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Centro Internacional de Agricultura Tropical

Germplasm

During 1981, the activities of the Germplasm section continued focused on:

a) Assembling of germplasm through direct collection and through exchange of materials with other institutions.

b) multiplication and maintenance of germplasm of priority species;

c) preliminary evaluation of germplasm and initial seed increase.

Collection and Introduction of Germplasm

Collection: During 1981, three major collection trips were conducted, mainly to areas with acid, infertile soils and with the purpose of increasing the collection of particular genera and species, which due to their already known potential, are of specific interest to the Tropical Pastures Program:

1. A collection expedition through the Venezuelan states of Aragua, Carabobo, Yaracuy, Lara, Trujillo, Portuguesa, Cojedes, Guárico, Anzoátegui, Sucre, Monagas, and Nueva Esparta (Fig. 1) aimed at native germplasm particularly of the species Stylosanthes capitata, S. guianensis "tardío", Centrosema macrocarpum, C. brasilianum, and Zornia spp. This trip was conducted in collaboration with the Venezuelan Fondo Nacional de Investigaciones Agropecuarias, FONAIAP.

2. A trip to the area of the Sierra Nevada de Santa Marta (Fig. 2) to collect mainly Centrosema germplasm, particularly of C. macrocarpum.

3. The collection trip through the Brazilian states of Goiás, Bahía, Espirito Santo and Minas Gerais (Fig. 3) sought to increase the collection of germplasm of Stylosanthes (mainly S. capitata, S. macrocephala and S. guianensis "tardío"), Zornia (mainly four-leaflet species such as Z. brasiliensis, Z. myriadena and Z. flemmingioides) and Centrosema (mainly C. brasilianum and C. macrocarpum). This trip was conducted as a collaborative project with EMBRAPA's Centro Nacional de Recursos Genéticos, CENARGEN, to areas with very low rainfall (e.g. caatinga in Bahía) as well as to very humid regions (e.g. tropical rain-forest in the coastal strip of Espirito Santo and Bahía). The specific aim was to broaden the genetic base of priority species with regard to probable drought resistance of material evolved under dry conditions, as well as better disease tolerance of germplasm evolved under rather humid conditions.

Introduction: The efforts to introduce germplasm through exchange with other institutions during 1981 continued concentrated on African grasses and added to the Program's germplasm bank an important collection from CSIRO, Australia, of approximately 100 accessions of Brachiaria spp. and Andropogon gayanus. In terms of legumes, the most important contributions were received from EMBRAPA-CENARGEN.

With the additions during the year -- 1175 accessions of directly collected germplasm and 325 accessions introduced through exchange with other institutions -- the Program collection reached more than 8600 accessions (Table 1), the majority originating from regions with acid, infertile savannas and forest soils. Table 2 shows that the collection increased considerably in terms of germplasm of "key species" for well-drained savanna ecosystems, the Llanos and the Cerrado.

