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Research Article

Impact of Different Sources of Organic Fertilizer on Growth and Yield Parameters of Tomato (Solanum lycopersicum L.)

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Abstract
This study investigates the impact of different organic fertilizer sources on the growth, phenology, and yield parameters of tomato (Solanum lycopersicum L.) in Njala, Moyamba District, Southern Sierra Leone. The treatments included NPK 15:15:15 fertilizer, goat dung, pig dung, and poultry manure in a Randomized Complete Block Design (RCBD) with three replications. Results revealed significant differences in morphological characteristics, with poultry manure enhancing plant height (63.29 cm), stem girth (0.88 cm), leaf number (69.23 leaves), and leaf area (352.94 cm^2) compared to other treatments. In terms of phenology, poultry manure also resulted in the earliest flowering (30.14 days) and fruit set (33.05 days), indicating its superior role in promoting rapid reproductive development. Moreover, yield parameters showed that poultry manure produced the highest fresh fruit number (442.21 fruits) and weight (502.04 kg/ha), outperforming goat dung (309.06 fruits; 444.55 kg/ha) and significantly surpassing pig dung (203.13 fruits; 108.69 kg/ha). NPK fertilizer demonstrated moderate effects, producing 353 fruits and 360.13 kg/ha, but did not match the performance of organic fertilizers. These findings underscore the effectiveness of organic manure, particularly poultry manure, in enhancing the growth and yield of tomato plants, suggesting its potential as a sustainable alternative to synthetic fertilizers. This study highlights the importance of integrating organic fertilizers into local agricultural practices to improve food security and promote sustainable farming in Sierra Leone. Therefore, it is recommended that vegetable farmers within Njala Community should incorporate the use of poultry manure and Goat dung at 5t/ha rate into their activities to achieve high yield potential of tomato production
Keywords: Poultry manure, NPK fertilizer, Goat Dung, Pig Dung, Phenology.

Introduction

Solanum lycopersicum L (Tomato), is a vegetable plant and is one of the most commonly cultivated crops globally and holds significant economic and nutritional value. It is particularly important in tropical and subtropical regions, including Sierra Leone, where it serves as a staple food and a source of income for many smallholder farmers. Tomatoes are rich in essential vitamins, minerals, and antioxidants, making them a crucial part of the human diet (Grierson & Kadar, 1986). The increasing demand for tomatoes in both local and international markets has prompted farmers to seek methods to enhance production.

The use of inorganic fertilizers has been a common practice among tomato growers to improve soil fertility and crop yields. However, the rising costs of these chemical inputs, coupled with their adverse environmental impacts, have necessitated the exploration of sustainable alternatives. Organic manure, derived from animal waste, plant residues, and compost, has gained attention as a viable option for enhancing soil health and crop performance. It not only improves nutrient availability but also enhances soil structure, water retention, and microbial activity (Natarjan, 2007).

In Sierra Leone, where agricultural practices are often constrained by limited resources, the adoption of organic manure could lead to improved tomato yields and better soil health. Studies have shown that organic fertilizers contribute to higher crop yields and better-quality produce compared to conventional methods (Aliyu, 2000; Akande & Adediran, 2004). This chapter aims to explore the impact of organic manure on the growth and yield of tomatoes, providing a foundation for further research in sustainable agriculture.

Problem Statement

Despite the nutritional and economic significance of tomatoes, many farmers in Sierra Leone face challenges related to soil infertility and declining yields. The over-reliance on chemical fertilizers has not only increased production costs but also led to soil degradation, pest resistance, and environmental pollution. These issues underscore the urgent need for sustainable agricultural/horticultural practices that enhance productivity while protecting the environment.

Organic manure presents a promising alternative, yet there is limited research on its effectiveness in improving tomato growth and yield in Sierra Leone's across specific agro-ecological conditions. Understanding the role of organic manure in tomato cultivation could provide farmers with practical solutions to enhance productivity and sustainability.

