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REPORTS OF THE USE OF URTICACEAE COLLECTED IN BRAZIL AND DEPOSITED IN THE HERBARIA OF KEW (K), NEW YORK (NY) AND PARIS (P)

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ABSTRACT

The purpose of this study was to use a historical series of exsiccates as a documentary source, aiming to retrieving information on species of Urticaceae Juss. The study approached the collections of exsiccates belonging to herbaria of the Royal Botanic Gardens (K), Kew, England; *Muséum National d'Histoire Naturelle* (P), Paris, France; and New York Botanical Garden (NY), New York, USA, also printed sources and manuscripts. We analyzed more than 2800 exsiccates, comprising the period between 1783 and 2003. From the information labels of the exsiccates, it was possible to obtain the use and common name of the Urticaceae species. A total of thirteen species with register of use were find in the labels, six genera of Urticaceae: five species of *Pourouma* Aubl., three of *Cecropia* Loefl., two of *Urera* Gaudich., one of *Boehmeria* Jacq., one of *Coussapoa* Aubl., one of *Laportea* Gaudich. Five categories of usage were identify: (1) animal feeding; (2) human feeding; (3) medicinal; (4) fiber and (5) fuel. The analysis of the labels registers pointed to be efficient to raise information related to Urticaceae species, and combined to the research of printed sources and manuscripts provide more details to the data. Furthermore, adding information to the review of the collections history in Brazil. It is necessary to establish initiatives which facilitate the access to documents associated to exsiccates, like the manuscripts of collectors, for continuing the advances in the retrieval of knowledge registered.

Keywords: *Historical ethnobotany, Exsiccates, Historical collections, Useful plants.*

INTRODUCTION

The people knowledge about natural living environment integrates a complex and dynamic system. The diachronic analysis of the complexity and dynamics of the plants use by population can bring answers about the adaptive nature of this type of knowledge, as well as about the various social factors that affect them unevenly, which is generated, transmitted or lost according to the specific needs of a society at a determinate given point of time (Reyes-García et al. 2013).

Contemporary, historical documents allow the access of data on the different uses of plants in the past periods, evaluating different collections, such as the manuscripts of Persian traditional medicine (Ameri et al. 2015; Hamedi 2013); records and graphics of European Herbals (Adams et al. 2012, Adams et al. 2011; Vos 2010; Buenz et al. 2004); floras pre-Linnaean (Spalik 2014), the herbarium

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(Andel et al. 2012a; Andel et al. 2012b) and forgotten ethnobotanical collections (Luczaj et al. 2013; Natale and Pollio 2012; Sandberg et al. 2005).

The scientific evaluation of these documents has allowed the retrieval of knowledge on the use of neglected plants and the conservation evaluation of native species, which still need studies for potential use (Medeiros and Albuquerque 2014; Breitbach et al. 2013; Giorgetti et al. 2011). Other contributions to scientific assessment of historical documents was the analysis of the transmission of knowledge about plants over time (Cero et al. 2014; Luczaj et al. 2013, Cosenza et al. 2013; Leonti 2011; Luczaj 2010; Kufer et al. 2005).

In the Americas, the written records date back to the beginning of colonization with the documents produced by explorers in the new lands. The Brazil flora was first described in the letter of Pero Vaz de Caminha to King Dom Manoel (Filgueiras and Peixoto 2002). However, more systematic documentation of information on natural resources was produced between the 17th and 19th centuries, when the Enlightenment criteria were incorporated in the natural sciences. This period is characterized, from a scientific point of view, by the movement of naturalist travelers in the colonies land (Leite 1995; Vos 2007) and collections send out to compose the collections of natural history museums abroad (Lopes and Heizer 2011; Kury 2001).

Behind the pursuit of new knowledge in natural sciences, there was an ideology that dominated the scientific trips, where nature was the focus for human development (Kury 2001; Vos 2007). This perspective scientific voyages is reinforced when we look at the "Travel Instructions", produced by natural history museums to guide the studies and records of traveler naturalists. Aspects such as natural and industrial products to be collected and how they should be prepared, places to collect, ethnographic observations that should be made, production of travel diaries and the record of knowledge of native plants, approached the theoretical and practical tools trip (Pataca 2011; Kury 1998).

