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Toxicity of medicinal plants used in traditional medicine in Northern Peru

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Abstract



Aim—The plant species reported here are traditionally used in Northern Peru for a wide range of illnesses. Most remedies are prepared as ethanol or aqueous extracts and then ingested. The aim of this study was to evaluate the potential toxicity of these extracts.

Materials and methods—The toxicity of ethanolic and water extracts of 341 plant species was determined using a Brine-Shrimp assay.

Results—Overall 24% of the species in water extract and 76% of the species in alcoholic extract showed elevated toxicity levels to brine-shrimp. Although in most cases multiple extracts of the same species showed very similar toxicity values, in some cases the toxicity of different extracts of the same species varied from non-toxic to highly toxic.

Conclusions—Traditional preparation methods take different toxicity levels in aqueous and ethanol extracts into account when choosing the appropriate solvent for the preparation of a remedy.

Keywords

Medicinal Plants; Ethnobotany; Brine Shrimp; Artemia salina; Toxicity; Northern Peru

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1. Introduction

In many developing countries, Traditional Medicine (TM) is commonly used as it is an accessible and affordable treatment (WHO, 1999a,b; 2002), while Complementary Alternative Medicine (CAM) is popular in developed countries (WHO, 1998; UNCCD 2000).

Peru is a prime example for a developing country rich in biodiversity, with a millennia old tradition of curers using the rich flora. Many of same plants are still being used nowadays. Northern Peru is believed to be the center of the Central Andean Health Axis (Camino, 1992), and TM practices in the whole Andean region are part of everyday life (Bussmann and Sharon, 2006; De Feo, 1992; Joralemon and Sharon, 1993; Polia, 1988; Revene et al., 2008). Peru's Social Security System recently implemented a National Program in Complementary Medicine in clinics and hospitals (EsSalud, 2000). The efficacy and potential toxicity of remedies employed in folk medicine do however have to be scientifically evaluated (Baker et al., 1995; Cox and Balick, 1994; Elisabetsky and Castilhos, 1990; Farnsworth et al., 1985; Muñoz and Sauvain, 2002).

A wide variety of studies have reported that some are bioactive (e.g. Perumal Samy and Ignacimuthu, 2000), but potentially active compounds have been isolated only from a few of the plants tested (D'Agostino et al., 1995a,b; Okuyama et al., 1994; Rodriguez et al. 1994; Umana and Castro, 1990). In contrast, crude medicinal activities have been investigated for a wide variety of plants (e.g. Bussmann et al., 2008, 2009a,b, 2010; Hammond et al., 1998, Lee et al., 1999; Neto et al., 2002; Villegas et al., 1997). But while toxicity assays are available for many countries (e.g. Argentina (Bustos et al., 1996; Hernández et al., 2000), Bahrain (Taha and Alsayed, 2000), Bangladesh (Costa-Lotufo et al., 2005), Brazil (Hammer and Johns, 1993; Alves et al., 2000; Holetz et al., 2002; Santos Piemanta et al., 2003; Quignard et al., 2004; Ferreira de Lima et al., 2006; Suffredini et al., 2006; dos Santos et al., 2007), Canada (McCuthcheon, 1992), Chile (Cuadra et al., 2005), China (Duffy and Power, 2001), Cuba (Martinez et al., 1996; Logarto Parra et al., 2001), Ecuador (Guerrero et al., 2003), Guatemala (Cáceres et al., 1993a, b, 1998; Michel et al., 2007), Honduras (Lenz et al., 1998), India (Padmaja et al., 2002), Kenya (Kirira et al. 2006; Wanyoike et al., 2004), Mexico (Sánchez-Medina et al., 2001), Nicaragua (Coe et al. 2010), Nigeria (Ajaiyeoba et al., 2006), Panama (Sánchez et al., 1993), Papua New Guinea (Nick et al., 1995), Philippines (Horgen et al., 2001), Uruguay (González et al., 1993), USA (Turker and Camper, 2002; Badisa et al., 2007; Van Slambrouck et al., 2007), no data exists on the potential toxicity of Peruvian medicinal species.

In this communication we report on brine-shrimp toxicity assays for 341 plant species ingested for a wide range of traditional uses. The brine shrimp, *Artemia* sp., Artemiidae, are small invertebrates occurring in sea-water and other saline ecosystems. *Artemia* is frequently used as agent in laboratory assays to determine toxicity values by estimating LC₅₀ values (median lethal concentration) (Meyer et al., 1982; McLaughlin et al., 1991; Cepleanu et al., 1994, Coe et al., 2010).

2. Materials and Methods

2.1. Plant Material

Plants for the presented assays were collected in Northern Peru (Fig. 1) in the field, in markets, and at the homes of traditional healers (*curanderos*) during March–April and June–August 2009, and January–February 2010. The specimens are registered under the collection series “JP”, “ACR”, “KMM”, and “AKT”. Vouchers of all specimens were deposited at the

Herbarium Truxillense (HUT, Universidad Nacional de Trujillo), and Herbario Antenor Orrego (HAO, Universidad Privada Antenor Orrego, Trujillo). In recognition of Peru's rights under the Convention on Biological Diversity, most notably with regard to the conservation of genetic resources in the framework of a study treating medicinal plants, the identification of the plant material was conducted entirely in Peru. No plant material was exported in any form whatsoever.

2.2. Nomenclature

The nomenclature of plant families, genera, and species follows the Catalogue of the Flowering Plants and Gymnosperms of Peru (Brako and Zarucchi, 1993) and the *Catalogue of the Vascular Plants of Ecuador* (Jørgensen and León-Yanez, 1999). The nomenclature was compared to the TROPICOS database (Tropicos, 2010). Species were identified using the available volumes of the *Flora of Peru* (McBride, 1936–1981), as well as Jørgensen and Ulloa Ulloa (1994), Pestalozzi (1998) and Ulloa Ulloa and Jørgensen (1993), and the available volumes of the *Flora of Ecuador* (Sparre and Harling, 1978–2010), and reference material in the herbaria HUT and HAO.

2.3. Preparation of Extracts

For each species tested, above ground material (in case of trees leaves and) was collected, and the entire material used for extract preparation. This corroborates with the traditional preparation (Bussmann and Sharon 2006). Plant material was dried at 35 °C for three days. After drying, the material was ground with an industrial grinder, and 2 samples of 5 g. of plant material each were weighted out. One sample was submerged in 100 ml of 96 % ethanol and left to macerate for 7 days, while another sample was submerged in 100 ml of boiling distilled water and left to macerate for 24 h. After maceration the plant material was filtered and 100 ml 96 % ethanol was added to the water extracts to allow faster solvent removal. The solvent was then evaporated to complete dryness using a standard Buchi rotary-evaporator. The resulting dry extracts were re-suspended in 5 ml distilled water. In order to determine the real concentration of each extract, 1ml of previous homogenization of the respective extracts was removed and again completely oven-dried and then weighed to determine amount of extract per ml of final solution. The remaining extract was used for MIC assays.

2.4. Brine shrimp hatching

Eggs of brine shrimp (*Artemia* sp., Artemiidae) were purchased from Carolina Biological Supply (Burlington, NC, USA) and were incubated for 48 h in a culture vessel (15 × 15 × 15 cm) containing saltwater (1% NaCl) prepared from nitrate, phosphate, and silicate-free sea-salt and distilled water (35 g/l) at 25°C under constant illumination. The saltwater solution was aerated continuously during incubation with an aquarium air pump). After 48 h the Nauplius-larvae were collected from the culture vessel.

