EFFECT OF HARVESTING AGE ON THE PROXIMATE COMPOSITION OF CONGO GRASS (*Brachiaria ruziziensis*)

G. B. Dandara[1], I. Sani[2], M. I. Dass[3], G.O. Gabriel[4] & A. A. Odumboni[5]
[1,4,5]Department of Animal Production and Health, Faculty of Agriculture, Federal University Oye-Ekiti
[2]Department of Animal Production, Faculty of Agriculture, Abubakar Tafawa Balewa University Bauchi
[3]Department of Crop Science and Horticulture, Faculty of Agriculture, Federal University Oye-Ekiti
Corresponding Authors Email: gbdandara@gmail.com

ABSTRACT
This study was carried out in crop production research farm at Abubakar Tafawa Balewa University Main Campus Gubi, Bauchi State to determine the effect of cutting age of on the proximate composition of Congo grass. The experiment was laid out in a Completely Randomized Design (CRD). *Brachiaria ruziziensis* was planted as a sole crop, at an intra row spacing of 30cm and intra row spacing of 60cm. The pasture was sampled at 6,8,10 and 12 weeks post-emergence. Harvesting stage significantly ($P<0.05$) affected crude protein, crude fibre, Ash and Ether extract. On the other hand, treatment effect was not significant ($P>0.05$) for dry matter. The crude protein (CP) values ranged from 7.68% at week 12 to 10.89% at week 8. The crude protein decline significantly from 10.89% to 7.68% in week 8 and 12 respectively, while the crude fibre was high at week 12, 36.24% and low at week 6 to 29.34%. Harvesting age significantly ($P<0.05$) affected phosphorus composition of the grass. On the other hand, harvesting stage was not significantly different ($P>0.05$) for calcium composition. *Brachiaria* ruziziensis has high crude protein of 10.89 at week 8, ether extract of 9.46% at week 8, crude fibre of 36.24% and ash of 9.46% at week 8. Harvesting stage significantly ($P<0.05$) affected phosphorus composition of the grass. It is recommended that *Brachiaria ruziziensis* should be harvested at week 12 for higher crude fibre and dry matter. For higher crude protein and phosphorus composition, *Brachiaria ruziziensis* should be harvested at week 8.

Key words: Effect, Harvesting, Age, Proximate, Congo grass

INTRODUCTION
Brachiaria ruziziensis is a species of grass originating from the savanna of the Eastern part of Africa. The grass is widely used as livestock feed. *Brachiaria ruziziensis* hay (Congo grass) is avaluable forage for livestock (Cook *et al.,* 2005). It is palatable and has a good nutritive value and can be made into hay or fed fresh to stalled ruminants (Cook *et al.,* 2005). *Brachiaria* is the most important forage grass for pastures in the tropics (Singh, 2009). *Brachiaria* cultivars have impacted the economy of various countries in the tropics because of their ability to grow so well in low fertility acid soils and still able to produce highly nutritious forage for many ruminants. In the past, 25 to 35 years, *brachiaria* cultuvation has become the major components of some pastures (Singh, 2009). *Brachiaria ruzinensis* has combined soil in other grasses and legumes, it combine well with legumes such as *Centrosema pubescence* or *Pureria phaseoloides*. *Brachiaria ruziziences* has a rapid growth especially in the wet season (Sani *et al.,* 2015). Sources of cheaper alternative forages of high quality for ruminant livestock production have been a subject of research in recent years (Alan *et al.* 2013) especially for small scale livestock producers in tropics. The bulk of the animal protein, especially milk and meat, consumed in Nigeria, derive from ruminant animals, which are dependent mainly on these crops. According to Kallah *et al*. (2005), grazing lands in Nigeria, including natural wetlands (fadama), woodlands and forest reserves, are estimated to cover about 32.42 million hectares, while cultivated croplands amount to about 39.41 million hectares. These lands provide substantial amount of forage and fodder, which are of vital importance in Nigeria's drive towards self- sufficiency in agricultural production, since they provide major source of feed, especially for the country's ruminant livestock, both domestic and wildlife.

MATERIAL AND METHODS
Experimental Site
The research was carried out in crop production research farm at Abubakar Tafawa Balewa University Main Campus, Gubi, Bauchi State. Bauchi lay between latitude 100°33´N and longitude 9°31´E. It is bordered by seven states, Kano and Jigawa to the North, Taraba and Plateau to the South, Gombe and Yobe to the East and

Kaduna to the West. It occupies a total area of 49,259.01sq kilometers, representing about 5.3% of the total land mass of Nigeria.(Hassan *et al*. 2013)

Soil Sample of the Experimental Plot

A composite soil sample was taken from the experimental site using a soil auger to collect soil samples to a depth of 15-20cm. The soil samples was analyzed for texture, particle size, nitrogen, phosphorus, soil PH and cations exchange capacity (CEC).

Experimental Design for Congo grass (*B. ruziziensis*)

The experiment was laid out in a Completely Randomized Design (CRD) with six replicates. *B. ruziziensis* was planted as a sole crop, at an intra row spacing of 30cm and intra row spacing of 60cm. The pasture was sampled at 6th, 8th, 10th and 12th weeks post-emergence to determine various agronomic parameters.

Method of data collection

At 6, 8, 10 and 12 weeks after germination, the numbers of plants were counted and samples were cut at 10-15cm above the ground level. The fresh material samples cut were oven dried at 65^0C before taken to laboratory for proximate analysis.

