Comparative Effects Of Poultry Droppings And Cowdung Rates On The Growth And Yield Of Sweet Pepper (*Capsicum Annuum*) In Wukari, Southern Guinea Savannah

Adashu Tanko Gani[1*], Aondoawase Zechariah Richard[1] and Tanko Bako[2]

1, Department of Soil Science and Land Resource Management, Federal University, Wukari, Nigeria
2, Department of Agricultural and Bio-Resources Engineering, Taraba State University, Jalingo, Nigeria
Email: adashutanko@yahoo.com Tel: +234 8034795399

Abstract: A field study was conducted at Federal University Wukari Teaching and Research Farm during the 2022 cropping season to investigate the effects of poultry droppings and cow dung on the growth and yield of sweet pepper in Wukari. The randomized complete block design was adopted for the experiment and replicated thrice, on a 3 m × 2 m plot. The treatments consist of different rates of cow dung and poultry droppings of 5 tons/ha, 10 tons/ha and 15 tons/ha, which were compared to the untreated control samples. The growth parameters were measured at 2, 4 and 6 weeks after transplanting while the yield parameters were taken at maturity. Results showed that using both cow dung and poultry droppings significantly increased the growth parameters of sweet pepper compared to the control. At six (6) weeks after transplanting, the highest growth parameters were obtained in the 15 tons/ha poultry droppings treatment with 101.1±1.31 leaves, 33.4±2.20 cm plant height, 2.8±0.15 cm stem girth, 21.3±3.69 secondary branches, 32.8±4.18 flower pods and 20.1±5.32 cm^2 leaf area. The yield of sweet pepper also significantly increased using of both poultry droppings and cow dung. The mean number of fruits per plant was highest in the 15 tons/ha poultry droppings treatment (21.9±2.76) and lowest in the control - no treatment (6.7±1.28), the mean yield per plant was highest in the 15 tons/ha poultry droppings treatment (3.32±0.22 kg), and lowest in the control - no treatment (0.78±0.02 kg) and the mean yield per plot was highest in the 15 tons/ha poultry droppings treatment (38.75±2.18 kg) and lowest in the control - no treatment (8.76±1.21 kg). These findings revealed that applying poultry droppings at the rate of 15 tons/ha or more will enhance the growth and yield of sweet pepper significantly and might be viable alternative to chemical fertilizers.

[Adashu Tanko Gani, Aondoawase Zechariah Richard[1] and Tanko Bako. **Comparative Effects Of Poultry Droppings And Cowdung Rates On The Growth And Yield Of Sweet Pepper (*Capsicum Annuum*) In Wukari, Southern Guinea Savannah.** *Researcher* 2025;17(4):9-19]. ISSN 1553-9865 (print); ISSN 2163-8950 (online). http://www.sciencepub.net/researcher. 02. doi:10.7537/marsrsj170425.02

Keywords: Sweet Pepper; Cow Dung; Poultry Droppings; Application

Introduction

Sweet pepper (*Capsicum annuum*), a vegetable crop widely grown and consumed around the world as a result of its nutritional and economic values. According to the Food and Agriculture Organization (FAO) of the United Nations, the global production of sweet peppers was approximately 35.8 million metric tons in 2020 (FAOSTAT, 2021). Nigeria is one of the top producers of sweet peppers in Africa, producing about 268,000 metric tonnes annually (Ayoola *et al.*, 2014). The production of sweet peppers in Nigeria is concentrated in the northern region of the country, particularly in Kano, Kaduna, Sokoto and Zamfara states (Saba *et al*., 2016). These states have favorable weather conditions for growing peppers, including a long rainy season and warm temperatures.

The demand for sweet peppers in Nigeria is driven by both domestic and international markets (Adetunji *et al.*, 2020). In Nigeria, sweet pepper is utilized in various dishes, including soups, stews, and salads. They are also popular in street food and are often grilled and served with other vegetables. In international markets, sweet pepper is used in the food industry for making sauces, canned products, and frozen foods (Bosland and Votava, 2012). Studies have shown that regular consumption of sweet peppers can help to reduce the risk of chronic diseases such as cancer, cardiovascular disease, and diabetes (Bouchenak and Lamri-Senhadji, 2013). It is a good source of vitamin A, vitamin C and other essential nutrients (Rao and Ramanjaneyulu, 2021).

The economic value of sweet peppers might be double when organically produced due to increased consumer demand and limited product availability. Generally, vegetables or crops created using organic fertilizers are more attractive to consumers than those made using inorganic fertilizers. This is due to the absence of synthetic chemicals that harm the environment and human health in organically produced vegetables. According to Arora *et al.* (2016), organic fertilizers provide a slow and steady release of nutrients, which helps to prevent nutrient leaching and runoff. This reduces the risk of groundwater contamination and helps to protect the environment.

The current environmental issues are capturing the attention of the world to focus on improving the environmental quality through the adoption of techniques and measures that have reduced impacts on the environment (Waliczek and Wagner, 2023). Organic cultivation techniques for crop production in the field and greenhouses have been developed in alternative production techniques which make use of biological or organic compounds for disease and pest control (Kim *et al*., 2015). Organic farming practices are known to improve soil health, reduce soil erosion and promote biodiversity in the agricultural landscape (Ogunwole *et al.*, 2021). Organic fertilizers, such as poultry droppings and cow dung, have already been established as recommended fertilizers for improving the productivity of several crops due to their high organic matter contents (Narayanan *et al.*, 2021).