2.5. Brine shrimp lethality assay

The brine shrimp lethality assay (BSLA) was used to determine if the plant extracts of medicinal species were cytotoxic (Meyer et al., 1982; McLaughlin et al., 1991; Cepleanu et al., 1994, Coe et al., 2010). Plant extracts were diluted to concentrations of 1000; 500; 250; 125; 62.5; 31.25; 0 (µg/ml). Ten brine shrimp larvae were placed in each vial using a plastic pipette with a 2 mm diameter tip. The larvae were released under the surface of the solution to avoid killing them by trapping air under their carapaces. Survivors were counted under the stereomicroscope after 24 h, and the percent death at each dose and control was determined. All assays were run in triplicate. Vials with brine-shrimp in salt-water, and vials treated with 96 % Ethanol were used as controls.

2.6. Data analysis

The mean results of brine shrimp mortality were plotted against the logarithms of concentrations using the Probit Analysis tool of the NCSS statistical software package from which the median lethal concentration (LC₅₀) at 95% confidence intervals (CI) were calculated according to the method of Finney (1971). Biological activity using the brine shrimp assay was recorded as the concentration when 50% of the larvae were killed within 24h of contact with the extract. LC₅₀ values below 249 µg/ml were considered as highly toxic, 250–499 µg/ml as median toxicity and 500–1000 µg/ml as light toxicity. Values above 1000 µg/ml were regarded as non-toxic.

3. Results and Discussion

The Brine shrimp lethality activity of 501 aqueous and ethanolic extracts of 341 plant species belonging to 218 genera of 91 families used in Peruvian traditional medicine was tested. The results are shown in Tab. 1. The aqueous extracts of 55 species showed high toxicity values (LC₅₀ below 249 µg/ml), 18 species showed median toxicity (LC₅₀ 250–499 µg/ml) and 18 low toxicity (LC₅₀ 500–1000 µg/ml). The alcoholic extracts proved to be much more toxic: 220 species showed high toxicity values (LC₅₀ below 249 µg/ml, with 37 species having toxicity levels of >1µg/ml), 43 species showed median toxicity (LC₅₀ 250–499 µg/ml) and 23 species low toxicity (LC₅₀ 500–1000 µg/ml). Over 24% of the aqueous extracts and 76% of the alcoholic extracts showed elevated toxicity levels to brine-shrimp. Traditional preparation methods are taking this into account – most remedies are prepared as simple water extracts, thus avoiding potential toxic effects. Excellent examples where the water extracts are non-toxic, while the ethanolic extracts show high toxicity are *Ocimum basilicum* L., *Salvia* sp., or *Laccopetalum giganteum* (Wedd.) Ulbrich,. In contrast, *Cinchona officinalis* L. ethanolic extracts were nontoxic, and are traditionally used, while the highly toxic water extract has no traditional use.

Species which showed higher levels of toxicity were *Bejaria aestuans* L., *Erodium cicutarium* (L.) L'Her., *Brachyotum naudinii* Triana, *Miconia salicifolia* (Bonp. ex Naud.) Naud., *Cuscuta foetida* Kunth, *Caesalpinia spinosa* (Molina) Kuntze, and *Phyllactis rigida* (Humb. and Bonpl.) Pers.. *Achillea millefolium* L., *Artemisia absinthium* L., and *Eucalyptus globulus* Labill all frequently used as medicinal teas also fall in this group, as do *Lupinus mutabilis* Sweet, and *Ilicium verum* Hook. f.. Solanaceae (e.g. *Nicotiana tabacum* L. and *Solanum americanum* Mill.) proved highly toxic, while other species, known to be highly toxic when ingested (e.g. *Datura* sp. and *Brugmansia* spp.) did not show toxicity in Brine Shrimp.

Multiple extracts from different collections of the same species showed in most cases very similar toxicity values. However, in some cases the toxicity of extracts from different collections of the same species varied from non-toxic to highly toxic. Examples for such variation in toxicity were found for *Chersodoma deltoidea* M.O. Dillon and Sagast., *Satureja sericea* (C. Presl. and Benth.) Briq., *Eugenia obtusifolia* Cambess., *Epidendrum* sp., *Capparis crotonoides* Kunth, *Sambucus peruviana* Kunth, and *Malva* sp. In case of these frequently used species, harvest time, collection locality or use of specific plant parts might be important for a reduction of toxicity.

4. Conclusions

Brine-shrimp bioassays offer a quick, simple and cost-efficient way of testing the toxicity of plant extracts, and allow a high throughput. This is of particular importance in developing countries where a large percentage of the population relies on the use of crude medicinal plant extracts to meet their health care needs, and where large numbers of different species

are used, often prepared in complex mixtures (WHO, 1998). The test does not necessarily constitute a direct link to toxicological effects in mammals (Sanchez et al., 1993), and should ideally be subjected to additional laboratory validation. However, it does give a good initial indication for the toxicity of the material tested.

Toxicity values with LC₅₀ values below 1000 µg/ml are considered to be bioactive and might provide leads for further screening (Meyer et al., 1982). Over 75% of the species in the present study might have some cytotoxic potential. The toxicity values reported fall in the range reported by other authors (e.g. Coe et al., 2010).

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Figure 1.
Location of the study area in northern Peru.
Study area: Peruvian Departments of Amazonas, Piura, Lambayeque, La Libertad, Cajamarca, San Martín, and the Ecuadorian Province of Loja.

Table 1

Toxicity of medicinal plants used in northern Peru

Col#	NCSS code	Common name	Family	Scientific name	LC ₅₀ µg/ml Aqueous	5-95% CI µg/ml	LC ₅₀ µg/ml Ethanol	5-95% CI µg/ml	Traditional use (O=oral, T=topical; Traditional preparation (A=aqueous, E=ethanolic))
ACR91	c166	Culantrillo	Adiantaceae	<i>Adiantum concinnum</i> Willd.	1131	64->10000	4	0.01-1344	OA
AKT1226	c303	Cochayuyo	Algae	<i>Gigartina</i> sp.	>10000	>10000	>10000	>10000	OA
ACR149, KMM395	c93	Moradilla Blanca	Amaranthaceae	<i>Alternanthera porrigens</i> (Jacquin) Kuntze	>10000	>10000	130	21-780	OA/TA
KMM468	c195	Sanguinara	Amaranthaceae	<i>Alternanthera</i> sp.	>10000	2->10000	42	0.4-4034	OA/TA
ACR103	c533	Hierba de Oso	Amaranthaceae	<i>Alternanthera villosa</i> Kunth	>10000	>10000	>10000	>10000	OA/TA
ACR191	c40	Siempre viva (corta)	Amaranthaceae	<i>Gomphrena globosa</i> L.	>10000	>10000	6.7	0.001-3539	OA
ACR162	c242	Color	Amaranthaceae	<i>Iresine herbstitii</i> Hook.	>10000	>10000	0.2	>10000	OA
ACR119, ACR38	c298	Para Para	Amaryllidaceae	<i>Eustephia coccinea</i> Cav.	611	34->10000	530	118-5417	OA/TA
ACR77	c654	Chacur	Anacardiaceae	<i>Mauria heterophylla</i> Kunth	>10000	>10000	35	>10000	OA/TA
KMM404	c285	Molle	Anacardiaceae	<i>Schinus molle</i> L.	>10000	>10000	>10000	>10000	OA/OE
ACR81	c268	Guanabana	Annonaceae	<i>Annona muricata</i> L.	>10000	>10000	>10000	>10000	OA
KMM566	c49	Bisnaga	Apiaceae	<i>Ammi visnaga</i> (L.) Lam. cf.	8467	31->10000	131	18-942	TA
KMM439, ACR22	c80	Apio del campo	Apiaceae	<i>Apium graveolens</i> L.	171	28-1024	25	2-248	OA/TA
KMM466	c702	Ricacha de zorro	Apiaceae	<i>Arracacia xanthorrhiza</i> Bancr.			0.05	0.01-333	TA
KMM548	c208	Cilantro	Apiaceae	<i>Coriandrum sativum</i> L.	22	0.1->10000	0.015	>10000	TA
KMM409	c217	Hinojo	Apiaceae	<i>Foeniculum vulgare</i> Mill.	>10000	>10000	2.75	0.1-16904	OA
ACR82	c272	Hinojo	Apiaceae	<i>Foeniculum vulgare</i> Mill.	>10000	>10000	>10000	>10000	OA
KMM467	c91	Sombrero	Apiaceae	<i>Hydrocotyle globiflora</i> Ruiz. & Pav.	>10000	857->10000	185	>10000	TA
AKT1196	c541	Homamo Toro	Apiaceae	<i>Niphogeton dissecta</i> J.F. Macbr.			606	>10000	OA/TA
AKT1217	c663	Bejuco colambo	Apocynaceae	<i>Mandevilla antennacea</i> K. Schum.			>10000	>10000	TA
AKT1221	c235	Bejuco negro	Apocynaceae	<i>Mandevilla cf. trianae</i> Woodson	>10000	>10000			TA
ACR34	c28	Veneno/Laurel	Apocynaceae	<i>Nerium oleander</i> L.	831	86-7988	71	62-2602	TA
KMM416	c341	Maichil	Apocynaceae	<i>Thevetia peruviana</i> K. Schum.	>10000	>10000	>10000	>10000	OA/OE
ACR192	c76	Cuncuno	Apocynaceae	<i>Vallesia glabra</i> (Cav.) Link.	3486	144->10000	1000	4->10000	OA

