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Weed interference in Marandu palisade grass pastures under renewal or maintenance conditions[1]

Interferência de plantas daninhas em pastagens de capim Marandu sob condições de renovação ou manutenção

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HIGHLIGHTS:
Weeds negatively influence the digestibility and the development of pastures with Marandu palisade grass.
On renewed pastures, with Marandu palisade grass, the weed control must be adopted before reaching 24 days of coexistence.
Weed control in pastures with Marandu palisade grass in maintenance must be done before reaching 18 days of coexistence.

ABSTRACT: The presence of weeds as a consequence of pasture degradation is one of the main problems facing livestock worldwide. Thus, knowing the interference aspects and the appropriate time for weed management is essential for applying a particular control measure. This research aimed to study the weed interference on the morphostructural and nutritional quality of the Marandu palisade grass in conditions of renewal or maintenance of pasture. The experiments were conducted in a randomized block design, with four replicates and treatments consisted of eight growth periods of coexistence between Marandu palisade grass and weeds (0, 15, 30, 45, 60, 75, 90, and 120 days). Forage grass was characterized at the end of the experimental period, corresponding to 120 days of coexistence, and the main morphostructural and nutritional components were determined. Under the renewal or maintenance process, the weeds interfere in the morphostructural and nutritional quality of pasture areas with Marandu palisade grass. *In vitro* organic matter digestibility of Marandu palisade grass is negatively influenced by weeds, suggesting that control measures for renewal or maintenance areas should be adopted within 24 and 18 days of coexistence, respectively.

Key words: *Brachiaria brizantha*, indigestible fibers, in vitro digestibility, pasture degradation

RESUMO: A presença de plantas daninhas como consequência da degradação de pastagens é um dos principais problemas da pecuária em todo o mundo. Assim, o conhecimento dos aspectos de interferência e do período apropriado para o manejo dessas espécies é essencial para a decisão de aplicar uma determinada medida de controle. Este estudo teve como objetivo estudar a interferência de plantas daninhas sobre os componentes morfoestruturais e na qualidade nutricional do capim Marandu em condições de renovação ou manutenção de pastagem. Os experimentos foram conduzidos em delineamento experimental de blocos ao acaso, com quatro repetições, sendo os tratamentos constituídos por oito períodos crescentes de convivência entre o capim Marandu e as plantas daninhas (0, 15, 30, 45, 60, 75, 90, e 120 dias). A caracterização da gramínea forrageira foi realizada ao final do período de condução do experimento, que correspondeu a 120 dias de convivência, obtendo os principais componentes morfoestruturais e nutricionais da forragem. As plantas daninhas interferem na qualidade morfoestrutural e nutricional de áreas de pastagem com capim Marandu que passam pelo processo de renovação ou manutenção. A digestibilidade in vitro da matéria orgânica do capim Marandu é negativamente influenciada pela presença de plantas daninhas, sugerindo que medidas de controle em áreas de renovação ou manutenção de pastagens devem ser adotadas até 24 e 18 dias de convivência em comum, respectivamente.

Palavras-chave: *Brachiaria brizantha*, fibras indigeríveis, digestibilidade in vitro, degradação de pastagens

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Introduction

The increase in the world population and, consequently, in demand for food will require intense changes in the agricultural sector, including greater diversification and production efficiency (Röös et al., 2017). However, these changes must coincide with addressing environmental issues relative to the use of good agricultural practices aimed at maximum use of degraded areas (Carvalho et al., 2019).

Pasture degradation is one of the main problems of livestock worldwide. The high stocking rate and the lack of replacement of soil nutrients favor this process since the drastic reduction in forage canopy height leads to weed emergence and reduces the productive potential of forages in the area (Bellé et al., 2018; Silva et al., 2018, Marchi et al., 2019a).

When the percentage of soil covered by pasture is very low, there must be a new grass formation process; that is, the degraded pasture must be renovated. However, this process is ineffective in removing the seeds left by the weeds. Therefore, weed and forage seeds germinate during renewal, initiating a new degradation process (Marques et al., 2019).

Pasture maintenance is also considered to be a viable alternative. It is performed by mowers attached to tractors. Although this method has the advantage of recovering pasture structure by renovating the tiller population (Marchi et al., 2020), the maintenance process is considered to be non-selective for forage grasses. It favors the germination of weed propagules present in the soil seed bank (Victória Filho et al., 2014).