Organic fertilizers, such as Poultry droppings and cow dung, contain essential plant nutrients and organic matter that can improve soil structure, enhance water-holding capacity and promote microbial activities (Narayanan *et al.*, 2021). This helps to create a healthy and balanced soil environment that is conducive to plant growth and development. Poultry droppings and cow dung are readily available and relatively cheap sources of organic fertilizers used to improve soil fertility in various crops (Mao *et al.*, 2021). According to Oyedeji *et al*. (2021), using organic fertilizers can reduce the cost of fertilizer inputs and increase the profitability of crop production. Organic fertilizers can be produced on-farm, reducing the need for external inputs and promoting self-sufficiency among farmers.

However, using organic fertilizers requires proper management to avoid potential adverse effects such as nutrient imbalances, contamination by pathogens, and environmental pollution (Liu *et al*., 2021). The application rate and timing of organic fertilizers should be carefully planned to ensure optimal plant growth and minimize the risk of pollution (Tijani *et al*., 2021). The effect of these organic fertilizers, such as Poultry droppings and cow dung, on growth and yield of sweet pepper is poorly documented. This work was carried out to determine the effect of different application rates of poultry droppings and cow dung on the growth and yield of sweet pepper. The choice of poultry droppings and cow dung as organic fertilizers for producing sweet pepper is based on their availability, nutrient content and ease of application.

Materials and Methods

Study area

This research was carried out at the Teaching and Research Farm, Federal University Wukari, Taraba State, located in Southern Guinea Savanna, Agro-ecological zone of Nigeria with coordinates latitude $7^0 51^0$ N - 7.850^0 N and longitude 90. 49^0 E - 9.783^0 E, annual precipitation of 1205 mm, and has an average temperature of 26.8^0C. The research was carried out during the rainy season, from July to November, 2022. Figure 1 depicts the Map of Nigeria showing Taraba State and the Map of Taraba State Showing Wukari Local Government Area. Figure 2 shows the Map of Wukari Local Government, Taraba State, Nigeria.

Soil sampling and analysis

Soil samples (0 to 15 cm in depth) was taken randomly using the zigzag method on plot basis before planting and at crop maturity. The soil samples were air-dried for a period of one week in a clean well ventilated laboratory, homogenized by grinding, passed through a 2 mm (10 mesh) stainless sieve and chemical properties using standard procedures (Brady and Weil, 2013).

Experimental treatment and design

The experiment was laid out in a Randomized Complete Block Design (RCBD) with seven (7) treatments and replicated thrice in plots size of 3 m×2 m. The treatments consist of different sources (cow dung and poultry droppings) and rates/levels of organic manure compared to that of untreated control. Thus, the treatments are control - no treatment (T_0), 5 ton/ha cow dung (T_1), 10 ton/ha cow dung (T_2), 15 ton/ha cow dung (T_3), 5 ton/ha poultry droppings (T_4), 10 ton/ha poultry droppings (T_5) and 15 ton/ha poultry droppings (T_6).

