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Emergency Foods of the Mixtec Highlands (Mexico)

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In the Mixtec Highlands of southern Mexico, most peasants practise subsistence agriculture of maize, beans and squash, but are not self-sufficient in these commodities. Land plots are very small. Cultivation is limited by climatic and physiographical factors. Two periods are difficult: the end of the dry season and part of rainy season, before the harvest. Not having enough maize is the main problem. Several plants are used as emergency foods to replace this staple. Some plants (greens, mushrooms) replace beans. Other plants (wild fruit, stems, flowers) are eaten as snack-foods. Even though the situation has evolved through migration and cash crops cultivation, people are still vulnerable to seasonal variation and prospect of harvest. Each emergency food has a different status: some are commonly eaten, some are eaten only by children or elders, some are consumed when there is nothing else to eat, and some others are about to be forgotten.

Keywords: Mexico; Mixtec; Foods; Insects

Objective

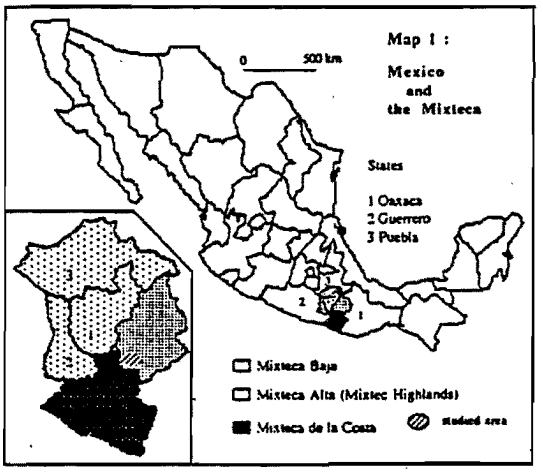
Most peasants of the Mixtec Highlands of southern Mexico practise subsistence agriculture of maize, beans and squash, but are not self-sufficient. I will point out the periods of food shortage, describe the plants used as emergency foods, and analyse the different status of each plant as well as the knowledge people of different ages have of them.

Methodology

This study is part of an anthropological research conducted between 1983 and 1992 in the Mixtec Highlands. The research focused on a sub-humid coffee-growing area located on the slopes facing the Pacific Ocean, at 850-2500 m altitudes with *Pinus-Quercus* forests mixed with rain forests (Map 1). This area varies from the rest of the Highlands, which are mainly located around 2000 m elevation and are drier and colder. The research was conducted according to the participatory observation anthropological method. The author remained permanently in a village for about two years in 1983-1985 and came back to check information during short stays from 1985 to 1992. Plants used by the local people were collected by the author and identified by botanists of Institute of Biology of UNAM (National Autonomous University of Mexico).

Results

The Mixtec Highlands are considered to be one of the poorest regions in Mexico, from where inhabitants migrate to richer rural area and cities,



Map of Mexico and the Mixteca

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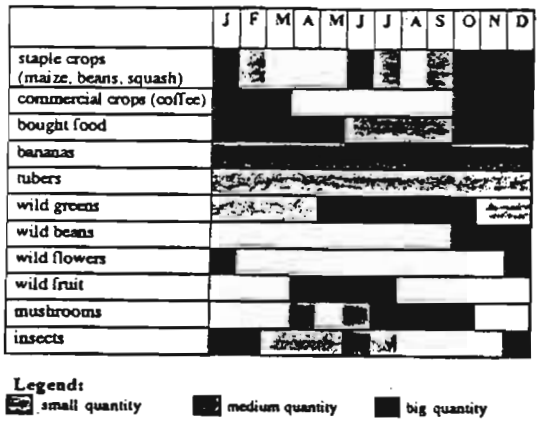
as well as to the United States. This area is populated by Mestizos and by Mixtecs and other smaller Indian groups, who were deprived of their best lands by the Spaniards after the conquest. Land plots are very small; cultivation is limited by climatic and physiographical factors. Local peasants practise subsistence agriculture of maize, beans and squash, but are not self-sufficient. Few lands can be irrigated in the dry season. Most lands are cultivated in the rainy season. Maize is sown with beans and squash at the beginning of the rainy season and is harvested between September and February, depending on the altitude. In many places in the Highlands, it is harvested in November-December. In the study area, there are some irrigated fields at the lowest altitudes, where maize is sown in January and harvested in June. Beans are harvested at the same time, but some varieties are harvested a few weeks before maize (Katz 1990).

