

Edible wild plants of the Chorote Indians, Gran Chaco, Argentina

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The Chorote Indians are hunter-gatherers and fishermen from north-west Argentina and south-west Paraguay who belong to the Mataco-Maká linguistic family. Their edible plants are identified by botanical and vernacular names, the parts employed and modes of preparation and consumption. The Chorote people use 57 plant species as a source of food, which they consume in 118 different ways. Five new edible species, that yield seven plant foods, are reported here for the first time for Chaquenan ethnic groups. However, only a few wild plant foods are in frequent use today, with most being used occasionally, infrequently or not at all. A cross-cultural comparison with four neighbouring ethnic groups reveals that one third of their plant foods are exclusive to the Chorote people, despite the fact that they share most of their edible plants with the other groups. This article is the first contribution to an understanding of the Chorote's ethnobotany and to a comparison of interethnic relationships concerning their edible plant resources. © 2007 The Linnean Society of London, *Botanical Journal of the Linnean Society*, 2007, **153**, 73–85.

ADDITIONAL KEYWORDS: ethnobotany – food – indigenous knowledge – nutrition – subtropical forest.

INTRODUCTION

The Chorote are an ethnic group inhabiting the Gran Chaco region of north-west Argentina and south-west Paraguay (Fig. 1). They belong to the Mataco-Maká linguistic family together with the Mataco (or Wichí), Chulupíes and Maká people (Loukotka, 1968; Gerzenstein, 1978). In Argentina, Chorote people live in settlements along the right bank of the Pilcomayo River in the province of Salta, up to 160 km inland, and in the vicinity of Tartagal city (Siffredi, 1973, 1982; Wilbert & Simoneau, 1985). They are represented by two dialect divisions that currently share the same territory: the Southern Chorotes, 'ribereños' or *Yojwáha*, and the Northern Chorotes, 'montaraces' or *Yóuwujwa* (Hunt, 1915; Siffredi, 1973). Those Chorote people who live in Paraguay, called 'manjuy' in the contact language and local literature (Zanardini & Biedermann, 2001: 319), are not studied in this paper.

The Argentinian Chorote population is estimated at approximately 2100 people (INDEC, 2005). This human group is a true ethnic minority whose existence and way of life have had scarce representation within Argentinian and Paraguayan societies. As a consequence of their small population and cultural assimilation, the cultural identity of the Chorotes is destined to disappear.

Many anthropological works dealing with the Chorote people (von Rosen, 1904; Nordenskiöld, 1910, 1912; Karsten, 1932; Siffredi, 1973, 1982; Mashnshnek, 1974; De los Ríos, 1976/1977) treat their ethnobotany quite episodically, and make scarce contributions to the subject. On the other hand, several detailed ethnobotanical papers on particular plant species mention only a few Chorote plant uses (Arenas, Maranta & Sáenz, 1986; Arenas & Giberti, 1987a, 1987b, 1993; Arenas, Galafassi & Braunstein, 1987/1988; Arenas & Arroyo, 1988; Arenas & Scarpa, 1999; Arenas, 1999). Therefore, it could be said that Chorote ethnobotany is practically unknown in the literature, because the disarticulated and partial data recorded up to the present preclude a full understand-

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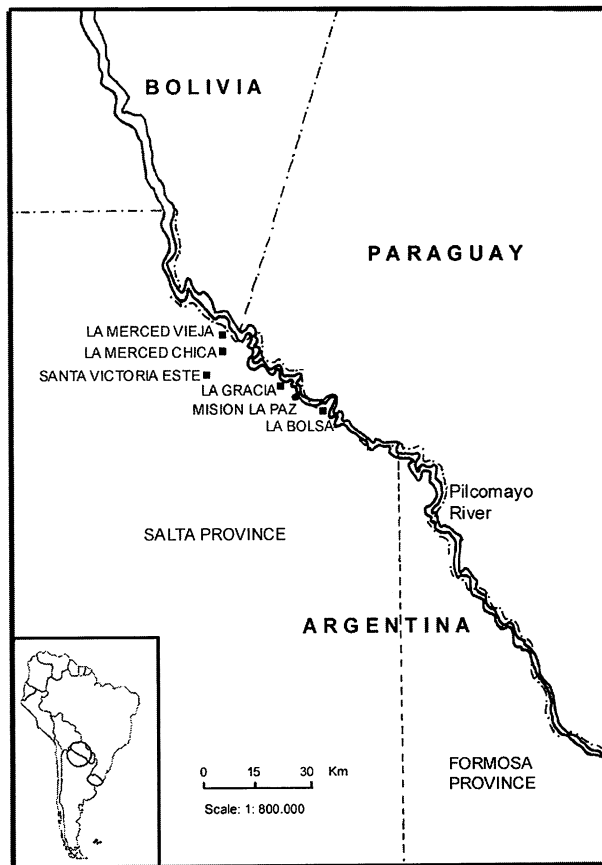


Figure 1. Location map showing distribution of Chorote people in Argentina.

ing of the important role plants play in Chorote culture.

The aim of this paper is to describe and analyse the uses of edible wild plants among the Chorote people and to evaluate the level of present use. Gathering practices, modes of preparation and consumption, and modes of conservation and storage are also discussed. A numerical comparison with other ethnic groups from the Gran Chaco is made here for the first time, in order to evaluate the distinctiveness of Chorote use of plant resources and plant foods.

STUDY AREA

This research was carried out in the Chorote settlements of La Merced Vieja, La Merced Chica, La Gracia, Mision La Paz and La Bolsa (Fig. 1). These are in the Salta province along the Argentinian shores of the Pilcomayo River, which serves as a natural border with Bolivia and Paraguay, between 22°S, 62°45'W and 22°30'S, 62°20'W.

The climate in the province is semidry continental/semitemperal with a mean annual temperature of 23 °C

and mean annual rainfall is 600 mm. There is a markedly seasonal rainfall pattern: a wet summer season, when most rain falls, from December to March and a long dry season from April to October. Primary productivity drops significantly when it is dry, so there is marked variation in the available volumes of wild edible plants throughout the year. This variation conditioned the typical seminomadic way of life of Chorote people in the past.

