

## MEDICINAL PLANTS OF THE ARGENTINEAN PUNA: A COMMON PROPERTY RESOURCE AND AN OPPORTUNITY FOR LOCAL PEOPLE

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### Abstract

Considering that poverty increased in Argentina due to local currency devaluation (400 %) in 2002, the objective of the project Cultivating the Health is to create certified phyto-medicines to give them for free to the rural poor. In order to contribute to that objective, I collected and identified the medicinal plants of the Argentinean Puna. The study area is placed in NW Argentina in Salta (Los Andes Department: 25636 Km<sup>2</sup>) and Jujuy Provinces (Susques Department: 9200 Km<sup>2</sup>), placed between 3500 and 5000 meters above sea level (m.a.s.l.), near the border with Bolivia and Chile. With the help of 3 medicine women and 18 local guides, 42 species of plants used as medicine by local people, were identified: 1 Pteridaceae, 1 Amaranthaceae, 1 Anacardiaceae, 2 Apiaceae, 13 Asteraceae, 2 Cactaceae, 2 Chenopodiaceae, 1 Ephedraceae, 2 Fabaceae, 1 Krameriaceae, 3 Lamiaceae, 2 Malvaceae, 1 Plantaginaceae, 3 Poaceae, 1 Rosaceae, 2 Solanaceae, 1 Tiphaceae and 4 Verbenaceae. According to their medicinal properties, 10 of those species are offered to tourists, despite one of them *Werneria poposa* (Asteraceae) is endangered. The traditional knowledge about the use of those plants is being eroded and lost, because now a day is easier for the dwellers to obtain medical attention in primary health care systems. On the other hand, the phytochemical and pharmacological properties of most of those species are little known. There is pharmaceutical information available for only 36 % of the species identified. With the participation of local people, is necessary to define plans for the sustainable use of that common property resource and to clarify the information about products sold and used in the popular medicine from the botanical and pharmaceutical point of view. The intellectual property rights of local people have to be protected properly.

### Acknowledgements

I am very grateful to the medicine-women, local guides, teachers and pupils of the Puna who helped me during the field work and to Patricia Picardo, who worked as a volunteer in this research. Carlos Saravia Toledo (Fudecha) identified the plants. Roberto Neumann (National Institute of Agriculture Research) and Guss Shaeffer (University of Massachusetts, USA), contributed to improve the manuscript. This research was supported by Wildlife Trust, Idea Wild (USA) and the Research Council (Project 1541) of the National University of Salta (Argentina).

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## Key Words

Argentina – Puna – medicinal plants – primary health care

## INTRODUCTION

The Puna (plateau) of the Central Andes extends through Argentina, Bolivia, Chile and Peru, between 3500 and 4500 m.s.l. Puna is a cold and arid region exposed to a high solar radiation, strong winds and daily fluctuations of temperature that can surpass 30° C, with an average of 9° C. The Argentinean Puna represents the SE extreme of this South American region (Reboratti, 1995).

The Puna is crossed by chains of mountains and volcanoes that can exceed the 6000 m., with closed (endorheic) basins that enclose lagoons and salt pans, with patches of aquatic habitat in a desert matrix. Many of them are surrounded by bogs locally called *vegas*, with plants similar to cushions. The soils are poorly developed and the dominant plants are mainly grasses and shrubs (Caziani et al., 2001).

The rain falls during summer, between November and February, decreasing to the West and the South. In San Antonio de los Cobres (Salta Province) annual average is 115 mm. but is irregular, alternating between dry and wet years: 13 mm. was the average in 1989 and 286 mm. in 1984 (Bianchi and Yañez, 1992).

Most of the Puna population has quechua and Aymara roots, with a density of 0,2 inhabitants/ Km<sup>2</sup> (Cajal, 1988). The study area is placed in the West of Salta and Jujuy Provinces in NW Argentina, in its North border with Bolivia and Chile (Figure 1). It overlaps with the southern area of the old Inca Empire: the Kollasuyo, the place where the Kollas live.

