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Weed Control Efficiency of Management Practices of Sesame (Sesamum indicum L.) Production under Different Level of Cow Dung Manure in Kano State Nigeria

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Abstract: *Two concurrent experiments were conducted during rainy season of 2017 at Research Farm of Bayero University Kano (Lat. 11^o $58^{'}$N and Long. 8^0 $33^{'}$ E and 475m above sea level), and Gurungawa Kumbotso Local Government area (lat. 11^o $56^{'}$N and long. 8^0 $31^{'}$ E and 447m above sea level) all in the Sudan savanna of Nigeria. The experiment consist of three levels of cow dung (0t ha^{-1}, 3t ha^{-1} and 6t ha^{-1}) and NPK fertilizer at 50 kg N ha^{-1}, 60 kg P_2O_5 ha^{-1}, 35 kg k_2O ha^{-1}, two levels each of two pre-emergence herbicides Metolachlor and Pendimenthalin at 2.0 Kg a.i. ha^{-1} and 2.5 Kg a.i. ha^{-1}, two hoe weeding at 3 and 6WAS and weedy check as control. The experiment was laid out in a split plot design with cow dung and NPK applied to the main plot and weed management practice to sub-plot and was replicated three times. The result indicated that weedy check was consistently recording the highest weed growth weed index. Two hoe weeding at 3 and 6 WAS significantly recorded more efficient in controlling the weeds followed by Metolachlor 2.5 kg a.i. ha^{-1} and Pendimenthalin 2.5 kg a.i. ha^{-1} increased weed suppression by decreasing weed dry weight which indicate better weed suppression. Application of NPK fertilizer resulted in higher grain yield closely followed by 6 t ha^{-1} cow dung manure, tow hoe weeding at 3 and 6WAS along with NPK fertilizer recorded higher grain yields across all locations is recommended for planting.*

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I. Introduction

Sesame (*Sesamum indicum* L.) is a flowering plant. This seed has a wide variety and relative spread in Africa. Widely naturalized in tropical region around the world and dating as old as man's existence. It is highly tolerant to drought and can grow where other crops fails. It is one of the most important oil seed crops in the world. The crop thrives well in the savanna zone of west and central Africa has the greatest potential for its production, due to relatively high incidence of solar radiation during the cropping season (Haruna *et al*. 2012). According to Food and Agricultural Organization of the United Nations, 4.8 million metric tons of sesame was produced worldwide in the year 2016. India and China are the largest exporters, the largest importer of this are Japan and China. In Africa, Nigeria is the second largest producer after Sudan and ranking seventh in the world (FAO, 2008). The plant thieves well in Northern part of Nigeria and some part of west. It can also be grown in some part of South East and South - South. Nigeria currently produces about 300,000 tons of sesame seed; about 26 states presently grow sesame with largest producing states being Jigawa, Nasarawa, Benue and Taraba.

Sesame is multipurpose crop use as raw materials in the production of confectionery and bakery products; while the oil is use in the industry to produce soap, perfume, carbon paper, pharmaceuticals and edible vegetable oils (Yol *et al*. 2010). It provides food for human beings, cake is also use in the production of livestock and poultry feed as well as use as organic fertilizer (Ogbonna & Umar-Shaaba, 2011). It has great nutritional value as it contain about 50% oil, 25% protein, oil from the seed contain about 47% oleic and 39% linoleic acid, and high protein 35 to 50% crude protein after oil extraction Oplinger (1990). In recent times the high cost of inorganic fertilizer, its poor distribution and manual labor intensive have affected sesame availability to resource poor farmers thereby resulting in the use of insufficient quantities at the time of need, hence contributing to low crop yields. In order to find alternative sources of nutrition for sesame production, cow dung manure can be considered. Food production, farm incomes and food prices are vulnerable to inadequacy in supply and high cost of chemical fertilizers in Nigeria Rahman *et al.* (2001). Where chemical fertilizers are available, excessive usage increases pollution, decreases soil productivity and leads to nutrient imbalance Duhoon *et al.* (2004).

