

EFFECTS OF PHOSPHORUS RATES ON THE GROWTH AND YIELD OF *MUCUNA FLAGELLIPES* (VOGEL EX HOOK) IN OBUBRA CROSS RIVER STATE, NIGERIA

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ABSTRACT

Two field experiments were conducted during the 2004 and 2005 cropping seasons at the teaching and research farm of the Department of Agronomy, Obubra Campus, Cross River University of Technology to study the effects of phosphorus on the growth and yield of *Mucuna flagellipes* (Vogel ex Hook). The experiment comprised nine treatments of single super phosphate (0-18-0) fertilizer rates at 0kg/ha, 15kg/ha, 20kg/ha, 25kg/ha, 30kg/ha, 35kg/ha, 40kg/ha, 45kg/ha and 50kg/ha, laid out in a Randomized Complete Block Design (RCBD) with three replications. Results showed that the application of phosphorus significantly improved the growth and yield of *Mucuna flagellipes*. The successive increases in phosphorus rate produced an increase in vegetative growth measured as the number of leaves and branches per plant, and plant height. Phosphorus at 40 kg/ha and 45kg/ha produced significantly higher pods and seed weight per plot and per hectare than the lower rates. The highest seed weight of 3.85 t/ha and 3.90 t/ha were obtained from the plots that had 45kg/ha of phosphorus fertilizer in both 2004 and 2005 cropping seasons.

KEYWORDS: *Mucuna flagellipes*, Phosphorus, growth, yield

INTRODUCTION

Mucuna flagellipes (Vogel ex Hook) is a legume that belongs to the sub-family papilionoideae and has been described as a climbing perennial herb with compound trifoliate leaves (Anonymous 1979).

Mucuna flagellipes is one of the less known legumes but rich in edible oils, fats, protein and minerals (Odelele 1983, Okoro 1998, Eyiuche 1988).

The seeds are used in soup preparation where it serves as a condiment and soup thickener. In pharmaceutical industry, the gum is used as a binder in formulation of ephedrine hydrochloric tablet (Okoro 1998 and Eyiuche 1988). Despite the high economic importance of *Mucuna flagellipes*, it is grown only at a sub-subsistence level. There is paucity of literature on the growth of the crop in a commercial quantity.

Phosphorus is an essential plant nutrient, which promotes growth and yield of most legumes. Literatures show that the application of phosphorus increases the growth and yield of legumes (Omueti, 1995, Sharma 1996, and Singh 1994). Generally, literature on the use of phosphorus in the cultivation of *Mucuna flagellipes* in Obubra is lacking.

The objectives of this study were to evaluate the effects of phosphorus on the vegetative growth of *Mucuna flagellipes* and determine the rate of phosphorus fertilizer that will give optimum yield of *Mucuna flagellipes* in Obubra agro-ecological zone.

MATERIALS AND METHODS

Two field experiments were conducted in the Teaching and Research Farm of the Department of Agronomy, Obubra Campus, Cross River University of Technology, Cross River State during the 2004/2005 cropping seasons.

The experimental site was cleared, ploughed and ridged on 10th April, 2004. The field was marked out into three blocks. Each block was further divided into nine plots of 3 x 2 metres which were separated by 0.5 meters. Mature seeds of *Mucuna flagellipes* were collected from Ikom market and planted on 20th April, 2004. The planting distance was 0.7 x 0.8 metres within and between the rows respectively.

Treatments comprised nine levels of phosphorus

(single super phosphate, 0-18-0) at the rates of 0, 15, 20, 25, 30, 35, 40, 45 and 50 kg/ha, laid out in Randomized complete Block Design (RCBD). The method of application was by localized placement by ringing at 4 weeks after planting.

Data were collected on the following parameters: average number of leaves, branches per plant, plant height (cm) at 6, and 12 weeks after planting, number of pods per plant, pod and seed weight (kg) per plot and hectare respectively. This trial was repeated during the 2005 cropping season.

All data collected were subjected to statistical analysis using Analysis of variance (ANOVA) procedure as outlined by Steel and Torrie (1980)

RESULTS AND DISCUSSION

The result of this investigation showed that the application of phosphorus significantly improved the growth and yield of *Mucuna flagellipes* (Table 1). All cases of phosphorus treatment produced better growth than where phosphorus was not applied. *Mucuna flagellipes* vegetative growth recorded as number of leaves and branches per plant increased with successive increases in phosphorus rate at 6 weeks after plant.

The application of 40kg/ha or 45kg/ha of phosphorus did not produced any significant difference in the growth of the crop as indicated by the number of leaves, branches, plant height, and vine diameter at 6 or 12 weeks after planting. However, phosphorus rate of 50 kg/ha produced the highest vegetative growth parameters recorded in both 2004 and 2005 cropping seasons. This result support the findings of Kumar and Pillar (1998) that reported increases in the vegetative growth of cowpea as a result of phosphorus application.