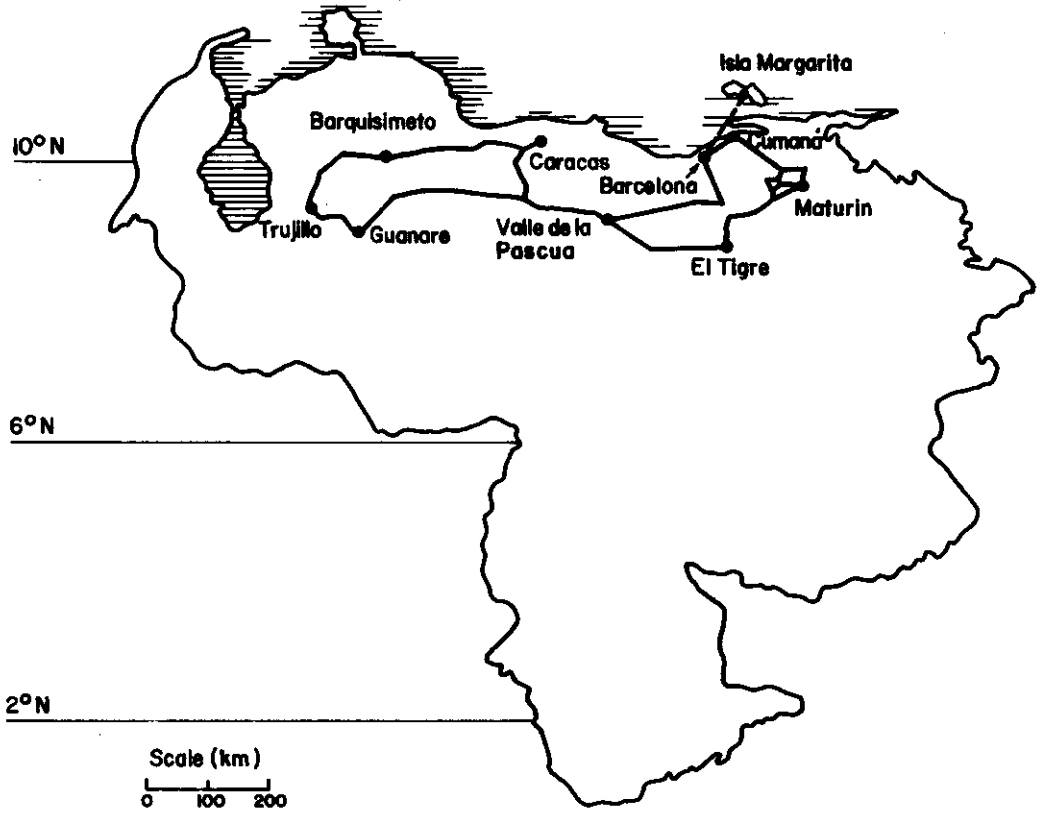

Figure 1. Routes of systematic collection of germplasm of tropical pasture species in Venezuela, January/February, 1981.

