

CULTIVATED AND WILD PLANT GENETIC RESOURCES FROM CHOCÓ DEPARTMENT COLOMBIA

RECURSOS FITOGENÉTICOS SILVESTRES Y CULTIVADOS DEL DEPARTAMENTO DEL CHOCÓ COLOMBIA

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ABSTRACT

The department of Chocó, Colombia is an area with a great diversity of plants, many of which are used for food purposes. A study (1999–2002) made for cultivated and wild edible plants in some river basins and markets of the Department found 75 species (33 cultivated, 35 wild or naturalized, and 7 both cultivated and naturalized or adventitious) from 25 botanical families. Results are presented on the features specific to the Chocó, and on the importance and value of each species. Most species, either cultivated or wild, are destined for local markets, although some cash crops exist (mainly banana and cocoa). Several species, like *borojó* (*Borojoa patinoi*), are endemic to the Chocó. Also, some types of rice and maize able to resist seawater intrusions are of particular interest. It is remarkable that a significant number of the plants used are wild or naturalized, with many plants from other regions seemingly adapted well to the natural environment of the Chocó. In general, a great diversity of types exists within each species, and, in the case of cultivated plants, there are few improved varieties. In conclusion, in the Chocó there is a great diversity of plants used for food purposes and a considerable associated ethnobotanical knowledge, which has mostly remained neglected and unknown to the rest of the world.

Keywords: Cultivated and wild edible plant; Chocó department; Plant genetic resources.

RESUMEN

La zona del departamento del Chocó, Colombia, posee una gran diversidad de plantas, muchas de las cuales se utiliza con fines alimentarios. En un estudio realizado entre 1999 y 2002 en busca de plantas comestibles silvestres y cultivadas en algunas cuencas fluviales y mercados del departamento se hallaron 75 especies (33 cultivadas, 35 silvestres o naturalizadas y 7 tanto cultivadas como naturalizadas o adventicias) pertenecientes a 25 familias botánicas. Se presentan resultados acerca de las características específicas del Chocó, y la importancia y el valor de cada especie, la mayoría de las ellas, tanto cultivadas como silvestres, se destina a los mercados locales, si bien existen algunos cultivos comerciales (principalmente cacao y bananos). Numerosas especies, como el borojó (*Borojoa patinoi*), son endémicas del Chocó. También son de particular interés algunos tipos de arroz y maíz capaces de resistir las intrusiones de aguas marinas. Es de notar que un número significativo de las plantas utilizadas son silvestres o naturalizadas, y muchas son plantas provenientes de otras regiones que parecen haberse adaptado bien al ambiente natural del Chocó. En general en cada especie existe una gran diversidad de tipos, y en el caso de las plantas cultivadas hay algunas variedades mejoradas. En conclusión, en el Chocó hay una gran diversidad de plantas que se emplean como alimentos, y un considerable acervo de conocimientos etnobotánicos relativos con las mismas, que en su mayor parte el resto del mundo no conoce o no se valora.

Palabras clave: Plantas cultivadas y silvestres comestibles; Departamento del Chocó; Recursos fitogenéticos.

INTRODUCTION

The Department of Chocó, Colombia is a tropical rainy region, situated between the Pacific Ocean to

the west, the Departments of Antioquia, Caldas and Risaralda to the east, Panama and the Atlantic Ocean to the north, and the Departments of Valle del Cauca

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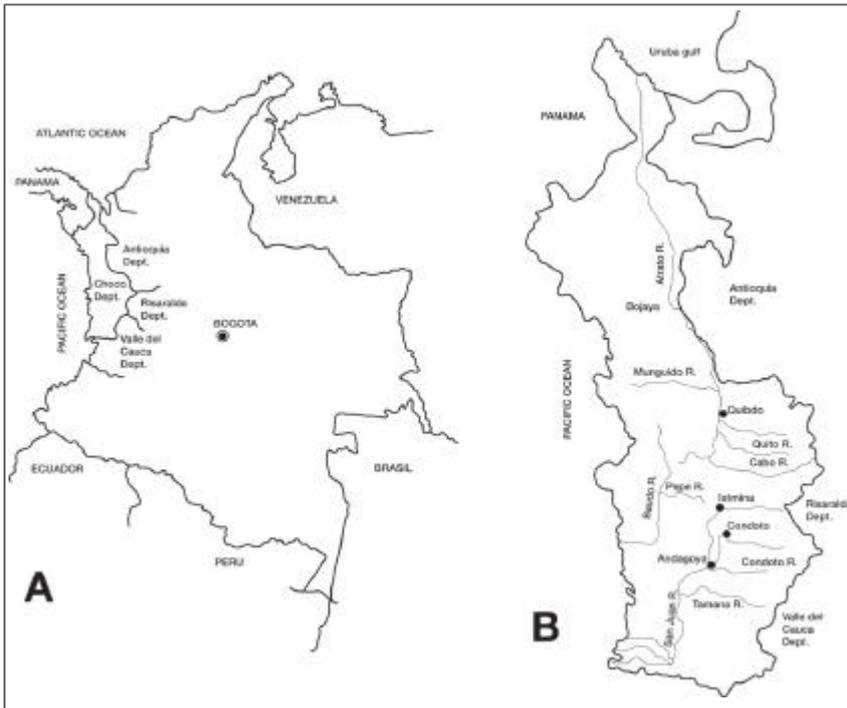


Figure 1. Situation of the Department of Chocó Colombia (A) and the area surveyed (B), which includes the rivers Atrato, Baudó and their tributaries. Biodiversity and the cultural diversity of the Chocó communities (Mosquera and Arenas 1995).

and Nariño to the south (Figure 1). Department of Chocó has 817.000 inhabitants, of which approximately 73% lives in urban areas. Most of the population (90%) is Afro-American, while the rest is formed by descendants of Europeans (6%) and Native American Indians (4%). Within the Chocó, 71 Indian reserves cover 16% of the area. Around 30.000 Indians, mainly from the Emberas and Waunana tribes, but also from the Katis and Kunas, are spread among 210 communities. The Chocó Department is one of the poorest regions in Colombia, with most of the population having their basic needs unsatisfied (Departamento Nacional de Planeación 1992).

