Chapter 19
Wild Food Plants of the Pantanal: Past, Present, and Future

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19.1 Introduction

The food plants traditionally utilized by local people have been the target of several ethnobotanical studies aiming to identify species that were important for human populations in the past and persist nowadays or those that were abandoned (Arenas and Scarpa 2007; Turner and Turner 2008; Turner and Von Aderkas 2012; Cámara-Leret et al. 2014). Besides identifying temporal changes in the use of wild plants, the studies aim to identify the reasons for such changes (Turner and Von Aderkas 2012; Kalle and Sõukand 2016).

Considering that many species associated with several human cultures have been abandoned by the communities (Keller et al. 2005), and became scarce by deforestation, with the decline in the availability of plants (Hanazaki et al. 2013), there occurs, for example, a progressive loss of the biocultural heritage. The combined loss of species and associated know-how leads to a collapse of knowledge nets and undermines the resilience of the communities that depend on that biocultural connection (Cámara-Leret et al. 2019). Regarding the abandonment of the traditional use of plants in indigenous communities, for example, Arenas and Scarpa (2007) discuss that their traditional preparation methods are maintained when traditional foods are eaten.

Several projects have been developed in South America that aim to rescue and conserve the biocultural diversity and assure the food and nutritional security and sovereignty (Alcorn et al. 2010; Depenthal and Yoder 2017), also in Brazil (May

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and Vinha 2013; MMA 2016; Bortolotto et al. 2017), and to the benefit of the communities. The Program Plants for the Future, developed by the Brazilian government, organized a series of publications by regions of Brazil highlighting regionally important species that also have the potential of economic utilization for the future (MMA 2016). The Central-West region of Brazil, where the Pantanal is located, harbors a high number of traditionally used species that have a relevant potential for the future, though are as yet neglected. The Pantanal is particularly rich in plant species (see the Chap. 3 on Flora), and many of them have a high food potential (Pott and Pott 1994; Pott and Pott 2000; Bortolotto et al. 2018; Bortolotto et al. 2021). The conservation of these species implies their sustainable use and gains critical importance for close relatives of cultivated species, such as wild rice (Bertazzoni and Damasceno-Junior 2011), as they offer potential germplasm for genetic improvement (Karasawa et al. 2007).

Besides strengthening the communities with the valorization of the traditional foods that are part of their diet, the conservation of these species, tested and confirmed by traditional use, offers a range of opportunities to strengthen and propose new food products and services, including neglected or abandoned species. Moreover, to associate culture with the recognition of flood plants for present and future use is of great importance, particularly in countries with a high biological and cultural diversity, as is the case of Brazil.

In this chapter, we aimed to gather information on the native food species that were most important in the past and that were maintained or neglected (or abandoned) in urban and rural communities located along the Paraguay River, on the western edge of the Brazilian Pantanal, and that have a potential for alimentary use in the future. We also compiled information on the main peoples that traditionally inhabited the Pantanal and who were sources of knowledge on food plants.

19.2 Biocultural Diversity in the Pantanal

Brazil encompasses most of the Pantanal area of 138,183 km^2 (Silva and Abdon 1998) (78%), one of the largest continuous wetlands in the world, which also stretches into the territory of Bolivia (18%) and Paraguay (4%) (Adámoli 1982). The Brazilian Pantanal is located in the states of Mato Grosso (35.36%) and Mato Grosso do Sul (64.64%). The Pantanal plain is divided into 11 subregions (Silva and Abdon 1998). According to that subdivision, the floodplain of the Paraguay River, which runs north-south through the Pantanal, is called Pantanal of the Paraguay River, corresponding to 5.9% of the Pantanal plain. The western edge of the Pantanal comprises a floodplain on the border of Brazil with Bolivia and Paraguay; it also includes the residual uplands Urucum-Amolar (Brasil 1982), adjacent to the Paraguay River (Fig. 19.1).

The vegetation is a mosaic of floras from the Cerrado, Amazonia, the Chaco, and the Atlantic Forest (Adámoli 1982). In the various vegetation physiognomies that occur on floodplains and highlands (Prance and Schaller 1982), up to 1065 m

Fig. 19.1 Amolar hill adjacent to the Paraguay River in Corumbá, Mato Grosso do Sul, Brazil. Picture by Geraldo Alves Damasceno Junior

altitude (Brasil 1982), the Pantanal shelters over 2500 species of angiosperms (see the Chap. 3 on Flora). Besides that species richness, there is also a diverse cultural heritage formed by indigenous populations with different matrices (Bespalez 2015) and by non-indigenous populations that live in urban and rural areas, in traditional and nontraditional communities (Neuburger and Silva 2011), including small riverside communities and large cattle ranches (Silva and Silva 1995), or even small populations dispersed over some small areas along the Paraguay River, but within the Pantanal (Silva 2020). The composition of these peoples resulted from the migration of farmer peoples enforced by the Inca conquests in the Andean and tropical zones (Métraux 1946; Oliveira and Viana 2000), including indigenous people of the Chaco (Súsnik and Chase-Sardi 1995). The various ethnicities were composed of hunters, collectors, fishers, or farmers that occupied both uplands (hilly countries) and lowlands (floodable areas) (Oliveira 2002).

The Guató, canoeing and collector Indians, occupied large areas extending along the Paraguay River (Oliveira 2002). The Bororo occupied areas in the northern stretch of the upper Paraguay basin, including the São Lourenço River until its junction with the Cuiabá (Frič and Radin 1906). The Mbayá (belonging to the Guaicuru linguistic family, ancestors of the Kadiwéu that nowadays occupy a reserve in an area south of the Pantanal), lived along the Paraguay River in the Chaco. The same happened with the Layana, Terena, and Kinikinao (Métraux

Table 19.1 Indigenous People in the Pantanal (Mato Grosso do Sul – MS or Mato Grosso – MT, Brazil) mentioned in this Chapter; native language, past and current location, and source (reference)

Indigenous communities	Native language	Past location	Current location	Source
Payaguá (+)	*Payaguá (extinct and little-known language)	**Along the Paraguay River	No current record	*Barros (2013); **Oliveira (2002)
Mbayá: ancestors of the Kadiwéu (+)	Guaikuru linguistic family	Along the Paraguay River	No current record	Métraux (1946)
Kadiwéu (!)	Guaikuru linguistic family, Kaiwéu language	Chaco	Kadiwéu indigenous reserve (MS)	ISA (2020)
Guató (†, !)	*Macro-Jê linguistic trunk; Guató linguistic family, Guató language	** On the shores of Lakes Guaíba and Uberaba and the connected rivers such as the Paraguay River	***Ilha Ínsua (MS); Baia Guató and Barão de Melgaço municipality (MT)	*ISA (2020); **Métraux (1942); ***Oliveira (1996)
Chamacoco (!)	*Zamuco linguistic family, Chamacoco language	**Baía Negra (municipality of Porto Murtinho), south of Forte Coimbra (municipality of Corumbá) and surroundings	**Kadiwéu Indigenous Reserve (MS)	*Martins and Chamorro (2015); **Fabre (2007)
Terena (!)	*Aruak linguistic family, Terena language	**Along the Paraguay River	**Spread over seven municipalities (MS)	*Castro (2015); **ISA (2020)
Kinikinau (†, !)	*Aruak linguistic family, Kinikinau language	*Along the Paraguay River	**Kadiwéu Indigenous Reserve (MS)	*Castro (2015) **ISA (2020)
Layana (†, !)	*Aruak linguistic family	Along the Paraguay River	Scattered Indians (remnants), some live among the Terena and Kinikinau (MS)	*Castro (2015)
Umutina (!)	*Macro-Jê linguistic trunk; Bororo linguistic family, Umutina	**Along the Paraguay River	**Paraguay River (upper basin) and Barra dos Bugres (MT)	*ISA (2020); **Neuburger and Silva (2011)

(continued)

Table 19.1 (continued)

Indigenous communities	Native language	Past location	Current location	Source
Bororo (!)	*Macro-Jê linguistic trunk; Bororo linguistic family, Bororo language	**Northern stretch of the upper Paraguay basin including the São Lourenço River until its junction with the Cuiabá River	***Village of Teresa Cristina and village of Pirigara, upper basin (MT); ****on the banks of the São Lourenço River (MT)	*ISA (2020); **Frič and Radin (1906); ***Neuburger and Silva (2011); **** Silva (2020)

Symbols of the legend: + (considered extinct); † (considered extinct in the past); ! (remaining peoples) and * to **** (in the column source gives the source that cited the information presented in the other columns)

1946). Before they migrated to the Pantanal, Brazil, they lived in the Spanish colony that became Paraguay in 1811 (Table 19.1).

Among the remaining peoples, some with small populational groups still live in the Pantanal. They are peoples with distinct languages and cultures (Table 19.1) that still keep their ways of life and utilize resources as part of their diet (Oliveira 1996; Bittencourt and Ladeira 2000; Ribas et al. 2001; Bortolotto et al. 2015). Several indigenous peoples were considered extinct in the Pantanal or in the process of extinction, such as the Payaguá, known as "lords of the river" (Oliveira 2002) and the Mbayá (Métraux 1946). In the years 1940 and 1941, Schmidt (1949) met a Payaguá Indian woman in Assunción (Paraguay) who was a representant, at that time one of the few remaining members of that ethnic group that was so populous in the past. The author commented that there might be others "on the other bank of the Paraguay River," but it would be difficult to identify them. According to Barros (2013), the last Payaguá speaker died in 1940, and both the Mbayá language and Payaguá are extinct (Table 19.1). Indeed, there is no record of this ethnicity in the Pantanal today. However, as other peoples seen as extinct in the past are emerging and are in the process of recognition, like Guató, Kinikinau, and Layana (Table 19.1), it is possible to think that these ethnic groups, or at least the biological descendants, are only hidden and not extinct. Many of these indigenous communities face the rapid decline of their ancestral languages. The Guató, Kinikinau and Chiquitano languages (Table 19.1) are classified as critically endangered, and Umutina language is considered extinct (Moseley 2010).

Nowadays, besides the Guató, considered extinct in the past, but living on the edge of the Uberaba Lake (Fig. 19.2), which is linked to the Paraguay River (Table 19.1), there are also isolated Indians and descendants living in small traditional communities, among big cattle ranches and the towns of Corumbá, Ladário, and Porto Murtinho, the latter in the Chaco area. Others migrated to the uplands, like the Bororo, or elsewhere in the Pantanal, away from the Paraguay River, e.g., the Terena, Kinikinau, and Kadiwéu (Table 19.1).

Fig. 19.2 View of the Guató village, on the edge of the Uberaba Lake, Corumbá, Mato Grosso do Sul, Brazil. (Picture by Ieda Maria Bortolotto)

Many Indians continued to stay in villages and small traditional communities located along the Paraguay River (Fig. 19.3), on the western edge of the Pantanal, next to descendants of European and African origin (Bortolotto and Amorozo 2012). The Albuquerque community is one of the oldest along the Paraguay River, founded at the end of the eighteenth century, in an area that was occupied by indigenous dwellers of various ethnicities (Bortolotto and Guarim-Neto 2004). Nowadays, the traditional communities and the Guató live from hunting, fishing, growing small subsistence crops, keeping some animal husbandry, craftsmanship, and, increasingly, tourism (Bortolotto and Amorozo 2012). Recent studies have discussed aspects related to sustainability in the rural area and demand public policies that respect essential social aspects of human life, intrinsically related to nature (Bortolotto et al. 2017; Chiaravalloti et al. 2017; Chiaravalloti 2019; Tomas et al. 2019).

