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An ethnobotany survey of medicinal plants to determine its usefulness in industry and biotechnology

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An ethnobotanical survey was done in Quissamã City, situated north of Rio de Janeiro State, during the period of 2001/2002. The study was carried out to collect information of species of plants used in traditional medicine by local population, and compared this information with those found in European Patent Office (EPO) and Japan Patent Information Organization (JAPIO) in October, 2002. A total of 94 species belonging to 49 botanical families were listed. The most representative families were Myrtaceae (8), Asteraceae (7), Lamiaceae (5) and Solanaceae (5). A total of 91 patent documents on 18 species were described. From these results, it is considered necessary to intensify efforts towards investments in programs designed to ensure proper search, inventory, conservation and management of biodiversity, as well as a system for managing the related patent documents. It is extremely important to form multidisciplinary teams for researches involving patents and plant biodiversity.

Key words: Ethnobotany, medicinal plants, patents, intellectual property.

INTRODUCTION

Ethnobotany allows interaction between researcher with the local people that have the knowledge about use of plants. These people manage and conserve significant amounts of biological resources useful for industry and world community (Medeiros et al., 2007). Ethnobotany also can provide useful information in drug development thus saving time and money (Amorozo, 1995, Brito, 1995). Medicines made from plants with a history of traditional use, confirming the safety and effectiveness, are used in many regulatory systems to guide the approval of commercial products.

The study of medicinal plants from traditional use by local people can lead to valuable information, allowing research to be done based on the empirical knowledge that should be tested scientifically. For that, there should be an analysis of medicinal plants in several aspects: anthropological, social, chemical, pharmacological, botanical, ecological, agronomic, and others (Boscolo, 2005).

Industrial Property is a collective name for a set of rights related to industrial or commercial activities of the indi-

vidual or company. It is an expression that corresponds to the right of ownership that one may have about their inventions, works and products of the intellect, talent and ingenuity (Fernandes, 2002).

The invention patent can be considered as a contract between two parties: one part is the inventor; the other is the public or society represented by the Government. The society gives grant the inventor, ownership and exclusive right of invention for a limited period. At the end of this period, the invention will be a benefit of all, or better better, will be of public domain (INPI, 1996).

The most important activity generated by the patent system is to induce of industrial and commercial exploitation of inventions, followed by benefits to the holders of the technology, inventors, companies, public and the economy in general (INPI, 1996; INDECOPI – WIPO, 1996).

Medicinal Plants study in the Quissamã Municipality is relevant because of the Parque Nacional da Restinga Jurubatiba, located mostly in this area and is one of the most preserved restinga areas in Brazil and around the world. This place is also important due to its singularities and cultural diversity of the population (Boscolo, 2008).

The aim of this study was to compare data from an ethnobotany survey of medicinal plants and patents docu-

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Table 1. Plants listed by informants, species and botanical families.