Co#	NCSS code	Common name	Family	Scientific name	L _{C50} µg/ml Aqueous	5-95% CI µg/ml	L _{C50} µg/ml Ethanol	5-95% CI µg/ml	Traditional use (O=oral, I=optical; Traditional preparation (A=aqueous, E=ethanolic))
KMM513, AKT1179	c39	Guayusa	Aquifoliaceae	<i>Ilex guayusa</i> Loes.	>10000	>10000	300	55-1624	OA
KMM486	c265	Patecina negra	Aracaceae	<i>Anthurium</i> sp.	>10000	>10000	>10000	>10000	OA
KMM445, ACR59	c343	Maqui Maqui	Araliaceae	<i>Oreopanax eriocephalus</i> Harms	>10000	>10000	0.00001	>10000	OA/TA
KMM563	c230	Bejuco del Aire	Aristolochiaceae	<i>Aristolochia</i> cf. <i>ruiziana</i> Duch.	>10000	>10000	8680	0.07->10000	OA
AKT1127	c148	Juan Alonzo/ Espina de Perro	Asteraceae	<i>Acanthoxanthium spinosum</i> (L.) Fourr.	263	32-2134	290	51-1640	OA
AKT1188	c123, c193	Milenrama	Asteraceae	<i>Achillea millefolium</i> L.	34	3-308	487	16-14543	OA/TA
ACR139	c474	Milenrama	Asteraceae	<i>Achillea millefolium</i> L.	>10000	>10000	34	3-311	OA/TA
AKT1199, ACR82	c240	Hierba (o Flor) de Ishpingo	Asteraceae	<i>Achyrocline alata</i> (Kunth) DC	>10000	>10000	>10000	>10000	TA
KMM547	c65	Espino de Hoja	Asteraceae	<i>Achyrocline</i> sp.	40154	>10000	79	23-384	TA
ACR111	c543	Miarco o Allamisa	Asteraceae	<i>Ambrosia peruviana</i> Willd.	>10000	>10000	14320	>10000	TA
AKT1099, KMM432	c146	Ajenco	Asteraceae	<i>Artemisia absinthium</i> L.	93	15-557	>10000	>10000	OA/TA
AKT1144, KMM42, ACR78	c257	Carqueja	Asteraceae	<i>Baccharis genistelloides</i> (Lam.) Pers.	1261	>10000	1	>10000	OA
KMM556	c94	Pega Pega	Asteraceae	<i>Baccharis glutinosa</i> Pers.	4395	113->10000	62	10-367	OA
AKT1126	c241	Cedron	Asteraceae	<i>Baccharis salicifolia</i> (Ruiz. & Pav.) Pers	>10000	>10000	1742	0.07->10000	TA
KMM562	c26	Chilca chica	Asteraceae	<i>Baccharis</i> sp	>10000	1432->10000	155	32-735	OA
KMM498	c204	Chilca	Asteraceae	<i>Baccharis</i> sp.	>10000	341->10000	0.4	>10000	OA
KMM427, KMM469, ACR177, ACR58, KMM552	c143	Amor seco	Asteraceae	<i>Bidens pilosa</i> L.	>10000	>10000	157	24-995	OA/TA
KMM446	c160	Arquitecta	Asteraceae	<i>Chersodoma deltoidea</i> M.O. Dillon & Sagast.	>10000	>10000	113	22-576	OA
ACR46	c317	Arquitecta	Asteraceae	<i>Chersodoma deltoidea</i> M.O. Dillon & Sagast.	0.1	0.1-100	>10000	>10000	OA
ACR113, KMM555	c350	Asma Chilca	Asteraceae	<i>Chromolaena</i> sp.	4017	49->10000	16	5-1824	OA
KMM434	c300	Huaman pinta	Asteraceae	<i>Chuquiraga spinosa</i> D. Don. ssp. <i>humana</i> C. Ezeurra	>10000	>10000	1.1	0.1->10000	OA
ACR85, KMM551	c128	Amaro/ Padre amaro	Asteraceae	<i>Chuquiraga weberbaueri</i> Tovar	>10000	>10000	0.25	61-2804	OA
KMM414	c286	Alcachofa	Asteraceae	<i>Cynara cardunculus</i> L.	>10000	>10000	21	>10000	OA

Co#	NCSS code	Common name	Family	Scientific name	LC ₅₀ µg/ml Aqueous	5-95% CI µg/ml	LC ₅₀ µg/ml Ethanol	5-95% CI µg/ml	Traditional use (O=oral, I=optical; Traditional preparation (A=aqueous, E=ethanolic))
ACR124, ACR153, KMM478, AKT1145, AKT1192	c42	Gato Simuro	Asteraceae	<i>Diplostephium sagasteguii</i> Cuatrec.	>10000	>10000	0.004	0.001->10000	OA/TA
KMM412	c329	Mata gusanos	Asteraceae	<i>Flaveria bidentis</i> (L.) Kuntze	>10000	>10000			OA
KMM393, ACR41	c188	Lechugilla	Asteraceae	<i>Gnaphalium americanum</i> Mill.	>10000	>10000	1311	>10000	OA
AKT1174, ACR63	c104	Palmilla	Asteraceae	<i>Loricaria cf. ferruginea</i> Wedd.	>10000	>10000	15	0.8-276	TA
KMM473	c304	Palma	Asteraceae	<i>Loricaria pauciflora</i> Cuatrec.	>10000	>10000	20	0.03-11551	TA
ACR182	c135	Palma Bendita	Asteraceae	<i>Loricaria</i> sp.	141	27-734	271	35-2054	TA
AKT1175	c226	Lavanda (la banda)	Asteraceae	<i>Matricaria frigidum</i> (Kunth) Kunth.	>10000	>10000	262	45-1505	OA/TA
ACR6	c68	Manzanilla	Asteraceae	<i>Matricaria recutita</i> L.	2970	24->10000	35	2-437	OA/TA
KMM519	c58	Caniahuanga	Asteraceae	<i>Munozia lyrata</i> (A. Gray) Rob. & Brett.	2286	47->10000	163	24-1091	OA/TA
ACR148	c348	Salvia blanca	Asteraceae	<i>Munozia</i> sp.	>10000	>10000	>10000	>10000	OA/TA
ACR150	c293	Hierba Aguila	Asteraceae	<i>Oxoseris odorata</i> (D. Don.) Hooker & Amott	>10000	>10000	1258	>10000	OA
KMM535, AKT1155, ACR54	c313	Escorcionera	Asteraceae	<i>Perezia multiflora</i> Less.	>10000	>10000	4575	>10000	OA
ACR29, KMM436, KMM540, ACR39	c158	Chicorial Hachecoria	Asteraceae	<i>Picrosia cf. longifolia</i> D. Don.	2215	21->10000	52	5-502	OA
KMM515, ACR49	c61	Hierba de Gallinazo	Asteraceae	<i>Porophyllum ruderale</i> Less.	>10000	>10000	239	42-1337	TA
AKT1168, ACR49	c54	Hiedra/ San Juan	Asteraceae	<i>Pseudognoxys cordifolia</i> (Cass.) Cabrera	>10000	>10000	200	31-1279	TA
ACR17, KMM436	c97	Encanchallacha	Asteraceae	<i>Schubertia pinnata</i> (Lam.) Kuntze	>10000	243->10000	93	16-512	OA
ACR44, ACR28, AKT1156, AKT1098	c60	Vida Vida/ Vira Vira	Asteraceae	<i>Senecio canescens</i> (Humb. & Bonpl.) Cuatrec.	1614	71->10000	365	0.5->10000	OA/TA
KMM449	c684	Huamanripa	Asteraceae	<i>Senecio</i> sp.	>10000	>10000	0.4	>10000	OA
KMM442	c17	Huamanripa (macho)	Asteraceae	<i>Senecio</i> sp.	>10000	>10000	252	46-1377	OA
KMM523	c575	Ornata blanco	Asteraceae	<i>Senecio</i> sp.	1989	66->10000	0.018	>10000	OA
KMM480	c19	Omamo	Asteraceae	<i>Senecio</i> sp.	>10000	>10000	255	39-1650	OA
AKT1158	c274	Omamo tigre	Asteraceae	<i>Senecio</i> sp.	>10000	>10000	20	0.3-1311	OA
ACR40, ACR197	c344	Yacon	Asteraceae	<i>Smallanthus sonchifolius</i> (Poepp. & Endl.) H. Rob.	>10000	>10000	>10000	>10000	OA