Chemical Analysis

Dry samples of Congo grass (*Brachiria ruziziensis*) were collected and analyzed at Abubakar Tafawa Balewa University Bauchi, Faculty of Agriculture and Agricultural Technology, Animal Science Laboratory for the determination of proximate composition. Samples collected were ovum dried to a constant weight at 105°C to determine the dry matter and therefore the samples were ground to pass through 1mm sieve for later use. Crude protein, crude fibre, ether extract and also ash content of Congo grass (*B.ruziziensis*) and the protein supplement were analyzed by AOAC (2001). The crude protein was calculated (by multiplying the Nitrogen value in feedstuffs by 6.25% protein coefficient) and the Crude fibre component was determined by the method of Van Soest, (1991).

Statistical Analysis

Data collected was analyzed using analysis of variance (ANOVA) by General Linear Model (GLM) procedure of Statistical Analysis System (SAS) version 9 (SAS, 2005). The treatment mean was separated and compared using Duncan´s Multiple Range Test (DMRT).

RESULTS AND DISCUSSIONS

Table 1: Physical and Chemical Properties of the Soil in the Study Area.

Properties	**Values**
Physical properties:	
Particle size:	
Clay	18.3
Silt	10.8
Sand	71.17
Chemical properties:	
Exchangeable Bases:	
K^+	6.52
Na^+	8.6
Mg^{++}	0.18
Ca^{++}	3.65
Micro nutrients:	
Fe	2.2
Zn	0.5
Mn	2.19
Cu	0.3
PH	6.36

The table above shows the physical and chemical properties of the soil in the study area. The soil has particle size which ranges from 10.8 to 71.17 (Silt and Sand respectively). The soil has high Potassium (K^+) of 6.52 while the soil has PH of 6.36 and the Fe, Zn, Mn and Cu were 2.2, 0.5, 2.19 and 0.3 respectively.

Table 2: Effect of Harvesting Age on the Proximate Composition of Congo Grass (*Brachiaria ruziziensis*)

Harvesting Age (weeks)	**DM**	**CP**	**ASH**	**EE**	**CF**
6	89.27	8.93^{ab}	9.23^{ab}	9.23^{ab}	29.34^{b}
8	88.93	10.89^{a}	9.46^{a}	9.46^{a}	31.63^{ab}
10	90.19	7.89^{b}	8.29^{ab}	8.29^{ab}	34.21^{ab}
12	90.36	7.68^{b}	7.16^{b}	7.16^{b}	36.24^{a}
SEM	0.58	0.58	0.58	0.58	0.58

$^{a, b,c}$ = Means in the same row with different superscripts differ significantly (P<0.05)
DM=Dry matter; CP= Crude protein; EE=Ether extract; CF= Crude fibre

Table 3 shows the result for the proximate composition of Congo grass at different harvesting age. Harvesting age significantly (P<0.05) affected crude protein, crude fibre, Ash and Ether extract. On the other hand, treatment effect was not significant (P>0.05) for dry matter. The crude protein (CP) values ranged from 7.68% at week 12 to 10.89% at week 8. The crude protein decline significantly from 10.89% to 7.68% in week 8 and 12 respectively, while the crude fibre was high at week 12, 36.24% and low at week 6 to 29.34%. Late harvesting was reported to significantly reduce crude protein concentration on herbage species, (Simpson *et al.,* 2014). This result goes in concord with that of Sani *et al.* (2015), where there is not significant (P>0.05) for dry matter at differ ent harvesting age, while crude protein, crude fibre, Ash and Ether extract were significantly different (P<0.05) at different stages of growth. The nutritive value of Congo grass (*Brachiaria ruziziensis*) steeply declines with maturity, the crude protein declines to 9-10% after 10 weeks of re-growth, and can be lower than 8% after 15 weeks of re- growth (*Sani et al*., 2015). Plants vary in the quantities of different nutritive components that they deliver to consumers. They can vary in the amounts of fat, protein, carbohydrate, fibre and other micro-nutrients that are present in tissues (Simpson *et al.,* 2004).

Table 3: Effect of Harvesting Age on the Macro Nutrients Composition of Congo Grass *(Brachiaria ruziziensis*)

Harvesting age (Weeks)	Ca	P
6	0.33	0.26^{ab}
7	0.36	0.29^{a}
10	0.26	0.23^{ab}
12	0.20	0.18^{c}
SEM	0.058	0.01

$^{a, b, c}$ = Means in the same row with different superscripts differ significantly (P<0.05).
P=Phosphorus; Ca= Calcium

Table 4 showed the results for calcium and phosphorus composition of Congo grass *(B. ruziziensis*) at different stages of harvest. Harvesting stage significantly (P<0.05) affected phosphorus composition of the grass. On the other hand, harvesting stage was not significant (P>0.05) for calcium composition. The result obtained was not similar to the result reported by Sani *et al.* (2015) where harvesting stage was not significant (P>0.05) for both calcium and phosphorus composition of *B. ruziziensis*. The highest phosphorus content was 0.29% at week 8 and 0.18% which was the lowest at week 12.

CONCLUSION AND RECOMMENDATIONS

Conclusion

Brachiaria ruziziensis has high crude protein of 10.89 at week 8, ether extract of 9.46% at week 8, crude fibre of 36.24% and ash of 9.46% at week 8. Harvesting stage significantly (P<0.05) affected phosphorus composition of the grass.

RECOMMENDATIONS

It is recommended that *Brachiaria ruziziensis* should be harvested at week 12 for higher crude fibre and dry matter. For higher crude protein and phosphorus composition, *Brachiaria ruziziensis* should be harvested at week 8.

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