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Preliminary Investigations on Egyptian Bean (*Lablab purpereus* L.) for Fodder in Semi-Arid Nigeria: Effects of Sowing Methods on Growth Components and Herbage Yield

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Abstract: An experiment was conducted to investigate the effects of sowing methods on the growth and herbage yield of Lablab (*Lablab purpureus*) at 13° 1'N, 5° 15'E in the semi-arid zone of Nigeria. Treatments consisted of three sowing methods (Broadcasting, Dibbling and Drilling). The experiment was designed as a Randomized Complete Block Design with three replications at the Usmanu Danfodiyo University Teaching and Research Farm in 2005/2006 cropping season. Plant height, leaf length, leaf width, leaf number and stand count yield were evaluated in every two weeks for ten weeks to monitor crop growth rate under different sowing methods. Herbage yield was estimated at the end of tenth week. Results indicated that mean number of leaves per plant and yield were significantly ($p<0.05$) affected by different sowing methods. Dibbling method recorded the highest number of leaves (4 plant^{-1}) at 4 WAP (weeks after planting) while drilling recorded the least number of leaves (1 plant^{-1}) at 10 WAP. Similarly, dibbling recorded the highest ($p<0.05$) yield of 1010 kg ha^{-1}. It was therefore concluded that dibbling is the best method of sowing *Lablab purpureus* in the semi-arid environment of Sokoto district.

Key words: Egyptian bean, sowing methods, fodder, semi-arid

INTRODUCTION

Lablab (*Lablab purpureus*) belongs to the Leguminosae family and Papilionoideae subfamily. Lablab crop is known with different names such as Egyptian bean, Lablab bean, Country bean, Hyacinth bean, Lubia and Poor man bean. This crop has been originated from the Southeast Asian subcontinent and it was introduced into Africa Continent in the 18th century (Westphal, 1974; Kay, 1979; Deka and Sarkar, 1990). It is commonly used as fodder crop in the Tropical countries (Murphy and Colucci, 1999). This crop is used for human consumption and livestock feeding. The human consumption of its young pods and seeds tender leaves and shoots in various parts of the world have been reported (NRC, 1979). On the other hand, its palatability and nutritive value to livestock have also been reported (NRC, 1979; Karachi, 1987; Sarwatt and Mkiwa, 1987; Murphy and Colucci, 1999; Aganga and Tshwenyane, 2003). Generally, it is mostly grown for fodder use in the northern part of Nigeria. Furthermore, it makes an excellent hay if the leaf is preserved. In Nigeria Lablab is a recent addition to the forage crop and is grown mostly in research and experimental farms. In the semi-arid Nigeria, where most of the ruminant population of the country is located has a very long dry season of 6-7 months, during which there is a serious problem of feed supply both in quantity and quality. This research was therefore conducted to investigate the growth characteristics and herbage yield of Lablab under different sowing methods in the northern Sudan savannah ecological zone of Nigeria for possible usage as fodder.

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MATERIALS AND METHODS

This experiment was conducted in the rainy season of 2005/2006 at the Usmanu Danfodiyo University Teaching and Research Farm (13° 1'N, 5° 15'E) in a Randomized Complete Block Design (RCBD) with replications. Used sowing methods are a-broadcasting b-dibbling and c-drilling. The land of the experimental site was prepared manually using hoe. The plots were marked were marked out in to parallel row, separated by 0.5 m water and footpath. The plots consist of leveled rectangular slightly sunken basin of gross area of 3 m^2×4 m^2 (12 m^2) size. A variety of Lablab HIGHWORTH was provided by the National Animal Production Research Institute (NAPRI) forage seed store at Shika, Zaria, Nigeria. Sowing was done manually. Seeds were sown at the rate of 3 seeds per stand at intervals of 50×50 cm between and within rows (dibbling and drilling). In broadcasting, seeds were evenly distributed on the plots. A total of 78 g of seeds were sown in each plot. The heights of three plants were measured in each plot randomly at different time intervals for 2, 4, 6, 8 and 10 weeks after sowing to measure crop growth rate (Harper, 1983). This was done by measuring the plant from the base up to the tip of the tallest leaf with a measuring ruler. The leaf length of the plant was obtained by measuring the leaf from the base of the leaf stalk to the tip, using a ruler. The measurement was taken on randomly selected plants at different time intervals. The leaf width was measured from the widest portion of the leaf using a ruler on randomly selected plants at different time intervals. The number of leaves per plot was taken from three randomly selected stands at different time intervals. Another measured trait is the stand count. This was done by counting the number of established plants per stand in dibbling (50 cm apart). For drilling, a random distance of 50 cm was used to count the number of established stands. In broadcasted plots, stand count was established by using a quadrate at random points. Herbage yield was taken by cutting the height of the plant to about 5 cm above the ground. It was obtained from the net plot area (3×4 m) and the yield was measured using weighing balance scale in kilograms per hectare. All obtained data were subjected to analysis of variance (ANOVA) (Gomez and Gomez, 1984). Where there were significant differences between treatment means, Least Significant Difference (LSD) method was used for comparison SAS (1988).

