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K Nalini
Assistant Professor, LFC, VCRI, Tamil Nadu Veterinary and Animal Sciences University, Tamil Nadu, India

C Vennila
Associate Professor, LFC, Tamil Nadu Veterinary and Animal Sciences University, Tamil Nadu, India

Corresponding Author:
K Nalini
Assistant Professor, LFC, VCRI, Tamil Nadu Veterinary and Animal Sciences University, Tamil Nadu, India

Effect of cutting height and interval on the productivity of mulberry

K Nalini and C Vennila

Abstract
One among the major constraints in livestock production is the deficit in quantity and quality of feedstuff and with ever increasing population, the land for cultivation with fodder is relatively less possible. The alternate option is to ensure fodder availability from unconventional feed resources (Van *et al*., 2005). To enhance productivity of livestock, potential source is to increase the protein availability. The protein and energy can be met out by the unconventional feed resource and one such is the mulberry plant, where the leaves are used for silkworm rearing.

Keywords: Cutting height, interval, mulberry

Introduction

Mulberry: an exceptional forage available almost worldwide!

Mulberry (*Morus* spp.) is a perennial heterozygous plant originated from China, which is the primary center of origin (Vavilov, 1926) [10]. Leaves of Mulberry plant are the primary and only food of silkworm (*Bombyx mori* L.) belongs to family Moraceae. As leaf productivity is one of the principal factors that decide the sustainability and profitability. The crude protein content is quite high, ranging between 21-26% with a level of digestibility between 75-85% (Kandylis *et al*., 2009) [7]. This is widely cultivated and requires different management practices, and environment decides the production potential. In general, crude protein values can be considered similar to most legume forages. Shayo (1997) [8] reported lignin (acid detergent lignin) contents of 8.1% and 7.1% for leaves and bark, respectively. A striking feature of mulberry leaves is the mineral content, with ash values up to 25%. Typical calcium contents are around 1.8-2.4% and phosphorus 0.14-0.24%. Espinoza *et al*. (1999) [2] found potassium values of 1.90-2.87% in leaves and 1.33-1.53% in young stems, and magnesium contents of 0.47-0.63% for leaves and 0.26-0.35% for young stems. As can be seen, leaf digestibilities *in vivo* (goats) and *in vitro* are very high (>80%) and total digestibility is equivalent to that of most tropical forages. One of the main features of mulberry as forage is its high palatability. Small ruminants avidly consume the fresh leaves and the young stems first, even if they have never been exposed to it before. Then, if the branches are offered unchopped, they might tear off and eat the bark. Cattle consume the whole biomass if it is finely chopped. There is a report (Jegou *et al*., 1994) [6] of *ad libitum* dry matter intake of 4.18% of liveweight (average of three lactating goats), which is much higher than in other tree fodders. Jayal and Kehar (1962) [5] reported dry matter intakes of mulberry leaves of 3.44% of body weight in sheep under experimental conditions. Animals initially prefer mulberry over other forages when they are offered simultaneously.

Methodology

The experiment was conducted during 2019 and 2020 to study the cutting height and interval on the biomass yield of mulberry and to evaluate the nutrient composition of leaves. The experiment was conducted in spilt plot design with cutting height in main plots and cutting interval in sub plots. The cutting height consisted of 30 cm, 60 cm and 90 cm and the cutting interval includes, 30 days, 45 days and 60 days. Area for one plot is 4m X 4m and replicated thrice. The management practices were carried out as per the crop production guide. The harvesting was done as per the treatments. The number of branches and leaf: stem ratio were

calculated. The fresh weight and dry weight of the leaves were calculated. The nutrient compositions were calculated as per the standard procedures.

Result and Discussion

The results showed that the leaf stem ratio was influenced by the cutting height and cutting interval. The highest leaf stem ratio was highest with cutting height of 30 cm and interval of 30 days. The highest leaf stem ratio was 1.6. The leaf stem ratio reveals the quantity of feed material available and its nutrient composition. The fresh and dry matter yield was found highest with the cutting height of 60 cm (39.3 and 16.7 t/ha/year) and with interval of 45 days (39 and 15.9 t/ha/year). The higher total yield was obtained with the cutting height of 60 cm and with interval of 45 days followed by the biomass yield with earlier harvest of 90 days interval and 60 cm cutting height, this is in line with cutting height had a little effect on yield, increasing by 1.7 tonnes DM/ha/year from 30 to 60 cm (Benavides *et al*., 1986) [1]. The biomass yield was similar to findings of Hultasoi *et al*., 2015 [3]. This might be due to the fact that plants have opportunity to make for the process of photosynthesis, enabling the plants to have higher production. Significant chemical composition such as crude protein (%), NDF (%) and ADF (%) was found with the cutting height and cutting interval of 30 cm and 30 days interval. Digestibility on cutting frequency of 90 days and at 60 cm was decreased significantly. This is associated with the decrease in leaf stem ratio and lignification. This is in line with the findings of Hutasoit *et al*., 2016 [4].

Table 1: Production and chemical composition of mulberry as influenced by plant height and days of harvesting

Particulars	No. of branches per plant	LS ratio	Dry matter yield (t/ha)	Green fodder yield (t/ha)	DM %	Ash%	CP%	NDF %	ADF %
30	40.6	1.6	9.6	32.2	29.9	9.6	27.3	34.3	33.6
60	38.6	1.3	16.7	39.3	28.1	9.2	23.7	33.1	33.5
90	37.5	1.0	13.9	35.3	39.5	9.5	23.5	35.8	33.3
CD(p=0.05)	1.89	0.06	1.03	2.16	1.09	0.76	1.21	1.91	1.41
30	41.4	1.6	10.2	33.8	30.3	9.1	27.4	32.1	31.4
45	44.6	1.5	15.9	39.0	40.7	8.3	24.7	32.7	31.3
60	45.6	1.1	12.5	36.5	34.1	9.9	25.6	32.1	33.3
CD(p=0.05)	2.15	0.05	1.26	2.28	1.20	0.90	2.09	2.05	1.89
Interaction	*	*	**	*	*	NS	*	*	NS

Conclusion

The present results shows that the total biomass yield of mulberry was found highest with the cutting height of 60 cm and cutting interval of 45 days. This also had advantages over the chemical composition of mulberry that is beneficial to enhance the productivity of livestock. Yield, quality and availability worldwide, make mulberry a very important option to intensify livestock systems, especially in those places where enough nutrients can be applied to obtain maximum response in biomass production. The high mineral content of mulberry foliage should be specifically taken into account in nutrient recycling and fertilizing schemes to prevent loss of soil fertility. Considering its high quality and palatability, mulberry should be relatively more valuable as a feed.

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