Tropical Grasslands – Forrajes Tropicales (2013) Volume 1, 74−75

Sward structural characteristics of perennial peanut genotypes as affected by harvest frequency

ALIEDSON S. FERREIRA, CARLOS G. PEDREIRA AND CARLA M. MARASSATTO

Universidade de São Paulo, Departamento de Zootecnia, ESALQ, Piracicaba, SP, Brazil. www.esalq.usp.br

Keywords: Light interception, *Arachis,* leaf angle, leaf area index, forage legumes, tropical legumes.

Introduction

Despite the high potential of tropical forage species, herbage production, nutritive value and animal production in Brazilian livestock production systems are lower than what should be obtained from both a biological and operational point of view (Pedreira and Mello 2000). Even with these limitations, the livestock industry is often able to sustain high levels of productivity (animal product per hectare) by using good animal genetics and supplementation. Reducing production costs, however, will likely depend on the identification and incorporation of a high-quality forage resource, in terms of both improving diet quality of grazing animals and sustaining pasture soil productivity.

The search for economically viable and sustainable forage production alternatives has been the subject of a great deal of research in many parts of the world. Among the alternatives explored, the diversification of pastures by the introduction of forage legumes in traditional production systems has been suggested, mainly to improve soil chemical characteristics (increased nitrogen levels) and improve forage quality (Perez 2004; Valentim and Andrade 2004). Promising legume germplasm is available in the tropics, but before these materials are incorporated into commercial systems, they need to be evaluated for adaptation, production and persistence in specific micro-environments. In addition, interactions involving grazing management strategies and genotypes should be described and explained, so that their agronomic potential can be explored. The aim of this study was to characterize sward structure of 4 perennial peanut genotypes, subjected to 2 harvest management strategies, in southeastern Brazil.

Correspondence: Universidade de São Paulo, Departamento de Zootecnia, ESALQ, Av. Pádua Dias, 11, Piracicaba CEP 13418-900, SP, Brazil.
Email: aliedson@usp.br

Methods

The experiment was conducted at the Escola Superior de Agricultura "Luiz de Queiroz" (ESALQ) in Piracicaba, SP, Brazil (22°42′ S, 47°30′ W; 580 m asl). Treatments consisted of all possible combinations between 4 perennial peanut (*Arachis pintoi*) genotypes: Alqueire-1, Amarillo, Belmonte and Mandobi and 2 harvest frequencies: 28 and 42 days. The soil was a Typic Hapludoll. The experimental design was completely randomized with 3 replications in a 5 x 2 factorial, totaling 30 experimental units of 18 m^2 separated by 1-m aisles. Light interception, leaf area index and foliage angle were measured using a model LAI-2000 canopy analyzer (Li-Cor, Lincoln, Nebraska, USA). Eight readings were taken per experimental unit immediately before each harvest using a ratio of 4 measurements at ground level and a comparative measure above the canopy. A 180-degree protection was used in the field of view of the sensor (lens) as recommended by the manufacturer for use in plots (Welles and Norman 1991). The experimental units were measured before and after the harvests; the residual height was 10 cm.

Results and Discussion

There were significant effects for frequency of harvest (P=0.0105) and genotype (P=0.0037) in pre-harvest measurements for leaf area index (LAI) (Table 1). Plots harvested every 42 d showed higher LAI than those harvested every 28 d, due to increase in the amount of leaves that are related to the exponential increase in shoot mass. Overall, Belmonte had greatest LAI as a result of better adaptation to local edaphoclimatic conditions and genetic differences among the genotypes. Light interception (LI) was modified only by harvest frequency (P=0.0242) with longer intervals increasing LI for all genotypes. This is related to increase in the LAI, leaves being the most important plant part for capturing light and performing photosynthesis. There was an interaction effect of harvest frequency x genotype (P=0.0393). Amarillo increased foliage angle when harvested with longer clipping intervals as a result of adaptation in the architecture, changing the orientation of the leaves to optimize LI with a greater LAI. When harvested every 28 d, Alqueire-1 and Mandobi had greater foliage angle than Belmonte. On the other hand, when harvested every 42 d, there was no difference among genotypes (Table 1). It is possible that modification in sward structure happens mainly during the initial 28 days of regrowth.

