NIGERIAN JOURNAL OF CROP SCIENCE
Volume 9 N0 2 January 2024 pp 20 - 25
ISSN – 2350 -2487

EFFECTS OF SEEDING RATE ON THE MINERAL COMPOSITION AND NUTRIENT UPTAKE OF TWO VARIETIES OF PEARL MILLET (*Pennisetum typhoides* Burm F.) IN A HUMID ENVIRONMENT IN EDO STATE, NIGERIA

[1]Omorogie, A U., [2]*Umeri, C. and [1]Agbonlahor, C.

[1]Ambrose Alli University, Faculty of Agriculture, Department of Crop Science, P.M.B. 14, Ekpoma, Edo State, Nigeria.

[2]University of Delta, Faculty of Agriculture, Department of Crop Science, P.M.B. 2090, Agbor, Delta State, Nigeria

*Corresponding author: Cliffordumeri@gmail.com

ABSTRACT

A field trial was conducted to determine the effects of seeding rate on the mineral composition and nutrient uptake of two varieties of millet at the Teaching and Research Farm, Faculty of Agriculture, Ambrose Alli University, Ekpoma. The experiment was a 2 x 4 factorial scheme fitted into Randomized Complete Block Design with three replicates. The two local millet varieties, Gero bida and Gero badeggi, sown at four different seeding rates (1, 2, 3 and 4 seeds/hole) to give equivalent population of 53,333, 106,666, 159,999 and 213,332 plants/ha, respectively. The parameter determined were mineral composition and nutrient uptake. GenStat version 12.0 was used to compute the analysis of variance of the data obtained and means separated using Duncan's Multiple Range Test. The micro- and macro- nutrients in the flag leaves of the millet varieties analyzed when compared to establish critical levels were adequate, except for K, Mg, Mn and Cu for ruminant animal nutrition. Generally, there was significant (P<0.05) difference in the nutrient uptake among the seeding rates except for K, Ca, Zn, and Cu. However, Gero badeggi sown at one seed/hole had the highest uptake of the micro- and macro- nutrients. Gero badeggi sown at one seed/hole had the highest concentration of both the micro-and macro-nutrients, in turn had the highest uptake and it is hereby recommended in this locality. Analysis, composition, humid, nutrient, seeding rate, varieties.

Keywords: Analysis, composition, humid, nutrient, seeding rate, varieties.

INTRODUCTION

Millet (Pennisetum typhiodes Burm F.) is of the family Poaceae and is a staple food Crop for millions of people in the semi-arid region of the world. Determining forage quality is one of the most important factors for good management of pasture. Nigeria uses millions of pearl millet as staple food in many homes, especially among the poor, predominantly, in Northern Nigeria (Remison, 2005). It is also used in making a popular friend cake know as “masa”. Its flour is also used in preparing “tuwo” a thick binding paste, also referred to as “toh” in northern Africa. It contains 18% protein, rich in vitamin B especially niacin, B6 and folic acid. It is fitted for flat bread especially because it lacks gluten (Lee *etal*., 2004). It is an important food across the Sahel. It is particularly the main stale in a large region of northern Nigeria, Niger, Mali and Burkina Faso (Remison, 2005). It is often ground into flour, rolled into large balls, parboiled, liquefied into a watery paste using fermented milk and then consumed as a beverage. This beverage called “fura” in Hausa or “tukura” in Marghi language is a popular drink in northern Nigeria and southern Niger. An important factor for fodder quality is seeding rates which can help to identify the adequate nutrient concentration, as different varieties of plants have different mineral concentration; production of good quality millet fodder is of a great importance for profitable ruminant production. Both quantity and quality of fodder are influenced by soil

variation, plat species, climate condition, water supply' seeding rate (Shinggu et al., 2009) frequency of cutting and agronomic practices. Cereals generally take up a large quantity of nitrogen and phosphorus for fodder production which influences the plant growth, development, and thereafter number of grains Seedling rate is the most important factor influencing nutritional quality. The protein andlipid content of forage are negatively influenced by seeding rate (Mahamud, 2014). However,mineral content increases with advancing seeding rate. However, the quality of fodder is veryhigh at optimum population. Therefore, in order to get more nutrients per unit area, the optimumSeeding rates, keeping in view its nutritive value and dry matter yield must be considered. Ayub*et al*., (2007) reported that nutrient uptake of millet was significantly influenced by seeding rate with those planted at 108 plants/m2 gave the highest uptake of the macro ad micro-nutrients. The crude protein contents increase with the age of the plant. The higher the crude protein content lower will be the digestibility.The objective of the study was to determine the effects of seeding rate on the mineral composition and nutrient uptake of two millet varieties in a humid environment of Edo State.The specific objectives of the study were to determine the effects of seeding rates to:(i) evaluate the mineral composition of the two varieties and (ii) determine the nutrient uptake of the two varieties under study.

