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No greens in the forest? Note on the limited consumption of greens in the Amazon

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Abstract

The consumption of greens is reported as being very minor among Amazonian Indians. The authors of this article present a new review of this subject, based on fieldwork with Amerindians and other populations in different parts of the Brazilian Amazon and French Guiana. Written sources on Brazilian, Peruvian, Columbian and Venezuelan Amazon were also reviewed. The consumption of cultivated, semi-cultivated and wild species of greens was taken into account here, as the data specific to wild greens is very scarce. It is confirmed that greens are not commonly eaten among native Amazonians and that some ethnic groups do not consume them at all. The consumed species are usually young shoots of weeds or cassava leaves. Common in the Belém region are some specific aromatic plants, which have been diffused to other parts of the Amazon, together with introduced plants such as kale and coriander. Migrants from Northeastern Brazil settled in the Amazon consume some cultivated greens, especially aromatic plants. Maroons are the ones who use more greens in their diet. Native Amazonian people, who supplement agriculture with game and fish, follow a hunter-gatherer pattern, preferring wild fruit and tubers to greens.

Keywords: Amazon, greens, herbs, wild foods, weeds, ethnobotany

Introduction

Canadian Indians of the West Coast consume wild greens in the springtime [1], Mexican Indians in the rainy season [2–4], but what happens with the inhabitants of the Amazon, who benefit of a warm climate all year long, of rain for several months and are surrounded by forests? In an overview of the consumption of wild plants by Amazonian Indians, Dufour and Wilson [5] mentioned that very few greens were consumed. Taking this idea as a starting point, we present here data collected in the field in different parts of the Amazon as well as a review of the available literature. We confirm that consumption of greens is a rarity in the Amazon, but note that it does happen in a few places, in specific contexts or populations. As the wild greens used are very few, we will deal as well with ruderal species, weeds and cultivated greens and try to understand why this consumption represents such a minor component of diets.

Material and methods

The authors are either social or natural scientists who have focused on ethnobotany at least in part of their research. They have conducted fieldwork in different parts of the Brazilian Amazon (and one author in French Guiana), working on use of the environment, agriculture, agroforestry and food with several Amerindian ethnic groups. They have also visited other parts of the Amazon where they gathered empirical observations. Three authors are Amerindian students at the University of Brasilia, in Social Sciences (Payê) and Sustainable Development (Silva, Oliveira). The last two students carry out research in their communities. The Amerindian peoples surveyed (see Tab. 1) are: Ethnic groups of the Carib linguistic family from the Northern Amazon: Wayana and Kali'ña in French Guiana (Fleury), Kaxuyana and Tiryo in the Brazilian State of Amapa,

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Tab. 1 Quoted ethnic and socio-cultural groups.

Country and region	Localization	Ethnic group	Linguistic family	Reference*
Amerindian ethnic groups				
French Guiana (France)				
NW	lower Maroni, coast	Ka'liña	Carib	Fleury
SW	upper Maroni	Wayana	Carib	Fleury
Venezuela				
State of Amazonas	Upper Rio Negro	Baniwa	Arawak	[6]
Columbia				
Dpt of Vaupés		Tatuyo	Tukanoan (Eastern Tukanoan)	[5]
Dpt of Caqueta		Ingano (Quichua)	Quechuan	[8]
Peru				
Dpt of Amazonas	Cenepa river	Awajún	Jivaroan	[12,13]
Dpt of Amazonas/Loreto		Wampis	Jivaroan	K. Świerk (pers. com.)
Brazil				
State of Amazonas	Rio Negro	Baniwa	Arawak	Silva, Katz
	(NW Amazon)	Baré	Arawak, speakers of Nheengatu (Tupi)	Katz
		Tukano	Tukanoan (Eastern Tukanoan)	Katz
		Desana	Tukanoan (Eastern Tukanoan)	Katz
		Piratapuia	Tukanoan (Eastern Tukanoan)	Katz
	Solimões (upper Amazon river)	Ticuna	Ticuna	López
	middle Amazon river	Sateré-Mawé	Tupi	[7]
State of Roraima	NE (Guyana border)	Patamona	Carib	Oliveira
	N, NE	Makushi	Carib	Miller
	N, NE	Taurepang	Carib	Miller
	N, NE	Wapishana	Arawak	Miller
	S	Waimiri-Atroari	Carib	Miller
	NW (Venezuela border)	Ye'kuana	Carib	Moreira
State of Amapa	Surinam border	Tiryo	Carib	Payê
	Surinam border	Kaxuiana	Carib	Payê
State of Pará		Parakanã	Tupi-Guarani	Miller
	Middle Xingu river	Kayapó	Jê	López
State of Pará/Maranhão		Ka'apor	Tupi-Guarani	López
State of Tocantins		Krahô	Jê	Dias
State of Mato Grosso		Xavante	Jê	S. Silva, S. Juruna (pers. com.)
	National Park of Xingu	Kuikuro	Carib	M. Smith (pers. com.)
State of Acre	Peru border	Kaxinawa	Pano	[10,11]
Other ethnic/cultural groups				
French Guiana (France)				
SW	upper Maroni	Aluku (Maroons)		Fleury
Brazil				
State of Pará	Belém and surroundings	mestizos (caboclos)		López
	Tapajos River	mestizos (of Nordestino descent)		[20]
State of Acre	upper Juruá (Cruzeiro do Sul)	mestizos (of Nordestino descent)		Katz
	upper Juruá (Extractive Reserve)	mestizos (of Nordestino descent)		[19]
State of Amazonas	Manaus	Amerindians, mestizos, Nordestinos,…		[21]

* Names indicate personal observations of the authors of the article.

