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The XXI International Grassland Congress / VIII International Rangeland Congress took place in Hohhot, China from June 29 through July 5, 2008.

Proceedings edited by Organizing Committee of 2008 IGC/IRC Conference

Published by Guangdong People's Publishing House

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## Forage productivity of *Flemingia macrophylla* under different planting density , defoliation management and phosphorus application in Chitwan , Nepal

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**Key words :** *Flemingia macrophylla* , forage biomass , defoliation , phosphorus

**Introduction** *Flemingia macrophylla* (Willd.) Merrill is a perennial leguminous shrub (Andersson *et al.*, 2002) Therefore , experiments were conducted in Chitwan during 2003/04 to 2006/07 to identify the optimum plant density , appropriate defoliation management and optimum level of phosphatic fertilizer .

**Materials and methods** The experiments were on upland site of Chitwan , Nepal (latitude , 27°40' N , and longitude 84°19' E and 228 masl) . Experiment one was conducted during June 2003 to February 2004 , using RCB design with very low plant density (0.9×0.7 m<sup>2</sup>) , quite low plant density (0.9×0.6 m<sup>2</sup>) , normal plant density (0.9×0.5 m<sup>2</sup>) , high plant density (0.9×0.4 m<sup>2</sup>) and very high plant density (0.9×0.3 m<sup>2</sup>) . Experiment two was conducted simultaneously with experiment 1 , using 2×3 Factorial Randomized Complete Block Design . The treatments were a factorial combination of two factors , viz : defoliation interval (8 and 12 weeks) , and defoliation height (25 , 50 , and 75 cm from the ground level) . Experiment 3 was conducted by imposing the five different levels of phosphorus (0 , 10 , 30 , 50 and 70 kg ha<sup>-1</sup>) with uniform basal dose of nitrogen (30 kg ha<sup>-1</sup>) , and replicated four times in a RCB design .

**Results and discussion** The cumulative response was such that low density planting constantly favored for higher dry matter production and *vice versa* (Table 1 , experiment 1) . The mean cumulative biomass and dried forage yield was significantly (p<0.001) different among the treatments with the maximum biomass (15.03 t ha<sup>-1</sup>) at very low density . Both the factors in second experiment , defoliation interval and defoliation height had significant (p<0.001) effect to the cumulative forage biomass yield and dried forage production too (Table 2) . The interaction effect of defoliation interval and defoliation height was statistically similar (p>0.05) . The results from third experiment showed that higher levels of phosphorus application (50 and 70 kg ha<sup>-1</sup>) had showed significantly higher (p<0.001) cumulative green biomass yield .

**Table 1 (Experiment 1)** Effects of planting density to the forage yield of *F. macrophylla* at Rampur , Chitwan during July 2003 to February 2004 (t ha<sup>-1</sup>) .

Treatments	CBY (t ha <sup>-1</sup> )	CDY (t ha <sup>-1</sup> )
Very low density	15.03	4.46
Quite low density	10.47	3.06
Normal density	9.56	2.93
High density	8.86	2.73
Very high density	7.50	2.26
F-probability	p<0.001	p<0.001
LSD <sub>0.05</sub>	1.64	0.48
SEM	0.50	0.14

Note : CBY=Cumulative biomass yield of 3 harvests ,  
CDY= Cumulative dried forage yield of 3 harvests

**Table 3 (Experiment 3)** Effect of different levels of phosphorus application to the forage biomass yield of *F. macrophylla* at Rampur , Chitwan , 2006 (t ha<sup>-1</sup>) .

Treatments <sup>a</sup>	CBY (t ha <sup>-1</sup> )	CDY (t ha <sup>-1</sup> )
T <sub>1</sub> (0 kg P ha <sup>-1</sup> )	10.69	2.96
T <sub>2</sub> (10 kg P ha <sup>-1</sup> )	11.46	3.19
T <sub>3</sub> (30 kg P ha <sup>-1</sup> )	14.33	3.40
T <sub>4</sub> (50 kg P ha <sup>-1</sup> )	18.64	4.96
T <sub>5</sub> (70 kg P ha <sup>-1</sup> )	17.54	4.91
F-probability	<0.001	<0.001
LSD <sub>0.05</sub>	1.56	0.423
SEM	4.37	1.18

<sup>a</sup> Each was combined with 30 kg nitrogen ha<sup>-1</sup>

Note : CBY=Cumulative biomass yield of 2 harvests ,  
CDY= Cumulative dried forage yield of 2 harvests

**Table 2 (Experiment 2)** Effects of defoliation interval and defoliation height to the forage yield of *Flemingia macrophylla* at Rampur , Chitwan during July 2003 to February 2004 (t ha<sup>-1</sup>) .

Treatment	CBY (t ha <sup>-1</sup> )	CDY (t ha <sup>-1</sup> )
Main effects		
Defoliation interval		
8 weeks	28.20	8.83
12 weeks	56.60	18.92
Probability	<0.001	<0.001
LSD <sub>0.05</sub>	9.59	3.15
SEM	3.25	1.07
Defoliation height from ground		
25 cm	29.40	9.78
50 cm	40.30	13.09
75 cm	57.50	18.16
Probability	<0.001	<0.001
LSD <sub>0.05</sub>	11.75	3.86
SEM	3.98	1.31
Interaction effects		
	NS	NS

Note : CBY=Cumulative biomass yield of 3 harvests ,  
CDY= Cumulative dried forage yield of 3 harvests

**Conclusions** *Flemingia* responded positively to the lower planting density , and delayed defoliation frequency if defoliation was done at 12 weeks interval with the constant defoliation height of 75 cm from the ground . It was also revealed that forage yields of *Flemingia* can be substantially increased by the use of 50 to 70 kg P with 30 kg N ha<sup>-1</sup> . It supports the concept of using fertilizer , basically substantial dose of phosphatic fertilizer to increase the productivity .