The Department of Chocó holds one of the greatest diversities of plants in the world (Gentry 1982). It has been estimated that in its 47.000 km² there are between 8.000 and 10 000 species, many of which are endemic (Gentry 1982; Forero and Gentry 1989). In this respect, more than 350 trees with trunk diameters >10 cm at breast height have been found in 1 ha (Faber-Langendoen and Gentry 1991). This great variety of plants is matched by an equally impressive fauna (Kirkbride and Faber-Langendoen

1990). This accumulation of biodiversity is a consequence of the existence of multiple micro-environments, the high rainfall of over 11.000 mm/year, the high average temperatures (mean minimum: 24°C; mean maximum: 28°C) (data from the Solar Station of the Universidad Tecnológica del Chocó), and to an altitudinal range from sea level to 3600 m, ranging from coastal plains and river beds to mountainous areas (Gentry 1982, 1988). Despite heavy rains all year, there is a more intense «wet season» from April to October. It is the only Department of Colombia that has plant formations ranging from the tropical pluvial forest to the high mountain forest (Gentry 1982).

Among this biodiversity, many plants exist with promising properties for different uses. Indian communities have made practical use of the forest, without altering the equilibrium of the ecosystems, and also have used cultivated plants. In this way, they have accumulated a huge ethnobotanical knowledge associated with the use of the wild and cultivated plants. The utilization of plants, from the medicinal and nutritional point of view, has had an important role in the cultural evolution of the Chocó communities. The interaction between the Indians and the Afro-American communities led to an enrichment of ethnobotanical knowledge due to the introduction of some plants and their associated uses, as well as for the use of plants native to the Chocó with properties or characteristics similar to those present in their regions of origin. In consequence,

there is a strong relationship between the biodiversity and the cultural diversity of the Chocó communities (Mosquera and Arenas, 1995).

However, both the biodiversity and the ethnobotanical knowledge of the Department of Chocó are in danger. Deforestation is resulting in the elimination of many wild species, and in soil erosion. At the same time, many autochthonous cultivated plants are being neglected, as they are displaced or replaced by others, so that an important part of the diversity and associated knowledge is being lost (Medina 1999).

Regrettably, studies on the diversity of plants used by humans and their associated ethnobotanical knowledge in area have been very few. The lack of personal security in many rural areas of Colombia, including the Department of Chocó, makes field surveying difficult. The present work presents the results of a survey for food plants and associated ethnobotanical knowledge in the Chocó Department. The objectives are to obtain ethnobotanical information on the most important food plants in this unique region, and to describe and discuss the most prominent features of the plant material.

MATERIAL AND METHODS

The areas to be surveyed were selected so that they included the diversity of environments and ethnic composition of the Department of Chocó. The areas visited lie between 4°N and 6°N and 76°W and 77°W and correspond to the basins of the rivers Atrato, San Juan and Baudó and their tributaries: Munguido, Quito and Cabí for the Atrato river; Condoto, Iró, Suruco and Tamaná for the San Juan river; and Pepé for the Baudó river (Figure 1). Populations visited were Quibdó, Puerto Conto, Campo Bonito, Munguidó, Istmina, Andagoya, Condoto, Pie de Pepé and Suruco.

Visits were carried out during the period 1999–2002 and during all the year. The surveys included home

gardens, orchards, commercial fields, wild areas and local markets. As there are few passable roads, an important part of the survey of the river basins was performed using canoes.

Whenever possible, ethnobotanical information was collected by means of personal interviews with farmers, either on the farms or in markets; retailers; local authorities; and owners of home gardens. We also collected information on the importance (assessed as frequency of use and how common each crop or wild species was in the markets) and the market value of each species. The frequency of use and presence in the markets was measured by assessing the overall presence of each species and its relative importance for the retailer in terms of quantity sold from the market stands throughout the year, and evaluated on a scale of 1 to 5 (1= consumption or presence in markets very occasional; 5=consumption or presence in the markets very common). The market price in the local markets was also evaluated using a similar scale (1=very low, usually <US\$ 0.25/kg; 5=very high, usually >US\$ 2/kg). Samples of the plants surveyed in the fields were classified and preserved in the herbarium of the Technological University of Chocó. Whenever possible, seeds were also extracted and conserved in the Technological University of the Chocó.

