EFFICACY OF RABBIT URINE AS FERTILIZER ON HERBAGE YIELD AND NUTRITIVE VALUE OF CONGO GRASS (B*rachiaria ruziziensis*)

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ABSTRACT
This study determined the efficacies of rabbit urine as fertilizer on herbage yield and nutritive value of *Brachiaria ruziziensis*. The experiment was set up in a completely randomized design with four treatments comprising of varying rabbit urine concentrations; T1 (no urine), T2 (714ml), T3 (833ml) and T4 (882ml) with each treatment replicated four times. Fresh matter yield (FMY), dry matter yield (DMY) and morphological traits were estimated. Samples of grasses were taken for chemical analysis. The FMY and DMY of T4 (882ml) had significantly ($P<0.05$) superior values to other treatments. The number of leaves was significantly ($P<0.05$) highest in T4 (615.00), followed by T1 (491.50), T2 (472.00) and least T3 (376.00). The T4 (9.78) concentration was significantly highest ($p<0.05$) in crude protein T1 (8.05), T2 (7.18) and T3 (6.36). The values of crude fibre was significantly higher ($p<0.05$) in T3 (33.96) and T1 (34.02) concentrations than T3 (33.96) and T4 (30.15). However, the Congo grass treated with T3 and T2 urine concentrations had significantly higher ($P<0.05$) NDF, ADF, ADL, HEM and CEL contents than T4 and T1. It could be concluded that rabbit urine at 882 ml/l concentration (T4) led to improved herbage and agronomic yields as well as crude protein and metabilisable energy contents.

Keywords: Rabbit, Urine, fertilizer, herbage yield, nutritive value, Congo grass.

DESCRIPTION OF PROBLEM
Rabbit urine is gaining popularity as a natural fertilizer and pesticide due to its high nutrient content and effectiveness in promoting crop growth (1). Rabbit urine is a rich source of nitrogen and phosphorus, which are essential nutrients for plant growth (2). Fertilization using rabbit urine has been reported to improve soil fertility and increase crop yield (3). Also, being organic fertilizer, it is cost-effective and environmentally friendly therefore rabbit urine possesses qualities that promote improved yield and environmental safety. *Brachiaria ruziziensis* (Congo grass) is an excellent source of fodder for animals with decent palatability. *Brachiaria ruziziensis* exhibits outstanding productive features such as excellent acceptance, an effective response to fertilization, great fodder quality and feeding value (4), quick establishment, swift growth at the inception of the rain season, ability to work well in a consortium with legumes, dense flowering, and enormous seed yield (5). However, despite these noteworthy traits, factors such as poor soil fertility and defective fertilization practices affect herbage yield and nutritive value of the grass hence this study is aimed at examining efficacies of rabbit urine fertilization on *Brachiaria ruziziensis* yield and nutritive value.

MATERIALS AND METHODS
Experimental location
The research was conducted at Pasture Plot of the Department of Animal Science Teaching and Research Farm, College of Agriculture, Ejigbo, Osun State University Osun State. Nigeria.

Experimental layout, design and treatment
The existing pasture plots of *Brachiaria ruziziensis* was divided into four (4) plots with each representing a treatment. The plots were cut back to a uniform height of 10cm using mower. There were four (4) replicates

per plot and 16 plots in total arranged in a Completely Randomized Design. Rabbit urine was collected from Rabbit Unit of the Teaching and Research Farm, Department of Animal Science, College of Agriculture, Osun State University, Ejigbo. The treatments comprised of T1 without rabbit urine application, T2 with rabbit urine and water mixed at the ratio of 1:2.5 (714ml/l concentration), T3 plots were fertilized with the mixture of rabbit urine and water at ratio 1:5 (833ml/l concentration) while T4 plots were fertilized with the mixture of rabbit urine and water at the ratio of 1:7.5 (882ml/l concentration). The rabbit urine concentrations were applied to Congo grass plots using foliar application method at what stage (days or weeks after defoliation).

The concentration of urine in each water-urine mixture was estimated as:

$$solute\ volume = \frac{final\ volume}{ratio\ of\ urine + ratio\ of\ water}$$

Determination of herbage yield

The biomass yield was calculated by random tossing of a wooden quadrat measured 0.5m^2. The grasses that fell within the quadrat were uprooted and it was repeated four times on each plot. The herbage was gathered using rake, put into a sack, and weighed. The results obtained were then interpolated in ton per hectare. Parameters estimated include plant height, root length, leaf length, leaf width, number of leaves, number of tillers, and leaf-stem ratio.

Determination of dry matter yield

Samples (100g) from each replicate were taken to the laboratory and oven-dried at 65^{0}C. The weight after oven drying was deducted from the fresh weight to get the moisture content.

Dry matter = 100 – Moisture content. The percentage dry matter was determined and multiplied by the fresh yield to estimate dry matter yield expressed in tonnes/ha.

Chemical Analysis

The chemical composition was analyzed using (6) technique. The fibre fraction was done in accordance with (7) approach.

Statistical analysis

Data collected were subjected to one-way analysis of variance (ANOVA) using (8) package and significant means were separated using Duncan's Multiple Range Test at 5% significant level.