The study area is located in the Dry Western District of the Chaco phytogeographical province, so the plant cover consists of an almost continuous semidry xerophilous forest, alternating with halophyte steppes in flooded areas of marshlands, some palm groves, and edaphic savannahs, which are sometimes the result of fires or land clearance (Cabrera, 1971: 17; Cabrera & Willink, 1980: 72). Hygrophilous forests are also present on the riverbanks of ancient watercourses once linked to the Pilcomayo River. According to old descriptions (Asp, 1906; Astrada, 1906), the original landscape would have been similar to the savannah type, revealing a pattern of forest patches in a matrix of grasslands. As in the rest of the Chaco region, most of this area has been degraded by cattle ranching and timber harvesting, which has entailed a process of ecosystem disruption characterized by bush-encroachment (Morello & Hortic, 1985).

MATERIAL AND METHODS

The ethnobotanical data were compiled from numerous interviews carried out with 30 qualified and occasional informants in 1982, 1983, 2002, 2003 and 2004, as well as from *in situ* observations. Information was obtained from general interviews designed to learn more about how respondents used a number of different plants, including edible ones.

The selection criterion used for informants was the reliability and depth of knowledge each one of them had. In general, the best informants were older men and women who were alive at times when their culture was subjected to fewer inputs from contemporary society. The criterion employed for the ethnobotanical data was that at least two informants had to report identical data regarding each species.

Interviews were performed in an open-ended fashion and lasted approximately 5 h a day. The ethnobotanical data obtained were recorded on tapes and in field books. Plant material was collected in the company of informants and was used for the preparation of voucher plant materials. Specimens gathered by Arenas were deposited in the Herbarium of the Museo Nacional de Ciencias Naturales 'Bernardino Rivadavia', Buenos Aires (BA), and those collected by Scarpa are kept in the Herbarium of the Instituto Darwinion (SI).

Interviews were designed to identify levels of present use of plants. Informants were specifically asked whether plant foods are used today and, if so, the relative frequency of use. Replies were categorized arbitrarily on a scale ranging from 'not used today'; 'very infrequently'; 'occasionally'; and 'frequently used'.

In comparing edible plants and plant foods with other indigenous people, four ethnic groups sharing very similar cultural features and ecological scope with the Chorote, were chosen. All data used to make the comparison come from published sources (Arenas, 1982, 2003; Maranta, 1987; Filipov, 1996).

RESULTS

Edible plant species consumed by the Chorote are shown in the Appendix. They are arranged alphabetically by botanical family and botanical name, and their vernacular names, parts employed and modes of preparation and consumption are indicated synthetically. The present-use levels of each plant food are also shown between bars.

PLANT ARTICLES AND THEIR EMPLOYMENT

A total of 57 plant species are traditionally used as a source of food by the Chorote people. Considering the different parts employed and their specific modes of preparation, a total of 118 ways of consumption were identified.

Fruits

Of great significance for Chorote people owing to both their quality and their abundance in the Chaco forests. It is the plant part that provides the highest number of resources (42), and which may be used in a wide variety of ways (80). Most fruits ripen during spring and summer; their periods of availability are relatively short and some of the fruit is dried and stored for the scarcity period (Fig. 9).

Underground organs

These include roots, tubers, rhizomes, and foliate sheaths and basal meristems of bromeliads. Underground organs are highly significant food sources because they are generally starchy reserves which are of great nutritive value during the cold dry months. They comprise 10 species and 17 plant foods that are consumed roasted or boiled (Figs 2, 4), except one water-reservoir root that is eaten raw.

Leaves and flowers

These plant parts play the role of fresh vegetables in the traditional Chorote diet. There are relatively few leaf/flower foods (14 from 10 species) but their consumption is of great importance owing to the high

vitamin, fibre and mineral content. A salad whose main ingredient is *Acmella oppositifolia* (Lam.) R.K. Jansen, a true Chorote specialty, deserves special attention at this point. The vegetative parts are cut or chewed and then put or spat into a bowl of water. Salt and wild chilli are usually added, along with other ingredients that vary according to availability: tender fruits of *Morrenia odorata* (Hook. & Arn.) Lindl., *Stetsonia coryne* (Salm-Dyck) Britton & Rose, *Opuntia cardiosperma* K. Schum. and/or *O. quimilo* K. Schum., vegetative parts of *Funastrum gracile* (Decne.) Schltdl., and roots of *Jacaratia corumbensis* Kuntze (see Figs 10, 11).

Aerial stems and apex

Although unexploited at present, the apex extracted from the local palm *Copernicia alba* Morong, is worthy of mention. The roasted stems of certain lianas are used during the months of scarcity (*Odontocarya asarifolia* Barneby and *Morrenia odorata*), while the tender stalks and leaves of many species are also eaten as vegetables (*Portulaca oleracea* L., *Acmella oppositifolia*, *Morrenia odorata*, *Capparis speciosa* Griseb., etc.). They comprise 10 species and 12 plant foods.

Seeds

Seeds are little-used, except for those that are eaten with the pulp because of their small size (*Celtis* spp., *Solanum sisymbriifolium* Lam., *Physalis* spp., *Passiflora mooreana* Hook.). We can only mention those of *Capparis speciosa*, *Geoffroea spinosa* Jacq. and *Ceiba chodatii* (Hassl.) Ravenna.

GATHERING PRACTICES

Gathering time begins in October when the first fruits of trees and shrubs become available, and ends in approximately April–May. This period reaches its peak from the middle of November towards the end of December when great volumes of *Prosopis* spp. and *Ziziphus mistol* Griseb. fruits become available. From May to September, a scarcity period for the Gran Chaco ethnic groups, gathering declines significantly. However, the activity does not stop altogether; gatherers continue to search for edible roots, stems and leaves to complement those foodstuffs obtained from other sources (mainly fishing and hunting), and those stored during the time of abundance.

