

## Evaluation of Different Levels of Bocashi in the Production of *Cenchrus Purpureus* cv. King Grass in the Ecuadorian Amazon.

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### ABSTRACT

**Introduction:** Soil fertility is a crucial aspect for agricultural productivity, and bocashi is presented as a sustainable alternative to chemical fertilizers, which can be harmful to the environment.

**Objectives:** This study investigates the impact of different levels of bocashi on morphological and bromatological performance of *Cenchrus purpureus* cv. King Grass.

**Methods:** The research was carried out at the Centro Experimental de Investigación y Producción Amazónica CEIPA), using a randomized experimental design with four treatments: three doses of bocashi (20 kg, 25 kg and 30 kg) and a control group. Several morphological and bromatological variables were measured for 45 days.

**Results:** It was found that the treatment with 30 kg of bocashi (T<sub>3</sub>) resulted in the highest levels of protein (13.04%) and crude fat (9.57%), indicating an improvement in the nutritional quality of the forage. In addition, it was observed that cutting age influences plant height, being a determining factor in the overall development of King Grass.

**Conclusions:** Bocashi improves some parameters of King Grass, although it was demonstrated that cutting age showed a significant effect on bromatological variables, with a decrease in crude protein and fat.

**Keywords:** Digital Forensics, criminal investigation, Prospects, Challenges, Solutions

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### INTRODUCTION

The production of high-quality forages is a topic of growing interest worldwide due to its relevance to the sustainability of livestock systems, especially in tropical and subtropical regions. In many countries, livestock farming represents a key economic activity, and the availability of nutritious, high-yielding forages is essential to maintain livestock productivity and reduce dependence on expensive concentrate feeds (FAO, 2021). However, global challenges such as soil degradation and climate change have prompted the search for sustainable alternatives, including the use of organic fertilizers, with the aim of improving the quality and quantity of forage crops (Pahalvi et al., 2021). In this context, *Cenchrus purpureus* cv. King Grass has stood out for its adaptability to tropical conditions and its high productivity, being used in several countries for animal feed and in agroforestry systems (Islam et al., 2024). In the Ecuadorian Amazon region, which represents approximately 40% of the national territory and is rich in biodiversity, agricultural production is fundamental to the local and national economy (Sánchez-Capa and Anguaya, 2024; González-Comín, 2023). However, this region faces environmental and economic challenges that affect its productive capacity, making forage production especially relevant for food security (Johannes et al., 2024).

Although King grass can provide forage throughout the year and has a good nutritional content, its productivity depends largely on soil fertility. In the Ecuadorian Amazon, soil acidity, low nutrient retention and low organic matter content are challenges that have decreased the productive capacity of the soil (Maleko

et al., 2019; Babu et al., 2025). In addition, the use of chemical fertilizers has generated negative effects on soil health and the environment (Pahalvi et al., 2021). For this reason, the use of organic fertilizers such as bocashi, which improves soil quality and promotes the sustainability of agricultural systems, has been proposed (Ginting, 2019).

Bocashi, which is made from the fermentation of organic residues, has been shown to have multiple benefits, such as improving soil structure and increasing its water and nutrient capacity. Previous studies have shown that bocashi can increase crop yields in tropical areas, but its impact on forages such as king grass requires further research (Oba et al., 2021; Mendivil-Lugo et al., 2019). This study aims to evaluate the effect of different levels of bocashi on the yield of king grass in the Ecuadorian Amazon, seeking to optimize its use and improve forage quality (López-Aguirre et al., 2022).

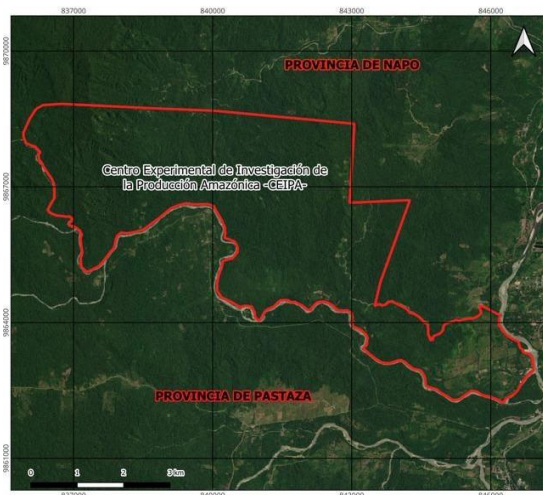
## OBJECTIVES

To evaluate the impact of different levels of bocashi on morphological and bromatological performance of *Cenchrus purpureus* cv. King Grass.