MATERIALS AND METHODS

Experimental Location

The field experiment was carried out at the 2018 cropping period in the Teaching and Research Farm, Faculty of Agriculture, Ambrose Alli University, Emaudo Annex, Ekpoma, Edo State. Ekpoma is located between latitude 6°45' North and longitude 608' East. The area falls within the humid rain forest/savanna transition zone of South-South, Nigeria. The area has a mean annual rainfall within the range 1200-1500 mm and air temperature of 29°C.

Experimental Materials

The millet varieties used were Gero bida and Gero badeggi and they were obtained from National Cereals Research Institute Badeggi, Niger State.

Treatments and Experimental Design

The treatments were two millet varieties (Gero bida and Gero badeggi) and fourseeding rates of 1, 2, 3 and 4 seeds per hole, equivalent to 53,333, 106,667, 159,999 and 213.332 plants/ha, respectively. The experiment was a 2 x 4 factorial laid out in a randomized complete block design (RCBD) with three replicates. The 2 varieties of millet were sown at 4 seeding rates to give 8 treatment combinations replicated three times to give a total of 24 plots.

Land Preparation and Planting

The site for the experiment was cleared and the stubbles packed out prior to planting the crops. The fallow land was manually prepared and the plot demarcated.A pinch of seeds of the two local millet varieties obtained were planted on prepared bed using the spacing of 25 x 75 cm and was later thinned according to treatment; to 1, 2, 3 and 4 plants/stand at eight days after planting. Each plot size was 1.25 X 3.75 m with a total plot size of 10 x 11.25 m (112.5 m) equivalent to 0.01 ha, with a spacing of lm within plots and between replicates. A total of twenty four (24) plots were involved. Weeding was manually done at 3 and 7 weeks after planting (Remison, 2005) with hoe and cutlass during the period of the experiment.

Plant Analysis

At fruiting stage, flag leaves of each variety per seeding rate were harvested, put into a paper envelop, weighed and dried in an oven at 70°C in the laboratory for nutrient analysis (Mineral composition) according to the method of AOAC (1990).

Data collection: Data collected are as follows**:**

Mineral Composition

Mineral composition of the flag leaves was determined following the procedure by
AOAC (1990). The mineral elements analyzed were N, P, K, Mg, Ca, Na, Fe, Mn, Zn and Cu. Crude protein (CP) was calculated by multiplying the mineral contents by 6.25 according to AOAC (1990).

Nutrient Uptake

The nutrient uptake was determined by multiplying the mineral concentration by the dry matter yield values.

Data analysis

The analysis of variance (ANOVA) was calculated using SAS (2002) software package. The differences between treatment means were compared using Duncan'sMultiples Range Test (DMT) at 5% level of significance.

RESULTS

Mineral composition of two varieties of millet

Che mineral composition of the two varieties of millet is presented in Table 1. Nitrogen concentration varied from 3.42-4.75 % in Gero badegg and 2.23-3.65 % in Gero bida. Gero badeggi had higher N (3.92 %) than Gero bida

(3.09%). One seed/hole sown crops had the highest N% while those of four seed/hole had the least. Phosphorus content in the flag leaves of millet varieties ranged from 0.23-0.35 % and 0.22-0.28 % in Gero badeggi and Gero bida, respectively. Although, P content was higher in Gero badeggi than in Gero bida, both had an average of 0.29 % and 0.25 %, respectively. One seed/hole planted crops had the highest P content while those of four seeds/hole had the least. The range of potassium (k) in the flag leaves of millet was from 0.86-1.03 % in Gero badeggi and 0.57-1.02 % in Gero bida. Thus, the K content was higher in Gero badeggi than in Gero bida. Generally, K content was similar in both varieties approximately 1 %. The highest K level was obtained from crops planted at one seed/hole, while the least was obtained in those of four seeds/hole. Sodium (Na) concentration ranged from 0.56-0.66 % in Gero badeggi and 0.36- 0.58% in Gero bida. On the whole, Gero badeggi had higher Na (0.61 %) concentration than Gero bida (0.44 %). One and four seed/hole plantings had the highest and the least Na contents, respectively. Range of values for calcium level was from 0.12-0.16 % and 0.09-0.15 % in Gero badeggi and Gero bida, respectively. Gero badeggi had higher concentration than Gero bida. Mean of 0.61 % and 0.47 % was recorded in Gero badeggi and Gero bida, respectively. However, the highest and the least Ca levels were obtained in one and two seeds/hole plantings.