Kuepper and Gegner (2004) pointed out that, application of large quantities of soluble fertilizer to a crop once, two or thrice per season mostly supply the plant with surplus, stimulating the development of certain noxious weed species and causing nutritional imbalances that leads to disease incidence and insect infestations. However, soluble nutrients like nitrate, are prone to leaching, which can cause a number of environmental and health problems and at the end leads to poor yield of the crop. Sesame has a slow early growth at initial stage as such it is poor competitors against weeds at early stage, cultivation of sesame field early will cause destruction of fine, and fibrous roots that grow close to the surface and are easily damaged the nutrients uptake of the plant which will also make it to grow slowly. However, in general, the crop is faced with a major problem of weeds as they compete for nutrients, space and solar radiation. Weeds have always been an important nuisance for all types of agricultural production. The heat and abundances of the rains during the rainy season favor the development of these weeds. They are the direct competitors of the cultivated plants. Indeed, weeds are responsible for 10 - 90% of crop losses in temperate areas (Akobundu, 1987 and Chauchan, 2012). They are a major obstacle to the development and production of crops. Weed management is a major concern to sesame farmers.

In order to find alternative sources of nutrition to crops, cow dung manure application can be considered. In view of its rich protein content, production of sesame through improved crop husbandry practices would help improve the nutritional status and oil demand of the populace. This study was therefore undertaken with the objectives of evaluating the effect of weed management practices and cow dung manure on weed control efficiency and other weed indicate of sesame in Kano state.

II. Materials and Methods

Two concurrent experiments were conducted during rainy season of 2017 at Teaching and Research Farm of Bayero University Kano (Lat. 11^{o} 58′N and Long. 8^{0} 33′ E and 475m above sea level), and Gurungawa located along Zaria Road in Kumbotso Local Government Area (lat. 11^{o} 56′N and long. 8^{0} 31′ E and 447m above sea level) all in the Sudan savanna ecology of Nigeria. The experiment consist of three levels of cow dung (0t ha^{-1}, 3t ha^{-1} and 6t ha^{-1}) plus NPK fertilizer at rate of 50 kg N ha^{-1}, 60 kg P_2O_5 ha^{-1}, 35 kg k_2O ha^{-1} using NPK 15:15:15, two levels each of two pre-emergence herbicides Metolachlor and Pendimenthalin at 2.0 Kg a.i. ha^{-1} and 2.5 Kg a.i. ha^{-1}, two hoe weeding at 3 and 6WAS and weedy check as control were employed. The experiment was laid out in a split plot design with fertilizers (cow dung and NPK) applied to the main plot and weed control method to the sub-plot and was replicated three times. Ex- Sudan seed was used as test crops which mature in less than 90 days with capable of yielding up to 1200kg ha^{-1} and 50% oil. The gross plot size is 3.0m x 2.0m (6m²), consisting of four ridges each of 2m long and spaced 0.75m apart. The net plot was 3m² consisting of the two innermost ridges while the two border row was used for sampling. A discard of 0.5m was left between plots and 1m between replications.

Weed dry weight was obtained from 1.0 m x 1.0 m quadrant placed randomly in two places within each net plot at harvest. The weeds were dried in an oven at 70^{0}C to a constant weight and were recorded as weed dry weight of that particular plot.

Weed control efficiency was determined at physiological maturity of the crop using the following relation as described by Mani *et al*. (1976). It is a derived parameter that compares different treatments of weed control on the basis of weed dry weight across them. It is an estimate of weed competition or control in crops (Das, 2008).

$$\textbf{WCE (\%)} = \frac{\text{weed dry weight in unweeded control (g)} - \text{weeddry weight in treatment in (g)}}{\text{weed dry weight in unweeded control}} \textbf{ x 100}$$

The data collected was subjected to statistical analysis of variance (ANOVA) to test for significance difference among the means as described by Snedecor and Cochran (1994). Means were compared using Students Newman-Keuls Test (SNK).