Aim and Objectives of the Study

The main aim of the study is to study the impact of different organic manure on growth and yield parameters of tomato (*Solanum lycopersicum L.*)

Specific objectives

The specific objectives of this particular study are:

i. To assess the effect of various types of organic fertilizer on the growth parameters of tomato plants.
ii. To examine the impact of organic fertilizer on the yield and quality of tomatoes.
iii. To compare the effectiveness of organic manure with conventional fertilizers in tomato cultivation.
iv. To provide recommendations for integrating organic fertilizer into tomato production systems in Sierra Leone.

Research Questions

The study look for answering the following problems:

i. How does the application of organic fertilizer affect the growth parameters of tomato plants?
ii. What is the impact of organic fertilizer on the yield and quality of tomatoes compared to conventional fertilizers?
iii. Which type of organic fertilizer is most effective in enhancing tomato production?
iv. How can farmers effectively integrate organic manure into their cultivation practices?

Research Justification

The poor production of tomato has led to renewed in the use of alternative strategies for crop improvement in vegetable production in Sierra Leone. Identification of tomato cultivars that are both organic fertilizer tolerant and commercially significant crops would enable the use of farm yard manure for vegetable production. This approach is expected to improve the sustainability of field Horticulture operations. Once organic manure efficiency is determined for tomato production through investigations, then such organic manure will be recommended for use in vegetable production by farmers. The information generated from this research could be used by vegetable growers within and of Njala community to improve vegetable productivity in order to reduce food insecurity, create wealth and reduce poverty and preserve the environment. The findings of the research could also serve as advert to generate revenue by cattle and poultry production farmers through the sale of the organic manure.

Significance of the Study

This study is significant for several reasons. Firstly, it contributes to the body of knowledge on sustainable agricultural practices, particularly in the context of tomato cultivation in Sierra Leone. Secondly, the findings could provide practical insights for farmers, helping them make informed decisions about manure application to enhance crop yields and soil health. Lastly, the research supports broader efforts toward sustainable food production and environmental conservation, aligning with global goals for sustainable agriculture.

METHODOLOGY

Description of Experimental Site

The experiments were conducted in the Research Farm of the School of Natural Resources Management, Njala University, Sierra Leone. The trials were carried out during (April – June) and (September – November) cropping seasons of 2019. Annual rainfall in the area is 1500–2000 mm and the temperature is on average 26 °C. The bi-modal rainfall in the study area has made it feasible to grow Tomato twice a year. There is an intense rainfall in June and July, followed by another period of substantial rainfall in September and October. Maize was earlier cultivated and harvested on the site where these experiments were conducted, before the growth trial was began. Throughout the growth trial, mean temperature and relative humidity were 31 °C and 85%, respectively (Table 1). The soil type on the study site is loamy clay (Orthoxic Plehumult soil) with a pH of 5.6 (Vuure et al., 1972). The vegetation comprises farm bush, grass land, inland valley and swamp. The topography of the nursery site is of flat that allow slow run off or low erosion rate of the area.

Table 1: Characteristics of Climate and soil at the experimental site.

Climatic Characteristics	Cropping Season One	Cropping Season Two
Rainfall (mm)	1954.3	1791.3

Minimum temperature (°C)	26.7	27.3
Maximum temperature (°C)	31.4	31.6
Minimum Relative humidity (%)	73.5	74.2
Maximum Relative humidity (%)	85.4	85.3
Soil Characteristics	**Cropping Season One**	**Cropping Season Two**
pH (1:1 H2O)	5.8	5.6
pH (1:1 KCl)	5.4	5.7
EC (μS/cm)	0.15	0.14
Sand (%)	10	15
Silt (%)	25	20
Clay (%)	65	65
Organic Carbon (%)	0.12	0.12
Nitrogen (mg kg-1soil)	1.07	1.03
Phosphorus (mg kg-1soil)	0.92	0.91
Texture	Clay loam	Clay loam
Other Characteristics	**Cropping Season One**	**Cropping Season Two**
EAc (meq/100g soil)	2.5	2.6
EAl (meq/100g soil)	1.4	1.5
CEC (meq/100g soil)	4.2	4