RESULTS AND DISCUSSION

Growth Components

The result showed that sowing methods had significant ($p<0.05$) influence on number of leaves per plant at 4, 6, 8 and 10 weeks after planting (Table 1). At the 4 WAP the maximum number of leaves per plant was recorded for the different sowing methods. However, this relation declined between 6 and 8 WAP. At 10 WAP the number of leaves per plant in dibbling and broadcasting methods increased. Closer spacing was observed to depress leaf production per plant because of an increased competition among the plants due to increased plant population per unit area. This is in conformity with the report of Wood (1983) who reported that widely spaced plants tend to grow

Table 1: Effect of sowing methods on number of leaves of Lablab bean cultivated in the field trial at 2, 4, 6, 8 and 10 weeks after planting (WAP)

	WAP				
Treatments	2	4	6	8	10
Dibbling	2.66^{NS}	4.33^{a}	1.99^{b}	2.11^{ab}	3.22^{a}
Broadcasting	2.33^{NS}	3.78^{b}	2.99^{a}	2.33^{a}	2.44^{ab}
Drilling	2.44^{NS}	3.66^{b}	2.11^{b}	1.77^{b}	1.44^{b}
LSD	0.46	0.36	0.56	0.37	1.57

Means with the different letter(s) superscripts along the column are significant at $p<0.05$, NS: Non Significant

Table 2: Effect sowing methods on plant height (cm) of Lablab bean cultivated in the field trial at 2, 4, 6, 8 and 10 weeks after planting (WAP)

	WAP				
Treatments	2	4	6	8	10
Dibbling	11.64^{NS}	18.13^{NS}	20.27^{NS}	18.33^{NS}	31.77^{NS}
Broadcasting	10.41^{NS}	17.25^{NS}	18.60^{NS}	16.24^{NS}	20.02^{NS}
Drilling	7.59^{NS}	15.46^{NS}	16.87^{NS}	13.82^{NS}	15.38^{NS}
LSD	4.18	5.77	3.62	7.19	17.23

NS: Non Significant

Table 3: Effect of sowing methods on leaf length (cm) of Lablab bean cultivated in the field trial at 2, 4, 6, 8 and 10 weeks after planting (WAP)

	WAP				
Treatments	2	4	6	8	10
Dibbling	5.44^{NS}	4.93^{a}	5.55^{a}	5.59^{NS}	9.86^{a}
Broadcasting	5.03^{NS}	4.32^{b}	5.28^{b}	4.69^{NS}	5.48^{b}
Drilling	3.43^{NS}	4.36^{b}	4.85^{c}	3.89^{NS}	4.69^{b}
LSD	2.62	0.48	0.27	2.52	4.94

Means with the different letter(s) superscripts along the column are significant at $p<0.05$, NS: Non Significant

more vegetative and bear more leaves due to absence of the competition. This explains why dibbling method had the highest number of leaves per plant. Erratic nature of rainfall during the study could have resulted in the lower number of leaves per plant recorded in the study.