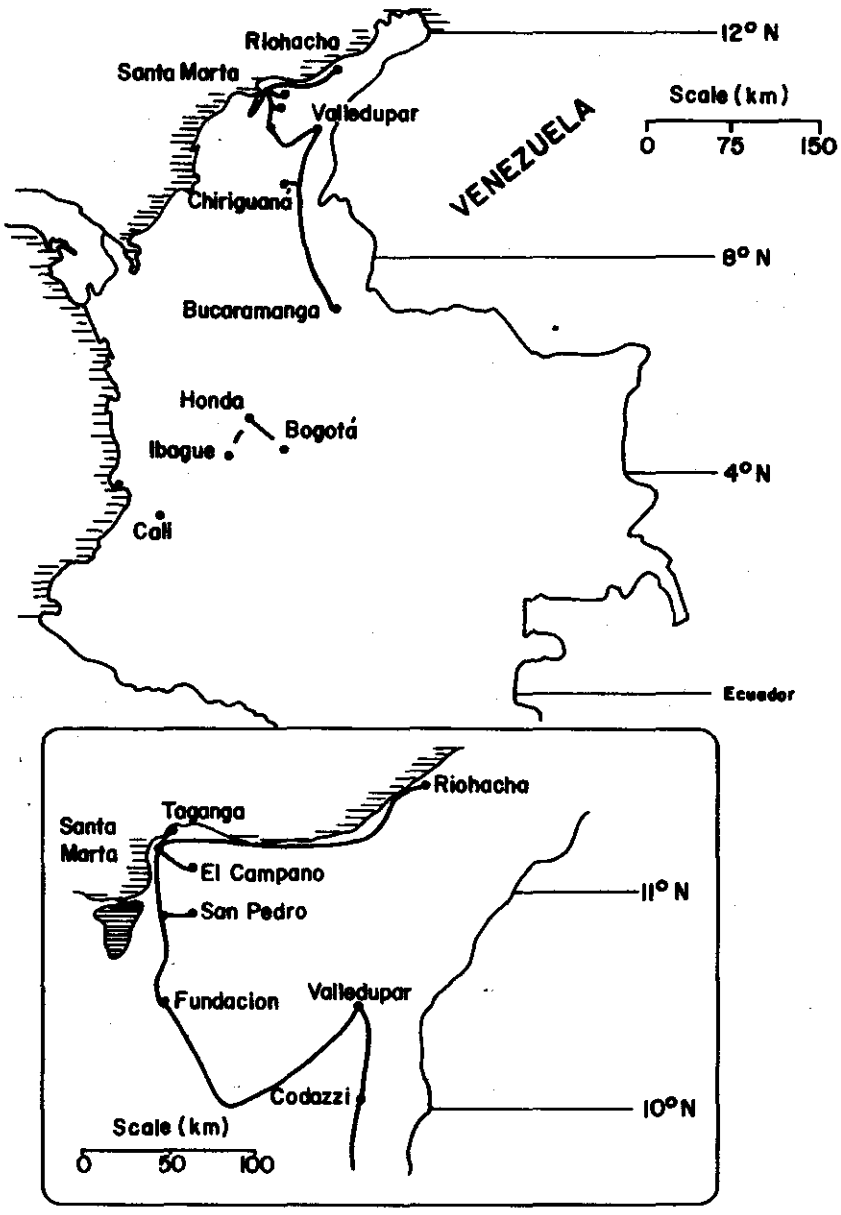

Figure 2. Routes of systematic collection of germplasm of tropical pasture species in Colombia, March/April, 1981.

