.30 ±4.15 a
100 (K1)	37.83 ±2.57 bcd	37.17 ±2.02 bcd	40.17 ±1.04 bc	37.00 ±0.50 bcd	37.17 ±0.58 bcd	37.86 ±1.32 b
200 (K2)	36.67 ±1.44 cd	36.67 ±0.76 cd	36.17 ±1.26 cd	35.83 ±2.47 cd	36.33 ±0.29 cd	36.33 ±0.35 c
300 (K3)	36.50 ±1.32 cd	36.00 ±0.50 cd	35.00 ±0.50 d	35.17 ±1.53 d	37.33 ±0.29 bcd	36.00 ±0.96 c
Average	39.83 ±5.70 a	37.46 ±1.76 b	38.21 ±3.12 ab	36.67 ±1.53 b	37.21 ±0.69 b	

Numbers followed by the same lowercase letter on a row and columns are not significantly different according to BNJ's further test at 5%.

The rapid formation of flowers in the treatment of 300 g/polybag Kasgot fertilizer and 7.5 and 11.25 g/polybag NPK is because the provision of Kasgot fertilizer can increase fertility in red-yellow podzolic soil, and with the addition of NPK, nutrients become available to plants. This is in line with the opinion (Reswita, 2022) revealed that the administration of asgot doses has been proven to improve the quality of ultisol soil, which is indicated by an increase in soil pH and the availability of macro and micronutrients, including the elements N, P, K, Ca, Mg, Na, S, organic C, and soil porosity. (Kastolani, 2019) Kasgot can be immediately applied as organic fertilizer to increase soil

fertility.

Using a combination of 300 g/polybag Kasgot fertilizer and 7.5 g/polybag NPK fertilizer (K3N2) is the most effective treatment, because it produces the fastest flower emergence time, 35 DAP. The age of flower formation is in line with research (Azizi et al., 2023) with PGPR and cow manure treatments, which is around 31-35 DAP.

This indicates that both treatments support each other in plants' vegetative and generative growth, by providing macro and micronutrients needed by cauliflower plants. This result aligns with research by Jadidah et al. (2024) that plants need sufficient and appropriate nutrients for early vegetative growtto accelerate crop formation in cauliflower. Maynizal (2018) stated that it requires the nutrients nitrogen (N) and phosphorus (P), as well as conditions such as aggregates, drainage, aeration, organic matter, and acidity levels appropriate to the type of plant during the flowering process. Element P plays a role in flower formation (Kustiawan et al., 2014). The need for P elements that are well met will support plant growth and development, as well as accelerate flower formation in cauliflower plants.

Observation results after analyzing variance showed that the provision of Kasgot fertilizer, NPK fertilizer, and their interactions had a significant effect on the parameters of the relative growth rate of cauliflower plants at 7-14 DAP, 14-21 DAP, and 21-28 DAP (Figure 3). The relative growth rate of cauliflower plants increased along with increasing age and doses of Kasgot and NPK fertilizer.

Applying Kasgot fertilizer 300 g/ polybag and NPK 7.5 g/ polybag (K3 N2) gave the highest growth rate of 0.12, respectively. g /day, 0.2 0 g / day, and 0.24 g /day at 7-14 DAP, 14-21 DAP, and 21-28 DAP. The K3N2 treatment was also significantly different from other treatments at all observation age periods except at 21-28 DAP, which was not substantially different from the K3N3, K2N2, and K2N1 treatments.

The above shows that the interaction of Kasgot and NPK fertilizers helps plant growth relative to growth rates. This is because the nutrient content of Kasgot fertilizer, combined with NPK, can meet the nutrient needs of plants in the plant growth phase by increasing the rate of photosynthesis, which can increase photosynthate production, increasing the dry weight of plants.

