

## Sward Composition and Silage Quality of Forage Land at The Department of Animal Science, University of Ibadan, Nigeria

**Eyebiokin, F. D., Komolafe, P. L., Fagbenro, R. B., Babayemi, O. J.**

*Department of Animal science, University of Ibadan, Nigeria*

Corresponding author: [prisyem2008@yahoo.com](mailto:prisyem2008@yahoo.com)

08036106690

### ABSTRACT

Ruminant farmers in semi-arid parts of Africa like Nigeria are faced with the problem of livestock feeding during the dry season, this problem can however be minimized through forage conservation during the time of abundance (raining season). The forage land in the Department of Animal Science quadrangle, University of Ibadan, Ibadan, was used for the study. The quadrangle was divided into 4 plots. Sward composition was done using random sampling method and plant species were identified. The 20 weeks old plants were harvested and ensiled with additives which include: control 3.85% urea (UR), Treatment (Trt)1, 3.85% UR + 9.09% sugar (SU), Trt 2, 3.85% UR + 9.09% sorghum (S), Trt 3, 3.85% UR + 9.09% maize flour (MF) and Trt 4, 3.85% UR + 9.09% cassava flour (CF) and ensiled. Samples were collected for analysis. The study revealed that 10 plant species was present on the quadrangle. A total of 483 plants were collected from the four plots. Plot 2 had the highest plant species (7) while plot 4 the least (4). *Megathyrsus maximus* (154) was the most occurring plant species while *Solenostemon monostachyus* had the least (13). From the proximate analysis of the silage, Treatment 1 had the best nutritional quality (DM 43.8<sup>a</sup>, CP 16.90<sup>a</sup>, CF 16.58<sup>b</sup>) while the control (DM 36.65<sup>b</sup>, CP 14.81<sup>c</sup>, CF 18.25<sup>a</sup>) had the least. The silage obtained showed good quality for ruminant feeding during dry season.

### INTRODUCTION

During the dry season, livestock most especially ruminants are forced to barely subsist on poor and sparse vegetation, leading to severe loss of body condition, reduced productivity, fertility of the land and threat of desertification. In the smallholder farming system, production of forage and fodder plants for ruminants consumption is often a sideline activity that is integrated with other areas of agricultural production (Nitis, 1999). During the rainy season when plants grow at a very fast rate to produce high yields under good management, they however deteriorate rapidly in nutritional quality after only about three months of growth, as lignification proceeds (Skerman, 1988). These plants grow into maturity if not cut at the right time and become lignified which make it less digestible compound thus, leading to a decrease in forage quality. To strategically manage the feeding of these livestock, forage conservation needs to be done. Forage can be conserved through hay and silage making. Silage is the preservation of forage plants through anaerobic fermentation (Babayemi, 2009) and ensiling of adapted forage plants at the peak of the rainy season has a good chance of success as the procedure relies on a high moisture content of the plants. There is underutilization of the quadrangle of the department of animal Science thus the land is filled with forages without animal grazing on then. To curb this waste, this research was therefore designed with the aim of addressing the challenge that comes with time of harvesting of forage plants and evaluates the fermentation qualities and nutritive value of forage plants cut at the study area.

### MATERIALS AND METHODS

This study was carried out at the Department of Animal Science quadrangle, University of Ibadan, Ibadan, Nigeria. The quadrangle was divided into four plots, 0.5 x 0.5 m<sup>2</sup> Quadrat was thrown to identify and know the sward composition of the different plots. The plant species were taken from the quadrant to the department of agronomy for identification. Forage on the quadrangle was cut at 20 weeks and ensiled with nylon: control 3.85% urea, Trt 1 (FR + 3.85% UR + 9.09% SU), Trt 2 ( FR + 3.85% UR + 9.09% Sorghum flour), Trt 3 ( FR + 3.85% UR + 9.09% maize flour MA), Trt 4 ( FR + 3.85% UR + 9.09% cassava flour CA). All treatments were thoroughly mixed and 5kg weight was compressed into each nylon. The silages were opened after 28 days for physical characteristic and samples were collected for proximate analysis according to AOAC (1990) procedure. The data obtained were subjected to descriptive statistics and ANOVA using SAS 2012 package.

