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Chemical composition of *Urochloa* and *Megathyrsus maximus* cultivars under tropical humid forest conditions

Composición química de cultivares de *Urochloa* y *Megathyrsus maximus* bajo condiciones de bosque húmedo tropical

Composição química de cultivares de *Urochloa* e *Megathyrsus maximus* sob condições de floresta úmida tropical

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Abstract

Urochloa and *Megathyrsus maximus* comprise the most widely sown grasses in Venezuela, and their composition is influenced by management practices and the rainfall regime in the region. The chemical composition of seven grass cultivars (CV) was evaluated during the dry and rainy seasons (SE) under two (4 and 6 weeks) defoliation frequencies (DF) in tropical humid forest conditions of the Catatumbo municipality, Zulia state, Venezuela. Dry Matter (DM), Ash (ASH), Ether Extract (EE), Crude Protein (CP) and Crude Fiber (CF) were measured. A randomized complete block design with a split-plot arrangement and four replications per cultivar was used. Highly significant effects ($p<0.01$) of SE were observed on ASH, EE and CF contents. Defoliation frequency significantly affected ($p<0.01$) all evaluated variables, with notable CP contents in cultivars BR02/0465 (10.36 %) and CIAT 606 (10.17 %). Considering SE, CV and DF together, highly significant effects ($p<0.01$) were determined on EE contents of *M. maximus* cv. Tanzania (2.59 %) and CIAT BR02/0465 (2.39 %) during the dry SE at DF 4 weeks. Regarding CF, significant decreases ($p<0.01$) were recorded as the age advanced from 4 to 6 weeks in cultivars Tanzania (26.87 % to 26.66 %), BR02/0465 (25.03 % to 21.68 %) and Mulato II (24.81 % to 20.46 %). From a bromatological perspective, the evaluated cultivars demonstrated high nutritional value, particularly CIAT BR02/0465, identifying it as a promising option for the tropical humid forest of El Guayabo.

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Resumen

Urochloa y *Megathyrsus maximus* agrupa a los pastos más sembrados en Venezuela y su composición está influenciada por el manejo y el régimen pluviométrico de la zona. Se evaluó la composición química de siete cultivares (CV) de pastos en época (EP) seca y lluviosa, bajo dos (4 y 6 semanas) frecuencias de defoliación (FD), en condiciones de bosque húmedo tropical del municipio Catatumbo del estado Zulia, Venezuela. Se evaluó la Materia Seca (MS), Cenizas (CEN), Extracto Etéreo (EE), Proteína Cruda (PC) y Fibra Cruda (FC). Se utilizó un diseño de bloques completos al azar con arreglo de parcelas subdivididas con cuatro repeticiones por cultivar. Se constataron efectos altamente significativos (p<0,01) de EP sobre los contenidos de CEN, EE y FC. La FD afectó significativamente (p<0,01) los contenidos de todas las variables evaluadas, destacando los contenidos de PC de los cultivares BR02/0465 (10,36 %) y Basilisk (10,17 %). Al considerar EP, CV y FD, se determinaron efectos altamente significativos (p<0,01*)* en los contenidos de EE de *M. maximus* cv. Tanzania (2,59 %) y CIAT BR02/0465 (2,39 %) durante EP seca en la FD 4 semanas. Respecto a FC, se registraron disminuciones (p<0,01) en sus contenidos conforme avanzó la edad desde las 4 hasta las 6 semanas en los CV Tanzania (26,87 a 26,66 %), BR02/0465 (25,03 % a 21,68 %) y CIAT Mulato II (24,81 a 20,46 %). Desde el punto de vista bromatológico, los cultivares evaluados presentan un alto valor nutricional, destacando a CIAT BR02/0465 como cultivar promisorio en el bosque húmedo tropical de El Guayabo.

