Morphological and Anatomical Characteristics of Forage Peanut under Shade

K. F. Gobbi
Federal University of Viçosa, Brazil

R. Garcia
Federal University of Viçosa, Brazil

A. F. Garcez Neto
Federal University of Viçosa, Brazil

M. C. Ventrella
Federal University of Viçosa, Brazil

O. G. Pereira
Federal University of Viçosa, Brazil

See next page for additional authors

The 21st International Grassland Congress / 8th International Rangeland Congress took place in Hohhot, China from June 29 through July 5, 2008.

Proceedings edited by Organizing Committee of 2008 IGC/IRC Conference

Published by Guangdong People's Publishing House

Presenter Information

K. F. Gobbi, R. Garcia, A. F. Garcez Neto, M. C. Ventrella, O. G. Pereira, and G. C. Rocha

Morphological and anatomical characteristics of forage peanut under shade

Gobbi , K .F . , Garcia , R . , Garcez Neto , A .F . , Ventrella , M .C . , Pereira , O .G . , Rocha , G .C .
Federal University of Viçosa , Minas Gerais , Brazil . E-mail : kfgobbi@vicosa .ufv .br

Key words : Arachis pintoi ,leaf tissues ,leaf stem ratio ,specific leaf area

Introduction Forage peanut (*Arachis pintoi* cv . Amarillo) is a stoloniferous legume of central Brazil . Because of its shade tolerance , very high quality and high persistence under grazing , it has been suggested that forage peanut could be used in silvopastoral systems (Kretschmer & Pitman , 2001) . This work was carried out to evaluate changes in leaf anatomy and morphological characteristics of forage peanut under shade and its acclimation to low light environment .

Material and methods The study was located at the Federal University of Viçosa , Brazil (20°45′40″ S and 42°51′40″ W) from December 2005 to May 2006 . The statistical design was a randomized complete block with three replicates . Treatments consisted of three levels of artificial shade (black shade cloth) : 0% (full sunlight) , 50% and 70% of shade .

Forage peanut was sown in plots of 4 m^2 , at seeding rate of 20 kg/ha , and after seeds germination shade structures were mounted on the plots . When the sward light interception reached 95% of photosynthetically active radiation , plants were harvested at 3 cm above ground level from 0 .60 m × 0 .40 m quadrats , and samples prepared to morphological and anatomical evaluations . Analysis of variance and regression of data were performed using the SAS software .

Results and discussion Mean petiole length , leaf area per leaflet and specific leaf area (SLA) increased linearly with shading (Table 1) . Longer petioles might provide better spatial arrangement of leaves to intercept light more efficiently (Lambers et al . , 1998) . In spite of SLA increase , the leaf thickness was not affected by treatments . Plants that tolerate shade invest relatively more of the products of photosynthesis to increase leaf area and maximize capture of light . Moreover , their leaf thickness is reduced to a smaller extent than it is in obligate sun plants submitted to shade (Lambers et al . , 1998) .

Except for a linear increase in intercellular spaces under increased shading (Table 1) , percentage of leaf cross-sectional area occupied by component tissues was similar for all the treatments . Once variation in SLA can be due to variation in leaf thickness or in leaf density (Witkowski & Lamont , 1991) , and leaf thickness of forage peanut was not altered ($P > 0.05$) , change in SLA is probably related to greater proportion of intercellular spaces and smaller leaf density under shade . The effect of shade on leaf : stem ratio was not significant ($P > 0.05$) for forage peanut , likely due to morphological adjustment found between leaf area and petiole length .

Table 1 *Morphological and anatomical characteristics of forage peanut under shade . (Significant : *** 0 .1% ; ** 1%) .*

Variables	Shade (%)			Regression
	0	50	70	
Petiole length (mm)	38 .0	51 .0	56 .2	$Y = 38.0479 + 0.2594^{***}x$; $r^2 = 0.94$
Leaf area/leaflet (cm^2)	4 .4	6 .2	6 .9	$Y = 4.3719 + 0.0362^{***}x$; $r^2 = 0.90$
SLA ($cm^2\ g^{-1}$)	214 .5	259 .5	277 .5	$Y = 214.5131 + 0.8993^{***}x$; $r^2 = 0.99$
Intercellular spaces (%)	6 .8	10 .7	12 .2	$Y = 6.7853 + 0.0773^{**}x$; $r^2 = 0.84$

Conclusions Forage peanut showed anatomical and morphological changes that confirmed its acclimation to shade . This forage legume has a good potential as a component of silvopastoral systems .

References

Kretschmer , A .E . , Pitman , W .D . , 2001 . Germplasm resources of tropical forage legumes . In : Sotomayor-Ríos , A . , Pitman , W .D . Tropical forage plants : development and use . *Boca Raton : CRC Press* , 41-57 .
Lambers , H . , Chapim III , F .S . , Pons , T .L . , 1998 . Plant physiological ecology . *New York : Springer* . 1998 . 317-323 .
Witkowski , E .T .F . ; Lamont , B .B . , 1991 . Leaf specific mass confounds leaf density and thickness . *Oecologia* 88 , 486-493 .