According to the National Population Census carried out in 2001, 37,1 % of the families couldn't cover their basic needs (Provincia de Salta, 2003). That census was carried out before the deep economic depression started in December 20 of that year, when the Argentinean currency was suddenly devalued by 240 %, so all the socio-economic indicators decreased (Barbarán, 2003; Barbarán and Arias, 2006). In January 2010 the peso is devalued 383 %.

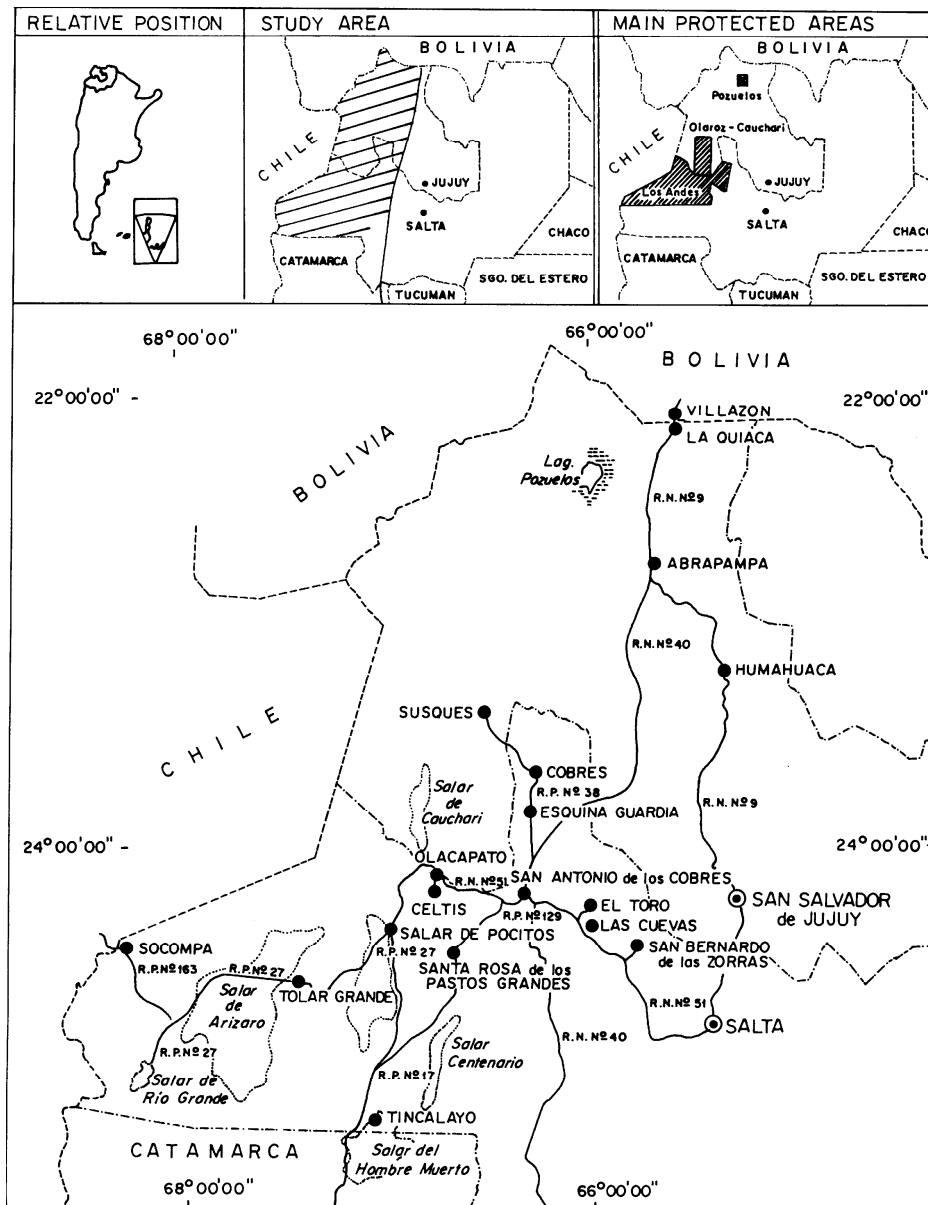
Despite cattle raise of sheep and goats in a subsistence economy is the main source of family income in the study area. No national, no provincial wildlife authorities have any conservation policy for Puna's flora. Overgrazing is the main environmental problem, but public policies are concentrated in mining and tourism

