

GOSSYPIUM SURVEY: COLLECTING IN PERU (III)

G.Ano^{1/} and J. Schwendiman^{2/}

Since 1980, a multi-phase collecting mission for sub-spontaneous cotton has been supported by the IBPGR in association with the Institut de Recherches du Coton et Textiles Exotiques (IRCT), France. These two reports deal with collecting in Peru (October 1981) and Mexico (February-March 1982) and are followed by comments by the authors on the survival of sub-spontaneous cotton. Previous reports in this series appeared in Newsletter No. 54.

The entire coastal area of Peru is desert-like except for the valleys of rivers. Pumping permits the cultivation of irrigated crops, particularly rice, sugarcane and cotton. To the east the foothills of the Andes rise rapidly to high altitudes where temperatures are too low for cotton cultivation. The eastern slope descends abruptly to the hot and humid Amazonian basin where natural conditions would seem well suited to cotton; but cultivation is precluded by an almost total absence of roads. The geographical configuration, therefore, considerably limits the ecological areas favourable for cotton culture and consequently also the regions for sub-spontaneous cotton plants.

No spontaneous Gossypium hirsutum species, except that which was introduced and grown on an industrial scale, was observed. In Colombia the southernmost sample of G. hirsutum race "Marie-Galante" (A.S. 00413) found by the authors originated from south of Cali. It seems therefore reasonable to conclude that on the Pacific Coast, the south of Colombia represents the maximum extension of this species.

Samples of G. barbadense collected in home gardens along the coast do not display remarkable phenotypical variability; it is less prevalent than in samples originating from French Guiana, for example. No anthocyanin pigmentation is found on leaves or stems and seeds are always free and naked. An outstanding characteristic is the chocolate-brown fibre which is locally called "pardo" cotton. A cotton called "aspero" shows much less intense coloration and might be a hybrid resulting from the cross between white and pardo fibre. The pardo fibre seems to exist only in Peru; it is considered to be similar to the fibre of samples found in archaeological excavations in Huaco Prieta and Ica.

In the Iquitos region (upper Amazonian Basin) a large quantity of cotton plants was found despite limited access. Large variability (red-green plants, khaki fibre, kidney seeds, etc.) was also found. Stephens notes that the Andean Cordillera represents an almost impassable natural barrier for a species like cotton. He bases this theory on comparative morphological observations of current G. barbadense cottons between an Ecuadorian type (broad, often pubescent leaf, small rounded capsule, free seeds, small bracts with fine teeth, short staminal column, etc.) and an Amazonian type (having inverse characteristics).

1/ IRCT, B.P. 1068, 97179 Pointe-à-Pitre, Guadeloupe

2/ Laboratoire de Cytogénétique, GERDAT, B.P. 5035, 34032 Montpellier Cedex, France

Such a clear distinction was not found during the present mission but the theory may well serve to explain the area (or areas) of origin or domestication of G. barbadense cotton.

Several researchers have previously noted the presence of "wild" cotton in the region of Tumbes which is very similar to G. barbadense var. darwinii found in the Galapagos Islands. In 1966 Stephens and Phillips visited the Peruvian site. A few kilometres south of the town of Aguas Verdes scattered plants were found; they spread over no more than 1 km along the trail and apparently did not penetrate the bush vegetation. Boll and seed characteristics (small and hard with a brownish and sparse fibre) were similar to that found in Ecuador and bear no resemblance to cultivars growing in adjacent fields which have big bolls and white fibre. A future mission by the authors to Ecuador may determine if these plants still survive.

Stephens and Phillips continued their search 20 km south of Tumbes but with no result; they concluded that it was not possible to locate a population of "wild" cotton plants comparable to the population found in the region of Playas in Ecuador. Since then, thanks to new trails in the hills, the authors precisely located two new areas of limited size, one about 10 km south of Matapalo (called La Guarita del Corral) the other 10 km west of Cabo Inga (Fig. 1). The latter area is of interest because, firstly it is situated in a region practically devoid of human population, and secondly it is 70 km to the south-southeast of Zarumilla and Aguas Verdes. Other sites may exist and this may not be the southern limit for "wild" G. barbadense cotton. A future search will be made on the Ecuadorian slope.

What do these "wild" forms represent in the evolution or domestication of G. barbadense cotton? Stephens and Moseley (1973) analyzed the remains of cotton plants (capsules, seeds and fibres) found in archaeological sites near Ancon (50 km north of Lima). These possessed characteristics which seem intermediary between the so-called "wild" forms and the cultivars presently grown; thus it may follow that a domestication process took place that resulted in the Ecuadorian type cotton. This cotton formerly grew along the valleys of the Chamaya and Marañon rivers and later on they probably spread to the Amazonian basin and adapted to ecological conditions there. Unfortunately, in the Upper Marañon the cotton plants growing at the present time do not show an intermediary aspect (or transitional aspect) between Ecuadorian and Amazonian types. Moreover, many anthropological data indicate that the Amazonian basin is probably the centre from which South American cultivated cotton is derived.