RESULTS

Seventy-five species of edible plants belonging to 25 families were studied. Of these, 33 species were cultivated, 35 species wild or naturalized, and 7 species were both cultivated and naturalized or adventitious (Table 1). The families with the greatest number of species were *Solanaceae*, *Rutaceae*, *Annonaceae*, *Arecaceae*, *Cucurbitaceae*, *Musaceae*, *Myrtaceae* and *Passifloraceae*. The great number of wild and naturalized plants that are harvested in the wild forests is remarkable. Within the home gardens, orchards and local markets, a great diversity of crops and varieties was found. An important characteristic was the absence of modern

Table 1
Scientific and common names, type of use, type of plant (A)

Scientific name	Common name	Type of use	Plant type*	Importance	Value
Annonaceae	Annonaceae	Annonaceae	Annonaceae	Annonaceae	
<i>Annona cherimolia</i>	Chirimoya	fruit	W	2	1
<i>Annona diversifolia</i>	Anón	fruit	W	1	1
<i>Annona glabra</i>	Anón	fruit	W	1	1
<i>Annona muricata</i>	Guanábana	fruit	C	5	5
<i>Annona reticulata</i>	Anón	fruit	W	3	3
<i>Annona purpurea</i>	Anón	fruit	W	1	1
Araceae	Araceae	Araceae	Araceae	Araceae	
<i>Colocasia esculenta</i>	Mafafa	cooked	W	3	2
<i>Xanthosoma sagittifolium</i>	Rascadera	cooked	W	3	2
Arecaceae	Arecaceae	Arecaceae	Arecaceae	Arecaceae	
<i>Attalea allenii</i>	Táparo	oil	W	2	1
<i>Bactris gasipaes</i>	Chontaduro	cooked	C	5	4
<i>Elaeis guineensis</i>	Palma Africana	oil	W	3	1
<i>Elaeis oleifera</i>	Corozo	oil	W	3	1
<i>Jessenia bataua</i>	Mil pesos – Seje	oil	W	3	1
Bixaceae	Bixaceae	Bixaceae	Bixaceae	Bixaceae	
<i>Bixa orellana</i>	Achiote- bija	colorant	W	5	2
Bombacaceae	Bombacaceae	Bombacaceae	Bombacaceae	Bombacaceae	
<i>Patinoa almirajo</i>	Almirajó	fruit	W	2	2
<i>Quaribaea cordata</i>	Sapote	fruit	C	5	3
Bromeliaceae	Bromeliaceae	Bromeliaceae	Bromeliaceae	Bromeliaceae	
<i>Ananas comosus</i>	Piña	fruit	C	5	3
Caricaceae	Caricaceae	Caricaceae	Caricaceae	Caricaceae	
<i>Carica papaya</i>	Papayo	fruit	W/C	5	3
Clusiaceae	Clusiaceae	Clusiaceae	Clusiaceae	Clusiaceae	
<i>Garcinia madrunno</i>	Madroño	fruit	W	3	2
Cucurbitaceae	Cucurbitaceae	Cucurbitaceae	Cucurbitaceae	Cucurbitaceae	
<i>Cucumis melo</i>	Melón	fruit	W/C	3	2
<i>Cucurbita ficifolia</i>	Alcayota	fruit	W/C	2	1
<i>Cucurbita maxima</i>	Zapallo	cooked	W/C	5	4
<i>Cucurbita moschata</i>	Zapallo	cooked	W/C	4	3
<i>Cucurbita pepo</i>	Zapallo	cooked	W/C	4	3
<i>Sicana odorifera</i>	Melocotón	fruit	W	2	1
Dioscoreaceae	Dioscoreaceae	Dioscoreaceae	Dioscoreaceae	Dioscoreaceae	
<i>Dioscorea alata</i>	ñame motete	cooked	C	4	2
<i>Dioscorea cayennensis</i>	ñame	cooked	C	2	2
<i>Dioscorea trifida</i>	Ñame	cooked	C		
Euphorbiaceae	Euphorbiaceae	Euphorbiaceae	Euphorbiaceae	Euphorbiaceae	
<i>Manihot dulcis</i>	Yuca	cooked	C	5	3
<i>Phyllanthus acidus</i>	Grosella	fruit	W	1	1
Fabaceae	Fabaceae	Fabaceae	Fabaceae	Fabaceae	
<i>Canavalia rosea</i>	Haba de monte	cooked	W	1	1
<i>Inga edulis</i>	Guama o Chiruma	fruit	W	3	2
Lauraceae	Lauraceae	Lauraceae	Lauraceae	Lauraceae	
<i>Persea americana</i>	Aguacate	fruit	C	5	3
Lecythidaceae	Lecythidaceae	Lecythidaceae	Lecythidaceae	Lecythidaceae	
<i>Gustavia superba</i>	Pacó	cooked	W	2	1
<i>Lecythis minor</i>	Pacó de monte	cooked	W	1	1
Melastomataceae	Melastomataceae	Melastomataceae	Melastomataceae	Melastomataceae	
<i>Bellucia axinantha</i>	Coronilla	fruit	W	1	1

Table 1
Scientific and common names, type of use, type of plant (B)