Table 1. Leaf area index (LAI), light interception (LI) and leaf angle of perennial peanut genotypes submitted to 2 cutting frequencies.

	Genotype				
Cutting frequency (days)	Alqueire-1	Amarillo	Belmonte	Mandobi	Mean
	LAI				
28	3.0	3.6	3.6	3.0	3.3 b[1]
	(0.24)	(0.25)	(0.25)	(0.25)	(0.12)
42	3.4	3.4	5.1	3.7	3.9 a
	(0.39)	(0.41)	(0.39)	(0.41)	(0.20)
Mean	3.2 B[1]	3.5 B	4.3 A	3.4 B	
	(0.23)[2]	(0.23)	(0.23)	(0.23)	
	LI (%)				
28	89	91	92	90	90 b
	(1.37)	(1.43)	(1.43)	(1.43)	(0.71)
42	94	93	95	92	94 a
	(2.24)	(2.38)	(2.24)	(2.38)	(1.15)
Mean	91	92	93	91	
	(1.31)	(1.39)	(1.33)	(1.39)	
	Leaf angle (degree)				
28	41 Aa	36 Bb	39 ABa	41 Aa	39
	(1.42)	(1.47)	(1.47)	(1.47)	(0.73)
42	41 Aa	46 Aa	43 Aa	40 Aa	42
	(2.30)	(2.44)	(2.30)	(2.44)	(1.19)
Mean	41	41	41	41	
	(1.35)	(1.42)	(1.37)	(1.43)	

[1]Capital letters compare genotypes and lower-case letters compare frequencies by Student's t-test ($P<0.05$).
[2]Numbers in parentheses are the standard error of the mean.

Conclusion

The findings from this study help to explain how different genotypes react structurally to different cutting frequencies. How this is reflected in production of dry matter is the subject of a different study.

Acknowledgments

Thanks are due to Fundação de Amparo à Pesquisa do Estado de São Paulo, Brazil (FAPESP) for granting a graduate scholarship to A.S. Ferreira.

References

Pedreira CGS; Mello ACL. 2000. *Cynodon* spp. In: Anais, Simpósio sobre manejo da pastagem: A planta forrageira no sistema de produção, 17, Piracicaba, 2000. Fundação de Estudos Agrários Luiz de Queiroz (FAEALQ), Piracicaba, SP, Brazil. p. 109−133.

Perez NB. 2004. Amendoim forrageiro**.** Leguminosa perene de verão. Cultivar Alqueire-1 (BRA 037036). Boletim Técnico, Brasília, DF, Brazil.

Valentim JF; Andrade CMSA. 2004. Perspectives of grass-legume pastures for sustainable animal production in the tropics. In: Anais, Reunião anual da Sociedade Brasileira de Zootecnia, 41, Campo Grande, 2004. CD-ROM. Sociedade Brasileira de Zootecnia (SBZ), Campo Grande, MS, Brazil. p. 142−154.

Welles JM; Norman JM. 1991. Instrument for indirect measurement of canopy architecture. Agronomy Journal 5:818−825.

Ferreira AS; Pedreira CG; Marassatto CM. 2013. Sward structural characteristics of perennial peanut genotypes as affected by harvest frequency. Tropical Grasslands – Forrajes Tropicales 1:74–75.
DOI: 10.17138/TGFT(1)74-75

This paper was presented at the 22nd International Grassland Congress, Sydney, Australia, 15−19 September 2013. Its publication in *Tropical Grasslands – Forrajes Tropicales* is the result of a co-publication agreement with the IGC 2013 Organizing Committee. Except for adjustments to the journal's style and format, the text is essentially the same as that published in: **Michalk LD; Millar GD; Badgery WB; Broadfoot KM, eds. 2013. Revitalising Grasslands to Sustain our Communities. Proceedings of the 22nd International Grassland Congress, Sydney, Australia, 2013. New South Wales Department of Primary Industries, Orange, NSW, Australia. p. 254–255.**