Magnesium content in the flag leaves of millet varied from 0.09-0.17 % in Gero hadeggi and 0.08-0.11 % in Gero bida. In all, it was revealed that Gero badeggi and Gero bida had similar value (0.09 %) content of Mg. One seed/hole sown crops had the highest Magnesium content while those at three seeds/hole had the least. Iron (Fe) concentration from the flag leaves of the two millet varieties ranged from 122-342 mg kg in Gero badeggi and 132-420 mg/kg in Gero bida. Overall, Gero bida had higher Fe content than Gero badeggi. Gero badeggi had a mean of 289.00 mg/kg while Gero bida had 202.75 mg/kg. However, one seed/hole planted crops had the highest Fe concentration while those from four seeds/hole had the least.

Manganese level ranged from 1.26-3.42 mg/kg in Gero badeggi and 3.38-8.80 mg/kg in Gero bida. Mn content was higher in Gero bida (5.71 mg/kg) than Gero badeggi (2.38 mgkg). The highest and the least content of Mn was obtained from crops planted one and four seeds/hole, respectively. Concentration of Zinc in the flag leaves varied from 62.10-67.00 mg/ kg and 44.00-68.00 mg/kg in Gero badeggi and Gero bida, respectively. Gero badeggi had higher (63.58mg/kg) Zn content than Gero bida (55.25 mg/kg). Crops planted at one seed/hole had the highest Zn content while those of four seeds/hole had the least.

Table 1: Effect of seeding rate on the grain yield of two varieties of millet.

Crop variety	seeding Cu rates seed/hole	CP	N	P	K	Na	Ca	Mg	Fe	Mn	Zn
		←			%			→	←	mg kg^{-1}	→
Ger	129.69	4.75	0.35	0.93	0.66	0.15	0.11	342	3.41	62.2	2.21
Badeggi	2 24.50	3.72	0.32	1.03	0.62	0.16	0.08	215	3.42	67	1.37
3	22.31	3.57	0.26	0.90	0.59	0.13	0.08	132	1.41	63	0.28
	431.38	3.42	0.23	0.86	0.56	0.12	0.09	122	1.26	62.1	0.26
	Mean 1.03	24.47	3.92	0.29	0.93	0.61	0.14	0.09	202.75	2.38	63.58
Gero	1 22.63	3.62	0.27	1.02	0.58	0.15	0.10	420	8.08	68	1.86
Bida	2 22.81	3.65	0.28	0.87	0.44	0.09	0.09	323	5.71	55	0.72
3	13.94	2.23	0.24	0.68	0.36	0.11	0.08	281	5.67	54	0.594
	17.74	2.87	0.22	0.57	0.37	0.12	0.08	132	3.38	44	0.46
	Mean	19.33	3.09	0.25	0.79	0.44	0.47	0.09	389	5.71	55.25
	0.91SE 0.27	1.63	0.26	0.02	0.06	0.04	0.01	0.01	39.86	0.82	2.82

SE: Standard error

Table 2: Effect of seeding rate on the nutrient uptake of two varieties of millet.