The used of phosphorus significantly enhanced the yield of *Mucuna flagellipes* (Table 2). Incremental application of phosphorus produced more number of pods per plant than where phosphorus was not applied.

On the average, pod and seed yield increased with the increases in the phosphorus rate but not beyond the rate of 45 kg/ha. Phosphorus at 45 kg/ha produced significantly higher pods and seed weight per plot and per hectare than the lower rates. The highest seed weight of 3.85 and 3.90 t/ha

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were obtained with the use of 45 kg/ha of phosphorus fertilizer in both 2004/2005 cropping seasons. Cromer *et al.* (1992) obtained a significant increase in cowpea yield due to phosphorus fertilization.

Table 1: Effects of phosphorus on the growth of *Mucuna flagellipes* during 2004 and 2005 cropping seasons.

2004 Growth parameters.					2005 Growth parameters				
Treat Phosphorus Rate (kg/ha)	No of Leaves per plant	No of branches per plant	Plant Height (CM)	Vine Diameter (mm)	No of Leaves per plant	No of branches per plant	Plant Height (CM)	Vine Diameter (mm)	
Vegetative Growth Parameters at 6 weeks after planting									
0	6	2.0	42.5	1.4	6	2.0	43.5	1.3	
15	9	3.2	65.7	1.1	8	3.1	65.8	2.1	
20	11	4.3	82.3	2.8	11	4.4	83.2	2.7	
25	12	5.1	91.3	3.2	13	5.1	92.3	3.3	
30	14	6.3	99.9	3.9	14	6.0	97.6	3.8	
35	17	6.5	110.3	4.5	17	6.3	111.2	4.7	
40	18	7.1	112.1	6.9	19	7.1	113.1	7.2	
45	18	7.1	121.6	6.9	19	7.1	125.4	7.2	
50	19	8.3	134.2	8.3	20	9.2	134.4	9.1	
LSD (P=0.05)	0.3	0.11	16.3	0.02	0.7	0.11	15.2	0.03	
Vegetative Growth parameters at 12 weeks after planting									
0	15	4.5	100.3	8.7	14	4.6	101.6	7.9	
15	20	6.3	121.5	13.1	19	6.2	121.5	13.2	
20	23	7.2	128.3	16.8	24	7.1	128.9	16.5	
25	25	7.5	134.7	19.9	26	7.1	135.2	19.8	
30	28	8.2	149.8	22.3	29	8.3	150.8	21.5	
35	33	10.3	158.3	25.4	33	10.5	159.2	26.3	
40	34	13.1	173.2	30.6	35	13.4	171.5	29.5	
45	34	13.2	184.6	32.3	35	13.4	183.4	32.6	
50	41	15.3	197.3	34.7	42	16.1	196.3	34.5	
LSD (P=0.05)	1.5	1.2	17.1	3.5	2.1	0.2	18.7	1.8	

Table 2. Effects of phosphorus on the yield of *Mucuna flagellipes* during 2004 and 2005 Cropping seasons.

2004 yield attributes						2005 yield attributes				
Treats phosphorus Rate (kg/ha)	No of pods per plant	Pod weight per plant (g)	Seed weight per plant (g)	Seed weight per plot (kg)	Seed weight per hectare (ton/ha)	No of pods per plant	Pod weight per plant (g)	Seed weight per plant (g)	Seed weight per plot (kg)	Seed weight per hectare (ton/ha)
0	11.1	68.2	38.5	0.53	0.88	12.1	69.5	47.2	0.15	0.85
15	15.2	157.3	68.7	0.84	1.40	14.8	148.9	69.1	0.85	1.42
20	17.3	185.5	84.3	1.03	1.72	17.3	187.4	82.3	1.04	1.73
25	18.5	218.7	99.5	1.14	1.90	18.2	212.6	97.6	1.13	1.88
30	21.4	243.4	107.4	1.23	2.05	21.5	241.5	105.5	1.31	2.18
35	24.3	261.6	115.3	1.44	2.40	23.1	260.2	113.8	1.45	2.42
40	27.2	289.3	120.6	1.78	2.97	27.1	278.4	121.3	1.76	2.93
45	32.5	317.7	131.6	2.31	3.85	33.1	301.5	130.5	2.34	3.90
50	35.7	341.5	158.4	2.10	3.50	36.2	333.7	149.5	2.12	3.53
LSD (P=0.05)	1.3	15.4	5.6	0.11	0.21	1.2	18.1	14.7	0.02	0.24

CONCLUSION AND RECOMMENDATION

The application of phosphorus at 45kg/ha promote the growth and seed yield of *Mucuna flagellipes*. Based on the results of this investigation, *Mucuna flagellipes* should be cultivated with the application of 45kg/ha of phosphorus (single super phosphate) for optimum growth and seed yield under Obubra agro-ecological zone of Cross River State.

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