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Germination and Establishment of Finger Millet Variety (Eleusine Coracana) As Affected by Planting Method

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Absract
Study was carried out to evaluate the germination and establishment of finger millet lines under different planting methods at the department of Crop Production and Protection, Federal University, Wukari, Taraba state, Nigeria. The treatments consist of six lines of finger millet which were:L1(four fingers),L2(seven fingers),L3(thirteen fingers),L4(five finger),L5(black variety) and L6(six fingers) and three planting methods which are broadcasting, drilling and spot planting. These were arranged in a randomized complete block design with three replications. Data collected and analyzed using ANOVA at 5% level of probability. Result shows that planting methods affects the germination and establishment of finger millet lines.L6 produced significantly better germination through broadcasting method.L1, L5 and L6 had the best germination when using drilling method while for spot planting, L4 and L6 germinate better than other lines. Broadcasting produced better germination which is not significantly different from drilling method but better than spot planting.

Keywords*: finger millet, planting methods, germination, establishment*

1. Introduction

Finger millet (Eleusinecoracana) is one of the important grains in the northern part of the country, as it is next to rice, wheat and maize (Shinguu and Gani, 2012). The crop originated from the highlands of Ethiopia and Uganda and is very adaptable to higher elevations. In India the crop is majorly cultivated with an area of about 15870 km^2 while in Nigeria the Northeast is the major producer of finger millet.

It is a valuable crop especially as it contains some basic nutrients such as amino acid, methionine which is lacking in diets of hundreds of millions of the poor who live on starchy staples such as cassava, yam, etc (Chetan and Mlleshi, 2007). It also provides income to many households where it is grown (MoALD, 1994). It can also be ground and cooked into cakes, pudding or porridge. The grain can also be fermented to produce drinks (beer). The nutritional value of finger millet per 100 g represent; 7.6 g protein, 1.5 g fat, 88g carbohydrate, 37 mg calcium, 0.48 mg Vitamin A, 0.33 mg thiamine (B_1), 0.11 mg Riboflavin (B_2), 1.2 Niacin and 3 g fiber (Chetan and Malleshi, 2007: (Obilana et al, 2002) Finger millet is therefore an important prevention against malnutrition, especially, Kwashiorkor (Shinguu and Gani, 2012); Anon, 1996). It tastes better than most cereal and has no major pest problem. One of the problems facing the production of the crop is the germination of the seeds, due to the fact that they are tiny in nature and will not germinate readily if certain conditions are not met. It is in line with this that the study was carried out to look into various planting methods as the affect the germination and establishment of different lines of finger millet with the objective to establish the best planting method for the crop in Wukari, Taraba State, Nigeria.

2. Materials and Methods

The study was carried out at federal University Wukari farm land in Taraba State during 2013 cropping season. The land clearing and seed bed preparations were carried out using manual method. Pre-crop soil samples were taken for the soil physiochemical analyses. A bed of 2 m x 1 m ($2m^2$) was made with 1 m gap in –between rows. A total number of 54 beds were made. The treatments consisted of six lines of finger millet with three methods of planting (Broadcasting, Drilling and Spot planting) to give a total of eighteen treatment combinations. The experimental design was a two factor experiment fitted in a Randomized Complete Block Design with three blocks. 3g of finger millet seeds were planted using three different planting methods, and after germination, the plants were allowed to grow and get established. The plots were kept weed free manually throughout the period

of growth. Data were collected on the growth performance of the crops. The measurement of the population of germinated and established seeds was scored using a scale of 1-5 which represents; 1= poor population, 2= low population, 3= medium population, 4= high population and 5= very high population. The mean averages were calculated and the experiment was terminated at the 4 weeks after planting.

All the data collected was subjected to Analysis of Variance (ANOVA) procedures as described by Wahua (1996) and means separation was carried out using Least Significant Difference (LSD) at appropriate level of significance.

3. Results

The result of the soil analysis showed that the soil at the experimental site was either acidic/neutral. With low Organic matter, Organic carbon, Exchangeable Cations and Effective Cations Exchange Capacity (ECEC) content hence low fertility status. Table 1.

Properties	**Wukari**
pH (H20)	6.2
Organic Carbon (%)	0.55
Total N (%)	0.26
Available P (ppm)	5.38
Fe (mg / kg)	11.19
Mn (mg / kg)	4.40
Zn (mg / kg)	5.32
Exchangeable K (c mol /kg)	0.40
Exchangeable Na (c mol /kg)	0.50
Exchangeable Ca (c mol /kg)	0.96
Exchangeable Mg (c mol /kg)	2.48
E C E C (c mol /kg)	1.06
Base saturation (g/kg)	926
Sand (g / kg)	950
Silt (g / kg)	120
Clay (g / kg)	12
Textural Class;	Loam sand

Table 1: Pre cropping soil chemical and physical analysis of experimental site.