One exsiccate is the basic unit of botanical collections, is a mixed document containing records in written form (label) that allow to obtain a copy of the information in its natural formation, which are usually lost when the sample is dehydrated, (Smith et al. 2012) and harvest plant sample. This material is often used by taxonomy researchers, who uses the fixed plant and the records contained on the label for their studies. However, other data recorded on the labels can be analyzed in the study of the stages of botany evolution, history collectors, ethnobotanical data and changes generated by human actions over time in the landscape (Peixoto 2005).

Given the characteristics of the documents produced by naturalists, recent work has focused on this material for historical ethnobotanical studies, such as manuscripts and field diaries (Fagg et al 2015; Brandão et al. 2012; Giorgetti, et al. 2011; Brandão et al. 2008), historical botanical collections (Andel et al. 2012b; Guerra et al. 2011), historical collections, along with the collectors of manuscripts (Moraes et al. 2014) and the common name records (Andel et al. 2014).

Urticaceae is commonly known as the nettle family, which comprises about 55 genera and more than 2000 species (Gaglioti and Romaniuc-Neto 2014). It is distributed throughout tropical and temperate regions worldwide, but its center of diversity is indicated for the tropics, with largest concentration of species in Asia (Wu et al. 2013). The family includes herbs, hemi-epiphytes, shrubs, or trees, and its synapomorphies are: latex restrict to the bark, cystoliths or silicon-accumulation in the leaves, pseudomonomerous ovary with one style, basal orthotropous ovule, achene fruits (Gaglioti and Romaniuc-Neto 2014).

This study focuses on the reading and analysis of labels of a time series composed by the exsiccates from the Urticaceae, to survey data on: (1) past use of species of this family; (2) vernacular names, information that could lead to the use of the plant.

MATERIAL AND METHODS

Characterization of the collections analyzed

The series of exsiccates[3] of this study belong to herbaria of the Royal Botanic Gardens (K), Kew,

3 Exsiccata: used the word towards, a set of dried specimens usually provided with printed labels. Botanical Latin 1992, 14 ed. Willian T. Stearn.

England; the *Muséum National d'Histoire Naturelle* (P), Paris, France; and the New York Botanical Garden (NY), New York, U.S.A. In the collection of the herbaria that belong to the project REFLORA, K and P, around 80 per cent of the nomenclatural types are clade Urticoide. Deposited in the last, we have collection of Hugh Algernon Weddell, Auguste François Marie Glaziou, and Auguste François César Prouvençal de Saint-Hilaire, naturalists that have been in Brazil and have dedicated their time to the study of the classification of families of the clade Urticoide.

The presence of such exsiccates indicated that this collection presents significate number of exsiccates collected in the beginning of 19th century. The NY collection is characterized by a more recent collection, composed mainly from the second half of the 20th century, when collaboration started between the NY herbarium and Brazilian institutions.

Digital Photographic Filing

The photographs of the series of exsiccates of the family Urticaceae belonging to the P herbarium have been taken in 2010, the ones from K in August 2013 and the ones from NY in January 2011. The exsiccates were photographed with digital camera, 14 mega pixels resolution and stored in JPEG format (Joint Photographic Experts Group), a format that allows good image compacting.

The images of exsiccates series of herbaria were kept in individual files named by the acronym corresponding of herbarium. In the file of herbaria, the images were subdivided into folders with the names of the Urticaceae family genus. The images were placed in folders according to the corresponding gender to be identified on the label.

After subdivision, the images were given a default name to the country belonging numeral. For Brazil, we use the number 1, followed by the museum's acronym, the species gender and sequential numbering to individualization. As an example, images of the photographic file belonging to herbarium of Paris, of the genus Pilea folder, were named as follows: 1_P_Pilea_1; 1_P_Pilea_2; and so on until 1_P_Pilea_ 89. The images of photographic file belonging to herbarium at K, of the genus Pilea folder, were named as follows: 1_K_Pilea_1; 1_K_Pilea_2; and so on until 1_K_Pilea_ 52.

