SHORT COMMUNICATION

EFFECT OF PLANT SPACING, PHOSPHORUS LEVEL, AND TIME OF HARVEST ON FORAGE YIELD OF LABLAB *(LABLAB PURPUREUS)*, CV. HIGHWORTH.

O.S. LAMIDI[1], B. ABDULLAHI[2] and A.T. OMOKANYE[1]

National Animal Production Research Institute, Ahmadu Bello University, P.M.B. 1096. Shika-Zaria.

[2] *Department of Animal Science, Ahmadu Bello University, Samaru-Zaria. Nigeria.*

Received 25 March, 1996; Accepted 05 May, 1997

ABSTRACT

A field trial was conducted at Shika, Northern Nigeria to examine the effects of two plant spacings: 30 x 25cm (S1) and 60 x 25cm (S2), four phosphorus levels (75,100,125 and 150kgP/ha) and harvesting at 86,100,114 and 128 days after planting (DAP) on forage yield of *Lablab purpureus* cv. Highworth. Closer spacing significantly gave higher ($P<0.05$) leaf, stem and total dry matter (DM) yields than wider spacing. Application of phosphorus fertilizer did not significantly ($P>0.05$) influence stem and total DM yield. Leaf DM yield was affected ($P<0.05$) by the levels of fertilizer applied. Earlier harvest favoured leaf DM yield, while later harvests gave significantly ($P<0.05$) higher stem and total DM yields. The contributions of stem towards the total DM yield increased with age of plant :86 DAP (55%) <100 DAP (71%) <114 DAP (80%) <128 DAP (89%). The data obtained suggest that a spacing of 30x25cm with the application of 100kg P/ha would suffice for satifactory forage yield.

Keywords: Spacing, Phosphorus, Harvest time, lablab

INTRODUCTION

Inadequate feed provision especially during 5-7 months dry season is one of the major limitations to ruminant livestock production in the Nigerian Savanna rangelands. The use of improved pastures particularly those based on high yielding tropical legume has been advocated as one of the ways of achieving year-round good quality forage (Thomas and Grof, 1984). Lablab *(Lablab purpureus)*, a fast growing plant with high foliage and seed production potential (Skerman, 1988) is one of the forage legumes recommended for Nigerian Savannas (Agishi, 1983). It is capable of maintaining its nutritive value far in the dry season up to February in the Northern Guinea Savanna zone of Nigeria (Adu *et. al.*, 1991) and has also shown some value for conservation (Agishi, 1983). While these are known, there is limited information in literature on its agronomy in Nigeria.

Highworth a cultiva of Lablab has a dual advantage as food (White seed) to the farmer as well as providing forage for the farmers' stock at no additional cost. This paper examines the appropriate spacing and optimum level of phosphorus required for increased DM yield at various stages of growth.

MATERIALS AND METHODS

The experiment was conducted at Shika (Lat. 11° 15'N and Long. 7° 32'E), in Northern Nigeria during the 1987 growing season. A total of 1151 mm rainfall was recorded during May to October of the experimental year. The site was ploughed, harrowed and plots measuring 4mx3m were marked out. Split-split plot design in three replicates was used.

The trial considered two plant spacings:-30 x 25 cm (S1) and 60 x 25 cm (S2) (main plot) and four phosphorus levels 75,100,125 and 150 kg P/ha which served as the sub-plot. The plants were harvested at 86,100,114 and 128 days after planting (DAP), this served as the sub-sub plot. Three to four seeds were planted per hole on 27th July 1987. Phosphorus was applied in form of single

superphosphate at planting. At each harvest, plants within 1m x 1m quadrant were cut at 15cm above ground level, separated into the leaf and stem components, weighed and oven dried at 70°c for 48 hours for DM determination. Pods were estimated with the stems and records of number of branches, leaves, time of floweing and podding were taken.

Data collected were subjected to the analysis of variance procedure (Steel and Torrie, 1980) and the means separated using the LSD.

RESULTS

Flower was first noticed 74 DAP on plots which received 150 kg P/ha and 100 P/ha and 10 days later flowering was about 50-75% and

TABLE 1. EFFECT OF PLANT SPACING, PHOSPHORUS LEVELS AND TIME OF HARVEST ON THE NUMBER OF LEAVES AND BRANCHES PER PLANT OF LABLAB.