19.3 Material and Methods

19.3.1 Historical Background

The data presented in this work were compiled from ethnobotanical and ethnographic studies or reports of chroniclers with information on the uses of food plants that occur in the Pantanal, especially for the Pantanal of the Paraguay River,

Fig. 19.3 Amolar community, Paraguay River, and hills in the background. (Picture by Ieda Maria Bortolotto)

Nhecolândia, Miranda, and Aquidauana (Silva and Abdon 1998), on the western edge of the Pantanal. We used primary and secondary sources (from the literature), mainly since the nineteenth century, but also used data on plants used by human populations since the European arrival in the sixteenth century. The species indicated as food by the indigenous peoples of the Chaco that moved to the borders of Paraguay, Bolivia, Argentina, and Brazil (Métraux 1942, 1946; Oberg 1949) were included when it concerned plant species that occur in the Pantanal vegetation (in Brazil) or were used by groups that migrated to Brazil.

As regards presently used food plants, we included species recently cited in ethnobotanical studies carried out along the Paraguay River (Bortolotto et al. 2015), (Bortolotto et al. 2019) or species used in cooking workshops carried out in communities in the Pantanal (Damasceno-Junior et al. 2010; Bortolotto et al. 2017). Edible species mentioned by some authors (Pott and Pott 1994; Pott and Pott 2000; Bortolotto et al. 2018) have been included to indicate the potential use of plants native to the Pantanal. Vernacular names (in Portuguese and the indigenous language) were included, as shown in the consulted literature. We also included species that occur on the hills of residual relief that remained in the floodplain.

For homonymous ethnospecies, such as *bocaiuva*, *ata*, *canjiqueira*, *jatobá*, wild rice, and *algarobo* belonging to genera such as *Acrocomia*, *Annona*, *Byrsonima*, *Hymenaea*, *Oryza*, and *Prosopis*, respectively, we added known food species that

occur in the Pantanal nowadays and that are mentioned in other reports (Pott and Pott 1994; Pott and Pott 2000; Bortolotto et al. 2018; Sartori et al. 2018). We also included the recently described species of *bocaiuva* (*Acrocomia corumbaensis* S.A.Vianna) (Vianna 2017). Cavalcanti and Albuquerque (2013) defined as "hidden diversity" a set of different homonymous ethnospecies "hidden" under the same common name among the medicinal plants of the Northeast of Brazil. We will follow that line regarding food plants, thus widening the information on species richness with food uses occurring in the Pantanal.

19.3.2 Sources of Data on Plants

In the Pantanal, as well as in other Brazilian regions and other South American countries, the first reports on plants utilized by indigenous peoples were made by European colonizers; they used indigenous vernacular names or their own names (in the conqueror's language), often associating with similar food plants in their countries of origin, but these generally were not documented with botanical collections. A recent study that analyzed documents of the Portuguese crown that colonized the Brazilian coast after 1500 (Tomchinsky and Ming 2019) identified 183 native and exotic edible plant species used in the sixteenth to eighteenth centuries in Brazil. That study used letters and original documents, as well as textual descriptions and images available in old works, with information on the origin, distribution area, and the common names, to identify the mentioned species.

Unlike what occurred on the coast, the western Brazilian area now known as Pantanal started to be appropriated by the Spanish crown by provisions in the "Tratado de Tordesilhas" after the beginning of the sixteenth century (Cintra 2012). Thus, the letters and reports of travelers and chroniclers who participated in the Spanish crown expeditions are sources of historical and ethnographic data for the sixteenth to eighteenth centuries (Schuch 1995) and also represent the first historical sources on the indigenous food plants of the Pantanal. Of course, the indigenous ethnicities that lived in that region shared a territory without the borders presently established with the neighboring countries (Paraguay and Bolivia).

The Spanish conqueror Alvar Nuñez Cabeza de Vaca who entered the Pantanal in 1543 (Cabeza de Vaca 1555, Costa 1999), and Ulrico Schmidl (Schmidl 1903), a German soldier, who participated in Iberian expeditions in the period of 1536–1548 (Kloster and Sommer 1942), made the firsts reports on the plants used by the indigenous people. Georg Heinrich von Langsdorff, who led a scientific expedition between the years 1826 and 1828 (Silva et al. 1997), and Hercules Florence, one of the two illustrators in the team (Florence 2007), narrated several facts pertinent to the results of that expedition. They crossed the Pantanal and collected hundreds of specimens of the local fauna and flora, and they recorded usages and objects in drawings (Silva et al. 1997). Alfredo d'Escragnolle Taunay (Taunay 1868; Taunay 1931) was a military who was in the Aquidauana and Miranda Pantanal during the Paraguayan War at the end of the nineteenth century; he

recorded mainly on the Chané and Guaná, but he also mentioned the Terena, Kinikinau, Laiana, Guaikurús, and other indigenous groups.

Max Schmidt, an ethnologist (Schmidt 1942), and Alberto Vojtěch Frič, an ethnographer and botanist (Frič and Radin 1906), studied the Guató and Bororo, respectively, both at the beginning of the twentieth century. Alfred Métraux was an anthropologist who assembled many data written about the Indian cultures of the Chaco from the sixteenth to the mid-twentieth centuries (Métraux 1946). Among the indigenous groups studied by them are those who lived in the north of the Chaco and the south and west of the state of "Matto Grosso" (Métraux 1942), presently being the State of Mato Grosso do Sul, created after the division of the former State of Mato Grosso in 1977. Kalervo Oberg was an anthropologist who studied the Terena and the Caduveo in the Pantanal (Oberg 1949).

Tekla Hartmann (Hartmann 1967) was, probably, the first researcher to use the term ethnobotany in a scientific report on the Pantanal and the first research woman in this region. She studied the nomenclature of plants used by the Bororo Indians in the second half of the twentieth century. In the same period, Jorge Eremites Oliveira carried out a study on the ethnohistory among the Guató, providing several names of food plants with their respective names in the Guató language (Oliveira 1996). Other historians collected primary data about the Pantanal indigenous human culture, including information on food plants used by them (Schuch 1995; Herberts 1998).

Many botanists (Conceição and Paula 1984; Berg 1986; Conceição and Paula 1990; Pott and Pott 1994; Guarim Neto et al. 2000; Pott and Pott 2000) gathered information about useful plants collected in the Pantanal. They made observations at the collection sites and linked that to literature sources and plant specimens deposited in herbaria. Several ethnobotanical studies carried out in communities along the Paraguay River have focused specifically on indigenous and traditional communities in Mato Grosso do Sul (Bortolotto and Damasceno-Junior 1998; Bortolotto 1999; Bortolotto et al. 2015; Bortolotto et al. 2019; Bortolotto 2006; Seleme et al. 2020), while other studies focusing on populations in Mato Grosso (Carniello 2007; Santos et al. 2016; de Morais and da Silva 2010) provided information on food plants used by them.

19.4 Results

19.4.1 Historical Background

The history of utilization of native food plants of the Pantanal is associated with the indigenous peoples that inhabited the region before European arrival in the sixteenth century. Archeological studies in the Pantanal suggest that the first human populations arrived circa 8000 years ago (Bespalez 2015); they explored animal and plant food resources all over the surroundings, i.e., in the floodplain, already

Fig. 19.4 Rock inscriptions at Caracará Hill, Poconé, Mato Grosso, Brazil. (Picture by Geraldo Alves Damasceno Junior)

using canoes, as well as on the slopes of the uplands of Urucum-Amolar. The farmer groups Guarani and Guaná that founded more stable settlements in the hills probably arrived after the first millennium of our era (Schmitz 2015). Besides the traces of those peoples at archeological sites, there are rupestrian inscriptions (sites of rupestrian art) at several points (Fig. 19.4) along the Paraguay River or lakes (Aguiar 2015).

When the first Iberic explorers reached the Pantanal, the indigenous populations of the Pantanal already cultivated food plants domesticated in the Americas (Costa 1999). In 1542, Domingos Martínez de Irala and Alvar Nuñez Cabeza de Vaca found the "Xaray"[1] on the Upper Paraguay River, which were good agriculturists, as were other indigenous tribes in the Upper Paraguay (Métraux 1942). Ulrich Schmidl mentioned "mannduis, turkish wheat, and the 'mandeochade'" (Schmidl 1903), names that refer, respectively, to *Arachis hypogea* L., *Zea mays* L., and *Manihot esculenta* Crantz. Ulrich Schmidl mentioned two varieties of cassava consumed after being cooked.

In chronicler reports of the sixteenth century, there is little information on native food plants. Generally, the chroniclers referred to "fruits," "heart of palms," "roots," or "seeds" consumed by the Indians. One of these, mentioned by Ulrich Schmidl in the contact period, would be the *mbocaja* palm fruits (*Acrocomia* sp.) (Schmidl 1903; Métraux 1942). Native and cultivated plants were also mentioned by Hercule Florence (Florence 2007) and by Georg Heinrich von Langsdorff (Silva

[1] Xaray were no longer known in the eighteenth century; "*In documents produced by Spanish conquerors of the 16th century, the Xaray are written as Xarayes or Jarayes, probably a Guarani nickname: savages of the river" (chara = unkempt, rude, "whooly" and y = water, river)*" (Oliveira and Viana 2000).

et al. 1997), between 1826 and 1828, during a scientific expedition lead by Langsdorff. Besides them, several ethnologists, ethnographers, and more recently ethnobotanists also recorded cultivated and wild plants used by indigenous peoples, especially for the Terena, Chamacoco, Kadiwéu, Guató, and Bororo (Taunay 1868; Frič and Radin 1906; Métraux 1942; Schmidt 1942; Hartmann 1967).

19.4.2 Wild Food Plants Used in the Past

We identified 67 ethnospecies of native plants cited in the literature as food in the past (between the sixteenth and mid-twentieth centuries) (Table 19.2). Those mentioned at the genus level, whose species are included in those listed in Table 19.2, are not considered here. Some ethnospecies were mentioned only by their genus or common name, such as rice, *bocaiuva* (*mbocaja* palm), acuri or uakuri, *algarobo*, and *guavira* (respectively *Oryza*, *Acrocomia*, *Attalea*, *Prosopis*, and *Campomanesia*) (Taunay 1868; Frič and Radin 1906; Métraux 1942; Schmidt 1942; Oberg 1949; Hartmann 1967; Silva et al. 1997; Florence 2007).

Some species were cited with synonyms or were certainly wrong. "Auassú," for example, was mentioned as *Attalea spectabilis* Mart., but that species does not occur in the Pantanal (see the Chap. 3 on Flora). The popular name auassú (babaçú) is traditionally associated with *Attalea speciosa* (Table 19.2). On the other hand, in Hartmann's work (1967), there is also possibly an identification error for "acuri or uakuri" (Table 19.2). Frič and Radin (1906) cited only the popular name "uakuri," and Hartmann (1967) mentioned *Attalea speciosa* Mart. ex Spreng. for the acuri palm. However, in the Pantanal, acuri is a popular name for *Attalea phalerata* and babaçu for *Attalea speciosa*, as mentioned above. Because of this, we are considering that both referred to *Attalea phalerata* when they mentioned the acuri or uakuri for the Bororo indigenous people. Also, other species were possibly mistaken in their identification. *Copernicia prunifera* (Mill.) H. E. Moore (mentioned by the synonym *Copernicia cerifera* (Arruda) Mart.), cited by Métraux (1946) for an indigenous group of the Chaco, probably is *Copernicia alba* (carandá); it is used as a food source by various indigenous people of the South American Chaco (Arenas and Scarpa 2007; Scarpa 2009). Other comments like this will be presented in the text below.

