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

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Introduction

Despite the high potential of tropical forage species, herbage production, nutritive value and animal productivity in Brazilian livestock production systems are lower than what can be obtained from both a biological and operational point of view (Pedreira and Mello 2000, Da Silva and Sbrissia 2000). Even with these limitations, the livestock industry is often able to sustain high productivity levels (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, productivity 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 characterise sward structure of 4 perennial peanut genotypes subjected to 2 harvest management strategies, in south-eastern Brazil.

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 two harvest frequencies: 28 and 42 days. The soil was a Typic Hapludoll. The experimental design was completely randomised with 3 replications in a 5 x 2 factorial totaling 30 experimental

units of 18 m² separated by 1-m aisles. Light interception, leaf area index and foliage angle were measured using a model LAI-2000 canopy analyser (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

There were significant effects for frequency of harvest ($P=0.011$) and genotypes ($P=0.004$) 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 exponential increase in the 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 ($P=0.024$) 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 genotypes ($P=0.039$). 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 optimise 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.

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.

Table 1. Leaf area index (LAI), light interception (LI), and leaf angle of perennial peanut genotypes submitted to 2 cutting frequencies. Capital letters compare genotypes and lower-case letters compare frequencies by Student's t-test (P<0.05). Numbers in parentheses are the standard error of the mean.

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

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