## METHODS

### Location of the experiment

The research was carried out at the Centro Experimental de Investigación y Producción Amazónica (CEIPA) of the Universidad Estatal Amazónica, located in zone 18, near kilometer 44 of the Puyo-Tena Road, in the Arosemena Tola canton, Napo province (Figure 1). The region has a tropical climate, with an annual rainfall of 4000 mm, temperatures between 15 and 25 °C, and a relative humidity of 80%. Its topography is slightly undulating, with altitudes varying between 590 and 957 m asl (Abril-Saltos et al., 2023). The experiment lasted 45 days.



Source : (Grefa-Andi et al., 2024).

Figure 1. Location of the Centro Experimental de Investigación y Producción Amazónica (CEIPA).

### Application of bocashi and experimental units

Organic fertilizer was applied only once at the beginning of the study. Three treatments were established in triplicate and compared with a control group. The first treatment (T1) consisted of the application of 20 kg of bocashi, the second (T2) of 25 kg, the third (T3) of 30 kg, and the control group (T0) received no application of bocashi. Twelve experimental units were used, each with an area of 25 m<sup>2</sup>, separated by 1 meter. Treatments were compared using a completely randomized block experimental design, according to the mathematical model (1).

$$Y_{ij} = \mu + \alpha_i + \beta_j + \varepsilon_{ij} \quad (1)$$

Where:

$Y_{ij}$  = observed value of the dependent variable in the  $i$ th treatment and  $j$ th block

$\mu$  = Overall mean

$\alpha_i$  = Effect of the  $i$ th treatment

$\beta_j$  = effect of the  $j$ th block

$\varepsilon_{ij}$  = experimental error associated with each experimental unit

### Sample collection

At the beginning of the experiment, an equalization cut was made to the king grass to ensure a homogeneous base in all experimental units. This cut allowed establishing a uniform height of growth among the plants before starting the treatments. Throughout the research, samples were taken every 15 days, 500 g of biomass per sample, from a total of 10 randomly selected plants in each experimental unit.

### Morphological variables

#### Plant height

It was measured directly using a 1 m graduated ruler. For each experimental unit, 10 representative plants were randomly selected and measured the height from the base of the stem to the top of the tallest leaf. Measurements were taken at 15-day intervals, starting from the beginning of the experiment.

#### Leaves/plant

The number of leaves per plant was recorded by observing each of the 10 randomly selected plants in each experimental unit. To avoid possible counting errors, a cross-check of the visible and developed leaves on the main stem of each plant was performed, excluding leaves that did not yet show signs of growth or showed obvious damage.

#### Plant leaf length

Leaf length was determined by measuring the length of the most representative leaves of each plant. The largest leaves of plants sampled in each experimental unit were selected, taking as reference the total length from the base of the petiole to the most distal tip of the leaf. Measurements were made using a millimeter ruler. To obtain a representative value, leaf length averages were calculated for each plant and each experimental treatment.

#### Blade width

The width of the was measured at their widest point using a precision digital caliper. The most representative leaves were selected from each of them and the width was determined from the measurement of the distance between the outermost margins of the leaf, in the intermediate area between the base and the tip. The values obtained were average for each treatment.

#### Stem diameter

Stem diameter was measured at a height of 10 cm from the base of the stem of randomly selected plants in each experimental unit. For a digital caliper was used to obtain accurate measurements of the diameter of the stems.

### Bromatological variables

It was determined at the Bromatology Laboratory of the Universidad Estatal Amazónica. The procedures established by AOAC (2023) were applied (Table 1).