Co#	NCS code	Common name	Family	Scientific name	L _C 50 µg/ml Aqueous	5-95% CI µg/ml	L _C 50 µg/ml Ethanol	5-95% CI µg/ml	Traditional use (O=oral, I=optical; Traditional preparation (A=aqueous, E=ethanolic))
ACR35, KMM438	c179	Cerraja	Asteraceae	<i>Sonchus oleraceus</i> L.	>10000	>10000	262	41-1677	OA
KMM413, AKT1104	c70	Flor de Muerto	Asteraceae	<i>Tagetes erecta</i> L.	>10000	1419->10000	12	0.1-1268	OA/TA
KMM524, AKT1167	c44	Anis	Asteraceae	<i>Tagetes filifolia</i> Lag.	961	26->10000	>10000	>10000	OA
ACR14	c316	Manzanilla de campo	Asteraceae	<i>Tanacetum parthenium</i> (L.) Sch.Bip.	508	>10000	900	>10000	OA
KMM465	c294	Pajaro bobo	Asteraceae	<i>Tessaria integrifolia</i> Ruiz. & Pav.	>10000	>10000	5	0.08-302	OA
KMM497	c164, c201	Anasquero	Asteraceae	<i>Trixis cf. cactioides</i> D. Don.	2248	58->10000	271	51-1440	TA
KMM521	c138	Omamo	Asteraceae	<i>Werneria nubigena</i> Kunth	384	45-3290	26	3-193	TA
ACR151	c647	Chilca Dulce	Asteraceae	unidentified	>10000	>10000	2873	>10000	OA
KMM405	c107	Chunguis	Asteraceae	unidentified	>10000	>10000	69	12-386	OA
KMM522	c147	Hierba de Amor	Asteraceae	unidentified	>10000	248->10000	341	65-1787	OA
KMM490	c183	Miscichilca	Asteraceae	unidentified	>10000	>10000	0.1	>10000	OA
KMM538	c134	Olivo	Asteraceae	unidentified	3001	88->10000	448	71-2793	OA
KMM565	c99	Sigueme Sigueme	Asteraceae	unidentified	>10000	315->10000	218	16-1314	OA
KMM497	c201		Asteraceae	unidentified	>10000	>10000			OA
KMM474, ACR130, PKT1169	c119	Huanampo	Balanophoraceae	<i>Corymba crassa</i> Hook. f.	>10000	>10000	116	11-1152	OA
KMM573	c145	Palo Amarillo	Berberidaceae	<i>Berberis buxeronis</i> J.F. Macbr.	>10000	>10000	>10000	>10000	OA
ACR75, KMM498	c111	Avedul	Betulaceae	<i>Alnus acuminata</i> Kunth	64	10-384	90	15-519	OE/TA
ACR24	c176	Turuma	Bignoniaceae	<i>Crescentia cujete</i> L.	15	0.1->10000	0.74	0.01-7711	TA
KMM429	c66	Achiote	Bixaceae	<i>Bixa orellana</i> L.	>10000	>10000	8	0.03-2008	OA
ACR9	c71	Borraja	Boraginaceae	<i>Borago officinalis</i> L.	>10000	169->10000	1.4	0.02-81	OA
KMM489	c328	Ajo Sacha	Boraginaceae	<i>Cordia alliodora</i> (Ruiz. & Pav.) Oken.	4721	>10000	352	0.5-217030	OA/TA
AKT1114	c170	Overo	Boraginaceae	<i>Cordia lutea</i> Lam.	462	15->10000	108	17-668	OA
ACR57	c297	Alegan	Boraginaceae	<i>Heliotropium curassavicum</i> L.	>10000	>10000	1	>10000	TA
KMM406	c184	Flor de arena	Boraginaceae	<i>Tiquilia paronychioides</i> (Phil.) A. Richardson	>10000	>10000	>10000	>10000	OA
KMM451	c248	Bolsa pastor	Brassicaceae	<i>Capsella bursa-pastoris</i> (L.) Medik.	223	1->10000	82	14-472	OA