Scientific name	Common name	Type of use	Plant type*	Importance	Value
Moraceae	Moraceae	Moraceae	Moraceae	Moraceae	
<i>Artocarpus altilis</i> (seedless)	Árbol del pan maceta	cooked	C	4	2
<i>Artocarpus altilis</i> (ceded)	Arbol del pan con semillas	cooked	C	4	3
Musaceae	Musaceae	Musaceae	Musaceae	Musaceae	
<i>Musa acuminata</i>	Primitivo	cooked/fruit	C	4	2
<i>Musa balbisiana</i>	Popocho	cooked/fruit	C	3	1
<i>Musa paradisiaca</i>	Dominico hartón	cooked/fruit	C	5	3
<i>Musa sapientum</i>	Banano	cooked/fruit	C	5	2
Myrtaceae	Myrtaceae	Myrtaceae	Myrtaceae	Myrtaceae	
<i>Psidium guajava</i>	Guayaba	fruit	C	5	3
<i>Psidium guineense</i>	Guayaba agria	fruit	C	5	4
<i>Syzygium jambos</i>	Pomo	fruit	C	2	1
<i>Syzygium malaccensis</i>	Pomo rosa	fruit	W	4	2
Passifloraceae	Passifloraceae	Passifloraceae	Passifloraceae	Passifloraceae	
<i>Passiflora edulis</i>	Granadilla	fruit	W	4	4
<i>Passiflora ligularis</i>	Granadilla	fruit	W	4	4
<i>Passiflora quadrangularis</i>	Badea	fruit	C	5	4
<i>Passiflora vitifolia</i>	Granadilla	fruit	W	4	4
Poaceae	Poaceae	Poaceae	Poaceae	Poaceae	
<i>Oryza sativa</i>	Arroz	cooked	C	5	3
<i>Saccharum officinarum</i>	Caña	procesado	C	5	2
<i>Zea mays</i>	Maíz	cooked	C	5	3
Rubiaceae	Rubiaceae	Rubiaceae	Rubiaceae	Rubiaceae	
<i>Borojoa patinoi</i>	Borojó	fruit	W/C	5	4
Rutaceae	Rutaceae	Rutaceae	Rutaceae	Rutaceae	
<i>Citrus</i> sp.	Limón verrugoso	fruit	W	5	2
<i>Citrus aurantiifolia</i>	Limón criollo	fruit	C	5	3
<i>Citrus aurantium</i>	Naranja agria	fruit	C	4	2
<i>Citrus grandis</i>	Toronja	fruit	C	3	1
<i>Citrus limon</i>	Limón pajarito	fruit	C	5	3
<i>Citrus medica</i>	Cidra	medicinal	W	1	1
<i>Citrus sinensis</i>	Naranja dulce	fruit	C	5	3
Sapotaceae	Sapotaceae	Sapotaceae	Sapotaceae	Sapotaceae	
<i>Pouteria caimito</i>	Caimito	fruit	W	4	3
Solanaceae	Solanaceae	Solanaceae	Solanaceae	Solanaceae	
<i>Capsicum annuum</i>	Ají dulce	condiment	W	3	1
<i>Capsicum baccatum</i>	Ají pique	condiment	W	3	1
<i>Cyphomandra crassifolia</i>	Tomate de árbol silvestre	fruit	W	1	1
<i>Lycopersicon esculentum</i>	Tomate	condiment	C	5	3
<i>Physalis peruviana</i>	Uchuva	fruit	C	3	2
<i>Physalis philadelphica</i>	Tomate de cáscara	cooked	W	1	1
<i>Physalis pubescens</i>	Uchuva	fruit	W	1	1
<i>Solanum</i> sp. (Section Lasiocarpa)	Lulo silvestre	fruit	W	1	2
<i>Solanum jamaicense</i>	Friega plato	fruit	W	1	1
<i>Solanum muricatum</i>	Pepino dulce	fruit	C	3	2
<i>Solanum quitoense</i>	Naranjilla	fruit	C	4	2
<i>Solanum sessiliflorum</i>	Lulo	fruit	C	4	3
Sterculariaceae	Sterculariaceae	Sterculariaceae	Sterculariaceae	Sterculariaceae	
<i>Theobroma bicolor</i>	Bacao	processed/ fruit	W	3	2
<i>Theobroma cacao</i>	Cacao	processed	C	5	3

(W=wild or weedy; C=cultivated), importance as assessed by the frequency of use and presence in the markets (1=very low; 5=very high) and value (1=very low, usually below 0.25 US\$/kg; 5=very high, usually above 2 US\$/kg) of the food plants surveyed.



Figure 2. Anonaces edibles from Chocó



Figure 3. Araceae Edibles from Chocó: *Colocasia esculenta* (L.) y *Xanthosoma sagittifolium* (L.)

varieties. Some examples are shown in Figure 3.

The most noteworthy characteristics of the families and species found in the survey, either because they differ from those of other regions, or because they present types of use, management or harvesting characteristic of the Chocó region, are commented upon below. Other families and species found are not included here as they presented no remarkable difference from other regions.

Annonaceae. Within this family, several species of genus *Annona* are used, although the only species cultivated on a commercial scale is *Annona muricata* L. (1) *A. muricata* is the most important species in the markets, and, apart from being cultivated in commercial fields, it is also found in home gardens and small orchards and is characterized by fruits that are very aromatic and have a juicy pulp. There is a lot of variation for shape (ovoid, pear-shaped, heart-shaped and round). This species is used to prepare juices, ice creams, refreshments and has a high commercial value. The juice obtained after

boiling the leaves is used as an analgesic for stomach pains, and also as an anthelmintic. Wild species frequently found in markets include *A. cherimolia* Mill. and *A. glabra* L., although other species, such as *A. reticulata* L., *A. diversifolia* Saff. and *A. purpurea* Moc, are found occasionally. The fruits of these wild species are used in a similar way to those of *A. muricata*, although they usually are smaller in size and less appreciated. Because of this, among all the species of this family, *A. muricata* fetches the highest market price.

Araceae. The most prominent species in the Chocó are *rascadera* (*Xanthosoma sagittifolium* (L.) Schott.) and *mafafa* (*Colocasia esculenta* (L.) Schott.), which are found in the wild. Both species have a similar importance in the market and their value is similar. *Rascadera* produces small rhizomes (around 6×10 cm). *C. esculenta* produces bigger rhizomes, white or yellow in colour. The rhizomes of both species have a brown hairy skin. They are used as a source of carbohydrate, either cooked with salt, or as an ingredient of stews (Figure 4).

