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# Diversity of Useful Plant Resources in the City of Monsenhor Gil, Piauí State, Brazil

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## ABSTRACT

The state of Piauí, northeastern Brazil, has 8349.759 hectares of Cerrado dominant area and 3507.107 hectares in transition area. The objectives were to know the botanical species traditionally used by the locals of Monsenhor Gil (PI). The botanical collecting was accomplished from February 2006 to May 2007, and the testimonials are part of the collection of Herbarium Graziela Barroso (TEPB/UFPI). Semi-structured interviews were applied to the locals, 21 interviewees who were over 45 years old and living in the city for over 15 years, chosen by community leaders as encyclopedic experts. The interviews were based on standard forms, on which were the general data of the interviewees, as well as information related to the studied native plants, which were classified into the use categories medicinal, fodder, mellifluous, lumbering, alimentary, ornamental and energy producer. Quantitative data were compiled with the calculation of the species' Use Value, from the formula VU= ∑U/ n. 112 useful botanical species were sampled of herbaceous and shrub-arboreal habit, distributed into 83 genera and 42 families, with *Leguminosae* being the best represented, twenty species, followed by Poaceae (10), Myrtaceae and Cyperaceae (8) families. The use category with the largest number of indications was fodder, with 76 species, followed by the mellifluous uses (55). The calculation of the Use Value for each species revealed that *Mimosa caesalpiniifolia* Benth. (unha-de-gato) (3.80), *Caryocar coriaceum* Wittim. (pequi) (3.38), *Mimosa acutistipula* Benth. (jurema, unha-de-gato-preta) (3.23) and *Tabebuia serratifolia* (Vahl.) G. Nicholson. (pau-d'arco-amarelo) (3.10) were the species found to have the largest values.

**Keywords:** cerrado, qualitative ethnobotanics, quantitative ethnobotanics, use value

## INTRODUCTION

Studying native plant diversity in a particular place is of great value to comprehend biological processes, hence these plants comprise an important cultural and economical heritage of native populations. Thus, the vegetation flower, ethnobotanics and economical potentialities surveys are significant.

The relationship between native peoples and natural riches in Brazilian lands has always been a constant. To Ribeiro (1987), this fact is so true that the Brazilian Indian has developed strategies and techniques for the use of his environment's natural resources.

In accordance with Felfili *et al.* (2004), in Cerrado (Brazilian savannah), areas, the great availability of natural resources such as medicinal plants, alimentary plants, fodder trees, and of materials for the making of handicraft products or energy production wood, represent an alternative income source for several population categories, such as traditional communities and traders. However, this is not a rational use, prevailing traditionally extraction practices.

Almeida (1998) mentions that many Cerrado species have varied uses, as it is the case of buriti (*Mauritia flexuosa* L.), from which almost everything is made use of: the leaves to cover roofs and as raw material for the fiber extraction and making of hammocks; the petiole used in the making of furniture, and the fruit pulp appreciated as food. She also observes the availability of food material during both seasons of the year in the Cerrado, with a greater fruit offer in the rainy season, from October to March, as well as the hearts of palms. Such fruits are alternative sources of protein, fiber, energy, vitamins, calcium, iron, phosphorus, and fatty acids. According to the above mentioned author, however, still today the Cerrado vegetation harvest is totally extractive. According to Felfili *et al.* (2004), in case of predatory harvest, this fact could generate along time the extinction of the species, since the alimentary use exploits the fruit, the reproductive part of the plant, and the extraction can also cause natural resources shortage in the biome Cerrado. The great challenge for the communities surviving from products coming from the Cerrado areas is exactly conservation and in conformity with Clay and Sampaio (2000), the solution would be the rational use and conservation of their genes in germplasm banks.

As Piauí State has the greatest part of the Cerrado from all the Northeast Region, responsible for 8349.759 hectares (70.4%) in its dominant area and 3507.107 hectares (29.6%) in the transitional area (CEPRO 1992), researches are essential which make available data on the flower riches, the use of these riches by the population, as well as comprehending how this harvest has been happening. Studies related specifically to the use of the Piauí Cerrado native products are decreased. Therefore, the need for filling in these gaps is urgent, since vast native areas have been substituted for large grazing lands projects in the last few years, especially with the soy culture. Particularly, the city of Monsenhor Gil has no records of researches developed in this field, thus the present proposal is the first in this sense, which aims to know the application of the vegetal resources used by the locals.

## MATERIALS AND METHODS

The research was conducted in nine communities with Cerrado vegetation: Bolívia, Boa Esperança, Cadoz, Canafístula, Saquinho Farm, Laranjeiras, Monte Alegre, São Luís and Varjota, located in the city of Monsenhor Gil (PI), whose City Hall is located on the geographic coordinates 05° 33′ 45″ S and 42° 37′ 02″ W, away 56

Received: 31 July, 2008. Accepted: 25 September, 2008.