**Table 1.** Standards used for determining the chemical composition of *Cenchrus purpureus* cv. King Grass.

Component	Standard
Protein	AOAC 954.01
Crude fiber	AOAC 935.53
Moisture	AOAC 925.10
Crude fat	AOAC 920.39
Total ash	AOAC 923.03

Source: Authors

The procedures used for each analysis are detailed below:

### Organic matter

1 g of sample was weighed in triplicate in porcelain crucibles. These crucibles were placed in an oven (brand: Memmert, model: SFE700) at a temperature of 105°C for a period of 4 hours. After the drying process, the samples were cooled in a desiccator and then. This procedure was repeated several times until a constant weight was reached. The dry matter content was calculated according to equation (2).

$$\%Organic\ Matter = \frac{C_{(ms)} - C_{(ma)}}{m} * 100 \quad (2)$$

Where  $C_{ms}$  is the mass of the crucible plus dry sample (g),  $C$  indicates the mass of the empty crucible (g) and  $m$  is the weight of the fresh sample (g).

### Crude fat

An automatic grease extractor (model XT15, Ankom brand) was used. The operating conditions were set at a temperature of 90°C and an extraction time of 2 hours, using n-hexane as solvent. Three samples of 1 g each were used in one, which were placed in filter bags previously weighed and then inserted into the equipment for the extraction process. Once the fat extraction was finished, the bags were dried in an oven at 105°C for 45 minutes to eliminate any trace of n-hexane. At the end of the process, the bags with the defatted samples were weighed again. The fat content was calculated by the difference in weight, according to the formula shown in equation 3.

$$\%CF = \frac{F_{md} - F}{m} * 100 \quad (3)$$

Where  $F_{md}$  is the mass of the casing plus defatted sample (g),  $F$  is the mass of the empty casing (g) and  $m$  represents the mass of the sample (g).

### Crude protein

A 1 g sample was weighed into digestion tubes. To each one was added a Kjeldahl tablet as catalyst 20 mL of concentrated sulfuric acid (96- 98%) and three boiling beads. The tubes were subjected to digestion in a digestion (Hanon SH420 model) for two hours. Then, 65 mL of distilled water and 60 mL of sodium hydroxide (45.4%) were added to perform the nitrogen distillation of processed samples. This procedure was carried out in a nitrogen distiller (Hanon model). The distillate was collected in a 100 mL Erlenmeyer flask, to which three drops of Tashiro's indicator and 35 mL of 2% boric acid were added. Finally, the distilled nitrogen was titrated with a 0.2 N sulfuric acid solution, and the protein content was calculated as a percentage using equation (4).

$$\%CP = \frac{(V - V_B) * N * 0.014 * 6.25 * 100}{m} \quad (4)$$

Where:  $V$  indicates the volume of  $H_2SO_4$  consumed (0.2 N),  $V_B$  the volume of blank consumed,  $N$  is the normal of the acid and  $m$  is the sample analyzed (g).

### Crude fiber

A 1 g of sample was weighed in triplicate and placed in filter bags moistened with distilled water, then processed in an automatic fiber determination equipment (brand: Tecnal, model: TE149). The samples were treated with 1.25% sulfuric acid at 90°C for 30 minutes, followed by rinsing with distilled water. Then, 1.25% sodium hydroxide was applied and shaken for 30 minutes. After rinsing with alcohol and acetone, the samples were oven dried for 4 hours and then calcined at 550°C for 2 hours. Finally, they were weighed, and crude fiber content was calculated according to equation 5.

$$\%FC = \frac{(C - A) - D * 100}{m} \quad (5)$$

Where  $A$  is the weight of the empty ball (g),  $m$  is the weight of the sample (g),  $C$  is the weight of the crucible-bag-extract set (g) and  $D$  is the crucible-ash set (g).

### Total ash

Three samples of 1 g each were weighed and placed in previously weighed crucibles. These samples were calcined for 10 minutes on a heating plate. Subsequently, the crucibles were transferred to a flask (brand: Thermo Scientific), where they were kept at 550°C for 2 hours. After the process, the crucibles were cooled in a desiccator and weighed. The total ash content was calculated using equation 6.

$$\%CE = \frac{P-C}{m} * 100 \quad (6)$$

Where P is the weight of the crucible plus ashes (g), C indicates the weight of the empty crucible (g) and m the weight of the sample (g).

### Statistical analysis

An analysis of variance, performed with Design Expert software, was used to examine the impact of bocashi application on morphological variables and chemical composition of *Cenchrus purpureus* cv. King Grass.