It is noteworthy that, regardless of the method used as an alternative to reverse the degradation rates of pastures, the knowledge of the interference aspects and of the appropriate time for weed management is essential for deciding to apply a particular control measure (Lourenço et al., 2019). Given the above, this research was aimed at studying the weed interference on the morphostructural and nutritional quality of the Marandu palisade grass (*Brachiaria brizantha* (Hochst. ex A.Rich.) R.D. Webster; syn. *Urochloa brizantha* (A.Rich.) Stapf) in conditions of renewal or maintenance of pasture.

Material and Methods

The experimental phase of this research was represented by two studies conducted in the field in the season 2018/19. One of the experimental units was set up in a pasture renewal area and another one in a pasture maintenance area, located at geographic coordinates 15° 38' 32" S; 52° 21' 07" W Gr. and 15° 32' 03" S; 52° 33' 45" W Gr., respectively (Figure 1).

The climate of the regions is Aw, characterized by annual rainfall of 1250 mm concentrated between November and April, with temperatures above 25 °C in the hottest months, but rarely under 17 °C in the coldest months (Marques et al., 2019).

The experiment was conducted in a randomized block design, with four replicates and treatments, consisted of eight growing periods of coexistence between Marandu grass and weeds (0, 15, 30, 45, 60, 75, 90, and 120 days). For the unit installed in the renewal area, this period was determined as days after the emergence of Marandu grass seedlings - DAE, and for the unit installed in the maintenance area, as days after forage regrowth - DAR. The treatment equivalent to 0 (zero) day was considered absolute control, in which there was no coexistence during the entire experimental period. Each experimental plot had a total area of 12 m^2 (4.0 x 3.0 m), and the usable area consisted of 6.0 m^2 of the central area of the plots.

The soil samples of the areas were collected in the layer of 0-20 cm of depth and sent to laboratory analysis to determine chemical and granulometric properties (Table 1).

Degraded pastures corresponded to the experimental areas. Activities of renewal and maintenance were carried out in these areas. The preparation of the renewal area started with desiccation for total control of the existing vegetation, using the herbicide glyphosate at a dose of 3.0 L ha^{-1}, with subsequent harrowing for incorporation of vegetable remains, without correction of soil fertility. Broadcast seeding and manual incorporation into the soil was performed with the seeds of Marandu palisade grass, with 70% germination and 98% purity, in sufficient quantity, to obtain at least ten forage plants per square meter.

The maintenance area was prepared with mechanical mowing of Marandu palisade grass plants and possible weeds