Original Research Paper

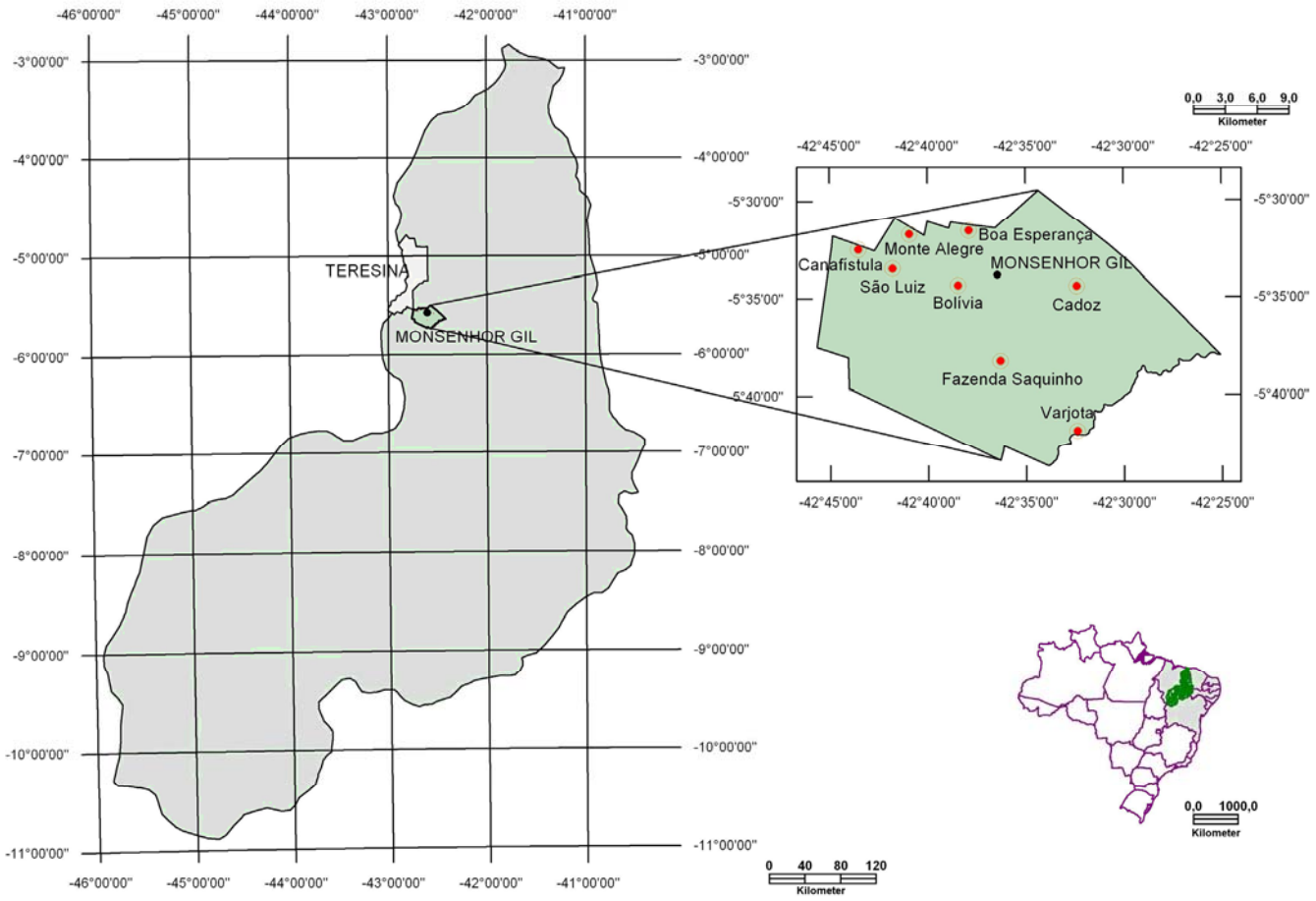


**Fig. 1 Location map to the city of Monsenhor Gil, Piauí State, Brazil, pointing out the botanic material collecting area.**

km from the Capital City of Teresina (**Fig. 1**), at an altitude of 116 manm, with a varying temperature of 25° and 38°C and a climate characterized as Warm Tropical. The vegetation is made of Cerrado and in smaller degree park vegetation. The predominant soils are B Texture Horizon, B Latisols and Tropical Concrete. The main water courses are the streams Natal, Caminho and da Cruz (CEPRO 1992). The Northern limit is the City of Lagoa do Piauí; the Southern limits are the cities of Miguel Leão and Olho D'água do Piauí; the Eastern limits are the cities of Beneditinos and Passagem Franca and the Western limit is the city of Curralinhos (Araújo 2006).

## Flower and ethnobotanics survey

The botanic collecting was accomplished from February 2006 to May 2007, fortnightly in rainy months and monthly during the dry ones. The plant collecting happened during random or previously planned walks, following usual field procedures, according to Mori *et al*. (1989). The species were identified through observing their external morphology, searches of specialized bibliographies, as well as comparisons to already identified and incorporated individuals to the collection of Federal University's Herbarium Graziela Barroso (TEPB), and they were conferred, complemented and/or corrected by experts. The classification system adopted was that of Cronquist's (1988). The abbreviations of the authors' names and of the spelling of the species are in accordance with Brummitt and Powell (1992), and with the IPNI.

The ethnobotanics data collecting collecting was carried out by means of semi-structured interviews, according to Albuquerque and Lucena (2004), to 21 locals key informants, ages 45 or older, who lived in the city for over 15 years, chosen by local community leaders as encyclopedic experts on the use of vegetal resources. All of them were considered key informants, and four of these followed most of the botanic collects. The interviews were based on standard forms, on which were the general data of the interviewees, such as: name, age, occupation, and residence time in the place; as well as information related to the studied native plants, with their respective uses, preparations and used parts. The vernacular names of the plants were registered according to the informants' pronunciation. Such procedures were performed to obtain information regarding the use of the species, which were placed into the following categories of use: medicinal, fodder, mellifluous, lumbering, alimentary, ornamental and energetic production, based on the methodology of Lima *et al.* (2000), slightly modified.

For each one of the species, the calculation of its Use Value is from the formula VU= ∑U/ n, adapted from Rossato *et al*. (1999). The Use Value (VU), is the ratio between the sum of the number of citations (or uses) of the ethnoespecie (∑U), by the total number of informants for the referred plants (n).

## RESULTS AND DISCUSSION

From the total of informants, eight are female and 13 are male; only six are literate, and only three have come to finish the Ensino Médio [high school equivalent]. Most of them are agricultural workers and some are retired or pensioners from the National Institute of Social Security (INSS), but they use agriculture to help maintain family expenses, guaranteeing at least the production of cereals, such as arroz (*Oryza sativa* L.), and feijão (*Phaseolus vulgaris* L.), the region's small workers' common cultures. It is worth mentioning that most of the informants practice subsistence farming, i.e., the production is almost totally intended to the family consumption, and a small quantity sold at the city market located in the central region of the city. The average income is no higher than a minimum wage (R$ 415.00 or US$ 230.60), so that this low income affects directly their housing conditions. This fact is verified when, from all the informants, only six have tile-covered houses and from these, two have brick-plastered walls, one have brick-unplastered walls and the others have lath-and-plaster walls. From the straw-covered houses, all of them are lath-and-plastered. Regarding the type of floor, only three residences are cement-covered and none of them are ceramic-

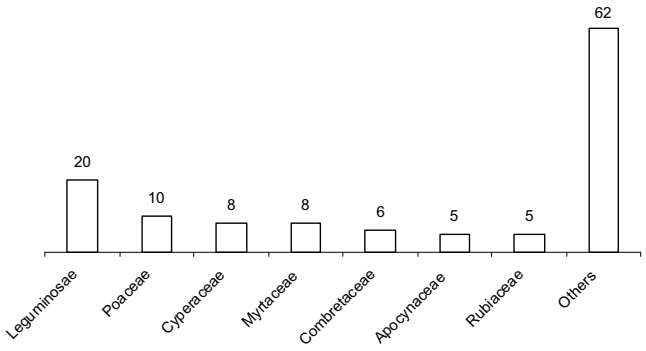


**Fig. 2 Number of useful botanical species in the best represented families in the city of Monsenhor Gil, Piauí State, Brazil.**

covered. All the informants drink water coming from wells, and only eight treat their water by means of a clay filter. The others use no treatment of any type. In general, the informants throw their house sewers directly into the soil, in the open. Four of the houses have concrete cesspits, three have cesspools and the other informants get rid of their excrements out in the soil of the vegetation located around the houses. Domestic garbage is thrown at the soil in lands around all the informants' houses, where it is usually buried or burnt.