Tab. 2 Greens consumed in the Amazon.

Family	Species	Status	Preparation form	Local name	Ethnic group using it
Leaves (eaten cooked or as salad)					
Amaranthaceae	*Amaranthus spinosus* L.	cultivated	cooked		Aluku
Amaranthaceae	*Amaranthus dubius* Mart.	cultivated	cooked		Aluku
Apocynaceae	*Matelea rivularis*	?	cooked		Awajún, Wampis
Araceae	*Xanthosoma sagittaefolium* Schott.	cultivated	cooked	taioba	Wayana, Aluku, Patamona?
Araceae	*Xanthosoma* spp.	cultivated	cooked		Awajún
Araceae	*Caladium bicolor* (Aiton) Vent.	cultivated	cooked		Awajún
Araceae	*Philodendron* sp.	cultivated/spontaneous	cooked		Awajún
Araceae	*Anthurium* sp.	?	cooked		Awajún, Wampis
Asteraceae	*Acmella oleracea* (L.) R. K Jansen (syn. *Spilanthes oleracea*)	cultivated	cooked	jambú	Belém caboclos
Asteraceae	*Lactuca sativa* L.	cultivated	salad	salada	Acre Nordestinos
Asteraceae	*Spilanthes acmella* Murray	cultivated	cooked, raw	jambú	Belém caboclos, Acre Nordestinos
Basellaceae	*Basella alba* L.	cultivated	cooked	caruru	Rio Negro ethnic groups
Basellaceae	?	cultivated	cooked	caruru	Sateré-Mawé
Brassicaceae	*Brassica oleracea* L.	cultivated	raw, cooked	couve, repolho	Acre Nordestinos
Brassicaceae	*Eruca sativa* Mill.	cultivated	salad	rúcula	Acre Nordestinos
Euphorbiaceae	*Manihot esculenta* Crantz	cultivated	cooked	maniçoba	Belém caboclos, Rio Negro, Sateré-Mawé, Ingano, Kaxinawa, Aluku
Malvaceae	*Abelmoschus esculentus* (L.) Moench	cultivated	cooked	okra leaves	Aluku
Oxalidaceae	*Oxalis barrelieri* L.	spontaneous	salad	suwa wiwii (Aluku)	Aluku
Palmae	*Astrocaryum chambira* Burret	cultivated/spontaneous	cooked		Awajún
Phytolaccaceae	*Phytolacca rivinoides* Kunth & Bouché	spontaneous, in swidden fields	cooked	caruru	Rio Negro ethnic groups, Patamona, Makushi, Ka'apor, Aluku, Acre Nordestinos
Piperaceae	*Piper* sp.	cultivated/spontaneous	cooked, raw		Awajún
Piperaceae	*Peperomia pellucida* (L.) H. B. K.	spontaneous	salad	"soldier salad"	Aluku
Portulacaceae	*Talinum paniculatum* (Jacq.) Gaertn.	spontaneous, in swidden fields	cooked	caruru	Belém caboclos, Rio Negro ethnic groups
Portulacaceae	*Talinum triangulare* (Jacq.) Willd	spontaneous, in swidden fields	cooked	caruru	Rio Negro ethnic groups
Portulacaceae	*Portulaca oleracea* L.	cultivated	salad	pourpier (French)	Aluku
Herbs (aromatic plants)					
Apiaceae	*Eryngium foetidum* L.	cultivated		chicória	Belém caboclos, Acre Nordestinos, Kaxuiana/Tiryo (semi-wild), Rio Negro (cultivated, recent), Ka'apor, Kayapó, Sateré-Mawé
Apiaceae	*Coriandrum sativum* L.	cultivated		cheiro verde	Acre Nordestinos, Kaxuiana/Tiriyo (cultivated, recent), Rio Negro (cultivated, recent)
Apiaceae	*Petrosellinum sativum* (Mill.) Fuss	cultivated		salsa	Acre Nordestinos
Lamiaceae	*Ocimum* cf. *micranthum* Willd.	cultivated		alfavaca	Sateré-Mawé
Liliaceae	*Allium fistulosum* L.	cultivated		cebolinha	Acre Nordestinos, Rio Negro, Sateré-Mawé
Malvaceae	*Hibiscus sabdariffa* L.	cultivated		vinagreira	Belém caboclos, Acre Nordestinos
Solanaceae	*Capsicum* spp.	cultivated		folhas de pimenta	Makushi, Wapishana
?	?	spontaneous		nawanti (Kaxinawa)	Kaxinawa
?	?	spontaneous		xiwan (Kaxinawa)	Kaxinawa
?	?	spontaneous		sawiti (Sateré)	Sateré-mawé
Stems					
Cucurbitaceae	*Cucurbita* sp.	cultivated			Tiryo, Kaxuiana
Araceae	*Xanthosoma* sp.?	cultivated		taioba	Tiryo, Kaxuiana

