

Measurement of Mulberry Shrubs Grazed by Cattle

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Introduction

The necessity to provide alternative sources of forage in certain periods of the year has encouraged research on new crops. Some deciduous shrubs, including mulberry, can contribute to balance forage supply during the summer months. The mulberry foliage can be considered a good protein supplement during the summer period, improving the intake of free-range cattle in marginal areas.

The measurement, evaluation and agronomic management of shrubs introduced in the Mediterranean forage system has been problematic. Among the various methods proposed for indirect evaluation of forage shrub production, photography appears to be most valid, both in measurement speed and reliability (Cereti and Rossini, 1992; 1993).

A trial was carried out to evaluate the practicality of the photographic method and to learn about mulberry productivity and relative grazing merit.

Methods

A two-year trial was carried out in 1992-93 at Tormancina, central Italy (42°-latitude north). In the first ten days of August a

herd of Maremmama cows grazed on fifty mulberry plants (*M. alba*). The shrubs had been planted in 1988 at a density of 5,000 plants/ha (2m x 1m), on the volcanic soil commonly found in Roman hillsides. In 1990 the shrubs were subjected to mechanical pruning at two different heights (10cm and 80cm). The photography and scanner technique for mass evaluation was used (Cereti and Rossini, 1992) with a green filter and a black opaque background to reduce disturbances caused by natural illumination (areas of shrubs in shadow, shadow on the screen). Shrub volume difference (ΔV), before (V_1) and after grazing, was used to determine dry matter (DM) availability and intake. The relationship between the dimensional parameters and the DM was obtained by manually stripping the leaves each year using 15 sample shrubs. Having observed that cattle feed from shrubs up to 180cm, DM was only considered available to up this height.

Results and Discussion

There was more rainfall in 1992 than in 1993. Good soil humidity was maintained up to the second half of July 1993. The relation between standing dry phytomass (g) and mean shrub volume before defoliation or V_1 (dm^3) was:

$$\text{Standing dry phytomass} = 0.71 V_1 + 3.08 \quad r^2 = 0.95^{**}$$

The relation was not influenced by pruning height of shrubs and, thus was used for the calculation of shrub DM availability (Table 1).

Table 1. Dry matter availability (g/plant) during the two-year trial.

Year	Pruning height		
	10cm	80cm	Mean
1992	50.2	101.2	74.6
1993	60.0	120.6	92.0
Mean	55.1 ^a	105.8 ^b	

Means were significantly different at 1% level.

Over the two-year trial period the DM availability was far greater in shrubs pruned at 80cm compared to those pruned at 10cm. Both the year difference and the interaction year by height were no significant. It is possible that the greater production obtained in 1993, despite the less favourable meteorological conditions, was certainly due to the height reached by the shrubs.

The relationship between the dry matter removed by the animals (g) and the average volume difference (dm³) of the shrubs taken before and after grazing (ΔV) was the following:

$$\text{Dry phytomass removed} = 1.13\Delta V + 9.15, \quad r^2 = 0.93^{**}$$

For this relationship, the dimensional parameters and the DM of the sample shrubs were measured not only before and after total leaf stripping by browsing, but also at intermediate stages in order to include various degrees of use. The DM estimate using this relationship, did not differ from that obtained using the previous relation. The shrubs pruned at 80cm produced, on average, more than double that those pruned at 10cm (114.6 g/plant vs. 50.4 g/plant).

In this case the quantity of DM resulted comparable to that actually used by the animals. The explanation could be that during the two years in which the trial was carried out the shrubs were completely stripped by the animals.

Conclusion

The indirect evaluation of shrub forage production determined by photographic survey could be applied in normal operative conditions while maintaining a high degree of certainty. Moreover, research results show that the higher cutting height enables greater productivity of mulberry, even after three years of pruning. The shrubs pruned at 80cm need frequent attention (every two or three years) as they tend to rapidly increase the average production level above requirement (Correal *et al.*, 1990). The 10cm pruning can be practised only during the first or second year after planting to give the shrubs suitable for browsing.

References

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