Periods of Food Shortage

Two periods are difficult: the end of the dry season and part of the rainy season, before the harvest. In the high altitudes (around 2000 m), lack of staples is most prevalent in August and September (called "hunger months"). In the coffee growing area studied, the peasants sell coffee during the November-to-February harvest, which allows them to buy more animal products, industrialized foods, ingredients for festive dishes, bottled drinks, and plants from higher (i.e. potatoes) or lower (i.e. chili peppers) areas, as well as maize and beans. In this area, money from coffee helps the people avoid suffering from lack of staples at the end of dry season. But coffee money is saved only until May or June. Trading is reduced during the rainy season, as roads become impassable. People who have enough money buy maize and beans during the dry season and keep the produce of their harvest for the rainy season. But many people do not have enough



Seasonal position of resources

money to buy maize in advance. In the rainy season, the trucks cannot cross over some bridges or drive up to the upper villages; people have to take mules to bring staples from the neighbouring villages or sometimes even carry on their backs. Before roads were built in this area, in the late seventies, sometimes even mules could not cross over the bridges. In spite of the availability of money from cash crops and better ways of communication, the rainy season is still a difficult period.

Substitutes of Maize

Lack of maize is the main problem in times of scarcity. For Mixtec peasants, maize is the main staple. A meal must always include maize, usually prepared as "*tortillas*" (maize griddle cakes), and a liquid dish, usually boiled beans in their broth, substituted or added to meat or greens (in a broth) and eaten with raw chili or a chili sauce.

Several starchy plants are used as emergency foods to replace this staple: bananas and banana roots (especially "Castille banana"), mango seeds, the "*tortilla mushroom*", wild grains or seeds ("*mazorca de monte*" and "*milpa de correcaminо*")*, Inga seeds, acorns, tubers (sweet potato,

*As these grain plants are not protected any more, I was not able to find and identify them. The "wild cob" ("*mazorca de monte*") seems to be a palm with big seeds (about 2 cm long); the leaf (called "*palma de matamoscas*", "fly-killer palm") is used to chase or kill flies.

manioc, cocoyam, wild yam), seeds of the maize tassel, and in extreme cases, at the beginning of the rainy season, the whole immature maize plant. Banana roots, mango seeds, the mushroom, the wild grains and acorns are boiled and ground into a dough which is blended with the maize dough in order to make "*tortillas*". The acorns have to be detoxified; they are boiled with lime and then rinsed. Seeds of the maize flowers and immature maize plant (including cob, flower, stem, but not leaves) are ground raw, each part separately, and are then blended with maize dough. Bananas, and sometimes banana roots, are ground without being cooked. *Inga* seeds are boiled with salt. Tubers are just boiled and eaten with the main dish or alone with sugar. Boiled bananas or green bananas cooked in ashes are also eaten that way (Table 1).

Other authors (Bolens 1980, Bergeret 1986, Chastanet 1991, Rosenberger 1993) also indicate lack of cereals as being the most serious problem in periods of food shortage and its substitution by other starchy foods: wild or minor cereals, cereal residues (bran, etc.), tubers, flours made of legumes, acorns, other nuts and fruit stones (such as dates).

Substitutes to Beans

Some plants replace beans: "wild" greens, mushrooms, leaves of wild prickly pear, *Opuntia* sp.) and "wild" beans. Similar to the other Indians of Mexico, Mixtec Indians particularly like mushrooms and use many "wild" greens (cf Messer 1978, Mapes *et al.* 1981, Bye 1981, Caballero & Mapes 1985). In the study area, they eat at least 18 species of mushrooms and up to 48 different species of greens, of which about 15 are very commonly eaten (Katz 1992 & 1993) (Tables 2 and 3).

Most of these greens are weeds collected in the fields or along the paths in the course of agricultural work or on the way to or from the fields. Mixtec Indians differentiate between greens eaten raw (as aromatic plants) (called "*nduwa*" in some dialects) and greens which are cooked (and most of the time boiled) (called "*yuve*"/"*yuwa*"/"*yiwa*"). Boiled greens in their broth eaten with tortillas can constitute a meal according to Mixtec criteria. They are not an emergency food proper, but when there are no beans, they serve as emergency foods. They are seen anyway as Indian foods or poor people foods. People are often ashamed of saying that