It may be reasonably assumed therefore, that cotton east of the Andes was domesticated independently of that of the Pacific coast. Stephens recommends that collecting be done in the Upper Marañon and neighbouring rivers to provide information about the origin of the Ecuadorian types. A possible wild ancestor of the Amazonian type is a plant with very small bolls and seeds which originated in Bolivia between the eastern slopes of the Andes and the Mamore River.

COLLECTING IN MEXICO (IV)

A collecting mission for Gossypium spp. took place in Mexico during February-March 1982. There was adequate time to collect seed-cotton, especially in the regions south and east of Mexico City; however, due to the dry season, most plants were without leaves and flowers, making it difficult to identify precisely the species. In areas where thousands of plants subsist, samples were chosen which displayed differences in some morphological characters. Half of the seed-cotton was deposited at the Iguala station to be included in the Mexican germplasm collection.

The following samples were collected: [AS 00601 to AS 00675 (75 samples, 2 lost at replanting)]: G. hirsutum race palmeri (8), G. hirsutum race morrillii (2), G. hirsutum race punctatum (39), G. hirsutum race yucatanense (13), G. hirsutum race latifolium (3), G. hirsutum race richmondi (6) and G. barbadense var. brasiliense (2).

Although it is difficult to compare with results obtained from previous prospecting missions in Mexico (especially during 1945-50 by Richmond and Manning; Stephens, Manning and Ware), it is nevertheless obvious that cotton plants growing in home gardens or along roadsides are only relics of populations which were formerly more abundant. This represents a decrease in cotton-growing at the family level resulting from less fibre utilization. Most plants were not harvested in spite of complete boll opening. In remote areas, e.g. around Salina Cruz, people grow cotton and weave cloth.

Plant populations were found to be extremely variable. Cotton grows abundantly in some places (near Acapulco, around Salina Cruz and Tizimin, along the Campeche Gulf between Champoton and Ciudad del Carmen). On the other hand, the Chiapas Central depression which was intensively surveyed at the beginning of this century now appears devoid of spontaneous cottons.

The different races of G. hirsutum correspond to separate geographic areas which overlap only partially, if at all. Small morphological inter-racial differences make it difficult to assign specimens to particular races. This was especially true for morrillii, palmeri, richmondi and even latifolium races; however, since their place of origin is known, identification was made easier.

G. hirsutum race yucatanense grew without any natural interruption from the Rio Lagartos area to the neighbourhood of Sisal (about 200 km). Primitive cotton is a natural element of the vegetation and thousands of plants grow along the new coastal road which connects Dzilam de Bravo to Sisal. They survive even in new coconut plantations where there has likely been extensive alteration of soil and vegetation. Stephens (1973) noted that primitive cottons are generally represented by small and distinct populations but the northern coast of Yucatan appears to be an exception, perhaps the only one. Certain related forms (sparsely distributed) grow in the Dominican Republic, St. Kitts, Antigua, Guadeloupe and Venezuela (Ano and Schwendiman, 1982), and also in the Tamaulipas State of Mexico, on Socorro Island and near Todos Santos.

Phenotypically, plants from northern Yucatan show unusual variation. Some plants were in the vegetative stage without flowers and bolls while others were in complete fructification; this may be due to a differential photoperiod. Also displaying variability were the canopies of plants, petal colour and size, petal spot, pollen colour, and size and shape of the bracts with numerous teeth of variable length. The bolls were small and rounded but sometimes of pyramidal shape. The fibre was short (10 to 15 mm) and light or dark brown in colour.

Hutchinson (1951) wrote that "(race) yucatanense fits naturally into the sequence as a specialized derivative of (race) punctatum, adapted to an exacting ecological situation". It is true that "yucatanense is obviously related to the variable commensal punctatum of Yucatan", but contrary to Hutchinson, the authors believe that it is a primitive type from which punctatum is derived. It should be emphasized that the punctatum types with brownish fibre have been found near the yucatanense area only.

Well-known sites having wild diploid species such as G. aridum, G. trilobum and G. gossypioïdes were also visited. At the Iguala station seeds of G. laxum and G.

lobatum were obtained. Seven new locations, not previously described, contained a wild species which appeared, after growing in the glasshouse, to belong to G. aridum. Five of these new sites are located in the Salina Cruz area (Gulf of Tehuantepec) and this considerably extends the previously known area of dispersion of G. aridum.