Plant Height (cm)

As shown in Table 2, obtained results revealed that the response of plant height for sowing methods was not significant ($p>0.05$) at all the periods of sampling, Plants in the three sowing methods recorded their maximum height 31.8, 20.0 and 15.4 cm at 10 WAP for dibbling, broadcasting and drilling, respectively. On the other hand, dibbling method of sowing produced the tallest plants (31.8 cm) which was comparable to the mean value of 32 cm for Lablab crop fertilized at 80 kg P_2O_5 ha^{-1} reported by Abdullahi (2006) for the same variety and in the same environment.

Leaf Length (cm)

Recorded results showed that sowing methods had significant effect ($p<0.05$) on the leaf length at 4, 6 and 10 weeks after planting (Table 3). The leaf length trait was not consistent during the periods. Dibbling method produced the longest (9.86 cm) leaf length at 10 WAP which was lower than the value of 11.7 cm fertilized at 80 kg P_2O_5 ha^{-1} reported by Abdullahi (2006) for the same variety in the same environment. However, the value (9.03 cm) reported by the same author for Lablab without phosphorus fertilization was similar to the mean value recorded in the present study.

Except for the crop sown under dibbling, the mean leaf length of other sowing methods were lower than the range reported by Hendricksen and Minson (1985) of 7-15 cm. Competition for soil moisture, space and nutrients could be the reason for the shorter leaves recorded in the study. However, in another experiment at the same environment at 10 WAP, Abdullahi (2006) reported a mean leaf length of 9.03 and 11.7 cm for crops fertilized with phosphorus at 0 and 80 kg ha^{-1}, respectively.

Leaf Width (cm)

Results of Table 4 showed that sowing methods had no significant effect ($p>0.05$) on leaf width at 2, 4, 6, 8 and 10 weeks after planting. Growth of leaf width was inconsistent throughout the periods even though wider leaves were recorded at 8 and 10 WAP. The dibbling method recorded the

widest leaves (7.7 cm) which was comparable to the mean value reported by Abdullahi (2006) of 6.9 cm for Lablab fertilized with 80 kg P_2O_5 ha^{-1} application. Less competition for space and nutrients could be the reason for the wider leaves in the dibbling compared to other sowing methods.

Stand Count

The results of Table 5 showed that the number of plants per stand was not significantly ($p>0.05$) affected by the sowing methods at the different periods of sampling. The dibbling method however recorded more (2.33) mean plants per stand at 10 WAP compared to the least (1.22) recorded for the drilling method. Abdullahi (2006) reported a mean stand count of about 5.0 fertilized with 80 kg P ha^{-1}. It could therefore be assumed that inadequate phosphorus dose in the soil resulted in poor stands of the Lablab. Isah and Shinkafi (2000) reported a low phosphorus content (0.08 meq/100 g) for the soil of the study area. The number of plants per stand was more stable from the start of the experiment 2 WAP for all the sowing methods as compared to the 10 WAP.

Herbage Yield (kg ha^{-1})

The results fo Table 6 showed that sowing methods had a significant influence ($p<0.05$) on herbage yield at the 10 weeks after planting. The highest yield level (1010 kg ha^{-1}) was recorded for the dibbling method. Dry matter yield of Lablab had been reported to be higher during the cool season. Wood (1983) reported low daily growth rate (37 kg ha^{-1}) from early summer sowing of a number of genotypes, compared with 50 kg ha^{-1} from autumn sowing. The daily growth rate recorded in the experiment was lower (15 kg ha^{-1}) at the end of the rainy season. Irregular rains during the growing season might have resulted to the lower yields recorded.

Table 4: Effect of sowing methods on leaf width (cm) of Lablab bean cultivated in the field trial at 2, 4, 6, 8 and 10 weeks after planting (WAP)

	WAP				
Treatments	2	4	6	8	10
Dibbling	3.82^{NS}	4.89^{NS}	3.61^{NS}	5.01^{NS}	7.72^{NS}
Broadcasting	3.84^{NS}	3.94^{NS}	3.51^{NS}	4.25^{NS}	5.29^{NS}
Drilling	3.09^{NS}	4.02^{NS}	3.55^{NS}	3.55^{NS}	4.09^{NS}
LSD	1.39	1.03	1.69	2.86	3.79

NS: Non Significant

Table 5: Effect of sowing methods stand count of Lablab bean cultivated in the field trial at 2, 4, 6, 8 and 10 weeks after planting (WAP)