Considering current poverty levels and limited access to medicines, to promote the use of medicinal plants in primary health care (PHC), the Argentinean Phytomedicine Association started the project "Cultivating the Health" with the support of the Italian Ministry of External Affairs and COE, an Italian NGO. The objective of the project is to make available, free of charge, certified phyto-therapeutic medicines for the poor, in

specific cases of PHC (Alonso and Desmarchelier, 2005). Until now, only the provinces of Buenos Aires, Misiones and Santa Fe have participated in this initiative.

Considering that Salta and Jujuy provinces are not included in that project, the main objectives of this research are to make a list of the medicinal plants of the Puna, to register the therapeutic value given to that species by local inhabitants, to contribute to define plans for the sustainable use of that common property resource and to clarify the information about products used in the regional medicine from the botanical and pharmaceutical point of view.

Figure 1: Study area.



Source: From the author

## METHODS

With the help of 3 medicine woman and 18 local guides, I collected medicinal plants in 8 points of Los Andes Department (Salta Province): Alto Cementa (S 24° 35' 38,1" W 68° 34' 35,4"), Arroyo Filomena (S 25° 08' 8,2" W 66° 50' 49,8"), Callejón Grande (S 23° 18' 40,4" W 66° 19' 30,5"), Chipas (S 24° 1' 18,8" W 66° 9' 22,9"), Finca El Acay (S 24° 21' 56,9" W 66° 5' 22,6"), Piscuno (S 24° 5' 28,2" W 66° 10' 4,1"), Macón Hills (S 29° 23' 52" W 67° 14' 52,3"), Vega Baten (S 24° 18' 5,8" W 67° 15' 45,5"); and one point in the Susques Department (Jujuy Province): Quebrada de Muñayo (S 23° 18' 54,5" W 66° 18' 55,9"). The species collected were identified taxonomically and deposited in the herbarium of Fundación para el Desarrollo del Chaco (Fudecha)<sup>2</sup>.

The guides mentioned the common name and local use of the plants collected, that information was enriched with the testimony given by 14 other key informants (primary health workers, craftsmen, cattle herders and primary school teachers), as well as 146 pupils aged between 10 and 15 years old, attending primary schools in Abrapampa and Susques in Jujuy Province. Sixteen species were not collected, but included in the list because they are commonly used by medicine woman in the study area.

To verify the therapeutic value given by surveyed people to each species, I compared it with the information already published by other authors about ethno-medicine and the pharmacological properties of the Argentinean flora, when available.

Conservation problems of the plants collected were identified comparing the medicinal use with other uses detected for the same species e.g. forage, human food, etc.

## RESULTS

**Table 1:** List of medicinal plants collected and identified during the field work. The other uses of each species by the inhabitants of the Puna are also communicated to highlight their value in the local economy.

Family	Common and Scientific Name	Local Uses	Date and Place of Collection
Amaranthaceae	1.Santa María <i>Gomphrena sp.</i>	Medicinal.	(15/4/03) 3685 m.o.s.l S 23° 18' 40,4" W 66° 19' 30,5" Callejón Grande, in rocky area.
Anacardiaceae	2. Molle <i>Schinua areira L.</i>	Medicinal Humane food (fresh fruits)	N.C.