close to Surinam (Payê), Waimiri-Atroari, Makushi, Taurepang (Miller), Ye'kuana (Moreira) and Patamona (Oliveira) in the Brazilian State of Roraima, as well as Wapishana (of the Arawak linguistic family) of the same region (Miller); Baniwa (of the Arawak linguistic family), Baré (people of the Arawak linguistic family who lost their language in favor of Nheengatu or Lingua geral, a Tupi language) and Tukano, Desana, Piratapuia (of the Tukanoan linguistic family, Eastern Tukanoan branch) from the middle Rio Negro (Katz); Baniwa of the upper Rio Negro (Silva); Parakanã of Pará (Miller) and Ka'apor of Pará/Maranhão (of the Tupi-Guarani linguistic family) and Ticuna (Ticuna linguistic family) of the Solimões (upper Amazon; López); Kayapo of Pará (López), and Krahô of Tocantins (Dias; of the Jê linguistic family). Fleury has also done fieldwork with the Aluku Maroons of Western French Guiana. Katz studied the market of Cruzeiro do Sul, in Acre (South-Western Amazon) and did fieldwork with farmers of the same region, with ethnic origins in the Northeast of Brazil (Nordestinos). López led a specific enquiry in and around Belém (Pará), in July 2012, on the management, use and consumption of local cultivated and semi-wild greens by the local mestizo population. Most authors have been revising literature on management and use of resources and food plants in the Amazon. Except for the recent enquiry led by López, the data presented have been collected over several years through observation and interviews that were not specifically oriented on greens but on food, agriculture and/or management of resources.

Results

Greens and the characteristics of the environment

First, what is called the "Amazon" is not a homogeneous forest area. Several types of environments must be distinguished. We will not enter here in ecological details, but roughly there are dense and more open forests, flooded and non-flooded forests ("terra firme"), and a wide range of vegetation formations and transition zones. Moreover, the South and Southeastern part of the legally defined "Amazon" region is actually covered by tree savanna ("cerrado"), also divided in several types of vegetation: "closed" and "open" "cerrado", gallery forests, and patches of various types of dry forests. In the northern portion of Amazonia, there is a corridor of savanna, called "lavrado" in the Brazilian regional terminology, contiguous with savannas of Guyana and Venezuela. In the "cerrado", rainy and dry seasons are strongly contrasted, with plant growth very limited in the dry season. As Dias observes, most leaves are very leathery, therefore not palatable, even if they are edible. In the dense forest, rainy and dry seasons are not so contrasted, with the forest maintaining a humid microclimate in its interior. As Fleury notes, the tree canopy is generally high, and the understory may be sparse. Tender leaves are not so easily available. Only a portion of tropical forest trees change their leaves on a seasonal basis, and therefore do not produce many young shoots, which are usually the consumed parts. Additionally, as highlighted by Miller, many plants contain secondary toxic compounds that protect leaves against potential predators. Available edible greens are more likely to grow as weeds in swidden fields, in fallow lands or along the paths.

Greens and Amerindian food habits: tortoise food?

As Miller observed among the Waimiri Atroari of Roraima and Amazonas states, leaves such as lettuce are jokingly considered "tortoise food" ("comida de jabuti"). Other researchers report that leaves are considered all over the Amazon as "animal food" ("comida de bicho"; Donald Sawyer, CDS-UnB, Brasilia, personal communication). According to Payê, when Carib Kaxuyana and Tiryo people of Amapa have wild animals as pets, they give them specific foods: monkeys are fed with fruit, agouti with nuts, birds with sweet potato and cassava bread, and tortoises ("jabuti" and "tartaruga") with leaves. Kaxuyana people who go to the city for the first time and are offered lettuce, perceive it as an "animal food" and consider it tasteless. In their community, they eat no leaves except for an aromatic herb, "chicória" (*Eryngium foetidum* L. – Apiaceae), used to flavour fish stew. They do not really cultivate "chicória", but rather favour it by throwing its seeds in the areas where it grows easily, close to the river. They also consume the stems of some plants. When a meal is prepared with leftovers of a fish stew, they add squash (*Cucurbita* sp. – Cucurbitaceae) and cocoyam or "taioba" (*Xanthosoma* sp.?, Araceae) stems, as well as sweet potato tubers [*Ipomea batatas* (L.) Lam. var *batatas* – Convolvulaceae]. Recently they have been adding vegetables introduced by Franciscan missionaries, such as "maxixe" (*Cucumis anguria* – Cucurbitaceae), now well appreciated, and coriander leaves ("cheiro verde", *Coriandrum sativum* – Apiaceae).

