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FORAGE AGRONOMY IN THE HYPERTHERMIC SAVANNAS (CARIMAGUA)

Germplasm Evaluation

Plant introduction continues to play an important role in the forage species selection and evaluation work Some 600 accessions have been established in nursery plots for evlauation in the hyperthermic well drained savanna region of Colombia represented by the Carimagua research station

The objectives are (1) to evaluate a wide range of tropical legumes and grasses for adaptation to the climatic and edaphic conditions prevailing in this ecosystem and (2) to test compatibility of adapted grasses and legumes mixtures and their persistence in mixtures under grazing

Stability of yield of sown grass and legume components under actual grazing conditions is the ultimate yardstick in the selection of improved forage cultivars As a result of these trials several promising pasture plants are in the final stages of evaluation and domestication Certain deficiencies still exist and the primary objective of the evaluation work centered at Carimagua is to select superior genotypes of the key species which have shown promise in preliminary tests over the past four years

Stylosanthes capitata S bracteata Desmodium ovalifolium (syn *D heterocarpon) heterocarpon Zornia Centrosema Aeschynomene* sp and accessions of *Andropogon gayanus* constitute the majority of materials currently under trial Other promising species each with a series of accessions are *S guianensis* tardío and *S* aff *leiocarpa*

Andropogon gayanus

The effect of fire on the rate of recovery of grasses and legumes was studied in another experiment following the burning of grass/legume associations shortly after the first rains in March The strongly rhizomatous *A gayanus* showed a significantly faster rate of growth during the eight week period immediately after burning than *B decumbens* (Figure 4) Two ecotypes of *Stylosanthes capitata* also recovered faster than three other legumes (Table 4)

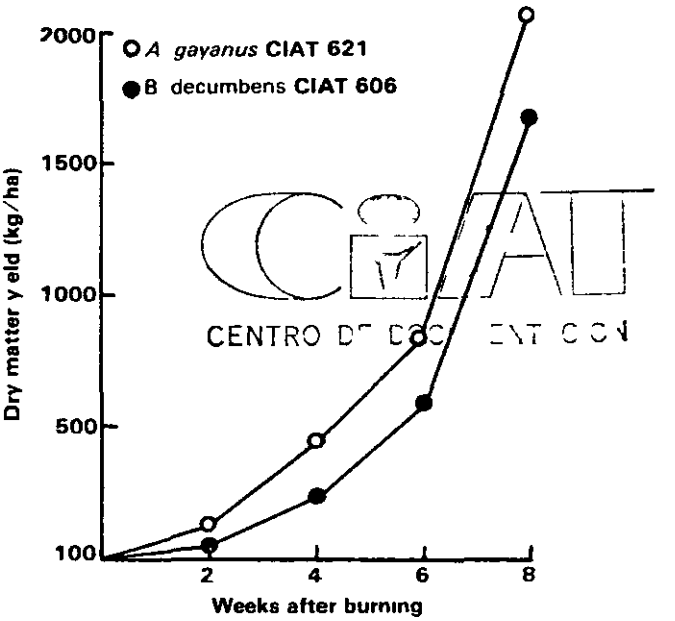


Figure 4 Rate of growth of *Andropogon gayanus* CIAT 621 and *Brachiaria decumbens* CIAT 606 after burning (March 12 1979) at the beginning of the wet season

Table Rate of growth of grasses and associations with *Andropogon gayanus* CIAT 621 or *Brachiaria decumbens* cv Basilisk after burning Llanos Orientales Colombia (Mean dry matter production two week and eight week after burning

Species	Rate of growth (kg/ha/week)
Legume	
Stylosanthes capitata CIAT 1019	138.5 a[1]
Stylosanthes capitata CIAT 1328	110.1a
Desmodium ovalifolium CIAT 350	30.6 b
Macroptilium sp CIAT 535	22.6 b
Desmodium barbatum CIAT 3063	1.4 c
Grass	
Andropogon gavanus CIAT 621	701.7a
Brachiaria decumbens cv Basilisk	42.2b

[1] Values followed by the same letter are not significantly different at 0.05 level

Open pollinated progenies of *A gayanus* CIAT 621 a strongly outcrossing type show considerable varia tion in several important forage traits Variation in flowering date is one of the readily discernible characteristics of this accession Early and late flowering segregates display a range of over one month for flower initiation This difference seems to be reduced with shorter day lengths at the end of the year Under light grazing later flowering types are preferentially grazed In a preliminary study early and late flowering segregates of *A gayanus* were com pared for N P Ca content and *in vitro* digestibility (Table 5) Both N content and digestibility declines in the early flowering segregates late flowering segregates showed 8 7% higher *in vitro* digestibility than the early flowering ones P and Ca contents did not vary due to differences in flowering date