III. Results and Discussions

The results of the soil analysis from the two locations revealed that soil textural class was loamy sandy in BUK and sandy loam in Gurungawa. The soil had pH in water (6.60) which is a neutral stage at BUK and (6.40) for Gurungawa, pH in KCl (5.70) for BUK and (5.50) for Gurungawa; the soil had 4.30 organic carbon for BUK and 3.20 gkg^{-1} for Gurungawa. Total nitrogen content was observed to 1.40 at BUK and 1.10 gkg^{-1} at Gurungawa. The available phosphorus content was 5.90 in BUK and 3.90$mgkg^{-1}$ in Gurungawa. The exchangeable cations (Ca, Mg, K and Na) were 5.80, 2.70, 0.10 and 0.10cmol (+) kg^{-1}at BUK while 1.20, 1.60, 0.10 and 0.10cmol (+) kg^{-1} at Gurungawa in 2017 rainy season, whereas the CEC of the soil analysis was 9.00 at BUK and 3.70cmol (+) kg^{-1} at Gurungawa, EC was 0.030 for BUK and 0.010dsm^{-1} for Gurungawa with EA of BUK being 0.30 and 0.70cmol (+) kg^{-1} for Gurungawa (Table 1).

The analyzed dry cow dung samples reveal high concentrations of both major and minor nutrients, with 21.7 (%) organic matter and 1.03 (%) moisture content (Table 2).

Table 1: Physical and chemical properties of soil at BUK and Gurungawa 2017 rainy season

Properties	BUK	Gurungawa
Physical (%)		
Sand	860	680
Clay	54	34
Silt	86	286
Textural Class	Loamy sand	Sandy loam
Chemical Composition		
pH in water	6.60	6.40
pH in KCl	5.70	5.50
Organic compound (g/kg)	4.30	3.20
Total nitrogen (g/kg)	1.40	1.10
Available phosphorus (mg/kg)	5.90	3.90
Exchangeable Bases		
Calcium	5.80	1.20
Magnesium	2.70	1.60
Potassium	0.10	0.10
Sodium	0.10	0.10
CEC (cmol/kg)	9.00	3.70
EC (ds/m)	0.030	0.010
EA (cmol/kg)	0.30	0.70

Source: Department of Soil Science Faculty of Agriculture Bayero University Kano.

Table 2: Chemical Composition of Cow Dung used during the Experimental period at BUK and Gurungawa, 2017 rainy season

Chemical Composition	Analytical Values
Total Nitrogen (%)	1.36
Available phosphorus (%)	0.71
Calcium (%)	0.68
Magnesium (%)	0.76
Sodium (%)	0.33
Potassium (%)	1.85
Iron (%)	0.22
Organic Carbon (%)	21.7
Moisture content (%)	1.03

Source: Department of Soil Science Faculty of Agriculture Bayero University Kano.

Table 3 presents the effect of weed management practice and cow dung manure rate on weed dry weight in sesame at BUK and Gurungawa in 2017. Weed management practices exhibited a significant influence on weed dry weight in both of study and locations. At both locations of study and weed dry weight was found to be significantly higher in the weedy check compared to all other treatments. This supported the findings of Garko *et al.,* (2016) who indicated that uncontrolled weeds suppressed the growth of the crops in weedy check plots. Also in the mean of both study locations, hoe weeding at 3 and 6 WAS resulted in significantly lower weed dry weight that was closely followed with application of Pendimenthalin or Metolachlor at 2.5 kg a.i.ha^{-1} each as compared with all other management practices. This showed that less competition for nutrients as a result of weed control. Cow dung manure did not significantly influenced weed dry weight in both of the experiment and locations. The report is in agreements with that of Akbar *et al*. (2011) who reported a maximum reduction of total weed density of 94.9% by hand pulling treatment compared with the untreated weedy check. Although highest weed reduction was obtained by manual weeding at 3 and 6 WAS, the involvement of intense labour with its associated tedium may render it uneconomical and unfeasible. Also, in a related finding of (Ndahi, and Kwaga, 2012; Garko *et al*. (2018) observed that application of Pendimethalin 2.0kg a. i. ha^{-1} alone or followed by hand weeding resulted in lower weed dry weight in groundnut production and lower weed index of bambara groundnut.

