

Effect of Poultry Manure Rates on The Growth and Yield of Carrot (*Daucus Carota L.*) in Gashua, Sahel Savanna Zone of Nigeria

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DOI: <https://doi.org/10.5281/zenodo.21862586>

Article History	ABSTRACT
Original Research Article	<i>This experiment was conducted at the Research and Training Farm of Faculty of Agriculture Federal University Gashua, Yobe State under irrigation during the dry seasons of 2024 and 2025 to investigate the effect of manure rates on growth and yield of carrot (<i>Daucus Carota L.</i>) the experiment was pots experiment. The treatments in the pots consisted of seven treatments which include $T_1 = 12\text{g/ha}$ of poultry manure, $T_2 = 24\text{g/ha}$ of poultry manure, $T_3 = 36\text{g/ha}$ of poultry manure, $T_4 = 48\text{g/ha}$ of poultry manure, $T_5 = 60\text{g/ha}$ of poultry manure, $T_6 = 72\text{g/ha}$ of poultry manure and $T_7 = 0\text{g/ha}$ of poultry manure = control. The design of the experimental was completely Randomized Design (CRD) Data were collected at two weeks interval on growth and yield parameters including plant height, number of leaves, stem girth, fresh and dry shoot weight, root characteristics and tuber yield of carrot. The results showed that all pots with poultry manure with different rates of application produced taller carrot plants than the control, with pot with 72g/ha of poultry manure recording the tallest plant at 10 weeks after transplanting. While pots with 48g/ha poultry manure consistently produced more leaves than the other rates used pots treated with 60g/ha of poultry manure recorded the greatest fresh and dry shoot of carrots. Pots with 60g/ha of poultry manure recorded the highest tuber weight and tuber yield per hectare.</i> Keywords: Poultry Manure, Carrot, Growth, Yields.
Received: 10-06-2026	
Accepted: 14-07-2026	
Published: 09-08-2026	
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Citation: Abdu, M., Abdullahi, R., Abubakar, A. Y., & Lassa, I. A. (2026). Effect of poultry manure rates on the growth and yield of carrot (<i>Daucus carota L.</i>) in Gashua, Sahel Savanna Zone of Nigeria. <i>UKR Journal of Agriculture and Veterinary Sciences</i>, 2(3), 21-25.	

INTRODUCTION

Carrot (*Daucus carota L.*) of the family Apiaceae (Kaur *et al.*, 2009) is a root vegetable, with a crispy texture when fresh (Dreosti, 2013). This vegetable is grouped among the most important root vegetables cultivated worldwide (FAOSTAT, 2021) it grouping among the most important root vegetables may probably be due to its medicinal and nutritional benefits. Records showed that carrots were first used for medicinal purposes and gradually used for food (Kaur *et al.*, 2009).

The yellow and the purple fleshed cultivars were developed much later in central Europe around the 15th and 16th centuries (Simon, 2000: Dreosti, 2013). A rapid rise in the popularity of orange carrots compared to the purple species was attributable to its high pro vitamin A content (Simon 2000). Apart from being a good source of pro vitamin A,

carrots generally are good sources of vitamin B-Complex and minerals (Kaur *et al.*, 2009) (Tanveer *et al.*, 2019). They also possess phytochemicals like carotenoids, flavonoids polyacetylenes and polyphenols which act as antioxidants, anticarcinogens and immune enhancers (Bhara, 2020).

MATERIALS AND METHODS

The experiment was carried out in 2024 and 2025 dry seasons at the Research and Training farm of the Faculty of Agriculture, Federal University Gashua, Yobe State on Latitude 12°53'031"N and Longitude 011°00.761'E in the Nigerian Sahel Savanna.

The experiment was laid out using a Completely Randomized Design (CRD). Each experiment was replicated five times treatments used include: $T_1 = 12\text{g/ha}$

of poultry manure, T2 = 24g/ha of poultry manure, T3 = 36g/ha of poultry manure, T4 = 48g/ha of poultry manure, T5 = 60g/ha of poultry manure, T6 = 72g/ha of poultry manure and 0g/ha of poultry manure = (control) nursery beds measuring 2m long and 1.2m wide were prepared. The seeds were raised in the nursery before transplanted into the pots at the five weeks after planting to the pots the plants were watered at five days intervals, weeding was done manually at 3 weeks intervals presowing soil sample was also analyzed for chemical and physical properties.

Data collected on growth and yield parameter include: plant height, number of leaves, stem girth, fresh and dry shoot weight and tuber yield of carrot.

Statistical Analysis

The average of the result of each year was proved and data of each variable were subjected to analysis of variance (ANOVA) the data were collected at two interval. The difference among treatment means for each parameter were separated by the least significant difference (LSD) the results of the year 2024 and 2025 were combined and the mean was analyzed.

