Original Article

PRODUCTION AND BROMATOLOGICAL COMPOSITION OF PEARL MILLET GENOTYPES FOR PASTURE MANNED IN DIFFERENT CUTTING HEIGHTS

PRODUÇÃO E COMPOSIÇÃO BROMATOLÓGICA DE GENÓTIPOS DE MILHETO PARA PASTEJO MANEJADOS EM DIFERENTES ALTURAS DE CORTE

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RESUMO: Desenvolveu-se esse estudo com o objetivo de avaliar a produção e a composição bromatológica de genótipos de milheto, manejados em diferentes alturas e submetidos a vários cortes. O delineamento experimental utilizado foi o de blocos completos ao acaso, com medidas repetidas no tempo, com quatro repetições, em esquema fatorial 3 x 3, sendo três cultivares de milheto (ADR 500, LAB 1542 e LAB 1838) e três alturas média de cortes (60; 80 e 100 cm). As avaliações foram realizadas durante quatro meses, consistindo de avaliações por cortes nas mesmas parcelas. Os resultados demonstraram que os genótipos de milheto representam uma boa alternativa para pastejo. Os genótipos (ADR 500; LAB 1542 e LAB 1838), apresentaram produção de massa seca e composição bromatológica semelhantes entre os materiais. A qualidade da forragem é afetada pelo manejo da altura de corte, sendo assim recomenda-se que os genótipos de milheto sejam manejados nas alturas de 80 cm, para associar melhor produção e qualidade da forragem.

PALAVRAS-CHAVE: Fração fibrosa. Massa seca. *Pennisetum glaucum* (L.) R. BR. Proteína bruta.

INTRODUCTION

The choice for the forage species to be used for each kind of production system influences the capacity to support the pasture and the success of productivity. The millet (*Pennisetum glaucum* (L.) R. Br) is being used in the tropical and subtropical regions by presenting a bigger flexibility at the time of seeding and high productive power and nutritional value. Onwards this grass can constitute alternatives of forage to intensify the animal production.

Due to its great adaptation to the savannah biome, the millet has been gaining attention in the last years, mainly with the advent of early genotypes and of high productive power, coming from genetic improvement. That made this plant no longer be a simple species of covering of economic value for the production of forage and silages in this region (DAN et al., 2009).

In this sense, the using of millet under pasture seems to be a great challenge, because, despite the high production of dry mass, keeping this forage at rest for a determined period of time may undermine the distribution and the arrangement of its air part, mainly, by the increasing of the participation of culms. This event, in addition to interfering directly in the quality of the offered diet, by the greater quantity of fiber of this vegetal compound, can also directly influence, making it difficult the access of the animals to the existing green blades (PEDROSO et al., 2009).

The handling of the pasture must aim at the optimization of the process of forage accumulation, in a way that the biggest part of the growing structures, as leaves and culms, are harvested in a stage of development which do not compromise the nutritional value of the pasture, and that the looses by the processes of senescence are minimized.

For being dealing with new materials, there is little information about these genotypes. In this sense, it is important to obtain technical information, supported in scientific studies, about the behavior of new millet genotypes to contribute significantly with the adequate handling of these materials. Before it, it was aimed to evaluate the production and the bromatological composition of millet genotypes, handled in different heights and submitted to several cuts.

MATERIAL AND METHODS

The experiment was conducted on the Sources of Knowledge Farm located on the

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Agronomy Campus of the University of Rio Verde in altitude 748m, 17º 48' of south latitude and 50º 55' of longitude to the west of Greenwich.

The soil of the experimental area was classified as distroferric Red Latosol (Oxisol), with 580 g kg^{-1} of clay; 50 g kg^{-1} of silty and 370 g kg^{-1} of sand. The chemical characteristics of the soil, layer 0-20 cm, before planting were: pH in water: 4.5; Ca 1.12 $cmol_c$ dm^{-3}; Mg: 0.08 $cmol_c$ dm^{-3}; Al: 0.65 $cmol_c$ dm^{-3}; Al+H: 4.0 $cmol_c$ dm^{-3}; CTC: 5.82 $cmol_c$ dm^{-3}; K: 30 mg dm^{-3}; P: 0.70 mg dm^{-3}; Cu: 3.9 mg dm^{-3}; Zn: 1.5 mg dm^{-3}; Fe: 56.4 mg dm^{-3}; M.O: 31.26 g dm^{-3}.