## RESULTS AND DISCUSSION

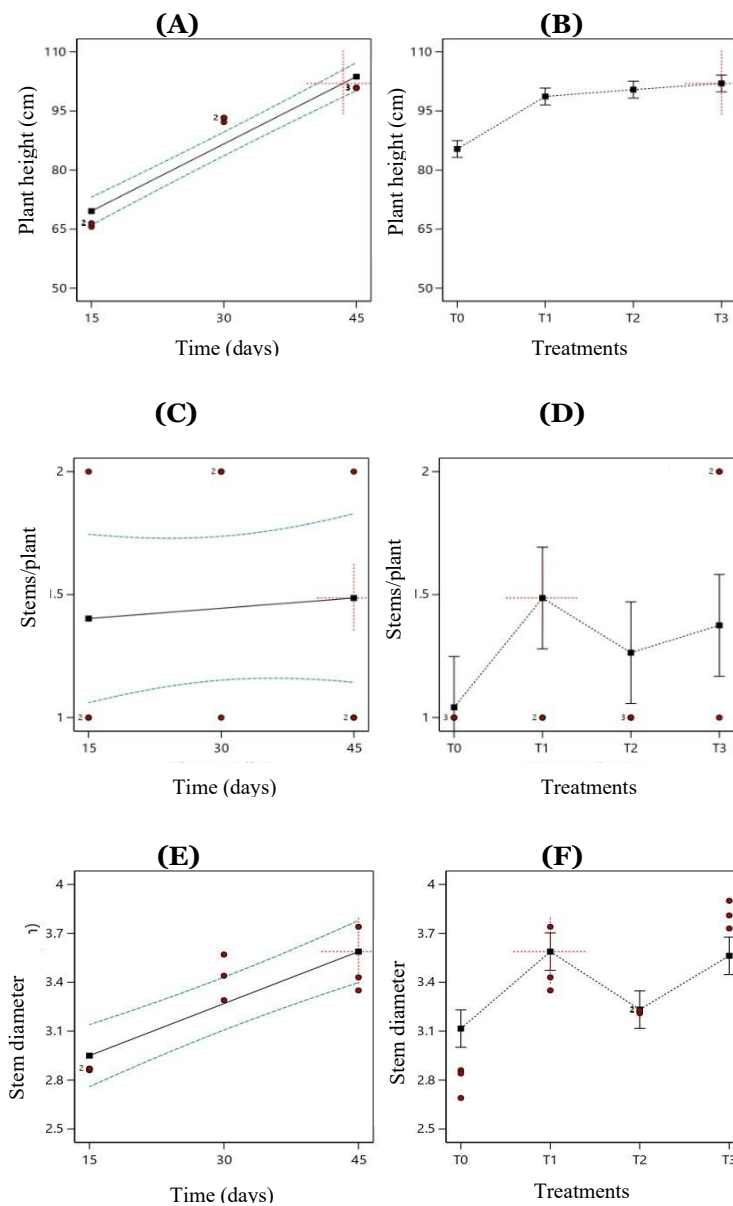
### Morphological variables

Figures 2 and 3 illustrate the influence of cutting age and bocashi application, using different treatments, on morphological parameters of King Grass. It was observed that cutting age had a positive effect on plant height (Figure 2A), number of stems/plant (Figure 2C) and stem diameter (Figure 2E), with a progressive increase between 15 and 45 days. On the other hand, bocashi application improved plant height compared to the T<sub>0</sub> treatment (Figure 2B). However, no significant differences were recorded between treatments T<sub>1</sub>, T<sub>2</sub> and T<sub>3</sub>, although the latter showed slightly higher values, ranging from 66.17±0.53 to 100.80±0.11 cm.

On the other hand, the application of bocashi did not show significant differences compared to the control treatment in the number of stems/plant (Figure 2D) indicating that the applied treatments did not have a significant effect on this variable. The results varied between 1±0 stems/plant at 15 days and 1±0 at 45 days. Likewise, in stem diameter (Figure 2F) no differences were found between treatments T<sub>2</sub> and T<sub>0</sub>. The most outstanding results were obtained with the treatment T<sub>3</sub> (3.81±0.09 cm) who outperformed slightly at T<sub>2</sub> (3.22±0.01 cm). On the other hand, the variables leaves/stem, leaf length and leaf width had a proportional behavior with the age at cutting (Figures 3A, 3C and 3E), i.e., as time increased from 15 to 45 days these variables increased progressively. For the variable leaves/stem, no significant differences were observed between treatments T<sub>1</sub> and T<sub>0</sub> with mean values of 11±0 and 10±1 leaves/stem, respectively (Figure 3B). For the leaf length variable, treatments T<sub>1</sub>, T<sub>2</sub> and T<sub>3</sub> were slightly superior to the control, however, there were no significant differences among the three treatments that included the application of bocashi (Figure 3D).