Parameters	Number of leaves per plant	Number of branches per plant
Spacing		
30 x 25cm	44.5^{b}	3.8
60 x 25cm	65.9^{a}	4.0
LSD	12.3	0.6
Phosphorus level (kg P/ha)		
75	48.2	3.8
100	53.4	4.2
125	60.4	3.9
150	58.7	3.8
LSD	17.3	0.5
Age at harvest (DAP)		
86	88.8^{a}	4.0
100	41.5^{b}	3.8
114	43.6^{b}	4.0
128	46.8^{b}	3.9
LSD	17.3	0.5

[a,b] Means within the same column having similar superscripts do not differ statistically ($P > 0.05$).

TABLE 2. EFFECT OF PLANT SPACING, PHOSPHORUS LEVEL AND TIME OF HARVEST ON THE LEAF, STEM, WHOLE PLANT DRY MATTER YIELD AND LEAF TO STEM RATIO

Parameters	Dry matter yield (t/ha) Leaf	Stem	Whole plant	leaf : stem
Spacing				
30 x 25cm	1.39^{a}	4.37^{a}	5.73^{a}	0.44
60 x 25cm	0.96^{b}	2.60^{b}	3.51^{b}	0.44
LSD	0.21	0.69	0.79	0.09
Phosphorus level (t/ha).				
75	0.95^{c}	3.33	4.30	0.40
100	1.30^{a}	3.53	4.79	0.46
125	1.17^{b}	3.33	4.43	0.48
150	1.26^{b}	3.75	4.97	0.46
LSD	0.29	0.97	1.13	0.13
Age at harvest (DAP)				
86	2.08^{a}	2.52^{b}	4.61^{c}	0.88^{a}
100	1.08^{b}	2.40^{b}	3.36^{c}	0.43^{b}
114	0.91^{c}	3.49^{ab}	4.32^{ab}	0.27^{c}
128	0.66^{c}	5.52^{a}	6.19^{a}	0.20^{c}
LSD	0.29	0.90	1.13	0.23

[a,b,c] Means within the same column having similar superscripts do not differ statistically ($P > 0.05$).

pod had started appearing. At 124 DAP about 90% of the plants had pods. The leaves per plant were more ($P<0.05$) at S2 (65.9) than at S1 (44.5). Phosphorus had no significant effect ($P>0.05$) on the number of leaves which were between 48.25 to 60.40 for 75 kg P/ha to 125 kg P/ha respectively. The number of leaves per plant decreased with delay in harvest, and was significantly ($P<0.05$) higher at 86 DAP than other stages of growth. Combinations of any of the treatments did not affect ($P>0.05$) the leaf number per plant.

Planting lablab at wider spacing (S2) produced more ($P<0.05$) branches than a closer (S1) plant spacing. The branches increased slightly ($P>0.05$) with the application of 75 kg P/ha to 100 kg P/ha after which decline set in (Table 1). Stage of growth did not significantly ($P<0.05$) affect branching. Interactions between any of the treatments had no effect ($P>0.05$) on the branches. Closer spacing (S1) produced significantly ($P<0.05$) higher leaf DM yield than wider spacing (S2) (Table 2). Application of phosphorus did not affect ($P>0.05$) the leaf DM yield. However, application of 100 kg/ha resulted in highest leaf DM yield. Delaying the time of harvest beyond 86 DAP progressively ($P<0.05$) decreased leaf yield by about 50.48% (100 DAP), 55.77% (114 DAP), and 68.71% (128 DAP) when compared with 86 DAP. Interaction between plant spacing and time of harvest had a significant ($P<0.05$) effect on the leaf DM yield.

The effect of spacing on stem DM yield followed the same trend with the leaf DM yield. Application of phosphorus had no significant effect ($P>0.05$) on stem DM yield. Stem DM yield increased ($P<0.05$) with delay in harvest from 100 DAP up to 128 DAP. The interaction between any of the treatments did not affect ($P>0.05$) the stem DM yield. Closer spacing (S1) significantly ($P<0.05$) gave higher total DM yield than wider spacing (Table 2). Application of phosphorus had no significant effect ($P>0.05$) on total DM yield. However, the total DM yield was highest with the application of 150 kg P/ha and lowest with the application of 125 kg P/ha. When the time of harvest was delayed from 86 to 100 DAP, the total DM yield was slightly decreased ($P>0.05$) after which a further delay increased the total DM yield and it peaked at 128 DAP (Table 2). The contribution of the leaf DM yield decreased progressively at the expense of the stem DM yield with delay in harvest.

