29 Traditional use of vegetation for cattle-raising in the Pantanal on the Brazilian-Bolivian border

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Abstract

The history of cattle-raising on the border between Brazil and Bolivia can be traced to the time of the Spanish and Portuguese conquerors. This study provides an overview of how local cattle breeders understand and use the vegetation components in this productive activity. Were studied 18 productive units in the Pantanal of Cáceres, on the border between the state of Mato Grosso and Bolivia. Protocols for the collection and analysis of data were adopted from those used in related ethnobotanical studies and included characterization of the productive units and livestock, recording the types of vegetation components present in the analyzed farms, and determining how the plants were perceived and used by the population with respect to cattle-raising activities. The livestock consisted of zebuine cattle and cross-breeds. Production was at a level that met the subsistence needs of the ranch families and allowed integration with the exploitation of beef-cattle rearing and milk production. The farms were found to be highly dependent on naturally occurring vegetation resources, which consisted of those available throughout the year and those that were only seasonally available. Cattle-raising activities were developed and are carried out by within families, using technologies passed on orally through generations. The 243

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plants of different *taxa* collected in this study belonged to 62 botanical families. Based on the perception and use of these plants by the local population, five categories of use of the vegetation were identified: livestock facilities (91 plants species), foraging (109), weeds (49), medicinal (10), shade protection (31), and toxic (8). The practice of traditional cattle-raising showed evidence of changes motivated by contact with technologies assimilated from the immigrant population and in response to state regulations.

29.1 Introduction

Cattle-raising in the Pantanal, located on the Brazil's border with Bolivia, can be traced to the territory's occupation by Spanish and Portuguese conquerors in the mid-16th century. The focus of this study is an area that belongs to the Alto Paraguay basin, in the extreme northwest of the Pantanal of Mato Grosso. It is located in the territorial region classified by Silva and Abdon (1998) as the Pantanal of Cáceres.

Archeological, ethnohistorical, ethnobotanical, and ethnoecological studies of the region (Maldi Meireles 1989; Maldi 1997; Migliácio 2001/2002; Charupá 2002; Januário 2004; Justiniano 2004; Carniello 2007) have emphasized its miscegenation and the massive indigenous population. Afro-descendents, immigrants of European descent, and recent immigrants, predominantly from southern Brazil also inhabit the Pantanal. Part of this latter population consists of families involved in activities linked to the management of smallhoding.

Nowadays, cattle-raising is the largest and most important economic activity in the sub-region of the Pantanal of Cáceres, with 892,348 animals. Herd size has increased by around 28% in the last decade and continues to increase (Brazilian institute of geography and statistics – IBGE, 2008). Beef-cattle-raising was developed mainly by immigrant populations (Brasil et al. 2005). It is practiced extensively and is the main economic activity in the region.

Ayala & Simon (1914) analyzed cattle-raising activities in the Pantanal region in the early 20th century. Some 40 years later, Corrêa-Filho (1946, 1955) focused on the Pantanal's ox and cattle ranches. Cadavid Garcia (1986) carried out studies to characterize the Pantanal's beef cattle, while Mazza et al. (1994) targeted ethnobiological aspects and the conservation of Pantanal's cattle.

The vegetation classes in the Pantanal, described by Silva et al. (2000), Nunes da Cunha et al. (2006), and in chapters by Nunes da Cunha & Junk, and Pott et al. in this volume, are associated with cattle-raising in several important ways. In the Pantanal of Cáceres, the vegetation is used for forage, timber, veterinary medicine, and shade protection. By contrast, some plants are considered as unwanted because they are toxic and weeds pastures.

In the literature describing plant use in the Pantanal, forage plants and the potential of native species are emphasized (Allem & Valls 1987; Pott & Pott 1994, 1999, 2000; Santos et al. 1999). Information regarding the use of timber is included in floristic studies of tree species of the region (Guarim Neto 1991; Pott & Pott 1994). Plants that are toxic for cattle have gained subsequent attention with respect to their botanical and pharmacological properties. Hoehne (1939) was the first to address this subject in Brazil. Tokarnia et al. (2000) gathered an important collection of toxic plants, including those toxic for cattle. Afonso & Pott (2001) studied these plants in the Pantanal of Mato Grosso do Sul and suggested several ways to prevent the poisoning of herds as well as the main symptomatic behaviors of affected animals.

In this study, we discuss the relationships between cattle-raising and human occupation of wetlands areas in the Pantanal of Cáceres, together with knowledge on the use of the regions's plants. This study is ethnobotanical, defi ned by Gómez-Pompa (1986) as the "science of traditional botanic knowledge," in its approach and deals with local, situated transmitted knowledge (Geertz 1989) in the context of the daily work associated with cattle-raising and the use of the flora in this activity.