The effect of weed management practice and cow dung manure rate on weed index in sesame at BUK and Gurungawa in 2017 is presented in Table 3. Weed management practices exhibited a significant influence on weed index in both of study and locations. At both locations, weed index was found to be significantly higher in the weedy check compared to all other treatments, application of Pendimenthalin at 2.5 kg a.i. ha^{-1} resulted in lower weed index across all the locations The results are in agreement with the findings of Ishaya *et al*. (2008) that Metolachlor at 3.0 kg a.i./ha and Galex at 1.2 kg a.i./ha (Metolachlor +Metobrumuron) pre emergence.

According to them the mixture of Metolachlor and Galex was better in controlling annual grasses and broad leaf weeds. However, weedy check recorded the highest weed index among all the treatments in both years of the trails. However, cow dung manure not significant at both locations.

The results obtained on the influence of weed management practice and cow dung manure rate on weed control efficiency in sesame during 2017 rainy season at BUK and Gurungawa is presented in Table 3. The weedy check consistently produced significantly lower weed control efficiency than all other treatments in all the locations of the experiment. At both locations two hoe weeding at 3 and 6 WAS had statistically the higher percentage of weed control efficiency, that was closely followed by application of Pendimenthalin or Metolachlor at 2.5 kg a.i.ha^{-1} as compared with all other management practices.

Table 3: Effect of Weed Management Practices and Cow Dung Manure and on Weed Dry Weight (kg ha^{-1}), Weed Index (%), Weed control efficiency (%) and Grain Yield (kg ha^{-1}) of Sesame at BUK and Gurungawa 2017, Rainy Season

	Weed Dry Weight (kg ha^{-1})		Weed Index (%)		Weed Control Efficiency (%)		Grain Yield (kg ha^{-1})	
Treatments	BUK	Gurungawa	BUK	Gurungawa	BUK	Gurungawa	BUK	Gurungawa
Weed Control Method (WCM)								
Metolachlor 2.0 kg a.i. ha^{-1}	470.8b	466.6c	28.8c	29.4c	29.6c	29.9c	1008d	979d
Pendimenthalin 2.0 kg a.i. ha^{-1}	485.2b	484.1b	34.1b	32.4b	27.4d	27.3d	927e	934e
Metolachlor 2.5 kg a.i. ha^{-1}	442.4c	436.2d	14.4d	14.7d	32.1b	32.9b	1218c	1189c
Pendimenthalin 2.5 kg a.i. ha^{-1}	453.6c	446.8d	11.1e	10.9e	33.8b	34.4b	1263b	1241b
Hoe weeding 3 and 6WAS	381.3d	377.3e	0.0f	0.0f	43.0a	43.3a	1431a	1399a
Weedy check	669.1a	666.2a	39.1a	39.7a	0.0e	0.0e	871f	845f
SE±	5.32	5.36	0.79	0.71	0.74	0.75	12.98	8.30
Cow Dung (t ha^{-1})								
0	477.1	468.7	18.3b	19.0	27.4	28.0	824d	810d
3	485.9	482.0	20.5b	20.3	27.9	28.3	1042c	1015c
6	478.8	478.4	20.5b	21.4	27.7	27.9	1211b	1187b
NPK	493.1	488.9	25.7a	23.9	27.7	27.7	1401a	1380a
SE±	9.07	8.78	0.70	1.05	1.31	1.09	22.13	11.59
Interactions								
WCM X CD	NS	NS	NS	NS	NS	NS	**	**

Table 4: Interaction between Weed Management Practices and Cow Dung Manure on Grain Yield (kg ha $^{-1}$) at BUK and Gurungawa 2017 Rainy season.

Cow Dun Manure	Weed Control Method (WCM)					
(CD) (t ha^{-1})	M1	P2	M2	P2	WFC	WC
	BUK at 2017					
0	756n	716n	927kl	898lm	1038hij	613o
3	958jkl	917kl	1181fg	1113gh	1276de	808mn
6	1096gh	998ijk	1378c	1329cd	1523b	944jkl
NPK	1223ef	1078hi	1566b	1533b	1886a	1119gh
SE ±			32.42			
	Gurungawa at 2017					
0	731k	731k	908j	878j	1018gh	593l
3	928ij	886j	1159e	1091f	1253d	772k
6	1069fg	971hi	1356c	1291d	1510b	924ij
NPK	1187e	1150e	1542b	1496b	1816a	1091f
SE ±			19.08			

Means followed by the same letter (s) in column and row differ significantly at 5% level using SNK (students Newman-Keuls test), NS= Not significant at 5% level of significance, M= Metolachlor, P= Pendimethalin, WFC= hoe weeding at 3 and 6WAS, WC= weedy check.