Reading and interpretation of the label registers

Labels of exsiccates, mainly historical, were at the time of their collection, handwritten having such cases reading difficulties due to handwriting. For these cases, the records passed by a data interpretation process where this hand writing on the label was compared to the botanical the time for data entry in the database, to follow the way of record labels, mostly common names and locations.

For historical exsiccates without the collector name registration, calligraphy labels were designed to reach the calligraphy author's name, with the calligraphy of the study came to the name of a botanical and collections dates matched the date of travel collector to Brazil, it was assumed that the exsiccates had been collected by botanist identified by calligraphy.

For the study and interpretation of the botanical calligraphy we used the online catalogs of four botanical institutions of calligraphy: of the Coimbra Herbarium, Conservatory and Botanic Garden of the city of Geneva, Global Plants Initiative (GPI) and of the Royal Botanic Garden of Madrid. These catalogues include samples of writing in different languages, herbarium labels and fragments of letters and other documents showing the different forms of calligraphy of each selected botanic. Besides these samples, they provide essential bibliographic reference for the most comprehensive review of the literature published about the botanic in question.

Systematization of the labels information

The data labels were organized in a database, in the software FileMaker Pro 13.0v3, all of the data entered as their record labels. For data interpreted in the case of historical exsiccates, the words were marked red for the interpreted data of distinction and data entered as they appear on the label to ensure greater accuracy at the time of data analysis.

To update the scientific names, we referred to the databases of The International Plant Names Index – IPNI, Tropicos.org of Missouri Botanical Gardens, List of the Flora of Brazil of Rio de Janeiro Botanic Garden, specialized literature and review of specialists on the Urticaceae, from Instituto de Botânica de São Paulo (IBt).

The information obtained with the systematization of information of the labels, traveler's books, field journals, bibliographic material, and mail about travels in Brazil, and different works produced by the collectors were consulted. The consultations were made in the Library of the Herbarium of Kew and Paris, private library of Dr. Lin Chau Ming, Central Library and Library of the Institute of Philosophy and Social Science at UNICAMP, online data bases and rare books: Internet Archival, JSTOR Global Plants Biodiversity Heritage Library, Herbarium Virtual A. of Saint-Hilaire, Flora Brasiliensis, Library Curt Nimuendaju and Open Library.

RESULTS AND DISCUSSION

Six genera of Urticaceae present registers of use in the labels: five species of *Pourouma*, three of *Cecropia*, two of *Urera*, one of *Boehmeria*, one of *Coussapoa*, and one of *Laportea*. A total of thirteen species with register of use displayed in figure 1, 2, 3 and 4 and thirty-five registers have been found. For the common name were raised thirty records some in Portuguese and other languages in the Makú, Kaapor and Yanomami ethnic groups. All data are presented in table 1.

The uses were categorized in: 1) animal feeding; (2) human feeding (3) medicinal; (4) fiber; and (5) fuel.

In the category human feeding there are 22 registers, distributed in seven species, *Cecropia concolor* Willd., *Coussapoa microcarpa* (Schott) Rizzini, *Pourouma bicolor* Mart., *P. cecropiifolia* Mart., *P. cucura* Standl. & Cuatrec, *P. guianensis* Aubl., *P. minor* Benoist., 20 being of *Pourouma*. The edible fruits of *Pourouma* have been related for a long time.

Richard Spruce describes *Pourouma* as one of the favorite fruits in Equatorial America and considers de genus similar to *Cecropia*, for the similarity of shape, leaves and colors. He reports to find distinction between the species founding the region in middle River Negro and the margins of the rivers Jupurá and Solimões. Spruce's account, on the distinction made by the indigenous peoples, who name with three different adjectives and on the derivation of primitive species is correlated to the contemporary data, which show the existence in all Amazonia of *Pourouma cecropiifolia* Mart, non-domesticated, wild, with small fruits and the ethnic groups Tikuna (River Solimões), Tukano (River Negro) and others under their influence have been selected this species, with great efficiency, keeping varieties which considerably distinguish from the primitive species (Kerr and Clement 1980).

