IJSAR ISSN: 2504-9070, Vol. 6, Issue. 1 2023 (www.ijsar.org)

HERBAGE YIELD OF LABLAB (*LABLAB PURPUREUS* L.) AS INFLUENCED BY SPACING AND ORGANIC MANURE APPLICATION

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ABSTRACT

The experiment was conducted to investigate the herbage yield of Lablab (*Lablab purpureus* L. Sweet) as influenced by spacing and different rates of poultry manure application.
The study was a 3x3 factorial experiment which comprised of three different intra and inter-row spacing (30cm x 30cm, 30cm x 60cm and 45cm x 45cm) and three rates of poultry manure application (0, 12 and 15t/ha) which were laid out in Randomized Completely Block Design (RCBD) and replicated three times. The parameters measured were Days to 50% germination, plant height, number of branches, leaf area and fresh weight at harvest.
Results obtained from the experiment showed that plant spacing of 30cm x 60cm and unamended plots recorded the shortest days to 50% germination; 6.78days and 6.67 days respectively. Plant spacing of 30cm x 60cm and poultry manure application rate at 12t/ha recorded highest values on parameters measured at harvest. Similarly, plant spacing of 30cm x 60cm produced the heaviest fresh weight (408.22g) while poultry manure application rate at 12t/ha produced the heaviest fresh weight (398.22g) of Lablab forage though not significantly different from other plant spacing and rates of poultry manure application. The interaction between Plant spacing and application rates (30cm x 60cm x 12t/ha) produced the heaviest fodder of (422.83g) which was significantly ($P<0.05$) heavier than 30cm x 30cm x 0t/ha.
From the result obtained, it can be concluded that plant spacing of 30cm x 60cm and poultry manure rate of 12t/ha influenced the herbage yield of Lablab positively and hereby recommend same to pasture growers.
Keywords: *Lablab purpureus*, spacing, rates, organic fertilizer, growth, herbage yield.

INTRODUCTION

Most African countries are presently in the midst of food crises (Omokanye, 2001). One of the ways of increasing livestock production in Nigeria is to increase the area and quality of legume-based pastures. Forage legumes in particular are used as green manure, cover crops and short-term pastures in rotation with cereal crops (Omokanye, 2001).

The problem of insufficient supply and poor quality of fodder for livestock production in Sub-Saharan Africa is partly responsible for the food insecurity prevalent in Africa. This has also led to security challenges been experienced in every part of the country as result of seasonal migration of herders which is a major cause of serious and often fatal communal clashes between traditional cattle herdsmen and native crop farmers.

In the Sudano – Sahelian region availability of nutritious feed (fodder) due to low and erratic rainfall and the long dry season extending from October to May (Sivakumar, 1990).

In the arid (North East) and semi – arid regions of this country, annual grasses that are the main source of nutrition for the ruminant populations grow within the three months rainy season; thus, decline in quantity and quality in less than half of the year. For most part of the year, the animals rely on crop residue and browse supplementation. According to Odunze *et al.* (2004), ruminant performance in Northern Guinea Savanna of Nigeria is affected by seasonal variation in the availability and quality pasture.

Improved live – weight gains have been reported on legumes (Thomas and Lascano, 1999). Supplementation of feeds with forage legumes encourages more roughage intake and digestion in sheep (Adu *et al.,* 1992). In Nigeria, traditional livestock rearing has been the specialized vocation of nomadic and transhumant pastoralists, therefore technological changes in livestock and feed production management strategies have been targeted at this group (Mohamed-Salim, 1992).

Good agronomic practices such as spacing, time of sowing and fertilizer application have been associated to high biological and economic yield potentials (Onwueme, 1990). Thus, it is important to determine the appropriate agronomic factors that optimize forage yield. Sheaffer *et al*. (2001).

To increase forage yield and improve quality to cope with high demand of the livestock feed, proper cultural practices such as spacing and optimum application rates of organic manure must be determined. Therefore, the objective of this study was to investigate the influence of different spacing and rates of organic manure on growth and herbage yield of Lablab.