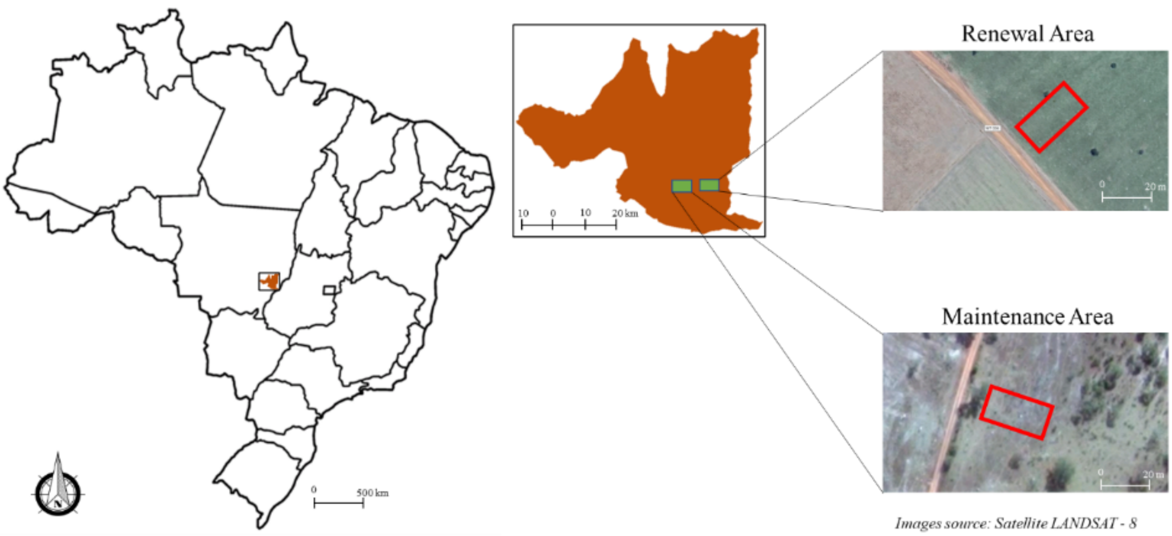


Figure 1. Location of the experimental areas

Table 1. Chemical and granulometric analysis of the soil of experimental areas

Renewal area							
pH $CaCl_2$ (0.01 mol L^{-1})	OM/1 (g dm^{-3})	P (resin) (mg dm^{-3})	Ca	Mg	K	Al + H	V/2 (%)
			(mmol$_c$ dm^{-3})				
4.9	16.0	7.0	7.0	4.0	0.8	22.0	35.6
Sand		Silt			Clay		
(g kg^{-1})							
751		73			176		
Maintenance area							
pH $CaCl_2$ (0.01 mol L^{-1})	OM/1 (g dm^{-3})	P(resin) (mg dm^{-3})	Ca	Mg	K	Al + H	V/2 (%)
			(mmol$_c$ dm^{-3})				
4.1	19.0	6.0	3.0	1.0	0.9	36.0	12.0
Sand		Silt			Clay		
(g kg^{-1})							
808		87			105		

/1 - Organic Matter; /2 - Base saturation

present in the area at approximately 10 cm from the ground. All the cuttings were immediately removed from the experimental units using a rake to prevent them from imposing physical barriers to the regrowth of forage or spontaneous vegetation propagules that might be present in the soil seed bank. Soil fertility was not adjusted.

During the experimental period in the renewal area, the following weed species were found: Diodia teres Walter; *Richardia brasiliensis* Gomes; *Spermacoce latifola* Aubl.; *Sida cordifolia* L.; *Sida rhombifolia* L.; *Ipomoea grandifolia* (Dammer) O' Donell; *Aeschynomene americana* L.; *Senna obtusifolia* (L.) H.S. Irvin & Barneby; *Euphorbia hirta* L.; *Triunfeta bartramia* L., and *Cyperus difformis* L. In the maintenance area, only the weed species *Eupatorium squalidum* DC. was found.

At the end of each coexistence period in both areas, the entire weed community was removed from the plot, and the development of any emerging plant was interrupted by applying 1.5 L ha^{-1} of herbicide, whose formulation was based on 40 g a.e. ha^{-1} of aminopyralid + 320 g a.e. ha^{-1} of 2,4-D. The sprays were applied with a CO_2-pressurized backpack sprayer containing a spray bar fitted with four XR 11002 fan tips and calibrated to provide a spray volume equivalent to 150 L ha^{-1}. Both areas were enclosed with the help of a smooth wire fence to prevent access by animals and the possible grazing of the forage grass.

For both areas, the characterization of the forage grass was carried out at 120 days of coexistence. Average canopy height (cm) was determined with a measuring tape. Two forage samples were collected by cutting the plants at 10 cm above the ground within an area delimited by a 0.50 x 0.50 m plastic quadrat randomly thrown into the experimental unit. The collected samples were taken to the laboratory and sectioned into green leaf, green stems, and dead material. The inflorescences that were eventually present were considered green stems.

All samples were packed in paper bags and kept in a forced air circulation oven at 65 °C for three days; after drying, the samples were weighed on a 0.01 g precision scale to determine green leaf dry matter (GLDM), green stem dry matter (GSDM), and dead material dry matter (DMDM), in addition to the total dry matter (TDM) obtained by the sum of the dry matter of the fractions (g m^{-2}). Thus, the ratio of green leaf dry matter to green stem dry matter (GLDM:GSDM ratio) was determined.

Green leaf volumetric density (GLVD) values (g m^{-3}) were calculated by dividing green leaf dry matter production (g m^{-2}) by forage canopy height (m).

The other forage samples were collected at 120 days of coexistence and dried in the laboratory as mentioned above but without fractionation. The dried samples were then ground in a Wiley mill and reduced to a particle size up to 1.0 mm.

