INTERIM REPORT

STYLOSANTHES COLLECTING IN COLOMBIA AND VENEZUELA

16.01.86 to 05.09.86

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1. Objectives

The natural allotetrapoloid S. hamata cultivar Verano, is the most important pasture legume for the world's semi-arid tropics. Verano is being widely used in Australia and Thailand and to a lesser extent in Africa, India and Indonesia.

Prior to this mission only 44 S. hamata allotetraploids had been collected and their origin was largely restricted to two states in Colombia (Magdalena and Atlantico) and three states in Venezuela (Zulia, Falcon and Neuva Esparta). All the accessions were obtained from altitudes less than 500 meters above sea level.

The main objectives of the 1986 mission were to find ecotypes of S. hamata allelotetraploids that will prove to be superior to Verano in anthracnose (Colletotrichum gloeosporioides) resistance and extend the range of adaptation and increase productivity in areas that are marginal for Verano. New cultivars are required for the lower rainfall tropics (< 600 mm annually) and the cooler subtropics. Different genes for anthracnose resistance are also required to increase the diversity for resistance in new cultivars.

The 'Project Application' predicted that S. hamata was more widely distributed in Colombia and Venezuela than the existing knowledge suggested and that it would be found in premontane vegetation associations at altitudes between 500 to 1500 m.

The results below show that these predictions were correct.

2. Areas Surveyed

Table 1 gives full details of the dates of the surveys, the collaborating scientists and Institutions involved, and the Country and States surveyed. The time in between surveys was occupied with seed processing, obtaining environmental data for the collection sites and in planning and making arrangements for the next field trip. Maps showing the areas traversed are attached as Figures 1 and 2.

3. The Collection

A total of 311 accessions were obtained during the mission but this included seed that was donated by CIAT (71 accessions) and UNET (12 accessions) (Table 1).

The collections obtained from Colombia and Venezuela comprised:-

S. hamata	230	accessions
S. humilis	7	"
S. capitata	4	"
S. guianensis	1	"
S. scabra	1	"
S. tuberculata	1	"
Stylosanthes spp.	7	"
Centrosema spp.	2	"
TOTAL	253	

S. hamata accessions predominate and include some diploids as well as allotetraploids and some high altitude collections that are tentatively named S. hamata. The ploidy level and species identification will be verified by early 1987.

The other Stylosanthes species collected were extremely rare in occurrence when compared with S. hamata and are mentioned only briefly in this report. All S. humilis collections lacked vigour and were badly infected with anthracnose whereas the S. hamata collections were relatively free of anthracnose except for collections obtained from the humid tropical areas of Colombia which were badly infected. S. scabra was observed at two locations at altitudes between 1000 to 1500 m in Venezuela growing in association with S. hamata but it was collected only once. Three of the S. capitata collections were selections made from CIAT accessions that had been grown by FONAIAP at Calabozo on a Mollisol for four years. The two Centrosema sp. were collected in Zulia, Venezuela, growing on a Ultisol with a surface pH of 4.2.

4. The Distribution of S. hamata

The vegetation, climate and altitude zones where S. hamata was collected in Colombia and Venezuela and the number of collections in each zone are summarised in Table 2. The Spanish vegetation descriptions and their symbols are given together twith the English translations. Tropical vegetation types occur between 0 to 500 m above sea level and premontane or sub-tropical types between 500 to 1500 m. The annual rainfall of the eight zones where S. hamata was found ranges from 250 mm to > 2000 mm and the length of the dry season decreases from 9 to 3 months with increasing rainfall.

S. hamata largely occurred in dry to very dry tropical forest zones but a significant collection was obtained for the FIRST TIME from premontane or sub-tropical vegetation types (Table 2). As stated previously, the species identification of some of the high altitude collections require verfication because their morphology is distinctly different from the majority of the S. hamata collections.

Table 3 shows the distribution of the S. hamata collection by country, state and vegetation type. S. hamata was more widely distributed in Colombia and Venezuela than was previously known. The location of the states where S. hamata was collected is given in Figure 3. S. hamata is also known to occur in Monagas and Guarico and I am hopeful that seed will be forthcoming from future Venezuelan collections in these two states. Zulia and particularly the Maracaibo district is undoubtedly the centre of genetic diversity for S. hamata allotetraploids. Intensive sampling in this area provided an additional 91 accessions showing considerable variation in growth form, stem thickness, longevity, and seeding ability.