Crop variety	seeding rates seed/hole	N	P	K	Ca	Mg	Na	Fe	Mn	Zn	Cu
		←					kg/ha				→
Gero	1	12627	934^{a}	1737^{ab}	400^{a}	293.5	1761^{a}	91.2^{a}	0.910^{abc}	16.53^{ab}	0.600
Badeggi	2	9015^{a}	803^{bc}	2369^{a}	368^{ab}	184.0^{a}	1426^{ab}	36.1^{c}	0.^{787bc}	20.53^{a}	0.337
	3	7413^{ab}	537^{b}	1869^{ab}	270^{bc}	166.1^{ab}	1225^{bc}	27.4^{c}	0.300^{d}	13.10^{ab}	0.100
	4	6765^{ab}	455^{b}	1701^{ab}	237^{b}	178.0^{a}	1108^{bcd}	24.1^{c}	0.233^{d}	12.27^{ab}	0.100
	Mean	8966	682	1919	319	205.4	1380	44.7	0.557	15.61	0.284
Gero	1	5753^{bc}	429^{b}	1621^{ab}	192^{b}	158.^{9ab}	922^{cdc}	66.7^{ab}	1.267^{a}	10.80^{b}	0.293
Bida	2	7638^{ab}	586^{bc}	1821^{ab}	188^{b}	188.3^{a}	921^{cdc}	67.6^{ab}	0.190^{ab}	11.52^{ab}	0.147
	3	3465^{c}	374^{b}	1059^{b}	171^{b}	97.8^{b}	560^{e}	43.8^{bc}	0.883^{abc}	8.43^{b}	0.467
	4	6135^{abc}	374^{b}	1159^{ab}	244^{b}	162.6^{ab}	752de	25.3^{c}	0.687^{c}	8.43^{b}	0.367
	Mean	5748	434	1415	199	151.9	789	50.9	1.007	9.92	0.318
	SL										
Variety		*	*	ns	*	*	ns	ns	*	*	ns
Seeding rate		*	*	ns	ns	*	*	*	*	ns	ns
Interaction (V x D)		*	*	*	*	*	*	*	*	*	ns

Values with same letters superscript in columns are not significantly different using DMRT at 5% level of Probability.
SL: significant level
*: Significant
Ns: not significant
V: variety
D: seeding rates
MDRT: Duncan's Multiple Range Test

Copper (Cu) level ranged from 0.26-2.21 mg/kg in Gero badeggi and 0.46-1.86 mg kg in Gero bida. Gero badeggi was higher Cu contents than Gero bida. 1.03 mg/kg Cu contents was for Gero badeggi while that of Gero bida was 0.91 mg/kg. The highest and he least Cu contents were obtained in crops planted one and four seeds/hole, respectively.

Nutrient uptake of two varieties of millet

The data obtained for the nutrient uptake of the micro- and macro- nutrients are presented in Table 2. The uptake of nitrogen ranged from 6765-12672.00 kg/ha in Gero badeggi and 6135-7638 kg/ha in Gero bida. Crops sown one seed/hole had the highest while those of four seeds/hole had the least. In all, Gero badeggi had higher nitrogen uptake than Gero bida. The average of 8966 kg/ha and 5748 kg/ha nutrient uptake was obtained in Gero badeggi and Gero bida, respectively.Phosphorus uptake varied from 445 -934 kg/ha and 374-586 kg/ha in Gero badeggi and Gero bida, respectively. On the whole, Gero badeggi was higher (682 kg/ha) than Gero bida (434 kg/ha) in P uptake. However, one seed/hole planted crops had the highest P uptake while those of four seeds/hole had the least. Potassium uptake ranged from 1701-2369 kg/ha in Gero badeggi and 1059-1821 kg/ha in Gero bida. Crops planted at two seeds/hole recorded the highest K uptake while those of four seeds/hole had the least. Generally, Gero badeggi had higher K uptake than Gero bida with an average of 1919 kg/ha and 1415 kg/ha, respectively. Mean value for sodium uptake varied from 1108-1761 kg/ha and 560-922 kg/ha in Gero Gero bida. Gero badeggi recorded higher (1380 kg/ha) in Na uptake than badeggi and Gero bida (789 kg/ha). Two seed/hole plantings recorded the highest Na uptake while three: seeds/hole plantings had the least.

Crops planted at one seed/hole had the highest Calcium uptake while those at three seeds/hole gave the least. Average Ca uptake ranged from 237-400 kg/ha in Gero badeggi and 171-244 kgha in Gero bida. Overall, Gero badeggi gave higher Ca uptake than Gero bida. Gero badeggi and Gero bida recorded an average of 237 kg/ha and 199 kg/ha, respectively.