Attention must be drawn to some points concerning wild species:

- the extension of a species as shown on a map often does not accurately represent its extension in the country, as the sites are generally scattered over a large area;
- the density of plant population at each site is highly variable, from no more than twenty plants to several hundred.
- due to the mountainous configuration of Mexico, there are large areas which lack roads or trails. Their future development will surely permit the discovery of other wild species locations or even new species.

PRESENT SURVIVAL OF SUB-SPONTANEOUS COTTON

From observations made by the authors in the West Indies and in certain Latin American countries (Ano and Schwendiman, 1980, 1981 and 1982), it is quite surprising to find today archaic types of cultivated cottons. Why do such plants still survive?

Cultivation on a family scale (as opposed to industrial growing), has diminished in importance although many specimens survive in home gardens or as escapes along roadsides. These plants were once more abundant when native people traditionally grew perennial cotton which was regenerated either by seed or by allowing new plantlets to grow spontaneously. This may explain in certain cases the fact that types considered to be primitive are still present today. Nevertheless, plants found in a certain site may not actually correspond to their "area of origin" as in the course of the numerous conversations with local people it became clear that seed exchanges frequently occurred.

While industrial utilization of the fibre is important, other criteria may be used. In addition to such qualities as length, fineness and strength, the natural brown, khaki or reddish coloration may be used to obtain patterns in weaving. Another criterion is the facility with which lint can be removed from the seed by hand, which may partly explain the wide dispersal of the G. barbadense var. brasiliense.

The fibre is also used for making hammocks, fishing nets, wicks for oil lamps and, where no weaving tradition exists, pillows and mattresses. Cotton is also used for other purposes; seeds are used as an emergency food in India and by the Bahia Indians of Brazil. The leaves and roots have been used for medicinal reasons.

These examples of the multiple uses of cotton by native people explain, at least partly, their current wide dispersal and also their survival. If only utilized for fibre it is possible that many sub-spontaneous types would have already disappeared in favour of more modern cultivars. Cotton is still a traditional element of home gardens, even if no longer used; it may also be grown simply as an ornamental.