29.2 Materials and methods

Studies of the knowledge gained by human populations about their environment cannot be dissociated from their activities, including commercial ones. Moreover, such studies require a prolonged period of contact with the population of interest in order for researchers to recognize the elements comprising this knowledge. According to Thiolent (1992), the appropriation of knowledge occurs through "sensitive listening."

In this study the first contacts established with the target community were made between 2001 and 2002, during research for the first author's doctoral thesis on several aspects of the Pantanal of Cáceres, as part of the project CPP/ UNEMAT/UFMT, protocol 0025/2005. The results of that project that are related to cattle-raising activities are presented here. Data for this study were collected from March 2003 to July 2007. Eighteen households whose productive activities included cattle-raising were selected and subdivided into one of two categories, small and medium-size farms. The farms were defined as those less than 80 hectares (ha), and the latter as those ranging in size from 80 to 5,000 ha.

In the Pantanal of Cáceres, water flow depends on the flood pulse (Junk et al. 1999) and is locally characterized in four phases: dry, flood, full, and ebb. In this wetland area of Brazil, these periods are associated with the presence of particular plants, which are used in different aspects of cattle-raising.

The adopted techniques enabled daily work, specifically, the presence and use of vegetation classes of different phytophysiognomies, to be recorded with respect to flood gradients. The methodologies, including participant observation activities, were those of Bernard (1988), Martin (1995), and Alexíades (1996) and they made use of the techniques for data collection involving human populations and plants as presented by Amorozo (1996). In the present study, this approach included trail-walking, adapting the pre-determined trail technique suggested by Brondízio & Neves (1996), and was carried out with the participation and guidance of local-family members who were involved in the research, making use of their expertise (Cunningham 1996). The botanical material thus obtained was collected and treated according to the recommendations of the FIBGE (1992). Herborized material was identified by experts and deposited in the reference collection associated with this study, in the Botanical Laboratory of UNEMAT, in Cáceres-MT. The voucher specimens were deposited in the HRCB e HCUFMT and duplicates were sent to the herbarium of the institution affiliated with the experts who collaborated in the botanical identifi cation. The local terms are noted in the text.

29.3 Results and Discussions

In the Pantanal of Cáceres, some of the established communities are the home of human populations whose family bonds can be traced back for at least 150 years. The communities include those of Porto Limão, Porto Alambrado, Campo Alegre, and Corixinha. Due to their geographic location, they are intimately linked to two distinct historical processes: the appropriation of the central region of South America by the Iberians, during the 16th and 17th centuries, and the events related to territorial occupation and demarcation of the borders of Mato Grosso with Bolivia. This same territory sheltered countless ancient indigenous peoples, who were collectors, hunters, fishermen, agriculturalists, ceramists, and their abilities included the domestication of animals and plants. According to Januário (2004) and Moreira Da Costa (2006), and confirmed by contemporary oral sources, around 40% of the population currently living in these communities have kinship ties with native peoples of Bolivia and the pantanal's plain. Among the autochthonous groups are the Chiquitanos, Mojos, Guató, Bororo, and Terena. However, the continuity of the indigenous population in the Pantanal of Cáceres, and throughout the Pantanal, from the time before the Iberian conquest until now is controversially discussed (personal communication, Migliácio, September 2006).

Zebuine cattle, mainly of the nelore breed, are raised in the Pantanal of Cáceres together with cattle resulting from crossings of Crioula Lageana breeds adapted to the region (Santos et al. 2002). Cattle-raising is a subsistence activity

but is also linked to commercial exploitation. The former meets the needs of the families of small lands owners, as well as those of other people who participate directly in cattle-raising. The latter can be divided into those who work in beef-cattle rearing and those involved in milk production. Commercial exploitation of cattle-raising is established in families with land areas >80 hectares.

All of the managed areas form part of the wetlands and high lands areas of the border of Cáceres with Bolivia and they have been used for cattle-raising for at least four centuries. The increasing occupation of this region by people carrying out mercantile cattle-raising and forestry has occurred over the last four decades, after the border between the two countries with respect to the limits of the municipality of Cáceres was defined, i.e., beginning in 1973.