LOCAL NAME	SPECIES	FAMILY
Pita	<i>Agave americana</i> L.	Agavaceae
Caju	<i>Anacardium occidentale</i> L.	Anacardiaceae
Manga	<i>Mangifera indica</i> L.	Anacardiaceae
Aroeira	<i>Schinus terebinthifolius</i> Raddi	Anacardiaceae
Graviola	<i>Annona muricata</i> L.	Annonaceae
Inhame branco	<i>Colocasia esculenta</i> (L.) Schott	Araceae
Coco	<i>Cocos nucifera</i> L.	Arecaceae
Macela	<i>Achyrocline satureioides</i> (Lam.) D.C	Asteraceae
Carqueja	<i>Bacharis trimera</i> (Less) D.C.	Asteraceae
Pico preto	<i>Bidens pilosa</i> L.	Asteraceae
Assa peixe	<i>Ethulia conyzoides</i> L.	Asteraceae
Arnica	<i>Eupatorium maximilianii</i> Scharad	Asteraceae
Girassol	<i>Helianthus annuus</i> L.	Asteraceae
Guaco	<i>Mikania glomerata</i> Sprengle	Asteraceae
Carobinha	<i>Jacaranda bracteata</i> Bureau & K. Schum.	Bignoniaceae
Erva baleeira	<i>Cordia verbenacea</i> D.C.	Boraginaceae
Mentrusto	<i>Coronopus didymus</i> (L.) Sm.	Brassicaceae
Mostarda	<i>Sinapis nigra</i> L.	Brassicaceae
Abacaxi	<i>Ananas comosus</i> (L.) Merril.	Bromeliaceae
Barba de pau	<i>Tillandsia usneoides</i> (L.) L.	Bromeliaceae
Amesca	<i>Protium heptaphyllum</i> (Aubl.) March	Burseraceae
Caldeira, cardeiro	<i>Pilocereus arrabidae</i> (Lem.) B. & R.	Cactaceae
Mamão	<i>Carica papaya</i> L.	Caricaceae
Embaúba	<i>Cecropia lyratiloba</i> Andr. Car.	Cecropiaceae
Erva de Santa Maria, Mastruz	<i>Chenopodium ambrosioides</i> L.	Chenopodiaceae
Trapoeraba	<i>Commelina nudiflora</i> L.	Commelinaceae
Batata doce	<i>Ipomea batatas</i> (L.) Poir	Convolvulaceae
Salsa da praia	<i>Ipomoea pes-caprae</i> (L.) R. Br.	Convolvulaceae
Cana do brejo, Cana de macaco	<i>Costus spiralis</i> (Jacq) Roscoe	Costaceae
Saião	<i>Kalanchoe brasiliensis</i> Cambess.	Crassulaceae
Maxixe	<i>Cucumis anguria</i> L.	Cucurbitaceae
Pepino	<i>Cucumis sativus</i> L.	Cucurbitaceae
Abóbora d'água	<i>Lagenaria vulgaris</i> Ser	Cucurbitaceae
Melão de São Caetano	<i>Momordica charantia</i> L.	Cucurbitaceae
Tiririca	<i>Cyperus iria</i> L.	Cyperaceae
Samambaia do mato	<i>Pteridium aquilinum</i> (L.) Kuhn	Dennstaedtiaceae
Erva de Santa Luzia, Olho de Santa Luzia	<i>Chamaesyce hirta</i> (L.) Millsp.	Euphorbiaceae
Erva grossa, Erva pombinha, Quebra pedra	<i>Phyllanthus niruri</i> L.	Euphorbiaceae
Mamona	<i>Ricinus communis</i> L.	Euphorbiaceae
Boldo, Alcachofra	<i>Coleus barbatus</i> (Andr.) Benth	Lamiaceae
Poejo	<i>Mentha pulegium</i> L.	Lamiaceae
Alfavacão	<i>Ocimum gratissimum</i> L.	Lamiaceae
Alfavaca	<i>Ocimum micranthum</i> Willd.	Lamiaceae
Alecrim	<i>Rosmarinus officinalis</i> L.	Lamiaceae
Abacate	<i>Persea americana</i> Mill.	Lauraceae
Pata de vaca	<i>Bauhinia forficata</i> Link	Leguminosae
Guandu	<i>Cajanus cajan</i> (L.) Millsp	Leguminosae
Maricá	<i>Mimosa bimucronata</i> (DC.) Kuntze	Leguminosae

Table 1. cont.