Table 1. Plants Used as Substitute of Maize

Scientific name	English name	Spanish name	Mixtec name	Availability
Dioscorea remotifolia (Dioscoreaceae)	wild yam	camote montes	ña'mi ku'u	year around
Inga sapindioides (Fabaceae)	inga	guajinicuile	chakwa	April
Ipomoea batatas (Convolvulaceae)	sweet potato	camote	ña'mi	year around
Mangifera indica (Anacardiaceae)	mango seed	semilla de mango	titi mangu	May-June
Manihot esculenta (Euphorbiaceae)	manioc	camote de palo	ña'mi yutu	year around
Musa sp. (Musaceae)	banana	platano	nika	year around
Musa sp. (Musaceae)	banana root	camote de platanar	ña'mi nika	year around
Quercus candidans (Fagaceae)	acorn	bellota	chi'lu	
Xanthosoma sagittifolium (Araceae)	cocoyam	malanga	malanga	year around
Zea mays (Poaceae)	young maize tassel	espiga tierna	yoko yute	July-August
Zea mays (Poaceae)	whole young maize plant	milpa tierna	biyu	July-August
? (Aracaceae?)	"wild cob"	mazorca de monte	niñi ñu'u	Aug-Sept
?	"tramp maize"	milpa de correcamino	'itu su'u	
?	tortilla mushroom	hongo de tortilla	i'yi shita	rainy season

(*Quercus* and mushroom come from highlands; *Mangifera, Manihot* and Arecaceae from Lowlands; the rest are in both low and highland)

Table 2. "Wild" Greens

2.1. Tasty greens commonly consumed

Scientific name	Spanish name	Mixtec name	Altitude
Amaranthus hibridus (Amaranthaceae)	quintonil	yuve iti	highl.lowl.(M)
Anoda cristata (Malvaceae)	quelite de violeta	yuve tyoo	highl./lowl. (MW)
Brassica napus (Brassicaceae)	mostaza	yuve kuli	highl. (M)
Chenopodium berlandieri (Chenopodiaceae)	quelite de manteca	yuve taka	highl. (M)
Crotalaria sp. (Fabaceae)	chipile	yuve ishi	lowl. (MC)
Leucaena macrophylla (Fabaceae)	puntas de guaje	yuve nete	lowl. (MC)
Manihot angustiloba (Euphorbiaceae)	quelite de toro	yuve iyu	lowl. (M)
Phytolacca icosandra (Phytolaccaceae)	jabonera	yuve viko	highl. (C)
Piper sanctum (Piperaceae)	hierba santa	yuve noo	highl./lowl. (C)
Porophyllum ruderale (Asteraceae)	papaloquelite	yuve no'su	lowl. (M)
Solanum americanum, (Solanaceae)	yerba mora	yuve tineso	highl./lowl.(MC)
Solanum nigrescens (Solanaceae)	yerba mora	yuve tineso	highl./lowl. (MC)
? (Asclepiadaceae)	chicañuma	yuve yo'o	lowl. (C)
? (Asteraceae)	quelite de guajolote	yuve kolo	highl./lowl. (C)
? (Asteraceae?)	quelite de fierro	yuve tungaa	highl./lowl. (C)

2.2. Greens occasionally consumed

Scientific name	Spanish name	Mixtec name	Altitude
Begonia bigerrata (Begoniaceae)	caña agría	tungaya	highl. (C)
Begonia sp. (Begoniaceae)	caña agría	tungaya	highl. (W)
Bidens pilosa (Asteraceae)	quelite de caballo	yuve iyu	lowl. (MC)
Commelina sp. (Commelinaceae)	siempreviva	yuve nti	highl. (M)
Drymaria cordata (Caryophyllaceae)	quelite de rocío	yuve yuyu	highl./lowl. (C)
Hybanthus verticillatus (Violaceae)	pierna de vieja	yuve biyu	lowl. (M)
Ipomoea sp. (Convolvulaceae)	quelite de pajarito	yuve saa	lowl. (MC)
Lopezia sp. (Onagraceae)	granadita	yuve ne'ya	highl./lowl. (C)
Malva parviflora (Malvaceae)	malva	?	highl. (M)
Montanoa tomentosa (Asteraceae)	quelite de borrego	yuve nu'u	highl./lowl. (M)
Oxalis decaphylla (Oxalidaceae)	xocoyule	yuve nuxiya	highl./lowl. (C)
Peperomia obtusifolia (Piperaceae)	quelite de vela	yuve tyiki	highl. (W)
Peperomia quadrifolia (Piperaceae)	quelite de ardilla	yuve tintyi	highl. (W)
Peperomia sp. (Piperaceae)	quelite de zopilote	yuve ndashi	highl. (W)
Peperomia sp. (Piperaceae)	quelite verde	yuve kwii	highl. (W)
Portulaca oleracea (Portulacaceae)	Verdolaga	yuve skitu	highl./lowl. (M)
Rorripa nasturnium-aquaticum (Brassicaceae)	berro	yuve tya'va	highl. (R)
Rumex mexicanus (Polygonaceae)	lengua de perro	yuve yaa sniki	highl. (M)
? (?)	chayotillo	yuve shi'ni	highl. (P)
? (?)	hierba de conejo	yuve ne'yu	highl. (M)
? (?)	quelite de leche	yuve shukwi	highl./lowl. (C)
? (?)	quelite de temblor	yuve taa	highl./lowl. (MC)
? (?)	rabo de iguana	yuve yo'o savi	lowl. (R)