29.3.1 The relationship of humans with plants and cattle-raising activities in the Pantanal of Cáceres

The vegetal species that compose the different units of the local landscape are mainly those exploited for timber and pasture demands. In the study area, 243 *taxa*, forming 62 botanical families, were catalogued. Locally, these plants are divided in two distinct groups (Fig. 29.1), one comprising undesirable species: weeds (pasture pests) and toxic (poisonous for the herd) species, and the other comprising useful species: pasture plants, timber (used in several types of cattle-raising facilities), medicinal (for cattle) and arboreal shade (protection and comfort of the herd).

The plants are obtained mainly in the natural vegetation areas (native) and, to a lesser extent, are cultivated. Within the 243 *taxa*, 19 (8%) consist of plants coming

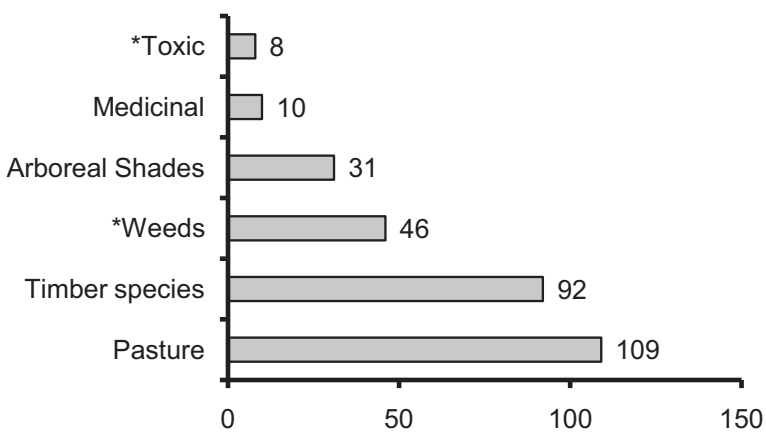

Fig. 29.1 Number of botanic species, as indicated by use category
* undesirable, # for cattle.

from other regions. This reveals the extensive knowledge of the studied human population regarding the use of local vegetation as well as its dependence on both endogenous and cultivated plants.

29.3.2 Improvements to support cattle-raising

The term "improvements" refers to the set of physical structures used in the activities of rural production. For the local population, improvements that support cattle-raising can be divided into two groups: those established in the wintering areas and those established near the farmhouse. The term "wintering area" refers to all spaces where pastures and water supply are established. It encompasses the most distant sites and those in the immediate vicinity of the farmhouse. The improvements included in this category are: fences, water supply (lakes and tanks), and troughs for salt.

The basic raw material for the construction of installations that support cattle-raising on the studied farm is of vegetal origin. The choice of the particular plant species is guided by the knowledge of the local population, mainly the native adults and elderly of the region, and takes into account the structural characteristics of the constructions, their usage, the expected lifetime of the building, and the resistance properties of the vegetal species chosen. Fences are named according to use, e.g., limiting fences delineate the boundaries between farms, while inside fences are used for internal separations of pasture areas within the same farm. This terminology was devised by the native population and has been retained by the majority of lands owners established on the frontier.

The type of fence is also distinguished by the construction material used. Hardwoods or hard timber are used in the limiting fences and as stakes in other constructions. The inside fences are most frequently made of timber of less resistance, referred to locally as white timber or soft timber. Table 29.1 lists the 30 most commonly used vegetable species, the places where they appear, the timber type, and the specific use of each one. The respective species were frequently referred to by those individuals who were interviewed for the study.

Livestock facilities in farms are: corrals, named by local population *mangueros*, *sargadero* or *sargadô*; paddocks for calves, storehouses named *cobertos* or *garpão*, and those needed for animal management. The terms *mangueros*, *sargadero* or *sargadô*, and *cobertos* or *garpão* are also used among the local population of other regions of the Pantanal. *Mangueros* are rustic installations, usually with an interior area of 150m^2, and found on small farms. They are used during the milking of dairy cows and in other kinds of management that require gathering of the herd. ROSSETO (2004) highlighted the accent of local population in the pronunciation of letters stressed at the end of a word (ô and á) as well as and that of the "r" in a word.

Several typical characteristics of Pantanal's people culture were observed in the 13 nuclear families involved in cattle-raising. Many of the activities developed at cattle-raising installations are carried out daily, particularly dairy-related functions and care of the animals, and thus require the constant presence of the respective personnel. Accordingly, the localization of these activities near the homes of the families is highly convenient and allows the integration of several members of the family (children, adolescents, and adults) in performing these tasks.

For natives of the region, fencing of the properties is viewed as a rupture in the occupation and use of the land. The tradition of communal use of native pastures combined with the practice of multiple activities that generate community support and income especially the planting of gardens, cattle-raising, and fishing, is being replaced by large cattle ranches with cultivated pastures and intense mechanization. Traditional communal land use was intensely present in the Pantanal of Cáceres until the 1970s.