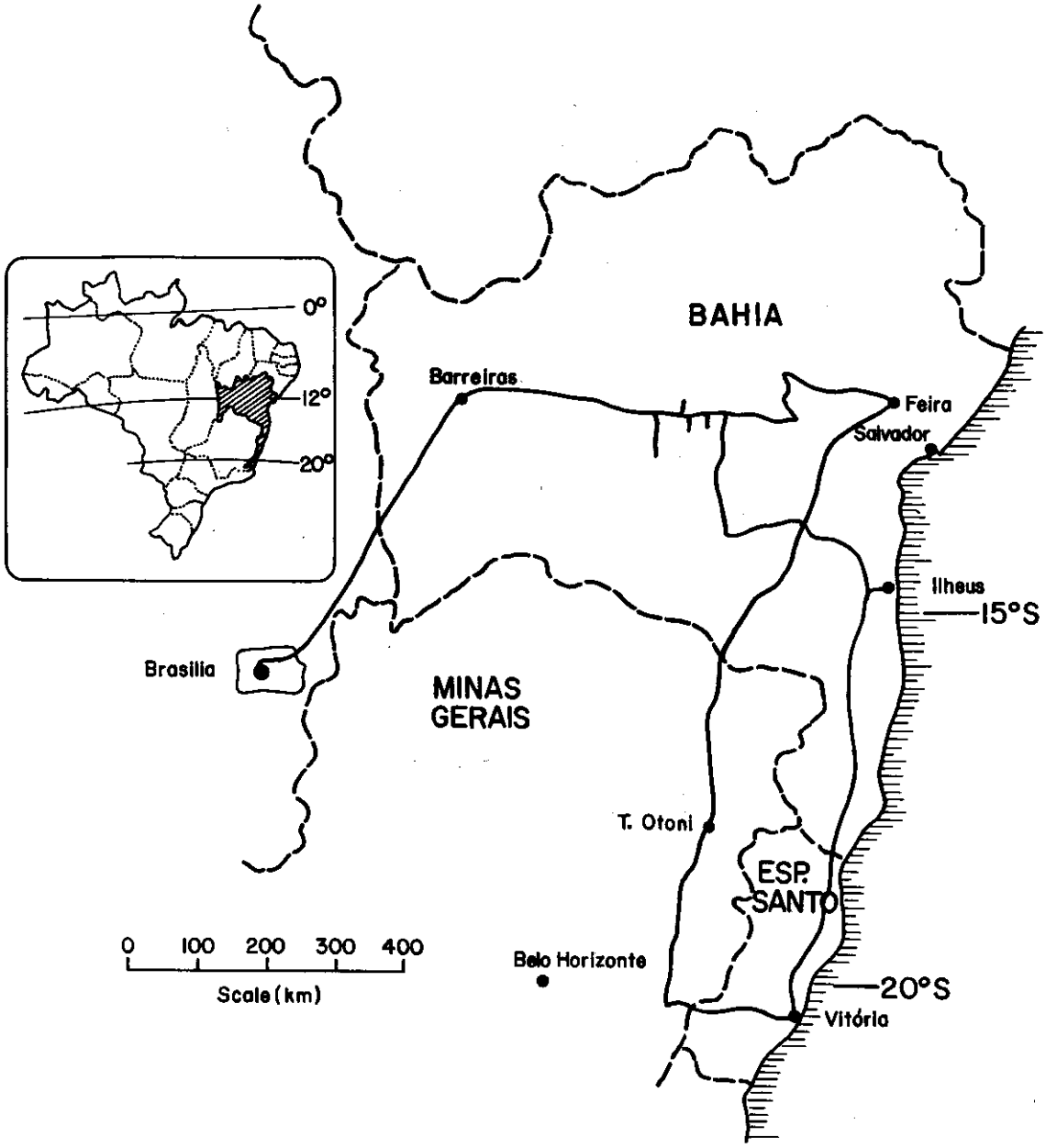

Figure 3. Routes of systematic collection of germplasm of tropical pasture species in Brazil, August/September, 1981.

Table 1. Introduction (number of accessions) of germplasm of tropical pasture species through direct collection and through exchange with other institutions during 1981.

Genera	Collections: Major collection trips in: Venezuela	Colombia	Brazil	Occasional collections	Exchange	Total 1981	Total accessions in germplasm bank
Stylosanthes	66	10	210	22	99	407	2130
Desmodium	23	19	37	20	5	104	969
Zornia	36	1	80	15	52	184	745
Aeschynomene	12	8	54	4	-	78	455
Centrosema	102	66	47	15	58	288	893
Macroptilium/Vigna	9	18	26	4	3	60	546
Calopogonium	10	10	10	3	-	33	176
Galactia	37	16	20	2	1	76	302
Miscellaneous legumues*	40	58	57	8	2	165	1586
Grasses	-	-	-	-	105	105	833
Total	335	206	541	93	325	1500	8635

* Arachis, Cassia, Clitoria, Crotalaria, Dioclea, Eriosema, Indigofera, Leucaena, Pueraria, Rhynchosia, Tephrosia, Teramnus and others.

Table 2. Introduction (No. of accessions) of germplasm of key species for both well-drained savanna ecosystems through direct collection and exchange with other institutions during 1981.

Species	Collections in:				Exchange	Total 1981	Total accessions in germplasm bank
	Venezuela	Colombia	Brazil	Occasional collections			
Andropogon gayanus	-	-	-	-	14	14	65
Brachiaria spp.	-	-	-	-	79	79	191
Stylosanthes capitata	7	-	12		43	62	241
Stylosanthes macrocephala			27		9	36	83
Stylosanthes guianensis "tardío"	13		26	5	1	45	187
Zornia brasiliensis			2		1	3	11
Centrosema brasilianum	25	1	11	4	8	49	132
Centrosema macrocarpum	14	15	4	1		34	63

Multiplication and Maintenance of Germplasm

Multiplication of priority materials and their distribution to other sections within the Program as well as to special collaborators outside CIAT, continued being one of the Germplasm Section's most important activities. In addition to seed harvesting from all germplasm materials established for characterization and preliminary evaluation in CIAT-Quilichao (approximately 1100 accessions), some 700 legume germplasm accessions were under seed multiplication as potted plants in the CIAT-Palmira greenhouse. Approximately 1500 seed samples of priority materials were given to members of the Program and to special collaborators.

Characterization and Preliminary Evaluation of Germplasm

During this phase, new legume germplasm, particularly of priority or "key" species, as well as new, agronomically unknown genera and species, are established in unreplicated, space-planted plots in CIAT-Quilichao for seed increase and for observations on the most important plant descriptors (life form, growth habit, flowering time, perenniality, etc.). Furthermore, the adaptation of germplasm to the Quilichao environment is assessed in terms of: (a) yield potential on a very acid, infertile Ultisol, (b) disease and insect tolerance and (c) seed production potential. Accessions with outstanding performance as well as any new material with especially interesting plant characters are then given priority at entering the flow of germplasm to the Program's principal testing sites in Carimagua and Brasilia as well as for Regional Trials A. In 1981 a series of new accessions were identified as promising (Table 3). Approximately 1100 accessions are currently being studied (Table 4). Some of the most important preliminary observations indicate:

- An increasing variation in the *Stylosanthes guianensis* "tardío" collection with regard to morphological and physiological plant characters, including resistance to anthracnose and seed production potential.

