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PERFORMANCE OF SESAME (SESAMUM INDICUM L.) VARIETIES AS AFFECTED BY ORGANIC AND INORGANIC FERTILIZERS IN BILLIRI, GOMBE STATE AND MAKURDI BENUE STATE NIGERIA.

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ABSTRACT
Field experiment was carried out during the rainy season of 2019 in Tal, Billiri Local Government, Gombe State and Teaching and Research farm University of Agriculture Makurdi Benue State. The aim of the experiment was to investigate the performance of five varieties of sesame under organic and inorganic fertilizer. Treatments consisted of five varieties of sesame (E-8, NCRIBEN-01, NCRIBEN-02, NCRIBEM-031 and YANDEV-55) and five fertilizers (NPK, Poultry dropping, cow dung, goat manure and control). These were factorially combined and laid in a randomized complete block design with three replications. The results of the study revealed that sesame generally responded to both varietal, fertilizer and location effects. All the parameters studied have significantly ($P \leq 0.05$) responded to the both varietal, fertilizer and location effects where variety NCRIBEN-01 and E-8 was observed to perform higher in both growth character and grain yield. NPK fertilizer and Benue location was significant in both growth, yield related character and overall yield. Based on the result obtained it can be suggested that the use of E-8, NCRIBEN-01 and NPK fertilizer will lead to optimum yield for farmer in Billiri local Government, Gombe state and Benue State Nigeria.

Keywords; varieties, organic source of nutrient or organic fertilizer, inorganic fertilizer

INTRODUCTION

Sesame is the seeds of the tropical annual Sesame (*Sesamum indicum*). The species has a long history of cultivation, mostly for its yield of oil. The original area of sesame domestication is obscure but it seems likely to have first being brought into cultivation in Asia or India (Chemonics, 2002). Archeological records indicates that it has been known and used in India for more than 5,000 years and is recorded as a crop in Babylon and Assyria some 4,000 years ago (Borchani *et al*., 2010). Sesame is an annual plant, which grows either bush-like or upright depending on the variety. The plant is usually 60 – 120 cm tall and the fruit is a dehiscent capsule held close to the stem. When ripe, the capsule shatters to release a number of small seeds. The seeds are protected by a fibrous „hull" or skin, which may be whitish to brown or black depending on the variety with 1,000 seeds weighing some 4 – 8 grammes. Sesame cultivation can be carried out on a wide range of soils but optimum are well-drained, loose, fertile and sandy alluvial soils that have a pH value between 5.4 and 6.75. Very low pH values have a drastic effect on growth, whereas some varieties can tolerate a pH value up to 8 (Naturland, 2002). Good drainage is crucial, as sesame is very susceptible to short periods of water logging. Sesame is intolerant of very acidic or saline soils (Bennet, 2011). Sesame as a sole crop can be planted on a flat bed with an inter-row and intra-row spacing of 60cm x 10cm, planting on the flat by seed drilling makes the operation very easy and could be used in relatively large farms. Sesame seed is harvested when 50% of capsules turn yellow in colour from green. Other indications of the optimum time of harvesting (physiological ripeness) include lowest capsules turning brown and beginning to pop open, stems turning yellow, leaves beginning to fall off, end of blossoming, leaves turning yellow (Kimbonguila *et al*., 2009). Harvesting should not be delayed to prevent seed loss through shattering. Harvesting should be done by cutting the stem with sickle. The size and shape of sesame (small and flat) makes it difficult to move much air through it in a storage bin. Therefore, the seeds need to be harvested as dry as possible and stored at 6% moisture or less (Langham et al. 2008; Hansen, 2011). If the seed is too moist, it can quickly heat up and become rancid. The two types of sesame produced in Nigeria are the white/raw which is a food-grade used in the bakery industry and the brown/mixed which is primarily oil-grade. The white food grade is grown around towns of Keffi, Lafia and Doma in Nasarawa State, Makurdi in Benue State, Taraba State and Gombe state. The brown/mixed grade grows in the North in places like Kano and Jigawa States and somewhat in the southern part of Katsina State (Chemonics, 2002). The improved varieties include NCRI BEN-01M, NCRI BEN-02M, NCRI BEN-032M, E8 and Yandev-55. According to NAERLS (2010), the NCRI BEN-01M is a medium maturing variety and matures between 102 – 115 days with