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Apiaceae	3.Yareta <i>Azorella compacta</i> Phil.	Medicinal. Emergency forage	N.C.
	4.Chichicaña, chuquicaña <sup>1</sup> <i>Mulinum</i> <i>crassifolium</i> Phil.	Medicinal.	(13/04/03) 3800 m.a.s.l. S 24° 5' 28,2" W 66° 10' 4,1" Piscuno Elementary School.
Asteraceae	5.Copa – copa <sup>1</sup> <i>Artemisia copa</i> Phil. var copa	Medicinal. Emergency forage.	(12/01/02) S 24° 35' 38,1" W 68° 34' 35,4" Alto Cementa.
	6.Quinchamal <i>Baccharis</i> <i>grisebachii</i> Hieron.	Medicinal. Tinctorial (yellow).	N.C.
	7.Espina amarilla <i>Chuquiraga</i> <i>acanthophylla</i> Weddell	Medicinal. Firewood. Tinctorial (yellow).	(15/04/03) 3680 m.a.s.l. S 23° 18' 40,4" W 66° 19' 30,5" Callejón Grande, in rocky area.
	8.Guira-guira o Vira-vira <i>Gnaphalium</i> <i>tarapacatum</i> Philippi	Medicinal.	(15/04/03) 3633 m.a.s.l. S 23° 18' 54,5" W 66° 18' 55,9" Quebrada de Muñayo.
	9.Canchalagua <i>Gutierrezia</i> <i>mandonii</i> (Sch.Bip.) Solbrig	Medicinal.	(15/04/03) 3680 m.a.s.l. S 23° 18' 40,4" W 66° 19' 30,5" Callejón Grande, in rocky area.
	10.Bailabuena <i>Haplopappus</i> <i>rigidus</i> Philippi	Medicinal.	(30/11/02) S 24° 18' 5,8" W 67° 15' 45,5") Vega Baten
	11.Chinchircuma <sup>1</sup> <i>Mutisia hamata</i> Reiche	Medicinal.	(13/04/03) 3690 m.a.s.l. S 24° 01' 6,7" W 66° 08' 45,1" Puesto Chipas, in vega.
	12.Suri llanta <i>Nardophyllum</i> <i>armatum</i> (Wedd) Reiche	Medicinal.	(12/03/02) (S 25° 08' 8,2" W 66° 50' 49,8") Arroyo Filomena.
	13.Marancel <i>Perezia ciliaris</i> Don	Medicinal.	N.C.
	14.Toqui, yana tola, tola de canasta <i>Plazia daphnoides</i> Wedd.	Medicinal. Used to make the <i>puiska</i> , part of the spinning device used by local weavers.	(16/04/03) 3633 m.a.s.l. S 23° 18' 54,5" W 66° 18' 55,9" Quebrada de Muñayo.

	15. Chachacoma, cachal <sup>i</sup> <i>Senecio graveolens</i> Weed	Medicinal. Condiment.	N.C.
	16. Suico vaca <sup>i</sup> <i>Tagetes campanulata</i> Griseb.	Medicinal. Condiment. Tinctorial (yellow).	(11/04/03) 3600 m.a.s.l. S 24° 21' 56,9" W 66° 5' 22,6" Finca El Acay.
	17. Pupusa <sup>i</sup> <i>Werneria poposa</i> Philippi	Medicinal.	(12/04/03) bought in San Antonio de los Cobres.
Cactaceae	18. Tuna <i>Opuntia af. indica</i>	Medicinal.	N.C.
	19. Airampo <sup>i</sup> <i>Opuntia soeherensii</i> Britton et Rose	Medicinal. Condiment (Girault, 1987).	(11/04/03) 3600 m.a.s.l. S 24° 21' 56,9" W 66° 5' 22,6" Finca El Acay.
Chenopodiaceae	20. Paico <i>Chenopodium ambrosioides</i> L.	Medicinal. Condiment.	(11/04/03) 3600 m.a.s.l. S 24° 21' 56,9" W 66° 5' 22,6" Finca El Acay. Weed.
	21. Arcayuyo <sup>i</sup> <i>Chenopodium mandonii</i> (S. Watson) Aellen	Medicinal.	(12/04/03) Bought in San Antonio de los Cobres.
Ephedraceae	22. Pinco-pinco <i>Ephedra americana</i> Humb. & Bonpl. ex Willd.	Medicinal. Good quality forage.	(15/04/03) 3680 m.a.s.l. S 23° 18' 40,4" W 66° 19' 30,5" Callejón Grande, in rocky area.
Fabaceae	23. Churqui <i>Acacia caven</i> (Molina) Molina	Medicinal.	N.C.
	24. Garbancillo <i>Astragalus garbancillo</i> Cav.	Medicinal.	N.C.
Krameriaceae	25. Chipi-chape <sup>i</sup> <i>Krameria lappacea</i> . (Dombey) Burdet & B.B. Simpson	Medicinal.	N.C.
Lamiaceae	26. Salvia <i>Lepechinia meyenii</i> (Walp.) Epling	Medicinal.	(15/04/03) 3685 m.a.s.l. S 23° 18' 40,4" W 66° 19' 30,5" Callejón Grande. in rocky area.
	27. Torongil <i>Melissa officinalis</i> L.	Medicinal.	N.C. Cultivated.
	28. Muña-muña <sup>i</sup> <i>Satureja parvifolia</i> (Philippi) Epling	Medicinal. Condiment.	(15/04/03) 3685 m.a.s.l. S 23° 18' 40,4" W 66° 19' 30,5" Callejón Grande, in rocky area.