In the survey, 112 useful botanical species of herbaceous and shrub-arboreal habit are distributed in 83 genera and 42 botanical families (**Table 1**). The most prominent families, according to the number of species are: Leguminosae (20), Poaceae (10), Myrtaceae and Cyperaceae (8), Cobretaceae (6), Aprocynaceae and Rubiaceae (5). The other families consisted of 62 species. In Leguminosae, these were noticeable: *Caesalpinia ferrea* Mart. ex Tul., *Copaifera luetzelburgii* Harms, *Cenostigma macrophyllum* Tul., *Dimorphandra gardneriana* Tul., *Hymenaea stignocarpa* Mart. ex Hayne, *Luetzelburgia auriculata* (Allem.) Ducke and *Sclerolobium paniculatum* Vogel. (**Fig. 2**). The information concerning the *Leguminosae* family are similar to that found by Abreu (2000), and Franco (2005), both with researches developed in the state of Piauí, in Black communities (quilombola*s*), in the cities of Amarante and Esperantina, respectively. On the other hand, the least represented families as for the number of species were: Annonaceae, Bromeliaceae, Capparaceae, Caryocaraceae, Cecropiaceae and Cochlospermaceae, which accounted for only one species cited as being recognizably useful.

According to the locals' information, the use categories of the plants were divided into seven types: alimentary (species used in human nourishment); fodder (intended for animal feeding); lumbering (useful in civil construction and making of furniture); medicinal (presenting therapeutic qualities); mellifluous (sources of pollen or nectar); energy production (species used as fuel, either firewood or charcoal); ornamental (species used in the forestry of ruined environment).

The use category fodder comprised the largest number of species 76 (26%), followed by mellifluous (55), lumbering and energy production (39, each), medicinal (35), Alimentary (24) and Ornamental (10). It is worth mentioning that the species might have been classified in one or more use categories, for instance *Mouriri pusa* Gard. (puçá), which was referred simultaneously in the categories fodder, mellifluous, alimentary, lumbering, energy production and ornamental, and *Coccoloba mollis* Casar. (pajeú), placed into the categories fodder, mellifluous, alimentary, lumbering, energy production.

## Fodder species

Regarding the use category fodder, the shrub-arboreal habit species were predominant, comprising 64.50% and were followed by the herbaceous (35.50%). The families Leguminosae and Poaceae were more evident, with 10 species, followed by Cyperaceae and Malpighiaceae (8), Bignoniaceae and Malpighiaceae (3). Cyperaceae and Poaceae are examples of families which presented 100% of their species as fodder.

*Parkia plathycephala* Benth. (faveira-de-bolota), *Tabebuia impetiginosa* Mart. ex. DC. [pau-d'arco-roxo], *Tabebuia serratifolia* (Vahl.) G. Nicholson (pau-d'arco-amarelo), and *Samanea tubulosa* (Benth.) Barneby & J. W. Grimes (bordão-de-velho), are considered, according to the informants, much appreciated by the animals. One of the informants attests that by saying:

"*...if one wanna catch one o'our little goats, you can only go to where there's a pau-d'arco-amarelo tree when the flowers is falling that's easy to find 'em there. They spend all day long lay just waiting for 'em to fall so that they might eat 'em.*"

*P. plathycephala*, referred here as fodder, was placed by Funch *et al.* (2004), into the list of useful plants of Chapada Diamantina (Diamantina Tablelands), where it is effective in the healing of womb wounds and used as a powerful external healing. Franco *et al*. (2007), also point out this species as important in feeding animals.

From among the botanical families which had only one species classified into the fodder category there is the case of Ebenaceae, with *Diospyros hispida* A. DC. (olho-de-boi), very frequently found in the researched areas. Moreover, even referred to as fodder, the informants consider it toxic to small animals, such as goats and sheep, although they have frequently been seen feeding on the fruits of this species. Pursuant to Pott *et al*. (2006), *D. hispida* is considered a weed in Cerrado pasture areas.

Fruits, flowers and leaves are the most consumed parts of the plants by animals. *P. plathycephala* and *Hymenaea stignocarpa* Mart. ex Hayne (jatobá), are examples of fruit providers species, which in this case, are eaten directly from the plant or provided by the raisers, when collected previously. As for the genus *Hymenaea* L., Rizzini (1971), showed then that the species pertaining to that genus provide good lumber, edible fruits, and tannin barks, as well as the resin produced by the genus be able to convert into amber, after a series of chemical processes occurred along the years.

Thus, the Cerrado native fodder trees in the researched area support the breeding of small animals, such as goats and sheep, swine, and fowl, a commonly developed activity by the locals. It is also important to mention that, from the total of fodder species, 41% are used as medicinal plants.

## Mellifluous species

The mellifluous species were those species cited by the informants and/or those whose data were verified by the presence of bees in the florescences, with no, however, certifying the type of material collected by these. In this use category, these were certified: Leguminosae (12 species), Myrtaceae and Rubiaceae (5), Combretaceae (4) and Bignoniaceae (3). In these five families, all species have shrub-arboreal habit. *Campomanesia velutina* (Cambess.) O. Berg (guabiraba-amarela), *Dipteryx alata* Vogel. (catuaba-branca), *Guetarda viburnoides* (Cham.) Schltdl. (angelica), *Magonia pubescens* A.St.-Hil. (tingui), and *Sclerolobium paniculatum* Vogel (pau-pombo), are introduced in the list of indicated mellifluous species. In the case of *D. alata*, besides the certification of large amounts of bees present in the plant, one could perceive the strong smell of honey, emanated from the flowers, at the time of the botanical collecting. For this work, *M. pubescens* was indicated as mellifluous with no restriction, although Guarim Neto *et al*. (2000), collected data on the toxicity of the honey produced by this species.