Areaceae. Palms provide the inhabitants of Chocó with basic elements for daily existence, including foodstuff, beverage, oil, fibre and construction materials. The most important palm, assessed by its abundance in the market place, is the cultivated *chontaduro* (*Bactris gasipaes* HB&K). Other species of this family, which are found in the markets and are harvested from the wild or from naturalized individuals, are the *palma mil pesos* (*Jessenia bataua* Burret), the *táparo* (*Attalea allenii* H.E.Moore), the African palm (*Elaeis guineensis* Jacq.) and the *corozo* (*E. oleifera* (Kunth) Cortés).



Figure 4. Aracaceae edibles from Chocó: *Attalea allenii* H.E.Moore, *Oenocarpus bataua*, *E. oleifera* (Kunth) Cortés.



Figura 5. *Bixa orellana* L.

Chontaduro is a commercially cultivated native palm. Several local varieties exist. They can be distinguished by the colour of the skin, which can be yellow, orange, red or green. The fruit of *B. gasipaes* is nutritionally equilibrated, since it contains balanced quantities of protein, fat, carbohydrates, vitamins and minerals. Palm hearts, which are used in salads and other dishes, are obtained from young plants.

Among the wild species of palms, the palma mil (*Oenocarpus bataua*) pesos is of great interest. Its fruits are black or purple coloured, with a diameter of 2 to 4 cm. Fruits have a thin mesocarp from which an oil similar in composition to olive oil is extracted. The mil pesos palm oil is used for cooking and in folk medicine. Methodology is being developed in the region for *in vitro* propagation in order to select plants with greater yield and better fruit quality (Medina 1999).

Bixaceae. *Bija* (*Bixa orellana* L.) is a wild plant widely used as a condiment and as a colorant. The fruit is a capsule with a red or yellow papilla. A red colorant is extracted from the pulp, which is used primarily to season foods. Some Indian tribes, like the Emberas, use it for body decoration (Figure 5).

Bombacaceae. All species found from this family are used for their fruit, which is eaten raw as a fresh fruit. The most important is *sapote* (*Quararibea cordata* (Humb & Bonpl) García-Barr & Hernández). It bears fruits having a diameter of 10 to 16 cm and a weight of around 1 kg, with a hard greenish-brown skin. The fibrous pulp is orange to red and with a sweet flavor. Another important species in this family is *almirajó* (*Patinoa almirajo* Cuatrec.), which is very common in the Chocó. It is a tree of 2 m in height that produces 20- to 40-cm long, pear-shaped or ovoid fruits, with a hard, opaque yellowish, skin. The pulp is yellow with an acid-sweet flavour. Sapote usually fetches higher prices than almirajó (Figure 6).

Bromeliaceae. The species with most relevance is the pineapple (*Ananas comosus* (L.) Merr.). In the Chocó, varieties similar to those common in other Colombian and international markets are found. However, there are many cultivated and wild local forms that yield small-sized ovoid fruits that have a sour flavour; they are used primarily as purges and as intestinal parasiticide (Figure 7).

Caricaceae. The only species with some economic importance in the Chocó is the papaya (*Carica pa-*



Figure 6. Bombacaceae edibles from Chocó: *Quararibea cordata* (Humb. & Bonpl.) García-Barr. & J. Hernandez) y *Patinoa almirajo* Cuatrec.



Figura 7. *Ananas comosus* (L.) Merr.

paya L.). It is cultivated, but can also be found growing wild in many habitats, becoming an invasive weed in some cases. The morphology of the fruit of the local races does not differ from those elsewhere in Colombia, but, as in the rest of the country, there is great variation in shape, size and colour (Figure 8).



Figura 8. *Carica papaya* L.

Clusiaceae. Within this family there is a plant endemic to the Chocó, the *madroño* (*Garcinia madruno* (Kunth) B.Hammel). It is a small tree that provides fruits 3 to 7 cm long with a prominent apex. The pericarp is yellow, rough, and there is a sweet and sour white pulp that contains 3 or 4 seeds. It is not cultivated, but the fruits of wild trees are harvested (Figure 9).



Figura 9. *Garcinia madruno* (Kunth) B. Hammel

Cucurbitaceae. Most of the species consumed in Chocó are found in the wild or as weedy forms. In this way, broad morphological variability can be found for *Cucurbita ficifolia* Bouché, *C. maxima* Duchesne, *C. moschata* Duchesne ex Lam. and *C. pepo* L. In the same way, there are naturalized plants of melon (*Cucumis melo* L.) and melocotón (*Sicana odorifera* (Vell.) Naudin) that are harvested for their fruits. The species from this family most frequently found in the market are the squashes and pumpkins, *Cucurbita maxima*, *C. moschata* and *C. pepo*, which are also the species that, within this family, fetch a higher market price (Figure 10).



Figure 10. *Cucurbitaceae* edibles form Chocó

Dioscoreaceae. This family is used for its rhizomes. The commercial species in Chocó are *Dioscorea alata* L., *D. cayennensis* L. and *D. trifida* L. Although they are mostly cultivated, they can also be found wild, being gathered and consumed, after being cooked with salt, as a source of carbohydrates. Among them, *D. alata* is the most common, although prices are similar (Figure 11).