The preparation of the area was performed by eliminating the invasive plants through the application of glyphosate at a dosage of 1.458 g ha^{-1}. Fifteen days after the desiccation were applied 1.3 ton of filler calcareous, with 100% of PRNT and posterior was performed a harrowing, followed of grader.

The experimental design was a completely randomized block with four replications, in 3 x 3 factorial scheme, being three millet genotypes (ADR 500, LAB 1542 and LAB 1838) and three average cutting heights (60; 80 and 100 cm). The evaluations were performed for four months, consisting of evaluations by cuts in the same plots. The genotype ADR 500 is a commercial variety and the LAB 1542 and 1838 genotypes are experimental hybrids seeds of Adriana.

Millet genotypes were settled on november the 6th, 2009, where they were naturally seeded in grooved and fertilized terrain with 150 kg ha^{-1} de P_2O_5 using as a source triple superphosphate. They were used 5 lines of 3 m for each millet genotype, spaced 0.35cm between rows. The quantities of seeds were of 12 kg ha^{-1}, aiming to reach a 250.000 plants ha^{-1}.

For the evaluation of productivity, the millet genotypes were harvested with cleaver, at a 20cm height of the soil surface. Four cuttings were held, when the genotypes have reached the heights of 60, 80 and 100 cm, corresponding to phonological stages of pre-boot, pre-flowering, early flowering, respectively. The nitrogen fertilization ((15 kg ha^{-1} of N) was performed after each cut of evaluation.

After, these materials were weighed and taken to the greenhouse of ventilation emissions to 60-65ºC during 96 hours, to determine the pre-dry substance. The samples were ground in mill of Willey type, with mesh screen of 1mm, stored in plastic bags, identified to be analyzed.

The bromatological analyses were performed for the determination of the Contents of dry matter (DM), crude protein (CP), neutral detergent fiber (NDF), acid detergent fiber (ADF), lignin, cellulose and hemicelluloses by the method described by Silva and Queiroz (2002). The total digestive nutrient (TDN) was estimated by the formula proposed by Chandler (1990).

During the experiment, temperature and precipitation data were monitored (Figure 1).