The ground samples were sent to a specialized laboratory to determine dry matter (DM), mineral matter (MM), and organic matter (OM) contents using the Kjeldahl method (Kołodziej et al., 2016). The indigestible neutral detergent fiber (iNDF), acid detergent fiber (ADF), and neutral detergent fiber (NDF) were determined according to Silva & Queiroz (2002). The in vitro digestibility of organic matter (IVDOM) analysis was performed according to Seker (2002). The levels of iNDF, ADF, NDF, and IVDOM were expressed as percentages of dry matter (DM%).

The values obtained for height, GLDM, GSDM, DMDM, TDM, GLVD, DM, MM, OM, NDF, ADF, and iNDF were analyzed by the F-test, and the effects of treatments were grouped by the Scott-Knott test at $p \le 0.05$ using the statistical program AgroEstat (Barbosa & Maldonado Jr, 2015).

The average IVDOM values obtained by the forage were adjusted to the linear model to determine the period prior to weed interference (PPI). The PPI was determined by estimating losses of 5% in comparison to the IVDOM values of the control. It is noteworthy that the values of Critical Period of Interference Prevention (CPIP) and Total Period of Interference Prevention (TPIP) were not stipulated because the pasture is considered a perennial crop (Marchi et al., 2017).

The leaf/stem ratio results underwent regression analysis, and the degrees of freedom of the evaluated factor were further analyzed for the exponential or polynomial effect by the Origin 8.5.1 SR1 program. According to the F-test, the regression model was selected based on the highest value of the coefficient of determination (R^2) at $p \le 0.05$ while respecting the biological response.

Results and Discussion

As far as green leaf dry matter (GLDM) is concerned, there was a significant difference on the 15th day of coexistence with weeds, with reductions of approximately 65% between the period of 0 to 120 days, in both areas of conduction of this experiment. There was also a significant reduction in the green stem dry matter (GSDM) in the pasture renewal area as of the 75th day of coexistence with the weed community. However, there was no significant contrast for this variable in the maintenance area (Table 2).

Only 15 days of coexistence with weeds were enough to reduce the dead material (DMDM) significantly and total dry matter (TDM) of Marandu grass in the renewal area, with reductions of up to approximately 51% for both variables, as compared to the control (0 days). Under pasture maintenance conditions, the DMDM and TDM values decreased by 43.12 and 46.82%, respectively, for this same period of coexistence with the weed community (Table 1).

Table 2. Dry matter of green leaf (GLDM), green stem (GSDM), dead material (DMDM), and total (TDM) accumulated by Marandu palisade grass in areas of renewal or maintenance of pastures under the interference of the periods of coexistence with weeds

Coexistence (days)	Renewal	Maintenance	Renewal	Maintenance
	GLDM (g m^{-2})		GSDM (g m^{-2})	
0	1928.0 a	1075.0 a	1866.3 a	887.2
15	1494.5 b	866.0 b	2008.5 a	774.3
30	1214.0 c	665.2 c	1848.0 a	800.0
45	1032.0 c	585.1 c	1816.0 a	784.2
60	1080.0 c	597.0 c	1720.0 a	764.4
75	928.0 c	535.7 c	1456.0 b	734.0
90	844.0 c	548.8 c	1380.0 b	726.5
120	670.2 c	371.1 d	1189.0 b	610.0
F Coexistence	13.22**	14.01**	3.19*	0.68^{NS}
F Block	0.93^{NS}	0.24^{NS}	2.33^{NS}	1.66^{NS}
C.V. (%)	19.1	17.9	19.2	25.0
	DMDM (g m^{-2})		TDM (g m^{-2})	
0	2295.3 a	1684.5 a	6089.6 a	3646.7 a
15	1804.0 b	1712.3 a	5307.0 b	3352.6 a
30	1666.0 b	1560.0 a	4728.0 b	3025.2 a
45	1568.0 b	1448.6 b	4416.0 c	2817.9 b
60	1488.0 b	1368.1 b	4288.0 c	2729.5 b
75	1502.0 b	1278.0 b	3886.0 c	2547.7 b
90	1301.0 c	1190.0 b	3525.0 d	2465.3 b
120	1126.4 c	958.0 b	2985.6 d	1939.1 b
F Coexistence	11.12**	3.28*	19.49**	6.39**
F Block	0.34^{NS}	1.32^{NS}	3.07^{NS}	1.19^{NS}
C.V. (%)	13.2	20.2	10.2	14.9

