



RELATIONSHIP BETWEEN GROWTH AND YIELD CHARACTERS AND THEIR INFLUENCE ON YIELD OF LABLAB (*LABLAB PURPUREUS* L. WALP) VARIETIES GROWN AT DIFFERENT PHOSPHORUS LEVELS AND SOWING DATES IN HADEJIA JIGAWA STATE, NIGERIA

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ABSTRACT

Field experiment was conducted during the 2025 cropping seasons at the Binyaminu Usman Polytechnic, Hadejia Jigawa State, Nigeria to determine the relationship between growth and yield characters on yield of lablab varieties grown under different phosphorus levels and sowing dates. The treatments consisted of four levels of phosphorous (0, 20, 40 and 60 kg/ha), two local varieties of lablab (Dan Inusa and Dan Farankachi) and three sowing dates (1st, 15th and 29th of July). The experiment was laid out in a Randomized Complete Block Design (RCBD) replicated three times. Growth and yield characters were measured and correlation analysis was done. Results indicated that 60 Kg P/ha produced highest seed yield. Sowing on 29th of July had highest yield and Variety Dan Inusa out yielded the other variety. The results also showed that most of the growth and yield components had significant positive correlation with yield. However, crop growth rate was observed to have significant negative correlation with the crop yield. It could be recommended that most of the growth and yield parameters were good yield contributing characters.

Keywords: Growth, Yield, Characters. Phosphorous

INTRODUCTION

Hyacinth bean (*Lablab purpureus* (L.) Sweet) is a prehistoric crop widely grown in the tropics and subtropics mostly in mixed crop-livestock systems (Kimani *et al.*, 2012). It is broadly distributed and domesticated in Africa, the Indian subcontinent and Southeast Asia as a grain legume and vegetable (Bryegowda *et al.*, 2015). In Africa, the lablab bean is mostly grown and adapted as a pulse crop (Ewansiha *et al.*, 2007; Lablab, 2013). As an indigenous leguminous cover crop in Africa that once fed much of the continent, largely through household garden production by women (Bryegowda *et al.*, 2015), however, values for the crop was lost to most of Africa during the colonial era when farmers were encouraged, or forced, to grow maize and common beans intended for export markets. Lablab is one of the most ancient crops among cultivated plants (Bryegowda *et al.*, 2015). The study was therefore carried out investigate on the relationship between growth and yield characters on yield of lablab varieties under different phosphorous rates.

MATERIALS AND METHOD

Study Area

Field experiment was conducted during the 2025 cropping seasons at Yamidi (Old site) and Mawadachi (New site) of the Binyaminu Usman Polytechnic, Hadejia Jigawa State, in the semi-arid zone of Nigeria.. The soil of the experimental sites was sandy loam. The rainfall distribution pattern is unimodal. It starts in June and ends in October with a mean annual rainfall of about 400 – 800 mm.

Treatments and Experimental Design

Treatments consisted of factorial combinations of four levels of phosphorous (0, 20, 40 and 60), two local varieties of lablab (*Dan Inusa* and *Dan Farankachi*) and three dates of sowing (1st, 15th and 29th of July) laid out in a Randomized Complete Block Design (RCBD) replicated three times.



Planting and Spacing

The seeds of lablab varieties were obtained from the farmers of the research area and sown according to the treatment in all cropping seasons. Two seeds were sown per mound at a depth of 3 - 4 cm and 100 cm apart at a plant-to plant spacing of 50 cm within a row. Urea at the rate 20 kg/ha was applied as a starter dose to all the plots while P₂O₅ was applied as per treatment (0, 20, 40, and 60 kg P₂O₅ ha⁻¹). Glyphosate (1.8 kg/ha) was applied before land preparation, while hoe weeding was carried out at 6WAS, supplementary hand pulling was carried out for undesirable weed species that grew above the canopy.

Data Collection

Soil properties were analyzed before the experiment. Data were taken four weeks after sowing for Plant height, number of branches, leaf area index and number of nodes per plant, number of pods per plant, pod length, pod width, phosphorus uptake, number of seed per pod, hundred seed weight, pod yield and seed yield were taken at maturity and after harvest.