3.3. Relative Growth Rate

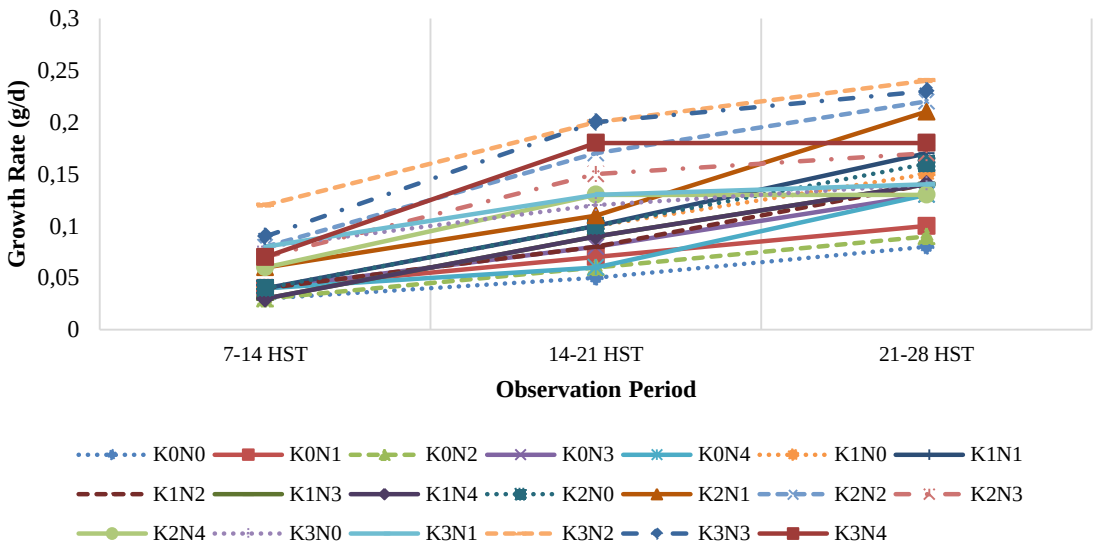

Figure 3. Graph the average relative growth rate (g/day) of cauliflower plants when given Kasgot and NPK fertilizers at various observation periods.

According to Prawoto and Hartatik (2018), to increase the yield of cauliflower plants, it is recommended that fertilizers with optimal nutrient content be used to achieve good quality. During the plant growth phase, the availability of essential nutrients, such as nitrogen and magnesium, is essential. Nitrogen and magnesium elements have the same role in increasing plant growth and yield. Nitrogen elements function in synthesizing chlorophyll, a necessary part of the photosynthesis process (Mu and Chen 2020). Magnesium elements also play a role as a chlorophyll component and enzyme activator in plant photosynthesis (Amanullah et al., 2016). It was added that magnesium administration can increase the growth of cauliflower. The process of photosynthesis significantly impacts the relative growth rate of plants, which means that the more photosynthesis results are produced, the greater the plant's growth. This study's results in aligning with research (Pramita et al., 2024) that the relative growth rate of cauliflower plants increases with increasing plant age from 14-35 DAP.

3.4. Weight of Flower per Plant and Flower Diameter

Flower weight per plant and diameter of cauliflower flowers due to the provision of Kasgot and NPK fertilizers (Table 2). The results of the variance analysis showed that the provision of Kasgot fertilizer and NPK fertilizer, and their interactions had a significant effect on the weight of flowers per plant and flower diameter.

Table 3 shows that the provision of Kasgot and NPK fertilizers significantly increased the weight of flowers without leaves per plant. The provision of Kasgot fertilizer 300 g/polybag and NPK 7.5 g/polybag (K3N2) increased the weight of flowers with the highest leaves per plant by 532% (202.36 g) compared to the control (32.00 g). The K3N2 treatment was not significantly different from the treatment (K2N3), which was 183.33 g, the treatment (K3N1), which was 178.16 g, and the treatment (K3N3), which was 172.74 g, but was significantly different from other treatments. This increase in yield was due to the provision of Kasgot and NPK fertilizers, which could increase the availability of nutrients needed by plants. A study also reported similar results (Kannaujiya et al., 2023; Kumar et al., 2024) with organic and inorganic fertilizer treatments that could provide maximum flower weight for cauliflower plants.

Flower weight per cauliflower plant gives heavier results in the treatment of 300 g/polybag Kasgot fertilizer and 3.5-7.5 g/polybag NPK because this application can improve the condition of the red-yellow podzolic soil to be more fertile so that The availability of nutrients in the soil increases and can be easily absorbed by the roots according to plant needs.(Triwijayani et al., 2023) Using Kasgot fertilizer as an organic fertilizer can improve soil structure, especially in dense or sandy soil. Soil quality and nutrient availability are influenced by soil particles' ability to retain these elements. The ability of soil particles to absorb nutrients can be increased by adding organic materials and inorganic fertilizers.