Palabras claves: época, pastos, frecuencia de defoliación, valor nutricional, bromatología, rebrote

Resumo

Urochloa e *Megathyrsus maximus* agrupam as pastagens mais cultivadas na Venezuela e sua composição é influenciada pelo manejo e pelo regime pluviométrico da região. Foi avaliada a composição química de sete cultivares (CV) de pastagens na época (EP) seca e chuvosa sob duas (4 e 6 semanas) frequências de desfolhação (FD), em condições de floresta úmida tropical do município de Catatumbo, estado Zulia, Venezuela. Foram avaliados o Material Seco (MS), Cinzas (CEN), Extrato Etéreo (EE), Proteína Bruta (PB) e Fibra Bruta (FB). Utilizou-se um delineamento em blocos completos ao acaso com arranjo de parcelas subdivididas e quatro repetições por CV. Foram constatados efeitos altamente significativos (p<0,01) da EP sobre os teores de CEN, EE e FB. A FD afetou significativamente (p<0,01) os teores de todas ases variáveis avaliadas, destacando-se os teores de PB dos cultivares BR02/0465 (10,36 %) e Basilisk (10,17 %). Ao considerar a EP, o CV e a FD, foram determinados efeitos altamente significativos (p<0,01) nos teores de EE de *M. maximus* cv. Tanzania (2,59 %) e CIAT BR02/0465 (2,39 %) durante a EP seca na FD 4 semanas. Em relação à FB, foram registradas diminuições (p<0,01) em seus teores conforme avançou a idade de 4 para 6 semanas nos cultivares Tanzania (26,87 a 26,66 %), BR02/0465 (25,03 % a 21,68 %) e CIAT Mulato II (24,81 a 20,46 %). Desde o ponto de vista bromatológico, os cultivares avaliados apresentam alto valor nutricional, destacando-se o CIAT BR02/0465 como cultivar promissor na floresta úmida tropical de El Guayabo.

Palavras-chave: época, pastagens, frequência de desfolhação, valor nutricional, bromatologia, rebrote

Introduction

Over the last few decades, various cultivars of the genus *Urochloa* have been developed to generate effective responses to global production constraints (Morales-Velasco, 2016), taking advantage of the natural diversity of this genus (Rodríguez *et al*., 2013). Currently, there are around 400 ecotypes of *Urochloa brizantha* and 83 of *Urochloa decumbens* (formerly *Brachiaria brizantha* and *Brachiaria decumbens*) preserved in germplasm banks around the world (Enríquez *et al*., 2005), which has provided a solid basis for the development of new cultivars in recent decades (Miles, 2005).

In Venezuela, species of the genus *Urochloa* predominate due to their lower nutritional requirements compared to other genera, such as *Megathyrsus* and *Cynodon*. Specifically, in 2003, there were 3,675,000 ha of *Urochloa* spp. planted throughout Venezuela, of which 949,000 were in the state of Zulia (Espinoza *et al*., 2012).

Despite the abundant literature on the chemical composition of grasses worldwide, there are few studies on the specific climatic conditions of Zulia State and how these influence yield and chemical composition. For these reasons, the objective of this research was to evaluate the chemical composition of seven grass cultivars in the dry and rainy seasons, with two defoliation frequencies, in the tropical humid forest of the Catatumbo municipality, Zulia State, Venezuela.

Materials and methods

The study was conducted using samples from the El Guayabo Local Station, of the Instituto Nacional de Investigaciones Agrícolas (INIA), located in the Catatumbo municipality of Zulia State, Venezuela (8°33’55.99‘N; 72°19’54.90’W). The climate and vegetation correspond to tropical humid forest (Ewel and Madriz, 1968), average rainfall 2,278.43 mm over 10 years and average annual temperature of 27.24 °C, with peak rainfall occurring in the months of April-June and September-November.

The soil is heavy in texture with low phosphorus and medium potassium content. It was classified as Vertic Hapludepts, isp, with a pH of 5.6, a slope of 0.5 % in northeast-southeast direction, no stoniness either on the surface or within the profile, and severe drainage limitations.

Management of experimental plots

The pastures were cultivated under rainfed conditions and without fertilization, using the methodology of Toledo and Schultze-Kraft (1982). Sowing was carried out directly, using sexual seed with distances of 0.80 m between furrows and 0.50 m between rows. The plots measured 5 × 3.2 m, reaching a total size of 16 m² per plot, with distances of 2 m between plots.

Each plot consisted of four rows of plants, separated by distances of 0.5 m. There were 10 plants per row, for a total of 1,120 individuals. Each plot was divided into two subplots of 8 m² each, corresponding to the two defoliation frequencies (4 and 6 weeks). For the evaluation, 1 m² was harvested in the centre of the plot in each repetition. A total of 10 samples were taken, considering the identification of the periods of minimum and maximum precipitation for the years 2016-2017 through the average monthly precipitation during the evaluation period (September the first 2016 to November 23, 2017), covering a minimum of two samples of both frequencies. Thus, 10 samples were used, of which 5 corresponded to the 4-week frequency and 5 to the 6-week frequency.