When greens are eaten in the Northern Amazon (Tab. 2), they are often cooked in fish stew, "to flavour it" ("temperar

Fig. 1 Wayana Indian cutting off the leafy parts of *Xanthosoma sagittaefolium* (M. Fleury; identification: M. Fleury).

Fig. 2 "Caruru" (*Phytolacca rivinoides*) in a swidden in Santa Isabel do Rio Negro (E. Katz; identification: L. Emperaire).

o peixe") or give it consistency (especially when there is not much fish), as noted by Silva; yams (*Dioscorea* spp. – Dioscoreaceae), peach palm flowers (*Bactris gasipaes* Kunth - Arecaceae) and other ingredients may also "flavour the fish". Wayana Indians of French Guiana use leaves of cultivated cocoyam in their fish stew, as observed by Fleury, picking the leafy part off from the veins (Fig. 1). In Santa Isabel, in the middle Rio Negro, as observed by Katz, Eastern Tukanoan and Arawak people use the leaves of weeds called "caruru" and of cultivated cassava (*Manihot esculenta* Crantz – Euphorbiaceae). Cassava leaves are called "maniçoba", in "Lingua geral" and local Portuguese. The botanist Laure Emperaire (personal communication) identified several species under the name of caruru in that region: *Phytolacca rivinoides* Kunth & Bouché (Phytolaccaceae), which usually grows in recently burnt swidden fields (Fig. 2), *Talinum paniculatum* (Jacq.) Gaertn. and *Talinum triangulare* (Jacq.) Willd (Portulacaceae), as well as an introduced species, *Basella alba* L. (Basellaceae), cultivated in the garden of the Salesian mission. As observed by Silva, in the upper Rio Negro, *Phytolacca* is also consumed in Baniwa communities of the Içana river, and *Talinum* is sold on the market in the town of São Gabriel da Cachoeira. Hoffmann [6] also mentions the consumption of caruru (*Phytolacca* cf. *rivinoides*) among the Baniwa of the upper Rio Negro in Venezuela, and Dufour and Wilson [5] among the Tatuyo, Eastern Tukanoan people of Columbia. "Caruru" and manioc leaves are usually boiled with chilli pepper, sometimes boiled manioc juice ("tucupi") also flavours the broth, then fish is added at the end. Manioc leaves may also be ground in a mortar before or after being cooked.

In the urban context of Santa Isabel do Rio Negro, not everybody eats these greens. Katz was shown by two older ladies how they are prepared, but most people referred to them as something that they used to eat more in the past, or when they lived in the upper Rio Negro (a more traditional area). Younger generations are not attracted by this type of food. Nevertheless, when demonstrated by a lady in a workshop on local food heritage (organised by the local Amerindian association, ACIMRN, and E. Katz), it raised curiosity and recalled the memories of some participants. In the Rio Negro towns, vegetables and aromatic plants have also been introduced in the last decades by missionaries, traders and public institutions: "chicória", which is not native to the region, coriander leaves, salad onions ("cebolhinha" or "cebola de palha"; *Allium fistulosum* – Liliaceae), "maxixe", cultivated locally by some people in the yard or home garden. Presently, people also consume onion ("cebola", *Allium cepa*), carrot [*Daucus carota* L. subsp. *sativus* (Hoffm.) Arcang. – Apiaceae] and tomato (*Lycopersicon esculentum* Mill. – Solanaceae), brought by boat from Manaus (Fig. 3).

The Sateré-Mawé of the middle Amazon also eat manioc leaves, and cultivate near the house "caruru" (identified as a Basellaceae species) which they use as a condiment, as well as other aromatic herbs used as condiment (salad onions, "chicórea") or medicine, such as basil – "alfavaca" – (*Ocimum* cf. *micranthum* Willd., Lamiaceae). They use a non-identified leaf from the abandoned swiddens, "sawiti", to flavour cassava fermented drinks [7]. More to the West, the consumption of cassava leaves is also mentioned for the Ingano, a Quichua-speaking ethnic group of the upper Columbian Amazon, in the Caqueta Department [8].

The Makushi and Wapishana who inhabit the savanna regions of Roraima (the "lavrado") commonly prepare a very spicy fish or meat stew called "damorida", in which main condiments are chili peppers (*Capsicum chinense* Jacq. and *Capsicum* spp. – Solanaceae) and the leaves of the chili pepper plant. Miller also observed a spontaneous plant in a swidden field (most likely *Phytolacca*) being collected for use in "damorida". According to Oliveira, the Patamona, who live in the highlands savannas above the Makushi and Wapishana communities, at the border of Guyana, eat leaves of at least three species of Araceae (including *Xanthosoma* sp.) generally called "taioba" ("João Gomes" in the local Portuguese, "er'oiá" in Patamona), and of a weed found in cassava swidden fields, after the burning, called in Patamona "aur'otsa" (very probably *Phytolacca rivinoides*).