its seeds white in colour and containing about 45% oil with a potential yield of 1000kg/ha. The NCRI BEN-02M is also medium maturing variety which matures between 102-115 days. The seeds are usually light brown in colour with a seed size of 3mm and also contains 45% oil with a potential yield of 700kg/ha. NCRI BEN-032M is a late maturing variety; it matures between 125-140 days. The seeds are white in colour and have an oil content of 40% with a potential yield of 600kg/ha. E8 is an early maturing variety with duration of 90 days. It is light brown in colour with a seed size of 3.6mm and has an oil content of 50% with a potential yield of 1000kg/ha. The Yandev- 55 is a long duration variety maturing above 125 days. The seeds are white in colour with an oil content of 40% with potential yield of 600kg/ha. Mixing of different seed sources or varieties will result in uneven height, maturity and seed quality. However, in the fields of sesame production, and post-harvest handling business, producers, mainly smallholder farmers are facing strong constraints and challenges to achieve significant increases in their incomes owing to factors including among others, poor knowledge good agricultural practices, and inadequate technical support from local extension services, and the poorly developed market opportunities. Weeds are serious problem in sesame production because they often cause drastic reduction in yields. For optimum yield, the crop must be kept weed free from planting to harvesting. Weeding can be carried out using different methods either by manual hand weeding or chemical weeding using the pre-emergence or post emergence herbicides stomp and sarosate respectively at recommended rates. Another major challenge in sesame production is the varieties that adopt to both environmental and soil condition that are high yielding and disease/pest resistance and recommended nutrient source to be used by farmer for optimum yield hence the aim of carrying out the experiment to determine among medium duration of Sesame variety and early duration variety the most yielding in the two location and the to determine which of the organic and inorganic source of nutrient is most appropriate for Sesame production in the two locations

MATERIALS AND METHODS

The experiment was carried out in Tal at (9º 50`N 11º 09`E) Billiri Local Government, Gombe State and Makurdi Benue State. At (7º44`0"N 8º 32` 0").The aim of the experiment was to investigate the performance of five varieties of sesame under organic and inorganic fertilizer. Two different varieties were; E-8, NCRIBEN-01, NCRIBEN-02, NCRIBEM-031 and YANDEV-55. the varieties considered where as follows; E-8 matures between 90-95 days with 50% oil, NCRIBEN O1 (530-6-10) matures between 102-115 days, NCRIBEN O2 (Type 4) matures between 102-115 days with 45% oil, NCRIBEM O31(Goza-25) matures between 125-140days with 45% oil, YANDEV-55 matures between 125-130 days with 40% oil the above varieties where improved by IITA (2000). The fertilizers used were NPK (15:15:15) at rate of 80kg/ha N, 40kg/ha P, 40kg/ha K. Poultry dropping applied at the rate of 3tones/ha and poultry dropping (100% Dry Matter, Organic Material 65%, Total Nitrogen 5.9%, Total Phosphorus 1.41% and Total Potassium 2.72%), Cow dung (Dry matter 12%, Organic Material 11%, Total Nitrogen 14.0%, Total Phosphorus 0.3% and Total Potassium 0.6%) and Goat manure (dry matter 45%, Organic material 40%, Total Nitrogen 10.2%, Total Phosphorus 0.5%, Total Potassium 1.46%). all kept under intensive care and was allowed to undergo partial decomposition for five months following the recommendation of Bello (2015) before it was used for the experiment, and control as check, The experiment was laid in a randomized complete block design (RCBD) with three replicate, a $4m^2$ plot was laid out with 0.5m between plots and 01m between blocks. There were 25 plots each within a block which gave the total number of 75 plots for the study, an inter-row and intra-row spacing of 75cm x 20cm was adopted for the research, Agronomic practice such as weeding was done manually at 2 and 6 weeks after planting to ensure weed free plots, all the data were collected within the net plot of 4m2 /where a total of 10 plants were tagged for data collection within each net plot. The parameters recorded were plant height (was taken with the aid of measuring tape from the base of the plant to the tip), number for leaves (were counted fortnightly) from 10 plants that was tagged and the average used fortnightly and days first day of flower, days of 50% flowering (were counted fortnightly), days of maturity, yield and yield related characters such as number of pod, number of seed per pod, pod weight and 1000 seed weight was recorded. All data collected were subjected to analysis of variance (ANOVA), while least significant difference (LSD) at 5% level of probability was used in separating the means.