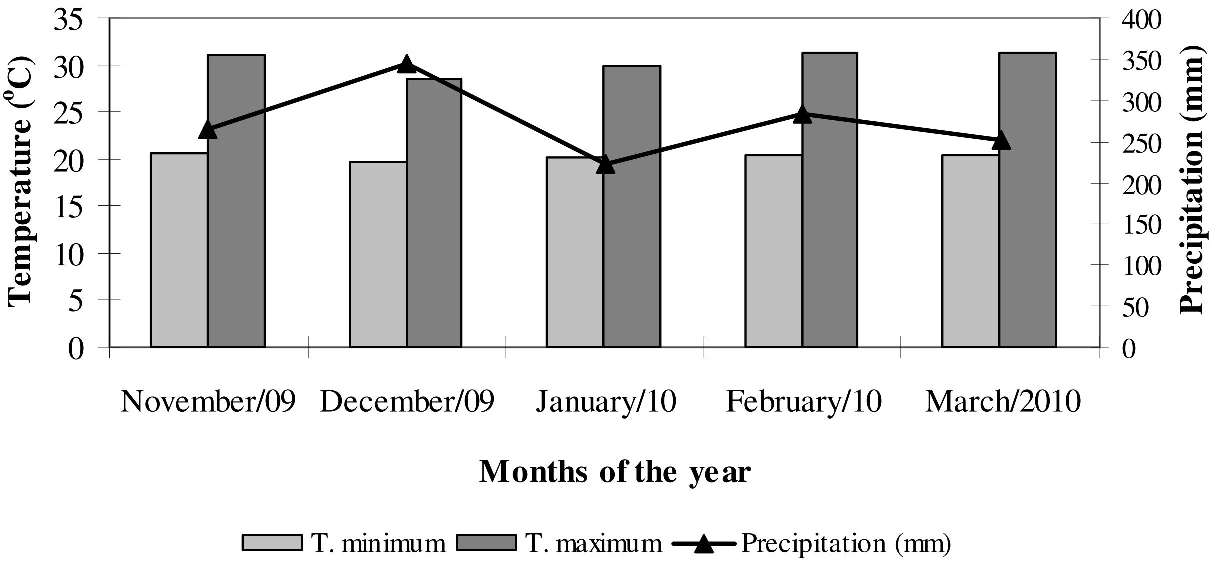

Figure 1. Average temperatures (°C) and precipitation (mm) observed during the period of November 2009 to March 2010 in Rio Verde - GO.

The data were submitted to analysis of variance and the averages compared by Tukey test, with significance content of a 5% probability. The analyses were performed by the model of plot subdivided in time, according to adequacy of Gauss-Markov's linear models, using SISVAR software (FERREIRA, 2000).

RESULTS AND DISCUSSION

There wasn't significant effect (P>0.05) of the dry mass production between the studied millet genotypes. However, the cutting heights, cuts, and interaction of these factors were influenced (Table 1).

Table 1. Dry matter production (kg ha^{-1}) of the interaction between millet genotypes and cutting heights (average of four cuts).

Millet Genotypes	Cutting height		
	60 cm	80 cm	100 cm
ADR 500	7.940 Ac	8.974 Ab	11.746 Aa
LAB 1542	7.608 Ac	9.336 Ab	11.350 Aa
LAB 1838	7.740 Ac	9.339 Ab	11.765 Aa
CV (%)	....	11.29	....

Averages followed by distinctive letters, capital in the column (genotypes) and tiny in the line (cutting height), differ by the test of Tukey (P < 0.05).

When it is analyzed the different cutting heights, it is observed that the minor production of dry mass was obtained in the 60 cm height. As the cutting height increases, there is expressive raise in the dry mass production. This result is due to the fast elongation of the culms and leaves, because in this period the plant is in full development phase. This indicates that from the point of view of the forage yield, the most appropriate age of cut was when the millet genotypes were handled on the 100 days of growing. Similar results were obtained by Kollet et al. (2006) who evaluating the forage yield of millet varieties in different cutting ages, verified increasing in the production of dry mass with the passing of the growing station.

Comparing the cuts within each genotype (Table 2), a reduction was observed in the production of dry matter as cuts were performed for every genotype of millet. The greatest productions were obtained in the first and second cuts. From the third cut on, there was a fall of dry mass production. It can be explained due to millet being an annual plant, whose forage production decreases by the day shortening, which induce flowering and the appearing of new tillers.

Table 2. Dry matter production (kg ha^{-1}) of the interaction between millet genotypes and cuttings (independent of the height).

Pearl Millet Genotypes	Cuts				
	1st cut	2nd cut	3rd cut	4th cut	Total
ADR 500	12.337Aa	11.714 Aa	8.690 Ab	5.472 Ac	38.213
LAB 1542	11.891 Aa	11.420 Aa	8.791 Ab	5.691 Ac	37.793
LAB 1838	12,310 Aa	11,616 Aa	9.183 Ab	5.350 Ac	38.459
CV %	....		8.07	....	

Averages followed by distinctive letters, capital in the column (genotypes), and tiny in the line (cuts) differ by Tukey test (P < 0.05).

Alves Filho et al. (2003) reported when the pasture is under process of physiological maturation, it presents a reduced leaf/stem ratio owing the elongation of the flower primordia and accumulation of structural material of the pasture. With the start of millet flowering, when the plant exports most of the assimilates to the development of inflorescence, there is a reduction in leaf growth, and the replacement of leaf tissue is not enough to compensate the leaves consumed by the animals, resulting in a reduced participation of this component in the forage mass (GONÇALVES; QUADROS, 2003).