MATERIALS AND METHODS

Field experiment was conducted during 2022 cropping season at Experimental Farm of Federal College Animal Health and Production Technology, National Veterinary Research Institute (NVRI), Vom, Plateau State. Vom covers an area of 5,104[2] kilometers and is located between latitude 9º 46 to 9º 77' N, and longitude 8º 48 to 8º 80' E. It has an area of 510 km² and a population of 306,716 (NPC, 2006).

The experimental design used for the experiment was a 3X3 factorial, laid out in Randomized Completely Block Design (RCBD) with three replications. Factor A comprised of three plant spacing (30cm X 30cm, 30cm X 60cm and 45cmX45cm) while Factor B comprised of three organic manure rates (0, 12 and 15 tons/ha) which made up nine treatment combinations.

The land was ploughed and twenty-seven seedbeds prepared with African dwarf hoe with each measured 2m x2m. poultry manure at the rates of (0, 12 and 15 tons/ha) were incorporated immediately into the soil after seedbed preparation. A variety of *Lablab* Rongai White was obtained from Dagwom Farm, of NVRI, K-Vom, Plateau

State. Two seeds were planted at the spacing of (30cm X 30cm, 30cm X 60cm and 45cmX45cm) according to the treatments. Manual weeding was adopted and carried out at three and six weeks after sowing.

Data on growth parameters (Plant height, Number of branches, Leaf area) were recorded at two, four, six, eight, 10 and 12 weeks after planting (WAP). Four randomly selected plants were tagged for measurement of growth parameters in the subsequent weeks of investigation.

Days to 50% germination was recorded when half of total number of seeds on a plot germinated. The herbage yield was determined by cutting the plant at the height of 5cm above ground level and weighed for the yield determination at 12 weeks after planting.

Data collected were subjected to Analysis of Variance (ANOVA) using DSAASTAT, Ver.1.101 add- in version 2011 (Onofri, 2007) and the significant means were separated using Least Significant Difference (LSD) at 5% level of probability.

RESULTS AND DISCUSSION

Days to 50% Germination

Days to 50% germination as influenced by different plant spacing was presented in Table 1. The table showed that plant spacing did not influence ($p<0.05$) Days to 50% germination of Lablab seeds. Though 30cm x 60cm germinated earlier (6.78 days) but it was not significantly different ($p<0.05$) from other spacing.

Table 1 also showed that manure application did not influence ($p<0.05$) Days to 50% germination of Lablab seeds. Though unamended plots (0 ton/ha) germinated earlier (6.67 days) but it was not significantly ($p<0.05$) different from others.

Plant Height

Spacing influenced ($p<0.05$) the plant height at four weeks after planting only (Table 1). 30cm x 30cm recorded the tallest plant height (17.83cm) while 45cm x 45cm recorded the least height (15.94cm).

Manure application influenced ($p<0.05$) the plant height at two, four, 10 and 12 WAP (table1). Unamended plots recorded the tallest plant at two WAP (5.17cm), while 15 tons/ha recorded the tallest plants at 10 (138.11cm) and 12 WAP (168.11cm), and it was significantly ($p<0.05$) taller than 0 ton/ha.

Number of branches

Spacing did not influence ($p<0.05$) branch proliferation on Lablab at 2, 4, 6, 8 10 and 12 WAP while application of poultry manure influenced ($p<0.05$) branch proliferation on Lablab at 10 and 12 WAP only (Table 2). Application rate of poultry manure at 15 tons/ha recorded the highest number of branches at 10 (20.22) and 12 (22.22) WAP, while unamended plots (0 ton/ha) recorded the lowest number of branches at 10 (18.22) and 12 (21.22) WAP.