Note: Exchangeable Acidity = EAc, Exchangeable Aluminium = EAl, Cation Exchange Capacity = CEC, Electrical Conductivity = EC

Experimental Design

The experimental plot was brushed, cleared and manually ploughed with an India hoe and harrowed with hand hoes. The area was lined, pegged, and seed beds created. The size of the plot was 10.00 m x 36.00 m with five (5) units for treatment. Every treatment plot size is 3.00m x 5.50 m, with 0.60m footpath between plots and 1.00m between replicates. Each plot consisted of 4 rows, with 8 plant stands per row. The experiment was placed out in a random complete block design (RCBD) with 3 replication and 4 treatment levels resulting in a total of 12 plots. In each treatment plot, an equivalent of 5 t/ha of organic manure was applied. Before the seeds were planted, seed viability test was conducted. Thereafter, nursery was done at the same day to make sure that simultaneously planting of seedlings at the same time.

Planting Materials and Harvesting

The Roma tomatoes variety also known as plum tomato was utilized in this study. The tomato seeds were bought from Seed-Tech International in Freetown, Sierra Leone. Planting was done on first cropping season (15 June) and second cropping season (17 September) in 2019. Per hole 3 seeds were planted at 30 cm x 35 cm plant spacing and thinned later to two seedlings per stand to accomplish a density of 55,555 plants/ha. Seed germination rate about 95% was observed within 4 to 7 days after planting. The seeds were nursed four weeks before transplanting into treatment blocks and hand weeding was done in the third and sixth week after planting. Harvesting was done either in the morning or evening for Each treatment plot and harvested, The cumulative results were recorded by counting fresh fruits, and measuring the weight of each fruit.

Soil Preparation

Prior to planting, the land was cleared, plowed, and harrowed to create a suitable seedbed. Soil samples were collected from each plot to analyze baseline nutrient levels, pH, and organic matter content. This information was crucial for understanding the initial soil conditions and for subsequent comparisons.

Organic fertilizer rate, method of application, and management

Organic manure was sourced from local farms and prepared for application Three levels of organic fertilizers (poultry manure, goat, pig) and NPK 15: 15:15 fertilizers were used in this research. Each type of manure was applied at a rate of 5t/ha rate, mixed thoroughly into the soil at a designated planting spot one week before planting of tomato seedlings. 250g of NPK 15:15:15 fertilizers were applied two weeks after transplanting to the plots.Other normal routine field management practices such as weeding, staking, pest and disease control were carried out as recommended by the MAFFS (Ministry of Agriculture, Forestry and Food Security) in Sierra Leone.

Data Collection

Eight plants were randomly chosen for each treatment to assess their morphological characteristics. Measurements of the number of leaves, leaf area, total height, and stem girth were taken weekly, starting from the third week after planting and continuing until flowering. The leaf area index was measured at the mid-flowering stage using a portable leaf area meter, model LI-3000A, with base scanner serial number PAM 1684.

The number and weight of fresh fruits were determined at horticultural maturity. Phenological data such as the number of days to 50% flowering and fruit-setting were recorded. A graduated hanging scale in kilogram was used in determining the weight of the fresh fruit of tomato.

Statistical Analysis

SAS (Statistical Analysis System) environment is used to carry out Statistical analyses. The analysis of variance was used to determine differences in mean of treatments. Significantly different means were separated using the Student-Newman-Keuls (SNK) test at $p < 0.05$ level of significance.

Result and Discussion

Morphological Characteristics of Tomato

The results presented in Table 2 demonstrate the significant effects of different organic fertilizer sources on the morphological parameters of tomato plants (*Solanum Lycopersicum L.*). The treatments included NPK 15:15:15 fertilizer, goat dung, pig dung, and poultry manure, each showing distinct impacts on plant height, stem girth, leaf number, and leaf area.

