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Nematotoxic Effects of Poultry Droppings, Cow Dung and Goat Dung in the Suppression of Root Knot Nematode (*Meloidogyne spp.)* Infection on Garden Egg

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ABSTRACT

An experiment to assess the Nematotoxic effects of poultry droppings, cow dung, and goat dung in the suppression of root-knot nematode (Meloidogyne spp) infection on eggplant during the 2023 wet season at the Teaching and Research Farm, Federal University Wukari, Taraba State, Nigeria. The experiment was laid out on a Randomized Complete Block Design (RCBD), which consisted of three organic manures (Poultry dropping, Goat dung, and Cow dung) at different rates of 1.2t/ha, 1.8t/ha, 2.4t/ha, 3t/ha and control at 0%/ha. The experiment revealed that the application of these organic manures improved the number of leaves per plant, stem girth, root length, yield parameters, and most especially suppressed nematode population. Interestingly, the application of Poultry droppings at 2.4 t/ha recorded a highly significant (P≤0.05) effect in the suppression of root galls and enhanced growth and yield of the eggplant. The result of the study further confirmed the nematotoxic potential of poultry droppings in the suppression of root-knot nematode (Meloidogyne spp).

Keywords: *Infection, Nematode, Nematotoxic, Root Knot, Suppression*

INTRODUCTION

Eggplant (*Solanum melongena*) is consumed as green fresh fruit and is highly used in homes as part of soup ingredients, most especially due to its nutritional qualities (Edeke *et al.*, 2021). Eggplant has a low caloric value and is considered among the healthiest vegetables for its high content of vitamins (Vitamins A, B1 and B6), minerals such as phosphorus, potassium, calcium, magnesium and bioactive compounds for human health (Gürbüz *et al*., 2018; Vicente *et al*., 2022; Adeyanju

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et al., 2021). The bioactive properties of eggplant are mostly associated with a high content of phenolic compounds (Karimi *et al*., 2021), which are mostly phenolic acids, particularly chlorogenic acid in the fruit flesh (Salamatullah *et al*., 2021) and anthocyanins in the fruit skin (Condurache *et al*., 2021). Both phenolic acids and anthocyanins have multiple properties that are beneficial for human health (Agregán *et al*., 2021; Sharma *et al*., 2021).

Meloidogyne spp. has been recorded as the most prevalent parasitic nematode that affects crops in the tropic and semi-tropic causing damage to the root of the crop which results in a considerable loss in the annual yield of the crop (Lulamba, 2021). Chemical nematicides hurt the environment and human health and these pathogens tend to develop or acquire resistance to widely used chemical products (Edwards and Arancon, 2021; Mangowa, 2020). The fruit yield has been reported to be low in Nigeria due to diseases, pest infestation, and low soil fertility problems, among others thus, farmers need improved varieties for sustainable production and adaptation to climate change challenges as it is more exposed than other vegetable crops to a broad range of plant diseases, pests, nematodes and weeds (Olusesan *et al*., 2022; Ofuya *et al*., 2023). Thus, this research evaluates the nematotoxic effects of poultry dropping, cow dung and goat dung in the suppression of root knot nematode (*Meloidogyne spp*.) infection on garden egg (*Solanum melongena*) in nematode infested soil of Wukai Local Government, Taraba State, Nigeria.

MATERIALS AND METHOD

Experimental Site

The experiment was carried out during the 2023 farming season at the Teaching and Research Farm Federal University Wukari, Taraba State. Wukari is within the Southern Guinea savannah zone of Nigeria. It is located in latitude 7.85^0 N and longitude 9.78^0 E at 152 m above sea level with annual rainfall of 1450mm, average daily temperatures of 24 to 33^0C during the rainy seasons and annual relative humidity of 78 %. It has the total population of 241,546 people according to 2016 census, with an area of 4.308km^3. This area has been reported to be nematode infested by Adepoju *et al*., 2016.