TABLE 1. Performance of five Varieties of Sesame under Organic and Inorganic fertilizer on plant height grown in Gombe and Makurdi

	Plant height (cm) WAE					
Varieties (V)	2	4	6	8	10	12
E-8	8.20b	21.91a	39.91a	66.12a	100.12a	132.01a
NCRIBEN-01	8.21a	14.02d	32.12c	58.21c	91.91b	121.21b
NCRIBEN-02	8.20b	16.12c	30.12d	51.78d	89.19d	119.76d
NCRIBEM-031.	8.19c	18.97b.	35.87b	59.16b	93.56c	125.09b
YANDEV-55	8.17e	13.12e	27.12e	48.99e	88.99e	102.12e
LSD	NS	1.11	2.21	2.92	3.09	3.25
Nutrients source (N)						
NPK	9.46a	21.62a.	34.21a	65.01a	101.21a	135.05a
Poultry dropping	9.21b	20.14b	31.42b	59.91b	92.32b.	126.99b
Cow dung	9.01d	18.20d.	29.12d	48.11d	90.12d	110.12d
Goat manure	9.19c	19.91c	30.12c	49.12c	91.01c	115.12c
Control	9.20e	13.21e	28.11e	42.91e	82.13e.	98.21e
LDS	0.01	5.92	1.21	1.09	1.01	2.20
Locations (L)						
Gombe	9.12b	20.12b	32.89b	58.91b	99.95b.	130.12b
Benue	9.78a	21.12a	34.12a	61.93a	104.12a.	135.91a
LSD	0.01	2.12	2.10	2.91	2.81	3.98
Interaction						
V X N	NS	NS	NS	NS	NS	NS
L X N	NS	NS	NS	NS	NS	NS

WAE= Weeks after emergence, N= Source of Nutrients, LSD= Least Significant Differences at 5% Level of Probability
=Not Significant at 5% Level of Probability.

TABLE 2. Performance of five Varieties of Sesame under Organic and Inorganic fertilizer on number of leaves grown in Gombe and Makurdi

	Number of leaves WAE					
Varieties (V)	2	4	6	8	10	12
E-8	4.21b	8.31b	14.21b	20.11a	28.02a.	30.21a
NCRIBEN-01	4.25a	8.41a	12.12d.	18.42b	26.28b	28.28b
NCRIBEN-02	4.12d	8.29d	13.99c.	17.99c	24.12c	26.91c
NCRIBEM-03	4.20c	8.30c	15.11a.	16.32d	23.99d	25.99d
YANDEV-55	4.19e	8.28e	11.99e.	14.89e	21.12e	22.45e
LSD	0.02	0.01	1.00	1.03	1.02	1.01
Nutrients source (N)						
NPK	4.24a	9.31a	12.42a	21.21a	28.54a.	31.24a
Poultry dropping	4.21b	8.82b	10.91b	19.42b	26.02b.	29.21b
Cow dung	4.08d	8.31d	10.12d	17.01d	23.22d.	26.76d
Goat manure	4.18c	8.58c	11.01c	18.19c	24.12c.	28.00c
Control	4.00e	8.19e	9.01e	15.01e	22.08e	25.01e
LDS	0.01	0.01	1.08	1.52	1.81	2.01
Location (L)						
Gombe	4.00b	8.01b	10.25b	18.12b	25.91b.	28.91b
Benue	4.91a	8.91a	11.43a	19.81a	26.45a.	29.99a
LSD	0.02	0.01	0.04	1.01	2.01	1.00
Interaction						
V X N	NS	NS	NS	NS	NS	NS
L X N	NS	NS	NS	NS	NS	NS

WAE= Weeks after emergence, N= Source of Nutrients, LSD= Least Significant Differences at 5% Level of Probability
NS=Not Significant at 5% Level of Probability.