Gathering is an activity carried out primarily by women who are particularly skilled in the different ways of obtaining and preparing edible plants. The Chorote people know precisely the time of availability and localization of each one of the different resources. They usually enter the forests in groups, knowing precisely which articles to gather and taking specific



Figures 2–6. Fig. 2. Root of *Merremia dissecta*; Fig. 3. Woman grinding raw fruits of *Morrenia odorata* with a typical Chorote mortar and pestle; Fig. 4. Roots of *Macroptilium panduratum*; Fig. 5. Consumption of *Prosopis alba* añapa; Fig. 6. Detail of Fig. 5.

instruments for that purpose. The tools are quite simple and rustic and, except for the carrying bags, are discarded once the work is finished. Nordenskiöld (1912: 54, 103–5) describes and illustrates these instruments as well as their mode of employment. In order to gather trees or vine fruits, the Chorote Indians use a wooden hook to pull down high branches, whilst for the extraction of underground organs they resort to a digging stick, and a forked stick. Since coming into contact with settlers and ranchers, they have employed manufactured tools for their gathering activities. The *Opuntia* fruits are gathered one by one with the help of a split pole that serves as a nipper, to protect their hands from the annoying glochids. There are two ways of removing the glochids from fruits: either the fruits can be placed on the ground to be rubbed or beaten with a handful of leafy herbs or shrubs, or as in the past, some fruits are put into a fibre bag which is repeatedly shaken until the glochids are removed by friction.

In all cases, women take along different kinds of bags made of leaf fibres of *Deinacanthon urbanianum* (Mez) Mez or *Bromelia hieronymi* Mez in which to carry the gathered plant articles (Arenas, 1997). For collecting certain small fruits, such as those of *Geoffroea decorticans* (Gillies ex Hook. & Arn.) Burkart and *Zizyphus mistol*, the women usually improvise rustic brooms with handfuls of herbs or shrubs in order to sweep up the fallen fruits from around the plants.

The foliate sheaths of bromeliads are the only plant foods that need *in situ* processing to facilitate their transportation. The spiny plants are first removed with the aid of the forked stick. Owing to the great volume of inedible and spiny parts in their leaves, entire plants are heaped together with some firewood and are then burned to reduce their volume to a rosette of foliate sheaths, which are then carried in the above-mentioned fibre bags (Arenas & Arroyo, 1988).

MODES OF PREPARATION AND CONSUMPTION

The Chorote people follow simple technical procedures to prepare and/or consume plant foods; their culinary art does not involve mixing many ingredients or complex processes of elaboration. This latter feature is a common pattern for all Chaquenan indigenous people. The plant foods are prepared and/or consumed in the following ways.

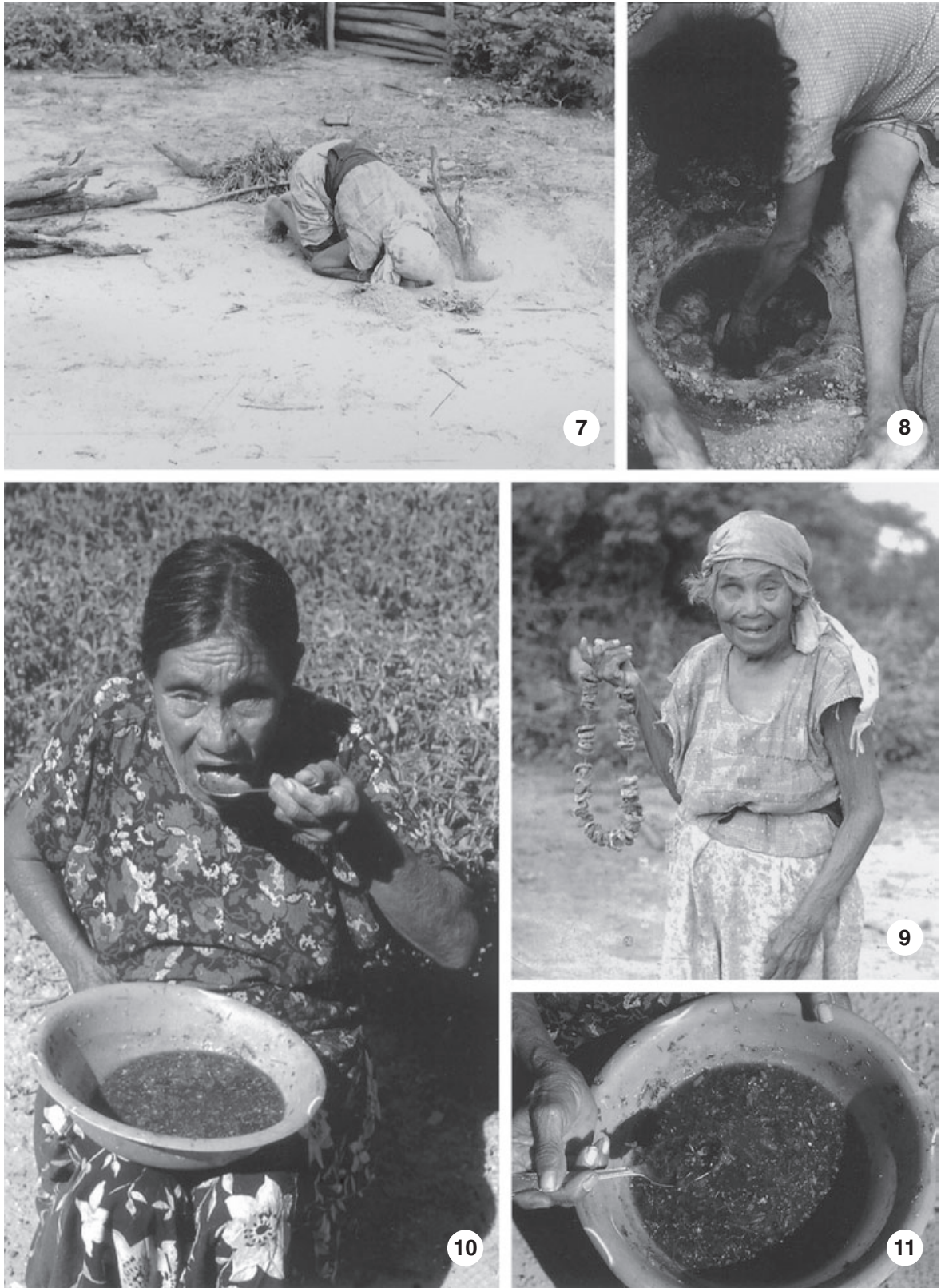
1. RAW: Fresh fruits are frequently eaten as tidbits while the Chorote walk through the forests. Tender leaves, stems and flowers are also consumed raw as vegetables in salads. These articles may involve one or many primary processing techniques such as peeling, breaking into pieces, grinding (Fig. 3), drying, diluting, ginning, hydrating or molding.

