HERBAL REMEDIES IN CENTRAL-WESTERN ARGENTINA, I. "AMBAY": GENUINE DRUG AND ADULTERANTS

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Abstract

Four medicinal plant species used in Central-western Argentina under the vernacular name "Ambay", from taxonomic, anatomic and ethnobotanic points of view, were studied. *Cecropia pachystachya* (*Cecropiaceae*), *Solanum granuloso-leprosum* (*Solanaceae*), *Tetrapanax papyrifer* (*Araliaceae*) and *Verbascum thapsus* (*Scrophulariaceae*), used with analogous popular therapeutical purposes were identified. Their morphoanatomic and micrographic characters are described for the improvement of an effective quality control, because only one species (*Cecropia pachystachya*) is codified in the Argentinian Pharmacopoeia, while the others are not at all chemically and pharmacologically known yet.

1. Introduction

Cecropia pachystachya, popularly known as "ambay", is used in Argentina and neighbouring countries for the treatment of respiratory paths affections (Basualdo and Soria, 1996; Parodi, 1886; Simões *et al.*, 1986; Toursarkissian, 1980). Because other botanical entities known by the same vernacular name in Argentina are used in the same way that *Cecropia pachystachya*, the present work was carried out.

2. Materials and methods

Dry and fresh samples were paraffin embedded, cutted by sliding microtome, stained with Safranin-Fast Green and mounted in DPX; some of them were dissociated with Jeffrey's reactive (Johansen, 1940) or cleared (Dizeo, 1973); histochemical tests were made with specific reactives. Stomata number and stomata ratio, palisade ratio, number of islets and nervure terminal number were determined.

Herbarium material, histologic slides and commercial samples are preserved at Herbarium, Universidad Nacional de San Luis (UNSL). Their data are as follows:

Cecropia pachystachya. ARGENTINA, Corrientes: Ferraro w/n. (UNSL 388).- Krapovickas 40700 (CTES, UNSL).- *Commercial samples*: UNSL-H 12, 162, 164 (mixture).

Solanum granuloso-leprosum. ARGENTINA, San Luis: Del Vitto *et al.* 8789 (UNSL).

Tetrapanax papyrifer. ARGENTINA, San Luis: Del Vitto *et al.* 8788 (UNSL).

Verbascum thapsus. ARGENTINA, Mendoza: Del Vitto 8814 (UNSL).

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3. Results and discussion

3.1. *Cecropia pachystachya* Trécul (*Cecropiaceae*). Vernacular names: "ambay", "palo lija", "ambay guazú", "amba-hú", "imbaúba"

Dioecious latescent tree with fistulous stems and large, discolor leaves. Florets in dense spikes arranged in fascicles; fruit an edible nucule. Tropical and subtropical Argentina, Paraguay, Uruguay and Southern Brazil (Biloni, 1990; Digilio, 1971; Rotman, 1987).

Uses and administration forms: Dried and crushed leaves, with 2 % maximum of alien organic matter (Farmacopea Argentina ed. VI: 101-102, 1978) are selled as simple drug in herbal shops and pharmacies (Amorín *et al.*, 1992) both in extracts (phytotherapics), pills, syrups (Martínez-Crovetto, 1981) and tinctures (Biloni, 1990), as well as a part of fluidificant, bechic, antitussive, expectorant and antasthmatic mixtures.

Phytochemical: Alkaloids (*cecropine*, *cecropidine*), resins, waxes and tannins, glucosides (*ambaine*, *ambainine*), oxidases, mucilages, and saponines were reported (Domínguez, 1928; Domínguez *et al.*, 1928; Floriani, 1939, 1940; Langón, 1918; Peckolt *et al.*, 1893; Rondina *et al.*, 1969).

Morphoanatomy: Coriaceous, discolor leaves, palmately divided (9-11 narrowly obovate segments), with conspicuous yellowish veins. Petiole long, broaded at base, provided in the lower part with a pulvinus coated by protein-secretory trichomes. Dorsiventral blade, the unistrate upper epidermis with lithocysts (recurved conic papiles, cystolith-containing cells) and piriform glands, with 3-5-celled head with proteins or oils, and unicelled trichopodium; the lower epidermis with eglandular, 1-celled, tubular and long-coiled trichomes, and shorts, simple, baculate ones. Anomocytic stomata. Mesophyll with secretory tubes both laticifers or mucilaginous and druses of calcium oxalate. Crystal-containing cells are spread both in vascular bundle and lateral veins; paranervular sheath present.

3.2. *Solanum granuloso-leprosum* Dunal *(Solanaceae - Solanoideae - Solaneae).* Vernacular names: "fumo bravo", "suncho blanco", "palo blanco", "cambará", "tabaco cimarrón", "tabaquillo", "caá-o-vetí", "ambay"

Tomentosus shrubs or trees to 12 m with elliptic leaves. Inflorescences furcate, corolla violet to purple. Berry globose yellow to brownish. Argentina, Paraguay, Uruguay and Southern Brazil (Morton, 1976; Roe, 1972).

Uses and administration forms: Leaves and berries are used as antinflammatory, calmatives and other popular uses (Hieronymus, 1882; Martínez-Crovetto, 1965; Martínez, 1969; Perrot, 1943-1944; Toursarkissian 1980). Flowers and leaves are antibacterial (Ramstad, 1975).

Phytochemical: *Solanine*, saponines -as *solasodine*- as well as oxidases and a bitter amorphous resine, alkaloids, steroisapogenines, and tannins were reported (Domínguez, 1928; Domínguez *et al.*, 1928; Dopke *et al.*, 1976; Manske, 1968; Perrot, 1943-1944; Willaman, 1970).