Malvaceae	29. <i>Altea Althaea officinalis</i> L.	Medicinal.	N.C. Cultivated.
	30. <i>Malva Tarassa</i> sp.	Medicinal. Good quality forage.	N.C.
Poaceae	31. <i>Brama Bouteloua simplex</i> Lag.	Medicinal.	N.C.
	32. <i>Cortadera Cortaderia atacamensis</i> (Phil.) Pilg.	Medicinal. Emergency forage. Mixed with mashed potatoes, the ashes are used to make <i>yista</i> . <sup>ii</sup>	(11/04/03) 3600 m.a.s.l. S 24° 21' 56,9" W 66° 5' 22,6" Finca El Acay.
Plantaginaceae	33. <i>Llantén Plantago</i> sp.	Medicinal.	(11/04/03) 3600 m.a.s.l. S 24° 21' 56,9" W 66° 5' 22,6" Finca El Acay.
Pteridaceae	34. <i>Tupasaire Argyrochosma nivea</i> (Poir.) Windham var. <i>nivea</i>	Medicinal. Used in Bolivia to prepare spicy sauces (Girault, 1987)	(15/4/03) 3685 m.a.s.l. S 23° 18' 40,4" W 66° 19' 30,5" Callejón Grande, in rocky area.
Rosaceae	35. <i>Canjia Tetraglochin cristatum</i> (Britton) Rothm.	Medicinal. Emergency forage.	(13/4/03) 3545 m.a.s.l. S 24° 01' 6,7" W 66° 08' 45,1" Puesto Chipas.
Solanaceae	36. <i>Tola Fabiana densa</i> J. Remy	Medicinal.	(13/04/03) 3545 m.a.s.l. S 24° 00' 13,9" W 66° 10' 23,1" Puesto Chipas, in rocky area.
	37. <i>Quitatabaco Nicotiana undulata</i> Ruiz & Pav.	Medicinal.	(13/04/03) 3690 m.a.s.l. S 24° 01' 6,7" W 66° 08' 45,1" Puesto Chipas, in vega.
Tiphaceae	38. <i>Totora Typha dominguensis</i> (Pers.) Steudel	Medicinal. Ornamental.	N.C.
Verbenaceae	39. <i>Rica – rica</i> <sup>i</sup> <i>Acantholippia punensis</i> Botta	Medicinal. Tinctorial (soft green).	(11/30/02) S 24° 24' 12,6" W 67° 15' 17,3" Sierras de Macón.
	40. <i>Palma Glandularia</i> sp.	Medicinal.	(13/4/03) 3690 m.a.s.l. S 24° 01' 18,8" W 66° 09' 22,9". Puesto Chipas, in vega.
	41. <i>Verbena Junellia longidentata</i> Mold.	Medicinal.	N.C.

	42.Lampaya, lampazo <i>Lampaya</i> <i>castellani</i> Mold.	Medicinal. Tinctorial (brown).	(13/4/03) 3690 m.a.s.l. S 24° 01' 18,8" W 66° 09' 22,9". Puesto Chipas, in vega.
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Source: from the author

References:

N.C.: Not collected

<sup>i</sup>: These species are usually sold to tourists in San Antonio de Los Cobres, the main town of the Puna in Salta Province, and capital of Los Andes Department.

<sup>ii</sup> Combined with humane saliva, the *yista* create an alkaline environment in the mouth allowing the extraction of cocaine, while chewing coca *Erytroxylum coca* leaves. On the other hand, most of the locals in the Puna, prefer to use sodium bicarbonate (NaHCO<sub>3</sub>) for the same purpose.

