International Journal of Organic agricultural Research & Development
Volume 19 (3) (2024)

EFFECT OF NEEM COMPOST AND NPK FERTILIZER ON THE GROWTH AND YIELD OF SESAME (*Sesamum indicum*)

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ABSTRACT

The study was examined the Performance of Sesame (*Sesamum indicum Linn*) as Influenced by varying rate of Neem compost fertilizer on the growth and yield of Sesame. Pot experiments was conducted during the rainy season of 2023 at the experimental plot behind Bee-Hall, Ladoke Akintola University of Technology, Ogbomoso in guinea savannah zone of Nigeria between May and October, 2023. Ogbomoso lies on latitude (8º N I0ºS) and longitude (4ºW, 10ºE). The maximum temperature was 28º C. The humidity was high at about 76% all the year round except in January when dry wind blows from the North, annual rainfall was over 1000mm. (Babajide *et al.,* 2008). Six fertilizer treaments were introduced; T0 = (Zero application of fertilizer material), T0 (Zero Application), T1 (NPK 100%), T2 (75% NPK + 25% Neem Compost), T3 (50% NPK + 50% Neem Compost), T4 (25% NPK + 75% Neem Compost) , T5 (100% Neem Compost).The trial was arranged in Completely Randomized Design (CRD) replicated three times. Data collected on growth and yield parameters were plant heights, numbers of leaves, numbers of branches, stem girths, Root Fresh Weights, Root Dry Weights, Shoot Fresh Weights, Shoot Dry Weights and were analyzed using Analyswas of Variance (ANOVA). Means were separated using Duncan Multiple Range Test (DMRT), at 5% level of probability (SAS, 2019). Application of T3 at 10WAS increased the yield parameters on both shoot fresh and seed yield weight with the highest mean value (98.60a and 131.27a) respectively which was not significantly different from T1, T4 and T5 but significantly different from T2 and T0 which had the least mean value of (25.27b and 63.32b).

INTRODUCTION

Sesame (*Sesamum indicum* L.), also known as benwaseed in West Africa, simsim in East Africa, was an oil producing crop belonging to the Pedaliaceae family, grown in both tropical and sub-tropical regions of Africa, Asia and Latin America (Haruna, 2011) and to some extent in Russia for edible oil and animal feed (Tunde-Akintunde and Akintunde, 2007). In Nigeria, sesame was cultivated in the savanna zone, where it was regarded as a crop with high economic potentials, both as raw material for industry and reliable foreign exchange earner (Alegbejo *et al.,* 2003). Hence attention has been focused on the crop, and this has resulted in an increase in area of production (Umar *et al.,* 2014). Sesame has geographical plasticity as it was cultivated in all continents of the world. The precwase natural origin of the species (*indicum*) was unknown, although numerous wild relatives occur in Africa and a smaller number in India (Desai, 2004). NPK fertilizer application tends to release fast nutrients to sustain soil fertility and crop production (Uyovbwasere *et al.,* 2010). It has been noted that the exorbitant price of fertilizer was a predicament to crop production in Nigeria (Akanbi *et al.,* 2011). Likewise, using inorganic fertilizer has led to reduced crop yield, soil acidity and nutrient imbalance (Agbede *et al.,* 2018). The use of inorganic fertilizer has been observed to cause the destruction of soil texture and structure, which often leads to soil erosion and acidity as a result of the leaching effect of nutrients. All these give rwase to reduced crop yields as a result of soil degradation and nutrients imbalance (Agbede *et al.,* 2018). Application of organic and inorganic fertilizer in form of NPK fertilizer and organic fertilizer can decrease the footprint on the environment and meet the nutrient demands for the crop since NPK are essential nutrients for vigorous growth due to their immediate availability to the plant roots and hence high yields (Mohamed *et al.,* 2012). Soil amelioration and improvement via integrated soil fertility management strategy including organic and inorganic fertilizer was a major intervention component that has improved crop production worldwide (Chand *et al.,* 2006). Therefore it was necessary to study the effect of neem compost and NPK fertilizer on the growth and yield of sesame (*Sesamum indicum*).

Experimental site

Pot experiment was conducted during the rainy season of 2023 at the experimental plot, behind Bee-Hall, Ladoke Akintola University of Technology, Ogbomoso in guinea savannah zone of Nigeria.

MATERIAL AND METHODS

Soil sampling and analyswas

After land preparation of each site, pre planting collection of soil sample was carried out using auger at a depth of 0-15cm, laboratory analyswas of the soil physical and chemical properties. The samples were bulked into a composite sample according to (Weil, 2014).