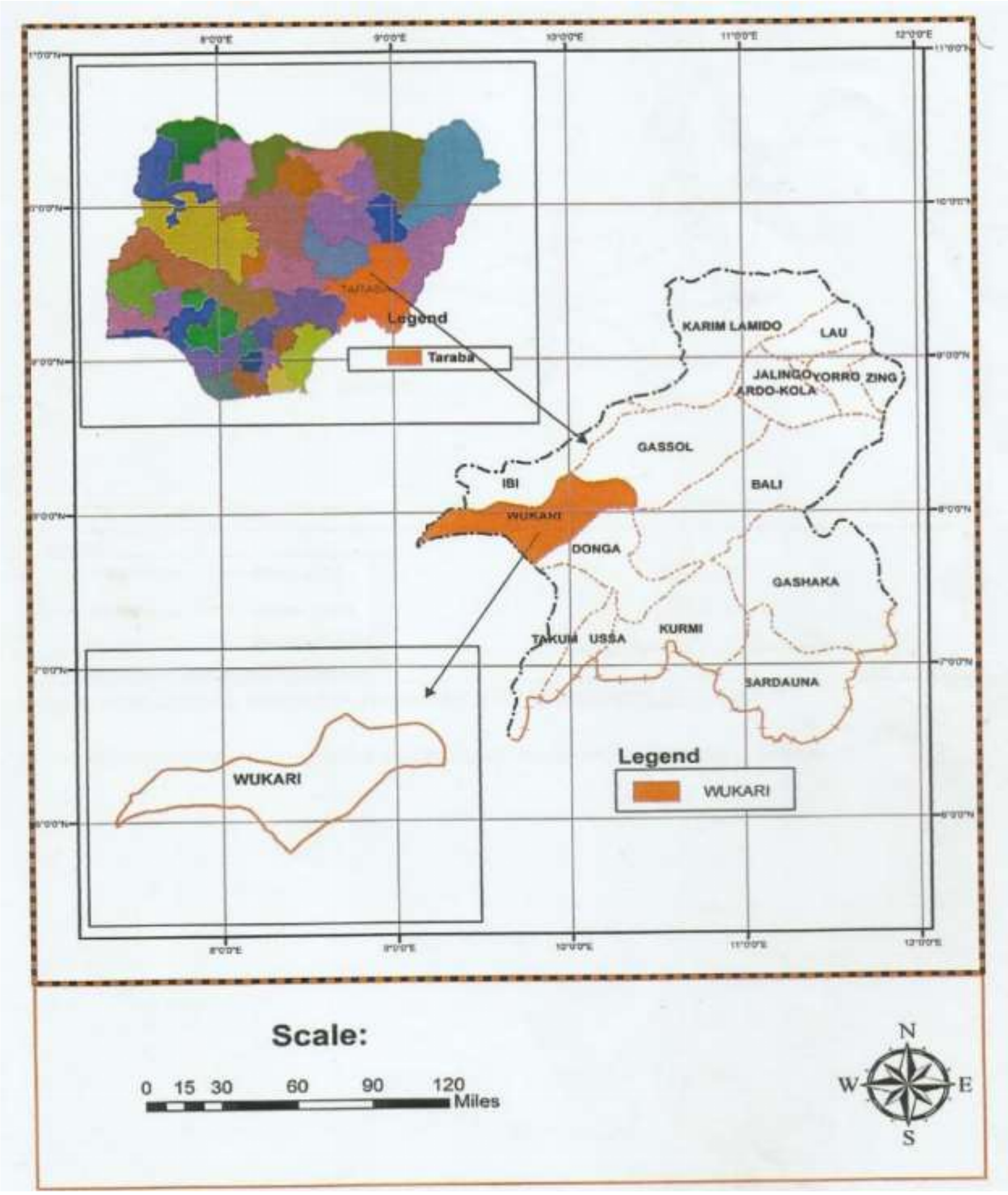

Figure 1: Map of Nigeria showing Taraba State and Map of Taraba State Showing Wukari Local Government Area (Ademiluyi *et al*., 2014).