Evaluating the behavior of grazing and forage intake of beef heifers on pastures of millet and papua, Costa et al. (2011) observed a linear decrease in height and supply of leaf blades over the pasture cycle. In turn, Sobrinho et al. (2005) carried out an agronomic evaluation of interspecific hybrids between elephant-grass and millet, and observed a reduction in the dry matter production in most of the hybrids in successive cuttings.

In relation to the pearl millet genotypes inside each cut, it's observed that the dry mass production was not influenced (P>0.05) between the genotypes, showing that these materials presented similar growth (Table 2). The total production in the four performed cuts was 38.213; 37.793 e 38.459 kg ha^{-1} for the genotypes ADR 500, LAB 1548 e 1838, respectively, showing high production power of these materials.

When it is evaluated the dry mass production among performed cuts, handled in the different heights (Table 3), it is observed that in 60 cm height, the first, the second and the third cuts presented similar production, differing only from the fourth cut, which presented smaller production. In the 80 cm height, all the cuts differed, with the biggest production of the first cut. In the 100 cm height, the first and the second presented similar production, differing from the third and fourth cuts.

Table 3. Dry mass production of pearl millet genotypes, submitted to several cuts and handled in different heights.

Cutting height	Cuts				
	1st cut	2nd cut	3rd cut	4th cut	Total
60 cm	8.670 Ca	9.148 Ca	8.120 Ba	5.112 Ab	31.050
80 cm	12.664 Ba	11.210 Bb	7.432 Bc	5.558 Ad	36.864
100 cm	15.204 Aa	14.391 Aa	11.112 Ab	5.775 Ac	46.482
CV %	8.07				

Averages followed by distinctive letters, capital in the columns (heights), and tiny in the lines (cuts) differ by Tukey test (P < 0.05).

Marting et al. (2005) evaluating the morphogenetic characteristics of pearl millet kept in two pasture heights verified that the forage production was 1,367 and 1,419 for the 20-30 cm height and 1.836 to 2.299 for the 40-50 cm height, when assessed in the period from December to January and January to February, respectively.

It is important to highlight that even with a significant drop in the dry mass production of the pearl millet genotypes with the performed cuts, these materials presented high production power, where the average of production on the fourth cut was 5.481 kg ha^{-1}. Another interesting factor is the total production on the four performed cuts, which came to reach 31.050; 36.864 and 46.482 kg ha^{-1}, when the pearl millet genotypes were handled on the 60, 80 and 100 cm heights. This result shows the high power of these materials to be used as pasture.

The contents of CP and TDN were influenced (P<0.05) by pearl millet genotypes, cutting heights and cuts, as well as the interaction of these factors (Tables 4, 5 and 6).

Analyzing the pearl millet genotypes inside each cutting height, it is observed in Table 4 that in the 60 and 80 cm heights, the contents of CP of ADR 500 differed from LAB 1838 and 1542 respectively. In the 100 cm height, the three genotypes presented similar contents of CP.

Table 4. Crude protein (CP) and total digestive nutrient (NDT) contents of pearl millet genotypes, handled in different cutting heights.

Pearl Millet Genotypes	Cutting Heights		
	60 cm	80 cm	100 cm
	CP content (%)		
ADR 500	15.74 Aa	13.79 Ab	10.51 Ac
LAB 1542	15.27 ABa	13.08 Bb	10.47 Ac
LAB 1838	14.76 Ba	13.16 ABb	10.31 Ac
CV (%)	6.06		
	TDN content (%)		
ADR 500	58.72 Aa	58.12 Aa	57.25 Ab
LAB 1542	58.76 Aa	57.50 Ab	56.83 Ac
LAB 1838	58.84 Aa	57.91 Ab	56.77 Ac
CV (%)	1.26		

Means followed by different capital letters in columns (genotype) and lowercase in rows (cutting height), differ by Tukey test (P<0.05).

Table 5. Crude protein (CP) and total digestive nutrient (NDT) contents of pearl millet genotypes, submitted to several cuts.