2.3. Untasty greens consumed as emergency foods

Scientific name	Spanish name	Mixtec name	Altitude
Buettneria aculeata (Sterculiaceae)	zarzahueca	yuve kuva	lowl. (R)
Lactuca brachyrrhyncha (Asteraceae)	lechuguilla	?	lowl. (C)
Manihot olfersiana (Euphorbiaceae)	quelite de cuchi	yuve kini	highl. (M)
Mimosa wastonii (Fabaceae)	punta de guaje espinuda	yuve iñu	lowl. (R)
Polanisia uniglandulosa (Capparidaceae)	quelite de rato'ñ	yuve ñiñi	highl. (C)
Rumex mexicanus (Polygonaceae)	lengua de perro	yuve yaa snikt	highl. (M)
Xanthosoma sagittifolium (Araceae)	malanga	yuve malanga	lowl. (C*)
Xanthosoma sp. (Araceae)	huachicata	yuvew kata	lowl. (C)
? (?)	chichicastle	yuve yaa	highl. (?)
? (?)	quelite mujer de pobre	yuve ña'a na'vi	highl. (P)

M = maize fields
C = coffee fields
W = woods
P = paths
R = riverside
* = cultivated

Table 3. Edible mushrooms*

Scientific name	Mixtec name ñyi	Spanish name hongo de...	Availability
Cantarellus cibarius (Cantharellaceae)	baya	jibaya	July-Oct
?	ka'ni	cuaresma	April
Suillus tomentosus (Boletaceae)	kuñu	panza	June-July
Suillus cembrae (Boletaceae)			
Phylloporus rhodoxanthus (Paxillaceae)			
?	ku shita	tortilla	June-Oct
?	kwañi	ardila	June-Oct
Amanita caesaria (Amanitaceae)	naa	jina	July-Oct
Lactarius volemus (Russulaceae)	shukwi	leche	July-Oct
Ramaria stricta (Clavariaceae)	taka	cacho de venado	July-Oct
Ramaria concolor (Clavariaceae)			
?	tisu	tiso	July-Oct
?	tü	huachipile	
Russula spp. (Russulaceae)	ya'a	chile	June-July
Hydnum repandum (Hydnaceae)	yaa chilu	lengua de gato	
?	?	gallina	June-Oct
Lactarius rufus ? (Russulaceae)	?	pajarito	
Hydnopolyporus palmatus (Polyporaceae)	?	?	

* All the mushrooms come from the highlands.

they eat them, even though they like them. In subhumid areas, like the study area, the species of greens which grow in woods, coffee fields and irrigated maize fields are found year around, but they are much more abundant in the rainy season, when all other foods are lacking. When the most liked greens cannot be found, people eat bitter or irritating greens (bitter such as *Manihot olfersiana*, irritating such as *Xanthosoma* sp.).* These greens are really perceived as poverty foods, especially by people of richer neighbouring villages who do not eat these (one is even called "*mujer de pobre*", "poor man's wife") (Table 2)**.

*But in spite of being irritating, the leaves of *Xanthosoma* sp. are well-liked by some people.

**In other societies, such as in Morocco, all wild greens are eaten only as emergency foods and are very depreciated (Rosenberger 1993).

