FORAGE YIELD AND QUALITY OF WHITE LABLAB (*Lablab purpureus* L. Sweet) AS INFLUENCED BY INTRA-ROW SPACING AND CUTTING AGE

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ABSTRACT

The study investigated the forage yield and quality of white lablab as influenced by intra-row spacing and cutting age. The treatment was laid down in a factorial randomized complete block design with intra-row spacing (30, 60 and 90 cm) as the first factor and cutting age (6, 9 and 12 weeks after sowing (WAS) as the second factor which was replicated three times. Higher ($P<0.05$) FFY and DFY were obtained at 90cm and 12WAS, respectively. Higher ($P<0.05$), DM and NFE were recorded at 90cm while higher ($P<0.05$) CP, EE and ash were recorded at 30cm. For cutting age, higher ($P<0.05$) DM, ash and NFE were recorded for white lablab forage harvested at 12WAS while crude protein and ether extract were higher ($P<0.05$) for white lablab forage harvested at 6WAS. NDF, ADF, cellulose and lignin were higher ($P<0.05$) at 30cm while hemicellulose was higher ($P<0.05$) at 90cm. NDF, ADF, cellulose and lignin were higher ($P<0.05$) for forage harvested at 6WAS while hemicellulose was higher ($P<0.05$) for forage harvested at 12 WAS. There was non-significant ($P>0.05$) interaction effect between intra-row spacing and cutting age on FFY and DFY, proximate and fibre fractions of white lablab. Results suggest that white lablab should be planted at 90cm while harvesting should be delayed to12WAS for higher FFY and DFY and better quality.

Keywords: **Cutting age, Forage yield, Intra-row spacing, Lablab and Quality**

INTRODUCTION

The low quantity and quality of available forage during the dry seasons are major constraints to efficient livestock production in Nigeria and other tropical countries (Ogedegbe *et al*., 2011; Hassan *et al*., 2014). This is causing a serious problem in the livestock industry which calls for intervention from the stakeholders. Introduced forage legumes with good quality can be used to correct this livestock feed deficit experienced in the semi-arid zone with its large livestock population (Amodu *et al*., 2005). Tropical forage legumes have been used to enhance soil fertility thereby providing the much-needed livestock feed (Tarawali *et al*., 1999). Lablab (*Lablab purpureus*) has been reported to be a promising crop in the Northern Guinea, Sudan and Sahel savannas by several researchers (Ewansiha *et al*., 2007; Ogedegbe *et al*., 2011; Hassan *et al*., 2014; Tanko, 2014; Girgiri *et al*., 2019). The introduction and use of herbaceous legume has contributed to agricultural intensification, especially in the context of sustainable crop and livestock production system, which mitigate the recurrent shortage of forage and lowered productivity of ruminants during the dry season (Ewansiha *et al*., 2007; Hassan *et al*., 2014; Tanko, 2014). The objective of this study was to determine the effect of intra-row spacing and cutting age on forage yield and quality of *Lablab purpureus* (L) sweet.

MATERIALS AND METHODS

The study was carried out during 2021 rainy season at the Pasture Experimental Field of the Teaching and Research Farm, Department of Animal Science, University of Maiduguri, Maiduguri, Borno State. The treatment was laid down in a factorial randomized complete block design with intra-row spacing (30, 60 and 90 cm) as the first factor and cutting age (6, 9 and 12 weeks after sowing (WAS)) as the second factor which was replicated three times. The plot size was 3m x 3m with 1m between and within plots totaling 11m x 11m (121 m^2). White Lablab seeds were obtained from the National Animal Production Research Institute (NAPRI), Shika, Zaria. No fertilizer was added and weeding of the experimental plots was done when the need arises. *Forage yield* was determined at the cutting ages by harvesting the fresh forage within each plot in a $1m^2$ quadrat at 1cm above the ground using a hand sickle. The total fresh forage of samples were weighed in the field using a sensitive weighing scale and sub-samples were shade-dried at room temperature for 48 - 72 hours and reweighed to estimate dry matter yield. Dry matter production was calculated as: (Total FW x (DWss/FWss)) x 10 = Dry matter kg/ha. (Tarawali *et al.*, 1995) where: Total FW = Total fresh weight from 1 m^2 in (g);DWss = Dry weight of the sub-sample in (g); FWss = Fresh weight of the sub-sample in (g). Proximate composition was determined according to AOAC (2005). Nitrogen free extract was calculated as % NFE = %100 - (% CP + % Ash + % EE + % CF). Fibre fraction was determined with the procedure of van Soest *et al*. (1991). All data obtained were subjected to the analysis of variance using SAS (2002) while significant means were separated using Duncan's Multiple Range Test (Duncan, 1955).

RESULTS AND DISCUSSION

The effect of intra-row spacing on fresh and dry forage yields was highly significant ($P<0.05$) (Table 1). Higher ($P<0.05$) fresh and dry forage yields obtained at 90cm intra-row spacing could be attributed to the available space which helps reduced competition for environmental resources resulting in more vegetative growth of the stands. Fresh and dry forage yields increased as cutting was delayed from 6WAS to 12WAS (Table 1). This may be ascribed to cumulative dry matter production for the 12 weeks of continuous vegetative production and lignification as the material matures. This agrees with the findings of Ogedegbe (2011) that lablab yield increased with increase in cutting age. However, fresh and dry forage yields recorded in this study is much lower than yields reported by Girgiri *et al*. (2019), Ogedegbe (2011) and Shehu (1994) respectively in semi-arid region and Bauchi, Nigeria. These variations may be due to differences in rainfall pattern, soil fertility and other environmental resources.