All physical components of the installations and structures that support cattle-raising activity as well as their respective maintenance depend on the presence and use of vegetal material, such that the local floristic composition is of tremendous importance. Among the hard-timber species, which are highly durable (ld) are aroeira (*Myracrodruon urundeuva* Allemão), peroba (*Aspidosperma cylindrocarpon* Müll. Arg.), angico (*Anadenanthera colubrina* (Vell.) Brenan.), cedro (*Cedrela fissilis* Vell.), copaíba (*Copaifera langsdorffii* Desf.), jatobá (*Hymenaea* spp.), and ipês (*Tabebuia* spp.). These species are maintained in the pasture areas of legal lands reserves and on the mountain range. Currently, due to their increasingly sporadic occurrence within the productive units, mainly the aroeira tree, timber to be used for construction must be imported from other regions. Species of the same resistance category, i.e., carijó (*Physocalymma scaberrimum* Phol), lixeira (*Curatella americana* L.), the sucupira-preta *(Bowdichia virgilioides* Kunth), and louro-preto (*Cordia glabra* A. DC.), are also frequently used and grow in the region. Likewise, white or soft timbers, which are of short durability (cd), including cabriteiro (*Rhamnidium elaeocarpum* Reissek), pindaíba (*Xylopia aromatica* (Lam.) Mart.), and açoita-cavalo (*Luehea paniculata* Mart.), are common in the flooding and pioneer vegetation areas; however, in pasture areas, with introduced forage species (*Brachiaria* spp.) by mechanized management tree vegetation does not occur anymore.

According to Rizzini (1990) and Pfeil & Pfeil (2003), timber is possibly the most ancient raw material incorporated into the culture related to rural constructions. For the population of the Pantanal of Cáceres, the most efficient use of each kind of timber reflects the application of knowledge about its compatibility with the specific use. The wisdom of the elderly concerning the management and use of timber is directly associated with the daily activities of cattle-raising in this region.

Table 29.1 The main timber species used by the local population in constructions supporting cattle-raising activities on small and medium-size farms. Places where species are found (LO): 1= flooding areas, 2=high as well as dry areas, 3=vegetal covering of seasonably flooded areas; 4=sparsely found in several formations and flood gradients; 5=bordering forests. Percentage of quotations (%C): a=100% and b=75–99% of interviewees. Local classification according to wood resistance (CR): d=hard or hard wood; m=white or soft. Period of use (PU): ld=long duration with expected durability of 10–30 years; cd= short duration with expected durability < 10 years.

Timber species	LO	%C	CR	PU
Acrocomia aculeata (Jacq.) Lodd. ex Mart.	3	b	m	cd
Anadenanthera colubrina (Vell.)Brenan.	2	b	d	ld
Aspidosperma cylindrocarpon Müll. Arg.	2	b	d	ld
Astronium fraxinifolium Schott ex Spreng.	3	b	d	ld
Bowdichia virgilioides Kunth	2	b	d	ld
Caryocar brasiliense Cambess.	2	b	m	cd
Cecropia pachystachya Trécul	1	b	m	cd
Cedrela fissilis Vell.	2	b	d	ld
Cordia glabra A. DC.	3	a	d	ld
Curatella americana L.	3	a	d	ld
Copaifera langsdorffii Desf.	4	b	d	ld
Dipteryx alata Vogel	3	b	d	ld
Enterolobium contortisiliquum (Vell.) Morong	2	b	m	cd
Guadua paniculata Munro	3	b	m	cd
Guazuma ulmifolia Lam.	1	b	m	cd
Hymenaea courbaril L. var. *stilbocarpa* (Hayne) Lee et Lang	3	b	d	ld
H. stigonocarpa Mart. ex Hayne	2	b	d	ld
Jacaranda cuspidifolia Mart.	1	b	m	cd
Luehea paniculata Mart.	1	b	m	cd
Myracrodruon urundeuva Allemão	3	a	d	ld
Physocalymma scaberrimum Pohl	3	b	d	ld
Rhamnidium elaeocarpum Reissek	1	b	m	cd
Sapium obovatum Klotzsch ex Müll. Arg.	5	b	m	cd
Tabebuia chrysotricha (Mart. ex A. DC.) Standl.	3	b	m	cd
T. heptaphylla (Vell.) Toledo.	3	b	d	ld
T. impetiginosa (Mart. ex DC.) Standl.	2	b	d	ld
Vitex cymosa Bertero ex Spreng.	1	b	d	ld
Vochysia divergens Pohl	1	b	d	ld
V. haenkeana Mart.	1	b	m	cd
Xylopia aromatica (Lam.) Mart.	1	b	m	cd