Even though some plants have been mentioned at the species level in other reports, it is likely that the indigenous peoples used all closely related, similar species and not only the one specifically mentioned by the researchers. Métraux (1946), for example, cited *Oryza perennis* Moench (synonym of *Oryza rufipogon* Griff.) for the Payaguá and Gauchi (extinct peoples) and the Mbayá, as will be discussed below. *Oryza rufipogon* is one of the three species of *Oryza* occurring in the Pantanal (Flora do Brasil 2020). To the list of plants with the same common names (ethnospecies) cited in the past (Table 19.2), we added 12 species as possible correspondent to those mentioned in the historical studies: bocaiuva (addition of 1 species), ata (2), guavira (5), arroz (2), and algaroba (2). But several species

Table 19.2 Wild food plants used in the past (from the fifteenth to the mid-twentieth century) mentioned in literature sources

Family	Species and original source	Popular name; *indigenous name (ethnic group, source)	Edible plant parts	Pa	Pr	Pu (sources)
Alismataceae	*Echinodorus grandiflorus* (Cham. & Schltr.) Micheli	Chapéu-de-couro	Tuber	+	–	22
Alismataceae	*Limnocharis flava* (L.) Buchenau	Camalote	Leaf, stem, inflorescence	–	–	22
Alismataceae	*Sagittaria guayanensis* Kunth	Lagartixa, largatissa	Rhizome	–	–	22
Amaranthaceae	*Amaranthus viridis* L.	Caruru	Leaf	–	–	21
Anacardiaceae	*Anacardium humile* A. St.-Hil.	Cajuzinho-do-mato, cajuí, cajuzinho-do-cerrado, cajuzinho-do-campo	Seed (nut), succulent pedicel	–	+	1, 21
Anacardiaceae	*Spondias mombin* L.	Cajá, acaiá, caiá	Fruit	–	+	1, 2, 21
Annonaceae	*Annona aurantiaca* Barb. Rodrig.	Ata	Fruit	‡	–	5
Annonaceae	*Annona cacans* Warm.	Ariticum-cagão	Fruit	–	–	23
Annonaceae	*Annona coriacea* Mart.	Araticum, marolo, pinha-do-cerrado	Fruit	–	+	1
Annonaceae	*Annona cornifolia* A. St.-Hil.	Ata-do-campo	Fruit	+	+	2, 17, 21
Annonaceae	*Annona crassiflora* Mart.	Ata	Fruit	–	+	3
Annonaceae	*Annona dioica* A.St.-Hil.	Arixicum, ariticum	Fruit	–	–	21
Annonaceae	*Annona emarginata* (Schltdl.) H.Rainer	Arixicum-do-mato	Fruit	–	–	21
Annonaceae	*Annona montana* Macfad.	Ata	Fruit	–	–	23
Annonaceae	*Annona nutans* (R.E.Fr.) R.E.Fr.	Ata-brava	Fruit	–	+	2, 3
Annonaceae	*Annona sylvatica* A. St.-Hil.	Ata	Fruit	‡	–	5
Annonaceae	*Annona* sp.	Ata-do-campo	Fruit	–	+	2
Annonaceae	*Duguetia furfuracea* (A.St.-Hil.) Saff.	Ariticunzinho	Fruit	–	–	21
Annonaceae	*Xylopia aromatica* (Lam.) Mart.	Pimenta-de-macaco, pindaíva, pindaíba	Seed	–	+	1, 21

(continued)

Table 19.2 (continued)

Family	Species and original source	Popular name; *indigenous name (ethnic group, source)	Edible plant parts	Pa	Pr	Pu (sources)
Apocynaceae	*Hancornia speciosa* Gomez	Mangaba, mangabeira, *báto í (Bo, 13)	Fruit	+	+	1, 2, 13, 21
Araceae	*Pistia stratiotes* L.	Alface-d'água	Cooked leaf	–	–	22
Araceae	*Urospatha sagittifolia* (Rudge) Schott	–	Rhizome	+	–	22
Araceae	*Xanthosoma striatipes* (Kunth & Bouché) Madison	Almeirão-do-brejo, banana-do-brejo	Spadix, tuber	+	–	22
Arecaceae	*Acrocomia aculeata* (Jacq.) Lodd. ex Mart. (mentioned by the synonym *Acrocomia glaucophylla* Drude (13)	Bocaiuva, macaúba, *áku (Bo, 13), *maguedji (Gt, 16), namogologi (Mb, 17)	Fruit pith, palm heart, seed, sap	+	+	1, 2, 3, 4, 13, 16, 17, 21
Arecaceae	*Acrocomia corumbaensis* S.A.Vianna	Bocaiuva, macaúba	Fruit, pith, palm heart, seed, sap	‡	+	5
Arecaceae	*Acrocomia* spp. (mentioned only by popular name (bocaiuva = similar to macaúba – *Acrocomia* sp.)	Bocaiuva, macauba, mbocaiá, *ecaié (Te, 18), *áku (Bo, 13), amukaya (Ki, 19)	Fruit, pith, palm heart, seed, sap, stipe	+	+	3 15, 18, 19, 20
Arecaceae	*Acrocomia totai* Mart.	Bocaiuva, macauba, mbocaiá, *namogologi (M-G, 11)	Fruit, pith, palm heart, seed, sap, long fibers in the lower part of the trunk (stipe)	+	+	11, 17
Arecaceae	*Allagoptera leucocalyx* Drude	Buri	Fruit, seed	–	+	2, 21
Arecaceae	*Attalea phalerata* Mart. ex Spreng. (mentioned by the synonym *Scheelea phalerata* (Mart. ex Spreng.) Burret (17); *Attalea speciosa* Mart. ex Spreng. (13) and with acepted name)	Acuri, *aucury (6), *mudjí (Gt, 16), *ápe or apído (Bo, 13), *exate (Ki, 19), *etchate (Kw, 17)	Fruit, leaf	+	+	1, 2, 3, 4, 6, 7, 9, 10, 13, 16, 17, 19, 21

(continued)

Table 19.2 (continued)

Family	Species and original source	Popular name; *indigenous name (ethnic group, source)	Edible plant parts	Pa	Pr	Pu (sources)
Arecaceae	*Attalea speciosa* Mart. ex Spreng. (mentioned with the popular name "auassú" and as *Attalea spectabilis* Mart.)	Babaçu, auassú or Chatellôd (Gk, 6)	Fruit, seeds	+	–	6, 21
Arecaceae	*Bactris glaucescens* Drude	Tucum-azedo, tucum-preto, tucum-roxo, tucum-verde, tucum, *magueto (Gt, 16)	Fruit	+	+	1, 2, 3, 4, 16, 21
Arecaceae	*Bactris major* Mart.	Tucum-branco	Fruit	–	+	2
Arecaceae	*Bactris riparia* Barb. Rodr.	Tucum-vermelho	Fruit	–	+	2
Arecaceae	*Bactris* spp. (mentioned by the popular name tucum)	Tucum	Fruit	+	–	10
Arecaceae	*Butia leptospatha* (Burret) Noblick	–	Seed	–	–	23
Arecaceae	*Butia paraguayensis* Barb. Rodr. (mentioned by the synonym *Cocos paraguayensis* Barb. Rodr.)	Butiá, cabeçudo, *yatái-guazú (Mb, 11)	Palm heart, fruit, pith	+	+	1, 11
Arecaceae	*Copernicia alba* Morong ex Morong & Britton (mentioned by the synonym *Copernicia australis* Becc.)	Carandá, *mufá (Gt, 16); *hérena (Gu or Ch, 6); *tugúri (Bo)	Fruit, kernels, pith, palm heart, long fibers in the lower part of the trunk (stipe)	+	+	2, 3, 6, 11, 13, 16, 21
Arecaceae	*Desmoncus orthacanthos* Mart.	Urubamba, tucum-preto	Fruit	–	+	1, 2
Arecaceae	*Mauritia flexuosa* L. f. (mentioned by the synonym *Mauritia vinifera* Mart. and accepted name)	Buriti, *bority or *mority (Tp, 6), *bority maiana heréna (Gu or Ch, 6)	Fruit, stipe	+	–	1, 6, 21
Arecaceae	*Syagrus romanzoffiana* (Cham.) Glassman	Jerivá, coquinho	Fruit, seed	–	+	1

(continued)

Table 19.2 (continued)

Family	Species and original source	Popular name; *indigenous name (ethnic group, source)	Edible plant parts	Pa	Pr	Pu (sources)
Arecaceae	*Syagrus flexuosa* (Mart.) Becc.	Acumã, acuman	Fruit, seed	–	–	21
Arecaceae	*Trithrinax schizophylla* Drude (mentioned by popular name carandaipé)	Carandaipé (11), carandilla, Carandaí		+	–	11, 23
Asteraceae	*Bidens pilosa* L.	Picão	Flower	–	–	21
Asteraceae	*Pacourina edulis* Aubl.	Pacurina	Floral receptacle	–	–	22
Asteraceae	*Stevia rebaudiana* (Bertoni) Bertoni	Caá-êhê (Gr, 23)	Plant	–	–	23
Balanophoraceae	*Langsdorffia hypogaea* Mart.	Paratudo	Inflorescence	–	–	21
Bignoniaceae	*Handroanthus heptaphyllus* (Vell.) Mattos	Piúva, piúva-do'pantanal, piúva-do-campo, piúva-roxa, peúva	Flower (petals)	–	–	21
Bignoniaceae	*Tabebuia aurea* (Silva Manso) Benth. & Hook.f. ex S.Moore	Paratudo	Flower (petals)	–	–	21
Bixaceae	*Bixa orellana* L.	Urucu	Root	+	–	17
Bromeliaceae	*Ananas ananassoides* Baker	Abacaxizinho	Fruit	+	+	1, 2, 17, 21
Bromeliaceae	*Bromelia balansae* Mez.	Sussa, caraguatá (Bo, 21), gravatá, gravateiro	Fruit, young leaf	–	+	3, 21
Bromeliaceae	*Bromelia interior* L.B.Sm.	–	Fruit	–	–	23
Bromeliaceae	*Pseudananas sagenarius* (Arruda) Camargo	Abacaxi-do-mato	Fruit	–	–	23
Burseraceae	*Protium heptaphyllum* (Aubl.) Marchand	Almecega, almésca, armésca, amécicla	Seed (aryl)	–	–	21
Cactaceae	*Brasiliopuntia brasiliensis* (Willd.) A. Berger	–	Fruit	–	–	23
Cactaceae	*Cereus bicolor* Rizzini & Mattos	Urumbeva	Fruit	–	+	2
Cactaceae	*Opuntia* sp. (mentioned as *Opuntia* sp.)	Tuna (Barbary figs)	Fruit	+	–	11, 15

(continued)

Table 19.2 (continued)

Family	Species and original source	Popular name; *indigenous name (ethnic group, source)	Edible plant parts	Pa	Pr	Pu (sources)
Cactaceae	*Pereskia sacharosa* Griseb.	Amapola	Fruit	–	–	21
Cannabaceae	*Celtis iguanaea* (Jacq.) Sarg. (mentioned by the synonym *Celtis pubescens* Spreng.)	Taleira	Fruit	–	+	3, 21
Cannaceae	*Canna glauca L.*	Cana-do-brejo cana, bananinha-do-brejo, cana-do-brejo	Rhizome	–	–	21
Capparaceae	*Anisocapparis speciosa* (Griseb.) Cornejo & Iltis (mentioned by the synonym *Capparis speciosa* Griseb.)	Mangaba-brava, naranja del monte (spanish name)	Fruit, seed	+	+	1, 11
Capparaceae	*Capparicordis tweediana* (Eichler) Iltis & Cornejo	–	Fruit	–	–	23
Capparaceae	*Crateva tapia* L.	*Pajaguanaranka (Gr, 3), cabaceira, cabaceira-do-pantanal,cabeceira	Fruit	–	+	1, 21
Capparaceae	*Cynophalla retusa (*Griseb.) Cornejo & Iltis (mentioned by the synonym *Capparis retusa* Griseb.)	Poroto del monte (spanish name)	Pods	+	–	11, 21
Caricaceae	*Jacaratia corumbensis* Kuntze (mentioned by the synonym *Jacaratia hassleriana* Chodat)	Jaracatiá, cipoy (Chaco Indians)	Tuber, fruit	+	+	1, 11, 21
Caryocaraceae	*Caryocar brasiliense* Cambess.	Pequi, piqui, pequi-do-campo, pequizeiro, *éko í (Bo, 13)	Fruit	+	+	1, 2, 3,4, 6, 13, 21
Celastraceae	*Salacia elliptica* (Mart. ex Schult.) G. Don	Siputá, sitoba, mats´í (Gt, 16)	Fruit	+	+	1, 2, 9, 10, 17
Celastraceae	*Peritassa campestris* (Cambess.) A.C. Sm.	Bacupari	Fruit	–	–	23