	WAP				
Treatments	2	4	6	8	10
Dibbling	2.22^{NS}	1.99^{NS}	1.89^{NS}	2.33^{NS}	2.33^{NS}
Broadcasting	2.33^{NS}	1.89^{NS}	1.77^{NS}	1.44^{NS}	1.99^{NS}
Drilling	2.11^{NS}	2.88^{NS}	2.11^{NS}	1.44^{NS}	1.22^{NS}
LSD	0.79	5.28	0.46	0.37	0.44

NS: Non Significant

Table 6: Effect of sowing methods on herbage yield (kg ha^{-1}) of Lablab bean cultivated in the field trial at 2, 4, 6, 8 and 10 weeks after planting (WAP)

Treatments	Herbage yield
Dibbling	1010.00^{a}
Broadcasting	720.00^{b}
Drilling	380.00^{c}
LSD	0.09

Means with the different letter(s) superscripts along the column are significant at $p<0.05$

CONCLUSION

It can be concluded from the result of this study that dibbling method of sowing could be the best for propagating *Lablab purpureus* in the semi-arid of Sokoto District. This method of sowing reduces competition for moisture because of the control on the number of seeds per hole. Rainfall is one of the major limiting climatic factors influencing plant growth in the semi-arid regions of the tropics.

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REFERENCES

Abdullahi, I.A., 2006. Effect of phosphorus fertilizer on growth and fodder yield of Lablab (*Lablab purpuereus*) in Sokoto. B.Sc. Thesis, Usmanu Danfodiyo University, Sokoto, Nigeria, pp: 25.

Aganga, A.A. and S.O. Tshwenyane, 2003. Lucerne, lablab and *Leucena leucocephala* forages: Production and utilization for livestock production. Pak. J. Nutr., 2: 46-53.

Deka, R.K. and C.R. Sarkar, 1990. Nutrient composition and anti-nutritional factors of *Dolichos lablab* L. seeds. Food Chem., 38: 239-246.

Gomez, K.A. and G.A. Gomez, 1984. Statistical Procedures for Agricultural Research. 2nd Edn., Longman Group Ltd., Singapore, pp: 344.

Harper, F., 1983. Principles of Arable Crop Production. Blackwell Science Ltd., London, pp: 336.

Hendricksen, K.E. and D.J. Minson, 1985. The feed intake and grazing behavior of Cahle grazing a crop of *Lablab purpureus* CV High worth. J. Agric. Sci., 95: 547-554.

Isah, A.D. and A.M. Shinkafi, 2000. Soil and vegetation of Dabagi Forest reserve in Sokoto State, Nigeria. J. Agric. Environ., 1: 79-84.

Karachi, N., 1987. Yield and quality of *Lablab purpureus* ecotypes in high altitude semi-arid lands in Kenya. Proc. 3rd Panses Workshop, Arusha, Tanzania, pp: 127-133.

Kay, D.E., 1979. Hyacinth bean. In: Forage legumes. Crop and Product Digest, Tropical Products Institute, 3: 184-196.

Murphy and Colucci, 1999. High worth Lablab grain as a supplement for beef cattle on native pasture. Proc. Aust. Soc. Anim. Prod., 15: 227-230.

NRC, 1979. Tropical Legume Resources for the future. National Academy of Science, Washington DC., pp: 332.

Sarwatt, S.V. and F.E.J. Mkiwa, 1987. The current status of knowledge on the feed value of *Gotolana species*. Proc. 3rd Panesa Workshop (1987), Arusha, Tanzania, pp: 196-205.

SAS, 1988. Statistical Analysis System (SAS/STAT) User's Guide Release 6.03. Edn., Statistical Analysis Systems Institute Inc., Cary NC., pp: 549-640.

Westphal, E., 1974. Pulses in Ethiopia, their taxonomy and agricultural significance. Agric. Res. Report, Wageningen, 815: 91-104.

Wood, I.M., 1983. Lablab bean (*Lablab purpereus*) for grain and forage production in the Ord River irrigation area. Aust. J. Exp. Agric. Anim. Husbandry, 23: 162-171.