Pearl Millet Genotypes	Cuts			
	1st cut	2nd cut	3rd cut	4th cut
	CP content (%)			
ADR 500	15.26 Aa	14.84 Aa	12.97 Ab	10.31 Ac
LAB 1542	14.79 Aa	14.43 ABa	12.97 Ab	9.58 Bc
LAB 1838	14.69 Aa	13.96 Ba	12.60 Ab	9.74 ABc
CV %	5.30			
	TDN content (%)			
ADR 500	59.87 Aa	58.97 Ab	57.14 Ac	56.12 Ad
LAB 1542	59.22 Ba	59.05 Aa	56.89 Ab	55.63 Ac
LAB 1838	59.72 ABa	59.24 Aa	56.82 Ab	55.57 Ac
CV %	1.62			

Means followed by different capital letters in columns (genotype) and lowercase in rows (cuts), differ by Tukey test (P<0.05).

Table 6. Crude protein (CP) and total digestive nutrient (NDT) contents of pearl millet genotypes, submitted to several cuts and handled in different heights.

Cutting Height	Cuts			
	1st cut	2nd cut	3rd cut	4th cut
	CP content (%)			
60 cm	17.55 Aa	16.72 Ab	15.10 Ac	11.67 Ad
80 cm	15.26 Ba	14.89 Ba	13.64 Bb	9.58 Bc
100 cm	11.93 Ca	11.61 Ca	9.79 Cb	8.38 Cc
CV %	5.11			
	TDN Content (%)			
60 cm	61.09 Aa	59.50 Ab	57.63 Ac	56.87 Ad
80 cm	59.29 Ba	59.72 Aa	56.70 Bb	55.66 Bc
100 cm	58.44 Ca	58.05 Ba	56.51 Bb	54.78 Cc
CV %	1.11			

Means followed by different capital letters in columns (cutting height) and lowercase in rows (cuts), differ by Tukey test (P<0.05).

When the contents of CP are compared in the cutting heights of the pearl millet genotypes, we observe in Table 4 that as the heights increase occurs reduction on the contents of PB. The greatest contents were obtained when the genotypes were handled on the 60 cm height. This result is due to the high percentage of leaves and low percentage of culms, besides the consequent high relation between leaf: culms. However, when the genotypes were handled in the 100 cm height, occurs reduction of 49.7% in the CP content, due to the smaller quality of the stem in relation to the leaf, which also compromises the pasture structure, mainly because of the smaller leaves density (PEDROSO et al., 2009). Moreover, in this height the pearl millet genotypes already started issuing the panicle, where occurs the translocation of nutrients for the seeds.

Costa et al. (2007) relate that the greatest changes that occur in the composition of the forage plants are those arising from their maturation. Most of the forage species suffer decline in the nutritional value with increasing age, resulting from the smaller relation leaf/stem combined with the growing lignifications of cell wall.

Assessing the CP contents of the pearl millet genotypes submitted to several cuts, it is observed in Table 5 that on the first and third cuts the genotypes presented similar contents. On the second and fourth cuts ADR 500 differed from LAB 1838 and 1542 respectively.

Comparing the cuts made inside each genotype, the CP contents of the first and second cuts were similar for both genotypes. However, from the third cut on occurs reduction in the contents (Table 5). It can be associated to greater leaf senescence rate and smaller tiller renovation rate, decreasing the CP contents, due to the smaller leaf proportion.

Forages with greater presence of leaves represent superior qualitative pastures, in view of the most elevated CP contents and digestibility, resulting in higher consume. Kollet et al. (2006) comparing the pearl millet CP contents in different cutting ages observed that the contents reduced from

19.3; 15.4; and 13.6% to the growing ages 35, 42 and 49 days respectively.

An interesting fact observed in this paper, that even the pearl millet genotypes being submitted to several cuts, the CP contents in the fourth cut was over 7%, showing that despite being an annual, can provide considerable PB contents, even with frequent cuts. Van Soest (1994) mentions that the ingestion of pastures with CP content under 7% compromises the microbial activity in the rumen, resulting in reduction of the pasture rate and growth in the retention time of food in the digestive tract.