As observed by Moreira, Carib Ye'kuana people of Northern Roraima use several types of leaves as medicines and for rituals, and wrap in large leaves (banana leaves, leaves of local wild Musaceae, etc.) food they want to cook or smoke-dry – a common practice all over the Amazon. While the Ye'kuana do not eat greens, they sprinkle some dry powdered leaves on cassava bread to speed growth of mould, in order to prepare fermented drinks, a practice also employed by other Carib people, the Tiryo, Kaxuyana (mentioned by Payê) and Wayana (Lucia van Velthem, personal communication). The Makushi reported to Miller the use of manioc leaves for this purpose, or leaves of the pioneer tree *Trema micrantha* (L.) Blume (Celtidaceae).

The Kuikuro, Carib ethnic group of the upper Xingu, do not consume any greens, according to the botanist Maira Smith (CDS-UnB, Brasilia, personal communication). As observed by López, the Ticuna of Amazonas also do not eat greens, the Ka'apor of Maranhão and the Kayapó of Pará only cultivate *Eryngium foetidum* to flavour their dishes, mainly beans in the case of the K'aapor. The consumption of *Phytolacca rivinoides* was also mentioned among the Ka'apor [5]. Among the Jê people of the "cerrado", Krahô children of Tocantins eat some flowers, but neither the children nor the adults eat greens, as observed by Dias, and the Xavante of Mato Grosso do not eat greens either (Sayonara Silva, Samantha Juruna, CDS-UnB Brasilia, personal communications).

In reviewing the food/agriculture/economic activities sections of the "Encyclopedia of the Indigenous People of Brazil" [9], as well as other sources on Amerindian food (which are actually not very numerous), Katz only found one reference on use of greens in the Amazon: according to Lagrou [10], the Kashinawa, a Pano people of the Southwestern Amazon, commonly use sweet manioc leaves as a condiment, as well as a herb that looks like coriander leaves. They make a gruel out of

Fig. 3 "Chicória", onion and salad onion on a kitchen table, Santa Isabel do Rio Negro (E. Katz).

cooked sweet cassava, flavoured with ground toasted peanuts and ground cassava leaves or "nawanti" or "xiwan", non-identified forest leaves with an acid taste similar to *Eryngium foetidum*. Pantoja et al. [11] also mention the consumption of "nawanti" and cassava leaves by the Kashinawa, as cooked together with manioc tubers. They note that women not only collect "nawanti" in the forest, but also cultivate it in "canteiros" (large pots) near the house.

Would the consumption of greens be more significant in the Western Amazon? Among all the cases we reviewed, the Awajún (or Aguaruna), a Jivaroan people from the Peruvian Amazon, are the Amerindians who consume the widest range of greens [12,13]. They cultivate several greens species: cassava leaves, *Caladium bicolor* (Aiton) Vent. (Araceae), *Xanthosoma* spp. (Araceae); other species are both cultivated and found in the wild: *Piper* sp. (Piperaceae), *Philodendron* sp. (Araceae), *Astrocaryum chambira* (Palmae), the only reference we found of the consumption of palm leaves. *Piper* sp. may be eaten cooked or raw, the other species are used cooked, in soups or in "patarashca" with fish (grilled food wrapped in leaves). According to the anthropologist Kacper Świerk (personal communication), the Awajún and Wampis (Huambisa/Peruvian Shuar, Jivaroan) also eat leaves of *Anthurium* sp. (Araceae; Wampis: "eep", regional Spanish: "repollo de monte", "wild cabbage") added to "patarashca" with fish, meat or with edible mushrooms called "esempu"; leaves of the small plant *Matelea rivularis* Woodson (Apocynaceae; Wampis: "tsamantsma", identified by the botanists David Neill and Camilo Kajekai) are also added to "patarashca".

Outside of the indigenous populations mentioned above, other inhabitants of the Amazon are mestizos of indigenous descent (called in Brazil "caboclos"), maroons and people who migrated from the Northeast of Brazil. We do not have data on other populations (of European origin or who migrated from other regions), except roughly on the city of Manaus.

Greens consumed by the mestizo population of the State of Pará

López conducted a short survey in the city of Belém (Pará; where she lives) and on the neighbouring Atlantic coast. Most inhabitants of the rural areas in Pará, and many of the city dwellers are "caboclos". Two greens enter in the composition of typical dishes of Belém region: ground manioc leaves and "jambú" [*Acmella oleracea* (L.) R. K. Jansen (syn. *Spilanthes oleracea* L.); *Spilanthes acmella* Murray – Asteraceae]; "Chicória" (*Eryngium foetidum*) and "vinagreira" (*Hibiscus sabdariffa* L. – Malvaceae) flavour several dishes. "Cariru" (or "caruru"; *Talinum esculentum*) is also consumed. Kale ("couve", *Brassica oleracea* L. – Brassicaceae), coriander leaves (*Coriandrum sativum*) and salad onion (*Allium fistulosum* L.), common in most regions of Brazil are also sold in Belém market (Fig. 4).