These supported the finding of Chikoye *el al*. (2001) who observed that weed competition is most serious when the crops are young, keeping the crop free of weeds for the first one-third to one-half of the life cycle of the crop offers effective control and also keeping the crop free from weed for the first one third of its life cycle usually assures maximum production. Weedy check recorded the lowest value of weed control efficiency. However, cow dung manure had no significantly effects across both locations.

The effect of weed management practice and cow dung manure rate on grain yield was significantly different and showed that two hoe weeding at 3 and 6WAS having statistically the higher grain yield that was followed by Pendimenthalin at 2.0 kg a.i. ha^{-1} compared to the other treatments, while the result is in conformity with the finding of Olorunmaiye, (2010) that, weed also reduce yield, deteriorate the quality of farm products and consequently reduced the market value of the crop. Weedy check resulted in the lowest grain yield across all of the locations examined. The result is consonance with the findings of Garko *et al*. (2016) that pre emergence application of Metolachlor at 1.0 or 2.0 kg a.i. /ha significantly resulted in lower weed dry weight at early growth stage of groundnut and produced higher pod yield as compared with weedy check. However, cow dung manure had significant effect with application of recommended level of NPK fertilizer resulting in statistically higher mean values across all location as compared with all other manure rates. The control rate (0 t ha^{-1}) of cow dung manure resulted in statistically lower mean yield that is at par with all other rates across both locations (Table 3).

Interaction between weed control management and cow dung manure on grain yield of sesame at both locations during 2017 rainy season is presented in Table 4. The results indicate that application of NPK fertilizer along with two hoe weeding at 3 and 6 WAS recorded highest grain yield, that was closely followed by application of 6 t ha^{-1} cow dung manure combined with the Pendimenthalin at 2.5 kg a.i. ha^{-1} as compared with all other treatments. The finding of the present study observed that application of cow dung manure at the rates of 6t ha^{-1} significantly increased growth and yield characters by producing higher yield. Weedy check treatment combined with all manure rates resulted in lower grain yield as compared with all other treatment combinations in the trails. The finding supported that of (Mahadi *et al.* 2012). That cow dung manure particularly at 6t/ha rates resulted in increase of mineralized nutrients which improved availability of macro and micro nutrients in the soil that were necessary for growth and development in crops. Apart from increasing soil fertility manure serves as a soil amendment by adding organic matter into the soil. Cow dung manure has also been reported to greatly improve water holding capacity, soil aeration, soil structure, nutrient retention and microbial activity.

IV. Conclusion

Based on the result of this study it can be concluded that two hoe weeding at 3 and 6WAS along with NPK fertilizer or 6 t ha^{-1} cow dung manure adequately controlled weeds and provided nutrients which increased growth and development of sesame. Alternatively, application of Pendimenthalin or Metolachlor at 2.5 kg a. /ha^{-1} and cow dung manure at 12t ha^{-1} could also effectively control weeds and supply the crop with adequate nutrient for better yield.

References

[1]. Alhassan, J., S. A. dadari, B. A. babaji, and J. A. Y. Shebayan (2015). Weed Control Efficiency of Management Practices of Lowland Paddy Production in Sudan Savanna Ecology *Journal of Biology, Agriculture and Healthcare* Vol.5, No.16, www.iiste.org ISSN 2224-3208 Pp 105 – 112.

[2]. Akobundu, I. O. (1987). *Weed Science in the Tropics- Principles and Practices*. A wiley- international publication. Pp 532

[3]. Chauchan, B. S. (2012). Weed ecology and weed management strategies for dry-seeded rice in Asia. *Weed Technology*, Pp 1-13.

