Production and plant density of Sulla grazed by sheep at three growth stages

H. Krishna and P.D. Kemp
Institute of Natural Resources, Massey University, Palmerston North, New Zealand, Email: p.kemp@massey.ac.nz

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Introduction Sulla is one of the few temperate forage legumes that contain enough condensed tannins to improve the efficiency with which livestock use protein (Marshall *et al*. 1979). However, it usually is productive only for approximately 14 months in New Zealand, and little is known of its response to grazing. This paper reports on the production and persistence of Sulla cv. Necton, when using growth stage as the criterion for time of grazing by sheep in a maritime, temperate environment.

Materials and methods Sulla cv. Necton was sown (15 kg/ha of inoculated seed) in October in medium fertility, Typic Fragiaqualf soil (pH 6, Olsen P 12 μg/g) near Palmerston North, New Zealand. A randomised complete block design with 3 treatments (LV (late vegetative), MSE (mid-stem elongation), and EF (early flowering) growth stages) and 4 blocks was used. Individual treatment plots were 29 X 6.6 m. Each time it reached the set growth stages, Sulla was grazed with mature Romney ewes for 365 days after sowing (DAS). The first grazing of LV, MSE, and EF was 83, 90, and 111 DAS, respectively. Grazing intensity was set at approximately 70% of herbage removed, including most leaves. Herbage mass was measured pre- and post-grazing using ground level cutting in three 0.3 m^2 quadrats/plot. Leaf and stem were dissected in the pre-grazing samples before drying.

Results Sulla was highly productive in all treatments and its EF stage had the highest 365-day herbage mass accumulated for three grazings (Table 1). The mean post-grazing herbage masses for the EF, MSE, and EF treatments were 1,616, 1,465, and 1,972 kg DM/ha, respectively. The residual herbage consisted almost entirely of stem. The ratio of leaf mass : stem mass was lower at EF than at LV or MSE stages (Table 1). In February, the grazed herbage in the EF treatment had 2.3% N and a DM digestibility of 72%. Plant density was greater in the EF treatments after 365 days (Table 1), but all treatments failed to persist >14 months. The grazing of LV and MSE treatments in winter was the main cause of their lower plant density than the EF treatments (Table 2).

Table 1 Net herbage mass accumulation, leaf: stem ratio and plant density of Sulla cv. Necton over 365 days from sowing under infrequent, hard grazing with sheep

Growth stage	No. of grazings	Herbage mass	Leaf: stem ratio	Plants/m^2	
		kg DM/ha		0 DAS	365 DAS
LV	4	21,780	2.0	67	15
MSE	4	22,020	2.1	62	16
EF	3	24,700	1.3	45	32
LSD 5%		1990	0.2	NS	6

Table 2 Plant density of Sulla cv. Necton in spring (September) after being grazed or not grazed in winter (June/July) at the late vegetative (LV) and the mid-stem elongation (MSE) growth stages, by sheep

Treatment	Plant/m^2	
	LV	MSE
Grazed in winter	14	16
Ungrazed in winter	34	39
LSD 5% 4	4	

Conclusions The productivity of Sulla cv. Necton was confirmed with >20 t DM/ha in all treatments when grazed hard (3-4 times) during the 365 day period post sowing. Winter grazing damaged plant density and it was difficult to use winter growth. Grazing at early flowering avoided winter grazing and increased plant survival, but decreased feed quality through increased stem. Necton Sulla is highly productive under infrequent grazing but its intolerance of winter grazing and short lifespan limits its usefulness.

References

Marshall, D.R., P. Broue, J. Munday (1979). Tannins in pasture legumes. *Australian Journal of Experimental Agriculture and Animal Husbandry*, 19, 192-197.