The values obtained for T<sub>1</sub>, T<sub>2</sub> and T<sub>3</sub> at the end of 45 days were 84.36±0.63, 84.41±0.71 and 85.51±0.11 cm, respectively. Finally, for leaf width (Figure 3F), the T<sub>3</sub> treatment stood out with the best results with a mean that varied between 3.62±0.62 cm at the end of 45 days. The results of the morphological variables coincide with those reported in previous studies, where morphological development of King Grass is influenced by growth time and nutrient availability. However, although the application of bocashi improved the plant height in compared to the control treatment, the values obtained (66.17±0.53 to 100.80±0.11 cm) were considerably lower than the 165.33 cm reported by Montero (2024) after the application of biol as fertilizer. This suggests that the type of organic fertilizer used influences grass response, with biol being a more effective alternative to promote height growth. In contrast, the number of stems/plants did not show significant variations with bocashi application, indicating that this characteristic could be more influenced by genetic factors or specific environmental conditions, as indicated by the study McAllister et al. (2018) where they reported a low response in stem production in tropical grasses fertilized with organic amendments.

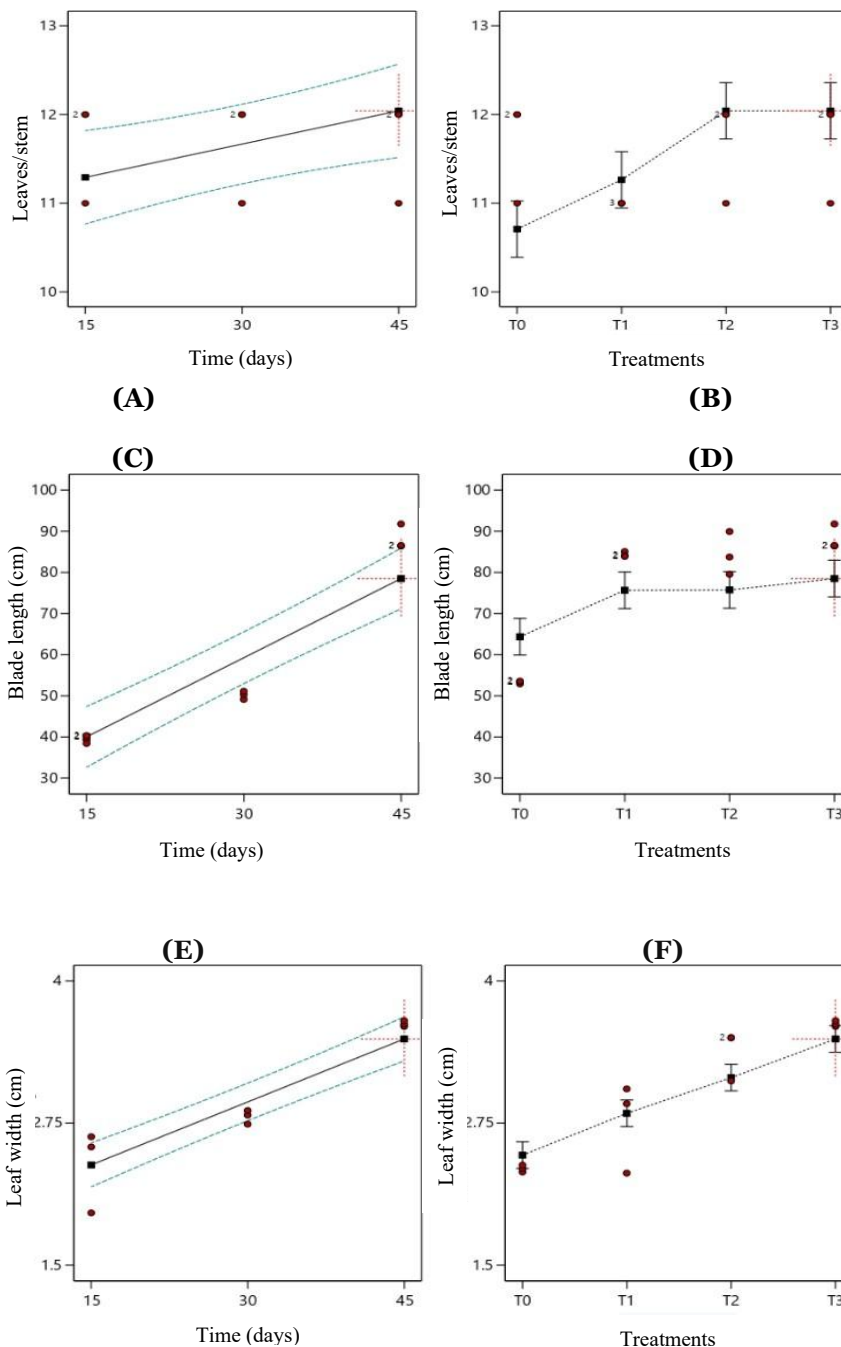
As for stem diameter, the values obtained ranged from 3.22±0.01 cm to 3.81±0.09 cm, with the T<sub>3</sub> treatment showing a slight advantage over the others. These results are superior to those reported by Hendarto & Setyaningrum (2022), who obtained a diameter of 1.24 cm in 60-day-old grasses treated with bovine manure, this shows that bocashi could generate greater stem thickening in early stages of growth. However, the absence of significant differences between treatments T<sub>2</sub> and T<sub>0</sub> indicates that the response of stem diameter to bocashi is not uniform and could depend on other factors, such as water availability and seeding density. The results obtained for the variables leaves/stem, leaf length and leaf width increased progressively with cutting age, indicating a positive correlation between growth time and leaf development of King Grass. These findings agree with that reported by Bedoić et al. (2019), who evidenced that longer growing time allows greater accumulation of leaf biomass in tropical grasses, favoring leaf elongation and leaf/stem ratio. However, bocashi application did not generate significant differences in leaf/stem ratio between T<sub>1</sub> and T<sub>0</sub> treatments, suggesting that this parameter could be more conditioned by plant genetics and intraspecific competition, as pointed out by Botero-Londoño et al. (2021) in a study on the morphology of *Cenchrus purpureus* cv. King Grass, where seeding density and light availability were key factors in the ratio of leaves to stem.