The soil types on which S. hamata occurred were Aridisols, Entisols, Inceptisols and Alfisols. S. hamata could not be found growing on Vertisols, Mollisols, Ultisols and Oxisols. The pH of the surface soil at the collecting sites ranged from pH 5.4 to 8.5 but the majority of the sites were neutral to alkaline in soil reaction.

5. Processing the Collection

A duplicate of the Colombian collection is held by CIAT at Cali, Colombia and FONAIAP, Maracay, Venezuela have a duplicate of

the Venezuelan collection. ILCA, Addis Ababa, Ethiopia, will receive the collection after it has been through quarantine procedures in Australia.

The total collection is held in bond under refrigerated storage conditions at the CSIRO, Davies Laboratory, Townsville. The collection has been established in a quarantine glasshouse and is undergoing quarantine procedures at CSIRO, Townsville. All the accessions are 'restricted species' and have to be grown under glasshouse quarantine throughout their life cycle.

The 'Passport Data' and 'Collecting Site Environmental Data' for the collection has been tabulated and is now being entered into the data files of the Australia Tropical Forages Genetic Resources Centre at CSIRO, St. Lucia and the Commonwealth Plant Introduction Section at CSIRO Canberra. The full collection will be listed in a forthcoming number of Australian Plant Introduction Review under the CPI numbers 109305-109353, 110024-110210 and 110308-110378

6. Conclusions

The collection significantly adds to the genetic resources available for allotetraploid S. hamata. The collection was obtained over a wide geographic and environmental range and intensive collecting was undertaken in the Maracaibo Centre of genetic diversity. For the FIRST TIME, S. hamata has been collected at altitudes between 500 to 1600 m (36 collections) and this material could provide cultivars for sub-tropical and high altitude areas. It is very likely that the objectives of the mission will be fulfilled.

7. Acknowledgements

I wish to acknowledge the invaluable assistance I received from Dr Santiago Rodriguez and his staff of FONAIAPA at Maracay (Aragua), Maracaibo (Zulia) and Bramon (Tachira), Venezuela, Dr Rainer Schultze-Kraft and his staff at CIAT, Cali, Colombia and Prof. Vera V. Anibal of UNET. All the Scientists who assisted me are mentioned in Table 1 and I wish to thank them very much. Without their help the mission would not have been the success that it was. A special thanks is recorded for Dr Juan Comerma and his wife Anne Marie for their help on both scientific and private matters.

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3.11.86

Table 1.

Stylosanthes collecting in Colombia and Venezuela

Period	Accompanying Scientist	Institution	Country	Main States Surveyed	Species	No.	Tota
12 Feb to	Javier Belalcazar	CIAT	Colombia	Atlantico, Magdalena	S. hamata	49	5
25 Feb 86	Arcenio Ciprian	CIAT		La Guajira, Cesar	S. humilis	4	
25 Feb to	David Morillo	FONAIAP	Venezuela	Zulia	S. hamata	47	4
6 Mar 86					Centrosema sp.	2	
13 Mar 86	Dr Juan Comerma	FONAIAP	Venezuela	Guarico	S. capitata	1	
					S. humilis	1	
31 Mar to	Jose Luis Gil	FONAIAP	Venezuela	Falcon, Lara, Yaracuy;	S. hamata	21	2
6 Apr 86				Portuguesa			
14 Apr to	Orlando Guenni	FONAIAP	Venezuela	Lara, Zulia, Trujillo,	S. hamata	14	1
19 Apr 86				Yaracuy	S. humilis	1	
					Stylosanthes sp.	1	
30 Apr to	-	-	Venezuela	Nueva Esparta	S. hamata	5	
5 May 86							
6 May to	Cesar Araque	FONAIAP	Venezuela	Tachira, Apure	S. hamata	2	
9 May 86							
22 May to	Orlando Guenni	FONAIAP	Venezuela	Sucre, Anzoategui	S. hamata	7	
26 May 86				Miranda			
2 Jul to	Dr Rainer Schultze-Kraft	CIAT	Colombia	Donated seed from	S. capitata	1	7
12 Jul 86				CIAT, Cali	S. hamata	16	
					S. ingrata	6	
					S. scabra	48	
12 Jul to	Dr Romulo Rincon	FONAIAP	Venezuela	Zulia	S. hamata	39	3
21 Jul 86	David Morillo						

... continued ...