As a follow up 100 late flowering clones have been selected from old grazed pastures of *A gayanus* 621 at the Carimagua station and were assembled in a polycross nursery to obtain seed and data on produc tivity and nutritional value

Stylosanthes spp

Of a large number of *Stylosanthes* accessions tested in the Carimagua environment to date only a few *S capitata* accessions some varieties of *S guianensis* tardio and one unidentified rhizomatous species of *Stylosanthes* possibly *S leiocarpa* are showing long term persistence in small plot studies The late and mid season types of *S capitata* are the most productive in mixtures with *A gayanus* for the 2000 mm rainfall zone represented by the Carimagua site (Table 6) Persistence was affected by overgrazing the young seedling stands in the second year following establish ment Adequate spelling and a heavy but intermittent system of grazing apparently will prevent this situa tion

Table 5 Mineral analysis (N P and Ca) and in vitro digestibility of early and late flowering segregates of Andropogon gayanus CIAT 621

	N	P	Ca	In vitro digestibility (%)
Early flowering segregates	0 78	0 08	0 28	38 0
Late flowering segregates	1 19	0 10	0 28	46 7

Table 6 Dry matter yield of four genotypes of Stylosanthes capitata and Andropogon gayanus at Carimagua

Species	Mean dry matter yield (kg/ha/month)
Stylosanthes capitata	
CIAT accession No	
1097 late flowering	1771 1a[1]
1078 late flowering	1533 9a
1405 early/mid season	1128 3b
1019 early	978 0b
Andropogon gayanus	968 0b

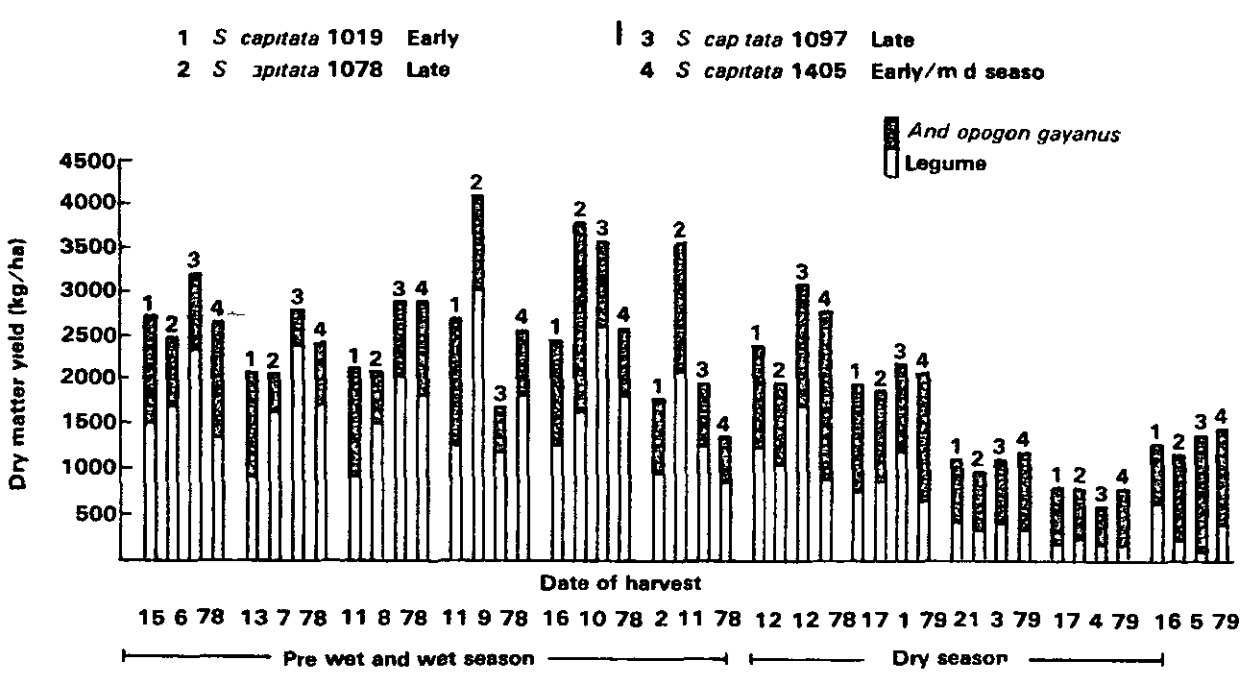
1 Values followed by the same letter are not significantly different at the P 0 05 level