Leaf Area

Spacing also did not influence Leaf Area at two, four, Eight, 10 and 12 except at six WAP (Table 2). Plant spacing at 45cm x 45cm recorded the widest Leaf area at four WAP which was significantly ($p<0.05$) wider than 30cm x 30cm. Spacing at 30 cm x 30cm recorded the widest leaf area, while 45cm x 45cm recorded the least leaf area at two and four WAP. Spacing at 30cm x 60cm recorded the largest leaf area while 30cm x 30cm recorded the least leaf area at eight, 10 and 12 WAP respectively.

Poultry manure application did not influence Leaf Area at two, six, Eight, 10 and 12 except at four WAP where 12 tons/ha recorded the largest leaf area which was significantly ($p<0.05$) wider than unamended (0 ton/ha) (Table 2).

Fresh Weight

Spacing and organic manure application did not influence herbage yield of Lablab harvested at 12 WAP (Table 3). Plant spacing of 30cm X 60cm recorded the

heaviest fresh weight while application rate at 12t/ha recorded the heaviest fresh weight at harvest. However, there was no significant ($P<0.05$) difference as a result of different plant spacing and manure application rates.

Interaction between spacing and manure application rates influenced fresh weight of harvested Lablab (Table 4). Treatment combination of 30cm X 60cm and 12t/ha recorded the heaviest fresh herbage harvested at 12 WAP. It was not significantly ($P<0.05$) heavier than other treatment combinations except 30cm X 30cm and 0t/ha.

Table 1: Effect of Spacing and Organic Manure Application Rates on Days to 50% Germination and Plant Height of Lablab at 2, 4, 6, 8, 10 and 12 Weeks after Planting.

Spacing	Days to Germination	PH (2 Wks)	PH (4 Wks)	PH (6 Wks)	PH (8 Wks)	PH (10 Wks)	PH (12 Wks)
30cm X 30cm	6.89^{ns}	4.83^{ns}	17.83	68.11	101.11^{ns}	133.78^{ns}	163.78^{ns}
30cm X 60cm	6.78^{ns}	4.89	16.39*	61.00^{ns}	103.78^{ns}	134.28	164.39
45cm X 45cm	7.11	4.61^{ns}	15.94*	65.00^{ns}	104.22	133.72^{ns}	163.78^{ns}
Mean	6.93	4.78	16.72	64.70	103.04	133.93	163.98
LSD (P<0.05)	**0.73**	**0.44**	**1.12**	**8.71**	**6.28**	**3.78**	**3.80**
Rates (t/ha)							
0tons	6.67	5.17	16.39^{ns}	65.44^{ns}	101.28^{ns}	127.67*	157.67*
12tons	7.33^{ns}	4.56*	17.17	62.61^{ns}	102.39^{ns}	136.00^{ns}	166.17^{ns}
15tons	6.78^{ns}	4.61*	16.61^{ns}	66.06	105.44	138.11	168.11
Mean	6.93	4.78	16.72	64.70	103.04	133.93	163.98
LSD (P<0.05)	**0.76**	**0.44**	**1.12**	**8.71**	**6.28**	**3.78**	**3.80**

Table 2: Effect of Spacing and Organic Manure Application rates on Number of Branches and Leaf Area (cm) of Lablab at 2, 4, 6, 8, 10 and 12 Weeks after Planting.

Spacing (cm)	NB 2	NB 4	NB 6	NB 8	NB 10	NB 12	LA 2	LA 4	LA 6	LA 8	LA 10	LA 12
30cm X 30cm	0.00	6.06	11.11^{ns}	16.56	19.28^{ns}	21.28^{ns}	104.89	126.39	223.67*	312.44^{ns}	348.83^{ns}	386.06^{ns}
30cm X 60cm	0.00	5.78^{ns}	11.00^{ns}	15.78^{ns}	19.83	21.83	97.11^{ns}	126.28^{ns}	235.94^{ns}	332.22	368.78	408.22
45cm X 45cm	0.00	5.89^{ns}	11.17	16.28^{ns}	19.28^{ns}	21.28^{ns}	98.00^{ns}	117.28^{ns}	238.06	313.39^{ns}	349.83^{ns}	388.28^{ns}
LSD (P<0.05)	0.00	0.89	1.68	1.14	0.81	0.82	19.35	17.25	12.99	20.57	22.30	24.03
Rates (t/ha)												
0tons	0.00	5.78^{ns}	11.33	16.33	18.22*	21.22*	102.61^{ns}	114.67*	236.00^{ns}	315.61^{ns}	351.17^{ns}	388.50^{ns}
12tons	0.00	6.17^{ns}	10.89^{ns}	16.23^{ns}	19.94^{ns}	21.94^{ns}	107.17	138.44	224.89^{ns}	322.28	359.28	398.22
15tons	0.00	5.78	11.06^{ns}	16.00^{ns}	20.22	22.22	90.22^{ns}	116.83*	236.78	320.17^{ns}	357.00^{ns}	395.83^{ns}
LSD (P<0.05)	0.00	0.89	1.68	1.14	0.81	0.81	19.35	17.25	12.99	20.57	22.30	24.03