Sample Collection

The seeds of the Eggplant (Gauta Bello) used were obtained from Samaru Open Market, Zaria. Organic manure (Poultry dropping, Cow dung, and Goat dung) was collected from the Animal Science and Health Research Farm, Federal University Wukari.

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Soil analysis
Five soil samples were obtained from the farm site using a random sampling technique. The five samples were then mixed to form a composite sample which was then taken to the Soil Science Laboratory FUW where it was analyzed.

Experimental Set-up

Pre-nursery and nursery preparation
The seedlings were raised under a shed on a 3 m x 3 m bed with topsoil. After a period of 28 days, seedlings were removed and placed 10 stands on a 2 m x 1.5 m field plot to enable establishment of roots and further development.

Site preparation, transplanting, treatment and data collection
The land area was cleared and prepared manually using cutlass and hoe. The layout covered a total land area of 287.5 m^2. the experiment was set out in a randomized complete block design with each bed measuring 2 m x 1.5 m. three replications were done. 4 weeks seedlings were transplanted (in the evening between 1600 hours and 1800 hours to minimize heat stress) on each bed at a spacing of 0.3 m x 0.5 m. The soil was pressed firmly around the plant, irrigated immediately and then, left for natural irrigation (rains). Standard agronomic practices were followed to ensure a good outcome. The plants were left to natural infestation. The treatment was poultry droppings, cow dung and goat dung which was applied manually 2 weeks after transplanting. Eggplant fruits were harvested immediately the fruits reached their full growth and when their skin turned glossy and the parameters were measured in order to determine the efficiency of the organic manure. The parameters were taken at 2 weeks intervals from 4 weeks after transplanting.

Field Experiment
The experiment was set up on a Randomized Complete Block Design, which consisted of three organic manure types (Poultry manure, Goat and Cow dung) at different rates of 1.2 t/ha, 1.8 t/ha, 2.4 t/ha, 3 t/ha replicated three times and an untreated control (0) . On the main plot were the organic fertilizer types and the rates of the organic manure on the subplot. The experimental site was measured 23 m × 12.5 m (287.5 m^2 i.e. 0.0288 ha) and mapped out and each experimental unit was 2 m x 1.5 m (3 m^2) with 0.5 m intra row spacing between plots and 1m between replicates respectively. Nursery of eggplant were prepared and transplanted after 28 days at inter-row and intra-row of 50 cm × 30 cm. Organic manure were applied two weeks after transplanting and all agronomic practices were carried out during the growing season

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Data Collected

Plant height (cm)
The height from the ground level to the highest point of the 5 tagged plants were measured at harvest with a meter rule and the average calculated.

Number of leaves/plant
The number of leaves of 5 tagged plants were counted at 2WAT interval and the average recorded.

Number of branches
The number of branches of 5 tagged plants per plot were counted at 20, 45, 60 DAT and the average was taken.

Yield component
To estimate crop yield component, the quantity of a given fruit harvested in a sample area was counted per plot and were weighed, and the crop yield of the entire field is extrapolated from the sample.

Nematode Population
Nematode population in the soil and gall index were determined by uprooting each tagged plant gently, washing in a bucket and the dipping water contained in a beaker and then observing through the beaker.

Data Analysis
All data on eggplant were subjected to analysis of variance (ANOVA) and mean were separated using Duncan Multiple Range Test (DMRT) as a follow up test to separate the means.

RESULTS

Physical and Chemical Parameters of Soil
The result of the physical and chemical properties of the soil (0-30cm) of the experimental site is presented in Table 1. The experimental soil was sandy loam in texture and slightly acidic with pH 6.45. Available phosphorus of 43.5 mg/kg was high and soil total nitrogen of 0.53% was low. The value for CEC (3.76) was moderate. Organic matter (1.10) and organic carbon (0.64) are within considerable range for an agricultural soil. K (0.42 mg/100g), Ca (2.05 mg/100g), Mg (0.74 meg/100g) and Na were considerably low.