Source: Authors

Figure 2. Influence of cutting age (A, C, and E) and bocashi application (B, D and F) on plant height, stems/plant and stem diameter.

Although the bocashi treatments (T1, T2 and T3) showed slightly higher values than the control, the absence of significant differences shows that organic fertilization favors leaf growth, but its impact is not sufficiently marked in the short term. These results contrast with those reported by Dokbua et al. (2021) who found significant increases in the leaf length of King Grass when applying compost enriched with efficient microorganisms, which highlights the importance of fertilizer composition in the morphological response of the grass. Regarding leaf width, the T3 treatment showed the best results, which could be attributed to a greater availability of nutrients that favor cell expansion in leaf tissue, as described by Ali et al. (2019) in their study on the response of forage maize to organic amendments. These findings provide evidence that, although bocashi contributes to leaf development of King Grass, its effect is most evident in leaf width and less pronounced in length and ratio leaves/stem, which suggests the need to evaluate other types of biofertilizers to enhance grass growth.



Source: Authors

Figure 3. Influence of age of cut (A, C, and E) and application of bocashi (B, D and F) on the variable’s leaf/stem, leaf length and leaf width.

### Bromatological variables

The analysis of variance (Table 2), showed that age at cutting had a statistically significant effect on crude protein ( $F = 9.21$ ;  $p = 0.02$ ), crude fat ( $F = 5.71$ ;  $p = 0.04$ ), total ash ( $F = 486.33$ ;  $p < 0.01$ ) and dry matter ( $F = 62.72$ ;  $p < 0.01$ ), since their p-values were less than the significance threshold (0.05). In contrast, crude fiber ( $F = 4.27$ ;  $p = 0.07$ ) did not show a significant difference, suggesting that the observed variability could be attributed to chance. The magnitude of the F-value in each case reflected the relationship between the variability explained by the model and the residual variability, with a particularly strong effect on total ash and dry matter.