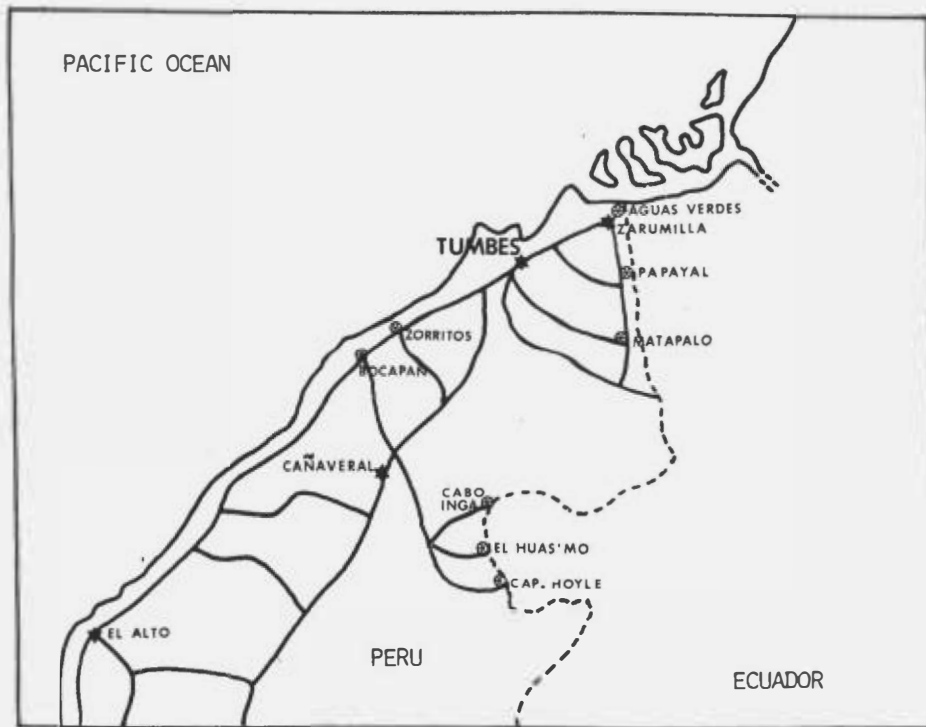


Fig. 1. Location of "wild" *Gossypium barbadense* plants in Peru

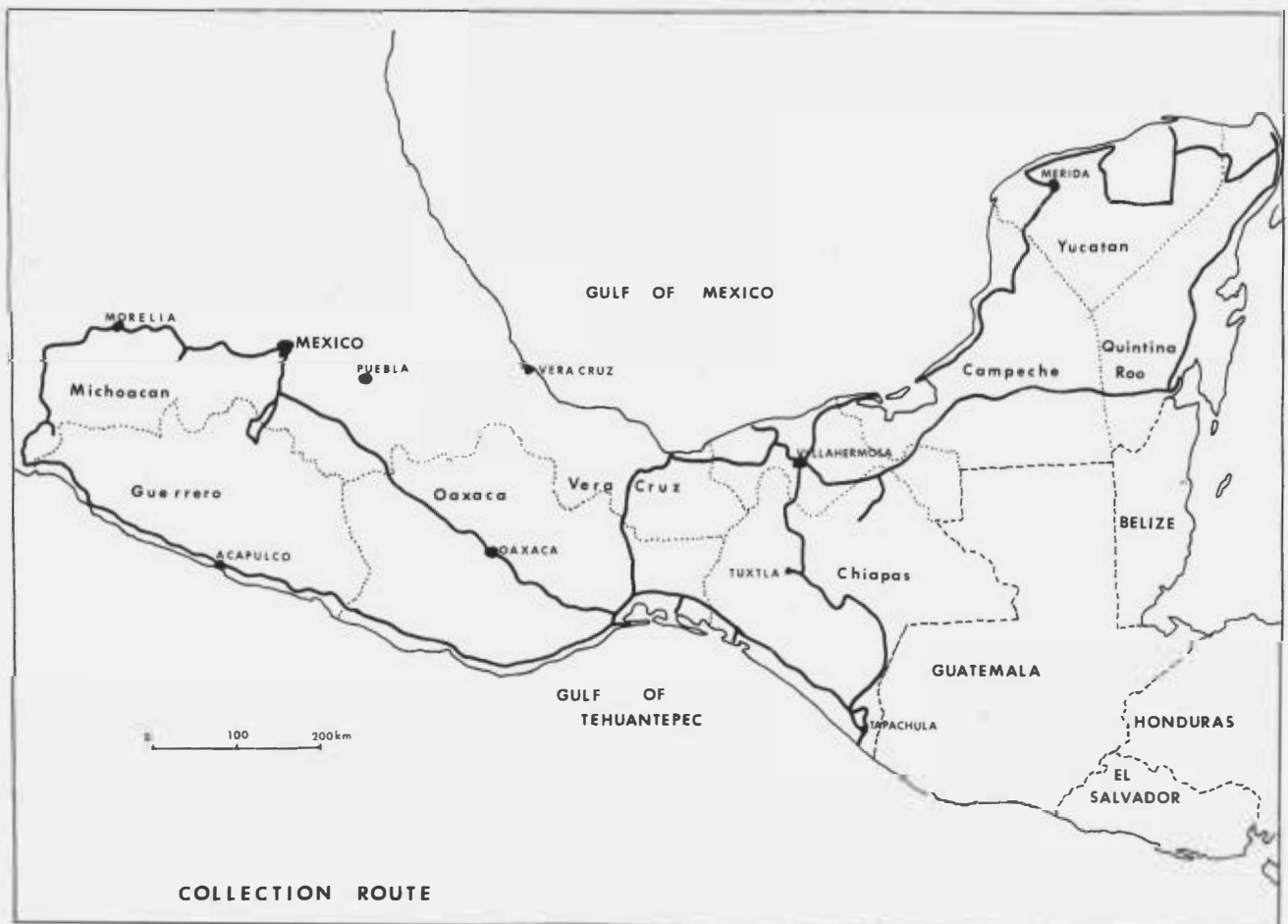


Fig. 2. Collection route in Mexico

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RESUME

Ces dernières années, le CIRP a organisé avec le concours de l'Institut français de recherches du coton et textiles exotiques (IRCT) une mission en plusieurs phases pour récolter des spécimens de cotonniers subspontanés. Les spécimens récoltés à l'intérieur du Pérou lors d'une mission effectuée en octobre 1981 variaient du point de vue de la couleur, de la fibre et de la forme des graines; lors d'une autre mission conduite dans le sud du Mexique en février-mars 1982, des échantillons de Gossypium hirsutum ont été récoltés et la gamme des G. hirsutum de la race du Yucatan a été passée en revue.

RESUMEN

En los últimos años se ha llevado a cabo en varias fases una misión de recolección de algodón subespontáneo con apoyo de CIRP y en asociación con el Instituto Francés de Investigación del Algodón y las Fibras Textiles Exóticas (IRCT). En una misión en el interior del Perú en octubre de 1981 las muestras recogidas mostraron variabilidad en el color, la fibra y la forma de la semilla; en otra misión en el sur de México, en febrero-marzo de 1982, se recogieron muestras de Gossypium hirsutum y se examinó el área de distribución de G. hirsutum raza yucatanense.

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