NS - Not significant; ** - Significant at $p \leq 0.01$; * - Significant at $p \leq 0.05$. Means followed by the same letter in the column do not differ statistically by the Scott-Knott test ($p < 0.05$)

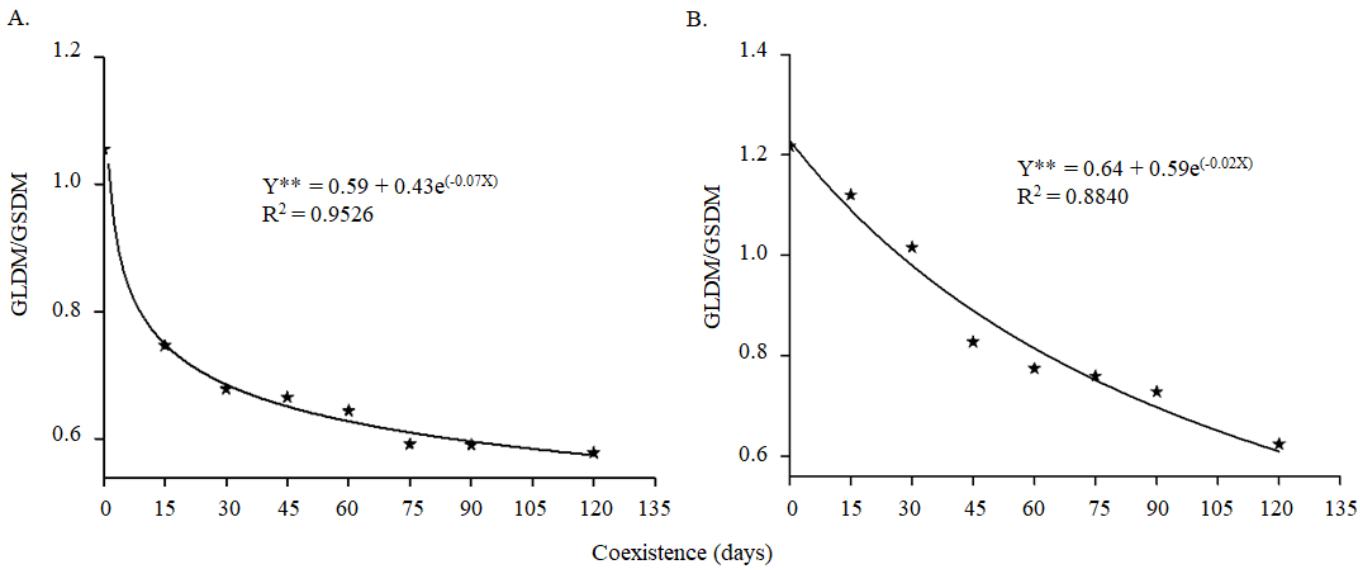
A comparison between the components green leaf dry matter (GLDM) and green stem dry matter (GSDM) showed that the GLDM values decreased more abruptly when compared to the GSDM values. This result indicates that between the evaluations of 15 and 30 days until the 120-day evaluation, the GSDM values were higher than the GLDM values in both experimental areas (Table 1). Once shaded due to competition with weeds for light, tropical forages tend to increase the elongation of the stalk to obtain sunlight and better survival conditions. For this reason, there will be less food intake by animals due to decreases in leaf/stem ratio and accumulations of fibrous material (Casagrande et al., 2010).

Therefore, this study showed that, in addition to decreased total dry matter production resulting from weed competition, there was a change in the photoassimilate partition, being most of the photoassimilates produced by the forage grass were used for stalk production, which has lower nutritional quality (Bottega et al., 2017). This implies that the presence of an infesting community can directly affect the nutritional quality of Marandu grass grown in pastures under both renewal and maintenance conditions.

Regardless of the pasture management method, there was a sharp decrease in the GLDM/GSDM ratio, even when the Marandu grass plants coexisted with weeds for 15 days only. Notably, there was an exponential and descending behavior for the pasture renewal area (Figure 2A) and the maintenance area (Figure 2B).