2. COOKED: Cooking techniques comprise simple boiling, successive boilings changing the water each time, singeing, roasting in ashes, roasting over fire or live coals, toasting and baking. Some fruits and underground organs are cooked by putting them beside the hearth or into an underground oven (Figs 7, 8); they are usually seasoned with wild animal fats. Stems, leaves, flowers, and some underground organs and fruits, are usually boiled.
3. GROUND: Some foods are usually ground into flour and sometimes molded into dough to make small cakes or biscuits, which are then cooked.
4. BEVERAGES: Chorote prepare 'añapa' by grinding and diluting sweet fruits in water, and 'aloja' by leaving this mixture to ferment into an alcoholic beverage.
5. INCINERATED: Branches and bark are burned to ashes to produce 'plant salt'.

Processing techniques may vary according to the type of product, phenological traits of the plant parts, and available volumes of food at a given time. For example, the fruits of *Morrenia odorata* and *Pithecoctenium cynanchoides* DC. are only eaten raw during their tender immature stage; however, once they ripen and become woody, they are cooked instead. Conversely, certain unripe fruits (*Capparis salicifolia* Griseb.) need to be cooked to make them palatable, which is not necessary when they ripen. On the other hand, if the harvest is scarce the fruits of *Capparis retusa* Griseb. are boiled several times over, with the water being replaced each time, while the roots of *Merremia dissecta* (Jacq.) Hallier f. are roasted over live coals. If these plants are abundant, the Chorote people will choose to cook both of them in underground ovens (plus a short boiling in the first case).

Considering their time of consumption, plant products may be: (1) browsed and directly consumed in the forests, (2) gathered and carried to their villages for immediate consumption, or (3) gathered and carried for future consumption. In the first case, they are always eaten raw, while in the other two they can be cooked.

Seasonings of plant origin are very much preferred by the Chorote Indians. In the past, the branches of *Maytenus vitis-idaea* Griseb. and the bark of *Aspidosperma quebracho-blanco* Schltdl. were incinerated for seasoning. This ash could be used directly on food or dissolved in water and allowed to decant. The resulting liquid was then added to food. In order to have access to this salt at any time, ash was stored in powder form in a receptacle such as a gourd, or was soaked to make dough, then molded into little balls and, finally dried in the sun. When the Chorote needed to use it, they scraped the desired quantity from the resulting balls. Wild chili (*Capsicum chacoense* A.T.



Figures 7–11. Fig. 7. Woman lighting an underground oven; Fig. 8. Extraction of roasted fruits from the oven; Fig. 9. Chorote woman holding a string of dried *Stetsonia coryne* fruit; Fig. 10. Mode of consumption of *Acmella* salad; Fig. 11. Detail.

Hunz.) and cactus fruits, whose taste resembles lemon (*Stetsonia coryne*), are also used as seasonings. The pungent quality of the vegetative parts of *Acmella oppositifolia* is also appreciated in certain preparations. We were not able to identify if it is used as a condiment or as a vegetable (or both), as arugula (*Eruca sativa* Mill.) might be in western cuisine.

Certain modes of preparation deserve a brief description because they are typical of different plant species. Such is the case of capparids, whose bitter and toxic properties are removed through prolonged boiling, with four or even six successive changes of water. This occurs with *Capparis retusa*, *C. speciosa* and particularly with *C. salicifolia*, whose unripe fruits are highly toxic. The preparation of *C. speciosa* seeds is even more complex. The pulp of mature fruits is extracted together with the seeds, squeezed and molded into balls, and then left in the sun to dry. The resulting dried mass is stored for several months. When it is to be used, the thickened mass is soaked in a lagoon, river or pond for a whole day. Then the mass is ground and the seeds are removed and then boiled for 4–5 h, with several changes of water.

Once a whole bromeliad plant is burned and reduced to its basal rosette, as mentioned above, it is roasted on the fire or boiled. When cooked, the leaves are removed one by one from each rosette. The foliate sheaths and meristem of the vertical axis are smeared with fats and then consumed.

Preparation and consumption of the 'añapa' beverage involve grinding or crushing the sweet fruits, putting the resulting mass into a bowl and then soaking with a little water. Once macerated, a handful of the soaked mixture is squeezed by hand, and then sucked as if it were a sponge (Figs 5, 6). Once the juice has been extracted the squeezed portion returns to the mixture, and the action is repeated several times until the mixture completely loses its taste. As regards 'aloja', the same sweet fruits, which may be ground, are placed in a larger receptacle and are left to ferment in the open for 24–48 h. The receptacles employed for this purpose are large gourds of *Lagenaria siceraria* (Molina) Standl., hollowed trunks of the bottle tree (*Ceiba chodatii*) resembling a barrel, or ceramic pots. These beverages were completely prohibited by religious missionaries as were the drinking parties of old.

CONSERVATION AND STORAGE

During the time of abundance, many kinds of plant products are stored for later consumption. They may be dried in the sun or dehydrated in underground ovens, and then placed inside a specially prepared storehouse. In the past, storehouses were rounded huts built around a framework of arched branches and

covered by grasses, herbs and leafy shrubs. They were of a similar design to Chorote dwellings but smaller, measuring c.2 m in diameter. Food was also stored in the hollowed-out trunks of *Ceiba chodatii*, whose main features were described by Maranta (1987) and Arenas (2003). Several informants also reported that Chorote stored certain products in fired clay pots. In all cases, they placed branches of *Capparis speciosa*, and the ashes resulting from incinerating them, into the storage receptacle to preserve plant foods from the attack of harmful insects.