TABLE 3. Performance of five Varieties of Sesame under Organic and Inorganic fertilizer on day of fist flower, 50% flower and maturity Grown in Gombe and Makurdi

Varieties (V)	1st flower	50%flower	Days of maturity
E-8	28.01e	38.21e	90.24e
NCRIBEN-01	30.24d	41.69d	110.68d
NCRIBEN-02	35.86c	45.90c	115.23c
NCRIBEM-03	38.90b	49.08b	140.45b
YANDEV-55	40.91a	52.85a	125.09a
LSD	1.02	2.01	5.92
Nutrients source (N)			
NPK	40.82a	62.01a	120.47a
Poultry dropping. 38.64b		58.54b	115.24b
Cow dung	35.23d	49.12d	110.91c
Goat manure	37.99c	53.81c	108.23d
Control	29.24e	45.06e	90.46e
LDS	2.42	3.01	3.66
Location (L)			
Gombe	38.01b	59.21b	118.19b
Benue	40.34a	60.72a	121.91a
LSD	2.01	4.92	2.01
Interaction			
V X N	NS	NS	**
L X N	NS	NS	**

WAE= Weeks after emergence, N= Source of Nutrients, V= variety, LSD= Least Significant Differences at 5% Level of Probability NS=Not Significant at 5% Level of Probability.

TABLE 4. Performance of five Varieties of Sesame under Organic and Inorganic fertilizer on Yield and yield related character Grown in Gombe and Makurdi

Varieties (V)	Capsule/plant	Seeds/capsule	1000seed weight	Seed yield
E-8	52.06a	77.02a	2.99b	3.51a
NCRIBEN-01	68.71b	80.04b	3.41a	3.41b
NCRIBEN-02	45.45c	54.67c	1.99c	2.41c
NCRIBEM-03	39.12d	62.18d	1.45d	1.54d
YANDEV-55	40.67e	48.91e	1.00e	1.25e
LSD	3.21	5.27	0.21	0.31
Nutrients source (N)				
NPK	66.21a	81.21a	3.11a	3.63a
Poultry dropping. 52.21b	72.08b	2.99b	3.01b	
Cow dung	48.23d	62.12d	2.00d	2.67d
Goat manure	50.12c	68.90c	2.21c	2.99c
Control	41.89e	52.11e	1.01e	1.51e
LDS	4.12	6.29	0.20	0.21
Location (L)				
Gombe	60.12b	79.34b	1.10b	2.10b
Benue	62.00a	82.01a	2.00a	3.12a
LSD	2.01	2.45	0.01	0.03
Interaction				
V X N	**	**	**	**
L X N	NS	NS	**	**

WAE= Weeks after emergence, N= Source of Nutrients V= Variety, LSD= Least Significant Differences at 5% Level of Probability NS=Not Significant at 5% Level of Probability.

RESULT AND DISCURSION

Table 1 in the performance of five varieties of sesame under organic and inorganic fertilizer on plant height. There was significant difference (P<0.05) on the five varieties used were E-8 and NCRIBEN-01 had taller plant compared to the other varieties used, this could be as a result of genetic

make-up and ability of the varieties to adopt to environmental condition as earlier reported by Lambot (2002). On source of nutrient used significant (P<0.05) different was recorded with NPK fertilizer had significant (P<0.05) taller plant followed by poultry dropping, this finding is not far the fact that chemical nutrients have fast ability to be dissolved and absorb by plant for both vigorous growth and later translate to yield as reported by Fagam (2009) moreover Singh (2000) also lend support to the present finding.