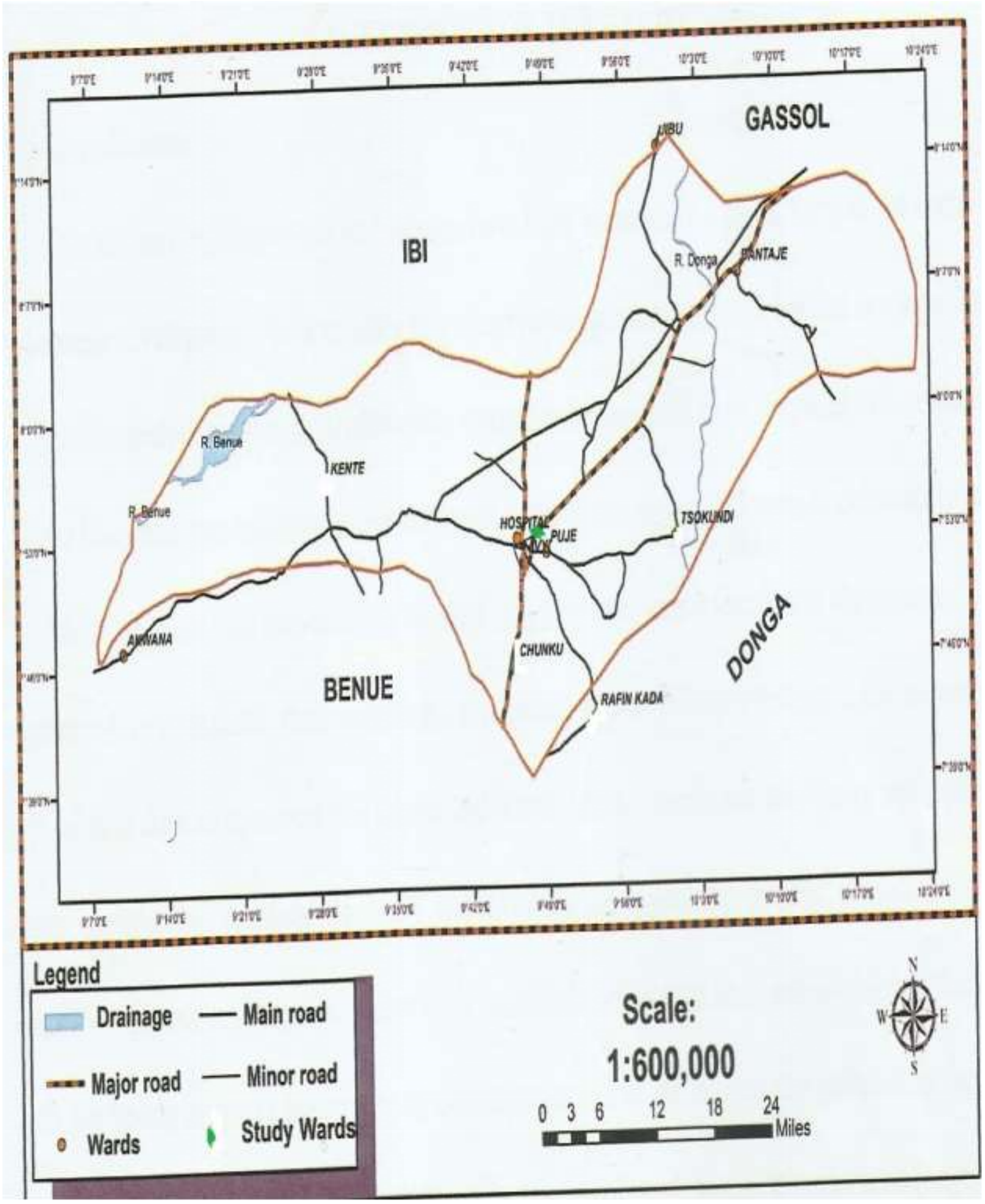

Figure 2: Map of Wukari Local Government, Taraba State, Nigeria (Ademiluyi *et al*., 2014).

Agronomic practices for sweet pepper

The improved varieties of sweet pepper's seeds used for this research were obtained at Wukari new market, Wukari Local Government Area of Taraba state. The seed viability test was performed using floating method. The floated seeds inside a rubber container with water were separated and discarded away. While the ones that sank to the bottom of the container were selected for the research.

The experimental site used for this research was selected based on the edaphic requirements for sweet pepper which is a well-drained loamy soil. Beds preparation was done manually using a big hoe. A large bed was used at the crop production nursery to raise the sweet pepper seedlings which were later transplanted to the experimental site at six (6) weeks after sowing at the inter-row spacing of 90 cm and intra-row spacing of 40 cm (FAOSTAT, 2001). The beds were incorporated with different rates of organic manure as pre-treatment one (1) week before transplanting. Weeding was done manually using a small hoe, a week before and at every two weeks interval after transplanting.

Sweet pepper pods (fruits) were harvested upon maturity, i.e when there is a colour change from green to the desired colors (red, yellow, pink, orange) and their quantity and weight measured and recorded.

Plant data collection

Data were collected on growth and yield parameters by random sampling of five plants that were tagged from each plot. Data of growth parameters were collected at two (2), four (4) and six (6) weeks after transplanting (WAT). Yield was determined by weighing freshly harvested fruits from each plant with a balance scale. The fresh fruit weights per each plant were added and taken as yield per plot. The matured fruits were harvested manually, by handpicking. Adequate care was taken not to damage the fruiting branches during harvesting. The fruits were placed directly into well-labelled field baskets before counting and weighing. Harvest was done based on fruiting frequency.

Statistical analysis

Data generated from the experiment were subjected to statistical analysis using the SPSS statistical tool (SPSS 20 for windows). The data were recorded as means and standard deviation. The Coefficient of Variation and Standard Error of the Mean were also determined.

Results and Discussion

Effect of cow dung and poultry droppings on the soil properties of the study area

Table 1 presents the soil chemical properties of the study area before planting. The analysis shows that the soil is slightly acidic, with a pH of 5.80 in water and 5.25 in KCl. The total nitrogen content of the soil is 0.81%, which is low, while the available phosphorus content is 5.54 mg/kg, which is considered moderate. The potassium content of the soil is 0.07 Meq/100g, which is low, and the exchangeable acidity is 0.25 Meq/100g. The soil's cation exchange capacity (CEC) is 5.36 Meq/100g, and the organic carbon content is 0.80%, which is relatively low.

Table 2 shows the effect of cow dung and poultry droppings on the chemical properties of soils in the study area. The chemical analysis showed that the different rates of cow dung and poultry droppings significantly affected the total nitrogen, available phosphorus, exchangeable acidity, calcium and organic matter content of the soil. The results showed that the application of poultry droppings and cow dung increased the total nitrogen, available phosphorus, calcium and organic matter content of the soil. However, the increase was more significant in the poultry droppings-treated plots than in the cow dung-treated plots.

According to Adekiya and Agbede (2021), using organic manure in agriculture has been shown to improve soil fertility, increase crop yield and promote sustainable agriculture. Organic manures are known to improve soil structure, water-holding capacity and nutrient availability in the soil. Poultry droppings are a good source of nitrogen, phosphorus and potassium, and they can improve soil fertility when applied to agricultural fields (Adekiya *et al.*, 2016). Similarly, cow dung is an excellent source of organic matter, nutrients and beneficial microorganisms, which can improve soil structure and nutrient content (Liang *et al.*, 2019).