(continued)

Table 19.2 (continued)

Family	Species and original source	Popular name; *indigenous name (ethnic group, source)	Edible plant parts	Pa	Pr	Pu (sources)
Celastraceae	*Tontelea micrantha* (Mart. ex Schult.) A.C. Sm.	Bacupari-do-cerrado, siputá-do-cerrado	Fruit	–	–	23
Chrysobalanaceae	*Couepia grandiflora* (Mart. & Zucc.) Benth.	Genciana, suquiana	Fruit	–	–	21
Chrysobalanaceae	*Couepia uiti* (Mart. & Zucc.) Benth. ex Hook.f.	Pateiro, fruta-de-pato, bola-de-bugio	fruit	–	+	1, 2, 3, 4, 21
Clusiaceae	*Garcinia gardneriana* (Planch. & Triana) Zappi	Acupari, cupari, bacupari	Fruit	–	+	1, 2, 21
Combretaceae	*Terminalia argentea* Mart. et Zucc.	Capitão	Trunk bark (tea)	–	–	21
Combretaceae	*Terminalia corrugata* (Ducke) Gere & Boatwr. (mentioned by the synonym *Buchenavia tomentosa* Eichler)	Tarumarana	Fruit	–	+	1, 2, 21
Convolvulaceae	*Ipomoea alba L.*	Viuviu, abre-noite-fecha-dia	Flower (chalice), seed	–	–	21
Costaceae	*Costus arabicus* L.	Caninha-do-brejo, cana- brava	Rhizome	–	–	21
Dilleniaceae	*Curatella americana* L.	Lixeira	Seed (aryl)	–	–	21
Dilleniaceae	*Doliocarpus dentatus* (Aubl.) Standl.	Cipó-de-fogo	Sap	–	–	21
Dioscoreaceae	*Dioscorea hassleriana* Chodat	–	Tuber	–	–	23
Dioscoreaceae	*Dioscorea trifida* L.	Japecanga	Tuber	–	–	21
Ebenaceae	*Diospyros lasiocalyx* (Mart.) B.Walln. (mentioned by the synonym *Diospyros hispida* A.DC.)	Fruta-de-boi, olho-de-boi	Fruit	–	+	2, 21
Ebenaceae	*Diospyros dalyom* B.Walln. (mentioned as *Diospyros obovata* Jacq.)	Olho-de-boi	Fruit	–	+	2, 21
Fabaceae	*Canavalia mattogrossensis* (Barb. Rodr.) Malme	Feijão-bravo, fijão-do-mato, faveirinho	Seed	–	–	21

(continued)

Table 19.2 (continued)

Family	Species and original source	Popular name; *indigenous name (ethnic group, source)	Edible plant parts	Pa	Pr	Pu (sources)
Fabaceae	*Cassia grandis* L. (mentioned by the popular name)	Canafístula	Fruit	+	+	2, 12
Fabaceae	*Copaifera coriacea* Mart.	Guaranazinho	Seed (aryl)	–	–	21
Fabaceae	*Dipteryx alata* Vogel	Cumbaru, baru	Seed	–	+	1, 21
Fabaceae	*Discolobium pulchellum* Benth	Cortiça	Flower	–	–	22
Fabaceae	*Geoffroea spinosa* Jacq. (mentioned by the synonym *Geoffroea striata* (Willd.) Morong)	Amendoim-do-mato	Fruit, seed	–	+	3
Fabaceae	*Hymenaea courbaril* L.	Jatobá-mirim, jatobá-preto, jatobá	Seed (sarcotesta)	–	+	1, 2, 4, 21
Fabaceae	*Hymenaea martiana* Hayne	Jatobá	Fruit	–	+	23
Fabaceae	*Hymenaea* sp.	Jatobá, *muku (Gt, 9, 16), jatobá-da-floresta (13), *bokwadí (Bo 13)	Seed (sarcotesta)	+	–	6, 9, 13, 16
Fabaceae	*Hymenaea stigonocarpa* Mart. ex Hayne	Jatobá-cascudo, jatobá, jatobá-do-cerrado (13), rumága í (Bo, 13)	Seeds (sarcotesta)	+	+	1, 2, 4, 13, 21
Fabaceae	*Inga laurina* (Sw.) Willd.	Ingá	Fruit	–	+	3
Fabaceae	*Inga vera* Willd.	Ingá	Fruit	–	+	1, 2, 3
Fabaceae	*Phaseolus lunatus* L.	Feijãozinho, fejão-fava	Seed	–	–	23
Fabaceae	*Prosopis alba* Griseb.	Algaroba, algarobo	Fruit	+	–	11
Fabaceae	*Prosopis nigra* Hieron.	Algaroba, algarobo	Fruit	+	–	11
Fabaceae	*Prosopis rubriflora* Hassl.	Algarobo-preto	Fruit	‡	+	3
Fabaceae	*Prosopis ruscifolia* Griseb.	Algarobo	Fruit	‡	+	3, 21
Fabaceae	*Prosopis* spp. (mentioned only as popular name)	Algarobo, *havahú (Pa, 12)	Fruit	+	–	11, 12, 17

(continued)

Table 19.2 (continued)

Family	Species and original source	Popular name; *indigenous name (ethnic group, source)	Edible plant parts	Pa	Pr	Pu (sources)
Fabaceae	*Samanea tubulosa* (Benth.) Barneby & J.W. Grimes	Farinha-seca	Fruit	–	–	21
Fabaceae	*Senna occidentalis* (L.) Link	Fedegoso	Seed	–	+	1, 2, 3, 21
Fabaceae	*Vachellia farnesiana* (L.) Wight & Arn.	Aromita	Fruit	–	+	3
Icacinaceae	*Emmotum nitens* (Benth.) Miers	Sobre	Fruit	–	–	23
Lamiaceae	*Vitex cymosa* Bertero ex Spreng.	Tarumã, taruma (7), *madô (Gt, 16)	Fruit, flower	+	+	1, 2, 3, 7, 9, 10, 16, 21
Lamiaceae	*Vitex megapotamica* (Spreng.) Moldenke(mentioned as the synonym *Vitex montevidensis* Cham.)	Tarumá	Fruit, flower	+	–	6, 11
Lecythidaceae	*Eschweilera nana* (O. Berg) Miers	Ovo-frito	Seed	–	–	23
Malpighiaceae	*Byrsonima arthropoda* A.Juss.	Uvinha	Fruit	–	+	1, 4, 21
Malpighiaceae	*Byrsonima chrysophylla* Kunth	Mureci-penina	Fruit	+	–	6
Malpighiaceae	*Byrsonima coccolobifolia* Kunth	Canjiqueira	Fruit	–	–	21
Malpighiaceae	*Byrsonima crassifolia* (L.) Kunth	Canjicão	Fruit	–	–	21
Malpighiaceae	*Byrsonima cydoniifolia* A.Juss. (mentioned as *B. orbignyana* A. Juss.)	Canjiqueira, canjiquinha, canjica, murici	Fruit	–	+	1, 2
Malpighiaceae	*Byrsonima intermedia* A. Juss.	Murici-do-campo	Fruit	–	–	23
Malpighiaceae	*Byrsonima verbascifolia* (L.) DC.	Mureci-do-pantanal	Fruit	+	–	6, 21
Malvaceae	*Guazuma ulmifolia* Lam.	Chico-magro, mutambo	Fruit	–	+	1, 2, 21
Malvaceae	*Sterculia apetala* (Jacq.) H. Karst	Mandovi, manduvi, manduvizeiro, amendoim-de-bugre	Seed	–	+	1, 21

(continued)

Table 19.2 (continued)

Family	Species and original source	Popular name; *indigenous name (ethnic group, source)	Edible plant parts	Pa	Pr	Pu (sources)
Malvaceae	*Sterculia striata* A.St.-Hil. & Naudin (mentioned with the popular name mandubiru)	Manduvi, amendoim-de-arara, xixá, mandubirú (12)	Seed	+	+	1, 2, 12
Marantaceae	*Thalia geniculata L.*	Caeté, acité, banana-d'água	Rhizome	–	–	21
Melastomataceae	*Clidemia biserrata* DC.	Cambucá-do-campo, cambucá-do-firme	Fruit	–	+	1, 4
Melastomataceae	*Mouriri elliptica* Mart.	Coroa-de-frade, coroa	Fruit	–	+	1, 21
Melastomataceae	*Mouriri guianensis* Aubl.	Roncador, *môguâadô (Gt, 16)	Fruit	+	+	2, 16, 21
Menispermaceae	*Abuta grandifolia* (Mart.) Sandw.	Grão-de-galo	Fruit	–	+	1, 2. 4
Menispermaceae	*Disciphania ernstii* Eichler	Uva-do-mato	Fruit	–	+	1
Moraceae	*Sorocea saxicola* Hassl. (mentioned as *Sorocea sprucei* (Baill.) J.F. Macbr.)	Figueirinha, figueirinha-do-pantanal, leiteiro	Fruit	–	+	21
Moraceae	*Brosimum gaudichaudii* Trec.	Mama-cadela, algodãozinho, chiclete-do-cerrado	Fruit	–	+	1, 21
Moraceae	*Ficus pertusa* L.f.	Figueirinha* ou figueira-de-folha miúda	Fruit	–	–	23
Moraceae	*Maclura tinctoria* (L.) D. Don ex Steud.	Amora-brava, taiuva	Fruit	–	+	1, 2, 21
Myrtaceae	*Campomanesia adamantium* (Cambess.) O. Berg	Guavira, gabiroba, guabiroba,	Fruit	‡	+	1, 3, 4
Myrtaceae	*Campomanesia eugenioides* (Cambess.) D. Legrand ex Landrum	Guavira, gabiroba, guabiroba,	Fruit	‡	–	21
Myrtaceae	*Campomanesia lineatifolia* Ruiz & Pav.	Guavira, gabiroba, guabiroba,	Fruit	‡	–	5

(continued)

Table 19.2 (continued)

Family	Species and original source	Popular name; *indigenous name (ethnic group, source)	Edible plant parts	Pa	Pr	Pu (sources)
Myrtaceae	*Campomanesia pubescens* (Mart. ex DC.) O. Berg	*Jokukuietái (Bo, 13)	Fruit	+	+	1, 4, 13
Myrtaceae	*Campomanesia sessiliflora* (O.Berg) Mattos	Guavira, gabiroba, guabiroba,	Fruit	‡	+	1, 21
Myrtaceae	*Campomanesia* sp. (mentioned as *Eugenia* spp.)	Guavira, guabiroba, araçá-do-campo	Fruit	+	–	6
Myrtaceae	*Campomanesia xanthocarpa* (Mart.) O.Berg	Guavira, gabiroba	Fruit	‡	–	5
Myrtaceae	*Eugenia aurata* O. Berg	–	Fruit	–	–	21
Myrtaceae	*Eugenia dysenterica* (Mart.) DC.	Cagaita, cagaiteira	Fruit	+	+	1, 6
Myrtaceae	*Eugenia egensis* DC.	–	Fruit	–	–	21
Myrtaceae	*Eugenia florida* DC.	–	Fruit	–	–	21
Myrtaceae	*Eugenia inundata* DC.	–	Fruit	–	–	21
Myrtaceae	*Eugenia involucrata* DC.	Cereja-do-cerrado	Fruit	–	+	1
Myrtaceae	*Eugenia matogrossensis* Sobral	Guariroba	Fruit	–	–	1
Myrtaceae	*Eugenia pitanga* (O. Berg) Kiaersk.	Pitanga	Fruit	–	+	1
Myrtaceae	*Eugenia punicifolia* (Kunth.) DC.	–	Fruit	–	–	23
Myrtaceae	*Eugenia pyriformis* Cambess.	Eucaliptinho	Fruit	–	–	21
Myrtaceae	*Eugenia stictopetala* Mart. ex DC. (mentioned by the synonym *Eugenia tapacumensis* O. Berg)	Cambucá, língua-de-cachorro	Fruit	–	–	21
Myrtaceae	*Eugenia repanda* O. Berg	–	Fruit	–	–	23
Myrtaceae	*Eugenia subterminalis* DC.	–	Fruit	–	–	23
Myrtaceae	*Eugenia uniflora* L.	Pitanga	Fruit	–	+	2, 3