Treatments

Six treatment were introduced; T0 = (Zero application of fertilizer material), T0 (Zero Application), T1 (NPK 100%), T2 (75% NPK + 25% Neem Compost), T3 (50% NPK + 50% Neem Compost), T4 (25% NPK + 75% Neem Compost) , T5 (100% Neem Compost). All thwas treatment will be applied at recommended rate. Two pots per treatment will be used and replicated three times.

Data collection and Analysis

Data were collected on the following parameters; Plant height (cm), Number of leaves, Stem girth (cm), Number of branches and Yield. All data collected were subjected. Data collected were on growth parameters (plant height, stem girth, number of branches and number of leaves). To analyswas of variance (ANOVA) means were separated using duncan's multiple range test (DMRT) at $p<0.5$.

RESULTS AND DISCUSSION

Soil physical and chemical properties of sample used.

The soils grossly low in essential nutrients particularly N (0.24gkg^{-1}), P (3.60 mgkg^{-1}) and K (0.36cmolkg^{-1}). Also the soil was texturally sandy loam (Table 1) The results corroborated the earlier research finding of (Babajide *et al.,* 2008) which indicate that the soil in the study area was grossly low in essential nutrients and there by requires regular supply of organic materials to improve its quality.

Effect of Neem compost on Growth Parameters of *Sesamum indicum*

Effect of Neem compost on Plant Height of *Sesamum indicum*

Table 2 shows the effect of Neem compost application on sesame. Application of T3 at 6WAS increased the plant height and had the highest mean value (58.58a) which was not significantly different from T1, T2 and T4 but significantly different from T5 and T0 which had the least mean value of (27.23c). At 7WAS, application of T3 increased the plant height and had the highest mean value (82.60a) which was not significantly different from all other treatments tested except T0 which had the least mean value of (41.27c). At 8WAS, application of T3 increased the plant height and had the highest mean value (80.47a) which was not significantly different from T1, T4 and T5 but significantly different from T2 and T0 which had the least mean value of (51.67c). Application of T3, at 9WAS increased the plant height and had the highest mean value (90.50a) which was not significantly different from all other treatments tested except T0 which had the least mean value of (70.03b). Application of T3 at 10WAS increased the plant height and had the highest mean value (91.50a) which was not significantly different from T1, T4 and T5 but significantly different from T2 and T0 which had the least mean value of (70.01b).

4.3 Effect of Neem compost on Stem Girth of *Sesamum indicum*

Table 4.3 shows the effect Neem copmpost application on sesame. Application of T3 at 6WAS increased the plant height and had the highest mean value (14.70a) which was not significantly different from all other treatments tested except T0 which had the least mean value of (7.87b). Application of T3 at 7WAS increased the plant height and had the highest mean value (18.33a) which was not significantly different from all other treatments tested except T0 which had the least mean value of (9.43b). Application of T3 at 8WAS increased the plant height and had the highest mean value (21.13a) which was not significantly different from all other treatments tested including T0 which had the least mean value of (16.77a). Application of T3 at 9WAS increased the plant height and had the highest mean value (23.13a) which was not

significantly different from all other treatments tested except T0 which had the least mean value of (11.53b). Application of T3 at 10WAS increased the plant height and had the highest mean value (22.47a) which was not significantly different from all other treatments tested including T0 which had the least mean value of (17.00a).

Effect of Neem compost on Number of leaves of *Sesamum indicum*

Table 4.5 shows the effect of Neem compost application on sesame. Application of T3 at 6WAS increased the plant height and had the highest mean value (43.33a) which was not significantly different from all other treatments tested except T0 which had the least mean value of (15.50c). Application of T3 at 7WAS increased the plant height and had the highest mean value (39.50a) which was not significantly different from all other treatments tested except T0 which had the least mean value of (21.67c). Application of T3 at 8WAS increased the plant height and had the highest mean value (64.83a) which was not significantly different from all other treatments tested except T0 which had the least mean value of (38.17b). Application of T3 at 9WAS increased the plant height and had the highest mean value (80.83a) which was not significantly different from all other treatments tested except T0 which had the least mean value of (49.83b). Application of T3 at 10WAS increased the plant height and had the highest mean value (99.40a) which was not significantly different from all other treatments tested except T0 which had the least mean value of (66.83c).