The mid season variety of *S capitata* CIAT 1328 and *Desmodium ovalifolium* CIAT 350 exhibited similar long seasonal growth patterns and compatibility with *A gayanus* (Figures 5 and 6) The early flowering *S capitata* CIAT 1019 showed a reduced growth rate during the wet and post wet seasons when this accession was fully reproductive In the same cutting experiment dry matter yields of *D barbatum* CIAT 3063 and *Macroptilium* sp CIAT 535 were very low

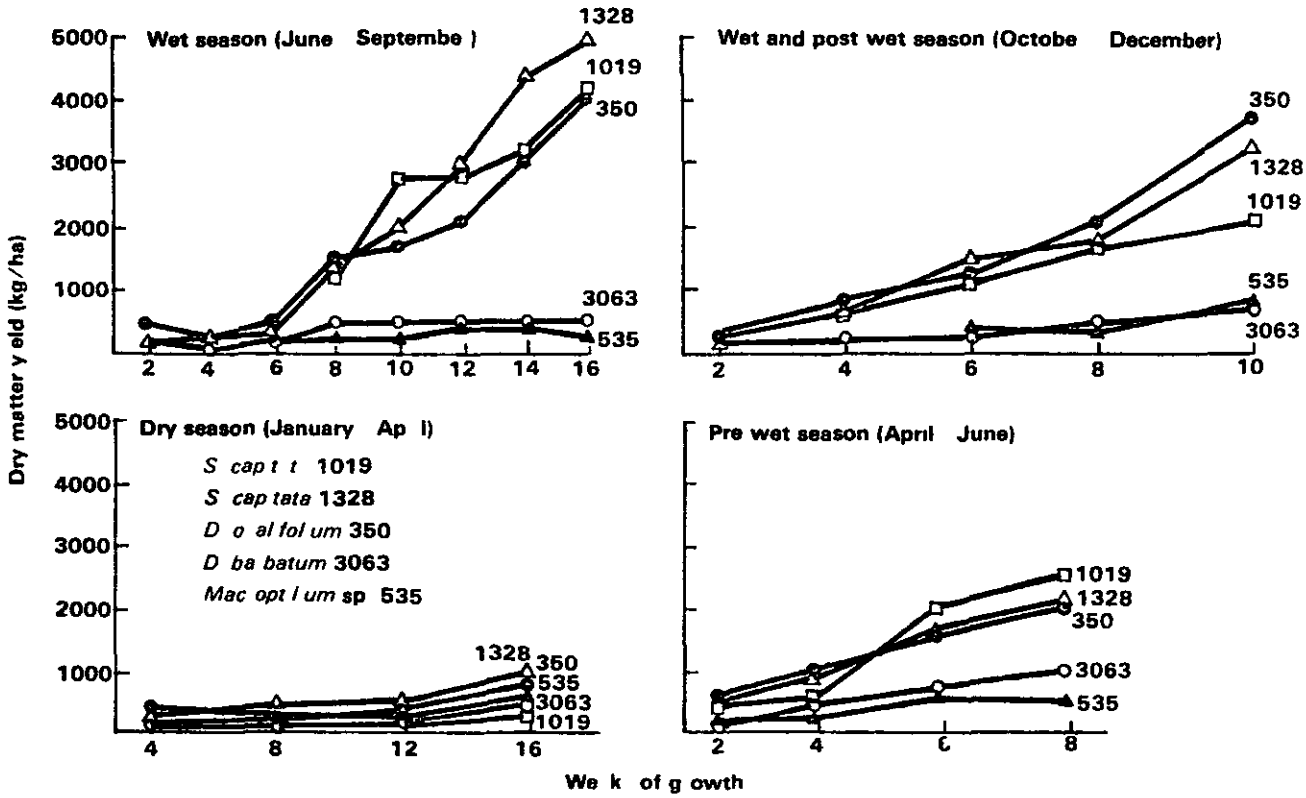
Desmodium ovalifolium

This legume of the tropics of the eastern hemisphere formed productive pastures in mixtures with stoloniferous aggressive grasses such as *Brachiaria decumbens Cynodon nlemfuensis* and *Digitaria decumbens* as well as with the vigorous tufted species *A gayanus* and *P maximum*

The seasonal distribution of yield and grass/legume composition of promising associations is being monitored in areas established in 1977 A very satisfactory grass/legume balance of 51 49 was recorded in *B decumbens/D ovalifolium* pastures On



