Establishment and Effects on Soil and Pasture of Diverse Arrangements of *Acacia decurrens*, *Acacia melanoxylon* and *Alnus acuminata* as Silvopasture Systems in the High Tropic in Colombia

A. Conde
Universidad de La Salle, Colombia

L. L. Betancourt
Universidad de La Salle, Colombia

C. J. Jaramillo
Universidad de La Salle, Colombia

A. Umaña
Universidad de La Salle, Colombia

D. Barrera
Universidad de La Salle, Colombia

See next page for additional authors

The XXI International Grassland Congress / VIII 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

A. Conde, L. L. Betancourt, C. J. Jaramillo, A. Umaña, D. Barrera, and D. R. Chamorro

Establishment and effects on soil and pasture of diverse arrangements of *Acacia decurrens*, *Acacia melanoxylon* and *Alnus acuminata* as silvopasture systems in the high tropic in Colombia

A .Conde [1], *L .L .Betancourt* [1] . *C .J . Jaramillo*[1] . *A . Umaña*[1], *D . Barrera*[1] *and D .R . Chamorro*[2]
[1] *Universidad de la Salle , Bogotá Colombia . E-mail : aconde@ lasalle .edu .co .* [2] *Corpoica*

Key words : Silvopastoral systems , degradated pastures , carbohydrate fractions , protein fractions

Introduction With the introduction of trees species into grass pastures , some of the expected benefits are : erosion control , enhancement of soil chemical characteristics , more efficient utilization of the available water and increased microbial activity in shaded areas . If management factors and environmental conditions allow these effects to occur , there will also be increased availability of forage and crude protein in the system , particularly in drier periods (Carvalho et al , 2002) . The objective of this study was to evaluate dasometric measures during establishment period and initial effects on soil and the availability and quality of grass in two arrangements : live fences and tree dispersed in pasture in the high tropic in Colombia .

Material and methods Three species of trees were planted in a hill pasture with *Pennisetum clandestinum* near to Sopo , Colombia (73° 57′ O , 4° 54′ N) , 2580 meters mean altitude , 14 °C , mean rainfall 693 mm/year , in two different arrangements : A) single row of two meters spaced trees like a live fence and B) dispersed trees in a pasture 10×5 m , each line with one specie . Dasometric measures were : average height , basal diameter and diameter at 40 cm height , Three treatments were imposed : 1) *Acacia decurrens* (Ad) 2) . *Acacia melanoxylon* (Am) and 3) . *Alnus acuminata* . (Aa) in a randomized complete block design with 6 replicates . Changes in soil and availability of forage and its quality were measured (Licitra et al , 1996 ; Sniffen et al , 1992) .

Results Best growth was achieved by Ad and Am compared with Aa ($p<0.05$) . In all dasometric measures were not different between Ad and Am (Table 1) but *Alnus acuminata* produced lower means values than acacias ($p<0.05$) .

Table 1 *Average height (m) of three dispersed trees in pasture 10×5 .*

Month	*Alnus acuminata*	*Acacia Melanoxylon*	*Acacia decurrens*
August(Planting)	0 .735±1 .80[b]	0 .887±3 .01[a]	0 .864±3 .29[a]
September	0 .931±2 .93[b]	1 .064±4 .15[a]	1 .088±3 .27[a]
October	1 .104±1 .98[b]	1 .365±2 .52[a]	1 .390±3 .00[a]
November	1 .138±1 .95[b]	1 .466±2 .05[a]	1 .520±2 .66[a]
December	1 .179±1 .92[b]	1 .521±1 .38[a]	1 .641±2 .16[a]
January	1 .220±1 .43[b]	1 .581±1 .61[a]	1 .726±1 .97[a]

Means ,±s .e .m . Means followed by the same letter in columns do not differ ($p<0.05$) . Months from 2005 to 2006 .

Pastures with trees did not differ in soil chemical characteristic compared with pastures without trees . Availability of forage was higher in pastures with trees dispersed 10×5 (720 g of dry matter/m^2) compared with pastures without trees (649 g of dry matter/m^2) .

Carbohydrates and protein fractions in grass did not differ with or without trees in the pastures ($p>0.05$) .

Conclusions Based on dasometric measures Acacia decurrens and Acacia melanoxylon grew faster and performed better than the native Alnus acumminata in the reported ecosystem .

The long term effects of planting trees on nutrient quality of grass (protein and carbohydrate fractions) and soil characteristics may be cumulative and need further research .

References

Carvalho M .M . , Alvim M .J and Xavier D .F . (2002) . International Symposium on Silvopastoral Systems and Second Congress on Agroforestry and Livestock Production in Latin America . *http ://www .fao .org/ WAIRDOCS/LEAD/X6109E/ x6109e03 . Html* .

Licitra G . , Hernandez T .M . and Van Soest P .J . Standardization of procedures for nitrogen fractional of ruminant feeds . *Anim . Feed Sci . Technol* . 57 : 347-358 .

Sniffed C .J . O Connor J .D . , Van Soest P . J . , Fox D .G . and Russell J .B . 1992 . Net Carbohydrate and protein system for evaluating cattle diets : I Carbohydrate and protein availability J . *Anim . Sci* . 70 : 3562-3577 .