Timber species used in the construction of fences and large and small corrals are processed in three ways: round, squared, or sawed. Squared wood is cut along the sides of an ax, forming compact, square, or rectangular sections (Pfeil & Pfeil 2003). In the construction of corrals, the literature describes the circular shape of these installations and points out their suitability in terms of the behavior of the cattle and thus their appropriateness for cattle management, especially beef cattle (Turner et al. 1995; Bicudo et al. 2003; Huhnke & Harp 2005). Circular-shaped corrals were observed at all 18 farms – in the oldest farms as well as the most recent constructions. According to some owners, corrals and *mangueros* (small corrals) have been built in this way since their childhood. This technology also fulfills current recommendations to ensure the comfort of the cattle by allowing the cattle to move in circles, which is more natural to the animals' movements (Huhnke & Harp 2005; Muzzolon 2005).

Among the traditional constructions, *sargadero* or *sargadô* are no longer used as the pantanal's people have substituted them with salt troughs, which are placed both in pasture areas close to the families' houses and in higher areas of the mountain range. The technique used to construct the salt troughs has been altered during the last several years, an indicator of new technology that has been incorporated in cattle-raising activities. Previously, salt containers were built by chipping the wood off the trunks of trees to form a container but they now consist of containers built with boards.

In the use of the timber, from its extraction until the construction and installation of the building, several procedures are adopted, including those that guarantee a higher durability of the wood. The first concern is availability, i.e., the trees must be available on the farms. The second is the choices of trees species based on their qualities; for example, small corrals are built with at least eight to ten timber species. The choice of the species and the time of its collection is a task usually carried out by older adults, who pay special attention to the phase of the moon optimal for timber collection, as it is said to guarantee that the chosen pieces will be of greater durability. In Pantanal communities, there is a common belief that the full-moon period is inappropriate for the extraction of white wood or soft wood (cd). Instead, the period of the waning moon during the month of August is considered optimal for the extraction of timber of any kind of resistance, otherwise the conservation of the wood, and thus the useful life of the construction, will be compromised by pest infestation. The use of different species within the same construction makes the gradual replacement of building elements possible following damage incurred over time and with use. This strategy is the basis for the selective extraction of species on the property.

The logic adopted by the elderly for the maintenance of the installations, including the seasonal replacement of specimens cut from the high forest (seasonal

semi-deciduous forest), savanna, and flooded fields (savannas with forests, with trees, park and grassy-woody), points to a strategy for managing the native tree species used in cattle-raising activities. Most of the timber vegetal resources come from flooded areas. Results similar to those described here were obtained for the other plants used in cattle-raising.

29.3.3 Pastures: composition and management

Some authors distinguish between forage and pasture species based on the lignifications of the species used by the animals. In this view, pastures are made up of non-ligneous species while forage comprises the group of ligneous vegetal species. Both can be consumed by animals directly from the source, i.e., the live plant, or prepared as silage. At the studied productive units, the herd received food through direct access to vegetal species present in native and cultivated pasture areas. Based on the current knowledge in the Pantanal of Cáceres, forage plants are defined as those that provide, on a smaller or larger scale, food for cattle and are predominantly herbaceous, followed by shrubby and tree species. Of these ligneous species, the leaves, young twigs (buds), and fruit are eaten. Forage species may be native or cultivated, the latter established in the areas used for herd management and associated with seasonal water flow in the Pantanal.

Pasture areas belonging to the 18 study units were located along different flood gradients, indicated from 1 to 5 in Table 29.1. Areas of greater flood are mainly occupied by native pastures: *murundus*, copses, wet fields, *chaparros* areas with plants of the families Malpighiaceae, Rhamnaceae, and Verbenaceae, areas with plants of the Zingiberaceae family, permanently flooded areas (lakes and small streams), and border forests, with the lattermost consisting of natural vegetal covering. In determining the type and name of the pastures, the population considered aspects such as its flood gradient, floristic composition, and source. These areas are therefore locally called *pasto de seco* (dry pasture), *pasto que enche* (pasture that fills), and *pantáno* (swampland) or *pasto de pantáno* (swampland pasture). The first two are of native and/or introduced composition whereas *pasto de pantáno* are exclusively formed by native species. These types of pastures have been used and managed for decades in the region. They reflect the refined knowledge of the local population in terms of composition, natural dynamics, and relation to the presence and needs of the established herds.