Ten exsiccates were categorized in the category medicinal, belonging six species: *Cecropia obtusa* Trécul, *C. pachystachya* Trécul, *Laportea aestuans* (L.) Chew, *Urera baccifera* (L.) Gaudich. ex Wedd., and *Urera caracasana* (Jacq.) Gaudich. ex Griseb. The medicinal uses are generally for antiinflammatory, and diabetes.

Figure 1. A - *Coussapoa microcarpa* (Glaziou, A.F.M. 1138, P). B - *Laportea aestuans* (Balée, W.L. et al. 815, NY). C - *Pourouma bicolor* (Rosa, N.A. et al. 4234, NY). D - *Pourouma cecropiifolia* (Krukoff, B.A. 8332, NY)

Figure 2. A - *Boehmeria nivea* (Archer, W.A. 7850, P). B - *Cecropia concolor* (Balée, W.L. 809, NY). C - *Cecropia obtusa* (Anderson, W.R. 1056, NY). D - *Cecropia pachystachya* (Agra, M.F. 682, K).

Figure 3. A - *Pourouma cucura* (Plowman, T. et al. 12636, NY). B - *Pourouma guianensis* (Balée, W.L. et al. 2690, NY). C - *Pourouma minor* (Balée, W.L. et al. 2823, NY). D - *Urera baccifera* (Milliken, W. 1785, K).