(continued)

Table 19.2 (continued)

Family	Species and original source	Popular name; *indigenous name (ethnic group, source)	Edible plant parts	Pa	Pr	Pu (sources)
Myrtaceae	*Myrcia palustris* DC. (mentioned by the synonym *Gomidesia palustris* (DC.) Kaussel)	Balsemim, jacarezinho	Fruit	–	–	21
Myrtaceae	*Myrcia splendens* (Sw.) DC. (mentioned by the synonym *Myrcia fallax* (Rich.) DC.)	Miguá (Gt, 16)	Fruit	+	–	16, 21
Myrtaceae	*Plinia cauliflora* (DC.) Kausel	Jabuticaba, jabuticaba-nativa	Fruit	+	+	1, 3, 10
Myrtaceae	*Psidium acutangulum DC.*	Araçá	Fruit	–	+	1
Myrtaceae	*Psidium guineense* Sw.	Araçá	Fruit	–	–	21
Myrtaceae	*Psidium* sp.	Goiabinha, goiabinha-do-mato	Fruit	–	+	2
Myrtaceae	*Psidium* sp. (mentioned with the popular name)	Araçá-de-corôa	Fruit	+	–	6
Myrtaceae	*Psidium striatulum* Mart. ex DC. (mentioned by the synonym *Psidium persicifolium* O. Berg)	Goiabinha	Fruit	–	–	21
Myrtaceae	*Psidium sartorianum* (O. Berg) Nied.	Araçá	Fruit	–	–	23
Nymphaeaceae	*Nymphaea amazonum* Mart. & Zucc.	Lagartixa	Rhizome	+	–	22
Nymphaeaceae	*Victoria amazonica* (Poepp.) J.C. Sowerby* (mentioned with the popular name (9, 11) forno d-água and with the accepted name)	Forno d'água, vitória-régia, muguãtã (Gt, 16)	Seed, rhizome, petiole	+	+	1, 2, 9, 11, 16, 22
Olacaceae	*Ximenia americana* L.	Limão-bravo, limãozinho	Fruit	–	–	21
Opiliaceae	*Agonandra brasiliensis* Miers ex Benth & Hook.f.	Pau-marfim, tinge-cuia	Fruit	–	+	1, 21

(continued)

Table 19.2 (continued)

Family	Species and original source	Popular name; *indigenous name (ethnic group, source)	Edible plant parts	Pa	Pr	Pu (sources)
Orchidaceae	*Vanilla palmarum* (Salzm. ex Lindl.) Lindl.	Baunilha-de-acuri	Fruit	–	+	1, 21
Passifloraceae	*Passiflora amethystina* J. C. Mikan	Maracujá	Fruit	–	–	23
Passifloraceae	*Passiflora cincinnata* Mast.	Maracujá-do-mato	Fruit	–	+	2
Passifloraceae	*Passiflora edulis* Sims	Maracujá	Fruit	–	+	23
Passifloraceae	*Passiflora foetida* L.	Maracujá-do-mato	Fruit	–	–	23
Passifloraceae	*Passiflora gibertii* N. E. Br.	Maracujazinho, maracujá-bravo, maracujá-do-mato	Fruit	–	+	1
Passifloraceae	*Passiflora misera* Kunth	Maracujá-do-mato, maracujá-nativo	Fruit	–	+	2
Passifloraceae	*Passiflora* sp. (mentioned by popular name maracujá)	Maracujá	Fruit	+	–	10
Piperaceae	*Piper aduncum* L.	Pimenta-do-mato	Fruit	–	+	21
Piperaceae	*Piper arboreum* L.	Pimenta-do-mato, pimenta-de-macaco, dedo- de-urubu	Fruit	–	–	21
Poaceae	*Leersia hexandra* Sw.	Felpudinho, grameiro, arrozinho, grama-do-brejo, capim-navalha	Seed	–	–	22
Poaceae	*Oryza grandiglumis* (Döll) Prod.	Arroz-do-campo	Seed	‡	–	5
Poaceae	*Oryza latifolia* Desv.* (sometimes mentioned as the synonym *Oryza alta* Swallen)	Arroz-do-campo, arroz-bravo, arroz-do-brejo, matchamo (Gt, 16)	Seed	+	+	1, 2, 4, 5, 16, 22, 23
Poaceae	*Oryza rufipogon* Griff. (Sometimes mentioned as the synonym *O. glumaepatula* Steud.)	Arroz-do-campo, *matchamo (Gt, 16)	Seed	+	–	1, 2, 4, 5, 11, 22, 23

(continued)

Table 19.2 (continued)

Family	Species and original source	Popular name; *indigenous name (ethnic group, source)	Edible plant parts	Pa	Pr	Pu (sources)
Poaceae	*Oryza* spp. (mentioned only as popular name or as *Oryza sativa* L.)	Wild rice, rice, nacacú (Gu or Ch 6)	Seed	+	−	6, 7, 8, 9, 10, 12, 14, 15
Polygonaceae	*Coccoloba ochreolata* Wedd.	Porô	Fruit	−	+	3
Polygonaceae	*Coccoloba parimensis* Benth.	Canjiquinha, rosarinho, uvinha	Fruit	−	+	2, 21
Polygonaceae	*Coccoloba rigida* Willd. ex Meisn.	Poró	Fruit, seed, pith, leaf	−	+	3
Pontederiaceae	*Eichhornia crassipes* (Mart.) Solms	Camalote	leaf, flower	−	+	3, 22
Pontederiaceae	*Pontederia cordata* L.	Guapé, aguapé	Seed	−	−	22
Portulacaceae	*Portulaca grandiflora* Hook. (mentioned by the synonym *Portulaca fluvialis* D. Legrand)	Nove-horas, nove-hora, onze-horas	Leaf	−	−	21
Rhamnaceae	*Rhamnidium elaeocarpum* Reissek	Cabriteira	Fruit	−	+	2, 3, 21
Rhamnaceae	*Sarcomphalus mistol* (Griseb) Hauenschild.	Mistol	Fruit	+	+	3, 11
Rhamnaceae	*Ziziphus oblongifolius* Moore	Fruto-de-cabra, veludinho, olho-de-boi, *macariguá (Gt, 16)	Fruit	+	+	2, 16, 21
Rubiaceae	*Alibertia edulis* (Rich.) A. Rich. ex DC. (mentioned as “marmelada, from the Rubiaceae family”)	Marmelo, marmelada, marmelada-olho-de-boi, marmelada-de-bola	Fruit	+	+	1, 2, 4, 6, 21
Rubiaceae	*Cordiera sessilis* (Vell.) Kuntze	Marmelada, marmelada- preta, marmelada-de-cachorro	Fruit	+	−	6, 21
Rubiaceae	*Genipa americana* L.	Jenipapo, jenipapeiro, *mató (Gt, 16); *bíe í (Bo, 13), *notiquigó (M-G)	Fruit	+	+	1, 2, 3, 13, 16, 21

(continued)

Table 19.2 (continued)

Family	Species and original source	Popular name; *indigenous name (ethnic group, source)	Edible plant parts	Pa	Pr	Pu (sources)
Rubiaceae	*Randia heteromera* Judkevich & R.M. Salas (mentioned as *Randia armata* (Sw.) DC.)	Veludo-de-espinho, espinheiro, unha-de-gato	Fruit	–	–	21
Rubiaceae	*Rudgea viburnoides* (Cham.) Benth.	Veludo	Fruit	–	–	23
Rutaceae	*Esenbeckia almawillia* Kaastra	Côca (tea)	Leaf	–	+	2
Salicaceae	*Casearia sylvestris* Sw.	Chá-de-frade	Fruit	–	–	21
Sapindaceae	*Allophylus edulis* (A. St.-Hil., A. Juss. & Cambess.) Hieron. ex Niederl.	Cuncun	Fruit	–	–	23
Sapindaceae	*Allophylus pauciflorus* Radlk.	Cuncun	Fruit	–	–	23
Sapindaceae	*Cardiospermum halicacabum* L.	Poca	Seed, leaf	–	–	21
Sapindaceae	*Dilodendron bipinnatum* Radlk.	Mulher-pobre, maria- pobre, mãe-pobre	Seed	–	–	21
Sapindaceae	*Melicoccus lepidopetalus* Radlk.	Água-pomba, *mapó' (Gt, 16)	Fruit, seed	+	+	1, 2, 6, 16, 21
Sapindaceae	*Paullinia elegans* Cambess.	–	Seed (aryl)	–	–	21
Sapindaceae	*Paullinia pinnata* L.	Cipó-cinco-folha, fruta-de- pomba (1)	Seed (aryl)	–	–	21
Sapindaceae	*Talisia esculenta* (A. St.-Hil.) Radlk.	Pitomba	Fruit	–	+	1, 2
Sapotaceae	*Chrysophyllum marginatum* (Hook. & Arn.) Radlk	Leiteirinho, uvinha, pimenteira-de-aranquã	Fruit	–	–	21
Sapotaceae	*Pouteria gardneri* (Mart. & Miq.) Baehni	Frutinha-de-veado	Fruit	–	–	23
Sapotaceae	*Pouteria glomerata* (Miq.) Radlk.	Laranjinha-de-pacu, laranjinha, moranguinha, parada, *macondjê (Gt, 16)	Fruit	–	+	1, 2, 4, 21

(continued)

Table 19.2 (continued)

Family	Species and original source	Popular name; *indigenous name (ethnic group, source)	Edible plant parts	Pa	Pr	Pu (sources)
Sapotaceae	*Pouteria ramiflora* (Mart.) Radlk.	Fruta-de-veado, fruteira	Fruit	–	–	21
Sapotaceae	*Sideroxylon obtusifolium* (Roem. & Schult.) T.D. Penn.	Guajuviraí, laranjinha-preta	Fruit	–	–	21
Solanaceae	*Capsicum baccatum* L.	Pimenta	Fruit	–	–	23
Solanaceae	*Physalis peruviana L.*	–	Fruit	–	–	21
Solanaceae	*Solanum paniculatum* L.	Jurubeba	Fruit	–	+	1, 3
Talinaceae	*Talinum fruticosum* (L.) Juss. (mentioned as the synonym *Talinum triangulare* (Jacq.) Willd.)	Caruru, alfavaca	Leaf, bud	–	–	21
Typhaceae	*Typha domingensis* Pers. (mentioned with the popular name totora)	Totora, taboa	Rhizome, seed, bud, pollen, young plant	+	–	17, 22
Urticaceae	*Cecropia pachystachya* Trec.	Embaúba, embauva	Fruit	–	+	2, 4, 21
Urticaceae	*Urera aurantiaca* Wedd.	Urtiga-de-pacu, urtiga, casanção	Fruit	–	–	21
Verbenaceae	*Lantana trifolia* L.	Cidreira (falsa), uvinha- do-campo	Fruit	–	–	21
Verbenaceae	*Lippia alba* (Mill.) N.E. Br. ex Britton & P. Wilson	Cidreira-do-campo, chá-de-zezinho	Leaf (tea)	–	–	23
Vitaceae	*Cissus campestris* (Baker) Planch.	Cipó-de-arraia	Fruit	–	–	21