From the 55 mellifluous species cited for this work, *Anacardium occidentale* L. (caju, cajuí), *Cuphea laricoides* Kohne (mãe-catirina), *Dimorphandra gardneriana* Tul. (fava-d'anta), *Luetzelburgia auriculata* (Allem.) Ducke (mocó, pau-mocó), *Magonia pubescens* A.St.-Hil. (tingui),

**Table 1** Cerrado species used by communities of the city of Monsenhor Gil, Piauí , Brazil.

| FAMILY/SPECIES | NV | UV | U Cat. | NR |
|---|---|---|---|---|
| **Anacardiaceae** | | | | |
| *Anacardium occidentale* L. | Caju, cajuí | 2.52 | a,b,c,d | 22.224 |
| *Myracrodruon urundeuva* Allem. | aroeira | 2.57 | a,b,e,f | 22.225 |
| **Annonaceae** | | | | |
| *Rollinia leptopetala* R. E. Fries | ata-braba-miúda | 0.23 | b | 22.222 |
| **Apocynaceae** | | | | |
| *Allamanda blanchetii* A. DC. | flor do campo | 0.14 | g | 21.657 |
| *Himathantus drasticus* (Mart.) Plumel | janaguba, pau-de-leite | 0.52 | a,c | 21.655 |
| *Mandevilla* sp | jasmim | 0.24 | e,g | 22.635 |
| *Tabernaemontana hystrix* Steud. | cunhão-de-porco | 0.14 | b | 21.656 |
| *Tabernaemontana solanifolia* A. DC. | cunhão-de-porco | 0.38 | d,e | 21.358 |
| **Arecaceae** | | | | |
| *Copernicia prunifera* (Mill.) H. E. Moore | carnaúba | 0.85 | a,b,c,d,f | 22.220 |
| **Bignoniaceae** | | | | |
| *Jacaranda brasiliana* Pers. | caroba | 1.71 | b,c,e,f,g | 22.364 |
| *Tabebuia impetiginosa* (Mart. ex DC.) Standl. | pau-d´arco- roxo | 2.85 | a,b,c,e,f,g | 22.366 |
| *Tabebuia serratifolia* (Vahl.) G. Nicholson | pau-d´arco- amarelo | 3.10 | a,b,c,e,f,g | 22.681 |
| **Boraginaceae** | | | | |
| *Cordia piauhiensis* Fresen | grão-de-galo | 2.00 | a,b,c,d | 22.258 |
| *Cordia rufescens* A. DC. | grão-de-galo | 1.52 | a,b,c,d | 22.679 |
| **Bromeliaceae** | | | | |
| *Bromelia laciniosa* Mart. ex Schult. | macambira | 0.38 | b | 22.,669 |
| **Cactaceae** | | | | |
| *Cereus jamacaru* DC. | mandacaru | 0.28 | b | 22.428 |
| **Capparaceae** | | | | |
| *Cleome spinosa* Jacq. | muçambê | 1.38 | a,c | 22.425 |
| **Caryocaraceae** | | | | |
| *Caryocar coriaceum* Wittm. | pequi | 3.38 | a,b,c,d,e,f | 22.427 |
| **Cecropiaceae** | | | | |
| *Cecropia pachystachya* Trécul | embaúba | 0.38 | a | 22.363 |
| **Chrysobalanaceae** | | | | |
| *Hirtella ciliata* Mart. & Zucc. | pau-de-galego | 0.43 | c,f | 22.368 |
| *Licania rigida* Benth. | oiticica | 0.43 | e,f | 22.369 |
| **Cochlospermaceae** | | | | |
| *Cochlospermum vitifolium* Spreng. | algodão-bravo | 0.23 | b | 22.680 |
| **Combretaceae** | | | | |
| *Buchenavia* sp | mirindiba | 1.24 | b,e,f | 22.641 |
| *Combretum duarteanum* Cambess. | catinga-branca | 0.42 | c,e,f | 22.384 |
| *Combretum leprosum* Mart. | mufumbo | 0.90 | a | 22.380 |
| *Combretum mellifluum* Eichl. | mufumbinho | 1.57 | a,c,f | 22.372 |
| *Terminalia brasiliensis* Eichl. | chapada | 2.00 | a,c,e,f | 22.374 |
| *Terminalia fagifolia* Mart. | chapada | 2.23 | a,c,e,f | 22.387 |
| **Convolvulaceae** | | | | |
| *Operculina alata* (Ham.) Urb. | batata-de-purga | 0.85 | a | 22.431 |
| **Cyperaceae** | | | | |
| *Cyperus lanceolatus* Poir | capim-frio | 0.85 | b | 22.419 |
| *Cyperus schomburgkianus* Nees | capim | 0.71 | b | 22.418 |
| *Kyllinga odorata* Vahl | capim | 0.57 | b | 21.870 |
| *Rhynchospora aurea* Vahl | capim | 0.85 | b | 22.432 |
| *Rhynchospora* cf. *barbata* Kunth | capim | 0.95 | b | 22.416 |
| *Rhynchospora nervosa* (Vahl.) Boeck. | capim | 0.76 | b | 21.869 |
| *Rhynchospora pubera* Boeckeler | capim | 0.61 | b | 22.417 |
| *Rhynchospora* sp | capim | 0.85 | b | 22.420 |
| **Dilleniaceae** | | | | |
| *Davilla macrocarpa* Eichl. | sambaibinha | 0.09 | a,b | 22.396 |
| **Ebenaceae** | | | | |
| *Diospyros hispida* A. DC. | olho-de-boi | 1.24 | b,f | 22.433 |
| **Euphorbiaceae** | | | | |
| *Croton betaceus* Baill. | velame | 0.85 | a | 22.438 |
| *Croton pedicellathus* Kunth | malva | 0.04 | b | 22.437 |
| **Flacourtiaceae** | | | | |
| *Casearia ulmifolia* Cambess. | farinha-seca | 1.19 | e,f | 22.415 |
| *Casearia* sp | farinha-seca | 0.76 | e,f | 22.646 |
| **Hydrophylaceae** | | | | |
| *Hydrolea spinosa* L. | amoroso | 0.14 | c | 22.441 |
| **Iridaceae** | | | | |
| *Cipura paludosa* Aubl. | flor-de-trovão | 0.14 | b | 22.445 |
| *Cipura xanthomelas* Mart. ex Klatt | coquinho-do-campo | 0.14 | b | 22.424 |
| *Herbertia pulchella* Sweet | flor-de-trovão | 0.47 | b | 22.443 |
| **Lamiaceae** | | | | |
| *Raphiodon echinus* (Nees & Mart.) Schauer | betânia | 0.14 | b | 22.590 |

NV = common name; UV = Use Value; U. Cat. = Use Category. Medicinal (a), fodder (b), mellifluous (c), alimentary (d), lumbering (e), energy production (f), ornamental (g). NR= registration number at Herbarium Graziela Barroso.