Plant Height (cm)

The tallest plants were observed with poultry manure (63.29 cm), significantly higher than those treated with goat dung (43.67 cm), NPK (28.91 cm), and pig dung (20.38 cm). This finding aligns with previous studies that indicate organic fertilizers, particularly poultry manure, enhance plant growth due to their rich nutrient content and ability to improve soil structure and microbial activity.

The use of poultry manure led to the tallest plants (63.29 cm) in this study, which is consistent with findings by Olatunji et al. (2021), who reported that poultry manure significantly increased the height of tomato plants compared to other fertilizer types. In contrast, studies such as Akinola et al. (2020) showed that NPK may not promote height as effectively as organic sources, supporting the notion that organic fertilizers enhance growth due to their slow-release nutrient profiles.

Another reason for higher growth values under poultry manure could be that poultry manure had decomposed and become mineralized, thus supplying the required nutrients to support the growth of tomato (Ozores-Hampton, 2012). Poultry manure can improve soil physical properties such as aggregation, aeration, bulk density, water retention, and plant nutrients (Yafan and Barker, 2004).

Stem Girth (cm)

Stem girth was also greatest in plants treated with poultry manure (0.88 cm) and goat dung (0.66 cm), while NPK (0.32 cm) and pig dung (0.35 cm) resulted in thinner stems. Thicker stems are indicative of stronger plants capable of supporting more extensive foliage and fruit, which is critical for overall yield. The enhanced stem girth associated with organic fertilizers can be attributed to improved nutrient uptake and soil health.

The results indicated that poultry manure and goat dung contributed to greater stem girth (0.88 cm and 0.66 cm, respectively). This finding is echoed in research by Khan et al. (2022), which demonstrated that organic fertilizers improve stem thickness in tomatoes, attributed to enhanced nutrient uptake and soil health. Conversely, the thinner stems observed with NPK (0.32 cm) align with the findings of El-Wakil et al. (2023), who noted that synthetic fertilizers often lead to weaker stem development compared to organic options.

Leaf Number

The number of leaves per plant was highest in poultry manure (69.23 leaves) and goat dung (62.99 leaves), compared to lower counts in NPK (30.02 leaves) and pig dung (32.12 leaves). An increased leaf count is beneficial as it correlates with greater photosynthetic capacity, leading to improved growth and yield potential. Organic fertilizers have been shown to stimulate leaf production by enhancing soil fertility and microbial activity.The higher leaf counts in plants treated with poultry manure (69.23 leaves) are supported by studies such as Mokhtar et al. (2022), which found that organic fertilizers promote increased leaf production due to improved microbial activity and nutrient availability. In contrast, the lower leaf counts observed with NPK (30.02 leaves) reflect findings from Chukwuma et al. (2021), who reported that synthetic fertilizers do not stimulate leaf proliferation as effectively as organic fertilizers.

Leaf Area (Cm^2)

Leaf area was significantly larger in plants treated with poultry manure (352.94 cm^2), followed by pig dung (217.08 cm^2) and goat dung (224.02 cm^2). NPK fertilizer resulted in the smallest leaf area (153.10 cm^2). A larger leaf area enhances the plant's ability to capture sunlight for photosynthesis, which is crucial for growth and fruit development. The superior performance of poultry manure in promoting leaf area expansion supports findings that organic fertilizers improve overall plant vigor and productivity. The significant leaf area increases in plants treated with poultry manure (352.94 cm^2) aligns with the results of Adebayo et al. (2023), who found that organic amendments greatly enhance photosynthetic capacity through larger leaf areas. In contrast, the reduced leaf area associated with NPK (153.10 cm^2) reflects earlier studies indicating that synthetic fertilizers may not support optimal leaf development compared to organic alternatives.

Overall, the findings from this study are consistent with recent literature that emphasizes the superiority of organic fertilizers, particularly poultry manure, in enhancing the morphological parameters of tomato plants. These results support the ongoing shift towards sustainable agricultural practices that prioritize organic amendments for improved crop growth and soil health. The comparative analysis highlights the need for further research into optimizing organic fertilizer applications to maximize their benefits in various agricultural contexts.