Euphorbiaceae. The species with greatest importance in the local market is the *yucca* (sweet *Manihot esculenta* Crantz). It is cultivated for its edible tuberous root, which is rich in starch. It has a brown skin and white or yellowish pulp. Shape is variable, although usually cylindrical. Forms of different size exist, so that the weight of a root can

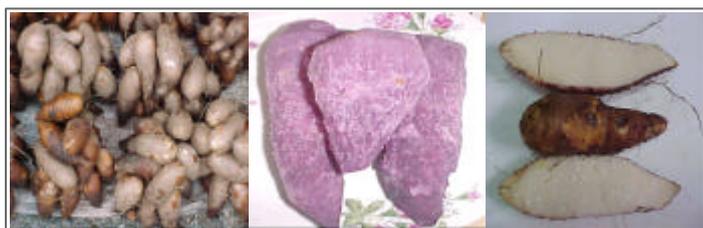


Figure 11. Dioscoreaceae edibles from Chocó: *Dioscorea alata*, *D. trifida*



Figure 12. Euphorbiaceae edibles from Chocó: *Manihot esculenta* Crantz.

reach 5 kg. Another species of interest, but with a different use it is *grosella* (*Phyllanthus acidus* Skeels.), which is naturalized; the fruits, which are yellow, kidney-shaped and 2 cm in diameter, are harvested for consumption as fresh fruit (Figure 12).

Fabaceae. Within this family there are two prominent species that are found in the wild, namely *guama* or *chiruma* (*Inga edulis* Mart.) and *haba de monte* (*Canavalia rosea* DC.). For guama or chiruma, as in other regions of South America, there are many forms. The most common ones, called guama, correspond to thick flattened pods 60 to 80 cm long, with a sweet and spongy edible aril that covers the black seed. The chiruma types have cylindrical, 2 to 3 cm diameter, pods that are found in the wild and are also used as a shade plant for banana borojó crops. The haba de monte has yellow-green pods up to 30 cm long. The seeds are used mostly as animal feed (Figure 13).

Lauraceae. The only species with importance is the avocado (*Persea americana* Mill.), which is cultivated in home gardens and small orchards, as well as in intensive plantings as a cash crop for export to other parts of Colombia. There is an important

diversity of varieties, but, in general, they are big, so that local varieties have a fruit weighing between 250 and 1000 g. The skin may be thin or thick, and smooth or rough. The pulp of the ripe fruit in some cases is yellowish, soft and with a buttery texture; in others it is pale green and soft or fibrous. The most common use is as an ingredient in salads and for preparing sauces (Figure 14).

Lecythidaceae. The most important species of this family in the Chocó is the *pacó* (*Gustavia superba* O. Berg), which is endemic to this region. It is found in the wild and has green, spherical, 10 to 16 cm diameter fruits that present a hard, oily and carotene-rich pulp. It is used boiled in soups. Another species of the same family is *Lecythis minor* Jacq., which is wild and has edible nuts, although its presence in the markets and the value of its fruit is lower than that of *Gustavia superba* (Figure 15).

Melastomataceae. The most important species is *coronilla* (*Bellucia axinantha* Triana), which is found in the wild state. The profitable part is the fruit, which is semi-spherical, 3 cm in diameter, with remains of the accrescent calyx that form a kind of crown of yellowish-green colour. The pulp is sweet



Figura 13. *Inga edulis* Mart.



Figura 14. *Persea americana* Mill.



Figure 15. Lecythidaceae edible from Chocó:
Gustavia superba O.Berg



Figure 16. *Bellucia axinanthera* Triana

and sour, and has a smoothly granular texture. Prices fetched by this species are relatively low (Figure 16).

Moraceae. It is a family broadly distributed in the Department of Chocó. The species with most commercial value is the breadfruit tree (*Artocarpus altilis* L.), which is cultivated for its sorosis (fleshy multiple fruits), which are round and can weigh up to 3 kg. In the Chocó there are two varietal types: one form is seeded and the other is seedless. In the



Figura 17. *Artocarpus altilis* L.



seeded type, the pericarp has soft prickles and the endocarp is fibrous and encloses the seeds, which are semi-spherical and brown. In the seeded type, the pericarp is rough and, because it is parthenocarpic, the pulp forms a milky-white hard mass. The most common type in the markets is the seeded one (Figure 17).

Musaceae. This family is one of those that make the greatest contribution to caloric supply in the diet of the Chocó people. Within the genus *Musa* there are several commercial species with great economic value in the Chocó, namely *banano* (*M. sapientum* L.), *dominico hartón* (*M. paradisiaca* L.), *popocho* or *cuatro esquinas* (*M. balbisiana* L.) and *primitivo* (*M. acuminata* L.). *M. sapientum* is more common in the Urabá area, while *M. paradisiaca* is more common in the Atrato river basin. Within each species there are many different clones, which vary in shape and size. In all these species, the immature fruit is used cooked, while the mature fruit is eaten raw. *Musa* species are grown not only for the local markets, but also as a cash crop for export (Figure 18).



Figura 18. Musaceae edibles from Chocó

Myrtaceae. The most common species are the guava (*Psidium guajaba* L.) and the sour guava (*Psidium guineense* Sw.), which are cultivated on a small scale. The mesocarp has a granulous, sandy consistency. In some improved varieties this characteristic has already been eliminated. However, the most common varieties found in the Chocó have a sandy pulp. Other species of importance within this family



Figure 19. Myrtaceae edibles from Chocó: *Syzygium jambos* L., *Psidium guajaba* L., *Psidium guineense* Sw

are *Syzygium jambos* L. and *S. malaccense* (L.) Merr. & Perry, which are wild. Both have a pear-shaped fruit with a rose to deep-red skin, and with a central seed enclosed by a sweet and sour white pulp. They are harvested just for local marketing (Figure 19).