The cultivated species were verified in the list published by Dimitri (1987).

### ***Therapeutic effects of identified species***

#### **1. Santa María**

Good against belly pain<sup>3</sup>. Girault (1987) and Marzocca (1997) cited other ethno-medicinal uses.

#### **2. Molle**

Febrifuge, the local people use to have baths with the leaves to alleviate bone pain<sup>3</sup>. Burgstaller Chiriani (1994), Girault (1987), Ratera and Ratera (1980) and Toursarkissian (1980) mention other ethno-medicinal uses. Effective against bacteria, fungus, inflammations, insecticide and a good regulator of the menstruation cycle (Alonso and Desmarchelier, 2005).

#### **3. Yareta**

Used against liver pain and the illness caused by the high altitudes of the Puna, known as *soroche*. The resin is used against waist pain and the root to alleviate external traumas<sup>3</sup>. Girault (1987), Palma (1978), Ratera and Ratera (1980) and Toursarkissian (1980) mention other ethnomedicinal uses. Used against rheumatism and pneumonia (Vignale, 1996).

#### **4. Chichicaña**

Antitussive, used against colds<sup>3</sup>. Vignale (1996) cited other ethnomedicinal uses.

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<sup>3</sup> Information collected by the author



### **5. *Copa-copa***

Used against colds, diarrhea, foot pain in hot baths, liver pain and soroche<sup>3</sup>. Ratera and Ratera (1980) mention other ethnomedicinal uses. Good against arterial hypertension and gastric pains (Alonso, 1988). Antispasmodic, used against rheumatism (Vignale, 1996). Analgesic, antiinflammatory and antimicrobial (Alonso and Desmarchelier, 2005).

### **6. *Quinchamal***

Digestive<sup>3</sup>, also used against bone pain and rheumatism (Vignale, 1996). Antimicrobial, antifungal (Feresin et. al. 2003; Hadad et. al, 2007)

### **7. *Espina Amarilla***

Antitussive, febrifuge, used against flu and stomachache, heal up with infections of the urinal tract<sup>3</sup>.

### **8. *Guira guira o vira-vira***

Antitussive<sup>3</sup>. Good against colds. The same use was reported by Palma (1978). Vignale (1996) report same use for *Achyrocline sp.* a species with same common name: Bira-bira.

### **9. *Canchalagua***

Good for the liver and gall bladder pain<sup>3</sup>.

### **10. *Bailabuena***

Aphrodisiac, good against colds and flu<sup>3</sup>. That use is coincident with the communication by Burgstaller Chiriani (1994), Palma (1978), Ratera and Ratera (1980) and Vignale (1996).

### **11. *Chinchircuma***

Help with childbirth, digestive<sup>3</sup>.

### **12. *Suri Llanta***

Antitussive, febrifuge, used to alleviate stomach ache<sup>3</sup>.

### **13. *Marancel***

Used against inflammation, sprains and waist pain<sup>3</sup>. Palma (1978) and Ratera and Ratera (1980) mention other ethnomedicinal uses. Antiviral, carminative, soft sedative, good against nervous migraine (Alonso, 1988). Gogg against sprains (Vignale, 1996).

**14. *Toqui***

Good against diarrhea and gall bladder pain<sup>3</sup>.

**15. *Chachacoma***

Used against, bone pain, cicatrizant, digestive<sup>3</sup>. Burgstaller Chiriani (1994), Girault (1987) and (Ratera y Ratera, 1980) cite other ethnomedicinal uses. Good against hypertension, photo dermal protector (Alonso and Desmarchelier, 2005). Good against colds and rheumatism.

**16. *Suico Vaca***

Digestive<sup>3</sup>. Girault (1987) mention other ethnomedicinal uses. Antimicrobial, antispasmodic, anti-tumor and insecticide of external use, good against louses (Alonso, 1988).