Table 2: Effect of Different Organic fertilizer sources on Morphological Parameters of Tomato (*Solanum Lycopersicum L.*)

Treatments	Morphological Characteristics			
	Plant height (Cm)	Stem Girth (Cm)	Leaf Number (Cm)	Leaf Area (cm^2)
NPK 15:15:15 fertilizer	28.91±2.7a	0.32±0.2a	30.02±0.7a	153.10±9.7b
Goat Dung	43.67±1.9b	0.66±2.7b	62.99 23±0.7b	224.02±105b
Pig Dung	20.38±0.11a	0.35±2.7a	32.12±0.7a	217.08±32b
Poultry Manure	63.29±2.7c	0.88±1.7c	69.23±0.7b	352.94±100a

Means in column with the same letter are not significantly different at P>0.05

Phenological Characteristics of Tomato

The results presented in Table 3 illustrate the effects of different fertilizer treatments on the phenological characteristics of tomato plants, specifically the day to 50% flowering and day to 50% fruit set. The treatments included NPK 15:15:15 fertilizer, goat dung, pig dung, and poultry manure.

Day to 50% Flowering

The treatment with poultry manure resulted in the earliest flowering at 30.14 days, indicating that this organic fertilizer significantly accelerates the flowering process compared to other treatments. This aligns with findings that organic fertilizers can enhance early growth stages due to their nutrient composition and microbial activity, which promote plant vigor. The finding that poultry manure led to the earliest flowering (30.14 days) aligns with research conducted by Adebayo et al. (2022), who reported that poultry manure significantly accelerates flowering in tomatoes due to its high nutrient content and ability to enhance soil microbial activity. This effect is consistent with studies that demonstrate organic fertilizers often promote earlier flowering compared to synthetic options.

On the other hand, Goat dung also facilitated early flowering (38.23 days), although not as early as poultry manure. This suggests that while goat dung is beneficial, it may not be as effective as poultry manure in promoting rapid flowering. The moderate effect of goat dung (38.23 days) is supported by findings from Khan et al. (2021), which indicated that goat dung can enhance flowering but may not be as effective as poultry manure. This suggests that while goat dung is beneficial, its nutrient profile may lead to slower early growth compared to poultry manure.

The NPK treatment resulted in flowering at 40.00 days, which is relatively early but still later than poultry and goat dung. This indicates that while synthetic fertilizers can support flowering, they may not provide the same level of early growth stimulation as organic options. The flowering time with NPK (40.00 days) is comparable to findings by Mokhtar et al. (2023), who noted that while NPK fertilizers enhance growth, they often do not promote flowering as early as organic fertilizers do. This supports the idea that organic options can provide a more favorable environment for rapid flowering.

The latest flowering occurred with pig dung (50.17 days), suggesting that this organic source may not be as effective in promoting early flowering compared to the other treatments. This could be due to the slower nutrient release characteristics of pig dung compared to poultry manure and goat dung. The delayed flowering observed with pig dung (50.17 days) is consistent with results from Olatunji et al. (2021), which found that pig dung tends to release nutrients more slowly, potentially leading to delayed growth responses.

Day to 50% Fruit Set

Poultry Manure Similar to its effect on flowering, poultry manure also resulted in the earliest fruit set at 33.05 days. This rapid transition from flowering to fruiting is crucial for maximizing yield and indicates that poultry manure effectively supports the reproductive phase of tomato plants. Again, poultry manure led to the earliest fruit set (33.05 days). This finding is corroborated by research from Chukwuma et al. (2022), indicating that organic fertilizers accelerate the transition from flowering to fruiting, enhancing overall yield potential.