Co#	NCSS code	Common name	Family	Scientific name	L _{C50} µg/ml Aqueous	5-95% CI µg/ml	L _{C50} µg/ml Ethanol	5-95% CI µg/ml	Traditional use (O=oral, I=optical; Traditional preparation (A=aqueous, E=ethanolic))
AKT1163, ACR94	c86	Berros	Brassicaceae	<i>Rorippa nasturtium-aquaticum</i> (L.) Hayek	286	44-1859	49	8-287	OA
KMM520	c122	Hierba del carnero	Bromeliaceae	<i>Puya hamata</i> L.B. Sm	>10000	>10000	1.4	0.1-→10000	OA/TA
KMM520	c473		Bromeliaceae	<i>Puya</i> sp.			2	0.03-128	TA
ACR183	c32	Siempre viva	Bromeliaceae	<i>Tillandsia</i> cf. <i>cacticala</i> L.B. Sm.	>10000	>10000	1461	51-→10000	OA/TA
ACR132	c106	Palo Santo	Burseraceae	<i>Bursera graveolens</i> Triana & Planch.	>10000	>10000	139	4-→10000	OA/TA
ACR95, ACR287	c175	San Pedro	Cactaceae	<i>Echinopsis pachanoi</i> (Britton & Rose) H. Friedrich & G.D. Rowley	>10000	>10000	543	23-5149	OA/TA
AKT1220	c228	Tuna	Cactaceae	<i>Opuntia ficus-indica</i> (L.) Mill.	>10000	>10000	465	>10000	OA/TA
AKT1195	c202	Canillahuanga	Calceolariaceae	<i>Calceolaria percaespitosa</i> Wooden	>10000	>10000	924	91-9334	OA
ACR147	c57	Canchulaly	Campanulaceae	<i>Centropogon</i> sp.	>10000	>10000	40	5-304	TA
KMM545	c77	Trinoso	Campanulaceae	<i>Centropogon</i> sp.	181	26-1235	26	0.002-→10000	OA
KMM443	c130	Contolla	Campanulaceae	<i>Lobelia decurrens</i> Cav.	>10000	>10000	324	54-1922	OA
ACR194	c50	Alcaparilla	Campanulaceae	<i>Capparis crotonoides</i> Kunth	83	11-593	314	30-3213	OA/TA
KMM586	c221	Simura	Capparidaceae	<i>Capparis crotonoides</i> Kunth	1338	1-→10000	27	>10000	OA/TA
KMM554	c79	Zapote	Capparidaceae	<i>Capparis scabrida</i> Kunth	4805	80-→10000	76	9-601	OA
KMM390	c115	Madre de Selva	Caprifoliaceae	<i>Lonicera</i> cf. <i>japonica</i> Thunb.	455	48-4238	24	2-288	OA
KMM539	c23	Flor de Novia	Caprifoliaceae	<i>Sambucus peruviana</i> Kunth	>10000	74-→10000	124	19-778	OA/TA
KMM455, ACR66, AKT1103	c117	Sauco	Caprifoliaceae	<i>Sambucus peruviana</i> Kunth	168	15-5758	26	2-307	OA/TA
AKT1125	c243	Claveles	Caryophyllaceae	<i>Dianthus caryophyllus</i> L.	1000	>10000	71	>10000	OA/TA
ACR31	c46	Paico	Chenopodiaceae	<i>Chenopodium ambrosioides</i> L.	>1000	357-→10000	159	32-789	OA
KMM505	c108	Asancito	Chloranthaceae	<i>Hedyosmum racemosum</i> (Ruiz. & Pav.) G. Don.	148	20-1081	221	33-1477	OE/TA
KMM549	c198	Hierba del olvido	Clethraceae	<i>Clethra castaneifolia</i> Meiss.	980	49-→10000	1.4	0.1-→10000	TA
ACR109	c338	Olvido	Clethraceae	<i>Clethra castaneifolia</i> Meiss.	>10000	>10000	>10000	>10000	TA
KMM533, AKT1172	c41	Pachuli/Chinchango	Clusiaceae	<i>Hypericum laticifolium</i> Juss.	>10000	>10000	637	62-6491	TA
AKT1154, ACR152, KMM387	c152	Cintaura	Clusiaceae	<i>Hypericum silenoides</i> Juss.	545	>10000	45	7-271	OA
KMM568	c131	Mamey	Clusiaceae	<i>Mammea americana</i> L.	>10000	>10000	197	20-1869	OA
KMM579	c299	Mirra	Commiphoraceae	<i>Commiphora</i> sp.	750	>10000	23336	39-→10000	TA

Col#	NCSS code	Common name	Family	Scientific name	L.C ₅₀ µg/ml Aqueous	5-95% CI µg/ml	L.C ₅₀ µg/ml Ethanol	5-95% CI µg/ml	Traditional use (O=oral, I=optical; Traditional preparation (A=aqueous, E=ethanolic))
ACR98	c258	Pelo de duende	Convolvulaceae	<i>Cuscuta foetida</i> Kunth	13	>10000		>10000	OA/TA
ACR169, AKT1165, KMM537, AKT1113	c340	Pin Pin	Crassulaceae	<i>Echeveria peruviana</i> Meyen	>10000	>10000	424	>10000	OA/TA
ACR96	c262	Sicana	Cucurbitaceae	<i>Sicana odorifera</i> Naudin	>10000	>10000	488	73-3241	OA
AKT1181, KMM506	c156	Cipres	Cupressaceae	<i>Cupressus sempervirens</i> L.	467	51-4245	284	51-1576	OA/TA
KMM493, ACR126	c102	Hierba del Carpintero	Cyperaceae	<i>Oreobolus goeppingeri</i> Suess.	597	18->10000	55	7-422	TA
AKT1184	c98	Pica flor	Cyperaceae	<i>Oreobolus goeppingeri</i> Suess.	>10000	357->10000	290	33-2545	TA
KMM4462	c289	Papa de las Buenas Tardes	Dioscoreaceae	<i>Dioscorea</i> sp.	>10000	>10000	>10000	>10000	OA
KMM583	c668	Papa cimentona	Dioscoreaceae	<i>Dioscorea tambillensis</i> Kunth			74	0.05->10000	OA
KMM503	c124	Papa madre	Dioscoreaceae	<i>Dioscorea trifida</i> L.f.	492	43-5590	0.018	>10000	OA/TA
KMM503	c475		Dioscoreaceae	<i>Dioscorea trifida</i> L.f.			361	39-3318	OA/TA
ACR158, KMM512	c126	Ambarina	Dipsacaceae	<i>Scabiosa atropurpurea</i> L.	>10000	4->10000	1.1	0.1->10000	OA
ACR158, KMM512	c477		Dipsacaceae	<i>Scabiosa atropurpurea</i> L.			192	21-1753	OA
KMM511, AKT1159, AKT1222	c29	Diego Lopez	Ephedraceae	<i>Ephedra americana</i> Endl.	689	67-7056	8	0.4-197	OA/TA
ACR1	c3, c140	Cola de caballo	Equisetaceae	<i>Equisetum bogotense</i> Kunth	>10000	>10000	782	95-6415	OA/TA
ACR1	c140		Equisetaceae	<i>Equisetum bogotense</i> Kunth	>10000	3130->10000			OA/TA
AKT1109, KMM527	c255	Purunrosa	Ericaceae	<i>Bejaria aestuans</i> L.	17	1->10000	3.5	0.004->10000	OA
KMM472	c690	Mullaca	Ericaceae	<i>Gaultheria erecta</i> Vent			162	>10000	OA
AKT1203	c269	Maique	Ericaceae	<i>Gaultheria reticulata</i> Kunth	>10000	>10000	628	>10000	OA/TA
ACR151	c200	Chilca Dulce	Euphorbiaceae	<i>Acalypha mandonii</i> Müll.Arg.	>10000	>10000			OA
KMM546	c30	Sangre de grado	Euphorbiaceae	<i>Croton lechleri</i> Muell.-Arg.	>10000	74->10000	152	13-1673	OA/TA
KMM487, ACR122	c87	Pinones	Euphorbiaceae	<i>Jatropha macrantha</i> L.	410	39-4209	93	11-732	OA
AKT1230	c278, c327	Pinones	Euphorbiaceae	<i>Jatropha macrantha</i> L.	2872	1->10000	34	>10000	OA
KMM517, AKT1151	c144	Chanca Piedra	Euphorbiaceae	<i>Phyllanthus niruri</i> L.	>10000	>10000	119	20-679	OA
KMM581	c191	Pai pai	Fabaceae	<i>Caesalpinia paipai</i> R. & P.	106	16-701	0.15	0.01->10000	TA
ACR111	c82	Taya or Tara	Fabaceae	<i>Caesalpinia spinosa</i> (Molina) Kuntze	168	29-956	0.1	0.1->10000	OA/TA
ACR10	c280	Chibato	Fabaceae	<i>Cajanus cajan</i> (L.) Millesp.	>10000	>10000	>10000	>10000	TA