Experimental design

A randomised block design with a split-plot arrangement was used, considering the season effect (SE) as the main plot, while the cultivars (CV) and defoliation frequencies (DF) were considered subplots.

Laboratory analysis

The samples used were dried in a forced-ventilation oven at 65 °C for 48 hours and ground in a Wiley mill (Thomas Scientific), using a 1 mm sieve, and then stored in pre-labelled, airtight plastic bags. The analyses are expressed as percentages based on dry matter.

Physical and chemical analysis was carried out at the Animal Nutrition Laboratory of the Faculty of Agronomy of the University of Zulia, using the methods described in AOAC (1990) for the determination of dry matter (DM), ash (ASH), crude protein (CP), ether extract (EE) and crude fibre (CF).

Statistical analysis

Physical and chemical variables data were recorded in MS-Excel® spreadsheets. The data were subjected to analysis of variance using the General Linear Model (GLM) of the InfoStat software version 2008 (Infostat, 2008). When significant effects of any of the factors evaluated were detected, a Tukey test was applied to detect possible differences in means. When interaction effects between the factors evaluated were detected, a minimum significant difference test was applied.

Results and discussion

Dry matter

Analysis of variance showed a highly significant effect ($p<0.01$) of CV, as well as the effect of DF and the SE × DF interaction on the DM content of the cultivars evaluated.

The highest DM levels ($p<0.05$) were observed in *M. maximus* cv. Tanzania, followed by *U. brizantha* cv. Marandú and *U. decumbens* cv. Basilisk, which did not differ from each other ($p<0.05$), as shown in Table 1. DM contents increased ($p<0.05$) with increasing plant age from 21.98 % at 4 weeks DF to 23.12 % at 6 weeks DF.

Regarding the SE × DF interaction, the lowest DM contents (21.03 %; $p<0.01$) were obtained in the rainy SE at 6 weeks (23.35 %), the dry SE at 4 weeks (22.93 %) and the dry SE at 6 weeks (22.90 %).

Table 1. Dry matter, ash and crude protein contents of cultivars of the genus *Urochloa* and *Megathyrsus maximus* cv. Tanzania, growing in the tropical humid tropic conditions of El Guayabo, Catatumbo municipality, Zulia State, Venezuela.

Cultivar	DM	ASH	CP
		%	
Megathyrsus maximus cv. Tanzania	24.91^{a}	11.31^{ab}	9.15^{d}
Urochloa brizantha cv. Marandú	23.42^{ab}	11.10^{ab}	9.86^{c}
Urochloa decumbens cv Basilisk	23.29^{ab}	10.74^{ab}	10.17^{ab}
Urochloa híbrido CIAT BR02/0465	22.90^{b}	11.45^{a}	10.36^{a}
Urochloa híbrido cv. Mulato II	22.00^{bc}	11.41^{a}	9.92^{bc}
Urochloa híbrido cv. Cayman	21.12^{cd}	10.53^{b}	9.30^{d}
Urochloa híbrido cv. Cobra	20.23^{d}	11.44^{a}	9.75^{c}
Standard error	0.39	0.18	0.07

$^{a, b, c, d, e}$Means with different letters within the same column are statistically different (Tukey, $p<0.05$).

Canchila *et al*. (2008) reported that defoliation at advanced stages of growth generates higher DM contents due to the longer period available for accumulation within the plant cell, while frequent defoliation reduces stem density, so that by prolonging the intervals between cuts, favours intraspecific competition for sunlight, accelerating the metabolic processes of plants due to this competition, given that as the plant ages, the apical meristems become less active, decreasing the biosynthesis of compounds such as proteins and nucleic acids, which favour the accumulation of compounds in the form of structural carbohydrates.

Cedeño *et al*. (2022) observed increases in DM from 25 to 50 days in *U. decumbens* (14.10 % to 20.43 %), *U. brizantha* (14.19 % to 21.54 %), *U.* hybrid (13.43 % to 23.51 %) and *M. maximus* cv. Tanzania (16.76 % to 28.19 %). Similarly, Núñez-Arroyo *et al*. (2022) determined increases in DM levels in the Diamantes cultivar (18.90 % to 20.40 %) of *U. decumbens* during the dry season.