Costa et al. (2011) assessing pearl millet under pasture, verified CP contents of 16.4%. These results were similar to those ones obtained in this study, indicating that pearl millet has high power of use in animal feeding, either for its production capacity or for its nutritional quality, beating several other tropical forages.

When CP contents of the cuts inside each height are evaluated (Table 6) it is observed in Table 6 that the pearl millet genotypes were handled on the 60 cm height, the CP content on the first cut reached 17.5%. The same behavior occurred to the frequent cuts, with smaller contents in 100 cm height, providing greater mortality rate of tillers. The CP contents were also affected by performed cuts (Table 6). From the first to the fourth cut occurred reduction of 58.1; 59.2 e 42.3% for the heights of 60, 80 and 100 cm. This behavior can be explained by the greater number of leaves on the first cuts.

Analyzing TDN contents of the pearl millet genotypes, submitted to different heights, it is observed in Table 4 that for all the studied heights the TDN contents were similar. The contents obtained in this study are over the ones related by Costa et al. (2011) of 54.8% in study with pearl millet pasture.

In relation to cutting heights, ADR 500 obtained similar contents of TDN when handled on 60 and 80 cm heights, differing only from 100 cm height. However, for LAB 1542 and 1838 genotypes, TDN contents reduced from 2.2 and 3.4% when compared with 60cm height to 80 and 100 cm respectively (Table 4).

Paulino (2003) relates that in relation to the nutritional value, pearl millet in the pasture period presents TDN contents around 60-65%, what characterizes as a high quality material for cattle grazing. Comparing to TDN contents of pearl millet genotypes, submitted to several cuts, it is observed in Table 5 that for the first cut ADR 500 differed from LAB 1542. For the second, third and fourth cuts TDN contents were similar among the studied genotypes.

In relation to the cuts inside each genotype, only ADR 500 differed among all the performed cuts. For LAB 1542 and 1838 the first and second cuts TDN contents were similar, differing from the third and fourth cuts, which obtained the smaller TDN contents (Table 5).

Cappelle et al. (2001) related that the estimates of the energy values of the foods and diets are important to high production animals, mainly for dairy cows, which require big energy quantity. Energy deficient diets reduce the milk production, cause excessive weight loss, reproductive problems and can reduce the resistance to diseases.

When TDN contents are evaluated, handled in different heights and submitted to several cuts, it is observed in Table 6 that there was reduction in the contents when increased the cutting height from 60 to 100 cm for all cuts. According to Van Soest (1994), TDN contents of forages are of about 55%, being possible to change according to the climate conditions, soil and cutting age of the plants. In relation to cuts inside each height it is observed that only on 60 cm height TDN contents of all cuts were different. In 80 and 100 cm heights, the first and second cuts were similar, differing from the third and fourth cuts, which obtained the smallest TDN contents (Table 6).

For NDF, ADF and lignin contents there wasn't influence from pearl millet genotypes on the three studied cutting heights (Tables 7, 8 and 9). There was significant effect ($P<0.05$) only between the cutting heights and cuts, and in the interaction of these factors.

For ADR 500 only 100cm height differed from 80 and 60 cm heights. For LAB 1542 and 1838 genotypes, the height of 60 cm differed from 80 and 100 cm heights. As the cutting height increases, rise in NDF and ADF contents occur, what can be justified because of the reduction of the leaves percentage and the increase of the stem proportion, what elevates the fiber compounds of the plant.

Kollet et al. (2006) found NDF contents of 51.68 to 69.17% for three varieties of pearl millet submitted to three cutting ages, of which with the aging of the cut occurs increase in NDF contents.

When the pearl millet genotypes were handled in 60 and 80 cm heights, ADF contents were similar, differing only from 100 cm height, which presented the highest ADF contents (Table 7). This result is due to the greater fiber presence when the genotypes were handled on this height, due to the smaller relation leaf/stem combined with high lignifications of cell wall in the stem (EUCLIDES et al., 2008).

Table 7. Neutral detergent fiber (NDF), acid detergent fiber (ADF), and lignin contents of pearl millet genotypes, handled in different cutting heights.