Table 1: Chemical properties of soils of the study area before planting

Soil Parameters	Mean Values
Total nitrogen (%)	0.81
Available phosphorus (mg/Kg)	5.54
Potassium (Meq/100g)	0.07
Sodium (Meq/100g)	0.80
Exchangeable acidity (Meq/100g)	0.25
Calcium (Meq/100g)	4.24
Magnesium (Meq/100g)	0.00
pH (H_2O)	5.80
pH (KCl)	5.25
CEC (Meq/100g)	5.36
Organic carbon (%)	0.80
Organic matter (%)	1.40

Effects of cow dung and poultry droppings on the growth of sweet pepper

Table 3 shows the effect of cow dung and poultry droppings on the growth of sweet peppers at two (2) weeks after transplanting. The mean number of leaves, plant height, stem girth, number of secondary branches, number of flower pods, and leaf area were highest in T_6 (15 ton/ha poultry droppings) with values of 47.3±18.15, 15.0±0.30 cm, 1.3±0.35 cm, 4.2±1.36, 6.8±3.00 and 8.5±2.44 cm^2, respectively. The control group (T_0) had the lowest mean values in all parameters except leaf area. The results showed that the application of organic fertilizers, particularly poultry droppings and cow dung, had a positive effect on the growth of sweet pepper plants.

At four (4) weeks after transplanting (Table 4), the mean number of leaves, plant height, stem girth, number of secondary branches, number of flower pods, and leaf area were 58.6±22.23, 21.9±3.30 cm, 1.7±0.40 cm, 9.2±3.35, 20.8±11.16 and 2.3±1.35 cm^2, respectively. Again, the application of organic fertilizers increased plant growth parameters. The highest mean values were observed in T_6, while the lowest mean values were obtained in T_0.

Table 5 shows the growth of sweet pepper plants six (6) weeks after transplanting. The mean number of leaves, plant height, stem girth, number of secondary branches, number of flower pods, and leaf area were 101.1±1.31, 33.4±2.20 cm, 2.8±0.15 cm, 21.3±3.69, 32.8±4.18 and 20.1±5.32 cm^2, respectively. The highest mean values were again observed in T6, while the lowest mean values were obtained in T0. The results of the study indicate that the application of organic fertilizers, particularly poultry droppings, can significantly improve the growth and yield of sweet pepper plants. The results are consistent with previous studies showing the beneficial effects of organic fertilizers on plant growth and yield (Akhtar *et al.*, 2021). Yadav *et al*., 2019) observed that as the amount of organic fertilizer increases, the growth parameters of the plants, including sweet peppers also increases.

Table 2: Effect of poultry droppings and cow dung on some soil chemical properties of the study area

Treatment	pH (H_2O)	pH (KCl)	O.C %	O.M %	TN %	AVP mg/kg	K	Na	EA	Ca	Mg	CEC
							Meq/100g					
T0	5.40	5.20	1.02	1.80	1.26	13.03	0.12	0.80	1.00	4.30	0.0001	6.22
T1	5.55	5.10	0.53	0.91	1.51	9.33	0.10	0.81	1.10	4.03	0.0000	6.04
T2	5.80	5.15	1.10	0.90	1.30	5.26	0.12	0.80	0.50	4.04	0.0001	5.46
T3	5.30	5.00	1.40	2.41	1.12	7.08	0.11	0.80	0.70	4.03	0.0001	5.54
T4	5.20	4.90	0.60	1.03	1.35	7.17	0.09	0.81	0.50	4.04	0.0001	5.44
T5	5.25	4.85	0.73	1.20	1.57	12.82	0.10	0.81	0.30	4.03	0.0001	5.24
T6	5.75	5.15	0.90	1.60	1.48	14.36	0.10	0.78	0.10	4.04	0.0001	5.02
Mean	5.46	5.05	0.90	1.41	1.37	9.86	0.11	0.80	0.60	4.07	0.0000	5.57
CV (%)	4.40	2.77	34.44	39.72	11.68	36.00	9.09	1.25	60.00	2.46	0.00	7.72

pH = potential Hydrogen, O.C = Organic Carbon, O.M = Organic Matter, TN = Total nitrogen, AVP = Available Phosphorus, K = Potassium, Na = sodium, EA = Exchangeable Acidity, Ca = Calcium, Mg = Magnesium, CEC = Cation exchange capacity, T0 = 0 ton/ha Control, T1 = 5 ton/ha Cow dung, T2 = 10 ton/ha Cow dung, T3 = 15 ton/ha, Cow dung, T4 = 5 ton/ha Poultry droppings, T5 = 10 ton/ha Poultry droppings, T6 = Poultry 15 ton/ha droppings, CV = Coefficient of Variation.

Table 3: Effect of cow dung and poultry droppings on the growth of sweet peppers at two (2) weeks after transplanting

Treatment	Number of Leaves	Plant Height (cm)	Stem Girth (cm)	Number of Secondary Branches	Number of Flower Pods	Leaf Area (cm^2)
T_0	12.9±5.63	7.6±3.75	0.9±0.37	0.5±0.98	0.8±0.51	6.1±2.10
T_1	13.6±2.65	8.0±0.57	0.8±0.00	0.8±0.51	1.6±0.35	6.0±1.50
T_2	16.5±6.46	9.5±2.55	0.9±0.20	1.2±0.68	2.1±0.34	8.3±2.88
T_3	16.4±7.76	10.6±2.65	0.9±0.20	0.6±0.57	1.2±0.85	8.6±2.65
T_4	28.7±7.48	13.4±3.37	1.4±0.55	2.3±0.65	3.7±1.68	9.9±4.32
T_5	22.4±9.79	13.3±4.04	1.2±0.45	1.9±1.31	3.7±2.33	6.9±3.55
T_6	47.3±18.15	15.0±0.30	1.3±0.35	4.2±1.36	6.8±3.00	8.5±2.44
Mean	22.58	11.09	1.08	1.68	2.88	7.79
SEM (P<0.05)	4.62	1.08	0.08	0.49	0.78	0.54

T0 = 0 ton/ha Control, T1 = 5 ton/ha Cow dung, T2 = 10 ton/ha Cow dung, T3 = 15 ton/ha Cow dung, T4 = 5 ton/ha Poultry droppings, T5 = 10 ton/ha Poultry droppings, T6 = Poultry 15 ton/ha Poultry droppings, SEM = Standard Error of the Mean.