Magnesium uptake decreased with seeding rate. The Mg uptake varied from 166.1-293.5 kg/ha and 97.8-1 88.3 kg/ha in Gero badeggi and Gero bida, respectively. On the whole, Gero badeggi had higher (205.4 kg/ha) Mg uptake than Gero bida (151.9 kg/ha). The highest and least Mg

uptake was obtained from crops planted at one seed/hole and three seeds/hole, respectively. The mean Iron uptake varied from 24.1-91.2 kg/ha in Gero badeggi and 25.3-66.7kg/ha in Gero bida, In all, Gero bida had higher iron uptake than Gero badeggi. 50.9 kg/ha Fe uptake was for Gero bida while that of Gero badeggi was 44.7 kg/ha. However the highest and the least iron uptake was obtained from one and four seed/hole sown crops, respectively. Manganese uptake ranged from 0.23-0.91 kg/ha and 0.68- 1.27 kgha in Gero badeggi and Gero bida, respectively. Gero badeggi and Gero bida had similar Mn uptake approximately 1.00 kg/ha. The highest Mn uptake was recorded from one seed/hole planted crops while the least was in four seed/hole.Zn uptake varied from 12.27-20.53 kg/ha in Gero badeggi and 8.43- 11.52 kg/ha in Gero bida. On the whole, Gero badeggi had higher Zn uptake than Gero bida. Both varieties had an average of 15.61 kg/ha and 9.92 kg/ha, respectively. Crops planted in two and four s seeds/hole had the highest and least Zn uptake, respectively. Copper (Cu) uptake varied from 0.10-0.6 kg/ha in Gero badeggi and 0.15-0.47 ke/ha in Gero bida. One seed/hole sown crops had the highest Cu uptake while those of four seeds/hole recorded the least. On the whole, Gero bida was higher than Gero badeggi. Gero bida had a mean of 0.28 kg/ha Cu uptake while that of Gero badeggi was 0.32 kg/ha.

DISCUSSION

Mineral composition of the two varieties of millet was not influenced by the seeding rate. Nitrogen, phosphorus, sodium, magnesium, iron and upper contents decreased with increase in seeding rate in both varieties. Potassium, calcium, and zinc increased from crops sown at one to those at two seeds/hole in Gero badegj, while they decreased with decreasing seeding rates in GerO bida. However, the highest concentration was obtained in crops sown at one seed/hole while cops planted at four seeds/hole had the least. N concentrations were higher when compared to P and K owing to N mobility and ease of absorption from the nutrient medium than K and P. The N content was adequate for ruminant animal production based on the critical requirement values of1.74% (NRC, 1976). Phosphorous was sufficient at the various seeding rates for both varieties, Gero badeggi at one seed/hole had the highest. The P Content decreased with seeding rates but the values met the suggested requirement of 0.10% for ruminant production (ARC, 1980). The potassium (K) composition at the various seeding rates for both varieties were well above the range of 0.01% to L.0% recommended by McDowell (1992) for ruminant livestock production. Sodium concentration was found to be highest at one seed/hole sown crops and then declined from two seeds/hole down to foar secds/hole The value of Na at all the seeding rates were well above the critical requirements (001- V25%) for ruminants (McDowell, 1992), The Ca content at all the seeding rates is the leaves were inadequate compared to the critical level 0.19-0.77% (McDowell, 1997). The value obtained for magnesium at the various rate was low compared the requirement of 0.12 - 0.17 % (ARC, 1985) values for goats. Going by the suggested 610 mg/kg minimum Fe levels for goats (ARC, 1985), Fe concentration in all the leaves studied were well above the range and adequate in meeting the requirement for ruminant animal production. The observed manganese contents were insufficient in meeting the 88 mg/kg. The manganese concentrations at the different seeding rates were inadequate using 88mg/kg Kessler (1991) for goats. The zinc content in the flag leaves at the seeding rates were inadequate for goats when compared to ARC (1985) suggested range of l 10 mg/kg. Copper in the investigated flag leaves at the various seeding rate were low, compared to the range of 10 mg/kg (McDonald *et al*., 1988).

The results nutrient uptake showed that only N, P, Mg, Na, Fe and Mn uptake were significantly influenced by seeding rate while K, Ca, Zn and Cu were not. One seed/hole sown crops had the highest in the uptake of N, P. Ca. Mg. Na, Fe, Mn and Cu, respectively. However, two seeds hole recorded the highest uptake of K and Zn. Nutrient uptake by plants is directly involved with the nutrient absorbed by the plant. The results Obtained showed the varietal performance at different seeding rate with regards to the availability of nutrient by the plants. It was also observed that the one seed hole with the highest growth characters had the significantly highest nutrient uptake. The findings are in line with Ayub *et al*. (2007) who reported that nutrient uptake of millet was significantly influenced by seeding rate with those planted at low seeding rate gave the highest uptake of the micro- and macro-nutrients.