Passifloraceae. Within this family there are several species with economic importance in the Chocó, although the only one cultivated, and which is the most frequently found in the markets, is *badea* (*Passiflora quadrangularis* L.). The varieties cultivated in this region have a fruit morphology similar to the types cultivated in the rest of Colombia. Other edible species (*P. edulis* Sims., *P. ligularis* Juss. and *P. vitifolia* Kunth) grow in the wild and are harvested for own consumption or for sale in



Figure 20. Passifloraceae edibles from Chocó: *Passiflora quadrangularis* L., *P. ligularis* Juss. and *P. vitifolia* Kunth.

local markets. All these species fetch similar prices in the market (Figure 20).

Poaceae. The most important species in Chocó are maize (*Zea mays* L.) and rice (*Oryza sativa* L.). There are some forms tolerant to salinity and that are cultivated in estuarine areas where seawater intrusion into the fields is frequent. Probably the fact that the marine intrusion is occasional, that the seawater is diluted with the fresh water of the river, and that the high rainfall washes the salt from the soils makes it possible for certain varieties to tolerate the intrusion of sea water. Other varieties do not show this tolerance and the crop dies as consequence of the marine intrusion. The varieties with tolerance to salinity could be of great interest as sources of variation in rice and maize breeding. However. The type of maize grown in the Chocó differs from the types that are commercially grown in the rest of the country. Chocó types have not been subjected to breeding pressure and have a smaller grain size and ear. Sugar-cane (*Saccharum officinarum* L.) is also commonly grown. It is noteworthy that the sugar content of the Chocó varieties is lower than that of modern varieties. Sugar-cane is used in the production of sugar, sugar loaves and local liquors like *bicho* and *vinete*, which have an alcohol content around 40%, and of fermented sugar-cane juice (*guarapo*), which has an alcohol content of 6-7% (Figure 21).



Figure 21. Oryza sativa L., *Zea mays* L., *Saccharum officinarum* L.

Rubiaceae. Within this family there is a species characteristic of the Chocó forest, the *borojó* (*Borojoa patinoi* Cuatrec.). Apart from being found in the wild state, it is also cultivated in small plantations for the production of fruit, which are either sold in the local markets or sent to other regions of Colombia, where it is very appreciated for the preparation of juices (Ricker *et al.* 1997). Its presence in the markets and the cultivated acreage is increasing, and it seems to be a promising crop for the region.

Borojó is a dioecious species. The fruit is a round or ovoid (sometimes pear-shaped) fleshy berry, of about 10 cm diameter. The skin colour is pale green and clear when immature and brown when ripe. The pulp, which constitutes most of the fruit (90%), is dark brown, sticky and with an intense and characteristic scent. Besides *B. patinoi*, there are some other wild species of borojó, although they are not so appreciated as *B. patinoi* and their presence in the markets is much smaller. Currently, methodology is being developed for the *in vitro* propagation of selected male (pollinator) and female clones (Medina 2003) (Figure 22).



Figura 22. *Borojoa patinoi* Cuatrec

Rutaceae. There are several species of *Citrus* that have economic importance and that are well adapted to the Chocó. Some of them are cultivated, such as the orange (*Citrus sinensis* (L.) Osbeck), the grapefruit (*C. grandis* (L.) Osbeck), the *pajarito* lemon (*C. lemon* L., Burm) and the *criollo* lemon (*C. aurantifolia* Christm.), while others are naturalized, such as the sour orange (*C. aurantium* L.), the citron (*C. medica* L.) and the *verrugoso* lemon (*Citrus* sp.). All these species, with the exception of *C. medica*, which is less frequent, are commonly found in the markets. Among the differential



Figura 23. Rutaceae edibles from Chocó

characteristics of these species, with regard to those of other regions of Colombia, the varieties of *C. aurantium* L. are characterized by having a small fruit with thick pericarp and white pulp, which contains many seeds. It is used for the elimination of intestinal parasites. Verrugoso lemons have a big fruit with a rough, thick pericarp, and there are forms with different pulp colors: yellow, rose and white. Market prices for these fruits vary, with some species being much more valued than others (Figure 23).

Sapotaceae. Within this family, the *caimito* (*Pouteria caimito* Radlk) has local economic importance. It is quite frequent in the wild state and used only locally. The Chocó types have a green to yellow, round, 6 to 10 cm diameter, fruit, which has sticky latex when unripe. When it ripens, a translucent white pulp of sweet flavor is formed around the seed (Figure 24).



Figura 24. *Pouteria caimito* Radlk

Solanaceae. Several genera of this family are locally important, especially *Lycopersicon*, *Capsicum*,



Figure 25. Solanaceae from Chocó: *Solanum*, lulo (*S. sessiliflorum* Dunalm, *Solanum jamaicense* Mill. Diversity of *Capsicum*, wild tree tomato (*Cyphomandra crassifolia* Cav., Sendtner).

Solanum, *Cyphomandra* and *Physalis*. The tomato (*Lycopersicon esculentum* Mill.) is commercially cultivated and is very frequent in markets. The morphology of most varieties is similar to that of the common types grown elsewhere in Colombia. Nevertheless, local races present diverse shapes (round, flattened, ovoid and kidney-shaped) and sizes. Peppers (*Capsicum* spp.) are cultivated to be used as a vegetable (sweet pepper) or as a condiment and to preserve foods (hot pepper). As in other regions of South America (Nuez *et al.* 1997), there are many local varieties with great variation in shape and size (Figure 25).

