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Peru, Ten Years Later: Medicinal Plant Species From Piura

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Introduction

This research is part of a Latin American project on the issue of medicinal flora growth, trade and consumption (Madaleno, 2012). In fact, fieldwork usually includes both food and therapeutic plant species. However, during the first mission to Belem, a Brazilian city located in the Amazon rainforest state of Para, back in 1998, we acknowledged that medicinal flora grown in front and backyards ranked second to fruit trees. So, subsequent scientific missions to Chile, Costa Rica, Cuba, Mexico and Peru were mainly focused on native and exotic flora, ingested against chronic or mild diseases, applied externally to resolve skin troubles, burns, rheumatic pains or even serious affections such as cancer and glaucoma. In the current decade, Argentina and Uruguay (2011) were added to the project, totaling eight countries explored for about a decade and a half.

Material and Methods

The 2006 sample conducted in Lima included 34 in-depth interviews to plant traders from nine city markets, nurseries, fairs, and to four natural pharmacies and plant collectors, totaling 13 trading posts. Two traditional Indian healers were added to the survey that was finalized with quests to another couple of conventional medicine doctors devoted to therapeutic flora research. The 38 informant's characterization and the findings from this first scientific mission to Peru have been published throughout the last decade and in the context of comparisons with the results gathered in nine other Latin American cities, more recently (Madaleno, 2012).

The 2016 sample conducted in Piura included interviews to six natural pharmacists, one of which was a homeopathic medicine expert; the second focus group was, similarly to Lima case-study, a total of 19 market traders, some of them wild plant collectors. Piura only has a central market with an amazingly varied offer of medicinal plant species, either fresh or dried; informal fruit and beverage traders were added, as street trade is common in this northern city; to finalize, the survey included supermarkets attendants that possessed stands offering teas and infusions, as well as packed dried therapeutic herbs or plant portions, totaling 40 informants.

Scientific identification of the vernaculars and the specimens gathered in both cities has used local botanist's expertise. In these two missions the team had the support of the Pontifical Catholic University of Peru, in Lima. The exploration of technical literature on the issue of Peruvian, American and European plant species added to the fieldwork, permitting to compare vernaculars and their uses. In fact, in an extensive and highly biodiverse country as Peru, there are identical vernaculars for totally different families and genders, as it happened with *pimpinela*. Finally, we accessed the Missouri Tropical Gardens site, so as to register the most recent botanical names of the flora, as research in this scientific domain is an ongoing challenge (MBG, 2016).

Results and Discussion

Peru has about 31 million inhabitants. In ten years the economy tripled and poverty levels have been halved. Table 1 presents eleven top-ranking medicinal plant species traded in Piura, as a result of the survey conducted in 2016, comparing current uses with those registered in Lima, in 2006. A list of 150 vernaculars was recorded during fieldwork in Piura, about two thirds of which have medicinal applications (93 plants). We stress there is an increase in demand for natural and alternative remedies ten years later, when compared to the 60 vernacular names of medicines registered during Lima's sample, in 2006 (Madaleno, 2012). Therefore, the first result detached from this study is that the medicinal flora traded is augmenting in Peru, in spite of the growing wealth of the Peruvian population, in general. According to the survey, the explanation is the wider awareness from the public that natural remedies have fewer secondary effects than those offered by allopathic medicine. Accordingly, we've noticed a recent proliferation of plant remedies for cholesterol, diabetes, memory loss, osteoporosis, as well as a good offer of dietetic drugs and natural food supplements.

The second result is that Chamomile (*Matricaria chamomilla*), a European herb, was the most consumed plant, a surprising fidelity with a ten year interval. Even though native plants are in dominance, truth is the European herb infusions are displayed as fresh offer in the market or in tea bags, in pharmacies and supermarkets, and the interviews to the traders confirm this public preference. Fresh chamomile in Piura is usually used to wash the eyes, in case of conjunctivitis, as registered 10 years ago in Lima and the digestive wonders of the anti-stress species are again the reason why it is the first ranking species. The difference noticed in Piura was the use of the herb as dietetic, which was not registered before. Consumer behavior favored 27 plant species that possess at least one common medicinal property in Lima and in Piura. As third result we emphasize that some are nutraceuticals, meaning, food that heals, as is the case with: 1) Yacón (*Polymnia sonchifolia*), a tuberous root consumed to lower sugar levels, recommended to diabetes patients. 2) Maca (*Lepidium peruvianum*), an endemic dwarf species from the Peruvian Andes, eaten to strengthen the bones, particularly sought by elderly consumers to resolve osteoporosis (Cabieses, 1997). These two vegetable species are now recognized in healthy food and diet product's shops all over the world, as the fieldwork in Asia has proven and European supermarket stands show (Madaleno, 2015).