**Table 2.** ANOVA for the effect of cutting age on bromatological variables of *Cenchrus purpureus* cv. King Grass.

Variable	gl	Sum of Squares	Squares media	F-value	p- value
Crude protein	2	1.43	0.72	9.21	0.02
Crude fat	2	0.57	0.28	5.71	0.04
Crude fiber	2	3.04	1.52	4.27	0.07
Total ash	2	2.43	1.22	486.33	0.00
Dry matter	2	81.03	40.52	62.72	0.00

Source: Authors.

The ANOVA presented in Table 3 shows that the application of bocashi manure generates a highly significant impact ( $p < 0.05$ ) on all the bromatological variables evaluated. Crude protein ( $F = 61.40$ ;  $p < 0.01$ ) exhibits the highest sensitivity to the treatment, suggesting a remarkable improvement in the protein profile of the forage. Similarly, crude fiber ( $F = 8.37$ ;  $p = 0.01$ ) and crude fat ( $F = 10.98$ ;  $p = 0.01$ ) present significant effects, indicating that organic fertilization influences the structural and energetic composition of the pasture. Total ash ( $F = 189.33$ ;  $p < 0.01$ ) reflects an extremely pronounced impact, showing an increased mineral accumulation due to the treatment. Finally, dry matter ( $F = 6.34$ ;  $p = 0.03$ ) is also significantly affected, implying possible changes in the storage capacity and nutritional quality of the forage. The magnitude of the F values indicates that the grass response is not uniform, but that certain bromatological fractions react more intensely to bocashi fertilization, consolidating its potential as a nutritional improvement strategy.

**Table 3.** ANOVA for the effect of treatments on bromatological variables of *Cenchrus purpureus* cv. King Grass.

Variable	Gl	Sum of squares	Squares media	F-Value	p-value
Crude protein	3	14.33	4.78	61.40	0.00
Crude fat	3	1.64	0.55	10.98	0.01
Crude fiber	3	8.94	2.98	8.37	0.01
Total ash	3	1.42	0.47	189.33	0.00
Dry matter	3	12.28	4.09	6.34	0.03

Source: Authors

Table 4 shows the experimental results for each bromatological variable. It was observed that, as the age of cutting increased, crude protein and fat content decreased, with the highest values at 15 days. In contrast, crude fiber, total ash and dry matter showed a progressive increase between 15 and 45 days. In addition, treatment T3 generated the highest protein values ( $13.04 \pm 0.22\%$ ), crude fat ( $9.57 \pm 0.42\%$ ), crude fiber ( $32.14 \pm 0.87\%$ ), total ash ( $11.60 \pm 0.08\%$ ) and dry matter ( $22.81 \pm 0.21\%$ ), evidencing their positive influence on bromatological composition.

The protein and fat results are consistent with the findings of Zi et al. (2021) and Ordaz-Contreras (2018), who also reported a decrease in protein and fat levels with increasing age in King Grass. Xuejuan (2021) found a protein content of 9.12% and fat content of 6.01% in 30-day-old plants, which is notably lower than the results obtained in this study at 15 days, where higher values were reached. This indicates that King Grass is more nutritious in its early stages of growth, which makes it an optimal choice for feeding animals in their early stages of development, especially in grazing systems where forage quality is a key factor for the growth and health of livestock. Similarly, Ordaz- Contreras (2018) reported a decrease in protein and fat in 90-day-old plants, with values of 10.1% and 4.03%, respectively, highlighting the general trend of reduction of these components as the plant matures.