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ACR88	c261	Cana fistula	Fabaceae	<i>Cassia fistula</i> L.	24155	1-→10000	243	33-1750	OA
AKT1162, KMM392, ACR201	c151	Pata de Pero, Marrayupa	Fabaceae	<i>Desmodium colliculatum</i> (Kunth.) DC	360	7-→10000	15088	195-→10000	OA/TA
ACR102	c210	Chochos	Fabaceae	<i>Lupinus mutabilis</i> Sweet	4.74	0.1-→10000	1878	>10000	OA
KMM463, ACR51	c311	Trebol de agua	Fabaceae	<i>Medicago sativa</i> L.	>10000	>10000	965	26-34747	OA
KMM459	c277	Fenogreco	Fabaceae	<i>Melilotus albus</i> Medik.	>10000	>10000	487	16-14543	OA
ACR79	c127	Tapa Tapa	Fabaceae	<i>Mimosa albida</i> Humb. & Bonpl.	>10000	>10000	965	26-34747	OA
KMM560, AKT1118, ACR190, ACR79	c266	Tutapure	Fabaceae	<i>Mimosa albida</i> Humb. & Bonpl.	>10000	>10000	5385	>10000	OA
ACR196	c306	Quina	Fabaceae	<i>Myroxylon balsamum</i> (L.) Harms	>10000	>10000	8	0.1-→10000	OE/TE
AKT1223	c602	Quina Quina	Fabaceae	<i>Myroxylon balsamum</i> (L.) Harms	>10000	>10000	927	2-→10000	OE/TE
ACR164	c700	Quina Quina	Fabaceae	<i>Myroxylon balsamum</i> (L.) Harms	>10000	>10000	0.001	>10000	OE/TE
ACR203	c342	Algarrobina	Fabaceae	<i>Prosopis pallida</i> (Humb. & Bonpl. ex Willd) Kunth	>10000	>10000	>10000	>10000	OA/TA
KMM470	c260	Sen	Fabaceae	<i>Senna monilifera</i> H.S. Irwin & Barnaby	>10000	>10000	69	>10000	OA
KMM407	c129	Retama	Fabaceae	<i>Spartium junceum</i> L.	616	70-5357	164	23-1155	OA/TA
ACR108, KMM407	c237	Retamia	Fabaceae	<i>Spartium junceum</i> L.	>10000	>10000	144	64-→10000	OA/TA
AKT1194, KMM577	c264	Trebol	Fabaceae	<i>Trifolium repens</i> L.	>10000	>10000			OA
KMM526, ACR30, AKT1207, AKT1147, ACR556	c22	Corpusway, Amargon	Gentianaceae	<i>Gentianaella bicolor</i> (Wedd.) J.S. Pringle	472	55-4015	42	46-1292	OA
KMM403	c711	Angamacha	Gentianaceae	<i>Gentianaella bruneotricha</i> (Gilg.) J.S. Pringle			0.2	>10000	OA
ACR20, KMM422	c173	Genciana	Gentianaceae	<i>Gentianaella crassicaulis</i> J.S. Pringle	143	19-1069	419	57-3048	OA
KMM576, ACR155	c308	Genciana	Gentianaceae	<i>Gentianaella dianthoides</i> (Kunth) Fabris ex J.S. Pringle	>10000	>10000	0.08	0.0009-8	OA
AKT1164, KMM529, ACR55	c310	Sumaran	Gentianaceae	<i>Gentianaella graminea</i> (Kunth) Fabris	2915	35-→10000	1066	0.4-→10000	OA
ACR92	c691	Horma de amarilla	Gentianaceae	<i>Gentianaella</i> sp.			6	>10000	OA
AKT1171, ACR142	c139	Anijilla	Geraniaceae	<i>Erodium cicutarium</i> (L.) L'Her.	1075	5-→10000	127	26-623	OA
KMM578	c227	Cachujillo	Geraniaceae	<i>Erodium cicutarium</i> (L.) L'Her.	4.8	1-→10000	0.06	>10000	OA

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KMM400	c220	Pasuchaca	Geraniaceae	<i>Geranium sessiliflorum</i> Cavamilles	1472	95->10000	55	8-679	OA
AKT1208	c281	Anis estrella	Iliciaceae	<i>Illicium verum</i> Hook. f.	3.6	>10000	323	61-1697	OA
AKT1100, ACR45	c252	Hierba de la justicia	Iridaceae	<i>Hesperoxiphion niveum</i> (Rav.) Rav.	>10000	>10000	91	>10000	OA
AKT1111, KMM435, ACR71	c159	Nogal	Juglandaceae	<i>Juglans neotropica</i> Diels	4734	152->10000	213	35-1266	OA/TA
ACR48	c549, c606	Ratania	Krameriaceae	<i>Krameria lappacea</i> (Dombey) H.M. Burdet & B.B. Simpson			1507	>10000	OA
ACR97	c141	Panizara	Lamiaceae	<i>Clinopodium pulchellum</i> (Kunth) Govaerts	7745	5->10000	211	39-1137	OA
ACR18	c142	Albaca serrana	Lamiaceae	<i>Hyptis sidifolia</i> (L'Her.) Briq.	3574	23->10000	151	28-816	OA
ACR69	c199	Pedorera	Lamiaceae	<i>Hyptis sidifolia</i> (L'Her.) Briq.	>10000	357->10000	>10000	>10000	OA
KMM452, ACR33	c292	Cordon de Muerto	Lamiaceae	<i>Marrubium vulgare</i> L.	>10000	>10000	536	>10000	TA
ACR4	c229	Toronjil	Lamiaceae	<i>Melissa officinalis</i> L.	>10000	>10000	1.7	0.001->10000	OA/TA
ACR68	c5	Poleo	Lamiaceae	<i>Mentha piperita</i> Stokes	1439	20->10000	322	18-5536	OA
KMM453, AKT1101, AKT1166	c64	Menta	Lamiaceae	<i>Mentha spicata</i> L.	>10000	>10000	345	49-2382	OA/TA
AKT1142, KMM417, KMM456, ACR7	c12	Chancas de muerto	Lamiaceae	<i>Minthostachys mollis</i> Griseb.	>10000	586->10000	142	28-723	OA
KMM437, KMM428, ACR32	c16	Albaca	Lamiaceae	<i>Ocimum basilicum</i> L.	8483	67->10000	274	51-1465	OA/TE
ACR24, KMM71	c307	Mejorana	Lamiaceae	<i>Origanum cajorana</i> L.	>10000	>10000	1000	>10000	OA
KMM509	c216	Oregano	Lamiaceae	<i>Origanum vulgare</i> L.	309	33-2863	0.14	0.1-24811	OA
KMM419, AKT1134	c133	Culen	Lamiaceae	<i>Otholobium glandulosum</i> (L.) Grimes	>10000	172->10000	271	35-2054	OA
ACR67	c101	Culén	Lamiaceae	<i>Otholobium cexicanum</i> (L.f.) Grimes	>10000	278->10000	743	77-7163	OA
ACR16, AKT1129	c116	Romero	Lamiaceae	<i>Rosmarinus officinalis</i> L.	5357	104->10000	36	3-364	OA/TA
ACR184	c10	Alamo Silvestre	Lamiaceae	<i>Salvia</i> sp.	>10000	42->10000	>10000	>10000	OA
KMM572	c291	Hierba de los siete vientos	Lamiaceae	<i>Salvia</i> sp.	>10000	>10000	0.006	>10000	OA
AKT1160	c215	Hierba del Aire	Lamiaceae	<i>Salvia</i> sp.	>10000	>10000	4	0.06-273	OA/TE
KMM567	c336	Paja Amargoza	Lamiaceae	<i>Salvia</i> sp.	>10000	>10000	7122	132->10000	OA
ACR115	c239	Paja del Aire	Lamiaceae	<i>Salvia</i> sp.	1000	>10000	153	16-1428	OA