Table 2. Average flower weight per plant and flower diameter with the provision of Kasgot Fertilizer and NPK Fertilizer

Kasgot Fertilizer (g/polybag)	NPK (g/polybag)					Average
	0 (N0)	3.75(N1)	7.5 (N2)	11.25 (N3)	15 (N4)	
			Flower weight per plant (g)			
0 (K0)	32.00 ±1.32 f	35.33 ±4.65 ef	43.88 ±2.51 ef	50.33 ±2.57 ef	63.93 ±2.20 ef	45.09 ±12.75 d
100 (K1)	63.42 ±4.88 ef	68.62 ±8.47 ef	74.72 ±0.97 de	67.50 ±3.64 ef	70.88 ±2.55 def	69.02 ±4.18 c
200 (K2)	61.77 ±13.24 ef	115.82 ±23.85 c	169.26 ±22.85 ab	183.33 ±6.90 ab	157.35 ±25.62 b	137.50 ±49.26 b
300 (K3)	108.95± 14.01 cd	178.16± 11.42 ab	202.36± 12.20 a	172.73± 25.64 ab	161.64± 9.93 b	164.77± 34.58 a
Average	66.53 ±31.75 c	99.48 ±61.98 b	22.55 ±75.34 a	118.47 ±69.26 a	113.45 ±53.28 ab	
			Flower diameter (cm)			
0 (K0)	5.83 ±0.29 i	7.08 ±1.44 ei	8.20 ±0.82 ch	6.50 ±0.43 ghi	6.33 ±0.29 ghi	6.79 ±0.91 c
100 (K1)	7.41 ±0.14 ei	9.33 ±1.01 be	7.83 ±0.14d-i	7.41 ±0.95 ei	6.83 ±0.29 fi	7.76 ±0.95 b
200 (K2)	7.75 ±0.75 in	7.16 ±0.88 ei	10.00 ±0.43 bcd	6.75 ±0.75 fi	6.00 ±0.58 hi	7.53 ±1.52 b
300 (K3)	8.58 ±1.01 cg	9.00 ±0.66c-f	12.41 ±1.23 a	11.50 ±0.50 ab	10.16 ±0.29 abc	10.33 ±1.63 a
Average	7.39 ±1.15 b	8.14 ±1.19 b	9.61 ±2.10 a	8.04 ±2.34 b	7.33 ±1.92 b	

Numbers followed by the same lowercase letter in columns and rows are not significantly different according to the BNJ follow-up test at the 5% level.

Besides that, fertilizer Kasgot contains nutrients of 41.2% N, 32.4% P, and 77.1% K (Sarpong et al., 2019), so it is expected to reduce the use of NPK fertilizer. The results of this study indicate that increasing doses of NPK high (above 7.5 g/polybag) tend to decrease flower weight per plant. This is thought to be due to the excess nutrients received by the plant, which inhibit its growth. This follows (Martinus et al., 2017), that giving inorganic fertilizers in high doses that exceed plant needs can negatively affect plant growth and yield.

The fulfillment of nutrient needs obtained from Kasgot and NPK fertilizer in this study can increase the yield of cauliflower plants. In the study (Metwaly, 2017), the high amountson of phosphorus and potassius can increase the yield and quality of flower crops. Phosphorus is an important element in the process of metabolism and root development. At the same time, potassium plays a role in photosynthesis, amino acid and protein synthesis, and assimilate translocation, which are needed for the formation and development of flowers.

Based on the description of the Larissa variety, the yield is 800-1000 g per flower, but in this study, the highest flower weight per plant was 220 g. Cauliflower requires a suitable climate, such as a temperature between 17°C-25°C with a humidity level around 80% to 90% (Rukmana, 1994). During the study, a significant daily temperature variation, ranging from 25-27ºC, impacted plant metabolic disorders. (Susi, 2019) revealed that high temperatures decrease flower density and shape, which in turn makes the plant head less dense and reduces its weight. Non-ideal microclimates cause a decrease in photosynthates used for flower head growth, resulting in degradation.

Table 2 shows that the interaction between the provision of Kasgot fertilizer and NPK significantly increased the diameter of cauliflower flowers. The provision of Kasgot fertilizer 300 g/polybag and NPK 7.5 g/polybag (K3N2) gave the largest flower diameter of 112.86% (12.42 cm) compared to the control (5.83 cm). The K3N2 treatment was not significantly different from the provision of Kasgot fertilizer 300 g/polybag and NPK 11.25 g/polybag (K3N3) and Kasgot fertilizer 2.00 g/polybag and NPK 7.5 g/polybag (K2N2) and was

significantly different from other treatments. Comparison of flower diameter in several treatments is shown in Figure 4.

The larger flower diameter provides 300 g/polybag Kasgot fertilizer and 3.5-11.25 g/polybag NPK because the treatment offers a nutrient composition that suits the plant's needs. The fulfillment of macro and micronutrients from both treatments supports the plant's metabolic process, resulting in the translocation of photosynthate during the generative phase to the parts of the plant that need it, especially the flowers. This serves to increase the diameter of the crop, so that crop enlargement can take place optimally. Aprilia and Nugroho (2021) explain that there is a strong relationship between crop diameter, plant height, and number of leaves; the more leaves a cauliflower has, the larger the diameter of the cauliflower crop will be.