Ground manioc leaves are a culinary specialty of the Belém región (Fig. 5). In the State of Pará, manioc leaves are known under the name of "maniva", which refers in other regions to the manioc plant. When ground, they are called "maniçoba", name given to the leaves in other regions of the Amazon, whether fresh, cooked, entire or ground. "Maniçoba" is also the name of a dish prepared with the ground leaves, first mentioned in the literature in the 18th century by an Italian astronomer, Giovanni Agnelo Brunelli, who participated in the Comisión Demarcadora de Limites, organized to define the boarders between Spain and Portugal according to what had been stipulated in the 1750 Madrid Treaty [14]. In 1767

Fig. 4 Cultivated aromatic leaves sold on Belém market (kale, "chicória", coriander and salad onion; E. Katz).

he published a text called "About cassava" in the "Journal of the Sciences Academy of Bologna Institute", where he describes the dish:

"Mas também as folhas da planta da 'Maniva' costumam ser preparadas muitas vezes pelos índios na alimentação, como legumes. Amassam as folhas, seguramente no pilão, e cozinham ao fogo em água, com pedaços de carne ou de peixe, com gordura também adicionada ao caldo de mandioca, pimenta e tempero. Essa comida que chamam de 'maniçoba', embora pareça ser de bárbaros, eu não pude desprezar" [But the leaves of the 'Maniva' plant are very often prepared by the Indians in their food, as greens. They grind the leaves, probably in a mortar, and cook them in water, with pieces of meat or fish, with grease added to the cassava broth, chili pepper and condiments. They call this dish maniçoba. Although it looked like barbarian food, I could not refuse it] (Brunelli, apud. [14]).

At that time, there were still Indians in the región. Today many people probably descend from them but do not identify themselves as such. Presently "maniçoba" is offered in many food stands of regional dishes all over the city and is consumed in different parts of the State of Pará. Along with "pato no tucupi" (duck in "tucupi", the cooked juice extracted from ground manioc roots), it enters in the composition of the traditional "Lunch of the Círio de Nazaré" (the Candle of Nazareth), the main religious festival of the city, celebrated in September or October all over Pará, and which, in Belém, attracts hundreds of thousands of people and was declared National Cultural Heritage.

The leaves of "jambú" (*Acmella oleracea*, *Spilanthes acmella*) are one of the main greens consumed by the rural and urban population of Pará and Eastern Amazon. "Jambú" is either favoured or cultivated in the homegardens of the rural and periurban areas of Pará. It often grows spontaneously in the wet parts of the garden, close to where clothes are washed (Fig. 6). It is cultivated more intensively, albeit on a small scale, by entrepreneurs who sell it in local markets and supermarkets in Belém to supply urban dwellers. It is an important ingredient in regional dishes such as "pato no tucupi" and "tacacá". "Tacacá" is a broth made of "tucupi" flavoured with "chicória", dry shrimp and "jambú", and thickened by "goma" – manioc starch. It is sold by small food stands in the streets of Belém and other town of the States of Pará and Amazônas [15]. "Jambú" is also consumed in chicken dishes (Fig. 7). Recently it has been explored as a gourmet ingredient in the best restaurants of regional paraense cuisine, and a pizza of "jambú" and shrimp, inspired by "tacacá", has been created. The late chef Paulo Martins invented a dish called "rondelle de jambú" in his highly renowned restaurant. In the Eastern Amazon, "jambú" is definitely the most consumed green, with the most diverse culinary uses.

At least one type of "caruru" [*Talinum paniculatum* (Jacq.) Gaertn., erroneously identified in the quoted article as *Talinum esculentum*] is used in Pará regional food [16]. It is cultivated, together with "jambú", in humid parts of rural house yards (Fig. 8) and is also sold in urban markets (Fig. 9) and supermarkets. In Pará, "caruru" is one of the main ingredients

Fig. 5 Grinding manioc leaves on Belém market (E. Katz).

of dish called by the same name, prepared with dry shrimp, okra [*Abelmoschus esculentus* (L.) Moench – Malvaceae], and cassava "flour", and sold in the small food stands in Belém. It is also commonly served in the religious celebrations of the month of June ("festas juninas"), all over the State. Occasionally it is cooked with beans.

Roselle (*Hibiscus sabdariffa* L.; Fig. 10), a cultivated plant originally from Africa [17], is consumed in the Northeast of Brazil. It is very popular in the State of Maranhão (Eastern Amazon), where it enters in the composition of different regional dishes, the most famous being "arroz com cuchá" ("rice with roselle"). It is not as common in Pará, but it flavours a few dishes of grilled fish, especially on the coast.