Effect of Neem compost on the yield parameters (cm) of *Sesamum indicum*.

Root Fresh Weight

Table 4.6 shows the effect of Neem compost application on sesame. Application of T3 at Root Fresh Weight increased the yield parameters and had the highest mean value (33.67a) which was not significantly different from T4, T1 and T5 but significantly different from T2 and T0 which had the least mean value of (9.17c).

Root Dry Weight

Application of T3 at 10WAS increased the yield parameters and had the highest mean value (13.58a) which was not significantly different from T1, T4 and T5 but significantly different from T2 and T0 which had the least mean value of (3.23b).

Shoot Fresh Weight

Application of T3 at 10WAS increased the yield parameters and had the highest mean value (98.60a) which was not significantly different from T1, T4 and T5 but significantly different from T2 and T0 which had the least mean value of (25.27b).

Shoot Dry Weight

Application of T3 at 10WAS increased the yield parameters and had the highest mean value (20.47a) which was not significantly different from T5, T1 and T4 but significantly different from T2 and T0 which had the least mean value of (7.67c).

Seed Yield Weight

Application of T3 at 10WAS increased the yield parameters and had the highest mean value (131.27a) which was not significantly different from T1, T4 and T5 but significantly different from T2 and T0 which had the least mean value of (63.32b).

Effect of Neem compost on Nutrients uptake of Sesame.

Nitrogen uptake was influenced by the application of Neem compost, T3 had the highest mean value of (123.93gkg^{-1}) which was significantly different from all other treatments including T0 which had the least mean value of (5.01gkg^{-1}). Uptake of phosphorus was influenced by the application of Neem compost, T4 had the highest mean value of (24.47gkg^{-1}) which was significantly different from all other treatments including T0 which had the least mean value of (0.53gkg^{-1}). Uptake of potassium was influenced by the application of Neem compost, T3 had the highest mean value of (23.07gkg^{-1}) which was significantly different from all other treatments including T0 which had the least mean value of (0.50gkg^{-1}).

CONCLUSION AND RECOMMENDATION

The study examined the effect of Neem compost and NPK fertilizer on the growth and yield of sesame (*Sesamum indicum*). The integrations had a significant effect on the growth and yield of *Sesamum indicum.* Nutrient uptake particularly N, P and K were also significantly enhanced through the application of integration. Application of T3 at 10WAS increased the yield parameters on both shoot fresh and seed yield weight with the highest mean value (98.60a and 131.27a) respectively which was not significantly different from T1, T4 and T5 but significantly different from T2 and T0 which had the least mean value of (25.27b and 63.32b).

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Table 1: Physical and chemical Analysis of the soil sample used

Soil characteristics	Values
pH (H_20)	6.10
Organic Carbon (gkg^{-1})	3.10
Total N (gkg^{-1})	0.24
Available P ($mgkg^{-1}$)	3.60
Fe ($mgkg^{-1}$)	12.72
Cu ($mgkg^{-1}$)	3.21
Zn ($mgkg^{-1}$)	2.55
Exchangeable K ($cmolkg^{-1}$)	0.36
Exchangeable Na ($cmolkg^{-1}$)	0.23
Exchangeable Ca ($cmolkg^{-1}$)	20.27
Exchangeable Mg ($cmolkg^{-1}$)	3.11
Sand (gkg^{-1})	825.20
Silt (gkg^{-1})	101.50
Clay (gkg^{-1})	73.30
Textural class	Sandy loam

Table 2: Effect of Neem compost on the plant height (cm) of *sesamum indicum*

TREATMENTS	6WAS	7WAS	8WAS	9WAS	10WAS
T0	50.30b	51.27b	55.67b	69.11b	72.33b
T1	118.23a	127.12a	138.20a	149.00a	168.20a
T2	99.31ab	102.21ab	126.10ab	130.00ab	139.33ab
T3	113.18a	132.11a	140.47a	148.77a	160.51a
T4	89.10ab	113.10ab	117.00ab	128.10ab	162.93a
T5	83.47ab	105.21ab	117.47ab	128.40ab	160.60a

Means within the column with the same letter are not significantly different by DMRT(P≤0.05) T0 = (Zero application of fertilizer material), T0 (Zero Application), T1 (NPK 100%), T2 (75% NPK + 25% Neem Compost), T3 (50% NPK + 50% Neem Compost), T4 (25% NPK + 75% Neem Compost) , T5 (100% Neem Compost).