This result shows that the forage grass was competing for light and space, a situation that caused it to etiolate in an attempt to avoid weed shading. Bigger forage plants in search of light proportionally produce greater internode elongation and greater stem accumulation, resulting in a gradual increase in the number of stems and a decrease in the leaf/stem ratio in the pasture biomass (Baroni et al., 2010).

The green leaf has lower resistance to grazing, greater accessibility, and easy digestibility, being the morphological component most preferred by animals during the forage intake (Oliveira et al., 2014). Pastures with low leaf availability and high stalk are usually little consumed because the amount of easily digestible fiber is decreased (Bellé et al., 2018). Moreover, the decrease in the leaf/stem ratio has a negative effect on the structural components of the grass, e.g., height, mass production, number of tillers, etc. (Santos et al., 2011). It is important to note that leaf/stem ratio values greater than one are considered ideal (Marchi et al., 2017), showing that 15 and 30 days of coexistence with weeds could reduce this variable in pastures under renewal and maintenance areas, respectively.



** - Significant at 0.01 probability level

Figure 2. Green leaf dry matter/green stem dry matter (GLDM/GSDM) ratio of Marandu palisade grass in areas of renewal (A) and maintenance (B) of pastures as a function of the periods of coexistence with weeds

The increase in the coexistence period between Marandu grass and weeds significantly reduced the canopy height and green leaf volume density (GLVD) in the pasture maintenance area. Under the renewal condition, there was no significant contrast for the plant height variable; however, only 15 days of coexistence with weeds reduced GLVD by 18% in comparison to the period with no competition (0 days), extrapolating by 67% the reduction of this variable at 120 days (Table 3).

These results suggest that short periods of coexistence between Marandu grass and weeds were sufficient to promote significant leaf production and pasture structure changes. Consequently, competition for space modifies how forage will be available to animals, and this change in forage canopy can reduce the effectiveness of the grazing habit (Marchi et al., 2019b).

Notably, because of the low quality of the available forage, particularly indicated by the lower GLDM/GSDM ratio and GLVD values, the bites of the animals have greater indigestible fiber mass. Therefore, these animals cannot remain at feeding stations for longer periods (Moterle et al., 2017). The displacement between feeding stations is more frequent to increase the likelihood of finding potential bites; the animals change their strategies of the daily search for forage to maintain adequate levels of consumption, causing greater energy expenditure by increasing the number of steps per day (Sichonany et al., 2015; Lopes et al., 2017).

Table 3. Canopy height and green leaf volumetric density (GLVD) accumulated by Marandu palisade grass in areas of renewal or maintenance of pastures under the interference of the periods of coexistence with weeds

Coexistence (days)	Canopy Height (m)		GLVD (g m^{-3})	
	Renewal	Maintenance	Renewal	Maintenance
0	0.77	0.47 a	2511.7 a	2287.2 a
15	0.73	0.38 b	2059.4 b	2327.6 a
30	0.68	0.37 b	1786.5 b	1791.5 b
45	0.74	0.36 b	1420.4 c	1612.5 b
60	0.75	0.38 b	1447.2 c	1565.6 b
75	0.77	0.39 b	1218.8 c	1376.9 b
90	0.80	0.38 b	1036.6 c	1447.8 b
120	0.81	0.41 b	823.6 c	918.1 c
F Coexistence	1.34^{NS}	3.03*	11.01**	9.71**
F Block	1.13^{NS}	0.83^{NS}	0.27^{NS}	0.33^{NS}
C.V. (%)	9.6	9.7	21.8	18.1

NS - Not significant; ** - Significant at p ≤ 0.01; * - Significant at p ≤ 0.05. Means followed by the same letter in the column do not differ statistically by the Scott-Knott test (p < 0.05)

Increasing periods of coexistence between Marandu grass and weeds did not interfere in the neutral detergent fiber (NDF) content, both in the pasture renewal and the pasture maintenance areas and values found in this study were higher than 67%, regardless of the period of coexistence and the forage management condition (Table 4).

The NDF is a food factor representative of the volume occupied by food. Diets with a high proportion of fibers fill the spaces of the ruminal reticulum, directly influencing the consumption and digestibility of animals (Meurer et al., 2020). The NDF values found in this study, including those for the control treatment (0 days), are considered high and are probably due to the date when the final forage evaluation was performed, since the NDF values naturally tend to be higher, depending on plant age (Moura et al., 2017). According to Cook et al. (2016), rumination time increases significantly in response to high levels of dietary fiber (NDF) in forage.

