

EFFECT OF CUTTING INTERVALS ON YIELD AND QUALITY FODDER PRODUCTION IN HYBRID NAPIER

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SUMMARY

The investigation entitled “Effect of cutting intervals on yield and quality fodder production” was conducted at Kerala Livestock Development Board farm, Dhoni, Palakkad during 2015 to 2016. The main objective was to assess the effect of cutting intervals on yield and quality of fodder using hybrid napier variety Suguna. The experiment was laid out in RBD with three treatments and seven replications. The treatments comprised of three cutting intervals - 45 days, 60 days and 75 days. The results showed that, the highest fodder yield of 57.85 t/ha/cut was obtained in T₃ (75 days), but the fodder quality was better in T₁ (45 days) which registered high crude protein content (10.56 %) and low crude fibre content (26.81 %).

Key words : Hybrid napier, cutting interval, green fodder yield, crude protein, crude fibre

In India, Kerala state has the highest percentage of cross bred animals with higher genetic potential for milk production. But the average milk yield of cow per day is very low and the total milk production does not meet the requirement of the state. The main reason for low productivity is lack of good quality fodder. The fodder requirement in the state is 232 m t where as the availability is only 94.5 m t, a deficit of nearly 60 per cent (137.5 m t) (FIB, 2015). Although the per capita land availability is very less in Kerala, high yielding varieties will help to tackle the problem of fodder shortage. Among the fodder crops hybrid napier is the most popular fodder crop in Kerala. Appropriate cutting management is essential for high production and quality of napier grass (Tessema *et al.*, 2010; Pathan *et al.*, 2012). In the light of the above facts, the present study was undertaken to assess the effect of cutting intervals on yield and quality of fodder production.

MATERIALS AND METHODS

The experiment was conducted at Kerala Livestock Development Board farm, Dhoni, Palakkad, Kerala, located at 11° N latitude and 67° 7' E longitude and at an altitude of 150 m above mean sea level. Soil of the experimental site was gravelly clay loam under Malampuzha I class III series. The soil of the experimental site was extremely acidic in reaction

(4.2), normal in electrical conductivity (0.3dS/m), high in organic carbon (1.56 %), low in available nitrogen (188.16 kg/ ha) and medium in available phosphorus (15.79 kg/ha) and potassium (161.84 kg/ha).

The crop was planted during *Kharif* season (June 2015) and was maintained for one year for the study. The weather parameters during the cropping season are given in Fig. 1. The hybrid napier variety Suguna released from Kerala Agricultural University was used in the study. The crop was raised as per the package of practices recommendations of Kerala Agricultural University (KAU, 2011). The experiment was conducted in RBD with 3 treatments and seven replications. The treatments comprised of three cutting intervals-45 days, 60 days and 75 days. The first cutting was taken in all treatments at 60 days after planting and subsequent cuttings were taken at 45, 60 and 75 days interval.

The crop was cut at each cutting interval, fresh weight was taken from net plot and it was expressed in t/ha. Total yield for one year also was calculated and expressed in t/ha. The crop samples collected from each net plot were sun dried and then oven dried to a constant weight at 60°C. The dry matter content was computed and dry fodder yield was worked out. Total dry fodder yield for one year was calculated and expressed in t/ha. The crude protein (Simpson *et al.*, 1965) and crude fibre (Sadasivam and Manickam, 1996) contents were recorded.

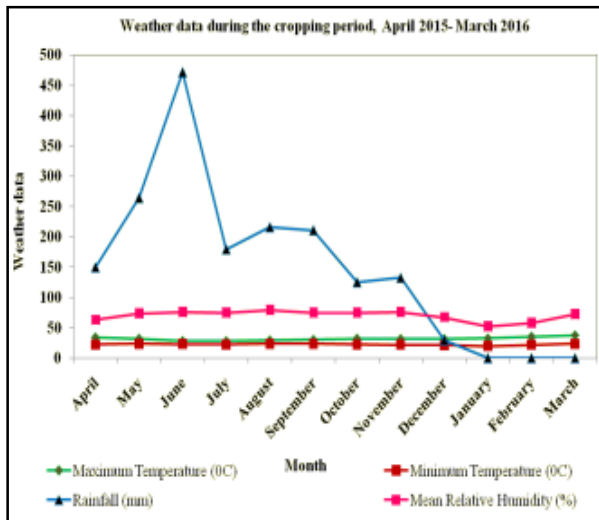


Fig. 1. Weather parameters during the cropping period, April 2015-March 2016.

The data on various parameters were analysed statistically by using Analysis of Variance (ANOVA) technique RBD (Panse and Sukhatme, 1985).

RESULTS AND DISCUSSION

Green Fodder Yield

Scanning of the data presented in Table 1 revealed that cutting intervals had significant effect on green fodder yield of hybrid napier. An increasing trend in the green fodder yield was observed when the cutting interval was increased. Among the three cutting intervals, the highest green fodder yield cut⁻¹ was obtained from 75 days cutting interval (T_3) and it was significantly superior to other two cutting intervals - 60 and 45 days. Lowest green fodder yield was reported at cutting interval 45 days. However harvesting at 45 days interval resulted in younger, leafier plants being harvested, but was reflected in the higher crude protein content (Table 1) and lower crude fibre content (Table 1) compared with harvesting at 60 and 75 days interval.