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Table 1: Physical and Chemical Parameter of Soil of the Experimental Site

Soil parameters	Value
% Clay	2.00
% Sand	71.60
% Silt	26.40
% Organic matter	1.10
Textural class	Sandy loam
Total N	0.53
Available P (mg/ kg^{-1})	43.5
K (Meg/ 100g)	0.42
Na (Meg/ 100g)	0.34
Ca (Meg/ 100g)	2.05
Mg (Meg/ 100g)	0.74
Ph	6.45
Exchangeable Acidity	0.21
ECEC (Meg/ 100g)	3.76

Effect of Organic Manure on Plant Height and Number of Branch in the Control of Root Knot Nematode on Eggplant during 2023 wet season

The effect of organic manure on plant height and number of branches is presented on Table 2. The result showed that plant height was significantly (P≤0.05) highest in 3 t/ha poultry manure and 1.8 t/ha of poultry manure followed by 2.4 t/ha of goat dung while other treatment was significantly not different from each other all through the weeks except at week 12 which showed no significant (P≤0.05) difference in plant height in all the treatment. The result on the number of branches was significantly (P≤0.05) highest in 1.8 t/ha of poultry manure followed by control cow dung and 2.4 t/ha of goat dung while other treatment showed no significant difference (P≤0.05) all through the weeks.

Effect of Organic manure on Leaf Number and Stem girth in the Control of Root Knot Nematode on Eggplant during the 2021 wet season

The effect of organic manure on leaf number and stem girth is presented on table 3. The result showed that there was significant (P≤0.05) difference in leaf number. Leaf number was significantly highest in 2.4 t/ha and 3 t/ha of poultry manure followed by 3 t/ha cow dung, 3 t/ha goat dung, 2.4 t/ha cow dung and 2.4 t/ha goat. Leaf number was significantly low in 1.2 t/ha goat dung.

The result on stem girth show there was significant (P≤0.05) difference. 3 t/ha of poultry dropping and 2.4 t/ha of poultry dropping were significantly high followed by 2.4 t/ha of cow dung, 3 t/ha of cow dung, 2.4 t/ha of goat dung and 1.8 poultry

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dropping at week 4, 6, 8 and 10 while the treatment that were significantly low were control poultry dropping, control at 4 weeks and 1.2 t/ha of goat dung at week 6 and 8. At 10 weeks, 3 t/ha of poultry dropping and 2.4 t/ha poultry dropping were significantly (P≤0.05) high, followed 2.4 t/ha cow dung, 3 t/ha cow dung and 3 t/ha of goat dung. Control was significantly low while other treatment was significant (P≤0.05) moderate and are statistically the same although their values differ. At week 12, 3 t/ha of poultry dropping and 2.4 t/ha of poultry dropping were significantly high followed 2.4 t/ha cow dung, 3 t/ha goat dung, 3 t/ha cow dung and 2.4 t/ha goat dung while 1.2 goat manure significantly low where as other treatment were significantly the same, although their values differ.

Table 2: Effect of Organic Manure on Plant Height and Number of Branch in the Suppression of Root Knot Nematode on Eggplant in 2021 wet season at Wukari LGA