Common Portuguese name and indigenous name, family and plant species (scientific name in original source), vegetation type, edible plant parts, and literature

popular name; *indigenous name (indigenous ethnicity): Bo (Bororo), Gu or Ch (Guaná or Chané), Gr (Guarani), Gk (Guaikuru), Gt (Guató), M-G (Mbayá-Guaikuru), Mb (Mbayá), Pa (Payaguá), Te (Terena). Pa (past), Pr (present), Pu (potential use). Confirmed use (+), no information (−), use in the past suggested in this work (‡). **Sources: 1 =** Damasceno-Junior et al. (2010)**, 2 =** Bortolotto et al. (2015)**, 3 =** Bortolotto et al. (2019)**, 4 =** Bortolotto et al. (2017)**, 5 = this work , 6 =** Taunay (1868)**, 7 =** Frič and Radin (1906)**, 8 =** Silva et al. (1997)**, 9 =** Schmidt (1942)**, 10 =** Métraux (1942)**, 11=** Métraux (1946)**, 12 =** Schmidt (1949)**, 13 =** Hartmann (1967)**, 14 =** Florence (2007)**, 15 =** Oberg (1949)**, 16 =** Oliveira (1996)**, 17 =** Herberts (1998)**, 18 =** Bittencourt and Ladeira (2000)**, 19 =** Souza (2008)**, 20 =** Schmídel (1903)**, 21 =** Pott and Pott (1994)**, 22 =** Pott and Pott (2000)**, 23 =** Bortolotto et al. (2018)

identified so far only with their local name and mentioned by Hartmann (1967) for the Bororo still need proper botanical identification. That is the case for wild varieties such as "kanho," "mxi," or "óko," which were not included here.

19.4.3 Wild Food Plants Used in the Present and with Potential Use

Besides the species used in the past, we included 96 known to be eaten nowadays in the Pantanal and 87 edible species occurring in the Pantanal with potential use. This totals to 211 species belonging to 134 genera and 61 botanical families (Table 19.2). All of these species have food potential for the future. Among the 67 species cited between the sixteenth and mid-twentieth centuries, 33 were not mentioned in the recent ethnobotanical studies (Bortolotto et al. 2015; Bortolotto et al. 2019). Some of these are well-known as food plants, e.g., *Prosopis alba* Griseb., *P. nigra* Hieron., *Attalea speciosa* Mart. *ex* Spreng., *Mauritia flexuosa* L.f., *Mouriri elliptica* Mart., *Byrsonima verbascifolia* (L.) DC., *Cynophalla retusa* (Griseb.) Cornejo & Iltis and *Typha domingensis* Pers. That omission may be partly due to the scarcity of recent studies on ethnobotany in the Pantanal (Ritter et al. 2015) that document the knowledge of local people based on botanical collection and identification. Further studies in other regions of the Pantanal would certainly result in a higher number of species.

However, it is possible that many of the edible species mentioned in Table 19.2 and which have not yet been recorded in ethnobotanical studies are not used or not known as food plants by current populations. Indeed, some traditionally used species have been totally abandoned and others only some uses have been maintained. However, as we will discuss below, these plants are relevant food resources for raw consumption; for the production of flours, oils, and drinks; and to supplement the diet; or they can be commercialized and linked to the traditional culture of local populations, and there are also species with a potential utilization as a medicine, or as building materials, or habitat for animals (Bortolotto and Amorozo 2012).

The species with the highest number of citations in the literature as a traditional diet of indigenous groups in the past are *Acrocomia* spp. (8), *Attalea phalerata* (8), *Oryza* spp. (8), *Copernicia alba* Morong *ex* Morong & Britton (4), *Prosopis* spp. (4), *Hymenaea* spp. (4), *Vitex* sp. (4), and *Victoria amazonica* (Poepp.) J.C. Sowerby (3). The most cited species in the literature sources consulted are presented in greater detail below.

19.4.4 Acrocomia spp.

Two species of *Acrocomia* are specifically cited for the Pantanal in the Lista de Espécies do Brasil (Table 19.2): *Acrocomia corumbaensis* S.A.Vianna and *Acrocomia totai* (Vianna 2017). *Acrocomia aculeata* (Jacq.) Lodd. ex Mart. also occurs in Mato Grosso do Sul (Vianna and Campos-Rocha 2020) and is cited as a traditional food currently used (Bortolotto et al. 2015; Bortolotto et al. 2019), and for the Bororo also in the past, where it was cited under the synonym *Acrocomia glaucophylla* Drude. The mentioning of the palm tree as part of the diet as early as the sixteenth century possibly covered all these species, given the considerable dynamics of indigenous ethnicities at the time, and considering the diversity of indigenous names for *Acrocomia* spp. They are called bocaiuva and macauba in Portuguese, and in many indigenous languages their name is mbocaiá, namogologi (Mbayá-Guaicuru), ecaié (Terena), mudjí (Guató), áku (Bororo), and amukaya (Kinikinau).

There are few studies on the botanical classification by the indigenous peoples of the Pantanal, but the studies by Hartmann (1967) showed that the Bororo indigenous people distinguished more than one species of *Acrocomia*. According to this study, akó is the indigenous name for coconut of macaíba (*A. aculeata*) and akoréu í – akó the indigenous name for a variety of macaíba (*Acrocomia* sp.) – (réu = similar and í = tree), meaning: "tree with fruits similar to macaíba coconuts" or "bacaiúva."

A. aculeata has been used in South America since 11,200 B.P., and its probable spread from South America to Central South America would have been eased by the characteristics of the fresh fruits, representing an excellent food option to migrating people (Morcote-Ríos and Bernal 2001). These authors discuss that the fruits of *Acrocomia* spp. (Fig. 19.5a) have a fleshy and abundantly oily mesocarp, protected by an exocarp that is easily removable (Fig. 19.5b) during the trip. The seed can be discarded intact when the endocarp does not break readily.

Besides the fleshy mesocarp, the three local species of *Acrocomia* produce edible nuts and heart of palm. Metraux (1946) mentioned that the "mbocayá" fruits (*A. totai*) were eaten raw or boiled to make a thick mush; the kernels were eaten raw or were first roasted in the ashes to extract the seeds. According to the author, the Mbayá extracted the long fibers embedded in the starch from the lower part of the trunk and also drank the slightly fermented sap of the mbocaya palm (*Acrocomia* sp.,); sometimes they allowed the mush made of the fruits of this palm to ferment, but this beverage was hardly alcoholic and larvae which grew in the decayed stipe were much relished as food. Processed products, such as oils and flours from nut and pulp, are currently cited as part of the diet in communities along the Paraguay River in the Pantanal, but the oil was reported to be used only in the past (Bortolotto et al. 2015). On the Ínsua island, indigenous people drink a juice know as a nonalcoholic "chicha" prepared from the pulp of *Acrocomia* sp. (Bortolotto and Damasceno-Junior 1998).

Fig. 19.5 Palm (**a**) and fruits (**b**) of *Acrocomia* sp. (Pictures by Paulo Robson de Souza. Source of the picture b: Damasceno-Junior et al. (2010))

Nowadays, the species occur in various natural landscapes of the Pantanal, in seasonal forests, and in Cerrado, Chaco, and anthropic areas, such as home yards, old cropland, pastures, and roadsides, and build monodominant formations (Table 19.2). The oldest citation of a native species is of *bocaiuva* (*mbocaya*), already utilized (and possibly managed) by indigenous peoples in the past; it remains a most important species in the Pantanal (Bortolotto et al. 2015), demonstrating strong resilience. Cooking workshops to produce cake, juice, cookies, and loaves of bocaiuva flour have been developed to promote the eating and valorization of this species in the Pantanal (Bortolotto et al. 2017).

19.4.5 Attalea phalerata Mart. ex Spreng

Locally known as *acuri* (Table 19.2), *Attalea phalerata* (Fig. 19.6) occurs in monodominant formations (*acurizal*) in the Pantanal (Pott and Pott 1994) and had uses closely associated with the diet and culture of the Guató in the past (Schmidt 1942). That author discussed that the Indians practiced a type of agriculture, moving earth from the floodplain to build small mounds to cultivate. The seeds, pulp (Fig. 19.6), and palm heart of *A. phalerata* were used in the diet of the Guató (Schmidt 1942), the nuts being broken in small cavities in rocks (Métraux 1942). According to Schmidt (1942), each family had its areas of *A. phalerata* (*acurizal*) for *chicha* production, a slightly fermented alcoholic drink that the Indians much appreciated. Even though removing the leaves from the palm top to obtain the sap and prepare *chicha* caused the palm's death, there existed such extensive areas with *A. phalerata* that its sustainability and culture was maintained over time.

Frič and Radin (1906) observed and described the process of producing *chicha* from *A. phalerata*, as well as its consumption in 1905 while visiting the Bororo who lived on the banks of the São Lourenço River, an affluent of the Paraguay River, in quite the same way as described for the Guató. Those authors recorded that the sap was obtained from a hollow dug into the stem top of the "uakuri" (*A. phalerata*). The fermented juice was sucked up through a bamboo straw and then spit into a bowl (made of dry fruit).

That report demonstrated the concern about the influence of civilization on the Bororo and its impact on their traditional lifestyle (Frič and Radin 1906). *A. phalerata* is still known as a food plant (Bortolotto et al. 2015) (Bortolotto et al. 2019), but the consumption of *chicha* obtained from the fermented sap was not mentioned in those studies, nor in Hartmann (1967). *A. phalerata* was considered a pasture weed (Nunes 2001).

Fig. 19.6 Ripe fruits (**a**) and dehydrated pulp (**b**) of *Attalea phalerata.* (Pictures by Ieda Maria Bortolotto (**a**) and Paulo Robson de Souza (**b**). Source of the picture **a**: Bortolotto et al. (2017). Source of the picture **b**: Damasceno-Junior et al. (2010))

19.4.6 Oryza spp.

Several authors in different epochs mentioned the natural *arrozais* or stands of wild rice (*Oryza* spp.) and its consumption (Table 19.2) for various indigenous ethnicities, such as the Guató (Métraux 1946; Oliveira 1996; Silva et al. 1997; Florence 2007), the extinct Payaguá (Schmidt 1949), and the Terena and Kadiwéu (Métraux 1946; Oberg 1949). Possibly, the *arrozais* have drawn attention because they form more conspicuous, monodominant formations (see the Chap. 8 on Monodominants) that occupy extensive areas in the Paraguay River floodplain (Bertazzoni and Damasceno-Junior 2011). These are species similar to the cultivated rice (*O. sativa* L.). Langsdorff reported in his diary that he had observed the *arrozais* in December and January. That means that he did not see it in fructification since that occurs only in the flood period (May and June) (Bertazzoni and Damasceno-Junior 2011). Even so, he wrote that the grain had a black shell and that for 40 years it occupied those areas without management. That evidently is information that he heard from the riverside people or from somebody who knew. About management practices, Hercule Florence, illustrator of the Langsdorff Expedition, mentioned that for "lack of cultivation, the grain has quality inferior to ours," indicating the Eurocentric vision of that time.