F gure 5 Mean monthly presentat on y elds of four ecotypes of *Stylosanthes capitata* n associat on w th *Andropogon gayanus* unde g ng n Ca magua



F g e 6 Growth rate and seaso al d st but n of y eld of early (1019) a d m d seaso (1328) *Stylos nthes cap tata Desmod um o al fol um* (350) *D ba batum* (3063) and *Mac opt l um* sp (535) n Carimagua

the other hand in the *A gayanus/D ovalifolium* plots a slight legume dominance occurred under a heavy grazing pressure (Figure 7)

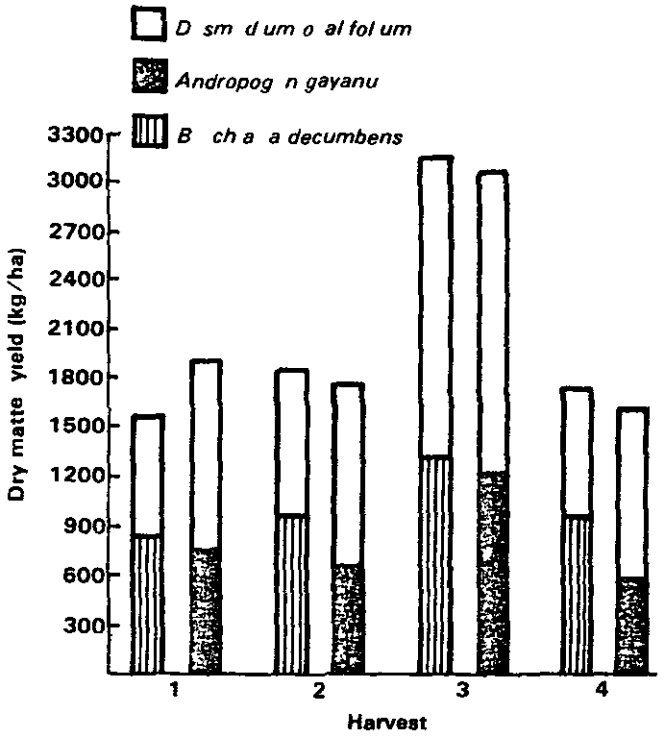
D ovalifolium 350 is apparently a moderately palatable species well accepted by grazing animals during the dry season The aim of a current selection program is to identify genotypes with better palatabili ty voluntary intake and digestibility within the *D ovalifolium/heterocarpon* complex

Zornia sp

Many of the *Zornia* accessions in CIAT s collection are affected by a fungal disease caused by *Sphaceloma zorniae* Although plants have in some cases recovered from severe attacks of this fungus disease resistance is a major selection objective of a recently established screening project Disease resistance seems to be more frequent in Brazilian *Zornia* species

Work with this species includes grazing trials and mixtures with *A gayanus* of 10 ecotypes

Emphasis in future work will be on the systematic evaluation of all available introductions in order to select for better dry season performance and resistance to *Sphaceloma* scab



F gu e 7 Presentat on y elds of *Desmod um ovalif lium* n assoc atio w th *Andropogon gayanus* CIAT 621 a d *Brachiaria decumbens* c Bas l sk estabi shed n 1977 n the Llanos Orientales, Colomb a (Monthly harvests du ng the wet season 1979)

FORAGE AGRONOMY IN THE THERMIC SAVANNAS (CERRADO)

The objectives of this section are to (1) evaluate and select germplasm under Cerrado conditions for adaptation to acid soils persistence under grazing and resistance or tolerance to pests and diseases (2) evaluate the potential of the Cerrado for commercial seed production and (3) produce seed of selected germplasm to supply the evaluation programs at the Cerrado Center (Centro de Pesquisa Agropecuaria dos Cerrados CPAC)

Pasture Evaluation

Preliminary germplasm evaluation

In November 1978 352 legume introductions were planted in the two major soil types of the region i e red yellow latosol (Latosolo Vermelho Amarelo LVA) and dark red latosol (Latosolo Vermelho Escuro LVE) Some physical and chemical characteristics typical of these soils are found in Table 7 The LVA site was 100 m higher than that on the LVE on a more exposed plateau area On the LVE one replicate was sown with *Andropogon gayanus* for grazing to indicate whether any accessions were rejected by the animals Genera and number of accessions evaluated are listed in Table 8 Species of *Stylosanthes* accounted for almost 50 percent of the introductions and a total of 159 introductions originated in Brazil Emphasis has been placed on the genus *Stylosanthes* because previous experience has demonstrated its good adaptation to the acid infertile soils of the target area

Dry matter production of most accessions growing on the LVE was higher than that on the LVA