**Table 1** (Cont.)

| FAMILY/SPECIES | NV | UV | U Cat. | NR |
|---|---|---|---|---|
| **Leguminosae** | | | | |
| **Caesalpinioideae** | | | | |
| *Bauhinia catingae* Harms | capa-bode | 0.61 | c,e,f | 22.583 |
| *Bauhinia pulchella* Benth. | mororó | 0.47 | c,e,f | 21.723 |
| *Caesalpinia bracteosa* Tul. | catinga-de-porco | 0.86 | e,f | 22.546 |
| *Caesalpinia ferrea* Mart. ex Tul. | jucá, pau-ferro | 2.61 | a,c,e,f,g | 22.599 |
| *Cenostigma macrophyllum* Tul. | caneleiro | 1.71 | a,c,e,f,g | 22.597 |
| *Copaifera luetzelburgii* Harms | podói | 2.52 | a,e,f | 22.600 |
| *Dimorphandra gardneriana* Tul. | fava-d´anta | 2.00 | a,b,c,e,f | 22.602 |
| *Hymenaea stignocarpa* Mart. ex Hayne | jatobá | 0.66 | a,b | 22.584 |
| *Martiodendron mediterraneum* (Mart. ex Benth.) Koeppen | quebra-machado | 0.85 | e,f | 22.549 |
| *Sclerolobium paniculatum* Vogel | pau-pombo | 2.33 | a,b,c,e,f | 22.594 |
| *Senna alata* (L.) Roxb | maria-mole | 0.19 | a | 22.592 |
| **Mimosoideae** | | | | |
| *Inga laurina* (Sw.) Willd. Benth. | ingá | 1.04 | b,c,d | 22.609 |
| *Mimosa acutistipula* Benth. | jurema, unha-de-gato-preta | 3.23 | a,b,c,e,f | 21.719 |
| *Mimosa caesalpiniifolia* Benth. | unha-de-gato | 3.80 | a,b,c,e,f | 22.603 |
| *Parkia platycephala* Benth. | faveira-de-bolota | 2.61 | b,c,e,f | 22.606 |
| *Piptadenia moniliformis* Benth. | rama-de-bezerro | 1.52 | b,c,d,e | 22.610 |
| *Samanea tubulosa* (Benth.) Barneby & J. W. Grimes | bordão-de-velho | | b,c,e,f,g | 22.608 |
| **Papilionoideae** | | | | |
| *Dipteryx alata* Vogel. | catuaba-branca | 2.31 | c,e,f | 22.219 |
| *Luetzelburgia auriculata* (Allem.) Ducke | mocó, pau-mocó | 0.80 | b,c,e,f,g | 22.613 |
| *Machaerium* sp | violeta | 1.20 | e,f | 22.612 |
| **Lythraceae** | | | | |
| *Cuphea laricoides* Kohne | mãe-catirina | 0.42 | a,b,c | 22.561 |
| *Cuphea* sp | mãe-catirina | 0.42 | a,b,c | 22.562 |
| **Malpighiaceae** | | | | |
| *Byrsonima correaefolia* A. Juss. | murici | 3.00 | b,c,d,e,f | 22.565 |
| *Byrsonima sericea* DC. | murici | 3.00 | b,c,d,e,f | 22.567 |
| **Melastomataceae** | | | | |
| *Mouriri pusa* Gard. | puçá | 1.95 | b,c,d,e,f,g | 22.570 |
| **Myrtaceae** | | | | |
| *Campomanesia velutina* (Cambess.) O. Berg | guabiraba-amarela | 1.28 | b,c,d | 22.576 |
| *Eugenia* aff. *rosea* DC. | goiabinha | 0.23 | b | 22.572 |
| *Eugenia biflora* DC. | murta | 0.87 | b,c,d | 22.579 |
| *Eugenia* sp | aracá-de-raposa | 0.71 | b | 22.658 |
| *Myrcia cuspicata* O. Berg | murta | 0.24 | b,c | 22.577 |
| *Myrcia guianensis* (Aubl.) DC. | murta | 1.24 | b,c,d | 22.573 |
| *Psidium hians* DC. | araçá | 1.42 | a,b,c,d | 22.581 |
| *Psidium myrsinites* DC. | aracá-de-porco, araçá | 1.40 | b,c | 22.580 |
| **Olacaceae** | | | | |
| *Ximenia americana* L. | ameixa | 2.47 | a,b,c,d | 22.496 |
| **Passifloraceae** | | | | |
| *Passiflora cincinata* Poir. | maracujá-do-mato | 2.00 | b,c,d | 22.398 |
| *Passiflora foetida* Vell. | maracujá-papoco | 0.23 | b,c | 22.397 |
| **Poaceae** | | | | |
| *Aristida longifolia* Trin. | capim-agulha | 0.24 | b | 21.874 |
| *Aristida setifolia* Kunth | capim | 0.15 | b | 21.783 |
| *Axonopus* sp | capim | 0.14 | b | 22.691 |
| *Eragrostis ciliaris* (L.) Link. | capim | 0.23 | b | 21.875 |
| *Paspalum convexum* Willd. ex Doell | capim | 0.14 | b | 22.407 |
| *Paspalum rojasii* Hackel | capim | 0.23 | b | 21.876 |
| *Setaria parviflora* (Poir.) Kerguélen | capim | 0.23 | b | 22.406 |
| *Setaria scabrifolia* (Nees) Kunth | capim | 0.43 | b | 21.872 |
| *Streptostachys asperifolia* Desv. | capim | 0.50 | b | 22.408 |
| *Trachypogon spicatus* Ktze. | capim-agreste | 1.00 | b | 21.877 |
| **Polygonaceae** | | | | |
| *Coccoloba mollis* Casar. | pajeú | 2.14 | b,c,d,e,f | 22.399 |
| **Rhamnaceae** | | | | |
| *Ziziphus joazeiro* Mart. | juá, juazeiro | 0.52 | b,c,d,e,g | 22.515 |
| **Rubiaceae** | | | | |
| *Alibertia edulis* A. Rich. ex DC. | marmelada | 1.66 | b,c,d | 22.520 |
| *Alibertia sessilis* (Vell.) K. Schum. | maria-pretinha | 1.33 | b,c,d | 22.522 |
| *Guetarda viburnoides* (Cham.) Schltdl. | angélica | 0.77 | c | 22.535 |
| *Tocoyena* cf. *hispidula* Standl. | | 0.25 | c | 22.620 |
| *Tocoyena formosa* (Cham. & Schltdl.) K. Schum. | jenipapinho | 0.85 | b,c,d | 22.517 |
| **Sapindaceae** | | | | |
| *Magonia pubescens* A.St.-Hil. | tingui | 2.70 | b,c,e,f | 22.499 |
| *Matayba* sp | pau-de-recongo | 0.15 | b | 22.652 |
| **Sapotaceae** | | | | |
| *Pouteria ramiflora* (Mart.) Radkl. | pitomba-de-leite, maçaranduba | 0.76 | b,c,d,e,f | 22.504 |

NV = common name; UV = Use Value; U. Cat. = Use Category. Medicinal (a), fodder (b), mellifluous (c), alimentary (d), lumbering (e), energy production (f), ornamental (g). NR= registration number at Herbarium Graziela Barroso.