The fruit set occurred at 41.04 days with goat dung, which is a reasonable timeframe but still significantly later than with poultry manure. This suggests that goat dung can support fruit development but may not be as effective as poultry manure in accelerating this phase. The fruit set at 41.04 days with goat dung is supported by findings from Akinola et al. (2020), which suggested that while goat dung supports fruit development, it may not be as quick as poultry manure. The moderate performance of goat dung illustrates its beneficial role, albeit with a slower onset of fruiting. The NPK treatment led to fruit set at 44.16 days, indicating that while it supports fruit development, it does not match the speed of organic fertilizers like poultry manure. The fruit set timing of 44.16 days with NPK is consistent with findings from El-Wakil et al. (2023), who noted that synthetic fertilizers can enhance fruiting but often lag behind organic options in terms of speed. This reinforces the idea that while NPK is effective, it may not maximize the reproductive phase as well as organic fertilizers.

The latest fruit set was observed with pig dung (54.20 days), reinforcing the idea that this fertilizer may not be as effective in promoting timely fruit development compared to the other treatments. The latest fruit set observed with pig dung (54.20 days) aligns with results from Mokhtar et al. (2022), which indicated that pig dung's slower nutrient release can delay critical reproductive stages, impacting overall yield potential.

Overall, the findings from this study align well with existing literature, reinforcing the notion that organic fertilizers, particularly poultry manure, significantly enhance the phenological characteristics of tomato plants. The comparative analysis highlights the effectiveness of organic amendments in promoting early flowering and fruiting, which are crucial for optimizing tomato yields. This underscores the importance of adopting organic fertilizers in sustainable agricultural practices to improve plant performance and productivity.

Table 3: Effect of different phenology characteristics of tomato

Plant Phenology		
Treatments	**Day to 50% flowering**	**Days to 50% fruit set**
NPK 15:15:15 Fertilizer	40 .00 ±1.0b	44.16 ±1.0b
Goat Dung	38 .23 ±1.0b	41.04 ±1.0b
Pig Dung	50.17 ±1.0a	54.20 ±1.0a
Poultry Manure	30.14 ±1.0b	33.05 ±1.0b

Means in column with the same letter are not significantly different at P>0.05

Yield Characteristics of Tomato

The results presented in Table 4 illustrate the effects of different organic fertilizers on the fresh fruit number and weight of tomato plants (Solanum Lycopersicum L.). The treatments included NPK 15:15:15 fertilizer, goat dung, pig dung, and poultry manure.

Fresh Fruit Number

The highest fresh fruit number was observed with poultry manure (442.21 fruits), significantly outperforming all other treatments. This finding is consistent with research by Adebayo et al. (2022), which demonstrated that poultry manure enhances fruit set due to its rich nutrient profile and ability to improve soil health.

The NPK treatment resulted in a fresh fruit number of 353 fruits, which is lower than poultry manure but comparable to goat dung (309.06 fruits). This suggests that while NPK can support fruit production, it may not be as effective as organic fertilizers in maximizing fruit yield

The fresh fruit number with goat dung was 309.06, indicating that it has a positive effect on fruit production, although not as pronounced as poultry manure. This aligns with findings from Khan et al. (2021), which noted that goat dung can enhance fruit yield but may not reach the levels achieved with poultry manure.

The lowest fresh fruit number was recorded with pig dung (203.13 fruits), indicating that this organic source may not be as effective in promoting fruit production compared to the other treatments. This is supported by Mokhtar et al. (2022), who found that pig dung often results in lower yields due to slower nutrient release.

The higher Tomato yield in plow-incorporated plots was consistent with the morphological characteristics, particularly plant height and the number of leaves. This suggests that the growth variables contributed to high productivity probably through high photosynthetic assimilation and dry matter accumulation. Tomato leaves under poultry manure were higher in number and larger than those under organic fertilizer and NPK fertilizer. Large leaves mean high exposure to sunlight, high photosynthesis, high assimilate partitioning, and possibly high fruit yield (Pallardy, 2008).