Maroons and greens

The Aluku Maroons, who live close to the Wayana Amerindians, on the upper Maroni River, in French Guiana, were studied by Fleury. They practice slash-and-burn agriculture and cultivate dry land rice, which is the base of their diet. They usually eat the rice with oleaginous or mucilaginous sauces, made respectively of peanut (*Arachis hypogaea* L. – Fabaceae), sesame seeds (*Sesamum orientale* L. – Pedialaceae) or okra (*Abelmoschus esculentus*). They also cook the leaves of cultivated plants such as cassava, okra, cocoyam (*Xanthosoma sagittaefolium* Schott) and amaranth (*Amaranthus spinosus* L., *Amaranthus dubius* Mart. – Amaranthaceae), and pick the leaves of makoko (*Phytolacca rivinoides*; the "caruru" of Brazil) on the borders of swidden fields or in fallows. They also pick "pourpier" ("poseen": *Portulaca oleracea* L.), eaten raw or cooked, "four-leaves clover" ("suwa wiwii": *Oxalis barrelieri* L. – Oxalidaceae), with acidy leaves, that are consumed raw to give appetite, and "soldier salad" ("salade soldat", "konsaka wiwii", *Peperomia pellucida* (L.) H. B. K. – Piperaceae) eaten as a salad. They definitely eat much more greens than the Wayana Amerindians, with whom they share the same environment.

Fig. 6 "Jambú" (*Acmella oleacera*) growing in the yard of a house on the Atlantic coast of Pará (C. López; identification: L. Emperaire).

Fig. 7 Chicken with "jambú" (C. López).

Peoples from the Northeast in the Amazon: cultivated herbs and greens

Since the end of the 19th century, periodic droughts in the semiarid Northeast of Brazil have led people to migrate to other regions. Many such migrants went to the Amazon and were engaged in rubber tapping until the end of the 2nd World War. In the State of Acre, descendants from these migrants presently form the majority of the non-indigenous population. In the market of Cruzeiro do Sul, one of the main towns of Acre, Katz [18] observed the following greens being sold on the market: herbs: coriander leaves, "chicória", parsley [*Petroselinum crispum* (Mill.) Fuss] and salad onion (*Allium fistulosum*); plants for salads: lettuce (*Lactuca sativa* L.), "agrião" (*Spilanthes acmella*, Asteraceae), garden rocket (*Eruca sativa* Mill.), and kale ("couve", *Brassica oleracea*), eaten raw or in soups; cabbage ("repolho", *Brassica oleracea*), cooked. In the Extractive Reserve of the Upper Juruá (Acre), Emperaire [19] observed the consumption of green onions, "chicória", coriander leaves and kale, cultivated in "canteiros" (raised beds), *Hibiscus sabdariffa* ("vinagreira") cultivated in homegardens and *Phytolacca rivinoides* ("couve-manteiga" – "butter kale") picked in swidden fields. Along the Tapajos River in Pará, where part of the population is of Northeastern origin, Passos et al. [20] found the consumption of cultivated greens, mainly kale and coriander leaves.

Urban population in Manaus

In a nutritional study carried out in 1973–1974, Shrimpton and Giuliano [21] found Manaus to be the Brazilian city where fewest greens were consumed. We must mention that, at the level of the country as a whole, greens are already much less consumed than in Europe, for instance, and a more reduced range of vegetable species is available. Not surprisingly, Manaus, in the middle of the Amazon, had a lower consumption of greens than cities on or near the coast, such as São Paulo, Rio de Janeiro, Salvador, and Recife. Shrimpton and Giuliano also noted that fruit and vegetables were more expensive in Manaus. Coriander leaves, garlic and onion were not bought frequently by people with lower incomes, and only people with higher incomes were buying kale and lettuce. However, besides income, the question of social origin and food habits must also be considered. The consumption of fish, for instance, was higher in lower classes than in upper classes. The authors noted that the consumption of fruit was higher in towns and villages outside of the city, such as Codajás on the Solimões river, where another nutritional study was conducted in 1958. There, green onions and coriander leaves were not even mentioned. Possibly, nowadays, under national influence, inhabitants of Manaus may eat a little more of salads than they used to in the seventies. Comparatively, cultivated *Eryngium foetidum* was the only green found on the markets of

the Columbian Amazon, in the cities of Leticia and Florencia, studied by Pulido and Cavelier [22].

Discussion

Despite a green environment, we find that actually there are not so many wild greens available in the Amazon (see Tab. 2). The few greens which are consumed are weeds, semi-cultivated or cultivated plants. The few spontaneous plants found are two types of leafy greens usually called "caruru" or "cariru": *Talinum paniculatum*, *T. triangulare* (Portulacaceae) and *Phytolacca rivinoides* (Phytolaccaceae), which seem to be widely distributed at least in the Northern Amazon. As observed by Emperaire (personal communication), *Phytolacca rivinoides* can actually grow up to the size of a shrub. The name "caruru" applies also to introduced *Basella alba*. According to Carney & Rosomoff [17], it may also refer in some regions to *Amaranthus* species. Among semi-wild herbs, *Eryngium foetidum*, *Acmella oleacera* and *Spilanthes acmella* seem to be native of the Northeastern Amazon. *Eryngium foetidum* (called "false coriander" in French Guiana) has been widely diffused as a cultivated plant in the rest of the Amazon, but not much in other regions of Brazil. *Spilanthes acmella* has been diffused only in some parts of the Amazon, but it was taken to Asia and Madagascar, where it is known as "brède mafane" [15]. Among cultivated plants, the leaves of manioc (*Manihot esculenta*) and cocoyam (*Xanthosoma*) are the most commonly consumed. Maroons who eat more greens than the Indians, actually do not use a much wider range of species. Leaves of *Xanthosoma* sp. are also consumed by some Mexican Indians, who also carefully separate out the veins [4].