Pasto de seco occupies sites where the natural vegetal covering has been partially or totally removed and is locally referred to as high forests. Silva et al. (1998) classified these areas as seasonal semi-deciduous forest and savannas (with forests and trees), characteristics typical of this sub-region of the Pantanal. The forage

plant braquiarão (*Brachiaria brizantha* (Hochst. ex A. Rich.) Staph) is the main species growing in these areas because of its adaptation to places compatible with its reduced flood tolerance. However, it was suggested, and confirmed by some lands owners, that, over time, the cattle show a preference for introduced species, gradually rejecting native ones.

Two palm trees, the babaçu (*Orbignya phalerata* Mart.) and indaiá (*Attalea* cf. *compta* Mart.), are considered invaders of these pastures and rigid controls to prevent their establishment have been implemented on medium-size farms while on small farms they are controlled because they are eaten by the cattle, especially during a long dry season.

Wetland areas susceptible to seasonal flooding are the sites of *pasto que enche*. These are areas of native pastures and extensively cultivated fields. The latter are formed by introduced species, such as the braquiária umedícula (*Brachiaria humidicula* (Rendle) Schweick), the capim (*Axonopus fissifolius* (Raddi) Chase), and colonhão (*Panicum maximum* Jacq.). Of this group, the first species tolerates a higher level and duration of flooding. Braquearão (*Brachiaria brizantha* (Hochst. ex A. Rich) Stapf), colonhão (*P. maximum* Jacq.), and mombacha (*Melinis minutiflora* P. Beauv.) grow along the drier borders of the flooded areas. For small lands owners, these plants form the basis of cultivated pasture in high places and in some lower, less-flooded areas. Fifty-eight native vegetal species with this phytophysiognomy that served as food for cattle were registered. The most important forage species in this group are: the capim-do-pantáno or capim *Eriochloa distachya* Kunth, the capim *Eragrostis articulata* (Schrank) Nees, pacovas (*Heliconia marginata* (Griggs) Pittier and *H. psittacorum* L. f.), pé de galinha (*Cyperus iria* L.), capim-mimoso (*Axonopus* cf. *purpusii* (Mez.) Chase), caninhas do brejo (*Costus spicatus* (Jacq.) Sw. and *Costus spiralis* (Jacq) Roscoe), grama do brejo (*Cyperus luzulae* (L.) Rottb. ex Retz.), corticinha (*Aeschynomene fluminensis* Vell.), caeté (*Thalia geniculata* L.), and the capim *Andropogon hypogymus* L. The other 22 species occur in dry and in flooded areas. Although these species are not considered of forage importance among cattle breeders with medium-size farms, they were mentioned as food alternatives in cattle raised on small farms. In the continuum from flooding to dry areas, palm species, shrubby plants, and trees are foraged. The most common species of palm trees is the bocaiúva (*Acrocomia aculeata* (Jacq.) Lodd. ex Mart.). The leaves, ripe fruit, and the easily reachable height make young palms an attractive food for cattle.

Within the two flood gradients mentioned above (dry and flooded) cultivated pastures are formed by plants that were introduced through propagules (seeds and/or seedlings) to obtain a higher density of food based on the monoculture of species established in contiguous extensions of pastures. For the cultivated pastures, *pasto de seco* and *pasto que enche*, the local population has warned of the need for rigid control of competitive vegetal species growing in these areas, as in this

region these plants are considered to be weeds: "If you are not careful, the weeds go up (grow). They take over everything and it will not be long until the pasture turns into *bamburro*" "Then there is nothing you can do, the place will be full of weeds and the cattle will not go in there" (68, S.T. Porto Limão). The *bamburro* is an anthropized area that has been taken over by pioneer vegetation. In the thickets of the region, bamboo populations and small bamboos with or without thorns (*Guadua paniculata* Munro and *Guadua* sp.) are found. There are also several kinds of vines, mainly the cipó-tripa-de-galinha (*Bauhinia glabra* Jacq.) and gravateiro species (*Bromelia balansae* Mez and *Ananas ananassoides* (Becker) L. B. SM.).

The pasture type *pasto de pantáno*, or *pantáno*, is located along the banks of rivers, small streams, low-lying areas built on the edge of the BR-070 freeway, and other low areas. Of the 12 forage species catalogued in these areas, six also occur in seasonally flooded areas. Among the species common to both areas and important for cattle is a group of herbaceous plants, referred to locally as the "little banana trees of the swamp," as well as pacovas and caninhas do brejo, which belong to the genera *Costus*, *Heliconia* and *Thalia* and comprise species also registered in areas of flooding.