**Table 1** (Cont.)

| FAMILY/SPECIES | NV | UV | U Cat. | NR |
|---|---|---|---|---|
| **Simaroubaceae** | | | | |
| *Simarouba versicolor* A.St.-Hil. | paraíba, praíba | 0.61 | a,e,f | 22.501 |
| **Smilacaceae** | | | | |
| *Smilax campestris* Griseb. | japecanga | 0.16 | b | 22.536 |
| **Sterculiaceae** | | | | |
| *Guazuma* sp | farinha-seca | 0.23 | b | 22.653 |
| **Turneraceae** | | | | |
| *Turnera ulmifolia* L. | chanana | 0.28 | a | 22.790 |
| **Verbenaceae** | | | | |
| *Lantana* sp | alecrim | 0.85 | a | 22.627 |
| *Lippia salviaefolia* Cham. | alecrim | 0.85 | a | 22.510 |
| **Vochysiaceae** | | | | |
| *Qualea grandiflora* Mart. | pau-terra-da-folha-larga | 0.52 | a,c | 22.512 |
| *Salvertia convallariaeodora* A.St.-Hil. | folha-larga | 0.35 | c | 22.511 |

NV = common name; UV = Use Value; U. Cat. = Use Category. Medicinal (a), fodder (b), mellifluous (c), alimentary (d), lumbering (e), energy production (f), ornamental (g). NR= registration number at Herbarium Graziela Barroso.

*Psidium myrsinites* DC. (aracá-de-porco, araçá), and *Qualea grandiflora* Mart. (pau-terra-da-folha-larga) were also referred by Costa and Castro (2007) when they studied the associated flora and the mellifauna of a lithographic Cerrado northern Piauí.

From the six species belonging to the Combretaceae family, four are mellifluous, such as *Terminalia fagifolia* Mart. (chapada), which was also cited by Silva Júnior *et al.* (2005), as being mellifluous, lumbering provider, curing gastritis and pulmonary diseases, as well as presenting potential for urban forestry and landscape architecture.

The second position of this use category suggests the great mellifluent potential of the vegetation in the city of Monsenhor Gil.

## Lumbering species

The classification of the lumbering use category in third most significant position, along with the energy production category, both with 39 species, suggests the economical and cultural importance of the shrub-arboreal vegetation in the city surveyed. Lima *et al.* (2000) have also rated the lumbering category in the same position in communities of the Environmental Protection Area in Guaraqueçaba, in the State of Paraná, southern Brazil. Among the informants, it is a custom to classify the lumbering species into ground lumbering and air lumbering. The first refers to those species which must be used buried into the ground, as it is the case of *Terminalia brasiliensis* Eichl. (chapada), used as cattle pole, while the latter is related to the those which cannot get into contact with the ground, for they tend to rot easily, such is the case of *Sclerolobium paniculatum* Vogel (pau-pombo).

From the 39 species classified as lumbering, *Terminalia brasiliensis* Eichl. (chapada), was recommended to the making of cattle poles; *Mimosa caesalpiniifolia* Benth. (unha-de-gato), to the filling of walls in lath-and-plaster houses and fence building; *Copernicia prunifera* (Mill.) H. E. Moore (carnauba), to the building of cattle, swine, and goat and sheep corrals, and *Sclerolobium paniculatum* Vogel (pau-pombo), used as rafters and beams. *Tabebuia serratifolia* (Vahl.) G. Nicholson (pau-d'arco-amarelo) has a deep-rooted tradition as quality lumbering in the building of houses. Silva Júnior *et al.* (2005) classify this species as heavy, very hard and long-lasting lumbering, as well as valuable because of its use versatility. Thus, the referred lumbering species are used more often in the building of small, medium and large-sized houses, fences, and corrals, and its use for the making of small utensils such as sickles, axes, and hoes handles, among others, or furniture, is very little. Regarding this, one of the informants say:

"*...In our days no one wanna no more or know how to make furniture or else. In the past we seen 'em (masons) making big furniture, wooden spoon, pestle, and even corpse coffin, but today, we see 'em buying all factored in the stores in town.*"

These data, besides being contradictory to those of Botrel *et al.* (2006), who concluded that in the city of Ingaí, in the State of Minas Gerais, the locals still produce a reasonable amount of small objects which they need, suggest a substantial acculturation of the locals in the studied region.

## Energy production species

At the communities surveyed, especially for being located in the city's rural area, it is still common the use of plants as energy source. Among the 39 families referred, these stand out for their number of species: *Leguminosae* (16), Combretaceae (5), and Bignoniaceae (3). *Cenostigma macrophyllum* Tul. (caneleiro), *Byrsonima sericea* DC. (murici), *Combretum mellifluum* Eichl. (mufumbinho), *Mimosa caesalpiniifolia* Benth. (unha-de-gato), *Pouteria ramiflora* (Mart.) Radkl. (pitomba-de-leite), *Sclerolobium paniculatum* Vogel (pau-pombo), *Terminalia brasiliensis* Eichl. (chapada), and *Terminalia fagifolia* Mart. (chapada), are among the species found, and *P. ramiflora* and *S. paniculatum* are among the 21 of 47 rated by Felfili *et al.* (2004) as having above-average calorific power, and being considered as priorities for the use, planting and energetic management in the Cerrado and *B. sericea* was presented as useful in providing firewood and charcoal, by Silva and Andrade (2005). As for the part of the plant used for the energy production, the stem surpasses the others; it is much used for changing into charcoal or directly as firewood. During botanical material collecting walks, it was possible to identify large bundles of firewood recently chopped and piled around the vegetation, according to the informants, to be used as energy source by the locals or traded at bakeries which use firewood oven in towns nearby, as it is the case of the Capital City Teresina.

The local informants attest not knowing any reforestation projects aiming at providing raw material for the production of energy, fact that is opposed to what has been found by Botrel *et al* (2006) among the locals of the city of Ingaí, in the State of Minas Gerais. According to the informants, the use of firewood is somehow related to the economical aspect, since a great deal of the local families cannot afford to have home gas system. However, the cultural aspects stand out, as these families use firewood stove because they like the taste of the foods cooked in these kinds of stove.