The levels of acid detergent fiber (ADF) and indigestible neutral detergent fiber (iNDF) increased significantly as the period of coexistence with weeds increased, with significant differences after 75 days of coexistence, in both pasture renewal and pasture maintenance areas (Table 3).

The higher the FDA, the lower the energetic value of the plant, the higher the lignin content and, consequently, the lower the digestibility of food. Likewise, reductions in the forage quality are linked to increases in the iNDF content, causing negative effects in the forage intakes. The levels of ADF and iNDF are generally indicators of easy digestibility of diet and can be decisive in the feed ability to physically fill the animal digestive system. Additionally, the higher these values, the worse the food quality and the longer the retention time in the animal's rumen, affecting the passage rate (Costa et al., 2011).

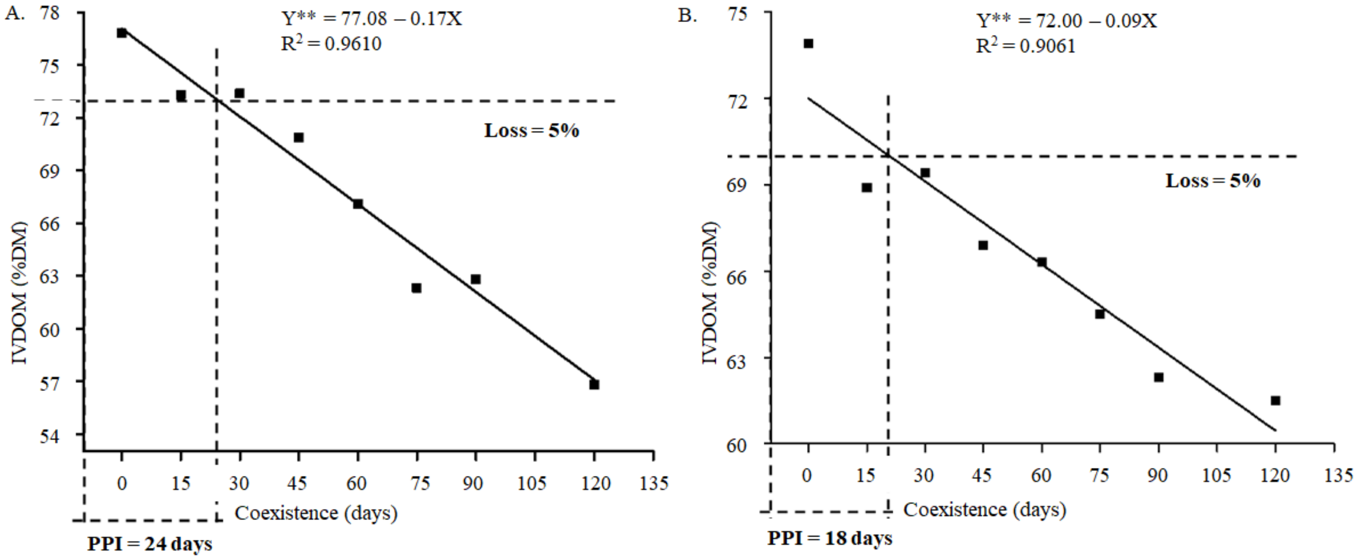
In diets with low ADF and iNDF values (high energetic value), the digestibility rate increases, and daily consumption of forage is limited by high energy as well as by satiety. In diets with high ADF and iNDF (low energy) rumen filled with indigestible fiber promotes limited intake, reducing digestibility and increasing the passage rate and the need for supplementary intake (Bellé et al., 2018).