The species most often mentioned in terms of the continuum of swampy areas with different flood gradients is the capim do pantáno (*Eriochloa distachya* Kunth), mentioned by 47% of the interviewees. Also common to the two areas are three species of the Pontederiaceae family, the aguapé *Eichhornia azurea* (Sw.) Kunth., *E. crassipes* (Mart.) Solms, and *Pontederia parviflora* Alexander.

Species of plants consumed exclusively in the swamp are: the little banana tree of the *pantáno* (*Canna glauca* L.) and three others known locally as chapéu de couro (*Echinodorus grandifolium* Rataj Micheli, *E. lanceolatus* Rataj, and *E. paniculatus* Micheli. Of the 53 swamp species, 27 were of particular importance. Thus, the number of forage species is relatively small compared to the wealth of species (93) registered in areas of flooding (*pasto que enche*). In the *pantáno*, a large amount of biomass covers the water surface. In 88% of the small farms native pastures established on wetland and swampy areas guarantee food for the cattle during the dry period. They supply the nutritional needs of the herd reducing costs involving in production system. Food supplements like napiê species (*Pennisetum purpureum* Schumach.), sugar cane (*Saccharum officinarum* L.), and corn (*Zea mays* L.) are used exclusively on medium-size farms units during periods of extended drought.

Due to the preference of cattle for species introduced into areas of natural vegetation, problems have emerged for small lands owners: (1) the cattle, motivated by the taste of the introduced species, break down fences to reach areas with those species even during period in which native pasture is abundant. (2) As a consequence of the rejection of native species in the cattle forage, their unchecked growth in native and in cultivated areas converts them into competitors in the

pasture such that they are eventually considered to be weeds, locally called pests. (3) Due to the overgrowth of these weeds, pressure on the land-owners to chemically control them in wetlands areas has increased. Of the 49 such *taxa* catalogued, araxicum (*Annoma cornifolia* A. St.-Hil., *A. dioica* A. St.-Hil., *A. phaeoclados* Mart.) was the most abundant. The fact that some unwanted species for cattle-raising activities were previously regarded as a cattle food source by native cattle-owners of the region reflects an alteration in the way the latter perceive and manage this group of plants.

In some sub-regions of the Pantanal, tree species such as cambará (*Vochysia divergens* Pohl), pateiro (*Couepia uiti* (Mart. & Zucc.) Benth. ex Hook.f.), and shrubs e.g., canjiquinha (*Byrsonima orbignyana* A. Juss.) are considered weeds of pastures (Pott & Pott 1994; Lorenzi 1998). However, these species are also used for other purposes (timber, medicinal, alimentary, honey bee forage) and were thus not included in the above classification of species unwanted for cattle-raising activity.

The species catalogued in this study are also referred to in the literature describing forage activities in the Pantanal (Allem & Valls 1987; Guarim Neto 1991; Pott & Pott 1994, 2000). The maintenance of cattle-raising on the farms studied depends in part on the local population's knowledge of the seasonality of water flow and the management of the vegetal covering native to the sub-region of the Pantanal of Cáceres. This knowledge is nowadays under intense pressure due to exogenous forces, with direct consequences for daily cattle-raising activities and thus for the human population. Of particular importance is that, for the farmers established in the Pantanal of Cáceres, the replacement of native pasture species with introduced species is preferred, since it is interpreted as reflecting successful production and, consequently, progress (Rosseto & Brasil Junior 2001; Rosseto 2004). Motivations of this kind were detected in three medium-size farms and in one smallholding, all of which have been managed by the same family units for nearly 30 years. For the farmers, the replacement of native vegetal covering by cultivated species represents a change in the system of pasture management; however the balance between costs and benefits, after 3 years, has not been estimated.

29.3.4 Secondary categories of plant use in local cattle-raising activities

In herd management, three other categories of plant use were registered: medicinal, physical comfort of the herd, and toxic plants. For the medicinal and toxic categories, eight and ten species were recorded, respectively. The use of medicinal plants is rapidly diminishing, and is almost exclusively found in small farms units, where, for example, Christ's thorn (*Machaerium hirtum* (Vell.) Stellfeld) is used in the treatment of intestinal infections of calves. By contrast, plants toxic to the

herds are of permanent concern in the Pantanal of Cáceres. Among the species recognized on the border region as unwanted in the pasture due to their harmful effects on the herd, some are not actually toxic but may cause internal or external mechanical injuries, e.g., the seeds of cumbaru (*Dipteryx alata* Vogel), the ingestion of which may damage the animal's digestive tract.