## Medicinal species

The Cerrado vegetation in the city of Monsenhor Gil-PI has for many decades been used as a medicinal source. However, some plants are feared, for they are considered toxic to the human body. The plants are intended, among other prescriptions, to prepare teas, baths, home-made flu and cough syrup compounds, powders and ointments. It was possible to observe that the plants used as medicines by the locals of Monsenhor Gil were more evident when associated to the

respiratory tract conditions, such as the flu and colds, and of the digestive system, gastritis, concurrent data with those obtained by Amorozo and Gély (1988), Amorozo (2002), and Viu *et al.* (2007). However, these findings may serve as reference for future works of phytochemical prospection, pointing out the greatest biological potential botanical families for the treatment of diseases and they could also guide potential producers on the species of larger local demand to be planted. From among the botanical families indicated to phytotherapy, the following stand out: Leguminosae (9 species) and Combretaceae (4). All Leguminosae species presented a shrub-arboreal habit, such as *Caesalpinia ferrea* Mart. ex Tul. (jucá, pau-ferro), indicated for the treatment of strokes, prostate cancer, liver conditions, the flu and general inflammations; *Hymenaea stignocarpa* Mart. ex Hayne (jatobá), for the reduction of cholesterol rates, diabetes control, gastritis, anemia and general inflammations, and *Caesalpinia bracteosa* Tul. (catinga-de-porco) for the treatment of flu, colds and general inflammations.

Combretaceae, which stood out by the citation of *Combretum leprosum* Mart. (mufumbo), and *C. melliflum* Eichl. (mufumbinho), was referred to as anti-hemorrhagic and anti-diarrhea. *Terminalia fagifolia* Mart. (chapada), and *T. brasiliensis* Eichl. (chapada) were indicated by 100% of the informants for the treatment of intestinal and stomach conditions.

Anacardiaceae had only two species but both were cited by all the informants, and *Anacardium occidentale* L. was also referred to by Pinto *et al*. (2006) in rural communities of Itacaré, in the State of Bahia, and by Fonseca-Kruel and Peixoto (2004) at the Sea Extractive Reserve of Arraial do Cabo, in the State of Rio de Janeiro, indicating it as having healing properties. *Myracrodruon urundeuva* Allem. (aroeira), in turn, was referred, for the interviewees in Monsenhor Gil, as a blood depurative and indicated for inflammations of female genitals, associated to the species *Ximenia americana* L. (plum). It is important to mention that even *M. urundeuva*, frequently recommended as possessing medicinal properties in a wide range of ethnobotanical works, for instance Amoroso (2002), Almeida and Albuquerque (2002), and Albuquerque and Andrade (2002b), Pasa *et al*. (2005) point out only its ornamental importance in the State of Mato Grosso. The use of *M. urundeuva* and *A. occidentale*, together, has been presented by Monteles and Pinheiro (2007), and in that case, they have been used for the preparation of efficient flu/cough potions, in the treatment of diseases in the osteo-muscular system.

The trading of medicinal plants was not seen in the area studied, such as the street market, taking place downtown weekly, where several regional products are traded. Nevertheless, it was possible to observe two informants trading medicinal species already prepared in the bottles (garrafadas – a mix of one or more plants, which are infused in alcohol or syrup inside a bottle), at R$ 15.00 for the locals, the citizens of small towns nearby, and even for people from other parts of Brazil, such as Distrito Federal.

As for the therapeutic effectiveness of the plants studied in this work, most of them have already pharmacological information available which may justify their popular use as it is the case of, according to Albuquerque and Andrade (2002a), the species *A. occidentale* and *M. urundeuva*.

## Alimentary species

It is known to the scientific community the importance of the Cerrado as food provider for human groups. Felfili *et al.* (2004) points out that many alimentary plants of this biome are used and traded, providing alternative foods and additional income for the communities. The alimentary use category has been placed in several ethnobotanical works, such as the works of Lima *et al.* (2000), Hanazaki *et al.* (2000) and Fonseca-Kruel and Peixoto (2004), who also mentioned the alimentary category in ethnobotanical surveys.

A total of twenty-four species is mentioned for the human feeding, from these the families with a larger number of species were: Myrtaceae (4) and Rubiaceae (3). On the other hand, the *Caryocaraceae* family presented only the species *Caryocar coriaceum* Wittim. (pequi), very important to a great number of local families' economy. It is very common to observe from January to March, locals, or sometimes entire families, setting up their stalls by the BR-316 [a federal highway], in order to sell these fruits to the people driving on vacation or holiday. It is also possible to find on these same stalls *Anacardium occidentale* L. (caju, cajuí) being sold, usually in September or October, or "cajuína" (a non-alcoholic product, made from cashew's or "cajuí's" pseudo-fruits). By selling these products, many families keep up for a great period of the year. Albuquerque and Andrade (2002b) observed a similar process in stunted/thorn trees forest (caatinga) areas in the State of Pernambuco, naming this activity opportunistic extrativism. *Campomanesia aromatica* (Aubl.) Griseb. (guabiraba-amarela) is another species which have its fruits traded similarly to the fruits of *Caryocar coriaceum* Wittim. and *Anacardium occidentale* L. Species such as *Ximenia americana* L. (plum), already mentioned as medicinal, *Inga laurina* (Sw.) Willd. Benth. (ingá), *Mouriri pusa* Gard. (puçá), *Alibertia edulis* A. Rich. ex DC. (marmelada), and *Pouteria ramiflora* (Mart.) Radkl. (pitomba-de-leite, maçaranduba) are much appreciated by locals, although, their trading is not verified. One of the informants justifies this saying:

"*...It ain't worth goin' out in the plains lookin' for these fruit, for we don't find 'em much and it ain't worth not selling much. Not to say that them people don't know these thicket fruit.*"

The informant's statement is related to Almeida's (1998) concerning the disregard by the townsfolk, especially the youngsters, for the Cerrado plants and their use.

## Ornamental species

The ornamental use category had the smallest number of mentioned species, only ten. Franco (2005), in turn, verified an even smaller number in this same category, at Quilombo (Black Community), Olho D'água do Pires, in Esperantina, also in the State of Piauí. From among the species found in Monsenhor Gil (PI), we have: *Cenostigma macrophyllum* Tul. (caneleiro), *Parkia plathycephala* Benth. (faveira-de-bolota), *Samanea tubulosa* (Benth.) Barneby & J. W. Grimes (bordão-de-velho), *Tabebuia impetiginosa* Mart. ex DC. (pau-d'arco-roxo), and *Tabebuia serratifolia* (Vahl.) G. Nicholson. (pau-d'arco-amarelo). Concerning the specie *C. macrophyllum*, referred to more than four use categories (medicinal, mellifluous, energy production and lumbering), Pott *et al*. (2006) support their importance in building houses and producing firewood and charcoal, besides mentioning that this same tree is the symbol of the Capital City of Piauí, Teresina. *P. plathycephala* is considered of a unique beauty, however, it is only frequently seen in yards and back yards of rural houses, being rejected as ornamental in the cities, for their leaves fall in a certain period of the year, causing extra household chores for housewives or maids. *Samanea tubulosa* (Benth.) Barneby & J. W. Grimes (bordão-de-velho), in turn, was one of the few species planted with ornamental purposes in some rural houses, and some species make part of the urban forestry in the city of Monsenhor Gil. As for the species *T. impetiginosa* and *T. serratifolia*, it was observed that the informants have a very special charisma, as one can see in a testimony:

"*...Pau-d'arco-roxo and pau-d'arco-amarelo are ones plants very much beautiful, we even feel sorry when we cut 'em off and don't see any more flower falling no more when the wind blow.*"

Nevertheless, even with all that worshipfulness for the species, the informant has not planted or cultivated it for ornamental purposes.