Morphoanatomy: Simple leaves of entire, elliptic to narrowly elliptic blades, scarcely decurrent, 8-20 x 3-7 cm, hardly discolor, velutine to scabrid on upper surface, pale green to gray-tomentose in lower surface; axillary leaves absents or, when present, elliptic to ovate-orbicular. Both unistrate epidermis with upper cells greater than lower ones. The upper epidermis shows polygonate walls, thick striate cuticle and spreading glandular and eglandular trichomes. Anisocytic stomata. Dorsiventral structure with bicollateral midrib, and fibrovascular bundles without sheath.

3.3. *Tetrapanax papyrifer* (Hook.) C. Koch (*Araliaceae - Schefflereae).* Vernacular names: "ambay"

Small tree or shrub with large leaves. Florets arranged in simple panicled-umbella. Fleshy fruit. Asia. Cultivated in warm-temperated Argentina (Burkart *et al.*, 1954; Dimitri *et al.*, 1952).

Uses: Expectorant, antitussive and against bronchial sickness; hepatoprotector (Handa *et al.*, 1986).

Phytochemical: Triterpenoids (*Papyriogenine A, B* and *C, Papyrioside L-II,* and *Propapyriogenines* A_1 and A_2, *11-dehidro-propapyriogenine* A_2 and *16-episaicogenine* (Handa *et al.*, 1986; Takai *et al.*, 1977).

Morphoanatomy: Simple, large, palmatifid, subdiscolor leaves, with long petioles and large stipules. Dorsiventral blade with unistrate upper epidermis with a thick striate cuticle and polygonate walls. Paracytic stomata presents only in below epidermis. Indument of diverse trichomes. Collateral fibrovascular bundles, with secretory channels and/or crystalliferous sheath; annulate collenchymatous midrib; lateral bundles with paranervular sheath.

3.4. *Verbascum thapsus* L. *(Scrophulariaceae - Antirrhinoideae - Verbasceae).* Vernacular names: "paño", "yerba del paño", "gordolobo", "barbasco"

Annual/biennal rosulate, tomentose herb with large leaves. Florets in dense spikes, with yellow corolla. Pluriseminate capsule. Europe, adventive in Argentina (Dawson, 1965; Ferguson, 1972).

Uses: Leaves and flowers are used in cataplasms, ointments and balneum, as bechic, emollient and antispasmodic against asthma, bronchitis and other sickness (Fernández *et al.*, 1982).

Phytochemical: Saponinic glycosides, saponines, mucilages and tannins, flavonoids (*harpagine, harpagide* and *aucubine*) and *verbascose* were reported (Domínguez, 1928; Fernández *et al.*, 1982; Perrot, 1943-1944; Ragonese *et al.*, 1984).

Morphoanatomy: Entire, subsessile leaves. Dense indument of branched, glanduliferous trichomes. Dorsiventral blade with subepidermal secretory channels. Unistrate epidermis with sinuose radial walls and strongly striate cuticle. Anomocytic stomata. Collateral fibrovascular bundles with starchy and paranervular sheaths.

Flower morphology: Dense, spike-like inflorescences; yellow, large corolla; stamina 5; ovoid capsules; seeds numerous.

4. Conclusions

Three species were found as adulterants of *Cecropia pachystachya* in Cuyo region, Argentina: *Solanum granuloso-leprosum, Tetrapanax papyrifer* and *Verbascum thapsus.*

In general, anatomic results are in agreement with Metcalfe *et al.* (1950). However, a crystalliferous sheath is present in bundles of *Cecropia pachystachya.* Bonsen *et al.* (1983) obtained similar results to us, except in the absence of sclerenchymatous sheaths, whereas crystalliferous and paranervular sheaths are present. In regard to *Solanum granuloso-leprosum* indument described by Roe (1971), we add glanduliferous trichomes. Micrographics parameters are cited by first time for these entities, wich contribute to practice an effective quality control.

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Table 1 - Differential characters among plant species known as "Ambay" in Argentina

	Cecropia pachystachya	*Solanum granuloso-leprosum*	*Tetrapanax papyrifer*	*Verbascum thapsus*
leaf morphology				
outline	suborbicular	elliptic	suborbicular	elliptic
lobing degree	palmately divided	entire	palmately cleft /parted	entire
nervure	palmately	pinnately	palmately	pinnately
coloration	strongly discolor	subdiscolor	subdiscolor	subconcolor
histologics				
crystal clusters	druses	crystal-sand	druses	absent
paranervular sheath	present	absent	present	present
eglandular trichomes	tubular-recurved	porrect-stellate	multiangulate	branched
glandulifer trichomes	pyriform glands	1-4 celled trichopode 1-pluricelled head	small papiles 2-4-celled head	1-3-celled trichopode
stomata types	anomocytic	anomocytic	paracytic	anomocytic
micrographic parameters				
Palisade ratio	13.25-(14)-14.2	5-(5.40)-5.75	4.75-(5.45)-6.25	3-(3.87)-5
Upper surface				
Stomata number	0	1.6 ± 0.89	0	0
Stomata ratio	0	1.07-(1.73)-3.06	0	0
Lower surface				
Stomata number	56.25 ± 5.5	10.33 ± 2.23	31.5 ± 1.3	8.25 ± 1.7
Stomata ratio	24.3-(28.7)-34	10.9-(12.1)-12.7	14.8-(15.5)-16	12.2-(14.3)-15.6
Islet number	8.33 ± 0.57	8.88 ± 1.01	6.25 ± 0.70	4.37 ± 0.88
Nervure terminal number	18.94 ± 2.33	5.66 ± 1.15	13.12 ± 0.53	4.82 ± 0.60