Table 3: Effect of Spacing and Rates of Organic Manure Application on the Fresh Weight (g) of Lablab Harvested At 12 Weeks after Planting.

Treatments	Fresh weight (g)
Spacing (cm)	
30cm X 30cm	386.06^{ns}
30cm X 60cm	408.22
45cm X 45cm	388.28^{ns}
LSD (P<0.05)	**24.03**
Organic Manure Rates (t/ha)	

0t/ha	388.50^{ns}
12t/ha	398.22
15t/ha	395.83^{ns}
LSD (P<0.05)	**24.03**

Table 4. Interaction between spacing and manure application rate on the Fresh Weight (g) of Lablab Harvested At 12 Weeks after Planting.

Treatment combination	Fresh weight (g)
30cm X 30cm X 0t	379.50*
30cm X 30cm X 12t	386.16^{ns}
30cm X 30cm X 15t	392.50^{ns}
30cm X 60cm X 0t	396.50^{ns}
30cm X 60cm X 12t	422.83
30cm X 60cm X 15t	405.33^{ns}

45cm X 45cm X 0t	389.50^{ns}
45cm X 45cm X 12t	385.67^{ns}
45cm X 45cm X 15t	389.67^{ns}
LSD (P<0.05)	**41.62**

Discussion

Different plant spacing did not have any significant effect on the days to 50% germination and plant height of Lablab throughout the period of study except at four weeks after planting where 30cm X 30cm produce the tallest plant.

Different plant spacing also did not have significant effect on the numbers of branches and leaf area of Lablab throughout the period of the study except at six weeks after planting where 45cm X 45cm recorded the highest value on leaf area of Lablab only. This result disagrees with the findings of Tanko *et al.,* 2013 and Malani and Sama'ila (2012), who reported the highest stand count at closer intra row spacing and fewer stand count at wider intra row spacing of cowpea grown in the same environment.

The finding on plant height was in agreement with Tanko *et al.,* 2013 who reported that different intra row spacing had no significant ($P<0.05$) on the plant heights and leaf area of Lablab planted in two-two seasons.

Applications of poultry manure at the rate of 15t/ha recorded the highest values on the Lablab height from week six to week twelve. This may be attributed to the enhanced availability and uptake of nutrients by plants fertilized with the highest organic manure rate. This agrees with Patil *et al.,* (1995) who reported that there was significant increase growth and reproductive parameters under higher fertilizer levels in French beans and Lablab bean respectively.

The wider spacing at 30cm X 60cm poultry manure rate at 12t/ha recorded the highest value in fresh weight of Lablab at harvest. This agrees with the findings of Shrikanth *et al.,* (2008) who reported higher number of pods and harvest index were seen in the plants at wider spacing (60cm X 15cm), than those at closer spacing (45cm X 15cm)

The application of poultry manure at the rate of 12t/ha recorded the heaviest herbage yield at harvest, more than the plots that received 15t/ha. This suggests that 12t/ha is the optimum poultry manure rate for Lablab production. These finding disagrees with Amodu *et al.,* (2004) who observed an increase in forage yield as the poultry manure rates increases.

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