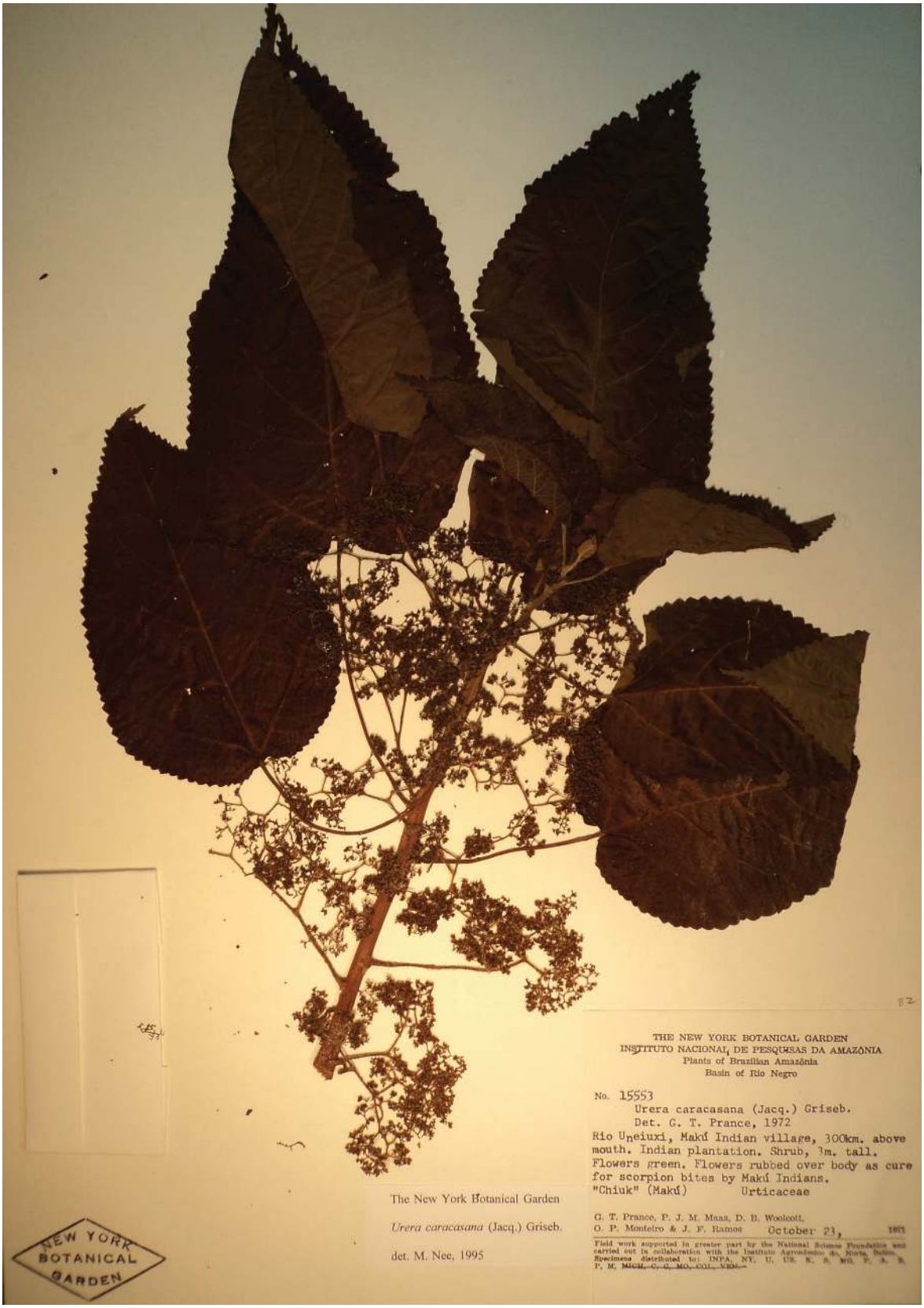

Figure 4. *Urera baccifera* (Prance, G.T. et al. 1553, NY).

Table 1. Register of use of Urticaceae in the labels of the botanic collections of Royal Botanic Gardens (K), *Muséum National d'Histoire Naturelle* (P); and New York Botanical Garden (NY).

Scientific name	Use in the Label	Common Name Register	Collector	Number of Collector	State of the Brazil	Colletion Year	Herbarium
Boehmeria nivea	Fiber	rami	Archer, W.A.	7850	Pará	1942	NY, P
Cecropia concolor	Human feeding	ama'y puku (Kaapor)*	Balée, W.L.	809	Maranhão	1985	NY, K
Cecropia obtusa	Medicinal and animal feeding	Imbauba	Anderson, W.R.	1056	Pará	1984	NY, K
Cecropia pachystachya	Medicinal	Imbauba	Agra, M.F.	682	Paraíba	1989	K
Coussapoa microcarpa	Human feeding		Glaziou, A.F.M.	1138	Rio de Janeiro	1867	P
Laportea aestuans	Medicinal	poraka ka' a (Kaapor)*	Balée, W.L.	815	Maranhão	1985	NY, K
	Animal feeding	pinu-pinu	Balée, W.L.	2625	Pará	1986	NY
	Medicinal	urtiga	Bruce, N	783	Acre	1980	NY
	Medicinal	urtiga vermelha	Daly, D.C.	9914	Acre	1999	NY
Pourouma bicolor	Human feeding and fuel	ama'yw-ci (Kaapor)*	Balée, W.L. et al.	1344	Pará	1985	NY
	Human feeding	imbaurana	Rosa, N.A. et al.	4234	Amapá	1982	NY
Pourouma cecropiifolia	Human feeding		Alexiades, M.N. et al.	1110	Amazonas	1991	NY
	Human feeding	mapaty	Krukoff, B.A.	8332	Amazonas	1936	NY
	Human feeding		Mori, S.A. et al.	10409	Bahia	1978	NY
	Human feeding		Prance, G.T. et al.	15791	Amazonas	1971	NY
	Human feeding	mapati	Silveira, M.	867	Acre	1994	NY
Pourouma cucura	Human feeding		Plowman, T.	12636	Amazonas	1982	NY
Pourouma guianensis	Human feeding	kaymbe ' y (Kaapor)*	Balée, W.L.	968	Maranhão	1985	NY
	Human and animal feeding	ka'a-bem-ý (Kaapor)*	Balée, W.L. et al.	2688	Maranhão	1986	NY
	Human and animal feeding	ka'a-bem-ý (Kaapor)*	Balée, W.L. et al.	2690	Maranhão	1986	NY
	Human and animal feeding	ka'a-imb-'y (Kaapor)*	Balée, W.L. et al.	2759	Maranhão	1986	NY
	Human and animal feeding	ka'a-imbe-'y (Kaapor)*	Balée, W.L. et al.	2763	Maranhão	1986	NY
	Human and animal feeding	Ka'a-bem-'y (Kaapor)*	Balée, W.L. et al.	2903	Maranhão	1986	NY
	Animal feeding; fuel	ama-'y-ca'ã-'y (Kaapor)*	Balée, W.L.	3211	Maranhão	1987	NY
Pourouma minor	Human and animal feeding	ama'y-rary-tuwyr (Kaapor)*	Balée, W.L. et al.	2693	Maranhão	1986	NY
	Human and animal feeding	ama'y-rary-tuwyr (Kaapor)*	Balée, W.L. et al.	2710	Maranhão	1986	NY