Table 4: Effect of cow dung and poultry droppings on the growth of sweet peppers at four (4) weeks after transplanting

Treatment	Number of Leaves	Plant Height (cm)	Stem Girth (cm)	Number of Secondary Branches	Number of Flower Pods	Leaf Area (cm^2)
T_0	18.3±10.38	12.2±6.51	1.2±0.46	1.4±1.96	3.1±3.15	0.3±0.57
T_1	18.6±2.17	12.7±2.24	1.1±0.57	1.6±0.85	3.3±0.65	1.7±0.40
T_2	19.9±6.76	13.9±2.59	1.4±0.26	2.0±1.00	4.5±1.96	1.9±0.85
T_3	20.4±5.58	15.4±2.25	1.3±0.20	1.3±1.15	2.5±1..80	1.4±1.69
T_4	35.9±8.15	20.1±4.50	1.8±0.55	3.6±1.19	9.2±4.80	2.2±1.15
T_5	27.9±11.71	18.8±3.85	1.7±0.55	3.1±1.2.02	8.0±6.32	1.1±1.15
T_6	58.6±22.23	21.9±3.30	1.7±0.40	9.2±3.35	20.8±11.16	2.3±1.35
Mean	28.51	16.42	1.45	3.17	7.34	1.55
SEM (P<0.05)	5.56	1.44	0.10	1.05	2.44	0.26

T0 = 0 ton/ha Control, T1 = 5 ton/ha Cow dung, T2 = 10 ton/ha Cow dung, T3 = 15 ton/ha Cow dung, T4 = 5 ton/ha Poultry droppings, T5 = 10 ton/ha Poultry droppings, T6 = Poultry 15 ton/ha Poultry droppings, SEM = Standard Error of the Mean.

Table 5: Effect of cow dung and poultry droppings on the growth of sweet peppers at six (6) weeks after transplanting

Treatment	Number of Leaves	Plant Height (cm)	Stem Girth (cm)	Number of Secondary Branches	Number of Flower Pods	Leaf Area (cm^2)
T_0	31.0±17.38	22.0±7.65	1.7±060	6.4±5.00	7.7±5.01	12.7±5.48
T_1	40.1±12.93	22.6±2.30	1.6±0.11	7.8±1.85	11.3±4.36	13.2±3.32
T_2	48.4±10.36	21.9±2.59	1.9±0.35	8.7±3.86	8.1±1.82	16.4±6.11
T_3	50.9±15.25	26.5±5.66	2.3±0.10	10.7±3.72	13.2±1.82	20.7±5.22
T_4	55.4±13.35	29.7±6.00	2.1±0.70	10.2±3.72	13.1±1.50	18.9±9.44
T_5	43.0±8.08	26.7±4.27	2.1±0.70	8.6±3.16	12.0±4.68	19.2±9.99
T_6	101.1±1.31	33.4±2.20	2.8±0.15	21.3±3.69	32.8±4.18	20.1±5.32
Mean	52.84	26.11	2.07	10.53	14.03	17.31
SEM (P<0.05)	8.58	1.64	0.15	1.87	3.24	1.24

T0 = 0 ton/ha Control, T1 = 5 ton/ha Cow dung, T2 = 10 ton/ha Cow dung, T3 = 15 ton/ha Cow dung, T4 = 5 ton/ha Poultry droppings, T5 = 10 ton/ha Poultry droppings, T6 = Poultry 15 ton/ha Poultry droppings, SEM = Standard Error of the Mean.

Effect of cow dung and poultry droppings on the yield of sweet peppers

Table 6 presents the results obtained from the study on the yield of sweet pepper. The mean number of fruits per plant was highest in T6 (21.9±2.76) and lowest in T0 (6.7±1.28), the mean yield per plant was highest in T6 (3.32±0.22 kg), and lowest in T0 (0.78±0.02 kg) and the mean yield per plot was highest in T6 (38.75±2.18 kg) and lowest in T0 (8.76±1.21 kg).

Applyig organic fertilizers such as poultry droppings and cow dung has been found to improve soil fertility, enhance crop growth and yield and promote sustainable agricultural practices (Obi *et al*., 2017). Cow dung is a rich source of organic matter, essential nutrients and microorganisms that enhance soil fertility and promote plant growth (Singh *et al.*, 2012). Similarly, poultry droppings contain vital nutrients such as nitrogen, phosphorus and potassium and can also improve soil structure and water-holding capacity (Koffi-Nevry *et al*., 2017).