It is different for mushrooms. While greens are usually found easily and collected in the course of another activity, mushrooms are difficult to find and need a special search. Greens are liked but have a low status, while mushrooms are highly valued. They are not an emergency food, as are greens, but they help people to survive during the rainy season. They can replace beans, but more particularly they are perceived as meat and cooked as such: in broth (as with beans), in "*mole*" (thick chili sauce), or in "*tamales*" (steamed maize dough wrapped in leaves). Mixtecs do not classify them as plants, but as a separate category ("*i'yi*", "mushroom") (Table 3).

Spontaneous beans are found along paths or in places which were cultivated several years ago (*Phaseolus coccineus* ssp. *formosus*) or as weeds of maize fields (*Phaseolus vulgaris* ssp. *mexicanus*). Their grains are small and very hard; they take hours to cook. They have to be grilled and ground into a powder which keeps for a long time. Then it is boiled and makes a thick soup. The flowers of *Phaseolus coccineus formosus* are eaten boiled; they taste like beans. People enjoy eating them, whereas they eat the grains occasionally or in case in necessity.

Chili Pepper

Chili pepper (*Capsicum* spp.) improves the taste of daily and poor foods. When there is nothing else, people eat tortillas with dried chili, ground with salt. Chili pepper is only grown in the lowlands and is bought in the market in other places. When chili pepper itself is lacking, people use its seeds instead. They grill them and grind them with water and salt. They also use ginger roots (*Zingiber officinale*), introduced in Mexico after the 16th century, which they call "spicy tuber" in Mixtec ("*ña'mi yatu*").

Snack Foods

Other plants (wild fruits, stems, flowers, mushrooms, insects) are eaten as snack foods. In ordinary times, they are only sought by children of age 6-14 who are capable of finding them while playing or walking in fields or along paths. They pick and eat mushrooms raw ("*hongo de leche*",–"milk mushroom"-, *Lactarius volemus*). Among the insects, they particularly enjoy eating forest bugs (*Edessa cordifera*) alive. They pick wild fruits such as blackberries (*Rubus adenostrichos*), "*huevos de gato*" (*Cestrum* sp.), arbutus-berries (*Arbutus xalapensis*). They suck the sweet juice from *Salvia* petals, eat maize plant stems when harvesting the cobs, and the stems of *Piper sanctum* when in coffee fields close to springs. Some adults remember having eaten the stem of "*gusanillo*" tree (*Vernonia aschenborniana*) or the fruits of *Lantana camara* when they were really hungry (Table 4).

Insects

Insects are also seen by outsiders as Indian foods or poor people foods. As shown by Ramos (1982), they are very interesting from nutrition point of view, especially for proteins. We have to remember that rural Mexican people consume little animal products. Meat is eaten about once a week or at festivals. Milk products are very rarely consumed. Actually, for Mixtec people, insects are not seen as emergency foods but as luxury foods, found only in small quantities and over short periods of time—mainly occurring in the dry season. In the study area, at least 16 species are consumed (Katz 1993). They are considered as appetizers. They are mainly consumed grilled, but are sometimes grilled, ground and mixed with a chili sauce. People especially like ants (*Atta mexicana*), forest bugs (*Edessa cordifera*), maize caterpillars (*Heliothis zea*) and grasshoppers (*Sphenarium purpurascens*) (Table 5).

Discussion and Conclusions

Through migration and cash crops cultivation, Mixtec peasants have gained more access to money. Nevertheless, they are still vulnerable to seasonal variation and prospect of harvest.

Each emergency food has a different status. The tasty plants (mushrooms, certain "wild" greens) are commonly consumed by everybody.

Table 4. Snack Food Plants

Scientific name	English name	Spanish name	Mixtec name	Availability	Altitude
Arbutus xalapensis (Ericaceae)	arbutus-berry	modroño	tu yulu	April	highl.
Cestrum sp. (Solanaceae)	(fruit)	huevo de gato	ne'ya ñungwi	May-June	highl.
Cissus rhombifolia (Vitaceae)	"wild grape"	uva de monte	uva ku'u	Dec.	highl./lowl.
Dahlia tenuis (Asteraceae)	dahlia (tuber)	dalia montes	ña'mi 'ita ka'yu	year round	highl.
Jaltomata procumbens (Solanaceae)	(fruit)	tileso	titi tileso	rainy season	highl.
Lantana camara (Verbenaceae)	lantana fruit	san cayetano	ni'inu		highl.
Oxalis decaphylla (Oxalidaceae)	oxalis (tuber)	xocoyule	nuxiya	year round	highl./lowl.
Psidium guineense (Myrtaceae)	wild guava	guayaba	tikwe'e de monte	(July-Oct?) niki yuku	lowl.
Rubus adenostrichos (Rosaceae)	blackberry	zarzamora	nañu	May-June	highl.
Salvia spp. (Lamiaceae)	sage flowers	ita kinta	ita kinta	end of rainy season	highl.
Sambucus mexicana (Caprifoliaceae)	elder fruit	sauco	tu ngati		highl.
Saurauia oreophila (Actinidiaceae)	(fruit)	cerbatana	titi sno'o	July-Dec.	highl.
Spondias mombin (Anacardiaceae)	mombin	ciruela de monte	tikava yuku	May	lowl.
Tigridia pavonia (Alliaceae)	wild onion	cebolleja	ña'mi sa'yi	year round	highl.
Vernonia aschenborniana (Asteraceae)	(stem)	gusanillo	tundavishi	year round	highl.