Table 1 ... continued

Period	Accompanying Scientist	Institution[+]	Country	Main States Surveyed	Species	No.[*]	Tota
23 Jul 86	Orlando Guenni	FONAIAP	Venezuela	Aragua	S. hamata	1	1
1 Aug 86	Jose Luis Gil	FONAIAP	Venezuela	Aragua	S. hamata	1	1
4 Aug to 8 Aug 86	Jose Luis Gil	FONAIAP	Venezuela	Carabobo, Yaracuy, Lara, Trujillo	S. hamata	21	23
					S. scabra	1	
					Stylosanthes sp.	1	
15 Aug 86	Ing Mari Dugarte	FONAIAP	Venezuela	Merida	S. hamata	3	3
18 Aug 86	Prof. Vera V. Anibal	UNET	Venezuela	Donated seed from Trujillo, Merida, Lara, Falcon, Dto Federal, Aragua	S. guianensis	1	12
					S. hamata	4	
					S. humilis	1	
					S. tuberculata	1	
					Stylosanthes sp.	5	
19 Aug 86	Orlando Guenni	FONAIAP	Venezuela	Miranda, Dto Federal, Aragua	S. hamata	4	4
20 Aug 86	Orlando Guenni	FONAIAP	Venezuela	Guarico	S. capitata	2	2
					TOTAL		311

[*] No. of collections/donations.

[+] CIAT - Centro Internacional De Agricultura Tropical, Cali, Colombia.

FONAIAP - Fondo Nacional De Investigaciones Agropecuarias, Maracay, Maracaibo, Bramon and Merida Venezuela.

UNET - Universidad Nacional Experimental del Tachira, San Cristobal, Venezuela.

Table 2.

Vegetation, climate and altitude zones where S. hamata was collected in Colombia and Venezuela.

Vegetation type	Symbol	Rainfall mm	Evapotranspiration Ratio[+]	Av. length dry season months	Climate type and No. of collections
TROPICAL 0-500 m alt.					
Monte Espinosa (thorn thicket)	meT	250-500	4-8	9	Arid, tropics (32)[++]
Bosque Muy Seco (very dry forest)	bmsT	500-1000	2-4	7	Semi-arid, tropics (106)
Bosque Seco (dry forest)	bsT	1000-2000	1-2	6	Sub-humid, tropics (49)
Bosque Humedo (humid forest)	bhT	2000-4000	0.5-1.0	3	Humid, tropics (7)
PREMONTANE 500-1500 m alt.					
Monte Espinosa (thorn thicket)	meP	250-500	2-4	7	Semi-arid, sub-tropics (6)
Bosque Seco (dry forest)	bsP	500-1000	1-2	6	Sub-humid, sub-tropics (25)
Bosque Seco 24°C (dry forest)	bsP*	500-1000	1-2	6	Sub-humid, sub-tropics (4)
Bosque Humedo (humid forest)	bhP	1000-2000	0.5-1.0	3	Humid, sub-tropics (1)

[+] Ratio = $\frac{\text{Evapotranspiration (mm)}}{\text{Precipitation (mm)}}$

[++] No. of S. hamata collections 1986.

Ref. Ewel, J.J. and Madriz, A. (1968). Zonas de Vida de Venezuela, Ministerio de Agricultura y Cria, Republica de Venezuela. pp. 265.

Table 3.

Distribution of S. hamata by country, state and vegetation type in Colombia and Venezuela

State	Country	Tropical Vegetation types+ meT	bmsT	bsT	bhT	Premontane Vegetation types+ meP	bsP	bsP*	bhP	Total	Total by Country
COLOMBIA											
Magdalena	Col.	18	1	-	4	-	-	-	-	23	
Guajira	Col.	2	1	10	3	-	-	-	-	16	
Atlantico	Col.	-	12	-	-	-	-	-	-	12	Colombia
Cesar	Col.	-	-	5	-	-	-	-	-	5	56
VENEZUELA											
Zulia	Ven.	-	76	15	-	-	-	-	-	91	
Lara	Ven.	-	2	5	-	6	10	-	-	23	
Falcon	Ven.	7	5	5	-	-	3	-	-	20	
Trujillo	Ven.	-	-	3	-	-	5	-	-	8	
Nueva Esparta	Ven.	3	2	-	-	-	-	-	-	5	
Anzoategui	Ven.	-	5	-	-	-	-	-	-	5	Venezuela
Yaracuy	Ven.	-	-	4	-	-	1	-	-	5	174
Aragua	Ven.	-	1	-	-	-	-	3	-	4	
Dto Federal	Ven.	-	1	-	-	-	2	-	-	3	
Merida	Ven.	-	-	-	-	-	3	-	-	3	
Sucre	Ven.	2	-	-	-	-	-	-	-	2	
Tachira	Ven.	-	-	-	-	-	1	-	1	2	
Carabobo	Ven.	-	-	2	-	-	-	-	-	2	
Miranda	Ven.	-	-	-	-	-	-	1	-	1	
Monagas	Ven.	-	-	-	-	-	-	-	-	-	
Guarico	Ven.	-	-	-	-	-	-	-	-	-	
		32	106	49	7	6	25	4	1	230	
			194				36				230

