ID # 21-29

YIELD, FEEDING VALUE AND ENSILING CHARACTERISTICS OF CLONE-13 (*Pennisetum purpureum*).

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Abstract

A study was carried out to find out the effect of frequency of defoliation on yield and feeding value of clone-13 (*Pennisetum purpureum*) in Sri Lanka. Three frequency of harvesting, namely 45, 60 and 75 days were used and, fresh yield per plot was measured. Sub samples were taken for dry matter determination and proximate analysis. According to results, frequency of harvesting of 60 days can be recommended for clone-13 under no fertilizer regime. In addition, effect of growth stage on ensiling characteristics of clone-13 was also studied. Clone-13 was harvested at 45, 60, 75 or 90 days and, ensiled alone or with 5% coconut (C*ocos nucifera* L.) scrapings or 5% rice (*Oriza sativa*) bran in laboratory silos. Therefore, altogether 12 treatments were used in the study with 5 replicates. Silos were opened after 6 weeks and, physical and ensiling characteristics were studied. Physical characteristics of silage were satisfactory and had a yellowish brown colour, pleasant aroma and a moist texture. Highest volatile fatty acids and crude protein contents were observed with 45 days old grass silage whereas lowest in 90 days old grass silage. Addition of rice bran and coconut scrapings improved the fermentation characteristics of silage compared to no additives.

Keywords: Napier, *Pennisetum purpureum*, yield, feeding value, silage

Introduction

Major problem, which hinders the ruminant production in Sri Lanka, is scarcity of feed especially during the dry season. In Sri Lanka, many varieties of grasses are grown but, Napier (*Pennisetum purpureum*) and Napier hybrids (*Pennisetum purpureum* * *Pennisetum americanum*) are very popular in the country. Clone 13 is one of the Napier selections and was introduced to Sri Lanka from Kenya around 1990. High soluble carbohydrate contents in feeds make good quality silage. But soluble carbohydrate content of tropical grasses are very low therefore, some agricultural byproducts need to be used as additives during ensiling.

Therefore, objectives of the present study were to find out the yield, feeding value and ensiling characteristics of clone-13 as affected by frequency of defoliation.

Material and Methods

Experiment 1. An experiment was carried out at Uda Peradeniya, Sri Lanka (longitude 80^0 29'E, latitude 7^0 13' N,) to find out the effect of frequency of harvesting on yield and feeding value of Clone -13 fodder in marginal tea lands without fertilizer application. The soil type was Reddish brown latosolic and had a pH of 5.2. Land was prepared and plants were established in 2 by 3 m plots, giving a spacing of 0.6m x 0.6m within and between rows. Nine plots were established in a Rondomized Complete Block Design (RCBD) with three replicates. Three different frequencies namely, 45,60 and 75 days were used in the study. Intensity of harvesting was constant for all plots. Forages were harvested and fresh yield per plot was weighed. A sub sample was taken from each plot for dry matter determination and for chemical analysis. Sampling was done continuously for a period of 8 months. Dried samples were ground to pass a 1 mm sieve and used for crude protein (CP) (AOAC, 1980), ash, crude fibre (CF) (AOAC, 1980) and crude fat (AOAC, 1980).

Experiment 2. Clone-13 used in this study was obtained from an established pastureland of one and half years of age. At the beginning of the experiment, the following fertilizers were applied to the plots (1005 kg Dolomite /ha/yr; 175 kg muriate of potash /ha/yr; 200 kg Triple Super Phosphate /ha/yr and 600 kg Urea /ha/yr as 4 split doses.). Grasses used were out for silage preparation at 45,60, 75 and 90 day of age. After grasses were harvested, representative sub samples were taken for dry matter determination and chemical analysis as described earlier.

Harvested forages (45,60,75 and 90 days) (4 levels.) were chopped and ensiled alone (control) or in combination with 5% coconut scrapings or 5% rice bran in laboratory silos. Therefore, altogether 12 treatments were used in the study with 5 replicates (60 small laboratory silos). After 6 weeks, the bags were opened and the top layer of the silage was removed, then the physical parameters such as smell, colour and texture were observed and recorded. Samples from each laboratory silo were analyzed for pH and volatile fatty acids (VFA) using the standard methods (Markham, 1942). For the crude protein analysis, 100g of a sample from each bag was removed and dried in an oven at 60^0 C and ground to pass a 1mm sieve and used in determination of CP (AOAC, 1980). Proximate analysis was carried out separately for grass samples, coconut scrapings and rice bran using standard methods as described earlier. Data were statistically analyzed using the analysis of variance procedure with the SAS computer package. Means were compared using Duncan's Multiple Range Test.