**Table 4. Chemical composition of *Cenchrus purpureus* cv. King Grass, evaluated at different mowing ages.**

Time (days)	Treatments	Crude protein (%)	Crude fat (%)	Crude fiber (%)	Total ash (%)	Dry matter (%)
15	T <sub>0</sub>	10.88±0.51	9.57±0.42	28.78±0.41	9.60±0.01	14.46±0.85
15	T <sub>1</sub>	11.75±0.04	10.20±0.19	30.17±0.12	9.90±0.41	14.70±0.45
15	T <sub>2</sub>	12.63±0.41	10.32±0.81	31.32±0.21	10.20± 0.25	16.88±0.75
15	T <sub>3</sub>	13.04±0.22	10.84±0.17	31.65±0.32	10.40±0.15	16.91±0.71
30	T <sub>0</sub>	9.71±0.18	9.45±0.44	29.07±0.24	10.30±0.64	17.37±0.18
30	T <sub>1</sub>	11.34±0.11	10.13±0.68	31.57±0.44	10.60±0.46	17.19±0.44
30	T <sub>2</sub>	12.32±0.28	10.25±0.37	31.79±0.21	11.00±0.29	20.62±0.32
30	T <sub>3</sub>	12.97±0.34	10.76±0.71	31.95±0.33	11.20±0.71	20.22±0.38
45	T <sub>0</sub>	9.32±0.08	9.32±0.64	31.2±0.37	10.60±0.32	21.54±0.52
45	T <sub>1</sub>	11.08±0.40	9.87±0.08	31.65±0.51	10.90±0.45	22.07±0.81
45	T <sub>2</sub>	11.97±0.19	9.98±0.50	31.86±0.17	11.30±0.22	21.99±0.11
45	T <sub>3</sub>	12.56±0.11	9.77±0.44	32.14±0.87	11.60±0.08	22.81±0.21

Source: Authors

On the other hand, in crude fiber, total ash and dry matter, a progressive increase was observed between 15 and 45 days, which is consistent with that reported by Ordaz-Contreras (2018), who documented an increase in crude fiber, reaching a value of 36.9% at 90 days. This increase in fibrous components can be explained by the maturation process of the plant, leading to higher cellulose and lignin content. Dry matter also showed an increasing trend, reaching values higher than those reported by Santana (2019), who found a value of 8.92% in pasture of 45 days.

However, in this study, the T<sub>3</sub> treatment presented the best results in terms of protein (13.04%), crude fat (9.57%), crude fiber (32.14%), total ash (11.60%) and dry matter (22.81%), suggesting that the use of organic fertilizers, such as bocashi, has a positive effect on improving the nutritional composition of the grass. In particular, the high protein and fat content in King Grass when this treatment is used makes it highly recommended for cattle, which require a nutrient-rich diet to maximize their productivity. According to Wang et al. (2023), King Grass is an ideal choice for animal nutrition due to its high protein and energy concentration, which supports the efficacy of this forage for sustainable production in grazing systems.

The linear models fitted for the bromatological variables of King Grass (Table 5) reflect a significant relationship with cutting age, evidenced by high coefficients of determination (R<sup>2</sup>). Crude protein (R<sup>2</sup>= 0.991) and crude fat (R<sup>2</sup>= 0.874) presented negative slopes, indicating a progressive decrease of these components as time progresses. In contrast, crude fiber (R<sup>2</sup> = 0.999), total ash (R<sup>2</sup> = 0.951) and dry matter (R<sup>2</sup> = 0.999) show increasing trends, suggesting a greater accumulation of structural and mineral compounds with forage aging. Values close to 1 in R<sup>2</sup> confirm a good fit of the models, which highlights the predictability of these relationships and the determinant influence of cutting time on the bromatological composition of the grass.

**Table 5. Linear regression for bromatological variables.**

Variable (%)	Model	R <sup>2</sup>
Crude protein	$y = -0.0281x + 12.473$	0.991
Crude fat	$y = -0.0166x + 10.537$	0.874
Crude fiber	$y = 0.0411x + 29.863$	0.999
Total ash	$y = 0.0358x + 9.558$	0.951
Dry matter	$y = 0.2122x + 12.532$	0.999

Source: Authors.

### CONCLUSIONS

Cutting age was the key factor in the morphological development of *Cenchrus purpureus* cv. King Grass, with progressive growth in all variables evaluated. The application of bocashi had a limited impact, showing only improvements in height and leaf width. There were no significant differences in the number of stems/plant or stem diameter between treatments.

It was demonstrated that the age of cutting showed a significant effect on bromatological variables, with a decrease in crude protein and fat as the plant aged, while crude fiber, total ash and dry matter increased progressively. Treatment T3, which involved the application of bocashi, proved to be effective in improving the nutritional composition of the grass, excelling in all parameters evaluated. These results suggest that *Cenchrus purpureus* cv. King Grass, especially in early stages of growth and with the application of bocashi, is a highly nutritious forage, which makes it an option for cattle feeding, promoting adequate nutrition and optimizing productivity.

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