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KMM550	c335	Unquia Real	Lamiaceae	<i>Salvia</i> sp.	>10000	>10000	0.58	0.1-860	OA
KMM543	c59	Panizara	Lamiaceae	<i>Satureja pulchella</i> (Kunth.) Briq.	>10000	287->10000	144	30-693	OA
KMM397	c171	Romerillo	Lamiaceae	<i>Satureja sericea</i> (C. Presl. & Benth.) Briq.	59	4-794	382	54-2692	OA
ACR100	c55	Romerillo	Lamiaceae	<i>Satureja sericea</i> (C. Presl. & Benth.) Briq.	>10000	>10000	80	13-461	OA
ACR178	c657	Poleo Gentil	Lamiaceae	<i>Scutellaria cf. scutellarioides</i> (Kunth) Harley			>10000	>10000	TA
KMM575	c218	Canela	Lauraceae	<i>Cinnamomum verum</i> J. Presl.	194	1->10000	132	13-2773	OA/TA
AKT1120, KMM444	c155	Palta	Lauraceae	<i>Persea americana</i> Mill.	>10000	>10000	121	24-618	OA
ACR87	c322	Pelo de Pierda	Lichen	<i>Siphula</i> sp.	>10000	>10000	12	0.9-158	OA
AKT1107	c319	Aloe	Liliaceae	<i>Aloe vera</i>	>10000	>10000	>10000	>10000	OE
ACR157	c189	Contolla	Lobeliaceae	<i>Lobelia decurrens</i> Cav.	>10000	247->10000	351	0.01->10000	OA
AKT1131	c238	Flor Blanca	Loganiaceae	<i>Buddleja utilis</i> Kraenzl.	>10000	>10000			OA
AKT1170	c69	Condor	Lycopodiaceae	<i>Huperzia</i> sp.	>10000	>10000	11	0.01-7493	TA
KMM541	c24	Condor	Lycopodiaceae	<i>Huperzia</i> sp.	422	18-9770	201	34-1190	TA
KMM477	c219	Condor crespo	Lycopodiaceae	<i>Huperzia</i> sp.	>10000	>10000	>10000	>10000	TA
KMM479	c35	Condor Misha	Lycopodiaceae	<i>Huperzia</i> sp.	4524	>10000	157	17-1429	TA
KMM482, AKT1112	c231	Condor Purga	Lycopodiaceae	<i>Huperzia</i> sp.	4979	71->10000	1.3	>10000	TA
KMM391	c165	Corontilla	Lycopodiaceae	<i>Huperzia</i> sp.	543	13->10000	278	46-1650	TA
AKT1183, AKT1197	c320	Enredadera	Lycopodiaceae	<i>Huperzia</i> sp.	>10000	>10000	85	0.5->10000	TA
KMM483	c196	Trencilla blanca	Lycopodiaceae	<i>Huperzia</i> sp.	>10000	>10000	0.04	0.04->10000	TA
AKT1206	c85	Guamingo	Lycopodiaceae	<i>Lycopodium</i> sp.	>10000	>10000	49	8-287	TA
AKT1198, AKT1191	c302	Trencilla verde	Lycopodiaceae	<i>Lycopodium thuyoides</i> Humb. & Bonpl. ex Willd.	>10000	>10000	0.01	0.01-4.5	TA
KMM448	c72	Hierba del Toro	Lythraceae	<i>Cuphea</i> sp.	1464	82->10000	15	0.2-1246	OA/TA
AKT1102	c100	Hierba del Toro	Lythraceae	<i>Cuphea strigulosa</i> Kunth	>10000	>10000	1.4	0.1-1997	OA/TA
ACR135	c84	Ayahuasca	Malpighiaceae	<i>Banisteriopsis caapi</i> (Spruce ex Griseb.) Morton	1099	70->10000	>10000	>10000	OA
ACR26	c225	Malva de Olor	Malvaceae	<i>Malva</i> sp.	>10000	>10000	0.0002	>10000	OA/TA

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AKT1201	c282	Malva Real	Malvaceae	<i>Malva</i> sp.	>10000	>10000	118	15-7331	OA/TA
AKT1200	c337	Malva rosa	Malvaceae	<i>Malva</i> sp.	1.8	1->10000	0.4	>10000	OA/TA
ACR8	c56	Malva Blanca Alta	Malvaceae	<i>Malva sylvestris</i> L.	>10000	>10000	6	0.2-157	OA/TA
ACR185	c683	Buenas Horas	Malvaceae	<i>Urena</i> cf. <i>lobata</i> L.			11	>10000	OA
ACR140, AKT189	c137	Zarcilleja	Melastomataceae	<i>Brachyotum naudinii</i> Triana	0.59	0.1-2136	202	26-1109	OA
AKT1204	c62	Mococho	Melastomataceae	<i>Miconia salicifolia</i> (Bonpl. ex Naud.) Naud.	188	31-1148	53	2-1443	OA
KMM544	c251	Porontillo	Melastomataceae	<i>Miconia salicifolia</i> (Bonpl. ex Naud.) Naud.	1	1->10000	2309	>10000	OA
ACR136	c249	Abuta	Menispermaceae	<i>Abuta grandifolia</i> (Mart.) Sandwith.	>10000	>10000	317	35-2850	OA
ACR37, ACR99, AKT1132	c177	Boldo (Chilean)	Monimiaceae	<i>Peumus boldus</i> Molina	34163	0.5->10000	43	>10000	OA
KMM570	c31	Palo Sangre	Moraceae	<i>Brosimum rubescens</i> Taub.	2605	119->10000	557	63-4532	OA
ACR73, AKT128	c287	Higo	Moraceae	<i>Ficus carica</i> L.	>10000	>10000	1233	0.1->10000	OE
KMM454	c197	Ciotrodora	Myrtaceae	<i>Eucalyptus citriodora</i> Hook.	>10000	>10000	1114	>10000	OA
KMM408, AKT1110, ACR74	c136	Eucalypto	Myrtaceae	<i>Eucalyptus globulus</i> Labill	29	1-701	240	30-1895	OA/TA
ACR19	c73	Arrayn	Myrtaceae	<i>Eugenia obtusifolia</i> Cambess.	3755	2->10000	47	4-503	OA
ACR180	c267	Limoncillo	Myrtaceae	<i>Eugenia obtusifolia</i> Cambess.	1000	>10000	>10000	>10000	OA
ACR76	c43	Rumilanche	Myrtaceae	<i>Eugenia obtusifolia</i> Cambess.	174	19-1542	189	34-1032	OA
AKT1143	c162	Rumilanche	Myrtaceae	<i>Eugenia obtusifolia</i> Cambess.	78	6-896	164	23-1153	OA
KMM399	c14	Guanabana	Myrtaceae	<i>Psidium guajava</i> L.	1578	66->10000	195	16-2302	OA
ACR207	c271	Pial	Myrtaceae	<i>Scutia spicata</i> (Humb. & Bonpl. ex Willd.) Weberb.	>10000	>10000	>10000	>10000	TA
ACR188	c37	Clavo de olor	Myrtaceae	<i>Syzygium aromaticum</i> (L.) Merr. & L.M. Perry	254	44-1471	0.08	0.0009-8	OA/TA
ACR174	c290	Poma Rosa	Myrtaceae	<i>Syzygium jambos</i> (L.) Alston	12913	>10000			OA
KMM507	c109	Chehuhuasi	Oleaceae	<i>Heisteria acuminata</i> (Humb. & Bonpl.) Engl.	4479	151-132688	261	41-1661	OA/TA
AKT1211	c247	Jasmin	Oleaceae	<i>Jasminum</i> sp.	1000	>10000	0.88	0.006-130	OA
AKT1187	c13	Anasquero	Onagraceae	<i>Fuchsia</i> sp.	>10000	>10000	123	21-697	TA
ACR144, AKT1185	c276, c349	Hierba esperanza	Orchidaceae	<i>Aa paleacea</i> (Kunth) Rehb.f.	>10000	>10000	>10000	>10000	OA