Table 1: Fresh forage and dry forage yields of White Lablab as influenced by intra-row spacing and cutting age

Treatments	Fresh Forage Yield (t/ha)	Dry Forage Yield (t/ha)
Intra-row Spacing (cm)		
30	0.65^{ab}	0.12^{b}
60	0.55^{b}	0.15^{ab}
90	0.78^{a}	0.18^{a}
SEM	0.09*	0.02*
Cutting Age (WAS)		
6	0.30^{c}	0.07^{c}
9	0.62^{b}	0.14^{b}
12	1.07^{a}	0.23^{a}
SEM	0.09*	0.02*
Interaction		
S x C	0.521	0.231

^{abc}= Means within rows with different superscripts differed significantly ($P<0.05$), SEM = Standard error of mean, WAS = Weeks after sowing, S = intra-row spacing, C = cutting age

The proximate composition of white lablab forage as influenced by intra-row spacing and cutting age is shown in Table 2. Proximate composition gives a measure of the nutritive value of a feedstuff or feed ingredients. Significantly ($P<0.05$) higher dry matter content was recorded at 90cm and 60cm intra-row spacing. This could be due to the wider spacing between the stands which afforded them access to more environmental resources resulting in higher accumulation of dry matter. Crude protein and ether extract decreased with advancement in cutting age while dry matter and ash increases when cutting age is delayed. It has been established that as plant material advance in age, the crude protein and the ether extract contents decrease while the fibre and ash content increases due to lignification of the material. The higher ($P<0.05$) crude protein, ether extract and ash values obtained for lablab forage in this study indicates that it can meet the requirements of ruminant animals for such nutrients. The value of crude protein content recorded here is within the range of values reported by Mbahi *et al.* (2006). Ash content was higher than 6.66% reported by Nworgu and Ajayi (2005) but within the range of l0.88 to 13.04% reported by Bah *et al.* (2020). Ether extract content of lablab in this study is higher than 4.02% reported by Nworgu and Ajayi (2005) and 5.51 to 7.56 % reported by Bah *et al*. (2020). These variations could be as a result of different cultivars on different soils with various rainfalls ranges and the stage of maturity (Girgiri *et al*. 2019).

Table 2: Proximate composition of White Lablab forage as influenced by intra-row spacing and cutting age

	Proximate Composition (%)				
Treatments	Dry Matter	Crude Protein	Ether Extract	Ash	Nitrogen Free Extract
Intra-row Spacing (cm)					
30	93.85^{b}	14.70^{a}	8.13^{a}	11.82^{a}	35.88^{b}
60	94.61^{a}	14.10^{a}	7.37^{b}	10.25^{b}	41.66^{a}
90	94.67^{a}	12.87^{b}	7.05^{b}	10.15^{b}	44.37^{a}
SEM	0.23*	0.34*	0.25*	0.48*	2.01*
Cutting Age (WAS)					
6	93.96^{c}	18.63^{a}	8.17^{a}	9.72^{b}	34.45^{b}
9	94.30^{b}	11.57^{b}	7.08^{b}	10.92^{ab}	44.57^{a}
12	94.87^{a}	11.46^{b}	7.30^{b}	11.56^{a}	42.89^{a}
SEM	0.23*	0.34*	0.25*	0.48*	2.01*
Interaction					

S x C	0.434	0.435	0.546	0.546	0.632

[abc]= Means within rows with different superscripts differed significantly (P<0.05), SEM = Standard error of mean, WAS = Weeks after sowing, S = intra-row spacing, C = cutting age

Fibre fractions of white lablab forage as influenced by intra-row spacing and cutting age is presented in Table 3. The results showed significant differences in the fibre content of the different treatments. Fibre fractions are used in assessing the nutritive value of roughages. Neutral detergent fibre, acid detergent fibre, hemicellulose and cellulose aid in giving an idea about the digestibility of the forage while lignin is the non-digestible component of a fibre. The variation obtained in this study might be attributed to stage of harvest and other environmental conditions. The values of NDF obtained in this study were below the values reported by Hassan *et al*. (2014) while the ADF values were within and slightly above the values reported by Hassan *et al*. (2014) at different ages of cutting.

Table 23: Fibre fractions of White Lablab forage as influenced by intra-row spacing and cutting age

Treatments	*Fibre Fractions (%)*				
	Neutral Detergent Fibre	Acid Detergent Fibre	Hemicellulose	Cellulose	Lignin
Intra-row Spacing (cm)					
30	24.80[a]	22.86[a]	7.17[b]	7.52[a]	7.75[a]
60	24.25[b]	20.81[b]	8.33[a]	6.85[b]	7.06[b]
90	23.93[b]	19.84[b]	8.87[a]	6.53[b]	6.73[b]
SEM	0.21*	0.72*	0.40*	0.24*	0.24*
Cutting Age (WAS)					
6	25.18[a]	23.43[a]	6.90[b]	7.71[a]	7.94[a]
9	23.83[b]	19.74[b]	8.91[a]	6.50[b]	6.70[b]
12	23.97[b]	20.34[b]	8.58[a]	6.70[b]	6.90[b]
SEM	0.21*	0.72*	0.40*	0.24*	0.24*
Interaction					
S x C	0.435	0.534	0.452	0.521	0.463

[abc]= Means within rows with different superscripts differed significantly (P<0.05), SEM = Standard error of mean, WAS = Weeks after sowing, S = intra-row spacing, C = cutting age

CONCLUSION/RECOMMENDATION

It was concluded that 90cm intra-row gave higher fresh and dry forage yields while optimum crude protein was recorded at 12WAS. It is therefore recommended that white lablab should be planted at 90cm intra-row spacing and should be harvested at 12WAS so as to optimize fresh and dry forage yields and quality.

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