Today, the Chorote people follow the criollo style of making aerial silos or barns. This construction consists of a framework of posts and crossbars, covered by leafy herbs and shrubs in its aerial part, above which a layer of earth is placed.

DISCUSSION AND CONCLUSIONS

In the Appendix the relative levels of present utilization for each food preparation are shown between bars. It is clear that gathering and frequent consumption of wild edible plants is at present restricted to a group of a few species. *Prosopis alba* Griseb., *Ziziphus mistol*, *Capparis retusa* and *Sideroxylon obtusifolium* (Roem. & Schult.) Pennington are the most representative species in terms of plant availability, volumes of edible plant parts produced, and quality of food supplied. Another product that is still eaten is the potage made of the leaves of *Acmella oppositifolia* and other vegetables and condiments. Raw cactus fruits are also consumed at present. When these traditional foods are eaten, their traditional preparation methods persist. Save for wild chilli (*Capsicum chacoense*), which is added to roast beef, soups or stews (depending on choice), the edible plants consumed by the Chorote are never used as ingredients when they eat non-indigenous foods. It is clear that most of the plant foods quoted in the Appendix are no longer used. Chorote eating habits have undergone similar changes to those experienced by their Wichi and Toba neighbours (Arenas, 2003), and many indigenous groups worldwide, whereby younger generations are increasingly ignorant of aspects of traditional culture.

The obsolescence of certain plant foods [*Copernicia alba*, *Jacaratia corumbensis*, *Nymphaea jamesoniana* Planch., *Odontocarya asarifolia*, *Synandropadix vermitoxicum* (Griseb.) Engl., among others], may be a consequence of cultural changes, or the absence of plant resources in the vicinity of present Chorote settlements. Two main reasons support the latter cause. First, the Chorote's gathering practices were strongly affected by sedentarization and confinement into their present settlements, resulting from the occupation of their ancestral territories by settler farmers and ranchers. Secondly, there has been extensive environ-

mental degradation in the region resulting from settler farming practices. However, bearing in mind that obsolescent plant foods are mostly roots and stems with high starch content, we may suppose that, even if they could, they would not be used. This is because almost all of these kind of products have been replaced by manufactured foods such as spaghetti, rice and breadstuffs. Rosettes of bromeliads and roots of *Macropitilium panduratum* (C. Mart. ex Benth.) Maréchal & Baudet are merely an exception to this situation.

Capparids are important in Gran Chaco peoples' diet. They are a very frequent floristic element in the Chaquenan forests, so large quantities are harvested, and are easy to preserve until the scarcity period. Their toxicity is always remarked on by the Chorote Indians when they discuss their use, and this is precisely the property that allows the fruits to be stored for up to one year without attack by any insect. However, the Chorote's present lifestyle has meant that the use of Capparids as plant foods is gradually disappearing, due to the hard work their cooking represents, i.e. many boilings with successive changes of water (which also implies the gathering of large amounts of fuelwood and water).

Edible plant species and plant foods from the Chorote people and the other four neighbouring ethnic groups are compared in Table 1. There is great similarity in number of edible species (57–68) and plant foods (118–136), excepting those data from the Pilagá. This could be due to certain fieldwork limitations whilst obtaining those data, and/or to high levels of transculturation. It is also interesting to note the high levels of edible plant species in common between the Chorote, Mataco and Toba-Nachilamole'ek. These similarities provide greater support for the cultural links already quoted for the typical ethnic groups of the Gran Chaco (Karsten, 1932; Métraux, 1946; Susnik, 1982). Differences recorded for the Pilagá people could be due to the abovementioned reasons, but never those

recorded for Maká, whose traditional habitat is in a wetter environment. Chorote people show a clear difference from other ethnic groups in plant food use. Plant foods shared with other groups ranged only from 42.3 to 66.1%, being less marked in relation to the Maticos and Toba-Nachilamole'ek than to the Pilagá and Maká people.

In spite of these exclusivity levels, it should be said that most of edible articles listed in the Appendix were already mentioned in previous works dealing with the eating habits of other Chaquenan ethnic groups (Schulz, 1963; Martínez Crovetto, 1964, 1965; Arenas, 1981; Barbarán, 2000). However, it is also true that among the differences revealed in the comparison, 5 new edible species that yield 7 plant foods are reported here for the first time for the typical indigenous groups of the Gran Chaco. These are the fruits of *Lycianthes asarifolia* (Kunth & Bouché) Bitter, *Opuntia quimilo*, and *Pithecoctenium cynanchoides*, which are consumed raw and/or roasted; the seeds, leaves and the carpelar hairs of the fruit of *Ceiba chodatii*, which are eaten toasted, boiled or roasted in embers, respectively; and the bark of *Aspidosperma quebracho-blanco*, which is burned to produce 'plant salt'.

This study recorded 57 edible species with which the Chorote people prepare a total of 118 plant foods. The species belong to five main botanical families: Cactaceae (10 species), Solanaceae (8), Fabaceae (7 species), Asclepiadaceae (6) and Capparaceae (4). The use of fruits, mostly from tree species, is significant and represents 67.8% of plant foods, while other plant organs account for less than 15%.

Only 6.7% of overall plant foods are frequently used at present, whilst 17.8% are prepared occasionally, and 37.2% are used very infrequently. The remaining traditional foods (38.3%) are no longer used and live on only in the reminiscences of elderly people. These values would seem to indicate that 3/4 of Chorote

Table 1 Comparison between edible plant uses by the Chorote indigenous people and other indigenous groups in the Gran Chaco region, South America

Indigenous group	Edible plant			Plant foods		
	Number of species	Number shared	% shared	Number of foods	Number shared	% shared
Chorote	57	57	100.0	118	118	100.0
Maticos ^a	68	49	85.9	136	75	63.5
Toba-Nachilamole'ek ^b	62	45	78.9	134	78	66.1
Pilagá ^c	49	36	63.1	92	56	47.4
Maká ^d	64	31	54.3	133	50	42.3

References: ^aMaranta (1987); ^bArenas (2003); ^cFilipov (1996); ^dArenas (1982).

foods may well be forgotten in the near future, along with many other aspects of their culture, of which traditional foods are an inseparable part.