RESULTS AND DISCUSSION

Herbage and agronomic yields of Congo grass fertilized with rabbit urine

Table 1 shows the effects of varying concentrations of rabbit urine on the yield and morphological parameters of *Brachiaria ruziziensis*. The T4 (882ml) urine concentration was significantly ($P<0.05$) higher in fresh matter yield, dry matter yield, plant height, root length, number of tillers and leaf/stem ratio. The number of leaves was significantly ($P<0.05$) highest in T4 (882ml), followed by T2 (714ml), T3 (833ml) and least T1 (no urine). The significant influence of fertilizer observed in the fresh matter and dry matter yield in the present study is in agreement with various studies (4). (9) revealed that root length is significantly influenced by fertilizer types and this was also observed in the present study. The highly significant effect observed for leaf length in the current study conforms to the study by (10). According to Ojo and Ojeniyi (11) a higher number of leaves was a desirable property of forage as forage leaves possess more nutritive value than other parts of the forage. The values of the leaf-stem ratio in the present study are within the range (1.04 – 2.70cm) reported by (12).

Chemical composition of Congo grass fertilized with rabbit urine

The effect of rabbit urine as fertilizer on the chemical composition of *Brachiaria ruziziensis* was shown in (Table 2). The result reveals that all parameters estimated were significantly ($P<0.05$) influenced by varying concentrations of rabbit urine as fertilizer for *Brachiaria ruziziensis*. The dry matter (DM) recorded in this study was significantly ($P<0.05$) highest in T1 (no urine), followed by T4 (882ml), T3 (833ml) and T2 (714ml). The T4 (882ml) concentration had

significantly (P<0.05) highest crude protein, followed by T1 (no urine), which was then followed by T2 (714) while the lowest value was recorded in T3 (833ml). The value of crude fibre (CF) was significantly (P<0.05) higher in T3 (833ml) and T1 (no urine) concentrations than T3 (833ml) and T4 (882ml). The metabolisable energy was significantly (P<0.05) higher in T4 (882ml) and T2 (714ml) than T1 (no urine) and T3 (833ml). However, the Congo grass treated with T3 (833ml) and T2 (714ml) urine concentrations had significantly (P<0.05) higher NDF (64.90 and 52.90), ADF (35.35 and 26.40), ADL (14.00 and 10.00) and HEM (29.55 and 26.50) contents than T4 (882ml) and T1 (no urine) which in most fraction were significantly (P>0.05) similar. The increasing crude protein among the treatments with an advancing concentration of urine is similar to the study by (13). These results were in agreement with those revealed by (14) in which application of fertilizer led to a reduction in crude fibre. Forages with low crude fibre were of high quality therefore *Brachiaria ruziziensis* grass in T4 (882ml) with the lowest crude fibre had a better nutritive value. The values of NFE obtained in this study were lower than those obtained by (15) but below those reported by (16).

Table 1: Herbage and agronomic yields of Congo grass fertilized with rabbit urine

Parameters	T1	T2	T3	T4	SEM	P Value
Fresh mater yield	18.63^{c}	25.25b^{c}	27.75^{b}	54.75^{a}	0.08	<0.0001
Dry matter yield	5.00^{b}	6.82^{b}	6.78^{b}	9.59^{a}	0.15	0.0043
Plant height (cm)	115.95^{d}	150.88^{b}	125.76^{c}	170.05^{a}	4.03	<0.0001
Root length (cm)	29.95^{d}	40.13^{b}	34.60^{c}	55.10^{a}	21.96	<0.0001
Leaf length (cm)	25.00^{c}	31.88^{b}	25.13^{c}	38.05^{a}	1.61	0.0006
Number of leaves	491.50^{b}	472.00^{c}	376.00^{d}	615.00^{a}	2.45	<0.0001
Number of tillers	33.50^{d}	36.75^{c}	43.50^{b}	73.00^{a}	5.48	<0.0001
Leaf/stem ratio	0.87^{d}	1.15^{c}	1.63^{b}	2.35^{a}	0.44	<0.0001
Leaf weight (kg)	2.28	2.23	1.85	2.03	3.69	0.1804

^{abcd} Means with different superscripts are significantly different (P<0.05).

Table 2: The chemical composition of Congo grass fertilized with rabbit urine

Parameters (%)	T1	T2	T3	T4	SEM	P Value
Dry matter	91.13^{a}	87.85^{c}	88.75^{b}	90.65^{a}	0.51	0.0008
Crude protein	8.05^{b}	7.18^{c}	6.36^{d}	9.78^{a}	0.47	<0.0001
Crude fibre	34.02^{a}	31.14^{b}	33.96^{a}	30.15^{b}	0.69	0.0306
Ether extract	1.89^{ab}	1.96^{a}	1.42^{b}	2.25^{a}	0.12	0.0397
Ash	10.05^{b}	9.28^{c}	9.91^{b}	10.67^{a}	0.19	0.0397
Nitrogen free extract	37.08	38.52	37.09	37.80	0.32	0.4068
Metabolisabe energy (MJ/kg)	1759.28^{b}	1766.10^{a}	1641.63^{b}	1856.38^{a}	30.56	0.0218
Neutral detergent fibre	43.87^{c}	52.90^{b}	64.90^{a}	40.00^{d}	3.62	<0.0001
Acid detergent fibre	25.50b^{c}	26.40^{b}	35.35^{a}	21.50^{c}	1.95	0.0030
Acide detergent lignin	8.95^{c}	10.00^{b}	14.00^{a}	7.70^{d}	0.89	<0.0001
Hemicellulose	18.37^{b}	26.50^{a}	29.55^{a}	18.50^{b}	1.90	0.0043
Ccellulose	16.50^{b}	16.40^{b}	21.35^{a}	13.80^{b}	1.10	0.0336

^{abcd} Means with different superscripts are significantly different (P<0.05).

CONCLUSION AND APPLICATION

It could be concluded that rabbit urine at 882 ml/l concentration (T4) led to improved herbage and agronomic yields as well as better crude protein and metabolisable energy contents.

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