Table 6: Effect of cow dung and poultry droppings on the yield of sweet peppers

Treatment	Number of Fruits/Plant	Yield/Plant (kg)	Yield/Plot (kg)
T0	6.7±1.28	0.78±0.02	8.76±1.21
T1	10.3±2.02	1.33±0.11	11.60±2.04
T2	13.1±2.36	2.12±0.20	15.95±2.55
T3	11.4±1.95	1.65±0.21	14.21±1.60
T4	15.1±1.72	2.41±0.05	20.62±3.13
T5	17.4±2.81	2.73±0.31	29.43±3.26
T6	21.9±2.76	3.32±0.22	38.75±2.18
Mean	13.61	2.06	19.93
SEM (P<0.05)	0.46	2.17	3.66

T0 = 0 ton/ha Control, T1 = 5 ton/ha Cow dung, T2 = 10 ton/ha Cow dung, T3 = 15 ton/ha Cow dung, T4 = 5 ton/ha Poultry droppings, T5 = 10 ton/ha Poultry droppings, T6 = Poultry 15 ton/ha Poultry droppings, SEM = Standard Error of the Mean.

The results of the present study are consistent with previous studies that have reported the beneficial effects of organic fertilizers on the growth and yield of sweet pepper (Odeyemi *et al*., 2016; Adekiya *et al*., 2021). For instance, Adekiya *et al.* (2021) reported that the application of poultry manure significantly increased the growth and yield of sweet pepper in southwest Nigeria. Similarly, Odeyemi *et al*. (2016) found that using cow dung and poultry manure improved soil fertility and increased the yield of sweet pepper in southwestern Nigeria.

Conclusion

Based on the findings, it can be concluded that the application of organic fertilizers, particularly poultry droppings and cow dung, had a positive effect on the growth and yield of sweet pepper plants and soils of the study area. The results showed that the mean number of leaves, plant height, stem girth, number of secondary branches, number of flower pods, leaf area, number of fruits per plant, yield per plant and yield per plot were highest in the 15 ton/ha poultry droppings treatment. Additionally, the results showed that the growth parameters of sweet pepper plants increased with an increase in the amount of organic fertilizers applied. These findings are consistent with previous studies showing the beneficial effects of organic fertilizers on plant growth and yield. The use of organic fertilizers will not only improve the yield and quality of sweet pepper but also contribute to the sustainability of the environment by reducing the use of chemical fertilizers that may have negative effects on the environment.

Based on the results of this study, it is recommended that.

1. Farmers in Wukari Local Government Area of Taraba State should adopt the use of organic fertilizers, particularly poultry droppings and cow dung, to improve the growth and yield of sweet pepper plants.
2. Farmers should use 15 tons per hectare of poultry droppings, since it was found to have the most significant positive effect on the growth and yield of sweet pepper plants.
3. Further studies should be carried out to determine the economic viability of using organic fertilizers in sweet pepper production in Wukari Local Government Area of Taraba State.

References

1. Adekiya, A. O., Agbede, T. M., and Aboyeji, C. M. (2016). Growth, Dry Matter Accumulation and Nutrient Uptake of Tomato as Influenced by Poultry Manure and NPK Fertilizer Rates. *Journal of Agriculture and Ecology Research International*, 8(1): 1-11.
2. Adekiya, A. O., and Agbede, T. M. (2021). Effects of Poultry Manure and NPK Fertilizer on Soil Properties, Nutrient Uptake and Yield of Okra (*Abelmoschus esculentus*). *Journal of Agricultural Science*, 6(12): 146-155.
3. Ademiluyi, I. A., Olayinka, K. O., and Adepoju, O. T. (2014). Soil properties and nutrient status of some selected soils in Wukari Local Government Area, Taraba State, Nigeria. Nigerian *Journal of Agriculture, Food and Environment*, 10(1): 89-94.
4. Adetunji, O. R., Adisa, V. A., Adetunji, O. I., and Adetunji, O. A. (2020). Pepper production in Nigeria: Current status, challenges and prospects. *Heliyon*, 6(2), e03202. https://doi.org/10.1016/j.heliyon.2020.e03202