Amerindian diet in the Amazon is based on starch and animal protein, more commonly bitter or sweet cassava, sometimes corn, and fish or game. All over the Amazon, many species of wild and cultivated tubers (yams, sweet potato, etc.) are used. These basic diets are complemented with fruit. The area is very rich in wild and cultivated fruit species, in particular palm fruits, oleaginous or starchy. The diet of indigenous peoples, richer in animal protein than many traditional diets in the world, and supplemented with forest fruits, is probably satisfactory without the need of greens.

What makes people choose to eat greens rather than other types of resources? When Katz asked inhabitants of the Rio Negro if they ate palm hearts (eaten in other parts of the Amazon), they answered: "why would we eat something like that? There are so many other tasty foods available, cassava, juice of palm fruit, sweet fruit from the forest or the gardens, fish, and so on". The same answer probably applies to greens. Young people in particular mentioned they perceived greens as bitter food. Many Rio Negro inhabitants do not appreciate the bitter taste at all, and consider bitter foods as not edible. It is the taste of remedies, and only the shamans look for bitter foods in specific diets. The Kaxuyana and Tiryo perceived lettuce as tasteless and, as we saw above, consider greens as "tortoise food". Supposedly the Touareg in the Sahara, who are probably far from having so many plants and animals available, do not eat greens either, because they perceive them as "camels' food" (Ph. Lefèvre-Witier, personal communication, 1984). This consumption is definitely cultural.

According to Turner et al. [23], hunters-gatherers collect mainly wild tubers and fruit; wild greens, or rather weeds, are more collected by cultivators. Most Amazonian Indians practice agriculture, but hunting, fishing and gathering are still important activities. We see that their gathering activities focus more on fruit and tubers, especially among "cerrado" people. Their attitude towards greens in the food could be described, using Łuczaj's term [24], as "herbophobia". The few greens they gather are more commonly weeds.

Amazonians with cultural origins in Northeastern Brazil (Nordestinos) eat a few cultivated greens as herbs or in soups. Maroons are the ones who consume them most. As Carney and Rosomoff [17] noted, greens were part of the traditional diets of African people, especially West Africans. As Fleury notes, the Aluku Maroon eat rice, which is a dry dish, and need to complete it with an oleaginous or mucilaginous sauce. Although living in the same environment as the Wayana, they definitely eat greens much more frequently, as mentioned above.

Carney & Rosomoff [17] found greens or dishes with greens eaten in different part of the Americas called "callalou", "calelu" and in Brazil "caruru", which refer to *Amaranthus* spp. (for instance in Jamaica), a genus of plants found in both continents, sometimes *Hibiscus sabdariffa* ("caruru azedo" – "sour caruru"

Fig. 8 "Caruru" (*Talinum paniculatum*) cultivated in a home garden (C. López; identification: L. Emperaire).

Fig. 9 "Caruru" (*Talinum paniculatum*) sold on Belém market (E. Katz; identification: L. Emperaire).

Fig. 10 Cultivated roselle (*Hibiscus sabdariffa*) on the coast of Pará (C. López).

– in some parts of Brazil) or to dishes with greens or with okra, like the "caruru" of Belém and of Bahia, in Brazil. The authors believe this name came from Africa with the slaves who applied it to species similar to the ones they knew in Africa. According to the data we collected in the Amazon, it also refers to at least three other weedy species. This name may have been taken from the coasts to the Amazon during the colonization, but we have no information on this process.

The same authors also consider the consumption of manioc leaves, common in Africa, boiled or ground, as an African innovation. Given the wide spatial range where it is consumed in the Amazon by Amerindian people, from the Northeastern Amazon to the Western Amazon, we are not totally convinced of an African origin for this culinary practice.

Presently, the cultivation of greens (lettuce and aromatic greens, such as kale and coriander) is being promoted in different development projects applied in the Amazon. However, little attention has been given to the fact that greens, salads, herbs are not part of the local people's traditional diet!

Conclusion

We confirm that greens are an extremely minor item in the diet of the inhabitants of the Amazon, with consumption lowest among Amerindians, with a few exceptions. Greens are very seldom mentioned in the bibliography as researchers usually focus on the main elements of the diet. Some of the authors here who have performed participant observation confirm that some Amazonian people do not eat any greens at all. In the other cases, we see that is not a very usual consumption, with few species being consumed. People with cultural origins in Northeastern Brazil consume more cultivated greens and Maroons are the ones who consume more species, either wild or cultivated, and in a more frequent pattern. Few species are wild or semi-wild, others are cultivated or semi-cultivated. We took the last ones into account here to understand the position of the different greens in this wild-cultivated gradient and in the diet. Greens are not totally absent from Amazonian diets, but they are not valued and preferably given as food for the tortoise.

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