Ashes

Highly significant effects ($p<0.01$) of SE and CV were observed, as well as significant effects ($p<0.05$) of DF related to ASH contents.

The highest ASH contents increased from the rainy SE (10.28 %) to the dry SE (12.00 %), possibly due to greater synthesis of organic nutrients during this period (Contreras-Jácome *et al*., 2025).

At the same time, a trend towards increased ASH levels ($p>0.05$) was observed during the rainy SE, possibly due to an increase in the solubility of minerals in the soil, which is consistent with Vega Espinosa *et al*. (2006), who observed a decrease during the rainy season from 30 (6.70 %) to 45 days (5.82 %).

The CVs with the highest ASH contents were BR02/0465, Cobra, and Mulato II, averaging 11.43 %, with no differences ($p>0.05$) between them, and higher ($p<0.05$) than those observed in Cayman, with 10.53 %, as shown in Table 1. The levels obtained in Cayman were higher than the values (9.4 %) reported by Ventura-Ríos *et al*. (2023) in the humid tropics of Mexico. The results in Mulato II were higher than those of Muinga *et al*. (2016), with 6.7 %, while the contents of Basilisk and Marandú CVs are close to those reported by Nguku *et al*. (2016) in the establishment phase, with 12.10 % and 13.90 % at 22 weeks after planting.

The ASH contents were higher ($p<0.05$) at DF 4 weeks with 11.30 % than at 6 weeks with 10.98 %. This effect corresponds to the dilution of ASH in DM due to the progress of plant development, since the concentration of mineral content in the tissue decreases as the age of the plant increases, because these elements are found in greater proportions in younger and growing organs (Ramírez *et al*., 2014), since the DM content increases at a faster rate than the absorption and transport of minerals to the leaves (Steinberg *et al*., 2012).

Crude protein

Highly significant effects ($p<0.01$) were observed for CV and DF, as well as for the SE × DF and DF × CV interactions related to the CP content of the cultivars evaluated.

The cultivars with the highest CP contents were BR02/0465 (10.36 %), followed by Basilisk (10.17 %) and Mulato II (9.92 %) (Table 1). In general, the CVs showed high CP contents. Hare *et al.* (2015) obtained 7.47 % in BR02/0465, which is lower than the results obtained in this study. Hare *et al*. (2023) reported CP values for the cultivars Cobra (10.1 %), Mulato II (9.4 %), Cayman (9.95 %) and Marandú (8.72 %) in the third year of evaluation, similar to those obtained in this study. Ventura-Ríos *et al*. (2023) obtained 6.5 % in the Cayman cultivar, considering four defoliation frequencies (30, 60, 90 and 120 days).

Regarding the effect of the SE × DF interaction, CP contents were higher ($p<0.01$) during DF 4 weeks, regardless of the SE, with 11.16 % in dry SE and 10.20 % in rainy SE, followed by DF 6 weeks, with 9.23 % in dry SE and 8.56 % in rainy SE.

Regarding the SE × CV interaction, with the exception of CVs BR02/0465 and Basilisk, CP contents were higher ($p<0.01$) during the rainy SE (Table 2). The CIAT BR02/0465 and Basilisk cultivars obtained the highest CP contents ($p<0.01$) during the rainy season (10.83 % and 10.45 %), while during the dry SE, the Mulato II and Cobra cultivars obtained higher CP contents (10.21 % and 10.00 %, respectively).

Table 2. Crude protein contents of cultivars of the genus *Urochloa* and *Megathyrsus maximus* cv. Tanzania during the dry and rainy seasons in the tropical humid forest of El Guayabo, Catatumbo municipality, Zulia State, Venezuela.

Cultivar	Season	
	Rainy	Dry
Urochloa híbrido CIAT BR02/0465	10.83[a]	9.90[cde]
Urochloa decumbens cv Basilisk	10.45[ab]	9.90[cde]
Urochloa brizantha cv. Marandú	9.79[def]	9.93[cde]
Urochloa híbrido cv. Mulato II	9.64[def]	10.21[bc]
Urochloa híbrido cv. Cobra	9.50[f]	10.00[cd]
Urochloa híbrido cv. Cayman	9.10[g]	9.50[f]
Megathyrsus maximus cv. Tanzania	8.70[h]	9.61[ef]
Standard error	0.10	

[a, b, c, d, e, f, g] Means with different letters are statistically different (LSD, $p<0.01$).