Table 2 in the performance of five varieties of sesame under organic and inorganic fertilizer on number of leaves. Significant difference (P<0.05) on the five varieties used were E-8 and NCRIBEN-01 had higher number of leaves than other varieties used, this may be as the result of adoptability of the varieties to soil and climatic condition of the place as supported by the work of Ngonagjio (2000). Significant (P<0.05) different was recorded on source of nutrients, significant (P<0.05) different was recorded when NPK fertilizer was used where higher number of leaves where recorded followed by poultry dropping, goat manure, cow dung and control having the least, this could be that chemical nutrients dissolve fast and absorb by plant for both vigorous growth and later to leaves initiation as reported by Makeri and Ugherighe (1992). Ayub et al (2009) report progressive increase in number of leaves in plant due to influence of chemical fertilizer application particularly macro nutrients which enhance photosynthetic activities in plants.

Table 3 in the performance of five varieties of sesame under organic and inorganic fertilizer on first day of flower. There was significant difference (P<0.05) on the five varieties used were E-8 and NCRIBEN-01 produced flower earlier compared to the other varieties used. This is not far from the fact that genetic make-up plays an important role in flower initiation as reported by Onyibe et al (2006) in his earlier work. significant(P<0.05) different was recorded on source of nutrient used of NPK fertilizer had early first flower followed by poultry dropping with control having the least, this shows that chemical fertilizer have ability to dissolved, assimilated and translate to flower initiation and later to fruits/grains mostly leading to higher yield in plants as reported by NCRI (2002).

Table 3 in the performance of five varieties of sesame under organic and inorganic fertilizer on first day of flower. There was significant (P<0.05) difference on the five varieties used were E-8 and NCRIBEN-01 produced 50% flower earlier compared to the other varieties used, is not far from the facts that they all produce their first flower early which is attributed to genetic make-up as supported by the finding of Onyibe et al (2006). On source of nutrient used significant(P<0.05) different was recorded with NPK fertilizer had 50% flower followed by poultry dropping, goat manure, cow dung and control recording the least, this could be the contribution made by the chemical fertilizer fastening the rate of maturity probably reaching 50% flowering as reported by Selim et al (1993)

Table 3 in the performance of five varieties of sesame under organic and inorganic fertilizer on first day of flower. Significant (P<0.05) difference was recorded on the five varieties used, with E-8 and NCRIBEN-01 maturing earlier compared to the other varieties used, this is not far from the genetic make-up and probably ability to adopt both soil and climatic condition to as reported by Hall et al (2000). Significant(P<0.05) different was recorded on source of nutrient used of NPK fertilizer mature early followed by poultry dropping with control recording least, this finding is not far the fact that chemical nutrients are assimilated fast by plant for both physiological and morphological activities which in turn affects overall yield as by reported by USAID (2009).

Table 4 in the performance of five varieties of sesame under organic and inorganic fertilizer on number of capsule per plant. There was significant (P<0.05) difference on the five varieties used were E-8 and NCRIBEN-01 were higher on number of capsule compared to the other varieties used, this is not far from the genetic make-up, agronomic practice and soil condition as reported by Singh el al (1997). On source of nutrient significant(P<0.05) different was recorded with NPK fertilizer mature early followed by poultry dropping, this finding is not far the fact that chemical nutrients have fast ability to dissolved and be utilized by plant for fruits, capsule initiation and even ripening as reported by David (2005).

Table 4 in the performance of five varieties of sesame under organic and inorganic fertilizer on number of seed per capsule. The findings recorded significant (P<0.05) difference on the five varieties used were E-8 and NCRIBEN-01 had higher number of seeds per capsule compared with the other varieties used, this is not far from the agronomic practice but laid more emphasis on genetic make-up of varieties and ability to adopt both soil and climatic condition to as reported by Adediran (2003). On source of nutrient used significant(P<0.05) different was recorded where NPK fertilizer mature early followed by poultry dropping, the fact remain that chemical nutrients dissolved fast and utilized by plant for seeds, fruits production which in turn affects yield positively which Abayomi (2006) lend support to the accession.