CONCLUSION AND RECOMMENDATIONS

This study was carried out to determine the effects of seeding rates on the mineral composition and nutrient uptake of two varieties of millet. The findings from the study are summarized as follows: Mineral composition of the two varieties was not affected by the seeding rates; except for K, Ca, Mn and Zn contents in Gero badeggi. Millet varieties were sufficient in the concentration of micro- and macro- nutrient, marginal K, Na and Ca and deficient in Mg, Mn

and Cu levels when compared with established critical levels. Seeding rate significantly influenced the uptake of N, P, Mg, Na, Fe and Mn by the varieties planted. Gero badeggi sown at one seed/hole had the highest concentration of both the micro-and macro-nutrients and in turn had the highest uptake.

ACKNOWLEDGMENTS

The authors appreciate the department of crop science, Faculty of Agriculture, Ambrose Alli University, Ekpoma for approval giving towards the use of their facilities in conducting this research work and extension services providers who were useful in relating farmer's research needs.

REFERENCES

A.O.A.C. (1990). Official Methods of Analysis, 15th (ed). Association of Official Analytical Chemists. Washington, DC.

ARC, (1985). The nutrient requirement of farm animals. Technical review and summaries, Agricultural Research Council, London UK. 342 pp.

ARC, (Agricultural Research Council) (1980). The nutrient requirements of ruminant livestock Commonwealth Agricultural Bureaux, Farnham Royal, Slough, UK. pp.351.

Ayub, M.; Nadeem, M.A.: Tanvir, A., Tahir, M. and Khan, RM.A (2007). Interactive effect of different nitrogen levels and seeding rates on fodder yield and quality of pearl Millet. *Pakistan Journal of Agricultural Science* 44:592-596

Kessler, J. (1991). In: Morand-Felhr. P. (editor) Goat nutrition Pudoc. Wageningen, Netherlands. pp. 104-119.

Kumar, P.; Singh, H.; Hooda, R.S. and Singh, V.P. (2006). Effect of nitrogen levels and biofertilizers on yield and quality of crops in pearl millet-wheat cropping system. *Haryana Journal of Agronomy* 22:71 -73

Lee,D.; Hanna, W.; Buntin, D., Dozier; W., Temper, P. and Wilson, J.P. (2004). Millet for grains.Bulletin 1216 cooperative extension service University of Georgia. *http://pubs.caes.uga.edu.caespubs/pubcd.*

Mahamud, H.F. (2014). Influence of seed rates and levels of NPK fertilizers on dry matter accumulations and yield performance of foxtail millet (*Setariaitalica* L. Beauv.). *BangladeshJournalofAgriculturalResearch* 38: 689-704

McDonald, P.: Edward, R.A. and Greenhalgh. J.F.D. (1988). Animal nutrition Longman Scientific and Technical, Essex, England. 54Spp.

McDowell. L.R. (1992). Minerals in animal and human nutrition. 1 (ed), Academic Press, New York, USA. 9lpp.

McDowell, L.R (1997). Minerals for grazing ruminants in tropical regions bulletin. Institute for food and agricultural sciences university of Florida, Gainesville, USA. 81pp.

NRC, (National Research Council) (1976). Nutrient requirements by domestic animals (No.4). Nutrient requirement of beef cattle. (5 ed). National Academy of Sciences, Washington DC, USA. 56 pp.

Remison, S.U. (2005). Arable and Vegetable Crops of the Tropics. Gift print associate, Benin City, Nigeria. 39 pp.

SAS (Statistical Analysis System). (2002),"Statistical Methods", SAS Institute. Inc., Cary. N.C., U.S.A.

Shinggu C.P.; Dadari S.A., Shebayan, J.A.; Adekpe, D.I; Mahadi, M.A.; Mukhtar A. A. and Sala. S.W. (2009). Influence of spacing and seed rate on weed suppression in finger millet (Eleucine carocana Gaertn). *Middle-East Journal of Scientific Research* 4: 267-270