Data Analysis

All data collected were subjected to Analysis of Variance (ANOVA) following the procedure for experimental design in Randomized Complete Block Design (RCBD) using the GENSTAT (2016) statistical software package. Mean separation was done using the Least Significant Difference (LSD) at a 5% probability level.

RESULT AND DISCUSSION

The Physico-chemical Properties of the soil prior to commencement of the experiment is presented in Table 1. Soil textural class ranged between sandy to loam, slightly acidic, with low Organic Carbon, Total Nitrogen, available Phosphorus and low Exchangeable bases irrespective of the seasons and depth were relatively low (Table 1). It can be inferred from the result that the soil is low in fertility and could respond well to soil amendment which will in turn boost the production of Hyacinth bean in the region. The performance of lablab was significantly increased by the application of 60 kg/ha of phosphorus. Planting on the 29th of July significantly produced higher seed yield than the other sowing dates. Variety Dan Inusa out yielded the other variety in both locations of the experiment (Table 2).

Table 3 shows the combined correlation indicating relationship between growth and yield characters and seed yield of lablab in both locations. Plant height, number of branches, leaf area index, number of nodes per plant, number of pods per plant, pod length, pod width, phosphorus uptake, number of seed per pod, hundred seed weight and pod yield had a highly significant positive correlation of 0.601**, 0.532**, 0.554**, 0.659**, 0.694**, 0.409**, 0.654**, 0.763**, 0.500**, 0.654** and 0.624**, respectively to seed yield. Crop growth rate had a significant negative correlation of -0.554** to seed yield.

A multiple regression analysis was also conducted to examine the extent of the relationship between yield and other yield characters as summarized in Table 4. The results obtained in both locations on plant height, number of branches, leaf area index, number of pods per plant, number of nodules per plant and pod yield per plant, with coefficient of determination that shows number of pods per plant added significantly ($P \leq 0.01$) to seed yield of the crop.

The highly significant correlation of plant height, number of branches, leaf area number of nodules per plant, number of pods per plant, pod length, pod width, phosphorus uptake, number of seed per pod, 100 seed weight and pod yield per hectare to seed yield might be contributed to the longer pod with higher seed yield. The result is in line with the earlier report of Yahaya *et al.* (2005) that pod length of cowpea was positively and significantly correlated with green pod yield. The highly significant positive correlation of plant height to seed yield may be attributed to the higher the plant height with number of leaves formed which may in turn increased Leaf Area Index (LAI); since photosynthetic area increased dry matter accumulation hence increased assimilates which then partitioned to the sink (seed).

The highly significant positive relationship of number of branches to seed yield might be due to the fact that increase in branches may mean higher number of leaves which resulted to higher



accumulation of photo-assimilates and hence higher vegetative production at the expense of yield. Pod width was significantly and positively correlated with number of seed per pod this indicating dependence of these characters on each other, and similar findings were reported by Adak and Kibritc (2016) for pod length. CGR was non significantly and positively correlated with seed yield. Similar results were reported by number of seeds per pod; Desai *et al.* (1996); Adak and Kibritc (2016). It could therefore be concluded that most of the growth and yield characters measured performed better at 60kg/ha application rate of Phosphorous and on crops planted towards ending of July. From the forgoing, it can thus be suggested for recommendation that Hyacinth bean being a grain legume be cultivated towards ending of July when the rains have stabilized and with fertilizer application rate of 60 kg/ha single super phosphate for enhanced pod and seed formation to meet the protein needs of the populace in Ringim and environs.