RESULT AND DISCUSSION

The result of the properties of the soil of the research farm is presented in Table 1. The texture of the soil is sandy loam.

Table 2. Shows significant difference in plant height of carrot at 2, 4, 6, 8 and 10 weeks after transplanting. The results show that all pots with poultry manure irrespective of the rate of application produced carrots taller than the control. Among the manure treated pots, pot with 72g/ha poultry manure recorded the tallest plant at 10 weeks after transplanting, this was significantly better than all other treated pots. Pot with control recorded the shortest plant at 10 weeks after transplanting.

Table 3 presents the effect of poultry manure rates on number of leaves of carrot at 2, 4, 6, 8 and 10 week after transplanting. Significant differences were observed in number of leaves of carrot. The result indicated that all pots with poultry manure had a greater number of leaves compared to the control. Pots with 48g/ha of poultry manure consistently produced more leaves than other rates used, at 10 weeks after transplanting. The least number of leaves was observed in the control.

The effect of different rates of poultry manure on stem girth of carrot is presented in table 4. Significant difference occurred in stem girth of carrot due to different rates of manure used except at 2 weeks after transplanting at 10 weeks after transplanting pot with 60g of poultry manure recorded the thickest plant followed by pot with 72/ha of poultry manure. Pot with 12, 24, 36 and 48g/ha of poultry manure produced similar stem girths which are

significantly inferior to pot with 60 and 72g/ha. Control pot recorded the thinnest plant in this experiment.

The effects of different rates of poultry manure on shoot fresh and dry weight of carrot are presented in table 5 significant difference was observed in shoot fresh and dry weight of carrot, pot treated with 60g/ha of poultry manure recorded the greatest weight of fresh and dry shoot of carrot.

The effect of different of poultry manure on root characteristic of carrot is presented in table 6 similar root length and root diameter occurred in all the pots with poultry manure and all these were significantly better in terms of root length and root diameter than the control. The effect of different rate of poultry manure on tuber weight tuber yield of carrot is presented in table 7. The result indicated that pot with 60g/ha of poultry manure recorded the highest tuber weight and tuber yield per hectare this was closely followed by pot with 72g/ha of poultry manure. He effect on pots with 24g and 36g/ha of poultry manure were statistically similar pot with 12g/ha of poultry manure had the least tuber weight and tuber yield per hectare among the pots treated with poultry manure. However, control pot recorded the least and significantly inferior to pot with 12g of poultry manure.

In this experiment the poultry manure used contain enough nutrients necessary to boost the growth and development of crop such as carrot (Ogundare, 2016). The results indicated that all pots with poultry irrespective of the rate of application produced growth characters such as plant height number of leaves and stem girth better than the control poultry manure improve the growth characters of crop especially plant height.

This agreed with the findings of Suge *et al.*, (2016) they attributed the better plant height in pot with poultry manure to gradual release of nutrients by the poultry manure applied and adequate release of both macro and micro nutrients. Results from the study showed that there is positive response of carrot to increased rate of application of poultry manure the increase in rate of application of poultry manure increase yield of crop as reported by Mousa and Mohammed (2009) Falodun *et al.*, (2018) reported that application of highest poultry manure (10t/ha) has superior effect on growth parameters Magdi *et al.*, (2009) reported that the yields of crops were significantly influenced by fertilizer rates.

CONCLUSION

From the results obtained, the following conclusion could be made, pots with poultry manure were better than the control in both growth and yield of carrot pots with 60g/ha of poultry manure had better performance in terms of growth and yield. Farmers should improve the production of carrot by using poultry manure as soil amendment.

Table 1. Physico-chemical properties of soil of the study area

Soil Parameters	Value
Particle size	16
Clay %	28
Silt %	28
Sand %	56
Textural class	Sandy loam
Physico-chemical properties	
Available Phosphorous (mg/kg)	0.48
Organic carbon %	0.37
Organic matter	0.52
Total Nitrogen %	0.70
Exchangeable bases	
Ca (cmol/kg ⁻¹)	8.85
Na (cmol/kg ⁻¹)	0.87
K (cmol/kg ⁻¹)	0.20
Cation exchange capacity (cmol/kg ⁻¹)	5.01

Source; Soil Science Laboratory IAR ABU Zaria

Table 2: Effect of different rates of poultry manure on plant height of carrot (Mean of 2024 and 2025 data)