## RESULTS AND DISCUSSION

Presented in Table 1 is the sward composition of the quadrangle in the Department of Animal Science University of Ibadan. The study revealed that, 10 different plant species were found on the quadrangle. Plot two had the highest (7) population of plant species which makes it the most heterogeneous part while plot 4 had the least number of species (4). The study also revealed that none of all the 10 plant species were present in all the plots. However, *Alternanthera sessilis*, *Chromolaena odorata*, *Tridax procumbens* and *Megathyrus maximus* were present in at least three plots while *Commelina diffusa* was present in only one of the plots. The identification of 10 different plant species in the quadrangle could indicate how nutritive the forage will be when fed to ruminant.

**Table 1:** Sward composition of quadrangle of the Department of Animal Science UI

| SPECIES LIST                     | PLOT 1 | PLOT 2 | PLOT 3 | PLOT 4 |
|----------------------------------|--------|--------|--------|--------|
| <i>Alternanthera sessilis</i>    | +      | +      | +      | -      |
| <i>Chromolaena odorata</i>       | +      | +      | +      | -      |
| <i>Cynodon dactylon</i>          | +      | -      | -      | +      |
| <i>Tridax procumbens</i>         | +      | +      | -      | +      |
| <i>Desmodium triflorum</i>       | +      | +      | -      | -      |
| <i>Megathyrus maximus</i>        | +      | +      | -      | +      |
| <i>Boerhavia diffusa</i>         | -      | +      | +      | -      |
| <i>Solenostemon monostachyus</i> | -      | +      | +      | -      |
| <i>Melochia corchorifolia</i>    | -      | -      | +      | +      |
| <i>Commelina diffusa</i>         | -      | -      | +      | -      |
| Total number of species present  | 6      | 7      | 6      | 4      |

The population of plant species per plot in Quadrangle of Animal Science Department UI is as shown in Table 2. The study revealed that a total number of 483 plants was found in all the four plots from the quadrant. The availability of large number of plant on the quadrangle could suggest that the land is still fertile and can be used for livestock feeding it could also be that the land had not been in use for continuous grazing activities. Plot 1 had the highest plant number (154) while plot 4 had the least. It was observed that *megathyrus maximus* had the most dominant plant on plot 1, 2 and 3 with a total frequency of 152 but it was completely absent in plot 3. The least was observed to be *Solenostemon monostachyus* (13). *Alternanthera sessilis* had the highest occurrence in plot 3. *Commelina diffusa* was only observe in plot 3 unlike the others plant species that can be found in at least two plots. The abundance of *megathyrus maximus* could be that the land is favourable for the growth of the plant species while that of *Solenostemon monostachyus* could be that the plant is merely surviving on the land.

**Table 2:** Population of plant species per plot in Quadrangle of Animal Science Department UI

| Plant Species                    | Plot 1 |      | Plot 2 |      | Plot 3 |      | Plot 4 |      | Total |   |
|----------------------------------|--------|------|--------|------|--------|------|--------|------|-------|---|
|                                  | F      | %    | F      | %    | F      | %    | F      | %    | F     | % |
| <i>Alternanthera sessilis</i>    | 40     | 8.3  | 18     | 3.7  | 40     | 8.3  | -      |      | 98    |   |
| <i>Chromolaena odorata</i>       | 07     | 1.4  | 16     | 3.3  | 09     | 1.9  | -      |      | 32    |   |
| <i>Cynodon dactylon</i>          | 15     | 3.1  | -      |      | -      |      | 18     | 3.7  | 33    |   |
| <i>Tridax procumbens</i>         | 06     | 1.2  | 06     | 1.2  | -      |      | 05     | 1.0  | 17    |   |
| <i>Desmodium triflorum</i>       | 30     | 6.2  | 16     | 3.3  | -      |      | -      |      | 46    |   |
| <i>Megathyrus maximus</i>        | 56     | 11.6 | 56     | 11.6 | -      |      | 40     | 8.3  | 152   |   |
| <i>Boerhavia diffusa</i>         | -      |      | 20     | 4.1  | 15     | 3.1  | -      |      | 35    |   |
| <i>Solenostemon monostachyus</i> | -      |      | 03     | 0.6  | 10     | 2.1  | -      |      | 13    |   |
| <i>Melochia corchorifolia</i>    | -      |      | -      |      | 29     | 6.0  | 13     | 2.7  | 42    |   |
| <i>Commelina diffusa</i>         | -      |      | -      |      | 15     | 3.1  | -      |      | 15    |   |
| Total                            | 154    | 31.8 | 135    | 27.8 | 118    | 24.5 | 76     | 15.7 | 483   |   |