It was observed that when cutting interval was reduced from T_3 (75 days) to T_2 (60 days), there was 21.08 per cent reduction in yield and when the interval was reduced to 45 days, yield reduction was 41.35 per cent. This might be due to increase in dry matter content of the crop with increase in growth period. This could be well explained by the sigmoid growth curve, in which as the growth period increases, the accumulation of photosynthetic products also increase up to a limit, after which the growth might decrease (Reddy and Reddy, 2010). Singh *et al.* (2002) also

reported higher green fodder yield in napier bajra hybrid with increased cutting interval.

Though the cutting interval had significant effect on green fodder yield/cut, the cutting interval did not show any significant effect on total green fodder yield/year. There were eight harvests for 45 days interval, six harvests for 60 days interval and five harvests for 75 days interval. As the cutting interval increases, the number of harvest per year decreases and this lead to non significant variation on green fodder yield/year.

Dry Fodder Yield

Similar to green fodder yield dry fodder yield/cut increased significantly with increase in cutting interval. The highest dry fodder yield/cut was recorded by 75 days cutting interval (T_3). Dry fodder yield/cut of hybrid napier grass (Table 1) increased with increasing intervals between harvests, from 9.76 t/ha at 45 day interval to 21.63 t/ha at 75 days interval. Mc Donald *et al.* (2002) also reported an increase in dry matter at higher cutting intervals due to the increase in the fibrous tissues and carbohydrates at late season.

The results on dry fodder yield/year also showed an increase in the dry fodder yield with increase in cutting interval. Here also, 75 days cutting interval (T_3) recorded the highest dry fodder yield/year. There was a 15.27 per cent increase in dry fodder yield when the cutting interval was increased from T_1 (45 days) to T_2 (60 days) and 27.80 per cent increase when the cutting interval was increased to T_3 (75 days). Increase in green fodder yield at 75 days cutting has resulted in corresponding increase in dry fodder yield.

Increase in dry fodder yield/cut with increase in cutting interval was also reported earlier by Wangchuk *et al.* (2015) in napier hybrid grass.

Crude Protein Percentage

It could be deciphered from Table 1 that cutting intervals had significant effect on crude protein content of hybrid napier. The increase in cutting interval decreased the crude protein percentage. The highest crude protein content (10.56 %) was observed in T_1 (45 days interval) and the lowest value of 7.61 % in T_3 (75 days interval). The crude protein content was reduced by 13.25 per cent when the cutting interval was increased from 45 days to 60 days and by 27.99 per cent when cutting interval was increased from 45 days to 75 days. The decrease in crude protein with increase in maturity had already been

TABLE 1
Effect of cutting intervals on yield and quality of hybrid napier

Treatments	Green fodder yield/cut (t/ha)	Green fodder yield/year (t/ha)	Dry fodder yield/cut (t/ha)	Dry fodder yield/year (t/ha)	Crude protein (%)	Crude fibre (%)
Cutting intervals (T)						
T ₁ -45 days	34.28	274.29	9.76	78.11	10.56	26.81
T ₂ -60 days	45.83	275.03	15.36	92.19	9.16	35.28
T ₃ -75 days	57.85	289.25	21.63	108.19	7.61	40.56
S. Em±	2.04	16.61	0.71	4.08	0.48	0.73
C. D. (P=0.05)	6.307	NS	2.198	12.592	1.036	1.594

documented. As explained by Van Soest (1994), with maturity there will be an immediate increase in the accumulation of carbohydrates in napier grass which can lead to the decrease in the concentration of crude protein concentration as well as digestibility. Ansah *et al.* (2010) also reported that the crude protein decreased with an increase in harvest day and it was observed that the crude protein levels decreased by 27 per cent from the 60 day harvest to the 120 days.

Similar results were also reported by Subhalakshmi *et al.* (2013), Pathan *et al.* (2014) and Wangchuk *et al.* (2015) in different forage crops. Though green fodder yield at cutting interval of 45 days was low, the quality of the fodder is good as evident from higher crude protein content (Table 1) and lower crude fibre content (Table 1) in this treatment.

Crude Fibre Percentage

The present results on crude fibre percentage (Table 1) revealed that, cutting intervals significantly influenced the crude fibre percentage. The crude fibre percentage in hybrid napier showed an increasing trend with increase in cutting interval from 45 days to 75 days; the content being 26.81 %, 35.28 % and 40.56 % at 45 days, 60 days and 75 days respectively.

Increase in cutting interval from 45 days to 60 days, increased the crude fibre content by 31.57 per cent and increase in cutting interval to 75 days enhanced the crude fibre by 51.25 per cent. As reported by FAO (2005), for each and every plant the maturity stage differs, which is having a great influence on the fibre content, as the maturation process brings about a general decline in the digestibility of each of these plant component parts. This might be due to thickening and hardening because of the accumulation of extra carbohydrates on the cell wall of plant fibres. This is partly due to a non digestible component called lignin.

As maturation takes place, the proportion of cell contents that are readily digestible parts of the plant, decline. In addition, as the plant matures the weight proportion of stem increases and the proportion of leaf declines. This might be the reason for increase in crude fibre content with increase in cutting interval.

A similar trend of increase in crude fibre percentage with increase in cutting interval was observed by Pathan *et al.* (2014). Pathan *et al.* (2014) noticed that the crude fibre content in hybrid napier was 30.2 %, 31.5 % and 32.6 % when the harvest was done at 45, 60 and 75 days.

These findings highlight the importance of optimum cutting interval and its varying effects on yield and quality. High cutting frequency reduces growth and yield and improves quality. Long intervals between harvests lead to accumulation of fiber and reduction in quality as reported by Tessema *et al.* (2010).

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