Pearl Millet Genotypes	Cutting Height		
	60 cm	80 cm	100 cm
		NDF content (%)	
ADR 500	68.35 Ab	69.23 Ab	70.50 Aa
LAB 1542	68.28 Ac	70.13 Ab	71.13 Aa
LAB 1838	68.17 Ac	69.54 Ab	71.21 Aa
CV (%)		1.54	
		ADF content (%)	
ADR 500	38.79 Ab	39.67 Ab	42.73 Aa
LAB 1542	38.43 Ab	39.41 Ab	42.85 Aa
LAB 1838	38.45 Ab	39.45 Ab	43.29 Aa
CV (%)		3.52	
		Lignin content (%)	
ADR 500	11.14 Ac	11.86 Ab	14.78 Aa
LAB 1542	11.15 Ac	11.81 Ab	14.70 Aa
LAB 1838	11.12 Ac	12.23 Ab	14.53 Aa
CV (%)		5.43	

Means followed by different capital letters in columns (cutting height) and lowercase in rows (genotype), differ by Tukey's test (P<0.05).

Comparing the pearl millet genotypes inside each cut (Table 8), it is observed that only in the first cut there was significant effect among the studied genotypes. For the second, third and fourth cuts NDF contents were similar. However, when cuts inside pearl millet genotypes are analyzed, NDF contents of ADR 500 and LAB 1838 differ in all cuts, with significant increase in the contents. This result is due to the vigor loss of the resprouting of genotypes, by the cuts made, resulting in higher quantities of stems and this way, higher fiber proportion, reflecting significantly on the forage nutritional value.

Table 8. Neutral detergent fiber (NDF), acid detergent fiber (ADF), and lignin contents of pearl millet genotypes, submitted to several cuts.

Pearl Millet Genotypes	Cuts			
	1st cut	2nd cut	3rd cut	4th cut
		NDF content (%)		
ADR 500	66.65 Aa	67.97 Ab	70.66 Ac	72.16 Ad
LAB 1542	67.60 ABa	67.85 Aa	71.04 Ab	72.89 Ac
LAB 1838	66.87 Ba	67.58 Aa	71.14 Ab	72.97 Ac
CV (%)		1.76		
		ADF content (%)		
ADR 500	39.10 Ac	39.39 Abc	40.27 Ab	42.84 Aa
LAB 1542	38.84 Ab	39.33 Ab	39.78 Ab	42.96 Aa
LAB 1838	39.18 Ab	39.18 Ab	40.15 Ab	43.07 Aa
CV (%)		2.85		
		Lignin content (%)		
ADR 500	11.16 Ab	11.58 Ab	13.90 Aa	13.73 Aa
LAB 1542	11.18 Ab	11.73 Ab	13.57 Aa	13.74 Aa
LAB 1838	11.49 Ab	11.43 Ab	13.77 Aa	13.81 Aa
CV (%)		6.15		

Means followed by different capital letters in columns (cuts) and lowercase in rows (genotype), differ by Tukey's test (P<0.05).

According to Lima et al. (2002), NDF presents a relation inversely proportional to the diet energetic density, and NDF values over 60% negatively correlate to forage consumption.

The ADF contents of the genotypes were not influenced in all cuts (Table 8). However, when the cuts of each genotypes are assessed, there was increase in the contents with the cuts made.

When NDF contents are assessed, handled in different heights and submitted to several cuts, it is observed in Table 9 that there was an increase in the contents when the cutting height was increased from 60 to 100 cm for all the cuts made. Pena et al. (2009) observed that the frequency of cuts is important in the control of the development of stems and the sward structure, and the lengthening of stems favors the increase of dry mass production, but negatively influences in the pasture efficiency and in the nutritional value of the produced forage, besides increasing the range of appearance of new leaves.

When the cuts inside each height are observed (Table 9), we verify that with the increase in the cutting numbers, rising in NDF and ADF contents occur, decreasing the forage quality that will have greater fiber proportion in relation to the green portion (Table 9), mainly in the fourth cut.