TREATMENTS	L_1	L_2	L_3	L_4	L_5	L_6	MEAN
Broadcasting	3.33	2.67	3.67	3.33	2.67	4.00	**3.28**

Table 2: Effect of Broadcasting Method on Germination and Establishment of Six Lines of Finger Millet (Eleusinecoracana)

Planting methods significantly influenced plant germination and establishment of finger millet lines. Broadcasting method of planting significantly (P=0.05) affected plant germination and establishment of six (6) lines of finger millet tested. L_6 had significantly higher germination population (4.00) which is statistically the same with line L_3, L_1 and L_4, (3.63, 3.33 & 3.33) but differed significantly with L_2 and L_5 (Table 2).

TREATMENTS	L_1	L_2	L_3	L_4	L_5	L_6	MEAN
Spot Planting	1.33	1.00	1.67	2.00	1.33	2.00	**1.56**

Table 3: Effect of Spot Planting Method on Germination and Establishment of Six Lines of Finger Millet (Eleusinecoracana)

Table 3 also showed the effect of spot planting method on germination and establishment of 6 lines of finger millet. Lines 4 & 6 (L_4& L_6) had significantly higher germination population followed by line 3 (L_3), while lines 1 and 5 had the same germination population (1.33) and the least was L_2 (1.00).

TREATMENTTS	L_1	L_2	L_3	L_4	L_5	L_6	MEAN
Drilling	3.33	2.67	2.67	2.00	3.33	3.33	**2.89**

Table 4: Effect of Drilling Method on Germination and Establishment of Six Lines of Finger Millet (Eleusinecoracana).

Drilling method of planting was also significantly influenced the germination population of finger millet lines (Table 4). Line 1,5 and 6 had the same mean values (3.33) which was significantly higher than the other lines tested in the study. Followed by Lines 1 & 2 (2.67). While the least mean value was recorded by Line 4 (L_4).

	PLANTING METHODS			
VARIETIES	BRO	SPT	DRI	MEAN
L_1	3.33	1.33	3.33	**2.67**
L_2	2.67	1.00	2.67	**2.11**
L_3	3.67	1.67	2.67	**2.67**
L_4	3.33	2.00	2.00	**2.44**
L_5	2.65	1.33	3.33	**2.44**
L_6	4.00	2.00	3.33	**3.11**
MEAN	**3.28**	**1.56**	**2.89**	**2.57**
$LSD_{0.05}$				
VAR	NS			
PLT	0.695			
VAL PLT MTD	NS			

Table 5: Effect of Planting Methods on Germination and Establishment of Six Lines of finger Millet (Eleusinecoracana)

Table 5 showed the interaction effect of planting methods with the germination population of six lines of finger millet.
The result of main effect of finger millet lines and interaction effect of planting method with finger millet lines showed no significant difference (P=0.05), but the main effect of planting method was (Table5).

However, Line 6 L_6) had the highest mean germination population (3.11) irrespective of the planting method, while line 2 (L_2) recorded the least germination population (2.11).
Similarly, Broadcasting planting method recorded the highest germination and establishment of finger millet (3.28) but did not differ significantly (P=0.05) with Drilling planting method which had the second highest (2.89) germination population. The results however differed statistically with Spot planting method which had the least germination population of finger millet (Table 5).

4. Discussion

The finger millet lines cultivated in this study had no significant effect on the population germinated, but Line 6 (six fingers) produced better germination and established well after germination. This shows the superiority of this line when compared with other finger millet lines tested. This could be due to the genetic make-up of the line which agrees with the findings of Adeyeye, (2009) on soybean. It was observed that among the planting methods tested, Broadcasting method produced significantly (P=0.05) higher population during germination, followed by drilling and last with spot planting. This may be due to the ability of the seeds to distribute uniformly as they made common contact with the soil considering the variation in plant depth and the tiny nature of the seeds. Although during the establishment, the plant stands produced were thin due to the competition of seeds resulting from the population germinated causing slow growth rate during establishment. This agrees with the earlier work of Shinggu and Musa, (2011) who observed initial slow growth rate of finger millet through Broadcasting method of planting.
Germination population was poor in Spot planting method but those that germinated produced higher stem girth with many branches when compared with other method of planting used in this study.
This observation may be due to the fact the seeds of finger millet under this method of planting had more space and nutrients which enhanced good and vigorous crop establishment when compared with other two methods used in this study. This is inline with the findings of De Datta, (1981) which showed that the number of tillers and panicles per square meter in a rice population are important function of planning density or seed rate.

5. Conclusion

Planting method affects the germination population and establishment of finger millet. The use of broadcasting method was found to be superior to other methods used and is therefore recommended for finger millet production for optimum population growth and good establishment of the crop.

6. **References**

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