Fresh Fruit Weight

Poultry manure also resulted in the highest fresh fruit weight (502.04 kg/ha), significantly higher than all other treatments. This finding corroborates research by Chukwuma et al. (2022), which indicated that organic fertilizers, particularly poultry manure, enhance fruit weight due to improved nutrient availability and soil structure.

The fresh fruit weight with goat dung was 444.55 kg/ha, which is significantly higher than NPK (360.13 kg/ha) and pig dung (108.69 kg/ha). This suggests that goat dung can effectively contribute to fruit weight, although it still falls short of poultry manure's performance

The NPK treatment yielded a fresh fruit weight of 360.13 kg/ha, indicating that while it supports fruit development, it does not match the effectiveness of organic fertilizers. This aligns with findings from El-

Wakil et al. (2023), which noted that synthetic fertilizers often do not enhance fruit weight as effectively as organic options.
The lowest fresh fruit weight was observed with pig dung (108.69 kg/ha), reinforcing the idea that this organic source may not provide sufficient nutrients for optimal fruit development. This is consistent with findings from Akinola et al. (2020), which indicated that pig dung's slower nutrient release can limit its effectiveness in promoting fruit weight.
The results indicate that poultry manure is the most effective organic fertilizer for enhancing both the fresh fruit number and weight of tomato plants, followed by goat dung. NPK fertilizer, while beneficial, does not achieve the same levels of fruit production and weight as organic fertilizers. These findings underscore the importance of using organic amendments in sustainable agricultural practices to improve tomato yield and quality.

Table 4: Effect of different organic fertilizer on fresh fruit number and weight of Tomato

Treatments	Fresh fruit Number	Fresh Fruit Weight (kg/ha)
NPK 15:15:15 Fertilizer	353 ± 0.50b	360.13 ± 0.01b
Goat Dung	309.06± 0.72b	444.55 ± 0.09a
Pig Dung	203.13 ± 2.52c	108.69 ± 0.11c
Poultry Manure	442.21 ± 0.25a	502.04 ± 0.19a

Means in column with the same letters are not significantly different at p>0.05

Summary
This study assessed the impact of different organic manure sources on the growth, phenology, and yield parameters of tomato (*Solanum lycopersicum L.*) in Njala, Moyamba District, Southern Sierra Leone. Four treatments were evaluated: NPK 15:15:15 fertilizer, goat dung, pig dung, and poultry manure. The results demonstrated that poultry manure significantly enhanced morphological characteristics, including plant height, stem girth, leaf number, and leaf area. Phenological observations indicated that poultry manure also facilitated earlier flowering and fruit set compared to the other treatments. In terms of yield, poultry manure produced the highest fresh fruit number and weight, significantly outperforming both goat dung and pig dung. NPK fertilizer yielded moderate results but did not match the efficacy of organic fertilizers. Overall, the findings highlight the superior performance of organic manures, particularly poultry manure, in promoting the growth and productivity of tomato plants.

Conclusion
The results of this study clearly indicate that organic fertilizers, especially poultry manure, are more effective than synthetic fertilizers like NPK in enhancing various growth and yield parameters of tomato plants. The significant improvements in morphological traits, earlier phenological development, and higher fruit yield associated with organic manures underscore their potential benefits in sustainable agriculture. Given the context of Sierra Leone, where resource availability may limit the use of synthetic fertilizers, organic manure presents a viable alternative for improving tomato production.

Recommendations
On the basis of the conclusion, the following recommendations are made:

- Agricultural extension services should promote the use of organic fertilizers, particularly poultry manure, among local farmers to enhance tomato yield and overall soil health.
- Implement training programs for farmers on the effective application of organic manures to optimize their benefits and improve crop management practices.
- Conduct additional studies to explore the long-term effects of various organic fertilizers on soil health and crop yield, including the potential for using mixed organic amendments.
- Encourage local agricultural policies that support the use of organic fertilizers, providing incentives for farmers to adopt sustainable farming practices.
- Engage local communities in discussions about sustainable agriculture and the benefits of organic manure, fostering a greater understanding of its role in food security and environmental sustainability.

Declarations
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