Scientific name	Use in the Label	Common Name Register	Collector	Number of Collector	State of the Brazil	Colletion Year	Herbarium
	Human and animal feeding	ama'y-rary-tuwyr (Kaapor)*	Balée, W.L. et al.	2747	Maranhão	1986	NY
	Human and animal feeding; fuel	ama'y-rary-tuwyr (Kaapor)*	Balée, W.L. et al.	2803	Maranhão	1986	NY
	Human and animal feeding; fuel	ama'y-rary-tuwyr (Kaapor)*	Balée, W.L. et al.	2804	Maranhão	1986	NY
	Human and animal feeding	ama'y-rary-tuwyr (Kaapor)*	Balée, W.L. et al.	2823	Maranhão	1986	NY
Urera baccifera	Medicinal	Abinake (Yanomami)*	Milliken, W.	1785	Amazonas	1993	NY, K
	Medicinal	Abinasik (Yanomami)*	Prance, G.T.	23604	Amazonas	1975	NY
Urera caracasana	Medicinal	puni-puiní	Glaziou, A.F.M.	10058	Espírito Santo	1890	P
	Medicinal	Ishanga	Prance, G.T.	6337	Pará	1970	NY
	Medicinal	Chiuk (Makú)	Prance, G.T.	15553	Amazonas	1971	NY

** indigenous ethnic groups*

Peckolt and Peckolt (1888), and Le Cointe (1945) related the medicinal use of the most species studied here, with the exception of *Cecropia obtusa*, and *Laportea aestuans*

Giorgetti (2011) remarked about the pontential medicinal of *Cecropia peltata* L. Moreover, the author cited the lack pharmacology studies for this species.

Some genera (e.g, *Laportea, Urera*) display medicinal potencial as anti-inflammatory, antimicrobial, antiulcer, antidiabetic and anesthetic (Gaglioti and Romaniuc-Neto, 2014). Moreover, the family has economically important species for the fabrication of fibers and ornamental usage, such as: rami, Boehmeria nivea (Duan et al. 2012).

The indication for use of fiber found in the labels refers to an exotic species, *Boehmeria nivea* (L.) Gaudich. The use of the species *Cecropia* and *Urera* is known and reported in the printed sources (Saint-Hilaire 2011; Sorarú 1972; Peckolt and Peckolt 1888). Saint-Hilaire (1975) reported in details the production of fiber species of the genus *Cecropia* from young branches by women of the ethnic group Macuni, who produce a cord used to make bags, nets and bows.

In the fuel category were grouped species with logging of wood for charcoal making, and for the production of gunpowder from the ashes. The ashes of wood were also recorded as for soap manufacturing, whitening clothes and sugarcane juice.

The multiplicity of uses recorded on labels and in historical literature reveal the richness and diversity of knowledge of local people about the species of the Urticaceae. Through the records and annotation labels of herbarium specimens, and the historical literature, we found the knowledge of resources in some moments of time an indication of the potential use of these species for future work.

CONCLUSIONS

The analysis of the labels registers has shown to be efficient to raise information on use and common names of the Urticaceae species, which integrated to printed sources and manuscripts, have provided more details of the data, and contributed for the review of the history of collections in Brazil.

The series of the studied collections follows a period from 1783 to 2003, and at different times were recorded uses of species of the Urticaceae. The survey of these reports back to the contemporary potential of genetic resources of this family as the food and feed supply, medical, fiber and energy production, which in the past were used by people.

For the advance in the retrieval of knowledge registered in the labels to continue, it is necessary to establish initiatives which make available material associated to the exsiccates and easy access, such as collector's manuscripts.

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