Within the genus *Solanum*, lulo (*S. sessiliflorum* Dunal), naranjilla (*S. quitoense* L.) and pepino dulce (*S. muricatum* Aiton) are cultivated commercially, of which the most common is *S. sessiliflorum*. There are also some wild species related to the lulo and naranjilla (*Solanum* section *Lasiocarpa*) and which are harvested. *S. sessiliflorum* is not usually marketed outside of Chocó, since the markets prefer *S. quitoense*. *S. sessiliflorum* is characterized by a fruit with a diameter from 4 to 7 cm, covered by a hard pericarp, especially when unripe, and slightly pubescent. The fruit color is yellow or red according to the variety, and the pulp is creamy yellow, with a sour flavor. As in the case of naranjilla, it is used to prepare juices and ice creams. The *friegaplatos*

(*Solanum jamaicense* Mill.), a wild, very spiny, shrub, is harvested for the fruits; its leaves are used for washing because they are abrasive.

The *Physalis* species with greatest importance in the Chocó is *uchuva* (*P. peruviana* L.), which is grown but also can be found naturalized. Other species, such as *P. philadelphica* Lam. and *P. pubescens* L., can be found naturalized, and although they may be harvested they are usually not marketed.

The wild tree tomato (*Cyphomandra crassifolia* Cav., Sendtner) is a relative of the cultivated tree tomato (*C. betacea* Cav., Sendtner). The fruit is a berry 5 cm long, ovoid or round in shape. The skin is thin and yellow or red in colour. The fruit is smaller than that of *C. betacea* but its flesh has greater bitterness. It is infrequent in markets.

Sterculariaceae. Cocoa (*Theobroma cacao* L.) has great importance in the Chocó. It is only found in cultivation and there are many local varieties, which differ in fruit colour, which can be yellow, green, red or dark purple, and in shape, which can be ovoid, elliptic or elongated.

It is a commercial crop that is destined mostly for export. A related wild species is *bacáo* or wild cocoa (*T. bicolor* Humb. & Bonpl.). It is less common in



Figure 26. Sterculariaceae edibles from Chocó: *Theobroma bicolor* Humb. & Bonpl and *Theobroma cacao* L.

markets and it is used as a substitute for cultivated cocoa, and consequently it fetches lower prices than *T. cacao*. Bacao is primarily destined for local consumption (Figure 26).

DISCUSSION

The Department of Chocó is one of the poorest regions in Colombia. However, it holds an enormous diversity of food plants that supply dietary needs, providing a varied and balanced nutrition (Medina 1999). Despite the important growth in population experienced in the last decades, caused by a high birth rate, the availability of agricultural and fishing natural resources has allowed the sustenance of a large part of the population.

Some of the species, both cultivated and wild, are widely distributed in the whole region of Chocó. Others are more abundant in certain areas where the micro-environment is favorable. Most produce is gathered all year round, since relatively little climatic variation occurs through the year. This allows a regular supply of food all year. In this way, in spite of the absence of storage facilities, and the warm and humid climate that hinders produce storage, most produce is available during the whole year.

The edible plants listed in Table 1 are species used for food purposes and that have had a major role in feeding the Chocó people, especially the agricultural communities situated far from markets. Those species also have some prominent characteristics, either because of their particular uses, the plant material or both, that deserve special treatment compared with other species also present in the Department, but not listed here. Because of the isolation of many local communities and low incomes, most cultivated land is devoted to subsistence agriculture, which is supplemented by the harvesting of wild species.

Although cultivated plants constitute the base of the diet (fundamentally rice, maize and bananas), wild plants, which are harvested in the forests and taken

by canoe to the local markets through the fluvial net, are also important in complementing the diet. Although many of the species that are found in the wild are native to the region, others are naturalized crops that produce edible fruits. When compared with their cultivated counterparts, in general, wild species are less appreciated and fetch lower prices than cultivated forms. This is a consequence of their lower proportion of edible part, lower uniformity, or a flavour or other characteristic less valued by the consumers.

Among the cultivated plants, there are practically no improved varieties, since the farmer uses the local landraces, which are well adapted to the local environments and needs of the farmers. Any modern, improved varieties present tend to have poor agronomic behavior under the climate and low inputs that characterize the subsistence agriculture of Chocó (Nuez *et al.* 1997).

However, during the last few years some local produce is being replaced by others imported from elsewhere in the country. In this way, among the plants providing an important quantity of carbohydrates in the diet, the rascaderas (genus *Xanthosoma*) are being substituted by potatoes (*Solanum tuberosum* L.), coming from the highlands. Also, among the fruits the lulo (*S. sessiliflorum*) is being replaced in the markets by naranjilla (*S. quitoense*), coming mostly from the Departments of Valle del Cauca and Antioquia.

At the same time, certain produce from the Chocó is appreciated in other regions of Colombia, and fetch high prices. These include borojó (*Borojoa patinoi*), avocado (*Persea americana*), lemon (*Citrus lemon*), chontaduro (*Bactris gassipaes*), yam (*Dioscorea trifida*) and bija (*Bixa orellana*). Some of these crops are not well known in other countries, but they present promising potential for introduction in exotic fruit markets. In particular, borojó has excellent expectations. In the same way, the oil of the mil pesos palm (*Jessenia bataua*) is appreciated

for its nutritional quality, as it is rich in polyunsaturated fatty acids.

In conclusion, the region of Chocó, because of its environmental peculiarities, presents a great diversity of profitable edible cultivated and wild species, which represent genetic resource of great value. The native and introduced plants, together with the enhancing effect on ethnobotanical knowledge resulting from the contact between Indian communities and Afro-Americans, has resulted in the accumulation of a great quantity of information that has remained unknown to the rest of the world. We hope that this report will increase interest in the importance of safeguarding the local resources and associated ethnobotanical knowledge from the Chocó.

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