Table 4 is the performance of five varieties of sesame under organic and inorganic fertilizer on 1000 seed weight. Significant(P<0.05) different was recorded on the five varieties used were E-8 and NCRIBEN-01 had heavier seeds when compared to the other varieties used Sharifai et al (2007) reported that seed weight is a component of genetic character which also can be attributed to agronomic practice, soil and climatic condition. Significant (P<0.05) different was recorded on source of nutrient used of NPK fertilizer mature early followed by poultry dropping, goat manure, cow dung and control recording the least, this finding is not far the fact that chemical nutrients have fast ability to dissolved and absorb by plant which plays an important role in adding weight to plant when given at the right time and appropriate quantity as reported by Hassan (2009).

Table 4 in the performance of five varieties of sesame under organic and inorganic fertilizer on seeds yield. There was significant (P<0.05) different was recorded on the five varieties used were E-8 and NCRIBEN-01 had higher yield compared to the other varieties used, this could be attributed to the genetic make-up and ability to adopt both soil and climatic condition to as reported by Carsky et al (1997) he also added that other factors like higher number of capsule, higher number of seeds per capsule and 1000seeds weight could contribute to higher yield. Significant (P<0.05) different was recorded on sources of nutrient used were NPK fertilizer mature early followed by poultry dropping, goat manure, cow dung and control recorded least, this work is in conformity with the finding of Brady and Weil (2004) who stated that chemical fertilizers particularly macro nutrient tend to influence the uptake of other non-essential elements which affects yield positively.

Interaction between variety and nutrient source on the performance of sesame under organic and inorganic fertilizer.

There was no interaction observed on plant height, number of leaves, 1st flowering days and 50% flowering. Table 5 is an interaction between variety and nutrient source on maturity days, the results indicated significant (P<0.05) difference where a positive interaction exists between E8 and NPK, this could be as a result the genetic make-up of the variety and the influence of chemical fertilizer and its ability to dissolve fast for plant absorption and utilization as reported by Maleku (2018). E8 is an early maturing variety with duration of 90 days. It is light brown in colour with a seed size of 3.6mm and has an oil content of 50% with a potential yield of 1000kg/ha NCRI (2002).

Table 5. Interaction between variety and nutrient source on performance of Sesame under Organic and Inorganic fertilizer on days of maturity grown in Gombe and Makurdi.

Varieties	Nutrients source				
	NPK	PD	CD	GM	CONTROL
E-8	88.21e	90.21e	91.32e	91.10e	91.01e
NCRIBEN-01	108.41d	109.34d.	106.11d.	101.19e.	110.25d
NCRIBEN-02	112.40c.	111.68c.	111.99d.	113.12c.	109.47c
NCRIBEN-03	129.92a.	125.42a.	123.45a.	127.12a	125.36a
YANDEV-55	115.62b	113.34b.	114.11b	116.09b.	112.04b
LSD	5.91	4.90	3.12	4.09	4.99

LSD= Least Significant Differences at 5% Level of Probability, PD=Poultry dropping, CD= Cow dung, GM=Goat manure.

Table 6. Interaction between location and nutrient source on performance of Sesame under Organic and Inorganic fertilizer on days of maturity grown in Gombe and Benue

Location	**Nutrients source**				
	NPK	PD	CD	GM	CONTROL
Gombe	113.62b	114.14b	110.01b	114.09b.	113.14b
Benue	127.92a	121.22a.	120.25a	123.12a	126.16a
LSD	5.91	4.90	3.12	4.09	4.99

LSD= Least Significant Differences at 5% Level of Probability, PD=Poultry dropping, CD= Cow dung, GM=Goat manure.

Table 6. Interaction between location and nutrient source on performance of Sesame under Organic and Inorganic fertilizer on days of maturity grown in Gombe and Benue. The result indicate an interaction where control and Benue had longer days of maturity this is in conformity with the findings of Ayub (2002) Who reported that longer days in maturity due to available soil nutrient leading to vegetative growth prolonging maturity. This could be seen in Table 13. Physicochemical properties of the experimental site at Gombe and Benue, Nigeria.