At present, three species of *Oryza* are recorded for the Pantanal (Tables 19.1 and 19.2) (see the Lista de Espécies da Flora do Brasil) (Filgueiras et al. 2015). However, in several sources, wild rice is generally mentioned only by its common name. About the rice that he saw the Guató harvesting near the Lake Gaíba, Schmidt (1951) thought it was *O. sativa* (and not the American wild rice) left by the Spanish on their first voyages to the region. Nevertheless, he comments that the plant would not have any cultivation practice once the rice "sown by the Spanish" kept growing as a wild plant without the influence of the Guató on its propagation (the same observation was made by Langsdorff, cited above). The occurrence of three species of *Oryza* in the Pantanal indicates that Schmidt would be mistaken about the origin of the species. Métraux (1946), in turn, referred to *O. perennis* Moench, a synonym of *O. rufipogon* Griff., as one of the species identified for the Pantanal.

Wild rice was widely consumed by the Indians of the Paraguay River. At flood time, the Guató and Payaguá harvested the rice shaking the grains into their canoes and store that (Métraux 1942; Schmidt 1942; Florence 2007). A similar process is described for the harvest of the wild rice *Zizania* spp. in North America (Métraux 1946). Pott and Pott (1994) mentioned the use of wild rice (*Oryza* spp.) in the Pantanal by people of the Paraguay River at the end of the twentieth century. However, at the beginning of the twenty-first century, such use was no longer observed (Bortolotto et al. 2015). In contrast, in North America, until today, *Zizania aquatica* is harvested still using the traditional process (Turner and Von Aderkas 2012). A strategy that contributed favorably to the incorporation of the indigenous species to the diet was the name "wild rice," adopted for *Zizania*, thus giving it a meaning to people familiar with eating cultivated rice (*O. sativa*) (Turner

and Von Aderkas 2012). The vernacular name "rice" was also adopted in the Pantanal, but different from what happened with *Zizania* spp., the native species were kept restricted to the local people, not being incorporated into the diet countrywide.

That has changed somewhat in the later years: the Guató indigenous people and other riverside communities of the Paraguay River became involved in projects aiming to recover this cultural practice (Bortolotto et al. 2017). These projects developed the utilization of the rice with harvest practices similar to those described above. The postharvest process includes stamping the grains and separation of the shell using a sieve. Métraux (1946) commented, based on José Sánches Labrador (Sánches Labrador 1910), that the Indians ate the rice without removing the shell. In the mentioned workshops, however, the process of removing the shell was adopted, since an elderly Guató woman (still speaking the Guató language) told us that when she was a child, that practice was used, and she learned it from her mother.

Most rice species, such as *O. latifolia* and *O. rufipogon*, have an awn that can be removed by stamping and sieving. *O. rufipogon*, for example, has awns (Fig. 19.7 a) of 6 to 16 cm in length (Rosa et al. 2006). The awn was mentioned as one of the inconveniences at harvest time, as it was necessary to protect one's eyes, mouth, nose nostrils, and ears to prevent irritation. These species are also strategic for in situ conservation of germplasm, as they are close relatives of the cultivated species. *O. rufipogon* has an AA genome, the same type as *O. sativa*, and has potential for genetic improvement of cultivated rice (Karasawa et al. 2007).

19.4.7 Copernicia alba Morong ex Morong & Britton

Copernicia alba is a palm (Fig. 19.8) typical of the Chaco, and it occurs in monodominant formations in the Pantanal called *carandazal*, frequently around alkaline ponds locally named *salinas* (Pott and Pott 1994). The fruit, nut, and palm heart were mentioned as part of the culture of the Guató, Terena, Bororo, and Kadiwéu (Métraux 1946; Oberg 1949; Hartmann 1967). Taunay (1868) commented that oil was extracted from the fruits and that it was edible. Especially, the Chaco Indians consumed the palm heart fresh, cooked in water or baked in ashes; the flour obtained from the grilled and ground heart of palm was used for cakes and porridge; the nut was consumed fresh or roasted (Métraux 1946).

The fruits (Fig. 19.8) and the palm heart are still used as food items in Porto Murtinho, where this species is one of the most valuable for use, also considering the importance of the stipe and leaves for construction and handicrafts (Silva 2018; Bortolotto et al. 2019; Seleme et al. 2020). A recent doctoral thesis discussed strategies for the sustainable use of *C. alba*, especially for the use of fruit pulp, which has nutritional value and is an excellent food potential (Silva 2018). In neighboring countries, such as Argentina, Paraguay, and Bolivia, this species has been reported as part of the Gran Chaco indigenous people diet (Schmeda-Hirschmann 1994; Arenas and Scarpa 2007; Scarpa 2009).

Fig. 19.7 Rice (*Oryza spp.*) (**a**) with awn (*Oryza rufipogon*) and peeled grain (*Oryza latifolia)* (**b**). (Pictures by Paulo Robson de Souza (**a**) e Ieda Maria Bortolotto (**b**))

19.4.8 Prosopis spp.

Algarobo is a popular name for species of *Prosopis* in the Gran Chaco. The algaroba pods are known to be part of the diet of the Chaco indigenous peoples for production of flour, the preparation of bread and cakes, and brewing an alcoholic drink (beer) (Table 19.2). *Prosopis alba* Griseb. and *P. ruscifolia* Griseb. were cited as being used in the past, and currently *P. ruscifolia* and *P. rubriflora* Hassl. were recorded for Porto Murtinho (Souza-Lima et al. 2017; Sartori et al. 2018). Algaroba pods were among the main plant foods of the Chamacoco, Mbayá, and other Chaco Indians (Métraux 1946). Many forms of consumption and preparation of the pods were mentioned. Algaroba pods (Fig. 19.9) were crushed in a mortar and eaten as mush, and the algaroba flour could be stored and used to make cakes. During the algaroba season (November to February), large quantities of beer were brewed every day (Métraux 1946).

Fig. 19.8 *Copernicia alba* palm with fruits. (Picture by Paulo Robson de Souza)

Fig. 19.9 Algaroba (*Prosopis* sp.) fruits. (Picture by Paulo Robson de Souza)

The utilization of fruits of *P. ruscifolia* and *P. rubriflora* was mentioned for the production of flour in Porto Murtinho, Brazil, as well as a *chicha* (beer) (Bortolotto et al. 2019), but with an inferior use value. An algaroba beer prepared with *P. alba* fruits is also consumed in Argentina and Bolivia (Cano et al. 2020). Algaroba beer and the flour produced from *Prosopis* pods are also used in several countries in South America (Lévi-Strauss 1952). Despite its potential use, even with the possibility of being stored, its present use in the Pantanal is minimal. Moreover, it is the same in other countries of the Gran Chaco (Bolivia and Argentina), where alternative projects in poor communities promote the commercialization of algaroba flour (*Prosopis alba*, "native carob") (Alcorn et al. 2010).

19.4.9 Hymenaea spp.

Jatobá is the popular name for three *Hymenaea* species in the Pantanal, *H. courbaril* L., *H. martiana* Hayne, and *Hymenaea stigonocarpa* Mart. ex Hayne (see the Chap. 3 on Flora). These tree species also occur in the Cerrado (*H. stigonocarpa*) and in the seasonal forests and riparian forests (Table 19.2) with fruits that are traditionally (Fig. 19.10) used in the diet because of the farinaceous pulp (sarcotesta). In addition to the name *jatobá*, residents currently distinguish these species with several other names (Table 19.2). In Bororo language, bokwadí means "jatobá-da-floresta" (*Hymenaea* sp.) and rumága í means "jatobá-do-cerrado" (*H. stigonocarpa*) (Hartmann 1967), again showing the potential of indigenous peoples in species differentiation, even though they are morphologically very similar.

The farinaceous pulp has a strong aroma, has a high caloric value, and is rich in magnesium and copper (Damasceno-Junior and Souza 2010). People who are not familiar with the strong aroma may reject the raw flour, but it becomes mild in derived dishes. However, in many indigenous and traditional communities in Brazil, the *Hymenaea* species are strongly associated with local culture and are

Fig. 19.10 *Hymenaea* sp. (jatobá) fruits, with farinaceous pulp. (Picture by Paulo Robson de Souza. Source: Bortolotto et al. 2017)

traditionally used in the diet (Lévi-Strauss 2004). It can be consumed unprocessed or used in cakes, bread, juices, porridge, and other dishes (Damasceno-Junior and Souza 2010). The nuts were also reported to have food value for the South American Indians (Lévi-Strauss 1952). The *Hymenaea* species are used for very different purposes, including medicinal, fuel, and wood source uses (Lévi-Strauss 1952; Bortolotto et al. 2015; Miguéis et al. 2019). Although it is an important food resource, with a rich nutritional value, with abundant fruit, and indeed was much used in the past, these species presently are neglected in the Pantanal. Nevertheless, they have been the target of extension actions for their valorization as food plants.

19.4.10 Vitex cymosa Bertero ex Spreng.

Tarumã (*Vitex* spp.) are arboreal species from riparian forests of the Pantanal, with fleshy drupes, whose color varies from purple to black when ripe (Fig. 19.11). Besides *V. cymosa*, which is very common, Taunay (1931) mentioned *Vitex megapotamica* (Spreng.) Moldenke (Table 19.2), whose characteristics are similar. According to him, in December 1866, it was the main food of the Kinikinao people of the hills. Fruits of both species can be consumed naturally or as sweets and are a traditional food in South America (Lévi-Strauss 1952; Guevara et al. 2020). Raw fruits have a strong odor considered unpleasant by those not used to consume them (the taste is a bit bitter), softened at processing. Fruits are abundant and an excellent resource to add to a diet. As a result, its use has been encouraged in recent years (Bortolotto et al. 2017). Cooking workshops have been developed in the communities where the production of preserved sweets of *Vitex* has been the main

Fig. 19.11 *Vitex cymosa* (*tarumã*) ripening fruits. (Picture by Paulo Robson de Souza)

item. When added to a traditional coconut sweet (produced with *Cocos nucifera* L.), it produces different flavors with contrasting colors.

19.4.11 Victoria amazonica Planch. ex Casp.

Victoria amazonica or vitória-régia, the Victoria lily, a rooted floating plant known as forno-d'água (probably because the leaf shape resembles a baking sheet) in the Pantanal subregion of the Paraguay River, "with floury grains similar to corn," is also mentioned as edible for the Guató (Métraux 1942, 1946; Schmidt 1942; Oliveira 1996). This species was one of the three aquatic food species mentioned as presently used by riverside communities of the Paraguay River (Bortolotto et al. 2015). In that report, the residents cited its use for starch made from the seeds after being peeled and crushed with a pestle (Fig. 19.12). Considering that the seeds are essential to regenerate the small population in the Pantanal, it was suggested to use them with restriction (Damasceno-Junior and Souza 2010). While hydrophytes grow abundantly in the Pantanal and 21 species of hydrophytes with food potential were listed, they still constitute a little-utilized potential in the area (Pott and Pott 2000; Bortolotto et al. 2018).

19.4.12 Other Native Food Species of the Pantanal

In addition to these species, which are among the most cited in historical sources and that are still used in some way or have their use stimulated at present, there are several native food plants that occur in the Chaco areas in the south of the Pantanal. Some of those species are abundant but not mentioned in recent ethnobotanical studies in the Pantanal. We highlight *Typha domingensis* Pers., the cattail, a hydrophyte with a wide geographical distribution. It is best known for using some of its plant parts for the confection of handmade mats and pillows. However, the pollen provides excellent food to indigenous groups of the Chaco in Argentina and Paraguay, both because of its nutritional value and availability in periods of scarcity of fruits and vegetables (Arenas and Scarpa 2003). Their rhizomes contain starch, and their "palm hearts" (Fig. 19.13) are edible. The species is frequent in the Pantanal and has a good potential for utilization as a food source or as fibers for handicrafts, with little danger of hampering its regeneration because it readily regrows and, in fact, often behaves like a weed (Silveira et al. 2012).