Dormideira	<i>Mimosa pudica</i> L.	Leguminosae
Erva de passarinho	<i>Phoradendrom affine</i> Trel.	Loranthaceae
Algodão	<i>Gossypium barbadense</i> L.	Malvaceae
Quiabo	<i>Hibiscus esculentum</i> L.	Malvaceae
Murici	<i>Byrsonima sericea</i> D.C.	Malpighiaceae
Acerola	<i>Malpighia glabra</i> L.	Malpighiaceae
Mexerico	<i>Miconia cinnamomifolia</i> (D. C.) Naudin	Melastomataceae
Jaca	<i>Artocarpus integrifolia</i> L.	Moraceae
Amora	<i>Morus nigra</i> L.	Moraceae
Banana	<i>Musa paradisiaca</i> L.	Musaceae
Capororoca	<i>Myrsine umbellata</i> Mart.	Myrsinaceae
Eucalipto	<i>Eucalyptus globolus</i> Lapill	Myrtaceae
Jabuticaba	<i>Eugenia cauliflora</i> O. Berg	Myrtaceae
Pitanga	<i>Eugenia uniflora</i> L.	Myrtaceae
Araçá da praia	<i>Psidium cattleianum</i> Sabine	Myrtaceae
Goiaba	<i>Psidium guajava</i> L.	Myrtaceae
Jamelão	<i>Syzygium cumini</i> (L.) Skeels	Myrtaceae
Batata fustão, Batata tostão	<i>Boerhavia diffusa</i> L.	Nyctaginaceae
Sumaré	<i>Cyrtopodium paranaense</i> Schltr.	Orchidaceae
Baunilha	<i>Vanilla sp</i>	Orchidaceae
Carambola	<i>Averrhoa carambola</i> L.	Oxalidaceae
Maracujá	<i>Passiflora edulis</i> Sims	Passifloraceae
Sururuca	<i>Passiflora mucronata</i> Lam.	Passifloraceae
Guiné	<i>Petiveria alliacea</i> L.	Phytolaccaceae
Tanchagem	<i>Plantago major</i> L.	Plantaginaceae
Lágrima de Nossa Senhora	<i>Coix lacrima-jobi</i> L.	Poaceae
Cana de açúcar	<i>Saccharum officinarum</i> L.	Poaceae
Milho	<i>Zea mays</i> L.	Poaceae
Erva de cobra	<i>Polygonum punctatum</i> L.	Polygonaceae
Romã	<i>Punica granatum</i> L.	Punicaceae
Arruda	<i>Ruta graveolens</i> L.	Rutaceae
Abiu	<i>Pouteria caimito</i> (Ruiz & Pav.) Radlk	Sapotaceae
Pimentão	<i>Capsicum annum</i> L.	Solanaceae
Trombeta	<i>Datura stramonium</i> L.	Solanaceae
Tomate	<i>Lycopersicum esculentum</i> Mill.	Solanaceae
Bracainha	<i>Solanum americanum</i> Mill.	Solanaceae
Jurubeba	<i>Solanum paniculatum</i> L.	Solanaceae
Alfazema	<i>Aloysia gratisima</i> (Gilles & Hook) Tronc.	Verbenaceae
Cambará	<i>Lantana camara</i> L.	Verbenaceae
Gervão	<i>Stachytarphetta cayenensis</i> (Rich) Schaub	Verbenaceae
Gervão da praia	<i>Stachytarphetta schottiana</i> Schau	Verbenaceae
Colônia	<i>Alpinia zerumbet</i> (Pers.) Burt & Smith	Zingiberaceae
Gengibre	<i>Zingiber officinale</i> Rosc.	Zingiberaceae

ments to show that the ethnobotanical data indicate that biodiversity can be used for industry and biotechnology.

Material and Methods

The ethnobotanical survey was carried out in Quissmã City in northern of the of Rio de Janeiro State during the period of 2001/2002. The data of the species of plants used as medicine were

obtained through structured questionnaires with open and closed questions (Rea and Parker, 2000), with 10 informants using the "snowball" technique (Bailey, 1994).

The plants were collected, identified (by specific bibliographies, compared with voucher species, consulting experts) and deposited in the National Museum of Rio de Janeiro Herbarium. The collection of the documents of filing the patent application was done in 2002 October, in Delphion Database (www.delphion.com). The offices

Table 2. Plants cited by the Quisamã community that have documents for filing the patent applications.