		Plant Height(cm)					Number of Branch		
Organic manure	Rate(t/ha)	4WAT	6WAT	8WAT	10WAT	12WAT	8WAT	10WAT	12WAT
Poultry dropping									
	1.2 t/ha	3.50 ^{ab}	6.33 ^{ab}	15.90 ^{ab}	30.07 ^{ab}	74.33	1.33 ^{ab}	2.47 ^{ab}	3.93 ^{ab}
	1.8 t/ha	4.67^{a}	8.47^{a}	21.23 ^{a}	40.07 ^{a}	81.87	1.60 ^{a}	3.03 ^{a}	4.80 ^{a}
	2. t/ha	4.07 ^{ab}	7.37 ^{ab}	18.47 ^{ab}	34.90 ^{ab}	70.07	1.13 ^{ab}	2.17 ^{ab}	3.40 ^{ab}
	3 t/ha	5.00^{a}	9.07a	22.73 ^{a}	42.93 ^{a}	78.73	1.40 ^{ab}	2.60 ^{ab}	4.13 ^{ab}
Cow Dung									
	1.2 t/ha	4.10 ^{ab}	7.43 ^{ab}	18.63 ^{ab}	35.23 ^{ab}	77.93	1.10 ^{ab}	2.07 ^{ab}	3.33 ^{ab}
	1.8 t/ha	3.46 ^{ab}	6.30 ^{ab}	15.73 ^{ab}	29.77 ^{ab}	72.73	1.20 ^{ab}	2.27 ^{ab}	3.60 ^{ab}
	2.4 t/ha	3.63 ^{ab}	6.57 ^{ab}	16.50 ^{ab}	31.20 ^{ab}	66.80	1.27 ^{ab}	2.37 ^{ab}	3.73 ^{ab}
	3 t/ha	5.23^{a}	9.50^{a}	23.77 ^{a}	44.93 ^{a}	76.00	1.40 ^{ab}	2.63 ^{ab}	4.20 ^{ab}
Goat Dung									
	1.2	2.37 ^{ab}	4.27 ^{ab}	10.77 ^{ab}	20.33 ^{ab}	60.07	1.03 ^{ab}	1.97 ^{ab}	3.13 ^{ab}
	1.8	2.43 ^{ab}	4.43 ^{ab}	11.03 ^{ab}	20.90 ^{ab}	63.67	1.03 ^{ab}	1.93 ^{ab}	3.07 ^{ab}
	2.4	1.73^{b}	3.17^{b}	7.90 ^{b}	14.90 ^{b}	61.60	0.90 ^{b}	1.70 ^{b}	2.73 ^{b}
	3	3.23 ^{ab}	5.87 ^{ab}	14.67 ^{ab}	27.77 ^{ab}	60.08	1.067 ^{ab}	2.03 ^{ab}	3.20 ^{ab}
Control	0% t/ha	2.37^{ab}	5.27^{ab}	13.20^{ab}	24.90^{ab}	60.27	0.90^{b}	1.73^{b}	2.73^{b}
Standard Error		2.174	7.092	44.924	160.385	207.619	0.089	0.322	0.832

Treatments with the same alphabet shows that their means are significantly (p≤0.05) not different from each other.

Effect of Organic manure on Yield Parameters of Eggplant in the Control of Root Knot Nematode on Eggplant during the 2021 wet season

The effect of organic manure on the yield parameters of eggplant is presented on table 4. the result showed there was significant difference (P≤0.05) on the yield parameter both in grams and t/ha. Poultry dropping at 3 t/ha (1517) and 2.4 t/ha (1454.66) were significantly (P≤0.05) higher although their values differ but statistically, they are the same followed by 3 t/ha cow dung, 1.8 t/ha poultry dropping, 2.4 t/ha cow dung while the lowest was recorded on the 1.2 t/ha goat dung (585.67), and control (522.67).

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Poultry dropping was significantly higher followed by cow dung and goat dung. The result on the number of fruits showed there was significant (P≤0.05) among treatments. 2.4 t/ha poultry dropping (75.33) was significant higher followed by 3 t/ha of poultry (69.33) whose value are statistically not far from that 2.4 t/ha, 3 t/ha cow dung (66.00), 1.8 t/ha poultry dropping (62.00) while 1.2 goat dung (32.67) was significantly low.

Effect of Organic Manure on Root Length, Gall Index, Initial and Final Nematode Population in the Control of Root Knot Nematode on Eggplant during 2021 wet season

The effect of organic manure on root length, root gall index, initial nematode population and final nematode population is presented in table 5. Root length was significantly highest in 2.4 t/ha of goat dung followed by 1.8 t/ha cow dung, 1.2 t/ha cow dung, 2.4 t/ha cow dung which their values differ but are statistically not from that of the 2.4 t/ha of goat dung. 3 t/ha of goat dung recorded lowest when compared to other treatment.