Table 1: Physical and Chemical Properties of soil from two depths [0-15cm and 15-30cm] of the experimental fields during 2025 cropping seasons at Hadejia

	Yamidi (Old site)		Mawadachi (New site)	
	0-15cm	15-30cm	0-15cm	15-30cm
Particle Size Distribution				
Sand (%)	46	56.8	61.4	59.7
Silt (%)	25.9	28.4	26.0	25.4
Clay (%)	12.2	14.8	13.6	14.9
Textural class	Sandy-Loam		Sandy-Loam	
Chemical Composition				
pH in H ₂ O (1:2:50)	5.90	5.50	5.00	5.60
pH in 0.01M CaCl ₂ (1:2:50)	5.10	4.80	4.90	4.80
Organic Carbon (gkg ⁻¹)	7.5	3.9	4.3	3.7
Total Nitrogen (gkg ⁻¹)	0.6	0.4	0.7	0.5
Available phosphorus (mg kg ⁻¹)	5.37	4.38	5.72	4.63
Exchange bases {Cmol kg⁻¹}				
Ca	3.61	2.26	2.70	2.00
Mg	1.02	0.87	0.74	0.44
Na	0.11	0.10	0.16	0.14
CEC	5.10	4.70	5.20	4.50



Table 2: Effect of Sowing Date and Phosphorus Level on Seed Yield per Hectare of Lablab Varieties at Yamidi and Mawadachi in 2025 Wet Seasons at Hadejia

Treatments	Yamidi	Mawadachi
Phosphorus Levels (kg/ha)		
0	2.4772d	2.611d
20	2.5983c	2.939c
40	3.1222b	3.179a
60	3.1939a	3.017b
Level of Probability	**	**
SE±	0.014	0.021
Sowing Dates		
1st July	2.8162b	2.949
15th July	2.8717a	2.932
29th July	2.85558a	2.929
Level of Probability	**	NS
SE±	0.011	0.017
Varieties		
<i>Dan Farankachi</i>	2.760b	2.789b
<i>Dan Inusa</i>	2.9353a	3.084a
Level of Probability	**	**
SE±	0.098	0.015
Interactions		
P*S	NS	**
P*V	NS	**
S*V	NS	NS
P*S*V	NS	**

Means in the same column followed by the same letter (s) are not significantly different at 5% level of probability using Duncan's Multiple Range Test (DMRT).



Table 3: Relationship between Growth, and Yield Characters to Grain Yield of Lablab

	ST	PT	SW	NS	PU	PW	PL	NP	ND	CG	LA	NB	PH
ST	1												
PT	0.624**	1											
SW	0.654**	0.697**	1										
NS	0.500**	0.466**	0.482**	1									
PU	0.763**	0.750**	0.750**	0.550*	1								
PW	0.654**	0.517**	0.420**	0.230*	0.392**	1							
PL	0.409**	0.450**	0.320**	0.228**	0.357**	0.662**	1						
NP	0.694**	0.622**	0.651**	0.436**	0.758**	0.399**	0.330**	1					
ND	0.659**	0.663**	0.704**	0.467**	0.737**	0.378**	0.224*	0.611**	1				
CG	-0.554**	-0.592**	-0.567**	-0.389**	-0.688**	-0.317**	-0.292**	-0.561**	-0.579**	1			
LA	0.554**	0.533**	0.539**	0.237*	0.558**	0.290*	0.185ns	0.621**	0.628**	-0.413**	1		
NB	0.532**	0.510**	0.541**	0.404**	0.605**	0.148*	0.075ns	0.578**	0.579**	-0.461**	0.501**	1	
PH	0.601**	0.516**	0.589**	0.351**	0.671**	0.179ns	0.170*	0.574**	0.590**	-0.511**	0.527**	0.620**	1

ST= Seed Yield per Hectare. PT=Pod Yield per Hectare. SW= Hundred Seed Weight. NS= Number of Seed per Pod. PU=Phosphorus Uptake. PW= Pod Width. PL= Pod Length. NP=Number of Pod per Plant. ND= Number of Nodes per Plant. CG= Crop Growth Rate. LA=Leaf Area Index. NB=Number of Branches. PH= Plant Height. * = significant at 5% level. ** = highly significant at 1% level. ns = not significant.



CONCLUSION AND RECOMMENDATION

The performance of lablab was significantly increased by the application of 60 kg/ha of phosphorus. Planting on the 29th of July significantly produced higher seed yield than the other sowing dates. Variety Dan Inusa out yielded the other variety in both locations of the experiment and is therefore recommended for the study area.

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