5. Akhtar, N., Ahmad, R., Hussain, A., and Qureshi, A. S. (2021). Effects of organic and inorganic fertilizers on the growth and yield of sweet pepper (Capsicum annuum L.). *Journal of Soil Science and Plant Nutrition*, 21(3): 449-459.
6. Arora, A., Singh, S., and Singh, S. (2016). Organic fertilizers: A sustainable approach to agriculture. *International Journal of Current Microbiology and Applied Sciences*, 5(4): 931-945.
7. Ayoola, O. T., Fawole, O. B., and Adekunle, A. A. (2014). Analysis of pepper production in Ogun State, Nigeria. *Agricultural Science Research Journal*, 4(2): 28-35.
8. Bosland, P.W. and Votava, E. J. (2012). Peppers: vegetable and spice capsicums. CABI.
9. Bouchenak, M., and Lamri-Senhadji, M. (2013). Nutritional quality of legumes, and their role in cardiometabolic risk prevention: a review. *Journal of medicinal food*, 16(3): 185-198.
10. Brady, N.C. and Weil, R.C. (2013). The Nature and Properties of Soils, 15th Edition. Dorlin Kindersley (India) PVT LTD. Pearson Printice- Hall Inc. India.
11. FAOSTAT. (2021). Crops - Production Quantity, 2020 Data. Food and Agriculture Organization of the United Nations. Retrieved from http://www.fao.org/faostat/en/#data/QC
12. Kim, M.J., Shim, C.K., Kim, Y.K., Hong, S.J., Park, J.H., Han, E.J., Kim, J.H. and Kim, S.C. (2015). Effect of aerated compost tea on the growth promotion of lettuce, soybean, and sweet corn in organic cultivation. *The Plant Pathology Journal*, 31(3): 259-268. http://dx.doi.org/10.5423/PPJ.OA.02.2015.0024
13. Koffi-Nevry, R., Atindehou, S., Gbeassor, M., and Sanni, A. (2017). Effect of Poultry Manure on Soil Physico-Chemical Properties and Maize Yield in a Tropical Sandy Soil. *Journal of Agriculture and Environmental Sciences*, 6(1): 302-312.
14. Liang, Y., Nikolic, M., Peng, Y., Chen, W., Jiang, Y., and Feng, J. (2019). Effect of organic fertilizers on soil organic carbon fractions and nutrient availability in apple orchards. Scientific Reports, 9(1): 1-11. doi: 10.1038/s41598-019-43670-6
15. Liu, Z., Li, Y., Zheng, L., and Pan, F. (2021). Influence of organic and inorganic fertilizers on soil microbial biomass, enzyme activities, and crop yields in dryland agriculture. Sustainability, 13(4): 2102.
16. Mao, L., Tang, J., Liu, H., Chen, J., Li, J., and Huang, Q. (2021). Comparison of three organic fertilizers on soil fertility, pepper growth, and yield. *Journal of Soils and Sediments*, 21(1): 180-191.
17. Narayanan, K., Arunachalam, V., and Ramachandran, N. (2021). Effect of organic and inorganic fertilizers on soil fertility and crop productivity in a tropical agroecosystem. *Environmental Science and Pollution Research*, 28(16): 20130-20140.
18. Obi, M. E., Uchendu, E. E., and Ojinnaka, M. C. (2017). Response of Okra (Abelmoschus esculentus) to Poultry Manure and NPK 15-15-15 Fertilizer in Southeast Nigeria. *Journal of Agricultural Science*, 9(11): 48-58.
19. Odeyemi, O. O., Ayeni, L. S., and Akinremi, O. A. (2016). The Effect of Organic Fertilizer and Chemical Fertilizer on the Growth, Yield and Nutrient Composition of Sweet Pepper (Capsicum annuum). *Journal of Agriculture and Ecology Research International*, 7(1): 1-9.
20. Ogunwole, O. A., Ajayi, S. A., and Adegboyega, E. J. (2021). Organic farming practices and their impact on soil health, crop yield, and the environment: A review. *Journal of Agricultural and Food Chemistry*, 69(9): 2591-2600.
21. Oyedeji, S. A., Faloye, D., and Agbede, T. M. (2021). Comparative effectiveness of organic and inorganic fertilizers on maize yield in Nigeria. *Journal of Plant Nutrition*, 44(3): 500-512.
22. Rao, V.P., and Ramanjaneyulu, G.V. (2021). Genetic resources, breeding, and biotechnological interventions for improvement of sweet pepper (*Capsicum annuum L.*). In Advances in Plant Breeding Strategies: Vegetable Crops. 161-178.
23. Saba, M. N., Adekola, O., Umar, A. H., and Adamu, A. (2016). Estimation of pepper production efficiency in selected local government areas of Kaduna State, Nigeria. *Nigerian Journal of Agricultural Economics*, 6(1): 41-54. https://doi.org/10.33406/njae.v6i1.1377
24. Singh, R. P., Agrawal, M., and Marshall, F.M. (2012). Soil organic matter and fertility: a review. Agronomy for Sustainable Development, 32(1): 13-32. doi: 10.1007/s13593-011-0028-9
25. Tijani, A. A., Odedina, J. N., and Adetunji, O. R. (2021). Effects of plant extract and synthetic insecticides on the control of major insect pests of sweet pepper in the Guinea savannah zone of Nigeria. *Journal of Plant Protection Research*, 61(1): 9-15. https://doi.org/10.24425/jppr.2021.136693
26. Waliczek, T.M. and Wagner, N.C. (2023). An Investigation of the Impact of Compost Tea Applications on Turf Quality and Soil Microbial Activity. *Journal of Environmental Horticulture*, 41(1): 1-6. https://doi.org/10.24266/2573-5586-41.1.1
27. Watson, M. E. and Galliher, T. L. (2001). Comparison of Dumas and Kjeldahl methods with automatic analyzers on agricultural samples under

routine rapid analysis conditions. Commun. Soil Sci. Plant Anal. (32): 2007-2019.

28. Yadav, A., Sharma, A., and Vishwakarma, R.K. (2019). Effect of organic and inorganic fertilizers on growth and yield of bell pepper (*Capsicum annuum L.*). *The Pharma Innovation Journal*, 8(2): 176-179.

2/21/2025