## Conservation and collecting means

The use of the botanical species by the locals in the areas surveyed in Monsenhor Gil is a reality, although the concern about the conservation of these riches has not been emphasized consistently by the informants who took part in this survey. Illustrating, there is the species *Myracrodruon urundeuva* Allem. (aroeira), which besides having revealed medicinal properties, it has also included as having lumbering ones. It occurs that, some informants have even, by the way, revealed significant information on the present shortage of this species, certainly due to the predatory extraction along several years for the mentioned purposes. According to them, there have been cases in which people removed the inner bark of the stem for medicinal purposes, then they ended up destroying that individual due to stem rings, in this study area. In this sense, Albuquerque and Andrade (2002b) discuss the extractivism pressure undergone by medicinal plants in stunted/thorn trees forest (caatinga) areas in the State of Pernambuco, including the same reference of *M. urundeuva*. Similar facts justify the presence of this species on the list of endangered species and they deserve special attention at the development of sustainable management techniques, aiming at economical return and assuring conservation.

Rodrigues and Carvalho (2001), discuss this issue when they verify in their work that the most common endangered species are those whose parts used for preparing medicines are roots, stem or stem bark, since most of the times the damage may cause the plant to die. In this study, one can refer to the species *Operculina alata* (Ham.) Urb. (batata-de-purga), whose root is removed completely for preparing vermicides.

One of the informants residing at the community Boa Esperança made the following statement on the present shortage of *Campomanesia aromatica* (Aubl.) Griseb. (guabiraba-amarela):

"*...'Round ten years ago, there was so much guabiraba 'round here that we saw pits of mud. Then, the landowners decided to deforest ev'r'thing and now it's really hard to find this fruit 'round here. We need to go further to find it.*"

However, this is not always the behavior of all landowners, as one informant stated two cases of landowners in the neighboring areas, one of the Saquinho Farm and the other of the community Monte Alegre, who were concerned about preserving vegetation as well as animal riches, but in order to achieve that they face great problems with local neighbors who insist on entering the farms to extract lumber or hunt animals there. This same informant says:

"*...The few landowners that wanna preserve them animals and plants are hated by them hunters. Many times them hunters enter the farms in secret and hunt in secret. It's an awful fight.*"

It was also observed that sustainable management actions almost do not exist. Traditional harvest practices, such as deforestations and fires are still frequent in the region. More general minimum-impact anthropic actions, such as planting largely useful native species, intended to minimize the natural pressure on the species, do not exist. This panorama cannot be seen as unexpected, as according to the informants, there is no record of any policy to the locals, regarding information divulging, when they were interviewed about any environmental project by the public sector or non-governmental organizations.

The observation of the landscape general aspects allowed an identification of intense soil erosion in some visited communities, caused by several factors, such as the extraction of the vegetative cover and stones (parallelepipeddons), used for paving streets, as well as other kinds of raw materials intended to the civil construction. In the community Boa Esperança, for instance, the informants stated that the extraction of stones is made by means of explosives (dynamites), a procedure which seriously damages the environment. In the community Cadoz, in turn, a large crater in the ground has been seen, after the removal of clay for trading.

Another relevant piece of information in this sense is that all informants declared that the final destination of their home-produced garbage is the lands surrounding their houses, where it is thrown away directly on the soil or burnt. As for the garbage burning practice, the locals believe that they are doing the right thing. For them, it is good to burn the garbage, so that it will not pile up attracting insects or other plagues. Taking into account that the locals do not have selective garbage collecting, nor an appropriate place, such as landfills, to dispose their garbage, the cost-effect of this practice in carbon dioxide emitter vegetal reserve regions is considerable, if compared to the large cities, where the environmental damages would be much greater.

## Use value of the useful species

The calculation of the Use Value for each species revealed that *Mimosa caesalpiniifolia* Benth. (unha-de-gato) (3.80), *Caryocar coriaceum* Wittim. (pequi) (3.38), *Mimosa acutistipula* Benth. (jurema, unha-de-gato-preta) (3.23) and *Tabebuia serratifolia* (Vahl.) G. Nicholson. (pau-d'arco-amarelo) (3.10) were the species found to have the largest values (**Table 1**). *M. caesalpiniifolia* was indicated as medicinal for the treatment of general inflammations, as well as being considered fodder, lumbering, mellifluous, and energy producer.

From all the species, 19.64% reached use values equal to or over two, and the others, 80.36% had variable values between 0.09 and 1.95, such as *Davila macrocarpa* Moric (sambaibinha) (0.09), indicated to the use categories medicinal and fodder, and *Paspalum convexum* Willd. ex Doell (0.14), exclusive of the fodder category. It is also important that of the species with use value equal to or over two, 64% revealed melliferous potential and 50% were indicated as holding medicinal properties.

Coincidently to the data found by Franco and Barros (2006), it is legitimate to mention that the species *Ximenia americana* L. (plum), even having Use Value equal to 2.47, is of great cultural importance to the local informants, being indicated to several types of body inflammations. This fact is proved by one of the informant's testimony:

"…Plum is a holy remedy. It heals all kinds of inflammations, especially women's. It is good for womb and ovary problems, and much more. If the woman's 'broken-down', she could just have some plum."

In the key communities of this study, it has been found that several Cerrado species are used by the local community for varied purposes, medicinal, fodder, ornamental, or alimentary, among others, and that for decades the traditional knowledge has been passed on from generation to generation orally, either or not from the same family. But, according to the informants, this knowledge may not be passed on for future generations similarly, since the youngsters do not demonstrate any interest in learning that knowledge, as such activity does not assure them a desirable income, so it remains on older people's minds. Coincidentally data were emphasized by Silva and Andrade (2004), at the Indian community Xucuru, which is at a highly advanced acculturation phase due to intense contact with other cultures and to the disregard by the younger Indians for learning and using the traditional botanical knowledge. It has also been found that even the locals, being aware of the importance of natural resources for their everyday life, do not adopt any preservation measures of these because of the lack of information concerning this issue. Albuquerque (2006) confirms that several ethnobotanical studies have already proved that the locals can show a refined knowledge of the environment around them, so that excluding them from the processes which aim at assuring the conservation of the existing biodiversity seems to be an ineffective and harmful attitude.

All of that said, one must urge to accomplish environmental education projects by the competent sectors, seeking to a broader awareness of the general population and con-

sequently the preservation of the natural resources.

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