**17. *Pupusa***

Used against abdominal pain, flu, indigestion, intestinal inflammation, rheumatism and to stabilize arterial pressure<sup>3</sup>. In infusion mixed with copa-copa is good to alleviate rheumatic pain (Alonso, 1988). Girault (1987), Palma (1978) and Toursarkissian (1980) reported other ethno medicinal uses. Antispasmodic, digestive, good against hypertension in rats (Alonso and Desmarchelier, 2005). Good against hearth diseases and soroche (Vignale, 1996).

**18. *Tuna***

Good against liver pain<sup>3</sup>. Girault (1987) and Toursarkissian (1980), mention other ethnobotanical uses.

**19. *Airampo***

Febrifuge, used against measles in children<sup>3</sup>. Same uses were reported by Vignale (1996). Palma (1978), Girault (1987), Ratera and Ratera (1980) and Toursarkissian (1980), mention other ethno-botanical uses.

**20. *Paico***

Good against stomach pain and gall bladder pain<sup>3</sup>. Burgstaller Chiriani (1994), Girault (1987) Marzocca (1997), Ratera and Ratera (1980) and Toursarkissian (1980) cite other ethno-medicinal uses. Analgesic, anti-inflammatory, anti-microbial, anti-malaria anti-parasitical, cardiac depressor, febrifuge, good against ulcerations, muscle relaxant, (Alonso and Desmarchelier, 2005). Two medicinal presentations available in Argentinean pharmacies (Alonso, 1988). This species is included in the Argentinean Phamacopoeia (Bandoni et. al., 1978)

### **21. Arcayuyo**

Good to alleviate stomach ache and gall bladder pain<sup>3</sup>. Digestive (Toursarkissian, 1980).

### **22. Pinco-pinco**

Anesthetic, digestive and diuretic<sup>3</sup>. Del Vitto (1997), Girault (1987), Ratera and Ratera (1980) and Toursarkissian (1980) reported other ethnomedicinal uses. Diuretic, good against cystitis (Alonso, 1988). Antinflammatory, antimicrobial, antiulcerous (Alonso and Desmarchelier, 2005).

### **23. Churqui**

This species is not native from the Puna, but used locally. Used to cure sprains<sup>3</sup>. Diuretic (leaves), purgative (root), antidiarrheic (bark) (Alonso, 1988). Good against fungi, the log sweat a resin similar to Arabic gum (Alonso and Desmarchelier, 2005). Del Vitto et al. (1977), Marzocca (1997), Ratera and Ratera (1980) and Toursarkissian (1980) cite other ethnomedicinal uses.

### **24. Garbanzillo**

Good to cure broken bones and sprains<sup>3</sup>. This species is toxic, so is for external use only. Girault (1987) and Marzocca (1997) cited other ethnomedicinal uses.

### **25. Chipi-chape**

Good against alcoholism, diabetes, kidney and womb pain<sup>3</sup>. Ratera and Ratera (1980) and Toursarkissian (1980) cited other ethnomedicinal uses. Antidiarrheic and against stomach aches (De la Cruz et. al, 2007). Vignale (1996) mentioned *Krameria illuca* Phil. with the same common name, but mainly used against urinary and vagina inflammations and sciatic pains.

### **26. Salvia**

Digestive, good against flu<sup>3</sup>. Girault (1987) and Palma (1978) cited other ethno-medicinal uses. Antimicrobial, indicated against respiratory infections (Alzamora et. al. 2001).

### **27. Toronjil**

This species is not native from the Puna, but used locally. Good for heart<sup>3</sup>. Girault (1987) mention other ethnomedicinal uses. Antispasmodic, antiviral, carminative, digestive, soft sedative, used against migraine and insomnia (Alonso, 1988). Antimicrobial, antitumoral, antiviral, antioxidant (Allahverdiyev et. al., 2003; de Sousa, 2004; Mimica-Dukic et. al., 2004). This species is included in the Argentinean pharmacopoeia (Bandoni et. al, 1978)

### **28. *Muña-muña***

Aphrodisiac, digestive, good against soroche<sup>3</sup>. Burgstaller Chiriani (1994) Ratera and Ratera, (1980) and Toursarkissian (1980) mention other ethnomedicinal uses.

Astringent in hemorrhagic injures, digestive, laxative, menstrual regulator (Alonso, 1988). Aphrodisiac and anti-oxidant (Alonso and Desmarchelier, 2005). Good against colds and pneumonia (Vignale, 1996).