HOLDER	COUNTRIES OF DEPOSIT	SPECIES
COTY BV	US, WO	<i>Malpighia glabra</i> L.
COLOSTRUM TEC. HERSTEL	DE	<i>Malpighia glabra</i> L.
SUN NUTRITION	WO, FR	<i>Malpighia glabra</i> L.
BOOTS CO PLC	WO	<i>Malpighia glabra</i> L.
AMWAY CORP	US, EPO, CN, US, JP	<i>Malpighia glabra</i> L.
NICHIREI CORP	US, JP	<i>Malpighia glabra</i> L.
COLEMAN THOMAS	EPO	<i>Malpighia glabra</i> L.
COUNCIL SCIENT IND RES	IN	<i>Coleus barbatus</i> (Andr.) Benth.
LEKO VLADIMIR	US, GB, WO	<i>Morus nigra</i> L.
ROLLAND SA	GB, IL, RO, ZA, US	<i>Anacardium occidentale</i> L.
TONEN CORP	JP	<i>Anacardium occidentale</i> L.
FLORIDA HOSPITAL; UNIV CENTRAL FLORIDA	WO, AU	<i>Lantana camara</i> L.
INTERNATL FLAVORS & FRAGRANCES INC	US, WO, JP, AU, EPO	<i>Saccharum officinarum</i> L.
TANG JIANZHONG	CN	<i>Averrhoa carambola</i> L.
WANG ZHONG	CN	<i>Averrhoa carambola</i> L.
LI SHENGCHU	CN	<i>Averrhoa carambola</i> L.
ZHANG SHAOPING	CN, WO	<i>Averrhoa carambola</i> L.
ZANCHENG FANG	CN	<i>Averrhoa carambola</i> L.
BINGYE LU	CN	<i>Averrhoa carambola</i> L.
CHEN XIANCHU	CN	<i>Averrhoa carambola</i> L.
CHENGDU	CN	<i>Averrhoa carambola</i> L.
TRADITIONAL CHINESE ME	CN	<i>Averrhoa carambola</i> L.
COTY BV	DE, WO	<i>Cocus nucifera</i> L.
NEUROMEDIX CO LTD	WO	<i>Zingiber officinale</i> Rosc.
NATURALENDO TECH CO LTD	WO	<i>Zingiber officinale</i> Rosc.
IDA DEVELOPMENTS AS	WO, US	<i>Zingiber officinale</i> Rosc.
PHARMACEUTICAL INDUSTRY TECHNO	US, FR, GB	<i>Zingiber officinale</i> Rosc.
DZH B KEMIKALS EHND FARMAS JUT	RU	<i>Zingiber officinale</i> Rosc.
ZUO ZHIZHONG	WO	<i>Zingiber officinale</i> Rosc.
NATURAL REMEDIES PRIVATE LTD	WO	<i>Zingiber officinale</i> Rosc.
NAT SCIENCE COUNCIL	US	<i>Zingiber officinale</i> Rosc.
COUNCIL SCIENT IND RES	US	<i>Zingiber officinale</i> Rosc.
HEXAL AG	DE	<i>Zingiber officinale</i> Rosc.
EASTERN EUROP INC	US	<i>Zingiber officinale</i> Rosc.
YUAN HAO	EP, WO, AU, CN	<i>Cajanus cajan</i> (L.) Millsp.
CROMAK RESEARCH INC	US	<i>Syzygium cumini</i> (L.) Skeels.
QUIMICA FARMACEUTICA CENTRO	WO, AU	<i>Mangifera indica</i> L.
BAYLOR COLLEGE MEDICINE	US, WO	<i>Zea mays</i> L.
NORTHCAROLINA STATE UNIVERSIT	US	<i>Zea mays</i> L.
KOJIMA YASUHIKO	US	<i>Zea mays</i> L.
LINDA SINGER DOLLA	CH	<i>Zea mays</i> L.
KIM CHAN SIK	EP, NZ, JP	<i>Cucumis sativus</i> L.
ESTEVE LABOR DR	AU, EP	<i>Cucumis sativus</i> L.
YISSUM RES DEV CO	WO	<i>Cucumis sativus</i> L.
UNIV VALLADOLID	WO	<i>Cucumis sativus</i> L.
BOTAN LAB INC	US	<i>Capsicum annum</i> L.
ZHANG ZHONGWU	CN	<i>Agave americana</i> L.
ICHIMARU PHARCOS CO	JP	<i>Agave americana</i> L.
NIETO BURGOS CARMEN	ES	<i>Agave americana</i> L.

Table 2. cont.

JAPAN TOBACCO INC	US, KR	<i>Cyperus iria L.</i>
ZHU MEIXIA	CN	<i>Datura stramonium L.</i>

AU- Austria **CN**- China **DE**- Germany **EPO**- European Office **FR**- France **GB**- Great Britain **IL**- Israel **IN**- India **JP**-Japan **RO**-Romania
RU-Russia **US**- United States **WO**- International Office **ZA**- South Africa

Table 3. Species, traditional use in Quissamã, use identified in the documents recovered in patents offices and number of documents of filing of patent.