Ether extract

Highly significant effects ($p<0.01$) were detected on SE, CV and DF, as well as on the DF × CV and SE × DF × CV interactions.

Regarding the SE × CV × DF interaction, the highest EE contents were obtained in the Basilisk cultivar during the rainy SE at DF 6 weeks (2.60 %) and in Tanzania during the dry SE at DF 4 weeks (2.59 %). On the other hand, Basilisk at DF 4 weeks during the rainy SE obtained the lowest ($p<0.01$) EE contents, followed by CV Cobra at DF 6 weeks and Marandú at DF 4 weeks under the same SE, with no differences between them ($p>0.01$), as shown in Table 3.

A trend ($p>0.01$) towards a decrease in EE during the dry SE was observed as age increased, because young plants have a high EE content since lipids are hydrolysed by lipase to glycerol and fatty acids (FA) in active cells to be used in the synthesis of phospholipids and glycolipids for organelles formation; thus, FA form part of the EE and are present as compounds in the protective layer of the epidermis, stems, leaves and fruits (Umami *et al*., 2018), functioning as a response to water stress.

Thus, Khan *et al*. (2015) consider that management practices that avoid prolonged ripening and a decrease in the leaf:stem ratio may favour the concentration of FA in the plant and, therefore, the EE.

During the rainy SE, and with the exception of the Cobra CV, a tendency ($p>0.01$) towards an increase in EE content was observed, which could be due to a lower dilution of EE per fresh mass, as well as a decrease in photosynthetic activity due to lower respiration and photoassimilate production caused by excess water in the soil profile (Del Pozo, 2002).

Crude fibre

Highly significant effects ($p<0.01$) were observed for SE, CV and DF, as well as effects of the DF × CV interaction.

During the dry SE, the CF contents were higher ($p<0.05$), at 25.24 %, compared to the rainy SE ($p<0.05$), at 22.84 %. The highest CF contents ($p<0.01$) were observed in *M. maximus* cv. Tanzania (26.76 %), followed by Marandú (24.39 %), as shown in Table 4. The latter contrasts with the results of Combat Caballero *et al*. (2018), who reported CF contents in *B. decumbens* of 38 %. Similarly, the CF contents of Mulato II and Marandú were lower than those reported by Balseca *et al*. (2015) (41.9 % and 45.4 %, respectively). In general, the CF contents of the CV were lower than those reported by Macas Giler *et al*. (2024) in *B*. hybrid Sabia AIG-3303 J (28 % at 30 days).

Table 4. Crude fibre contents of cultivars of the genus *Urochloa* and *Megathyrsus maximus* cv. Tanzania, growing in the tropical humid forest conditions of El Guayabo, Catatumbo municipality, state of Zulia, Venezuela.

Cultivar	Crude fibre (%)
Megathyrsus maximus cv. Tanzania	26.76[a]
Urochloa brizantha cv. Marandú	24.39[b]
Urochloa decumbens cv Basilik	24.02[c]
Urochloa híbrido cv. CIAT BR02/1794, Cobra	23.83[c]
Urochloa híbrido cv. CIAT BR02/1752, Cayman	23.37[d]
Urochloa híbrido CIAT BR02/0465	23.35[d]
Urochloa híbrido cv. Mulato II	22.64[e]
Standard error	0.07

[a, b, c, d, e] Means with different letters differ statistically (Tukey, $p<0.05$).

Table 3. Ether extract content of seven cultivars of the genus *Urochloa* and *Megathyrsus maximus* at two defoliation frequencies during the dry and rainy seasons in the tropical humid forest of El Guayabo, Catatumbo municipality, Zulia State, Venezuela (Mean ± Standard Error).