Figure 4. Comparison of flower diameters in treatment a. K0N0, b. K1N1, c. K2N2, d. K3N3, e. K3N4.

In addition, using fertilizers significantly impacts providing the nutrients needed for the growth and development of cauliflower crops. The results of this study agree with the study conducted by Setiawan et al. (2023), which shows that the provision of chicken manure and NPK fertilizer successfully increased the diameter of cauliflower. The availability of sufficient nutrients in the soil will impact the size of agricultural products. The availability of phosphorus is crucial in flower formation (Agustina et al., 2024). Aprilian (2022) states that if the nutrient requirements are met, the plant can fully express its genetics and complete its entire life cycle, thus showing optimal yield potential.

3.5. Root Volume

The results of the variance analysis showed that the application of Kasgot fertilizer and NPK fertilizer, as well as their interactions, had a significant effect on root volume (Table 3). Table 3 shows that administering Kasgot fertilizer as much as 300 g per polybag and NPK as much as 15 g per polybag (K3N4) increased the root volume of cauliflower plants by 312% compared to the control treatment.

This treatment showed no significant difference compared to the administration of Kasgot fertilizer 200 g/polybag and NPK 15 g/polybag (K2N4), which produced 22.33 ml, and treatment with Kasgot fertilizer 300 g/polybag and NPK 11.25 g/polybag (K3N3), which produced 5.66 ml. Similar findings were also obtained in the study (Melsy et al., 2023), which shows that using organic fertilizer from goat manure and NPK can increase the root volume of cauliflower.

Table 3. Average root volume with the provision of Kasgot Fertilizer and NPK Fertilizer

Kasgot Fertilizer (g/polybag)	NPK (g/polybag)					Average
	0 (N0)	3.75(N1)	7.5 (N2)	11.25 (N3)	15 (N4)	
0 (K0)	5.66 ±0.58 k	5.33 ±0.29 k	6.00 ±0.00 k	8.33 ±0.76 ijk	11.00 ±0.50 ej	7.26 ±2.40 d
100 (K1)	9.83 ±0.29 gj	8.00 ±0.50 jk	8.66 ±0.76 hk	11.50 ±0.50 ei	13.16 ±1.26 efg	10.23 ±2.11 c
200 (K2)	12.00 ±0.50 eh	11.83 ±2.31 eh	14.83 ±0.29 de	19.50 ±0.00 bc	22.33 ±0.29 ab	16.10 ±4.66 b
300 (K3)	12.33 ±2.25 efg	14.00 ±1.73ef	17.50 ±1.32 cd	21.33 ±0.76 ab	23.33 ±1.76 a	17.70 ±4.68 a
Average	9.95 ±3.07 d	9.79 ±3.87 d	11.75 ±5.33 c	15.16 ±6.24 b	17.45 ±6.28 a	

Numbers followed by the same lowercase letter in columns and rows are not significantly different according to the BNJ follow-up test at the 5% level.

Combination between Kasgot fertilizer and NPK fertilizer as organic materials and the addition of nutrients have been proven to positively impact the soil's physical properties by making the soil looser, increasing aeration and drainage, and increasing the soil's ability to retain water. This condition allows plant roots to develop more optimally, so that they can absorb water and nutrients from the soil and the NPK fertilizer given, increasing cauliflower plants' growth.

Using organic materials, including Kasgot fertilizer, can increase soil porosity by creating soil pores that facilitate root growth (Musadik & Agustin, 2021). Optimal soil porosity can improve the effectiveness of fertilization by reducing nutrient loss caused by leaching. Optimal soil porosity increases soil aeration, leading to increased oxygen content, so root respiration will also increase.

Sarif et al. (2015) also stated that the nitrogen content in fertilizer can contribute to increased meristem tissue division and promote root growth. Nuraini et al. (2023) noted that phosphorus elements enhance cell division activity and increase the number of root hairs, ultimately optimizing the condition of plant roots. Optimal root growth increases the number of roots and improves the nutrient absorption process from fertilization. Gustianty (2016) indicated that the phosphate and nitrogen content are crucial in enhancing root cell division, promoting root development, and strengthening root hairs. Consequently, the plant root system becomes more robust.

4. Conclusion

It can be concluded that the growth parameters, yield, and yield components of cauliflower respond positively to the combination of Kasgot and NPK fertilizers applied to red-yellow podzolic soil. The dosage of Kasgot and NPK fertilizers significantly influences the flower yield in cauliflower. The highest flower weight per plant and diameter are achieved with 300 grams of Kasgot and 7.25 grams of NPK per polybag.

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