### **29. *Altea***

This species is not native from the Puna, but used locally. Febrifuge<sup>3</sup>, in coincidence with Palma (1978). Saggese (1959) report other ethno-medicinal uses. Antitussive (Nosálvá et. al., 1993).

### **30. *Malva***

Used in baths against headache<sup>3</sup>. Burgstaller Chiriani (1994), Girault (1987) and Saggese (1959) report other ethno-medicinal uses. Antinflammatory, expectorant, soft laxative, one medicinal presentation available in argentinean pharmacies (Alonso, 1988).

### **31. *Brama***

Febrifuge<sup>3</sup>.

### **32. *Cortadera***

Febrifuge<sup>3</sup>. Palma (1978) and Marzocca (1997) cited other ethnomedicinal uses.

### **33. *Llanten***

Digestive, good for kidney<sup>3</sup>. Burgstaller Chirrián (1994), Girault (1987), Marzocca (1997), Ratera and Ratera (1980) and (Toursarkissian, 1980) cited other ethnomedicinal uses.

### **34. *Tupasaire***

To alleviate headaches and sinusitis, fresh smashed flowers must be inhaled<sup>3</sup>. Girault (1987) and. Palma (1978) mentioned other ethnomedicinal uses.

### **35. *Canguia***

Used against cancer, febrifuge<sup>3</sup>.

**36. Tola**

Good in baths for children with indigestion<sup>3</sup>. Vignale (1996) mentioned this common name for *Paratrephia lepidopylla* (Wedd.) Cabr. with other ethnomedicinal uses.

**37. Quitatabaco**

Good against external traumatism<sup>3</sup>. Girault (1987) cited other ethno-botanical uses.

**38. Totorá**

Antitussive<sup>3</sup>. Marzocca (1997) cited other ethnobotanical uses.

**39. Rica-rica**

Digestive and febrifuge<sup>3</sup>. Good against indigestion (Palma, 1978) and colds (Vignale, 1996).

**40. Palma**

Good against stomach ache<sup>3</sup>.

**41. Verbena**

This species belong to Prepuna and Western Monte ecosystems, but used locally in the Puna. Digestive, good against external traumas<sup>3</sup>

**42. Lampaya**

Febrifuge, good against back pain, cough and kidney pain<sup>3</sup>. Marzocca (1997), Burgstaller Chiriani (1994); Girault (1987), Palma (1978) and Ratera and Ratera (1980) mention other ethnobotanical uses. Also used as digestive, diuretic (Vignale, 1996)

**DISCUSSION**

Comparing the number of ethnomedicinal values cited by Girault (1987) in Bolivia with the few therapeutic effects attributed to the same species by the people surveyed in this study, is clear that traditional knowledge about the use of those plants, is being eroded and lost in the argentinean Puna.

That happens because here there is a bigger infrastructure (more hospitals, health posts, and PHC programs) and availability of health services than in Bolivia, the poorest country of South America.

On the other hand, in Bolivia the ethnomedicine is allowed by the government. The traditional andean doctors, known as *kallawayas* can receive official licenses to apply their knowledge (Barbarán, 2004).

The 10 species sold to tourists, are offered in plastic bags of no more that 30 g. in the Puna, but is possible to find them also, in fruit markets and herbal shops of Salta, Jujuy and other argentinean capitals.

Despite market pressure, those plants are widely available in the Puna, because they are emergency forage for cattle and are consumed mainly by local residents. They use to combine the western medicine with the traditional one (Barbarán, 2004; Barbarán and Arias, 2006).

The exception is the pupusa, because its habitat is only above 4500 m.a.s.l. and is in high demand because of therapeutic properties. This species need to be protected through effective management plans.

Considering that only 15 (36 %) of the species identified in this survey have pharmacological studies, is evident the need to invest more in bioprospecting and pharmacological research, in order to make free medicines for the poor. At the same time, the traditional knowledge of the inhabitants of the Puna should be protected properly. The sustainable use of the medicinal plants as a common property resource, for the benefit and health of local people, is an opportunity that can't be missed.

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