Legume Biomass Quantity Requirement for Maize Production with Reference Tomucuna Green Manure in Kenya

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Introduction *Mucuna pruriens* , a potential on-farm legume source of nitrogen , has low biomass production that varies with agro-ecological and niche conditions (Mureithi and Gitahi , 2004) . This limits its capability to meet maize N requirement . The objective of this research was to determine effect of different application rates of mucuna green manure biomass on maize grain yield during application season .

Materials and methods Treatments investigated were : mucuna green manure applied at rates of 0 , 30 , 60 , 120 , 240 and 480 kg N ha^{-1} equivalent to 0 , 1 .5 , 3 , 6 , 12 and 24 t DM ha^{-1} of biomass ; and inorganic fertilizer-urea at 0 , 30 , 60 and 120 kg N ha^{-1} . The experimental design was a randomized complete block with four replications , and planting period 2002-2005 .

Results Nitrogen source failed to show significant effect on maize grain yield , regardless of application rate (Table 1) . Maize with no fertilizer and that applied with mucuna green manure at 30 kg N ha^{-1} had comparable grain yield . Maize applied with mucuna at rate of 60 kg N ha^{-1} showed significant increase in grain yield over the control during long rains , but failed to achieve the same in short rains (Table 1) . Application of mucuna green manure at rates of 120 , 240 and 480 kg N ha^{-1} caused consistent and significant increase in maize grain yield over the control (Table 1) . Mucuna green manure application rates in excess of 120 kg N ha^{-1} showed little or no further harmonious improvement in maize yield (Table 1) .

Table 1 *Effect of mucuna green manure and inorganic fertilizer-urea application rate on maize grain yield during application season , at Mosocho , Kisii , southwest Kenya (2002-2005)*♣ .

		Maize grain yield (t · ha^{-1})				
		Short rain 2002	Long rain 2003	Short rain 2003	Long rain 2004	Short rain 2004
Rainfall (mm)		638	1654	850	999	844
Treatment(Nitrogen , kg N ha^{-1})						
Mucuna green manure	0	1 .07	2 .07	0 .90	1 .09	0 .70
	30	1 .30	3 .13	0 .99	1 .52	0 .72
	60	1 .14	3 .08	1 .52	2 .38	0 .97
	120	1 .62	3 .96	3 .01	3 .55	1 .53
	240	1 .68	3 .13	2 .08	3 .51	1 .48
	480	1 .39	3 .13	2 .36	4 .12	1 .29
Inorganic fertilizer-urea	30	1 .46	2 .83	1 .40	2 .41	0 .68
	60	1 .55	3 .23	1 .42	2 .27	0 .90
	120	1 .32	3 .59	1 .95	2 .07	0 .47
Mean		1 .39	3 .13	1 .62	2 .55	0 .97
Nitrogen source F test		ns	ns	ns	ns	*
LSD Nitrogen source		0 .20	0 .45	0 .43	0 .70	0 .36
Nitrogen rate F test		*	*	*	*	*
LSD Nitrogen rate		0 .35	0 .56	0 .53	1 .01	0 .47
% C .V Treatment		17 .3	11 .8	22 .6	27 .2	33 .3

♣ F= Fischer test ; * =Differences significant at p≤ 0 .05 and , ns= non-signifcant at p≤ 0 .05 ; LSD= Least significant difference .

Conclusions Legume biomass from mucuna applied at 120 kg N ha^{-1} equivalent to 6 t DM ha^{-1} of the green manure showed consistent significant increase in maize yield over the control , in all seasons . Therefore , application rates less 120 kg N ha^{-1} could require supplementation with inorganic fertilizer N used in combination , if notable increase in yield is to be expected .

Reference

Mureithi , J . G . and Gitahi , F . M . 2004 . Legume screening database and instructional manual . Legume Research Network projects . Kenya Agricultural Research Institute (KARI) , 23 p .