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APPENDIX

Uses of wild edible plants by the Chorote of Semiarid Chaco in northwestern Argentina. Plant foods are grouped by plant parts and modes of preparation in the following categories: burned to ashes (ASH), baked (BA), boiled (BO), ground and diluted in water (GDW), ground and fermented in water (GFW), ground (GR), ground and moulded (GRM), roasted (RO), raw (RW), and toasted (TO). Dialectal divisions are pointed out as (1) for the *Yójwaha*, and (2) for the *Yówujwa* people. In word transcription from the indigenous language the diacritical mark ' represents the glottal stop. Present use levels of plant foods are indicated as /-/ (not used today), /+/-/ (very infrequently), /++/ (occasionally); and /+++/ (frequently used).

APOCYNACEAE

Aspidosperma quebracho-blanco Schltdl.

Vernacular names: istíinik (1), istéenik (2). Vouchers: Scarpa 644 (SI). Bark, alburnum: ASH. Ashes are added pure or diluted in water as a condiment to many foods. Resulting liquid has a bitter-salted taste/-/.

Vallesia glabra (Cav.) Link

Vernacular names: istiyatín kiwáik (1); istá' káwayik (2). Vouchers: Arenas 2586 (BA). Fruits: RW. Eaten as a fresh fruit or occasionally gathered/+/-/.

ARACEAE

Synandropadix vermitoxicus (Griseb.) Engl.

Vernacular names: láap lápitie (1). sihíé (2). Vouchers: Arenas 2576 (BA). Tubers: RO or BO. Consumed with fish fats and sometimes salt and chilli are added/-/.

ARECACEAE

Copernicia alba Morong.

Vernacular names: jwitsiúk (1) (2). Vouchers: Arenas 3146 (BA). Fruit: RW. As fresh fruit./-/. GDW. As a fresh juice (añapa)/-/. GFW. As an alcoholic beverage (aloja)/-/. Apex: BA. Only apices of young plants are used/-/.

ASCLEPIADACEAE

Funastrum clausum (Jacq.) Schltdl.

Vernacular names: táhsa (1) hú'ta (2). Vouchers: Scarpa 647 (SI). Unripe fruit: RW. As vegetable. Only tender fruits are chosen/+/-/.

Funastrum gracile (Decne.) Schltdl.

Vernacular names: neekiák (1) néek'yek (2). Vouchers: Scarpa 656 (SI). Stems and leaves: RW. Ground as vegetable, consumed with salt and water. Also an ingredient in *Acmella* salad/-/.

Marsdenia castillonii Lillo ex T. Mey.

Vernacular names: niwák (1); náawishiuk (2). Vouchers: Arenas 2572 (BA). Unripe fruits: RW. As fresh fruit/+/-/. Fruits: RO/ Roots: RO or BO. Eaten seasoned with fish fats/+/-/.

Morrenia odorata (Hook. & Arn.) Lindl.

Vernacular names: jwaalók (1); jwáalok (2). Vouchers: Arenas 2622 (BA). Stems: BO. Feculent inner part eaten seasoned with fish fats/+/-/. Unripe fruits: RW. As fresh fruit/+++/. Also ground with salt and water as an ingredient in *Acmella* salad/++/. Fruits: RO. With fish fats/+++/. Leaves and flowers: RW. Ground and consumed as vegetables with salt and water/+/-/.

Schubertia schreiteri Desc. & T. Mey.

Vernacular names: héshini (1); téshini (2). Vouchers: Arenas 2736 (BA). Unripe fruits: RW. Eaten with salt and water/+/-/. Fruits: RO. Eaten with fish fats/+/-/. Leaves and flowers: RW. Eaten when there are no fruits/+/-/. BA. Only when gathered in large quantities/+/-/.

Telminostelma foetidum (Cav.) Fontella & E.A. Schwarz

Vernacular names: hootinkiká sí'mpé (1); kátsitak lhák (2). Vouchers: Scarpa 648 (SI). Unripe fruits: RW. Only tender fruits are chosen, consumed as vegetables with salt/+/-/.

ASTERACEAE

Acmella oppositifolia (Lam.) R.K. Jansen

Vernacular names: lintá' (1); iwási (2). Vouchers: Arenas 2752 (BA). Stems and flowers: RW. Chewed or cut into pieces and mixed with salt, chilli, water and other

plant articles (see text). Main ingredient in *Acmella* salad/+++/. Stems and leaves: BO. Added to fish soup and wild animal meats as a condiment/+/-.

BIGNONIACEAE

Pithecoctenium cynanchoides DC.

Vernacular names: ímosikiot lhelé; tóksiaka' (1); kaláh kalá (2). Vouchers: Scarpa 445 (SI). Unripe fruits: RW or RO. Used as vegetables; in both cases they employ the inner part of the capsule/-/.

BOMBACACEAE

Ceiba chodatii (Hassl.) Ravenna

Vernacular names: sémlhàk (1)(2). Vouchers: Arenas 2749 (BA). Leaves: BO. Tender buds are eaten as vegetables on its own or with salt/-/. Seeds: TO & GR. Eaten on its own or mixed with the meristem of the basal rosette of *Bromelia hieronymi*. Before toasting, the seeds are removed from the mass of long hairs of the capsule. Only used by the *i'yowujwa* people (dialectal group '2')/-/. Unripe fruits: RO. Only the inner tender parts/-/.

BROMELIACEAE

Bromelia hieronymi Mez

Vernacular names: kisyé (1); isá' (2). Vouchers: Scarpa 659 (SI). Foliate sheaths and basal meristem: RO. Meristem of the basal rosette and the foliate sheaths are eaten with fish fats (see text)/+/-/. Stolons: RW. Tender young stolons used only after peeling. Fish fats are added/+/-.

Bromelia serra Griseb.

Vernacular names: jwiyí (1) (2). Vouchers: Arenas 2723 (BA). Foliate sheaths and basal meristem: RO. Used just like *B. hieronymi*/-/. Fruits: RW. As fresh fruit/-/.

CACTACEAE

Cereus forbesii Otto ex C.F. Först.