Table 3: Effect of NPK and Neem compost on the stem girth (cm) of *sesamum indicum* at different WAP

TREATMENTS	6WAS	7WAS	8WAS	9WAS	10WAS
T0	0.5b	0.53b	0.70a	0.93b	1.00a
T1	1.00a	1.23a	1.43a	1.57a	1.57a
T2	0.8a	0.8a	1.01a	1.09a	1.23a
T3	0.97a	1.03a	1.03a	1.03a	1.37a
T4	1.06a	1.1a	1.1a	1.13a	1.33a
T5	1.03a	1.23a	1.23a	1.24a	1.24a

Means within the column with the same letter are not significantly different by DMRT(P≤0.05) T0 = (Zero application of fertilizer material), T0 (Zero Application), T1 (NPK 100%), T2 (75% NPK + 25% Neem Compost), T3 (50% NPK + 50% Neem Compost), T4 (25% NPK + 75% Neem Compost) , T5 (100% Neem Compost).

Table 4: Effect of Neem compost on the number of leaves (cm) of *sesamum indicum* at different ages

TREATMENTS	6WAS	7WAS	8WAS	9WAS	10WAS
T0	17.50b	22.67b	28.17b	33.83b	40.83b
T1	35.17a	65.50a	109.17a	135.67a	175.63a
T2	32.17ab	54.87ab	88.67ab	99.33ab	134.17ab
T3	44.33a	59.50ab	84.83ab	100.83ab	122.40ab
T4	39.67a	66.17a	86.00ab	101.50ab	111.57ab
T5	32.30ab	55.17ab	82.50ab	97.83ab	114.67ab

Means within the column with the same letter are not significantly different by DMRT(P≤0.05) T0 = (Zero application of fertilizer material), T0 (Zero Application), T1 (NPK 100%), T2 (75% NPK + 25% Neem Compost), T3 (50% NPK + 50% Neem Compost), T4 (25% NPK + 75% Neem Compost) , T5 (100% Neem Compost).

Table 5: Effect Neem compost on the yield parameters (cm) of *Sesamum indicum*

	RFW	RDW	SFW	SDW	SYW
T0	13.17b	5.23b	41.27b	5.67b	63.32b
T1	23.33ab	12.63a	89.50ab	23.23a	129.10a
T2	15.27b	6.67b	47.40b	10.90b	78.01ab
T3	33.67a	14.58a	92.60a	24.47a	131.27a
T4	26.30ab	8.10ab	80.80ab	16.00ab	79.00ab
T5	19.20ab	9.47ab	79.27ab	22.47a	79.02ab

Means within the column with the same letter are not significantly different by DMRT(P≤0.05) T0 = (Zero application of fertilizer material), T0 (Zero Application), T1 (NPK 100%), T2 (75% NPK + 25% Neem Compost), T3 (50% NPK + 50% Neem Compost), T4 (25% NPK + 75% Neem Compost) , T5 (100% Neem Compost) SFW = Shoot fresh weight, SDW = Shoot dry weight , RFW = Root fres h weight, RDW = Root dry weight, SYW = Seed yield weight.

Table 6: Effect of organic and inorganic fertilizers on the uptake of nutrient

	N	P	K	Ca	Na	Mg	Fe	Cu	Mn	Zn
		g/kg					mg/kg			
T0	5.01e	0.73d	0.70d	0.60d	0.77a	0.53c	50.50d	1.55d	55.55a	10.73c
T1	46.20d	15.73c	10.53c	2.90c	1.00a	1.27c	89.63c	6.73a	59.50a	22.47ab
T2	83.33b	20.20b	20.93b	16.93ab	0.57b	2.53ab	145.56b	6.60ab	24.47b	24.20ab
T3	123.93a	19.80b	25.07a	18.90a	0.30c	3.20ab	164.06a	6.40ab	24.77b	26.40a
T4	68.40bc	21.47a	20.73b	14.83b	0.27c	2.27a	163.96a	5.73bc	25.07b	25.87a
T5	74.06c	23.77a	20.13b	17.53ab	0.33c5	2.47b	150.93b	5.07c	23.23b	22.43b

Means within the column with the same letter are not significantly different by DMRT(P≤0.05) T0 = (Zero application of fertilizer material), T0 (Zero Application), T1 (NPK 100%), T2 (75% NPK + 25% Neem Compost), T3 (50% NPK + 50% Neem Compost), T4 (25% NPK + 75% Neem Compost) , T5 (100% Neem Compost).