Table 7 shows an interaction between variety and nutrient source on number of capsule.it also recorded significant (P<0.05) difference and a positive interaction between NCRIBEN-01 and NPK, this is not far from the truth that genetic make-up, environmental/climatic condition, soil condition and agronomic practice couple with the fast release of NPK fertilizer which influence capsule initiation, this assertion is supported by the findings of Bala (2002). NCRIBEN-01 is a medium maturing variety and matures between 102 – 115 days with its seeds white in colour and containing about 45% oil with a potential yield of 1000kg/ha NCRI (2002).

Table 7. Interaction between variety and nutrient source on performance of Sesame under Organic and Inorganic fertilizer on number of capsule Grown in Gombe and Makurdi

Varieties	Nutrients source				
	NPK	PD	CD	GM	CONTROL
E-8	58.24b	53.91b	50.11b	51.45b	49.04a
NCRIBEN-01	60.02a	55.04a	51.81a	53.91a	48.99b
NCRIBEN-02	42.60c	39.64c	35.21c	37.01c	34.07c
NCRIBEN-03	40.62d	36.20d	32.91d	35.92	31.46d
YANDEV-55	37.62e	32.04e	28.29e	30.12e	29.99e
LSD	2.01	2.00	2.01	2.00	2.00

LSD= Least Significant Differences at 5% Level of Probability, PD=Poultry dropping, CD= Cow dung, GM=Goat manure

Table 8 is an interaction between variety and nutrient source on 1000 seeds weight, were a significant (P<0.05) difference was recorded and an interaction with NCRIBEN-01 and NPK both varietal and fertilizer influences the weight as reported by IITA (2013). Moreover, Moosavi et al (2013) reported that NPK fertilizers significantly influence gain number, 1000 grain weight, biological yield, grain harvest index and grain harvest index per capsule.
Table 9 is an interaction between variety and nutrient source with significant (P<0.05) difference, were perfect interaction was observed between E8 and NPK having higher number of seeds per capsule, this could be due to the genetic make-up, ability of the fertilizer to be utilized by the plant as reported by Ogah (2019).

Table 8. Interaction between variety and nutrient source on performance of Sesame under Organic and Inorganic fertilizer 1000 seed weight Grown in Gombe and Makurdi

Varieties	Nutrients source				
	NPK	PD	CD	GM	CONTROL
E-8	3.21b	2.81b	2.43.b	2.54b	2.01b
NCRIBEN-01	3.91a	2.94a	2.34b	2.72b	2.05a
NCRIBEN-02	2.60c	1.99c	1.45c	1.87c	1.27c
NCRIBEN-03	1.92d	1.50d	1.32d	1.41d	1.26d
YANDEV-55	1.41e	1.34e	1.11e	1.23e	1.00e
LSD	0.09	0.07	0.01	0.01	0.06

LSD= Least Significant Differences at 5% Level of Probability, PD=Poultry dropping, CD= Cow dung, GM=Goat manure

Table 9. Interaction between variety and nutrient source on performance of Sesame under Organic and Inorganic fertilizer on number of seeds per capsule Grown in Gombe.

Varieties	Nutrients source				
	NPK	PD	CD	GM	CONTROL
E-8	83.21a	72.01a	68.12a	70.23a	63.41a
NCRIBEN-01	71.91b	61.74b	55.23b	60.45b	52.15b
NCRIBEN-02	62.60c	53.98c	50.91c	52.91c	43.27c
NCRIBEN-03	52.92d	50.20d	43.32c	48.91d	40.16d
YANDEV-55	45.62e	41.94e	39.90e	40.23d	38.01e
LSD	2.91	2.00	2.00	2.01	3.99

LSD= Least Significant Differences at 5% Level of Probability, PD=Poultry dropping, CD= Cow dung, GM=Goat manure.
Table 10 is the interaction between variety and nutrient source seed yield significant (P<0.05), where an interaction was observed between NCRIBEN-01 and NPK, this could be attributed by higher number of capsule, weightier seeds and higher number of seeds, this in agreement with the report of Kaltungo (1995) who reported that chemical fertilizer mostly NPK increases vegetative, yield related character and overall yield.