- Resistance to anthracnose of the whole collection of *S. macrocephala*.

- Lack of productivity as well as of anthracnose resistance of the *S. leiocarpa* collection.

- Considerable variability in the *S. viscosa* collection with respect to morphological and physiological plant characters.

- Continuing *Sphaceloma* resistance of *Zornia brasiliensis* and a few two-leaflet *Zornia* sp. accessions from high rainfall areas in Bahía, Brazil.

- Increasing variability in the *Centrosema macrocarpum* collection due to new Venezuelan and Colombian germplasm.

Table 3. Characterization and preliminary evaluation of germplasm of tropical pasture legume species during 1981 in CIAT-Quilichao. Evaluations concluded.

Species	No. of accessions evaluated	Observations
Stylosanthes capitata	73	With exception of late-flowering ecotypes from Brazil, all ecotypes anthracnose-resistant. Outstanding vigor of material from the dry Brazilian Northeast. Potential of Mato Grosso material confirmed. Venezuelan material very healthy but lack vigor.
Centrosema spp.	160	High potential for acid infertile soils identified for *C. macrocarpum*, *C. brasilianum*, *C. arenarium*, *C. schiedeanum*, some *C. pubescens* ecotypes as well as two not-yet-described new species.
Centrosema brasilianum	49	*Rhizoctonia* blight limiting factor; some moderately resistant accessions identified.
Centrosema macrocarpum	10	Outstanding vigor of germplasm native to Colombian Llanos, lack of adaptation of material from Belize and Mexico.
Centrosema pubescens	144	Only few ecotypes identified with adaptation to acid, infertile soil.
Centrosema plumieri/C. schottii	24	Very poor growth of *C. schotti*; one *C. plumieri* accession with good vigor.
Centrosema virginianum	35	Lack of adaptation (soil).
Zornia spp. (2-leaflet)	100	With very few exceptions all material *Sphaceloma*-susceptible and/or short-living annuals.
Zornia spp. (4-leaflet)	24	All tested material *Sphaceloma*-resistant and with good adaptation to acid, infertile soil; *Z. brasiliensis* and *Z. myriadena* particularly productive.
Desmodium spp. (erect browse types)	27	*D. gyroides* (syn. *Codariocalyx gyroides*) the only species with potential.
Desmodium heterocarpon	29	Lack of adaptation (in contrast with *D. ovalifolium*).
Mimosa spp. (spineless)	11	With one exception, lack of adaptation and unfavorable growth habit.
Cassia rotundifolia	15	Good adaptation; two selected ecotypes seem to be perennials.

Remarkable *Rhizoctonia* tolerance of some *Centrosema brasilianum* ecotypes from high rainfall areas in Bahía, Brazil.

Excellent adaptation and productivity of the subshrub *Rhynchosia schomburgkii* and the twining *Rh. reticulata* var. *kuntzei*.

Table 4. Characterization and preliminary evaluation of germplasm of tropical pasture legume species during 1981 in CIAT-Quilichao. Evaluations not yet concluded.

Species	No. of accessions
Stylosanthes guianensis "tardío"	142
Stylosanthes macrocephala	54
Stylosanthes capitata	124
Stylosanthes leiocarpa	26
Stylosanthes viscosa	156
Zornia spp. (2-leaflet)	237
Zornia brasiliensis	7
Centrosema spp.	25
Centrosema macrocarpum	58
Centrosema brasilianum	77
Desmodium ovalifolium	18
Dioclea guyanensis	45
Calopogonium caeruleum	43
Rhynchosia spp.	58
Cassia rotundifolia	23
Total	1093