Plant spacing and level of phosphorus applied did not show any significant effect ($P>0.05$) on the leaf :stem ratio. Delaying the time of harvest beyond 86 DAP had a progressive ($P<0.05$) decreasing effect on the leaf :stem ratio (Table 2). The impressive performance recorded for the leaf, stem and whole plant DM yield with closer spacing (S1) supports the need for closer plant spacing in order to obtain higher plant density or seedling rate per unit area. Similar findings had earlier been reported in India (Verma, 1975) and at Shika, Nigeria, (Hena, *et. al.*, 1990 and Amodu *et. al.*, 1992). However, whether or not much closer spacing could influence higher herbage yield of lablab needs to be examined.

The data obtained indicate that the application of 100 kg P/ha would suffice for satisfactory herbage yield. The trend of stem DM yield obtained with advancing plant growth agreed with the findings of Mkiwa *et. al.*, (1990) on *Crotolaria ochrolenca* and Omokanye *et. al.*, (1992) on *Macrotyloma uniflorum*, that with advancing plant growth, stem elongation increased at the expense of the leaf due to an increased in the proportion of lignified structural tissues. Whether or not earlier stage of harvest would produce more forage needs further examination.

In conclusion from the results of the study a combination of 30 x 25 cm plant spacing with the application of 100 kg P/ha when harvested at 86 DAP would lead to better herbage yield of Lablab.

REFERENCES

ADU, I.F., FAJEMISIN, B.A., HENA, S.W., TANKO, R.J., EDUVIE, L.O. and ADEWUYI, A.A. (1993). The use of *Lablab*

purpureus as supplement to sorghum fed to Yankasa sheep. In: Second livestock development project. Proceedings of a workshop on forage production and utilization in Nigeria. 151-156.

AGISHI, E.C. (1983). Forage legume and pasture development in Nigeria. In: Nigeria-Australia Collaborative Agricultural Research. ACIAR Proceedings series 4. Eds. Saka Nuru and J.G. Ryan pp. 79-87.

AMODU, J.T., ONIFADE, O.S., OMOKANYE, A.T. and KALLAH, M.S. (1992). The effect of different sowing dates and spacing on forage and seed yield of *Lablab purpureus*. A paper presented at the 17th Annual Conference of the Nig. Soc. for Ani. Prod., March 23rd to 27th, 1992. Abuja, Nigeria.

HENA, S.W., AGISHI, E.C., OLORUNJU, S.A.S. and MOHAMMED, I.R. (1990). The effect of time of cut on the productivity and nutritive value of Lablab varieties. NAPRI Annual Report 1990. 75-78.

MKIWA, F.E.J., SARWATT, S.V., LWOGA, A.B. and DZOWELLA, B.H. (1990). Nutritive value of Crotolaria ochrolenca. 1. Chemical Composition and *in vitro* DM digestibility at different stages of growth. Proceeding of the first joint workshop held in Lilongwe, Malawi. 1988. ED. B.H Dzowella, A.N Said, Asrat Wendem-Agenhu and J.A. Kategile.

OMOKANYE, A.T., KALLAH, M.S., OTCHERE, E.O., ONIFADE, O.S. and OLORUNJU, S.A.S. (1992). Effect of sowing date. phosphorus level and stage of growth at cutting on forage and seed production of *Centrosema pubescens*. A paper presented at the 17th annual Conference of the Nig. Soc. for Anim. Prod. 23rd to 27th March, 1992. Abuja, Nigeria.

SKERMA, P.J. (1988). Tropical forage legumes, FAO plant production and protection series number 2. 2nd edition

STEEL, R.G. and TORRIE, J.H. (1980). Principles and procedures of statistics. (2nd edition). McGraw Hill, New York.

THOMAS, D. and GROF, B. (1986) Some pasture species for the tropical savannas of south America. 1. Species of Stylosanthes. A review. Herbage Abstr. 56:445-456.

VERMA, C.M. (1975). Effect of spacing and phosphorus fertilizer on forage and seed yield of Dolicos lablab. cv. Lignosus. Annal of Arid zone 14. (3):235-240