According to Müller et al. (2006) in consequence of plants maturation, because, with the cycle advance there is increase in the lignin content and increase of cell wall (NDF) in the plant tissues, due to, mainly, the decreasing of the leaf/stem relation. The greater changes that occur in the chemical composition of the forage plants are those which accompany its maturation. As the plant ages, the proportion of the digestible compounds tends to decrease and the proportion of fibers, increase.

For ADF contents, on the first and second cuts all the heights were influenced (Table 9). However, for the third cut the contents between 60 and 80 cm heights and on the fourth cut the contents were similar in relation to the studied heights.

Maia et al. (2000), verified more elevated NDF and ADF contents for the pearl millet harvested in advanced age, what can be associated to the elevation of fiber compounds with the aging of the plant.

Table 9. Neutral detergent fiber (NDF), acid detergent fiber (ADF), and lignin contents of pearl millet genotypes, submitted to several cuts and handled in different heights.

Cutting Height	Cuts			
	1st cut	2nd cut	3rd cut	4th cut
	NDF content (%)			
60 cm	64.86Cd	67.20 Ac	69.94 Bb	71.06 Ca
80 cm	67.51 Bc	66.88 Ac	71.31 Ab	72.84 Ba
100 cm	68.75 Ac	69.33 Bc	71.59 Ab	74.13 Aa
CV (%)	1.36			
	ADF content (%)			
60 cm	36.30 Cc	36.85 Cc	38.40 Bb	42.66 Aa
80 cm	38.00 Bb	38.14 Bb	38.65 Bb	43.25 Aa
100 cm	42.82 Aa	42.90 Aa	43.15 Aa	42.95 Aa
CV (%)	2.16			
	Lignin content (%)			
60 cm	9.38 Cc	9.98 Cc	13.05 Ba	12.13 Cb
80 cm	10.45 Bb	10.83 Bb	13.33 Ba	13.25 Ba
100 cm	13.99 Ac	13.93 Ac	14.86 Ab	15.90 Aa
CV (%)	3.87			

Means followed by different capital letters in columns (cuts) and lowercase in rows (cutting height), differ by Tukey's test (P<0.05).

Analyzing the pearl millet genotypes handled in the different heights, it is verified that the smaller lignin contents were obtained when the genotypes were handled on 60 cm height, differing from 80 and 100 cm heights (Table 7). It can be explained due to the greater proportion of stems when handled on 80 and 100 cm height, what would explain greater lignifications.

Low lignin contents are considered relevant to the improvement of the forage nutritional value and the increase of forage consumption by the animals, by the fact that lignin is associated to the food indigestibility, however, more important than its content is its structural arrangement in the forage cell wall (JUNG; DEETZ, 1993). Nevertheless, it has been addressed the lignin content in tropical grasses as depreciative fraction of the foods (LEONEL et al., 2009), therefore low lignin contents allow better use of the fiber by the rumen microorganisms (RIBEIRO et al., 2008).

When lignin contents of the pearl millet genotypes submitted to several cuts are compared, we observe in Table 8 that on the first and second cuts the contents were similar, differing from the third and fourth cuts which also obtained similar contents. Smaller lignin content from the third cut can be correlated to smaller leaf proportion.

In relation to handled cuts at different heights (Table 9) the smaller lignin contents were obtained with 60 cm height, differing from 80 and 100 cm heights for the first, second and fourth cuts. Only on the third cut the contents were similar in 60 and 80 cm heights.

However, when the heights inside each cut are analyzed, we observe on Table 9 that the lignin contents of all heights were influenced by the cuts made, and smaller for the first and second cuts. According to Van Soest (1994), lignin is considered indigestible and inhibitory of the digestibility of the forage plants and its content increases with physiological maturity of the plants.

CONCLUSIONS

Pearl millet genotypes represent a good alternative for pasture. The genotypes (ADR 500; LAB 1542 and LAB 1838) presented production of dry matter and bromatological composition similar between the materials.

The forage quality is affected by handling of cutting height, and thus it is recommended that the pearl millet genotypes are handled in 80 cm height, to associate production and forage quality.

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