

PERFORMANCE OF LABLAB (*Lablab purpureus* L.) AS INFLUENCED BY PHOSPHORUS FERTILIZER RATES AND INTER-ROW SPACING IN THE NORTHERN GUINEA SAVANNA, NIGERIA.

¹Bature, M. S., *¹Bala, A.G., ¹Hassan, A. H & ¹Tinau, A.T

¹Division of Agricultural Colleges, College of Agriculture and Animal Science, Ahmadu Bello University, Mando, Kaduna State, Nigeria.

*Corresponding author: balaaminu@gmail.com; agbala@abu.edu.ng ; +2348068928548

ABSTRACT

An experiment was conducted to evaluate the forage yield of Lablab (*Lablab purpureus* L.) during the 2018 cropping season at the Teaching and research farm of the College of Agriculture and Animal Science, Ahmadu Bello University, Mando Road, Kaduna. Treatments consisted of three phosphorus fertilizer rates (0, 20, and 30 kg/ha) and three plant spacing (20cm x 30cm, 25cm x 30cm, and 30cm x 30cm), laid out in a 3x3 factorial arrangement in a randomized complete block design with three replications. The results of the experiment showed that phosphorus fertilizer rates significantly ($p<0.05$) affected plant height, number of leaves/plant and dry forage yield at 6 and 9 weeks after sowing. However, number of leaves was not affected by phosphorus fertilizer application rates across the sampling periods. Plant spacing at (25cm x 30cm and 30cm x 30cm) have significantly increased ($p<0.05$) plant height and total dry forage yield. It can be concluded that 30kg /ha of phosphorus fertilizer application rate and plant inter-row spacing at 30cm x 30cm, produced the highest dry forage yield of Lablab. Farmers in Northern ecological zone of Nigeria can adopt the application of phosphorus fertilizer at 30kg/ha and using wider spacing of 30cm x 30cm for better yield of Lablab, thereby increasing farm output and animal performance.

Key words: Lablab, phosphorus rates, plant spacing, forage, yield

INTRODUCTION

In Nigeria, Lablab (*Lablab purpureus* L.) as forage crop is grown mostly in research and experimental farms. Despite the importance of *Lablab* in our diet and as feed for livestock, the yield obtained by farmers in Nigeria is low, because of the problem of neglecting good cultural practices such as fertilizer application and plant spacing. To achieve maximum yield of *Lablab*, agronomic factors must be at their optimum, such as phosphorus fertilizer application rates and plant spacing (Karachi, 1997). Phosphorus fertilizer plays significant roles in increasing the plant height, number of leaves and dry forage yield of *Lablab*. Similarly, management of *Lablab* using intra-row spacing has been used to increase its productivity (Pandita and Randhawa, 1994). The objectives of the study were to determine the effect of phosphorus fertilizer rates (0kg/ha, 25kg/ha, and 30kg/ha) and inter-row spacing at different level (20cm x 30cm, 25cm x 30cm and 30cm x 30cm) on growth components and yield of *Lablab*.

MATERIALS AND METHODS

The study was conducted at the pasture and range unit of teaching and research farm, College of Agriculture and Animal Science, Ahmadu Bello University, Mando Road- Kaduna. The farm is located at an elevation of 676m and latitude of 10°35'N and longitude of 7°25' E (GPS, 2018). The experiment was laid out in a 3 x 3 factorial arrangement in a randomized complete block design (RCBD) with three replications. There were three phosphorus rates (0kg/ha, 20kg/ha, and 30kg/ha) and three plant inter-row spacing (20cm x 30cm, 25cm x 30cm, and 30cm x 30cm). The Seeds of *Lablab purpureus* were planted at about 2 cm depth using a seed rate of 10 kg/ha. Planting took place when rain was established in July 2018. First and second weeding were carried out manually with hoe at 3 and 6 weeks after sowing, respectively. There was a total of 27 plots inform of basins measuring 4m² with 1m inter-row path way. The growth components and yield parameters measured were as follows:

- Plant height; the height of 5 tagged plants in each plot will be measured from the ground level to the tip of the plant using a meter rule at 6 and 9 weeks after sowing.
- Number of leaves per plant; these will be obtained by counting and recording the average of 5 tagged plants in each plot.
- Dry forage yield: Total fresh weight (TFW) of the material cut will be weighed immediately using

a hanging scale to determine the fresh forage yield. A sample of 150–200g fresh material (FWss) will be weighed, oven dried at 65°C for 48hrs and reweighed (DWss) to give an estimate of the dry-matter production during this period using the formula below by Tarawali *et al.*, 1995.

$$\text{Dry matter (kg/ha)} = \text{TFW} \times (\text{DWss} / \text{FWss}) \times 10$$

Where: TFW = total fresh weight from 1 m² in g

FWss = fresh weight of the subsample in g

DWss = dry weight of the subsample in g

Data on plant height, number of leaves and dry forage yield were collected and subjected to analysis of variance by using procedure of Statistical Analysis System (SAS, 2003).

RESULTS AND DISCUSSION

Table 1 shows that, at 6 WAS application of phosphorus (30kg/ha) produced the tallest plants than the other rates, but at 9 WAS application of 20kg/ha and 30kg/ha of phosphorus fertilizer significantly ($p < 0.05$) produced the longest lablab plants than the control. The effect of spacing on plant height shows that at 6 and 9 WAS, plant spacing of 30cm x 30cm produced the longest lablab plant, but statistically at par with application of phosphorus at 25cm x 30cm. The highest number of leaves of lablab was produced at 30kg/ha, but was statistically similar with application of 20kg/ha of phosphorus. Similarly, at 6 WAS, phosphorus fertilizer application rates at 30kg/ha statistically produced the higher dry forage yield of lablab, than at 0kg/ha and 20kg/ha. At 6 and 9 WAS, plant inter-row spacing of 20cm x 30cm produced the lowest dry matter yield of lablab plant. The results showed that plant height, number of leaves and dry matter yield significantly produced better results using phosphorus fertilizer rates at 20kg/ha and 30kg/ha. This might be related to plants having access to greater share of available nutrients (response to phosphorus) in the soil which resulted in improved growth performance. This is in consonance with the findings of Tanko *et al.*, (2013) in which they reported that plant height and dry matter yield of lablab was better at 30kg/ha phosphorus fertilizer rate. Plant inter-row spacing significantly affected the performance of lablab. Plant inter-row spacing of 30cm x 30cm from the research, significantly gave tallest plant, higher number of leaves and dry matter yield of lablab. This is in line with the findings of Ahmed *et al.* (1988) who stated that wider plant spacing in lablab, recorded the highest plant height.

Table 1: Effect of phosphorus fertilizer rates and inter-row spacing on plant height and number of leaves of Lablab at 3, 6 and 9 weeks after sowing

Treatment	Plant height (cm)		Number of leaves		Dry forage yield (kg/ha)	
	6 WAS	9 WAS	6 WAS	9 WAS	6 WAS	9 WAS
SSP kg/ha						
0	29.93 ^b	36.29 ^b	13.20 ^b	16.60 ^b	59.33 ^b	89.02 ^c
20	33.42 ^b	42.89 ^a	15.53 ^{ab}	17.53 ^{ab}	104.46 ^{ab}	156.72 ^b
30	37.32 ^a	43.79 ^a	16.60 ^a	18.93 ^a	163.06 ^a	244.60 ^a
SEM	3.88	5.58	3.01	9.00	72.87	12.63
Spacing (cm)						
20 x 30	28.27 ^b	34.72 ^b	14.80	16.67 ^b	39.95 ^c	59.93 ^c
25 x 30	32.74 ^{ab}	41.84 ^{ab}	14.30	18.27 ^{ab}	65.24 ^b	97.87 ^b
30 x 30	35.10 ^a	42.91 ^a	14.33	26.00 ^a	82.78 ^a	135.62 ^a
SEM	3.88	5.58	3.01	9.00	72.87	12.63

Means within a column of any set of treatment group with unlike letters are significantly different at ($p < 0.05$), SEM = Standard Error of Mean, WAS = Weeks after sowing.

CONCLUSION

Based on the findings of the study, farmers could plant lablab using 30kg/ha phosphorus fertilizer application rate at wider inter-row plant spacing of (30cm x 30cm) for better growth components and forage yield.

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