A fourth result from the study was that some flora common to both urban realms presented narrowed uses in 2016, as field researched in Piura. Examples are: 1) Andean species muña (*Minthostachys setosa*) only used as analgesic, now; 2) European plant Ruda (*Ruta graveolens*) widely used in Peru and elsewhere in Latin America against evil eye, was also considered a good analgesic in Lima, yet not in Piura; 3) Paico (*Chenopodium ambrosioides*) a local herb also renown as anti-septic and anti-parasites plant species, had several other applications in Lima, not found in Piura, in 2016. As fifth result, research proved there are four natural remedies that presented noticeable changes in the therapeutic application: 1) Borage (*Borago officinalis*) was considered a good expectorant in Lima. In Piura it has widened the application as anti-flu, and dietetic remedy, not registered before. 2) Corn (*Zea mays*) was consumed as dietetic food and now has no such claims, which were controversial anyway, and is now applied externally against skin problems; 3) Plantain (*Plantago major*) was considered in Lima anti-cancer species, with no type of cancer allegation in particular, and in Piura is used as skin healer. 3) Sage (*Salvia officinalis*) is also now applied in Piura against skin problems, yet it was ingested in Lima against cough, asthma and was even eaten to lower sugar levels in case of diabetes. 4) Matico (*Buddleja globosa*) was applied to the skin against cuts. In Piura the species is only recommended against gynecological problems.

As sixth result, in 2016 there was an increase of herbal remedies for chronic or mild diseases, offered as a substitute to pharmaceutical drugs, even in pharmacies. Examples are: 1) Natural preparations or pills to lower cholesterol (coconut, sacha-inchi, pasuchaca, flax, chia, watercress, alfalfa, apple); 2) Purgative natural drugs (sen, tamarind, canary grass); 3) Anti-oxidant remedies (noni, camu camu, licorice, soursop, hibiscus); 4) Herbal remedies to resolve calcium deficiency,

namely osteoporosis (sesame, maca); 5) Herbal prescriptions against liver diseases (boldo, roselle, aloe); 6) Anti-anemic plants (native algarrobo, cañihua); 7) Anti-parasites plants or plant seeds (pumpkin, peppermint, worm-seed); 8) Herbs and leaves against memory loss and concentration (ginkgo biloba, ginseng, walnut, rosemary); 9) Hypertension pills made of one or several plant species (artichoke, garlic, chicory, moradilla, nettle); 10) Dietetic herbal remedies (algae, green tea, culén, borage, dandelion, chamomile). As seventh result, we would like to record that the wide native offer of anti-cancer species gives us hope for future development of related pharmaceutical drugs. Examples are: 1) Annato (prostate cancer); 2) Cañihua (antioxidant and anti-anemic); 3) Huamampinta (prostate cancer); 4) Huila-Huila (lung cancer); 5) Manayupa (uterine cancer); 6) Noni (liver cancer); 7) Pasuchaca (pancreatic cancer); 8) Uña de gato (prostate cancer); 9) Hierba del cancer (unspecified uses). Eye diseases or infections also have a good offer, some of them from ancestral cultures, such as matico, huamampinta (conjunctivitis), and maca (Vega, 1609); others are exotic and were introduced by the Spanish colonizers, of which the outstanding example is chamomile, or by migrants settled as time goes by, such as *Aloe vera*.

The preferences detected in 2006 in Lima were Chamomile traded by 52.6% of the informants, followed by lemongrass (*Cymbopogon citratus*) with 44.7%, while ranking third was Maca (*Lepidium peruvianum*), traded in 34.2% of the posts, and fourth cat's claw (*Uncaria tomentosa*), with 31.6% of the 60 vernaculars registered. In 2016, the 40 interviews survey conducted in Piura gave again the European herb chamomile as the first ranking species, as said, traded by 12.9% of the respondents, and then came in second the native Andean maca, with 11.8%; in third were aloe (*Aloe vera*) and stevia (*Stevia rebaudiana*), ex aequo, available in 9.7 % of the trading posts. Only in fourth place came lemongrass, with 8.6% of the occurrences in the stands, in the group of medicinal plant species, which accounted number was ninety-three. We stress the smaller percentages in the ranking of Piura, gathered during the 2016 survey, which is explained by the wider number of therapeutic flora recorded 10 years later in Peru, a fact that favors a greater dispersion of plants offered to the public, in Piura's sample.