The result on root gall index showed significant (P≤0.05) difference among treatments. 1.8 t/ha poultry dropping, control cow dung, 1.2 t/ha of cow dung, 1.8 t/ha of cow dung, 1.2 t/ha of goat dug and 2.4 t/ha goat dung were significantly (P≤0.05) highest with no statistical difference followed by1.2 t/ha poultry dropping, 2.4 t/ha cow dung, 1.8 t/ha poultry dropping and 1.8 t/ha goat dung with values that are statistically the same. The lowest was recorded in control poultry dropping and 3 t/ha of goat dung.

On the nematode population, various treatments showed significant (P≤0.05) reductions in the final nematode population when compared to the initial population. Poultry dropping was significantly (P≤0.05) highest in the reduction of nematode followed by goat and cow. Control was significantly (P≤0.05) low in final nematode pollution followed by 3 t/ha of poultry dropping, control has the highest final nematode population.

DISCUSSION

It is important to mention that organic manure has a great impact on soil fertility which is essential for good plant growth because, fertile soil provide nutrients necessary to grown crops (Singh *et al*., 2020). The control strategies of organic manure are particularly interesting because of their low cost and the more general positive agronomical effect on plant growth and on physical, chemical and biological properties of the soils (Singh *et al*., 2022). Reports on the suppressive effect of soil

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amendments, with a wide range of composted waste materials, on plant parasitic nematodes was largely and frequently documented, although an inconsistent nematode control or variable effects were also described in literature (Moosavi, 2022; De Corato, 2020).

During the study, all treatments used as organic manure (Poultry dropping, Cow dung and Goat dung) at different levels were found to increase the growth parameters, yield of eggplant per plant, root length and significantly reduced root-knot nematode population. In terms of growth parameters, it was observed that an increased rate in organic manure of some result shows an increase in the growth parameters which include plant height, leaf number, number of branch and stem girth. (Dalorima *et al*., 2021) reported similar result that to reliably increase the growth of horticultural crops such as eggplants by an increase in organic manure. An increase in the dosage of poultry dropping, showed an increase in the growth and yield parameter of eggplant better compare to other manure. Similar report had been obtained by Idowu *et al*., 2023.

Table 3: Effect of Organic Manure on Leaf Number and Stem girth in the Suppression of Root Knot Nematode on Eggplant in 2021 wet season, at Wukari LGA.