SPECIES	TRADITIONAL USE IN QUISSAMÃ	USE IDENTIFIED IN THE DOCUMENTS RECOVERED IN PATENTS OFFICES	NUMBER OF DOCUMENTS OF FILING OF PATENT
<i>Agave americana</i>	column pain	Medicine and cosmetic	3
<i>Malpighia glabra</i>	Flu	Cosmetic, immunostimulating agent, phytotherapeutic, capillary product and medicine	16
<i>Coleus barbatus</i>	stomach and liver pain, gases	Medicines	1
<i>Morus nigra</i>	Thrush, diarrhea, sore throat, mouth sores, diabetes, menstruation and ovary problems	Medicines	3
<i>Anacardium occidentale</i>	Diabetes, sore throat, wounds, ulcers, intestinal pain, cough, bronchitis, body weakness, muscular weakness	Medicines	8
<i>Lantana camara</i>	Bronchitis, stomach problems, rheumatism	Medicines	2
<i>Saccharum officinarum</i>	Fatigue, anemia, colic, digestive, thrush, liver pain, constipation, sinus cracking, itching, wounds, infections, catarrh, bronchitis	Medicine, food and additive for food	6
<i>Averrhoa carambola</i>	High blood pressure, diabetes, kidney problems, skin wounds	Beverage-food, food-medicine, Beverage-medicine and medicine	9
<i>Cocos nucifera</i>	Rickets, worms, constipation, anemia, erysipelas, weakness, malnutrition	Cosmetic	2
<i>Cajanus cajan</i>	Ulcers, sores, airways problems, anti-haemorrhagic, diuretic	Medicines	4
<i>Datura stramonium</i>	Earache	Medicines	1
<i>Capsicum annum</i>	Hemorrhoids, stomach pain, constipation, pneumonia	Tooth analgesic	1
<i>Zingiber officinale</i>	Digestion, lack of appetite, colic, gases, cough, bronchitis, flu, catarrh, asthma, hoarseness, influenza	Medicine, drug-cosmetic and toothpaste	17
<i>Syzygium cumini</i>	Diabetes, diarrhea	Medicines	2
<i>Cyperus iria</i>	Stimulant, diuretic	Herbicide	2
<i>Mangifera indica</i>	Wounds, cough, bronchitis, asthma, colic, diarrhea, inflammation in general	Food-medicine-cosmetic	2
<i>Zea mays</i>	Diuretic, bladder inflammation, kidneys, eyes	Medicine and cosmetic	5
<i>Cucumis sativus</i>	Urinary bladder problems, kidney, eye inflammation, mange, itch	Veterinary medicine, and medicine	7

searched were: European Patent Office - EPO and Japan Patent Information Organization – JAPIO since these have a greater number of application filings.

Results and Discussion

A total of 94 species belonging to 49 botanic families were cited in interviews with 10 informants (Table 1). Those that had the greatest number of citations by informants were: Myrtaceae (8), Asteraceae (7), Lamiaceae (5) and Solanaceae (5). None of these plants listed are described in the Official List of Endangered Species of Brazilian Flora published by the Brazilian Institute of Environment and Natural Resources, IBAMA (Brasil, 2000).

91 documents for filing patent was checked and involving 18 plants of Brazilian biodiversity (Table 2).

Table 3 combines the plants species, traditional use in Quissamã as well as its use as specified in the patent document. These plants are mainly commercialized as drug followed by cosmetics. Brazil was pointed as a possible second biggest market in the world for cosmetics and hygienic products in 2010 (Laird, 2000).

As there is no indication of deposit in Brazil, the technologies described in these documents are not protected in Brazil, and are, therefore, in the public domain. This allows the possibility to market this knowledge, re-search and develop products without paying royalties and without infringing rights of third parties in Brazil.

It is necessary to promote the creation and strengthening of technology-based companies by linking them with universities, research institutes that utilize medicinal plants derived from biodiversity and traditional knowledge (Martins et al., 2008). Tomas (2003) emphasizes the importance of a link between the ethnobiologists and emerging bioinformatics tools, so that tools can help integrating research data collaboratively.

The spread of knowledge of intellectual property associated with areas of biology, chemistry, pharmacy and others is valuable. This knowledge can be protected or commercialized through the development of technologies that are in the public domain and do not need to pay royalties on their use.

The management of biodiversity potential must reconcile ecological balance, sustainable development, improving the quality of life of the enabling social inclusion and generation of jobs. Actions in this field can be substantiated by studies such as those described here and integrated with innovative programs that are aligned with the principles of the Convention on Biological Diversity, to which Brazil is a signatory.

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