Vernacular names: kiahátyuk (1); kihétyuk (2). Vouchers: Arenas 2619 (BA). Fruits: RW. As fresh fruit/+/.

Cleistocactus baumannii (Lem.) Lem.

Vernacular names: séetia lhák (1) (2). Vouchers: Arenas 2716 (BA). Fruits: RW. As fresh fruit/+/-.

Echinopsis rhodotricha K. Schum.

Vernacular names: náawa (1) (2). Vouchers: Arenas 2717 (BA). Flowers: BO. As vegetable; used just before the anthesis/-/. Fruits: RW. As fresh fruit/-/. Stems:

RW. Chorote employ the liquid resulting from squeezing watery inner stem as source of water/-/.

Harrisia bonplandii (Parm.) Britton & Rose

Vernacular names: sát'a (1); sát'oi (2). Vouchers: Scarpa 562 (SI). Fruits: RW. As fresh fruit/+/+. Flowers: BO. As vegetables/+/-.

Monvillea spegazzinii (F.A.C. Weber) Britton & Rose

Vernacular names: nópayik (1); wúm (2). Vouchers: Arenas 2713 (BA). Fruits: RW. Inner part only used as fresh fruit/+/-/. Roots: RO. Eaten with fish fats or with salt and chilli/+/-.

Opuntia anacantha Speg. var. *kiska-loro* (Speg.) R. Kiesling

Vernacular names: jwatóonyek, láatiti (1); sátinyuk (2). Vouchers: Arenas 2675 (BA). Fruits: RW. As fresh fruit. Only the pulp is eaten when unripe, and the entire fruit when ripe/+/-.

Opuntia cardiosperma K. Schum.

Vernacular names: alásak (1) (2). Vouchers: Scarpa 565 (SI). Fruits: RW. Pulp is eaten on its own or in salads together with onions, *M. odorata*, *P. oleracea* and/or *Acmella* sp./+/-/. BO. As seasoning for fish soup/+/.

Opuntia sulphurea Gillies ex Salm-Dyck var. *pampeana* (Speg.) Backeb.

Vernacular names: jwatóonyek (1); jwityúnak (2). Vouchers: Arenas 2673 (BA). Fruits: RW. Consumed as fresh fruit just like *O. anacantha* var. *kiska-loro* (excessive consumption produces constipation) as well as by swallowing their seeds/+/-.

Opuntia quimilo K. Schum.

Vernacular names: anák hitiój (1); kajwiták (2). Vouchers: Arenas 2710 (BA). Fruits: RO. Pulp is mixed with tender fruits of *M. odorata*/-/. RW. As a vegetable. Pulp only was eaten as an ingredient in *Acmella* salad/-/.

Stetsonia coryne (Salm-Dyck) Britton & Rose

Vernacular names: istiék (1); isták (2). Vouchers: Arenas 2674 (BA). Fruits: RW. As fresh fruit or as sialagogue/+/+. RW. As a vegetable or as seasoning for fish. Ingredient in *Acmella* and *Portulaca* salads/+/+. BO. As seasoning for fish soup or wild animals meats; often stored dry/-/.

CAPPARIDACEAE

Capparis retusa Griseb.

Vernacular names: óhnyik (1); óhnyuk (2). Vouchers: Scarpa 516 (SI). Fruits: BO. Fresh or dried fruits are boiled, water is removed and boiled again;

process repeated twice. Consumed with fish or other fats/+++/. BA & BO. Baked just in order to store them dry; in this way the boiling time is reduced/+/.

Capparis salicifolia Griseb.

Vernacular names: óohnak (1); nénuak (2). Vouchers: Scarpa 543 (SI). Unripe fruits: BO. Fresh or dried fruits are boiled, changing water at least five times. Particularly toxic if not submitted to prolonged cooking/++/. BA & BO. Idem *C. retusa*/+/. Fruits: RW. Pulp consumed as fresh fruit. Opened capsules or fallen fruits are only eaten in this way/+/.

Capparis speciosa Griseb.

Vernacular names: tsijwáanuk (1); tsajwánuk (2). Vouchers: Arenas 2590 (BA). Fruits: RW. The pulp is eaten as fresh fruit/+/. Unripe fruits, flowers and leaves: BO. After boiling, plant parts squeezed and mixed with fish fat. Only the tender young leaves are employed/++/. Seeds: GR & BO (see text). It is eaten either mashed and mixed with fish fat or on its own. Many changes of water are made during the prolonged cooking. Seeds often stored dry/++/. Leaves and flowers: BO. Only two changes of water are made. Consumed as vegetables added to the soup of wild animal meat/+/.

Capparis tweediana Eichl.

Vernacular names: mé'tsuk (1); ts'ówk, ts'éwk (2). Vouchers: Scarpa 453 (SI). Fruits: RW. The pulp is eaten as fresh fruit/+/.

CARICACEAE

Jacaratia corumbensis Kuntze

Vernacular names: ilísa (1) (2). Vouchers: Arenas 1689 (BA). Roots: RW. As source of water using liquid resulting from squeezing their watery inner parts/-/. Also consumed as vegetables in *Acmella* salad/-/.

CELASTRACEAE

Maytenus vitis-idaea Griseb.

Vernacular names: sóhowa (1) (2). Vouchers: Arenas 2708 (BA). Stems and leaves: ASH. Ashes added pure or diluted in water to many foods as a condiment (plant salt)/-/.

CELTIDACEAE

Celtis pallida Torrey

Vouchers: Arenas 2591 (BA)

Celtis iguanaea Spreng.

Vouchers: (Scarpa 466) (SI)

Vernacular names: kí'íntak (1); tsehinyetéak (2). Fruits: RW. As fresh fruit; occasionally gathered/+/.

CONVOLVULACEAE

Merremia dissecta (Jacq.) Hallier f.

Vernacular names: kiohoní' (1); néewata (2). Vouchers: Arenas 2629 (BA). Roots: BO, BA or RO. Boiled most frequently and consumed on its own or with fats; occasionally cultivated/-/.

FABACEAE

Acacia aroma Hook. & Arn.