Conclusions and Outlook

Native Peruvian, in particular, and Latin American flora, in general, are on demand all over the world. There is now bigger pressure over Andean species like maca, and so it is difficult to assess, with two small field surveys whether the current harvest trends are sustainable. Yet, the species are not collected near Lima nor Piura, the urban settlements under study. What the research has proven is that there are at least three conservation projects in Piura department: 1) Algarrobo tree (*Prosopis alba* and *pallida*) has been planted inside and around the city of Piura, namely in the UDEP campus, a private university that has a Spanish network. The tree provides shade and moisture and the forest is used as experimental area for agronomic studies.

2) Local NGO's (Ecobosque and CITE) promote replanting of algarrobos in northern Peruvian regions, with so much success that the tree now occupies about 2/3 of the 3 million arable areas of Piura's department. Under the technical guidance of German and Switzerland International Cooperation Programs, the UDEP University together with these local NGO's minister courses to local farmers in order to get organic certification for flour, syrup, liquor and oil extracted from the pods. They have high content of iron and vitamins, making them eligible as anti-anemic. They have antioxidant and anti-diarrheal properties too, and are particularly recommended to children. These studies conducted in Piura and in Europe, have opened new business opportunities in the market niche of natural products and plant pharmaceutical products, as learnt during workshops attended at the University.

3) The third international cooperation program is being developed under the guidance and financial sponsorship of the United Nations, and promotes reforestation of high river Piura margin areas with native dry forest species: Palo Santo (*Bursera graveolens*); guayacán (*Caesalpinia paraguariensis*); hualtaco (*Loxopterygium huasango*); and ceibo (*Eriotheca discolor*). The project uses local nurseries, located west of the city of Piura, for example the seaside Paita businesses.

Both the local government and of the United Nations are responsible for technical and financial support of reforestation programs, towards a low carbon emissions sustainable development of Piura River margins, making the basin more resilient to climate change. These trees present medicinal properties as well.

Vernacular Name	Scientific Name	Lima Uses in 2006	Piura Uses in 2016
1. Manzanilla <i>Chamomille</i>	<i>Matricaria chamomilla</i> L. ASTERACEAE	Conjunctivitis, cataracts, anti-bacterial, anti-inflammatory, anti-spasmodic, carminative, digestive, sedative	Wash the eyes, anti-stress, dietetic, skin problems, digestive
2. Maca	<i>Lepidium peruvianum</i> G. Chacón BRASSICACEAE	Gynecological problems, energetic, osteoporosis, ulcers, aphrodisiac	Red variety: eye problems Black: sterility and aphrodisiac White: antioxidant, osteoporosis, memory loss, anti-anemic, aphrodisiac
3. Sábila <i>Aloe</i>	<i>Aloe vera</i> (L.) Burm. f. XANTHORRHOEACEAE	Cataracts	Gastritis, purgative, gastrointestinal problems, stomach aches, nausea, vomit, burnings, liver problems
3. Estevia <i>Stevia</i>	<i>Stevia rebaudiana</i> (Bertoni) Bertoni ASTERACEAE	Not recorded	Diabetes, dietetic
4. Hierba Luisa <i>Lemongrass</i>	<i>Cymbopogon citratus</i> (DC.) Stapf POACEAE	Diuretic, sedative, analgesic	Stomach aches, carminative, relaxing herb
5. Alcachofa <i>Artichoke</i>	<i>Cynara cardunculus</i> L. ASTERACEAE	Anti-anemic	Cholesterol, diabetes, liver problems, hypertension, stomach pains, dietetic, equilibrates intestinal flora
5. Anís <i>Anise</i>	<i>Pimpinella anisum</i> L. APIACEAE	Digestive, carminative, mild sedative	Anti-inflammatory Carminative
5. Coca	<i>Erythroxylum coca</i> Lam. ERYTHROXYLACEAE	Acosta disease, digestive, carminative, energizing	Carminative, anti-inflammatory, arthritis, digestive problems, energizing, Acosta disease
5. Manzana <i>Apple</i>	<i>Malus domestica</i> L., <i>M. asiatica</i> Nakai ROSACEAE	Food	Food Cholesterol Memory loss
5. Nopal and Tuna	<i>Opuntia ficus-indica</i> (L.) Mill. CACTACEAE	Food	Diabetes (stems) Food, Beverage (fruit) Kidney troubles (fruit)
5. Té verde <i>Green Tea</i>	<i>Thea sinensis</i> L. THEACEAE	Not recorded	Dietetic, antioxidant

Figure 1: Summary of the data obtained during the 2006 and 2016 missions to Peru.

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