Other neglected food species that were eaten in the past in the Pantanal are *Anisocapparis speciosa* (Fig. 19.14), called *mangaba-brava* (Portuguese) or *naranja del monte* (Spanish), and *Cynophalla retusa*, both species belonging to the Capparaceae (Table 19.2). Their fleshy fruits must be cooked several times in fresh water to remove the bitter taste; afterward, they used to be stamped and sun-dried (Lévi-Strauss 1952). The people of the Chaco (biome) consumed fruits *in natura*

Fig. 19.12 Fruits (**a**) and seeds (**b**) of *Victoria amazonica*. (Pictures by Paulo Robson de Souza. Source of the picture **a**: Damasceno-Junior et al. 2010)

(raw), cooked or baked, and processed their pulp and nuts to produce oils, flours, and drinks; their "palm hearts" were eaten raw, cooked or baked, and their roots were cooked or baked (Métraux 1946). Food processing, such as *algarobo* flour, baked "palm heart," nuts that could be stored for several months, was an essential procedure for shortage periods. Lévi-Strauss also mentioned food storage in the Chaco "...as soon as the rains stop, in April, the surplus of wild fruits are put to dry in the sun, for provisions for the winter and the plantation plots are prepared" (Lévi-Strauss 2004). These species cited for the Chaco were also mentioned in several studies in the nearby countries (Argentina, Paraguay, and Bolivia) (Schmeda-Hirschmann 1994; Arenas and Scarpa 2007; Scarpa 2009).

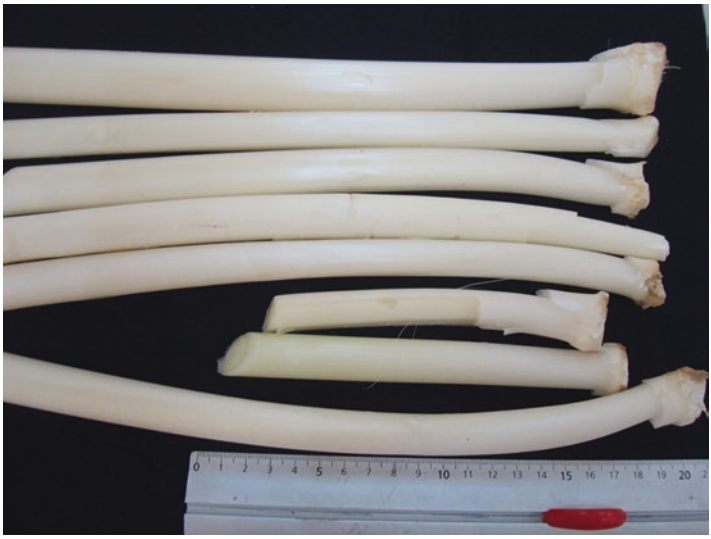

Fig. 19.13 "Palm heart" of *Typha domingensis*. (Picture by Iria Hiromi Ishii)

Fig. 19.14 *Anisocapparis speciosa* fruits and seeds. (Pictures by Paulo Robson de Souza)

A report on the Terena and Kadiwéu (Miranda, MS) mentioned, besides *algarobo* (*Prosopis* sp.) and wild rice (*Oryza* spp.), a great variety of palms (Table 19.1) and the Barbary fig (*Opuntia* sp.) (Métraux 1946). The species of *Opuntia* were not mentioned in recent ethnobotanical studies in the Brazilian Chaco (Bortolotto et al. 2019), despite their occurrence in native landscapes (Sartori et al. 2018): they occur with nine species in ethnobotanical studies on ten ethnicities of the Grand Chaco (Scarpa 2009).

There are few data on the plants that were part of the food habits of the Payaguá, who became already extinct in the seventeenth century. Apart from the rice already mentioned, that people consumed *algaroba*, *canafístula*, and *mandubiru* (Schmidt 1949). That author mentioned only the common names, but his description suggested that these were *Prosopis* spp., *Cassia grandis* L.f., and *Sterculia striata*

A.St.-Hil. & Naudin, respectively. About *algaroba* (*algarobo*), he mentioned that they had fruits very similar to those used for *chicha* by neighboring tribes of the Chaco. The *cana fístula* (*canafístula*) was described as a big, large-canopied tree, which fruits of a hand palm and a half long, that could be consumed after dilution in water. About *mandubiru*, he mentioned that these were medium-sized trees, with fruits containing seeds like peanuts (referring to *Arachis* seeds; the Portuguese name *amendoim* derives from the Tupy term *mandu'wi* = *mandubi*). The raw seeds are bitter, but the Indians consumed them after boiling them several times in fresh water. The uses for *mandubiruu* and *cana fístula* were based on information of José Sanches Labrador (Sánches Labrador 1910).

The fruits (pulp and nuts) are the main part utilized of most species (Table 19.2), but the leaves (including palm heart), stem (xylopodium), and flowers were also mentioned. For the palm species, both palm heart, stipe, and the fruits (pulp and nuts) were mentioned (Table 19.2). The most common species, often abundant and forming part of monodominant formations, have products that could be stored, such as oil, flour, or dehydrated pulp. This certainly made these species of strategic importance for feeding these peoples, in addition to the cultivated plants already mentioned. The uses of starchy fibers present in palm trees such as *Acrocomia* spp., *Copernicia alba*, and *Mauritia flexuosa* have not been mentioned recently; thus, they may no longer be part of people's diet as in the past. They seem to have become a neglected resource.

Nowadays, in the Pantanal, while *chicha* (juice), made from fruits of the *Acrocomia* spp., is consumed in the Guató community, another *chicha* (a fermented drink made from fruits of the *Prosopis* spp.) is only known in Porto Murtinho, but it is not manufactured. The fermented *chicha* beverage obtained after excavating the apex of the palm tree (*Attalea phalerata*) also is in disuse. Thus, in the Pantanal, the name *chicha* was used for both fermented and non-fermented drinks from different species, produced in the present and past times. The origin of the word "chicha" is not fully understood, but the Spaniards used to describe both alcoholic and nonalcoholic beverages produced since pre-Hispanic times in American countries (Pardo 2004; Goldstein et al. 2009). The consumption of corn *chicha* was widespread in America, but it was also prepared from roots and tubers, with the mead of the agaves and the sap of the palms and with many fruits from different species (Pardo 2004).

Despite the abandonment of some species or common uses in the past, the recent ethnobotanical studies have pointed to the species richness that still is part of the culture of indigenous and traditional communities in the western edge of the Pantanal. For example, the Guató, who now live on the Ínsua island in the Pantanal, are among those who, compared to other communities along the Paraguay River, best know the native food plants (Bortolotto et al. 2015). Wild food plants are still part of the diet of the Terena, such as *bocaiuva* (*Acrocomia aculeata*), *araticum* (*Annona dioica*), *jatobá* (*Hymenaea stigonocarpa*), *jenipapo* (*Genipa americana*), *coroa-de-frade* (*Mouriri elliptica*), *buriti* (*Mauritia flexuosa*), *pequi* (*Caryocar brasiliense*), *jurubeba* (*Solanum paniculatum*), *ingá* (*Inga vera*), *guariroba*

(*Syagrus oleracea*), *araçá* (*Psidium guineense*), *urucum* (*Bixa orellana*), and *caraguatá* (*Bromelia balansae*) (Ribas et al. 2001).

The fact that species were abandoned and the consumption of resources that were important in the past diminished significantly in the present (Bortolotto et al. 2015), associated with the increased demand for human food resources in the Pantanal, has stimulated the development of projects aiming at the rescue of information and the reestablishment of old knowledge for the benefit of the present human populations, improving either their diet or their income based on biodiversity (Bortolotto et al. 2017). However, even while the harvest of species such as rice and the preparation of fruits, flours, and oils have been abandoned or neglected, the results obtained in recent projects (Bortolotto et al. 2017) point to a new scenario involving the cooperation of local communities and production chains.

19.4.13 Future: Challenges for Conservation

Over the past two decades, projects focused on the sustainable use of biodiversity with the utilization of native fruits and economic and social benefits to the Pantanal communities, have aimed to stimulate the use of native food species in the diets and their economic utilization (Bortolotto 2017; Bortolotto et al. 2017). In workshops about food plants, several dishes were developed with *acuri* (*A. phalerata*), such as coconut sweet (Fig. 19.15) and regional donut ("bolinho de chuva") (Fig. 19.15), as well as the production of pulp flour that started to be commercialized with a label mentioning the nutritional value (Damasceno-Junior and Souza 2010).

Much progress was made, not only in the Pantanal but also in rural communities outside the Pantanal that search for income alternatives based on the utilization of native food plants. In the Pantanal, the traditional and indigenous communities have adhered to the strategies of use known food plants in their diet, participating in projects aiming at conservation of the species and improving their source of income. About six communities in the Pantanal started to harvest fruits and produce jams and realized an increment in the production of oil and flour obtained from the pulp of *bocaiuva* (Fig. 19.16) *Acrocomia* spp. (Bortolotto et al. 2017).

Thus, we observed a recent change in the relationship of the people with the plants in small rural communities, aiming to rescue their values and culture. In this process, the plants that had priority value for subsistence (food security) and culture acquired economic value and associated with it created new demands and challenges for the conservation of natural resources. Several studies have reported the utilization of fruits from the Pantanal as jam, flour, and others (Hiane et al. 2006; Prates et al. 2015; da Silva et al. 2017). These activities have stimulated the communities and helped to develop their activities.

There is an ongoing debate on whether or not the lands for nature and production should be segregated (land sparing) or integrated into the same geographical space (land sharing, wildlife-friendly farming) (Tscharntke et al. 2012). To assure

Fig. 19.15 "Acuri coco sweet" (**a**) and "acuri donut" (**b**) made of seeds and pulp of *Attalea phalerata* fruits, respectively. (Pictures by Paulo Robson de Souza. Source of the picture **b**: Damasceno-Junior et al. 2010)

Fig. 19.16 *Bocaiuva* flour (*Acrocomia* spp.). (Pictures by Ieda Maria Bortolotto)

the production of sufficient food, it is necessary to establish a dialogue with the people who live or have properties in the rural area (*besides* the indigenous and traditional communities) on conserving strategic species to assure food purposes. Much of these resources are in rural properties (large cattle ranches). Nowadays, 95% of the Pantanal is occupied by private ranches (Santos et al. 2011). The National Park of the Pantanal and the private Conservation Units (RPPNs) are of great importance for conservation of biodiversity, though, ungrazed, needing a robust integrated management program to keep them free from periodic wildfires. Nevertheless, there still is a demand for public policies focused on sustainable use involving the human populations and their culture.

19.5 Final Considerations

While domesticated plant species, widely cultivated globally, have been much researched, the wild food or semi-domesticated species still require many more studies to show their potential utilization; reveal their morphology, distribution, and ecology; and demonstrate their nutritional value and postharvest treatment.

Extension actions also need to be intensified in the rural area, considering the abandonment of ancient food plants. Such species represent a potential resource for food and nutritional security of the local human populations, and projects in this line aiming to incite their cultural rescue are essential.

There is a certain gap regarding ethnobotanical studies in present indigenous communities (Bortolotto and Damasceno-Junior 2021): we need more projects that take into consideration the local culture, forms of uses and management, as well as projects that reveal the knowledge of species used in the past, as available in primary historical documents not analyzed here. Knowledge on the species used in the past, maintained or abandoned, is essential for developing strategies for their conservation in situ and food security.

The study on historical ethnobotany based on primary sources of the Portuguese crown (Tomchinsky and Ming 2019) and covering the eastern part of Brazil, which has flora and indigenous cultures distinct from the Pantanal, discusses species utilized as food plants that are different from those utilized for food in the Pantanal. None of the species here mentioned (*Oryza* spp., *Prosopis* spp., *Copernicia alba*, or *Attalea phalerata*) are reported in that study. That is characteristic of a country with a very diverse biological and cultural heritage, where many studies are still needed to understand the past and the present and plan for the future.

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