+See Table 2 for descriptions of the vegetation type, climate and altitude zones where S. hamata was collected.

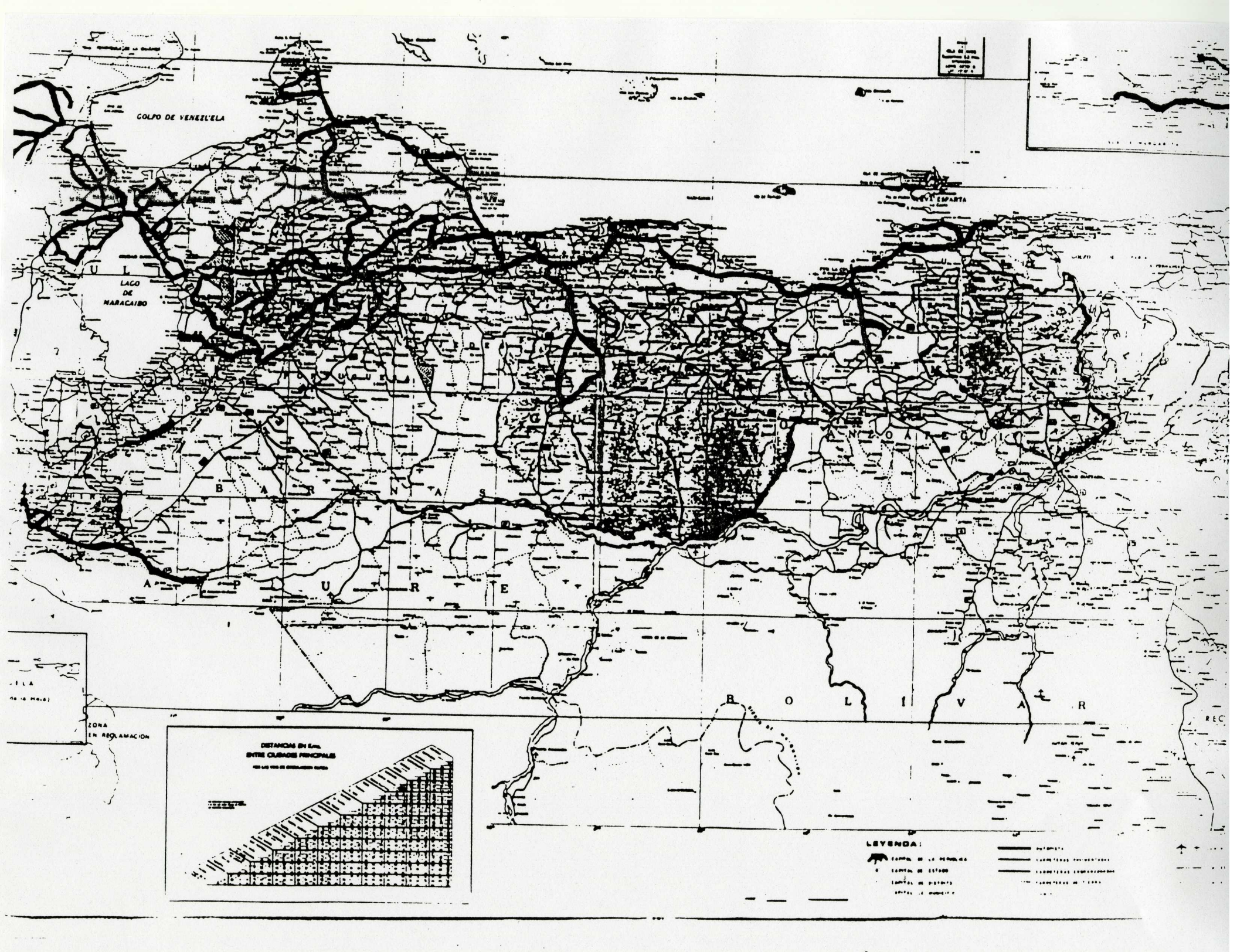
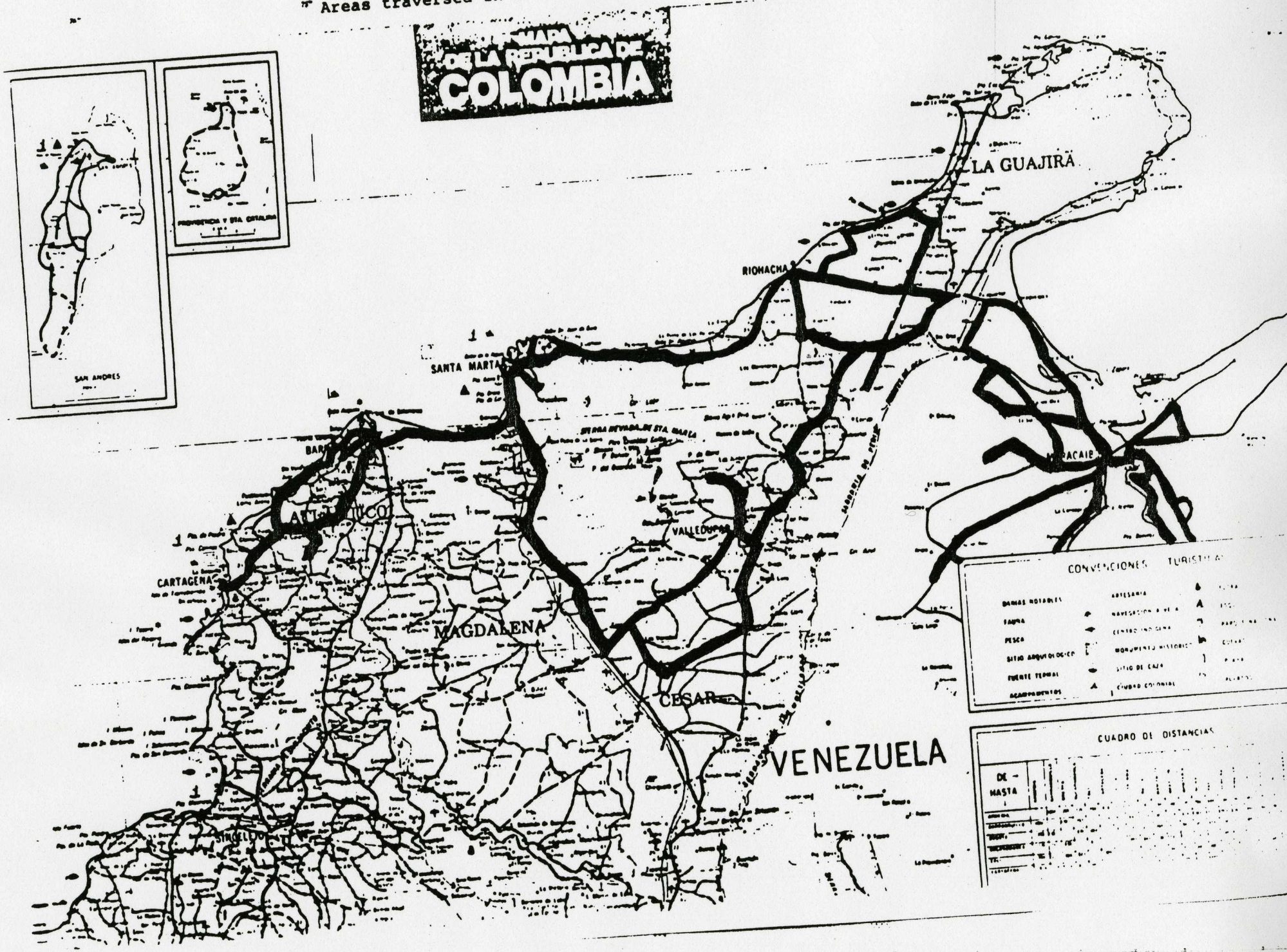

GOLFO DE VENEZUELA
LAGO DE MARACAIBO
ZULIA
FALCON
LARA
PORTUGUESA
BARINAS
APURE
ANZOATEGUI
MONAGAS
BOLIVAR
ZONA EN RECLAMACION
DISTANCIAS EN Km.
ENTRE CIUDADES PRINCIPALES
LEYENDA:

Figure 2.
Areas traversed in Colombia and Zulia, Venezuela.