Results and Discussion

Experiment 1. Effect of frequency of harvesting on dry matter yield and feeding value of Clone-13 is presented in Table 1. According to table 1, frequency of harvesting had a significant ($P<0.01$) effect on the herbage dry matter yield. Increasing the frequency of harvesting from 45 days to 75 days increased the herbage dry matter yield from 8848 kg ha^{-1}

yr^{-1} to 18566 kg ha^{-1} yr^{-1}. According to Santana et al., (1994), when Napier hybrids namely BM 82048 and NB-21 were cut at 28, 54 or 84 days in South Western Bahia, dry matter yield was linearly and positively correlated with cutting interval. Crude protein and ash % decreased whereas, crude fibre was increased with the maturity. In general, cellular content of plants, which include CP and ash, goes down whereas cell wall content increases with maturity (Singh and Pradhan, 1995).

The highest cumulative dry matter yield was observed with 75 days frequency of harvesting followed by 60 days and 45 days. On the other hand, highest mean crude protein yield was observed with 60 days frequency of harvesting while lowest was observed with 45 days frequency of defoliation.

Experiment 2. According to proximate analysis, crude protein content of 45 days old grass was much higher compared to 60 and 75 days old grass. Crude protein content of rice bran and coconut scrapings were much higher compared to grass whereas, crude fibre and ash Percentages were lower in coconut scrapings compared with the grass. Physical characters of all silages were satisfactory and had a yellowish brown colour, pleasant aroma and a moist texture. Ensiling characteristics of Clone-13 as affected by plant age are given in Table 2. pH value of silage ranged from 4.78 to 5.08. Highest VFA and CP% was observed in 45 days old grass whereas lowest in 90 days old grass silage. Premaratne et al., (1993) reported that stage of maturity influenced the fermentation characteristics of silage made out of Guinea ‘A’ grass. Addition of rice bran and coconut scrapings increased the dry matter content of silage compared to control. Crude protein content of silage was much higher ($P<0.05$) with the addition of coconut scrapings compared to addition of rice bran and the control. However, addition of rice bran also increased ($P<0.05$) the crude protein content of silage compared to the control. This may be due to the higher CP content of additives used at the time of ensiling.

According to results, yield, feeding value and ensiling characteristics of Clone-13 depends on the maturity of grasses. Under no fertilization regime, frequency of harvesting of 60 days can be recommended in marginal tea lands. Frequency of harvesting of 45 and 60 days were much better compared to 75 and 90 days for Clone-13 to make silage. Addition of rice bran and coconut scrapings improved the fermentation characteristics of silage compared to no additives. Addition of rice bran improved the quality of silage compared to coconut scrapings.

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Table 1- Effect of plant age on dry matter yield and feeding value of Clone-13grass.

Parameter	Plant age (days) 45*	60**	75***	SEM
DM yield (kg/ ha/yr)	8848[a]	16830[b]	18566[c]	±1200
Crude protein (%)	13.8[c]	12.5[b]	10.7[a]	±0.53
Crude fibre (%)	28.2[a]	30.2[b]	32.4[c]	±0.73
Ash (%)	7.7[c]	6.9[b]	6.2[a]	±0.23

* Mean of 4 harvests, for 3 replicates.
** Mean of 3 harvests, for 3 replicates.
*** Mean of 2 harveste, for 3 replicates.
[a,b,c] Means with the same letter in a row are not different (P<0.05).

Table 2 - Ensiling characteristics of Clone-13 as affected byplant age of forages.

	Plant age (days) *				
Parameter	45	60	75	90	SEM
DM, %	20.6[d]	23.3[c]	24.4[b]	28.2[a]	± 0.80
CP, %	9.3[a]	7.1[b]	6.9[c]	5.0[d]	± 0.29
pH	4.93[b]	4.78[d]	4.9[c]	5.08[a]	± 0.26
VFA,µ moles/g	37.6[a]	34.5[c]	35.3[b]	32.2[d]	± 0.89

*Average of 15 replicates

[a,b,c,d] Different superscripts in a row are significantly different (P<0.05)