The high values of ADF and iNDF are probably because the plants have allocated resources in the stem elongation process to the detriment of leaf blade production. This process represents a response to the search for light by the Marandu palisade grass

Table 4. Neutral detergent fiber (NDF), acid detergent fiber (ADF), and indigestible neutral detergent fiber (iNDF) observed in Marandu palisade grass in areas of renewal or maintenance of pastures under the interference of the periods of coexistence with weeds

Coexistence (days)	NDF (%DM)		ADF (%DM)		iNDF (%DM)	
	Renewal	Maintenance	Renewal	Maintenance	Renewal	Maintenance
0	67.3	75.5	31.5 d	31.9 c	16.7 b	17.0 b
15	68.8	72.5	33.5 d	34.7 b	17.4 b	18.1 b
30	68.2	73.3	37.3 c	35.4 b	17.4 b	18.6 b
45	71.7	73.8	37.2 c	35.2 b	17.8 b	19.0 b
60	69.2	71.2	37.4 c	36.0 b	17.9 b	19.1 b
75	71.3	72.2	39.2 b	36.4 b	18.1 b	23.5 a
90	70.8	71.5	41.1 a	38.0 a	19.8 a	24.4 a
120	69.3	69.4	45.3 a	40.2 a	19.7 a	25.6 a
F Coexistence	0.89^{NS}	1.65^{NS}	24.42**	9.68**	4.53**	10.53**
F Block	0.84^{NS}	1.82^{NS}	1.40^{NS}	3.91*	0.62^{NS}	0.71^{NS}
C.V. (%)	4.72	3.9	4.6	4.3	5.7	9.8

DM – Dry matter; NS - Not significant; * - Significant at p ≤ 0.05; ** - Significant at p ≤ 0.01. Means followed by the same letter in the column do not differ significantly by the Scott-Knott test (p < 0.05)



** - Significant at 0.01 probability level

Figure 3. Period prior to interference (PPI) considering an acceptable loss of five percent in the in vitro digestibility of organic matter (IVDOM) obtained by Marandu palisade grass in areas of renewal (A) or maintenance (B) of pastures under the interference of the periods of coexistence with weeds

that weeds have shaded. Thus, the increased growth of the forage plant owing to the plant-weed competition implies an increase in the conversion of photoassimilates into structural carbohydrates, which do not have adequate nutritional value for the diet of ruminants (Velásquez et al., 2010).

The analysis of the in vitro organic matter digestibility (IVDOM) levels showed that weed community interference was significant even when the Marandu grass plants coexisted with weeds for 15 days only. As shown by the graphical representation of the adjustment equation of the IVDOM data, there was a linear reduction for both the pasture renewal and the pasture maintenance areas (Figures 3A and B).

The IVDOM of Marandu palisade grass was directly affected by the increases in fiber fractions (Table 3) mentioned before. The IVDOM values reflect the quantity of forage consumed that will be effectively digested by the gastrointestinal tract and then absorbed and used during the various metabolic pathways (Silva et al., 2017). In addition, the feed passage rate through the gastrointestinal tract also is influenced by the level of digestibility. It can negatively interfere between 10 and 40% in the performance production of animals (Marchi et al., 2019b).

The results of this research are probably linked to the great aggressiveness exerted by weeds. They suggest that weed control should be performed at the first growth stages of Marandu grass, i.e., a period prior to interference (PPI) for the areas of renewal and maintenance of pastures of 24 and 18 days, respectively, considering an acceptable loss of five percent in the IVDOM of the forage grass (Figure 3).

A similar result was found by Marchi et al. (2017), who reported a reduction in the yield of Marandu grass at the beginning of its development caused by weeds. The authors suggested that control measures should occur within 15 days of coexistence so that there are no significant losses in forage productivity and quality. Bellé et al. (2018) also suggested that control measures should be adopted before 30 days of coexistence with weeds to avoid establishing a competitive biological relationship and causing damage to the development and nutritional value of Marandu grass.

Thus, it is evident that by competing for growth factors such as space, light, water, and nutrients, weeds can drastically reduce the physiological reserves of forages and increase the time for pasture formation and recovery and cause injury and/or poisoning to animals. So, the consequences of the presence of weeds associated with the extractive aspects of the exploitation system might impose on animals a condition of feeds with low nutritional value, reducing the feeding efficiency and consequently animal production performance (Marchi et al., 2019a; Lourenço et al., 2019).

Conclusions

1. The weeds interfere with the morphostructural and nutritional quality of pasture areas with Marandu palisade grass under the renewal or maintenance process.

2. In vitro organic matter digestibility of Marandu palisade grass is negatively influenced by weeds, suggesting that control measures for renewal or maintenance areas should be adopted within 24 and 18 days of coexistence, respectively.

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