[4]. Diomande S., Yao, A. C., Mangara A. and Bakayoko A. (2018). Weeds in The Vegetable Garden of The Town of Gagnoa (Côte d'Ivoire) *Journal of Agriculture and Veterinary Science (IOSR-JAVS)* Volume 11, Issue 4,www.iosrjournals.org, ISSN: 2319-2380, Pp 49-59.

[5]. Duhoon, S.S. Jyotishi, A., Deshmukh, M.R and Singh, N.B. (2004). Optimazation of sesame *(sesamum indicum L.) Production through bio/natural inputs.* http://www.cropsceince.au/res.

[6]. FAO (2008). Regional sesame production, trade and consumption. *United Nation/ Food and Agricultural Organization.*

[7]. Haruna, I. M., Aliyu, L., Olufajo, O.O. & Odion, E. C. (2012). Contributions of some growth characters to seed yield of sesame (*Sesamum indicum* L.). *ISABB Journal of Food and Agriculture Science* 2, 9 –14.

[8]. Garko, M. S., Mohammed, I. B. and Fulani, M. S., (2016) Performance of Groundnut (*Arachis hypogea* L.) Varieties as Influenced by Weed Control Treatments in Kano State of Nigeria. *International Journal of Scientific and Research Publications*, 6, 134 – 140.

[9]. Garko M. S., Yawale, M. A., Sa'ad A. M. and Abba U. U. (2018). Growth and Development of Bambara Groundnut (V*igna subterranea L.*) as Affected by Phosphorus Levels and Weed Control Method in Sudan Savanna, Nigeria *FUDMA Journal of Agriculture and Agricultural Technology* ISSN: 2504 - 9496 Vol. 4 No. 1, Pp 24-31.

[10]. Kuepper, G. and L. Gegner (2004). Fundamental of Sustainable Agriculture*: Organic crop production overview*. *http://www.attrg.ncat.org/attra-pub/organiccrop.html. Retrieved on 03/09/08.*

[11]. Mahadi, M. A., Dadari, S. A., Tanimu, B., Kuchinda, N. C., Sharifai, A.I. and Bature, M.S. (2012). Effects of Weed Control and Cow Dung Manure on Growth Indices of Quality Protein Maize. *Bayero Journal of Pure and Applied Sciences*, **5**(2): Pp 148 – 155.

[12]. Ndahi, W. B, and Kwaga Y. M. (2012). Evaluation of herbicides for dual *Rottboellia cochinchinensis* (Lour) Clayton and other groundnut (*Arachis hypogaea*). *Adamawa State Journal of Agricultural Sciences* 2,: 150- 155.

[13]. Ogbonna, P. E. and Umar, Y. G. (2011) Yield responses of sesame (*Sesamum indicum* L.) to rates of poultry manure application and time of planting in a derived savannah ecology of south eastern Nigeria. *African Journal of Biotechnology* 10, 14881 – 14887.

[14]. Olorunmaiye K.S., (2010) Time of weed removal influence on vegetative and reproductive yield of two cowpea (*Vigna unguiculata* (L.) varieties, Ife brown and tux 3236.

[15]. Oplinger, (1990). *Alternative field Crop Manual* (sesame).Dept. of Agronomy and Soil Sceinces, College of Agriculture and life sceinces and Cooperative Extension Services, University of Wisconsin-Madison W1 53706.

[16]. Rahman, S.A., J.F., Alamu and M.I. Haruna (2001). Comparative Economic Analysis of Maize production under organic and inorganic fertilizers: A case study of Daudawa village in Katsina State, Nigeria. *Nigerian Journal of Bio-Sciences.* Vol 1: 1 Pp 64-65.

[17]. Yol, E., Karaman, E., Furat, S. & Uzun, B. (2010). Assessment of selection criteria in sesame by using correlation coefficients, path and factor analyses. *Australian Journal of Crop Science* 4, Pp 598 - 602.

G. M. Adewale. "Weed Control Efficiency of Management Practices of Sesame (Sesamum indicum L.) Production under Different Level of Cow Dung Manure in Kano State Nigeria." IOSR Journal of Agriculture and Veterinary Science (IOSR-JAVS) 12.1 (2019): PP- 78-81.