Treatments (g/pot)	2	4	6 WAT	8	10
10.99	10.96 ^b	13.08 ^b	27.99 ^b	41.05 ^{ab}	43.03 ^b
22.99	12.36 ^{ab}	16.06 ^b	25.92 ^b	32.82 ^b	36.32 ^c
34.99	13.04 ^{ab}	17.56 ^{ab}	28.99 ^{ab}	40.42 ^{ab}	43.08 ^b
46.99	14.66 ^a	20.08 ^a	33.76 ^a	38.32 ^{ab}	42.03 ^{bc}
58.99	9.66 ^b	14.6 ^b	24.02 ^b	34.96 ^{ab}	39.56 ^{bc}
70.99	12.36 ^{ab}	17.36 ^{ab}	24.96 ^b	43.06 ^a	49.76 ^a
Control	5.62 ^c	8.03 ^c	15.36 ^c	19.66 ^c	21.03 ^d
LSD _{0.96}	1.35	2.00	4.33	7.45	5.3

WAT = Weeks after transplanting

Table 3: Effect of Different Rate of Poultry Manure on Number of Leaves of Carrot (Mean of 2024 and 2025 data)

Treatments (g/pot)	2	4 WAT	6	8	10
10.99	2.02 ^{bc}	3.66 ^b	5.99 ^a	8.32 ^a	9.99 ^b
22.99	1.99 ^c	3.32 ^b	5.99 ^a	8.66 ^a	10.66 ^{ab}
34.99	2.66 ^b	3.66 ^b	5.99 ^a	8.32 ^a	10.66 ^{ab}
46.99	3.32 ^a	4.99 ^a	6.32 ^a	8.32 ^a	10.99 ^a
58.99	2.66 ^b	3.99 ^{ab}	5.66 ^a	7.32 ^b	10.32 ^{ab}
70.99	2.66 ^b	4.99 ^a	5.99 ^a	7.99 ^{ab}	10.32 ^{ab}
Control	1.66 ^c	2.32 ^c	3.32 ^b	5.99 ^c	7.32 ^c
LSD _{0.96}	-0.37	0.05	0.1	-0.32	-0.1

WAT = Weeks after transplanting

Table 4: Effect of Different Rate of Poultry Manure on Stem Girth of Carrot (Mean of 2024 and 2025 data)

Treatments (g/pot)	2	4	6 WAT	8	10
10.99	1.92	3.01 ^b	5.26 ^c	7.08 ^b	9.03 ^a
22.99	2.02	3.32 ^b	5.01 ^b	6.08 ^a	8.99 ^a
34.99	2.00	4.01 ^{ab}	4.86 ^b	6.82 ^{bc}	8.86 ^b
46.99	2.06	4.05 ^{ab}	5.22 ^b	6.66 ^{bc}	8.87 ^b
58.99	2.06	4.16 ^a	5.04 ^b	7.92 ^{ab}	9.99 ^a
70.99	2.02	4.76 ^a	6.22 ^a	8.22 ^a	10.01 ^a
Control	2.00	2.02 ^c	3.06 ^c	4.06 ^d	8.86 ^c
LSD _{-0.96}	NS	-0.25	-0.43	-0.08	-0.2

WAT = Weeks after transplanting

Table 5: Effect of Different Rate of Poultry Manure on Fresh and Dry Shoot Weight of Carrot (Mean of 2024 and 2025 data)

Treatments (g/pot)	Fresh root weight (g)	Dry root weight (g)
10.99	15.07 ^c	4.2 ^c
22.99	18.07 ^c	4.9 ^c
34.99	14.92 ^c	4.57 ^c
46.99	27.9 ^b	8.82 ^b
58.99	35.34 ^a	10.62 ^a
70.99	24.16 ^b	6.79 ^b
Control	7.53 ^d	2.15 ^d
LSD _{-0.96}	4.68	0.42

Table 6: Effect of Different Rate of Poultry Manure on Root Characteristics of Carrot (Mean of 2024 and 2025 data)

Treatments (g/pot)	Fresh root weight (g)	Dry root weight (g)
10.99	19.21 ^a	3.73 ^a
22.99	19.92 ^a	4.54 ^a
34.99	20.08 ^a	4.31 ^a
46.99	17.79 ^a	5.4 ^a
58.99	19.12 ^a	5.08 ^a
70.99	18.67 ^a	4.99 ^a
Control	14.15 ^b	1.82 ^b
LSD _{-0.96}	1.4	1.38

Table 7: Effect of Different Rate of Poultry Manure on Tuber Yield of Carrot (Mean of 2024 and 2025 data)

Treatments (g/pot)	Fresh root weight (g)	Dry root weight (g)
10.99	15.62 ^d	9.26 ^c
22.99	17.09 ^{cd}	10.66 ^{bc}
34.99	18.38 ^c	10.96 ^{bc}
46.99	26.29 ^a	15.85 ^{ab}
58.99	28.16 ^a	17.00 ^a
70.99	21.25 ^b	12.74 ^b
Control	9.04 ^c	5.47 ^d
LSD _{-0.96}	1.3	2.46

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