Vernacular names: ihniétak (1) (2). Vouchers: Scarpa 528 (SI). Fruits: RW. As fresh fruit; they were often stored dry/+/. GDW. As a fresh juice/-/. GFW. The strongest alcoholic beverage of Chorote people; drunk on its own or mixed with honey/-/.

Geoffroea decorticans (Gillies ex Hook. & Arn.) Burkart

Vernacular names: lésiniuk (1); kaséenuk (2). Vouchers: Arenas 2599 (BA). Fruits: RW. As fresh fruit/++/. GDW. As a fresh juice/+/. GFW. As an alcoholic beverage; occasionally boiled before fermenting/-/. BO. Eaten either mashed and mixed with fish fat or on its own. Occasionally stored dry/++/.

Geoffroea spinosa Jacq.

Vernacular names: nóokiki (1) (2). Vouchers: Arenas 2735 (BA). Seeds: BO, RO or BA. The thick endocarp is broken to extract the seeds. Eaten directly or mashed and moulded into biscuits. Occasionally eaten stewed with wild animal meats. Sometimes stored dry/-/.

Macroptilium panduratum (C. Mart. ex Benth.) Maréchal & Baudet

Vernacular names: sóp'ítie (1); sáp'ítie (2). Vouchers: Scarpa 607 (SI). Roots: BO. Eaten with fish or other fats. Less frequently consumed roasted/++/.

Prosopis alba Griseb.

Vernacular names: jwa'áyuk (1) (2). Vouchers: Scarpa 451 (SI). Fruits: RW. As a fresh fruit/+/. GRM. Eaten in powder form or soaked, sifted and moulded into balls. They were often stored in aerial silos/++/. GDW. As a fresh juice/++/. GFW. As an alcoholic beverage/-/.

Prosopis elata (Burkart) Burkart

Vernacular names: kitíitak (1)(2); ajwéntyek (1); ajwéntak (2). Vouchers: Arenas 2650 (BA). Fruits: Idem *P. alba*. Fruits of both species usually mixed. Gathered and consumed less frequently than *P. alba*/+/.

Prosopis nigra (Griseb.) Hieron.

Vernacular names: ishiójsok (1); wóshishyuk (2). Vouchers: Scarpa 525 (SI). Fruits: Idem *P. alba*. Ditto as above/++/.

MENISPERMACEAE

Odontocarya asarifolia Barneby

Vernacular names: jwi'íye (1); kíjwel hikásili (2). Vouchers: Arenas 2571 (BA). Stems: BO. It is previously singed. Tender parts used, bark and fibers discarded. Eaten with fish or others fats/–/.

MORACEAE

Maclura tinctoria (L.) Don ex Steud.

Vernacular names: tséjenet (1); ishúk (2). Vouchers: Scarpa 526 (SI). Fruits: RW. As a fresh fruit/+/.

NYMPHAEACEAE

Nymphaea jamesoniana Planch.

Vernacular names: koyeká sí'mpé (1) (2); aléna kyóti hi'mpé (1). Vouchers: Maranta 26 (BA). Rhizomes: RO. Feculent inner part eaten; occasionally boiled/–/.

PASSIFLORACEAE

Passiflora mooreana Hook.

Vernacular names: aléna kiánisis sí'mpé (1); nó'o kiénisis hi'mpé (2). Vouchers: Arenas 2608 (BA). Seeds and arils: RW. As a fresh fruit. Whole mass formed by their seeds and arils is consumed/+/.

PORTULACACEAE

Portulaca oleracea L.

Vernacular names: wóosta (1) (2). Vouchers: Scarpa 524 (SI). Aerial parts: RW. Eaten as vegetables in salads of *S. coryne* fruits with salt, chilli and water/+/.

RHAMNACEAE

Ziziphus mistol Griseb.

Vernacular names: áyiitak (1); aháyuk (2). Vouchers: Scarpa 517 (SI). Fruits: RW. As a fresh fruit/++/. GDW. As a fresh juice/++/. GFW. As an alcoholic beverage/–/. GRM. In powder form or soaked, and moulded into balls. Fruits and moulded balls were often stored dried/+/.

SANTALACEAE

Acanthosyris falcata (Mart. ex Eichl.) Griseb.

Vernacular names: jwatéenuk (1); katóshuk (2). Vouchers: Arenas 2617 (BA). Fruits: RW. As a fresh fruit/+/.

SAPOTACEAE

Sideroxylon obtusifolium (Roem. & Schult.) Pennington

Vernacular names: tséhenyek (1) (2); tséhenuk (1) (2). Vouchers: Arenas 2617 (BA). Fruits: RW. As a fresh fruit/++/. GDW. As a fresh juice/++/. GFW. As an alcoholic beverage/–/.

SOLANACEAE

Capsicum chacoense A.T. Hunz.

Vernacular names: páhana' (1); atéshyuk (2). Vouchers: Scarpa 649 (SI). Fruits: RW. As a condiment for fish soup, wild animals meat and salads; often stored dried/++/.

Lycianthes asarifolia (Kunth. & Bouché) Bitter

Vernacular names: káani (1). Vouchers: Scarpa 667 (SI). Fruits: RW. As a fresh fruit/+/.

Lycium americanum Jacq.

Vernacular names: sójwatak (1) (2); 'sohowa (1). Vouchers: Arenas 2626 (BA). Fruits: RW. As a fresh fruit. Large amounts were gathered in the past/+/.

Physalis viscosa L.

Vouchers: Arenas 2609 (BA)

Ph. pubescens L.

Vouchers: Scarpa 628 (SI);

Ph. neesiana Sendt.

Vouchers: Arenas 2683 (BA)

Vernacular names: kaaní (1); káani (2). Fruits: RW. As a fresh fruit/+/.

Solanum hieronymi Kuntze

Vernacular names: jwéelie (1) (2). Vouchers: Scarpa 442 (SI). Roots: RO. On its own or with fish fats. Less frequently also eaten boiled/–/.

Solanum sisymbriifolium Lam.

Vernacular names: jwéelye (1) (2). Vouchers: Arenas 2611 (BA). Fruits: RW. As a fresh fruit/+/.