Cultivar	Dry season		Rainy season	
	DF4	DF6	DF4	DF6
M. maximus cv. Tanzania	2.59 ± 0.14[a]	2.08 ± 0.17[abcdef]	1.67 ± 0.14[efghi]	1.89 ± 0.17[cdefgh]
CIAT BR02/0465	2.39 ± 0.14[abc]	2.19 ± 0.17[abcde]	1.65 ± 0.14[efghi]	1.80 ± 0.17[defgh]
U. híbrido cv. Mulato II	2.08 ± 0.14[abcdef]	2.15 ± 0.17[abcde]	1.44 ± 0.14[gihj]	2.19 ± 0.17[abcde]
U. brizantha cv. Marandú	2.38 ± 0.14[abc]	2.08 ± 0.17[abcdef]	1.34 ± 0.14[hij]	1.97 ± 0.17[cdefg]
U. híbrido cv. Cobra	2.35 ± 0.14[abcd]	2.51 ± 0.17[ab]	1.73 ± 0.14[efgh]	1.12 ± 0.17[ij]
U. híbrido cv. Cayman	2.01 ± 0.14[defgh]	2.13 ± 0.17[abcdef]	1.58 ± 0.14[fghi]	2.07 ± 0.17[abcdef]
U. decumbens cv. Basilisk	1.85 ± 0.14[bcdef]	2.60 ± 0.17[a]	1.01 ± 0.14[j]	1.52 ± 0.17[fghij]

DF: Defoliation frequency (weeks). [a, b, c] Means with different letters between lines are statistically different (LSD, $P<0.01$).

Regarding the DF × CV effect, the highest CF contents ($p<0.01$) were exhibited by *M. maximus* cv. Tanzania, regardless of DF, followed by CIAT BR02/0465 (Table 5). The higher values for Tanzania are attributed to its lower tolerance to flooding, an effect observed by Smith *et al*. (2025).

Table 5. Crude fibre contents of cultivars of the genus *Urochloa* and *Megathyrsus maximus* cv. Tanzania at two defoliation frequencies, growing in the conditions of the tropical humid forest of El Guayabo, Catatumbo municipality, Zulia State, Venezuela.

Cultivar	Defoliation frequency	
	4 weeks	6 weeks
Megathyrsus maximus cv. Tanzania	26.87[a]	26.66[ab]
Urochloa híbrido CIAT BR02/0465	25.03[abc]	21.68[de]
Urochloa híbrido cv. Mulato II	24.81[bc]	20.46[e]
Urochloa brizantha cv. Marandu	24.60[bc]	24.18[c]
Urochloa decumbens cv Basilisk	24.27[c]	23.77[cd]
Urochloa híbrido cv. Cobra	24.18[c]	23.48[cd]
Urochloa híbrido cv. Cayman	23.69[cd]	23.06[cd]
Standard error	0.53	0.65

[a, b, c, d, e, f, g]Means with different letters differ statistically (LSD, $p<0.01$).

Umami *et al*. (2018) observed decreases in both stems and leaves of *U. brizantha*, *U. ruziziensis*, *U. decumbens*, and *U. humidicola* during the dry SE. Likewise, a decrease ($p<0.01$) in CF was observed as the age of the plant increased (24.78 % to 23.33 %). In early stages, grasses are usually in the vegetative phase, with a high proportion of young stems and leaves where CF accumulates. On the other hand, at DF 6 weeks, during the transition to the reproductive phase, there may be a temporary increase in non-fibrous components in new leaves, thus diluting the CF content in the DM. In addition, as physiological maturity approaches, the CF concentration depends on the metabolic pathways, given that C4 plants are more efficient than C3 plants, allowing to increase photosynthetic efficiency and water use by modifying its primary and secondary structural walls at a faster rate than C3 plants (Ventura-Ríos, 2024).

Low CF levels could in turn be associated with the effect of soil texture class, rainfall volume and proximity to the Zulia River (770 m), which determines the presence of sufficient moisture in the soil to sustain the plant's metabolic needs. The behaviour is similar to that of CP content, which could be associated with the C4 metabolism type, which overcomes the limitations of photorespiration and increases photosynthetic efficiency under stress conditions (Reyes-Pérez *et al*., 2022).

Conclusions

The season was a determining factor in the nutritional quality of *Urochloa* and *Megathyrsus maximus* grasses in tropical rainforest conditions, influencing the DM, ASH, CP, EE and CF contents. In contrast, DF proved to be a less influential management factor on most nutrients (DM, ASH, EE), but critical for CP and CF accumulation.

The *Urochloa* and *Megathyrsus* grass cultivars evaluated have an adequate physical-chemical profile. Within this group, *U.* hybrid BR02/0465 is established as the most promising species for El Guayabo region due to its excellent bromatological balance (23.22 % DM, 10.42 % CP, 2.03 % EE, 24.15 % CF), suggesting high nutritional quality and sustained animal performance potential.

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