Table 5. Edible Insects

Scientific name	English name	Spanish name	Mixtec name	Phase	Availability	Altitude
Coleopterae						
Prionus sp. (Cerambycidae)	beetle	tikoko	tikoko	larva, adult	dry season	highlands
Hemipterae						
Edessa cordifera (Pentatomidae)	forest bug	chinche	tia'a	adult	dry season	highlands
Acantocephala declivis? (Coreidae)	"catalan bug"	chinche catalán	tia'a shiko	adult	dry season	highl/lowl.
Hymenopterae						
Atta mexicana/(Myrmicidae)	ant	chicatana	'isu noko	queen	June	lowlands
Brachygastra mellifica? (Vespidae)	honey wasp	panal de Castilla	yoko nushi	larva		
Polybia sp.? (Vespidae)	wasp	huevo de toro	yoko kwachi	larva		
Polystes instabilis? (Vespidae)	wasp	panal de guitarrón	yoko teyu	larva		
Vespula sp. (Vespidae)	wasp	panal de zopilote	yoko chi'i	larva		highlands
Vespula squamosa? (Vespidae)	wasp	tintaka	tineka to'o	larva	(dry)-rainy	
? (Vespidae)	wasp	panal de tiso	yoko tisu	larva		highlands
Lepidopterae						
Aegiale hesperiaris (Megathymidae)	"agave worm"	gusano de maguey	?	caterpillar		highlands
Cossus redtenbachi (Cossidae)	"agave worm"	gusano de maguey	?	caterpillar		highlands
Eucheira socialis (Pieridae)	caterpillar	gusano de modroño	nyi li'chama	caterpillar	year around	highlands
Heliothis zea (Noctuidae)	caterpillar	gusano de elote	lingu	caterpillar	variable	highl/lowl.
Phassus sp. (Hepialidae)	caterpillar	lusti	lusti	caterpillar	dry season	highlands
Orthopterae						
Sphenarium purpurascens (Acrididae)	grasshopper	chapuli'n	tika	adult	dry season	highl/lowl.

Snack food plants are commonly eaten by children. Some plants are used occasionally and are turned into staples only when stocks are low (tubers, *Inga* seeds, mushrooms or bananas mixed with dough). Bitter greens are eaten only by old people, or when there is nothing else. The "wild" grain plants are not protected anymore and are now very rare. The use of some plants, such as acorns, is about to be forgotten. Many plants have different purposes; they can be used on a daily basis, or in times of need. The same is true of insects. As Chastanet (1991) has shown, there is not really a boundary between complementary and emergency foods.

Not all the knowledge about plants is transmitted from old to younger adults. Some of the knowledge is transmitted from old people to children (many children go to the fields with their grand-parents) and from older to younger children, and it is maintained that way. As living conditions have been improving in the last decades, knowledge about some emergency plants is being lost. But innovation and adaptation to new plants and new situations might still occur, as it has been in the past. Although most emergency foods are local spontaneous plants, some are introduced cultivated plants, such as ginger, banana and mango. Nevertheless, in the last few years, Mexico has been going through an economic crisis again. So, people are likely to have to go back to emergency foods.

Mixtec people have always had quite a hard life. They have learned over the centuries to draw as much as possible from their harsh environment. Their attention is focused on agriculture, but they make great use of spontaneous plants in general. As pointed out before (Messer 1978, Casas *et al.* 1987, Caballero 1994), Mixtec Indians, as other Mexican Indians, have a very wide knowledge about plants and a strong interaction with them, which is deeply rooted culturally.

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