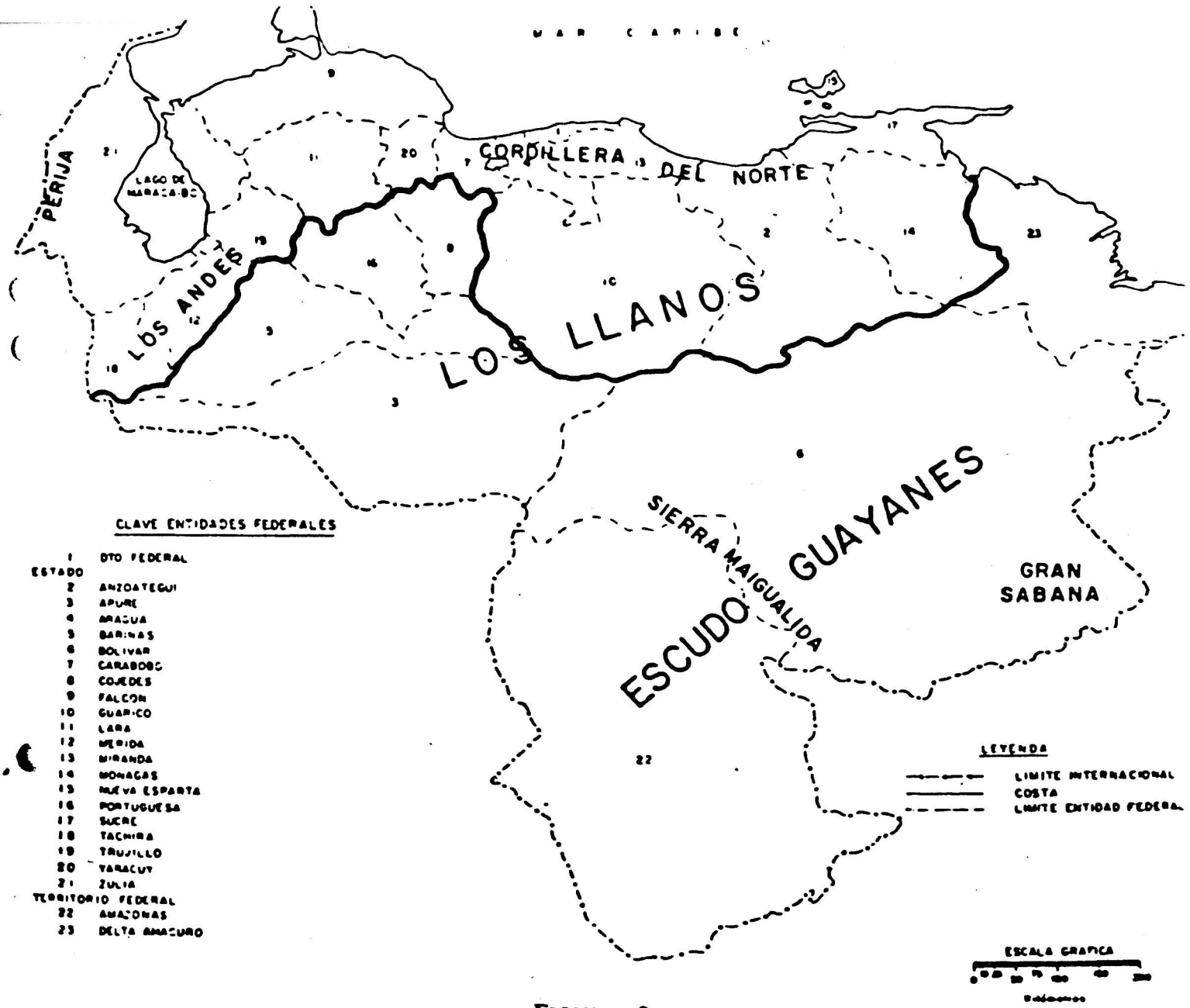


FIGURA 3

Line separating the States of Venezuela with (to the north) and without (to the south) Stylosanthes hamata.