Shown in Table 3 is the proximate composition of ensiled forage with additive from the study area. It was observed that dry matter (DM) content of the ensiled products ranged between 36.65% and 43.89%. The highest DM was from Treatment 1 (43.89%) while control had the least (36.65%). The DM value obtained from the study is above the average DM (25%) that has been reported for a good silage (Nussio, 2005). The high DM value obtained from the analysis could be as a result of the sugar

additive. The crude protein (CP) ranged between 14.81% and 16.90%. The CP obtained is however higher than the recommendation (12-15%) for a good silage (Dube, 1995), although, the values is still within the requirement of ruminant feed (16%) however low for dairy cow which is 18%. Treatment 1 had the highest CP while control also had the least. The reverse is the case for CF as the highest CF value was from control while the least from treatment 1. The CF ranged between 16.58% and 18.25% which is lower than the average fiber content reported for good silage 35% in another research. The lowest CF value observed in treatment with sugar can be because addition of sugar to silage increases the number of aerobic bacteria, including lactic acid bacterium, therefore, the fiber fraction degradation of silages increased (Bolsen *et al.*, 1996) while the control group having the highest CF can be because of lower fiber content of the additives used in other treatment groups that is absent in the control group (Bingol and Baytok 2003). Ash content of the ensiled silage ranged between 8.44 - 9.04%. This is higher than an average of 5% value reported for good silage in other research and also lower than 10% ash value which could mean soil contamination.

Table 3. Proximate composition of Animal Science Department UI Quadrangle forages ensiled with additives

| TREATMENTS        | DM                 | CP                 | CF                  | EE                 | ASH                | NFE                 |
|-------------------|--------------------|--------------------|---------------------|--------------------|--------------------|---------------------|
| FR + UR + SU      | 43.89 <sup>a</sup> | 16.90 <sup>a</sup> | 16.58 <sup>b</sup>  | 0.49 <sup>ab</sup> | 8.78 <sup>ab</sup> | 49.63 <sup>b</sup>  |
| FR + UR + SO      | 42.43 <sup>a</sup> | 14.98 <sup>c</sup> | 17.58 <sup>ab</sup> | 0.43 <sup>b</sup>  | 8.44 <sup>c</sup>  | 50.98 <sup>a</sup>  |
| FR + UR + CA      | 43.17 <sup>a</sup> | 15.63 <sup>b</sup> | 17.59 <sup>ab</sup> | 0.54 <sup>a</sup>  | 8.52 <sup>bc</sup> | 50.07 <sup>ab</sup> |
| FR + UR + MA      | 44.11 <sup>a</sup> | 15.58 <sup>b</sup> | 17.43 <sup>ab</sup> | 0.50 <sup>ab</sup> | 9.04 <sup>a</sup>  | 50.00 <sup>ab</sup> |
| FR + UR (control) | 36.65 <sup>b</sup> | 14.81 <sup>c</sup> | 18.25 <sup>a</sup>  | 0.46 <sup>ab</sup> | 8.87 <sup>a</sup>  | 49.83 <sup>ab</sup> |
| M <sup>2</sup> E  | 19.9658            | 0.1885             | 1.5540              | 0.0103             | 0.1269             | 2.0764              |
| P value           | <0.0001            | <0.0001            | 0.0381              | 0.1096             | 0.0006             | 0.2045              |

<sup>abc</sup> Means of treatment along a column with different superscript differed significantly (p<0.05)

FR=Forage UR=Urea SU=Sugar SO=Sorghum flour CA=Cassava flour MA=Maize flour  
DM=Dry matter CP=Crude protein CF=Crude fiber EE=Ether extract NFE=Nitrogen-free extract  
M<sup>2</sup>E Mean square error P value= Probability of error

## CONCLUSION

In conclusion, the result of the analysis showed that, 10 different plant species were obtained from the sward composition in the quadrangle. None of the 4 plots had all the 10 plant species present. plot two had the highest population of plant species. *Megathyrsus maximus* was the most occurring plant species with a frequency of 152 while *Solenostemon monostachyus* the least (13) treatment 1 (FR + UR + SU) group has the best nutritional quality according to the proximate composition while the control group had the least. The silage obtained showed good quality for ruminant feeding during dry season. Forage land can be considered and maximally utilized during the period of abundance in the raining season to make silage which could reduce the problem of ruminant feeding during the dry season.

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