		Leaf Number					**Stem Girth(cm)**				
Organic manure	Rate (t/ha)	4WAT	6WAT	8WAT	10WAT	12WAT	4WAT	6WAT	8WAT	10WAT	12WAT
Poultry dropping	1.2 t/ha	4.43^{def}	8.90^{efg}	17.76^{def}	22.23^{efg}	27.00^{efg}	0.18^{bcde}	0.40^{bcde}	0.80^{bcde}	1.03^{bcd}	1.13^{bcde}
	1.8 t/ha	5.13^{bcd}	10.20^{cde}	20.47^{cd}	25.53cde	30.87^{cde}	0.22^{bcd}	0.49^{bcd}	0.97^{bcd}	1.2^{bcd}	1.40^{bcd}
	2.4 t/ha	7.33^{a}	14.67^{a}	29.33^{a}	36.67^{a}	44.40^{a}	0.33a	0.72^{a}	1.45^{a}	1.87^{a}	2.03^{a}
	3 t/ha	7.33^{a}	14.67^{a}	29.33^{a}	36.67^{a}	44.43^{a}	0.35a	0.78^{a}	1.55^{a}	2.00^{a}	2.20^{a}
Cow Dung	1.2 t/ha	4.33^{ef}	8.67^{fg}	17.33^{ef}	21.67^{fg}	26.13^{fg}	0.17^{cde}	0.38^{cde}	0.76^{cde}	0.97^{cd}	1.07^{cde}
	1.8 t/ha	5.10^{cd}	10.23^{cde}	20.43^{cd}	25.57^{cde}	31.03^{cde}	0.21^{bcde}	0.48^{bcde}	0.95^{bcde}	1.20^{bcd}	1.37^{bcde}
	2.4 t/ha	5.60^{bc}	11.23^{bc}	22.43^{bc}	28.07^{bc}	33.93^{bc}	0.24^{b}	0.53^{b}	1.06^{b}	1.33^{b}	1.50^{b}
	3 t/ha	5.87^{b}	11.80^{b}	23.53^{b}	29.47^{b}	35.50^{b}	0.24^{b}	0.52^{b}	1.04^{b}	1.33^{b}	1.47^{bc}
Goat Dung	1.2 t/ha	3.83^{f}	7.67^{f}	15.33^{f}	19.17^{f}	23.57^{g}	0.16^{c}	0.35^{e}	0.69^{e}	0.90^{d}	0.97^{e}
	1.8 t/ha	4.77^{de}	9.57^{def}	19.10^{de}	23.90^{de}	29.20^{def}	0.20^{bcde}	0.44^{bcde}	0.89^{bcde}	1.13^{bcd}	1.27^{bcde}
	2.4 t/ha	5.50^{bc}	11.00^{bcd}	22.00^{bc}	27.50^{bc}	33.20^{bcd}	0.23^{bc}	0.51^{bc}	1.02^{bc}	1.30^{bc}	1.43^{bc}
	3 t/ha	5.70^{bc}	11.47^{bc}	22.87^{bc}	28.63^{bc}	34.70^{bc}	0.24^{b}	0.52^{b}	1.04^{b}	1.30^{b}	1.50^{b}
	0 t/ha	4.33^{ef}	8.67^{fg}	17.33^{ef}	21.67^{fg}	26.10^{fg}	0.16^{ce}	0.36^{de}	0.71^{de}	0.90^{c}	1.00^{de}
Control											
S. Error		0.162	0.640	2.574	4.007	5.534	0.001	0.005	0.021	0.036	0.045

Treatments with the same alphabet shows that their means are significantly (p≤0.05) not significant. WAT = Week after transplanting.

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Table 4: Effects of Organic Manure on Yield Parameters of Eggplant in the Suppression of Root Knot Nematode on Eggplant in 2021 wet season, at Wukari LGA.

Organic Manure	Rate (t/ha)	Yield (g/plot)	Yield (g/ha)	Number of fruits (g/plot)
Poultry dropping	1.2 t/ha	814.000^{cd}	21.70^{de}	55.00^{d}
	1.8 t/ha	1076.33^{bc}	28.30^{bc}	62.00^{c}
	2.4 t/ha	1454.66^{a}	38.73^{a}	75.33^{a}
	3 t/ha	1517.00^{a}	40.47^{a}	69.33^{ab}
Cow Dung	1.2 t/ha	689.00^{fg}	18.27^{fg}	49.33^{de}
	1.8 t/ha	819.66^{cd}	21.83^{de}	44.67^{fg}
	2.4 t/ha	1031.00^{c}	27.50^{c}	50.33^{de}
	3 t/ha	1126.00^{b}	30.03^{b}	66.00^{bc}
Goat Dung	1.2 t/ha	585.67^{hi}	15.37^{hi}	32.67^{i}
	1.8 t/ha	752.67^{de}	20.07^{ef}	40.00^{gh}
	2.4 t/ha	890.33^{d}	23.87^{d}	52.33^{de}
	3 t/ha	901.33^{d}	23.87^{d}	52.33^{de}
Control	0 t/ha	522.67^{i}	13.96^{i}	34.66^{hi}
Standard Error		2805.644	2.006	16.444

Treatments with the same alphabet shows that their means are significantly ($p \leq 0.05$) not different from each other

Table 5: Effects of Organic Manure on the Root Length, Gall Index, Initial Nematode and Final Nematode population on Eggplant in Nematode infested Soil in 2021 wet season, at Wukari LGA**.**