Table 10. Interaction between variety and nutrient source on performance of Sesame under Organic and Inorganic fertilizer on Seed yield Grown in Gombe and Makurdi

Varieties	Nutrients source (N)				
	NPK	PD	CD	GM	CONTROL
E-8	3.21b	3.01a	3.00a	3.13a	2.99a
NCRIBEN-01	3.81a	2.94b	2.67b	2.73b	2.55b
NCRIBEN-02	2.60c	1.89c	1.23c	1.56c	1.87c
NCRIBEN-03	2.00d	1.60d	1.12d	1.43c	1.56d
YANDEV-55	1.25e	1.20e	1.11e	1.19e	1.01e
LSD	0.12	0.10	0.01	0.01	0.09

LSD= Least Significant Differences at 5% Level of Probability, PD=Poultry dropping, CD= Cow dung, GM=Goat manure

Table11 Interaction between nutrient source and location on performance of Sesame under Organic and Inorganic fertilizer 1000 seed weight Grown in Gombe and Benue. There was an interaction between location and nutrient source where Benue and the application of NPK fertilizer had heavier 1000 seeds this could be as result of soil and environmental factors as reported by the finding of Bennet (2011).

Table 12. Interaction between nutrient source and location on performance of Sesame under Organic and Inorganic fertilizer on seed yield grown in Gombe and Benue, a perfect interaction was recorded in yield between NPK nutrient source and Benue, this could be as a result of ability of the chemical fertilizer to dissolve fast by the plant and also both climatic and soil condition, this finding is supported by Adediran (2003) where he reported rainfall, relative humidity, soil and plant adaptability could have led to perfect interaction. So also table 12 indicated in term of soli and rainfall pattern.

Table 11. Interaction between variety and lacation on performance of Sesame under Organic and Inorganic fertilizer 1000 seed weight Grown in Gombe and Makurdi.

Location	**Nutrients source**				
	NPK	PD	CD	GM	CONTROL
Gombe	3.11b	2.61b	2.23.b	2.54b	2.00b
Benue	3.99a	2.81a	2.84a	2.72b	2.09a
LSD	0.08	0.07	0.01	0.01	0.04

LSD= Least Significant Differences at 5% Level of Probability, PD=Poultry dropping, CD= Cow dung, GM=Goat manure

Table 12. Interaction between nutrient source and location on performance of Sesame under Organic and Inorganic fertilizer on Seed yield Grown in Gombe and Makurdi.

Location	**Nutrients source (N)**				
	NPK	PD	CD	GM	CONTROL
Benue	3.91a	3.11a	3.10a	3.53a	2.89a
Gombe	3.01b	2.84b	2.47b	2.83b	2.25b
LSD	0.11	0.9	0.01	0.01	0.04

LSD= Least Significant Differences at 5% Level of Probability, PD=Poultry dropping, CD= Cow dung, GM=Goat manure.

Table 13. Physicochemical properties of the experimental site at Gombe and Benue, Nigeria.

	GOMBE		**BENUE**	
Soil property	Before	After	Before	After
% Sand	58.3	57.06	71.50	70.00
% Silt	14.3	15.54	22.00	21.00
% Clay	27.4	27.4	3.35	3.34
Texture	Sandy loam	Sandy loam	Sandy loam	Sandy loam
Ph	6.11	6.13	5.60	5.85
Organic carbon (%)	0.76	0.79	1.29	1.30
Organic matter (%)	1.53	1.61	2.12	2.31
Total nitrogen (%).	0.28	0.29	1.14	2.15
P(Bray)ppm	11.02	12.78	12.89	13.00
CEC (CmolKg-1)	4.81	4.56	4.92	5.01
EC (CmolKg-1)				
Ca2+	3.32	3.41	3.46	3.89
Na2+	0.57	0.58	0.62	0.81
K+	0.24	0.28	0.31	0.56
Mg2+	0.93	0.94	0.95	0.99
Base saturation	74.74	76.5	75.92	77.91

Key; ppm= part per million, CEC= Cat ion exchange capacity, EC= Exchangeable cation

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