The Brazil–Bolivia border region is the site of the most unwanted plant, ximbuva (*Enterolobium contortisiliquum* (Vell.) Morong). Animals that ingest its fruit show symptoms such as loss of balance and appetite and fast weight loss, all of which are provoked by toxic effects on the nervous system. For cattle breeders, this set of symptoms is called *requeima do animal*. AFONSO & POTT (2001) also found that ximbuva is a toxic plant of great concern in the Pantanal. The vector of its toxicity is the ripe fruit, when ingested by the animal. Control over this toxic species is typically by its mechanical elimination but in some cases also by chemical control, i.e., the same techniques used to remove weeds from the pasture.

The same vegetal covering used as timber resources is also employed in the herd's comfort. Of the 31 such species, four are cultivated and the rest are native or spontaneous species. Besides the tree species listed in Table 29.1, cultivated and commonly used trees are: amora (*Morus nigra* L.), goiaba (*Psidium guajava* L.), ingá (*Inga edulis* Mart.), and manga (*Mangifera indica* L.).

In the areas with natural tree cover, the vegetal covering protects the animals from weather phenomena (temperature variations, rains, and storms), both during foraging and/or during rest in the winter pastures. These tree species provide food as well as a source of timber for the construction and maintenance of the above-described rural buildings. The remnants of trees in old backyards serve as shelters that protect the herd during the hottest periods of the year. In native and cultivated pastures, trees scattered throughout are maintained to protect the cattle.

Finally, it is important to mention the work of SANTOS (2005, personal communication), who emphasized the importance of preserving native pastures of wetlands areas in order to preserve the Pantanal. This study, by providing ethnobiological and ethnoecological information, contributes to current efforts aimed at preservation of the Pantanal by elucidating the dynamics of cattle-raising in the region. These results show that it is necessary to provide the conditions that will allow pantanal's populations to remain in the Pantanal and on their family farms, which, in turn, will preserve local culture and native pastures.

29.5 Conclusions

The presence of a variety of disturbances that alter the way of life of the border population with respect to their use of plants associated with cattle-breeding was

verified. The study population has been strongly identified for nearly a century with cattle-raising, an activity that reflects traditional land use and family-based production systems. Grandparents and parents maintain the necessary knowledge and skills, passing them on to younger generations by involving them in the daily practices of cattle-raising. This local behavior can be traced to the history of the territory and thus of cattle-breeding in the region. Historically, cattle-raising was carried out in the 17th century mainly in occupied areas by religion missions. These were later integrated by the government of the state of Mato Grosso into large cattle ranches in order to supply the food needs of the population residing in villages and, since the 18th century, in military forts situated along the border.

In the continuum of the Pantanal of Cáceres, the farms share certain common features: (a) the origin and permanence of the owner in the same land unit for at least two generations; (b) the pronounced dependence on local natural resources; (c) the dominance of male family members in the work of cattle-raising, (d) the use of wetlands areas as native pasture, which contain a large number of forage species that occupied these sites spontaneously, (e) the smaller role of cultivated pasture for cattle foraging, (f) the co-existence of officially required veterinary care and the use of home remedies in the treatment of cattle diseases, (g) the continuity of cattle-raising activities due to the vertical transmission of knowledge in the nuclear family through daily practice, which allows the individuals with talent and interest in cattle-raising to be identified and encouraged, (h) the location of small and medium-size farms in areas under intense pressure by large cattle-breeding farms , which threatens to change traditional cattle-raising methods.

The variations in life style and the forms of management used in traditional cattle-raising are strongly associated with the cultural origins of each family unit, independent of the territorial extent of the land. The population's perceptions regarding the presence and importance of plants for cattle-raising is clearly reflected in the use of these plants to effectively support this production activity and in the number of taxa mentioned by interviewed members of the population. Three important aspects were thus identified: species diversity, multi-functionality, and, the number of places where the plants are obtained.

In all of the farms individuals responsible for cattle-raising call themselves cattle-breeders or *pantaneiro*, and they have been involved in cattle-raising since reaching adolescence. While the productive activity of cattle-raising continues to grow in the region, it tends to be increasingly concentrated in large farms, such that native small and medium-size cattle breeders are being employed in these farms as paid cow-keepers.

The new technology in cattle-raising is a strong element that has altered the daily practices of cattle-raising. At the same time, the material culture and the methods and types of constructions are, for now, maintained despite exogenous pressures on the local population.

The knowledge of this population regarding the vegetal component associated with cattle-raising is closely related to other productive activities carried out in the region, such as fishing and small vegetable gardens. These activities constitute part of the cultural legacy maintained by the border population and of the natural environment that has for many years provided the basis for its support.

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