Organic manure	Rate (t/ha)	Root length (cm)	Root galls index	Initial root knot nematode	Final root knot nematode
Poultry dropping	1.2 t/ha	32.00^{def}	4.33^{ab}	924	138.58^{de}
	1.8 t/ha	30.33^{ef}	3.67 ^{abc}	965	110.10^{ef}
	2.4 t/ha	38.00^{cde}	5.00 ^{a}	892	90.00^{ef}
	3 t/ha	30.33^{ef}	2.33^{cd}	1007	70.67^{de}
Cow Dung	1.2 t/ha	43.67^{b}	5.00 ^{a}	943	218.35^{cd}
	1.8 t/ha	47.67^{ab}	5.00 ^{a}	972	230.35^{cd}
	2.4 t/ha	48.33^{ab}	5.00 ^{a}	989	241.65^{c}
	3 t/ha	46.00^{abc}	4.33 ^{ab}	792	199.18^{de}
Goat Dung	1.2 t/ha	39.33^{cd}	3.00^{bcd}	956	117.99^{de}
	1.8 t/ha	44.67^{bc}	5.00^{a}	972	223.35^{cd}
	2.4 t/ha	42.67^{bc}	3.67^{abc}	879	156.59^{d}
	3 t/ha	53.33^{a}	5.00 ^{a}	1019	266.65^{bc}
Control	0 t/ha	13.67^{g}	1.67^{d}	976	425.33^{a}
Standard Error		18.31	0.89	NS	14.36

Treatments with the same alphabet shows that their means are significantly ($p \leq 0.05$) not different from each other.

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Poultry dropping have significant effects on the plant's vegetative growth and ensures stable and robust production (Bhunia *et al*., 2021). Application of an increased rate of poultry dropping results in yield increase indicating that poultry manure provides nutrients that promote vigorous plant growth, culminating in an increase in fruit yield (Adekiya *et al*., 2020). Ashworth *et al*., 2020 reported that poultry dropping contains higher nitrogen and phosphorus than other organic waste. The application of poultry dropping also gave a positive impact on growth. The influence on growth in eggplant has been attributed to the abundance of nutrient it contains and components linked to elevate the photosynthetic activities of crops which encourages root and vegetative development (Agbede and Oyewumi, 2022). It is also known for its ability to supply adequate nutrients to the soil and facilitate rapid vegetative growth in crops.

Eggplants treated with poultry manure also recorded reduced root-knot nematode infection. Similar report was recorded by Mostafa *et al*. (2022) found a significant reduction in nematode infection and root gall index after the application of rhizobacteria inoculated in composted chicken manure. The suppression of plant parasitic nematodes and improving of some free-living (beneficial) nematodes have also been reported in other studies (Udo *et al.,* 2020; Abolusoro, *et al.,* 2020; Karimipour and Doryanizadeh, 2022).

The suppression of plant parasitic nematodes observed may be due to the enhancement of the indigenous soil micro-fauna and flora. Ahmad *et al.,* 2021 reported that organic manure, including compost amended to the soil, improves the performance of nematode infested plant due to direct stimulation of predators and parasites of nematodes leading to reduction in soil pathogens and consequent increase in growth and yield. Similar results were obtained by El-Shaefeey *et al*. (2023) who reported significant reduction of nematode population on eggplant with increase in growth, yield and reduced gall index of root knot nematode due to treatment with organic manure compared to the untreated control.

CONCLUSION AND RECOMMENDATION

All the selected organic manure types had significant effect on the growth and yield of eggplant at each varying rate. Poultry manure among other organic manure used showed better suppression on root knot nematode population in the soil considerably, allowing better yield and plant establishment mostly at 2.4 t/ha and 3 t/ha. Higher dose of Cow dung and Goat dung also showed a good suppressive attribute toward root knot nematode *Melodogyne spp.* and in the yield and growth of eggplant but it effects were not as high as was recorded in poultry dropping..

From this study, it can be reported that root knot nematode disease on Eggplant plot can be effectively suppressed with the use of poultry dropping to obtain

good yields in infested soils. The present study provides useful information for further research to understand the nematotoxic effect of the poultry dropping on root knot nematodes.

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