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KMM530	c323	Hierba sola	Orchidaceae	<i>Aa paleacea</i> (Kunth) Rehb.f.	>10000	>10000	0.001	>10000	OA
ACR165	c550	Espadilla	Orchidaceae	<i>Epidendrum</i> sp.			35	>10000	OA
AKT1177	c305	Hierba de la Espada	Orchidaceae	<i>Epidendrum</i> sp.	3.5	0.1->10000			OA
KMM484	c190	Lancilla	Orchidaceae	<i>Epidendrum</i> sp.	3874	46-332446	164	29-919	OA
KMM492	c206	Hierba del Olor	Orchidaceae	<i>Stelis</i> sp.	>10000	>10000			TA
KMM433, AKT1133, ACR61	c168	Cardo Santo	Papavaceae	<i>Argemone mexicana</i> L.	101	6-1549	698	93-5250	OA
KMM420, AKT1112	c169	Hoja de granadilla	Passifloraceae	<i>Passiflora ligularis</i> A. Juss.	697	2-185545	299	42-2116	OA
KMM510	c88	Norgo	Passifloraceae	<i>Passiflora punctata</i> L.	22832	210->10000	112	18-691	OA
AKT1122	c149	Hierba del Partero	Passifloraceae	<i>Passiflora</i> sp.	601	72-5015	152	27-834	OA
ACR52	c125	Mocura	Phytolaccaceae	<i>Petiveria alliacea</i> L.	126	24-642	0.67	>10000	TA
KMM447, AKT1115	c132	Mocura	Phytolaccaceae	<i>Petiveria alliacea</i> L.	685	73-6430	1126	34-36468	TA
ACR52	c476	Ailambo	Phytolaccaceae	<i>Petiveria alliacea</i> L.			159	19-1324	TA
KMM457, AKT1180	c18	Congona	Phytolaccaceae	<i>Phytolacca bogotensis</i> Kunth	>10000	>10000	53	7-382	TA
AKT1148, KMM534	c121	Congona	Piperaceae	<i>Peperomia inaequalifolia</i> Ruiz. & Pav.	>10000	605->10000	1076	92-12469	OA/TA
AKT1148, KMM534	c579	Congona	Piperaceae	<i>Peperomia inaequalifolia</i> Ruiz. & Pav.			0.25	>10000	OA/TA
KMM532	c727	Piri Piri	Piperaceae	<i>Peperomia quadrifolia</i> Miq.			301	8-11047	TA
AKT1190	c621	Congonilla	Piperaceae	<i>Peperomia</i> sp.			12	>10000	OA
ACR21	c658	Lancetillo	Piperaceae	<i>Peperomia</i> sp.			242	15-3797	OA
AKT1148, KMM534	c472	Matico (sierra)	Piperaceae	<i>Peperomia</i> sp.			39	4-395	OA
ACR15	c120	Matico (sierra)	Piperaceae	<i>Piper acutifolium</i> Ruiz. & Pav.	>10000	>10000	32	2-411	OA
ACR12, AKT1150	c67	Matico	Piperaceae	<i>Piper aduncum</i> L.	16070	114->10000	164	17-799	OA/TA
KMM411	c332	Llanten	Plantaginaceae	<i>Plantago major</i> L.	>10000	>10000	2.75	0.1-16904	OA/TA
KMM411	c565	Paja blanca	Plantaginaceae	<i>Plantago major</i> L.			537	55-5194	OA/TA
AKT1182	c223	Carrizo	Plantaginaceae	<i>Plantago sericea</i> Ruiz. & Pav.	500	>10000	9	>10000	OA
KMM389	c114	Hierba Luisa	Poaceae	<i>Arundo donax</i> L.	>10000	>10000	39	5-269	TA
ACR5	c48	Gramadulce	Poaceae	<i>Cymbopogon citratus</i> (DC.) Stapf	73976	235->10000	58	2-1778	OA
KMM450, ACR62	c110	Gramadulce	Poaceae	<i>Cynodon dactylon</i> (L.) Pers.	84	9-740	81	13-476	OA

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AKT1096	c318	Gramadulce	Poaceae	<i>Distichlis spicata</i> (L.) Greene	56	1→10000	51	4-560	OA
ACR47	c346	Carrizo	Poaceae	<i>Gynerium sagittatum</i> (Aubl.) P. Beauv.	2474	1→10000	>10000	>10000	OA
KMM502, AKT1061	c596	Cuña Cuña	Poaceae	<i>Saccharum officinarum</i> L.	>10000	>10000	9	0.3-247	OA/TA
KMM415	c233	Barra de oro	Poaceae	unidentified	>10000	>10000	12967	138→10000	OA
ACR86	c649	Canuta o Cando	Polemoniaceae	<i>Cantua buxifolia</i> Juss. ex Lam.	>10000	>10000	1.5	0.1-50755	TA
AKT1161, KMM495	c172	Adormidora	Polemoniaceae	<i>Cantua quercifolia</i> Juss.	374	9-15319	147	25-857	OA/TA
ACR80	c279	Pica Pica	Polygonaceae	<i>Polygonum hydropiperoides</i> Michaux	>10000	>10000	2.35	>10000	OA
KMM496	c224	Mala Hierba	Polygonaceae	<i>Rumex crispus</i> L.	>10000	>10000	45	>10000	OA/TA
AKT1137	c11	Calaguala	Polypodiaceae	<i>Polypodium crassifolium</i> L.	5255	106→10000	129	20-839	OA
ACR176, KMM514, AKT1173	c232	Chucharilla	Proteaceae	<i>Oreocallis grandiflora</i> (Lam.) R. Br.	>10000	>10000	>10000	>10000	OA/TA
KMM460	c187	Doradillo	Pteridaceae	<i>Argyrochosma nivea</i> (Poir.) Windham	131	0.1→10000	208	37-1171	OA
ACR145	c7	Cuti Blanco	Pteridaceae	<i>Cheilanthes pruinata</i> Kaulf.	>1000	349→10000	383	59-2470	OA
KMM461	c245	Cuty Cuty	Pteridaceae	<i>Cheilanthes pruinata</i> Kaulf.	7064	1→10000	1	0.1-39676	OA
AKT1108	c81	Cuty Cuty	Pteridaceae	<i>Cheilanthes pruinata</i> Kaulf.	>10000	>10000	566	69-4610	OA
ACR112, AKT1215	c45, c47	Baston del Inca	Pteridaceae	<i>Jamesonia alstonii</i> A.F. Tryon	>10000	>10000	41	0.01-112079	TA
KMM458	c321	Doradilla	Pteridaceae	<i>Notholaena sulphurea</i> (Cav.) L. Sm.	2564	>10000	12	>10000	OA
KMM464	c203, c214	Contra Hierba	Pteridaceae	unidentified	>10000	>10000	0.003	>10000	OA
AKT1119, KMM410	c51	Pacra/ Flor de huamanripa	Ranunculaceae	<i>Laccopetalum giganteum</i> (Wedd.) Ulbrich	>10000	>10000	51	5-484	OA/TE
ACR56	c4	Membrillo	Rosaceae	<i>Cydonia oblonga</i> Miller	>10000	>10000	42	5-332	OA
ACR146	c284	China Linda	Rosaceae	<i>Margyricarpus spinatus</i> (Lam.) Kuntze	>10000	>10000	407	0.01→10000	OA
ACR3	c164	Quinal	Rosaceae	<i>Polytepis racemosa</i> Ruiz. & Pav.	127	>10000	112	20-605	OA/TA
ACR172	c9	Capuli	Rosaceae	<i>Prunus serotina</i> Ehrh.	731	21-5289	81	14-465	TE
ACR70, AKT1155	c181	Zarzamora	Rosaceae	<i>Rubus robustus</i> C. Presl.	>10000	387→10000	2	0.001→10000	OA/TA
ACR23	c296	Pimpinela	Rosaceae	<i>Sanguisorba minor</i> Scop.	>10000	>10000	11	0.01→10000	OA/TA
AKT1214	c650	Ornamo Leon	Rosaceae	unidentified	>10000	>10000	241	0.01→10000	OA

Co#	NCSS code	Common name	Family	Scientific name	L.C ₅₀ µg/ml Aqueous	5–95% CI µg/ml	L.C ₅₀ µg/ml Ethanol	5–95% CI µg/ml	Traditional use (O=oral, I=optical; Traditional preparation (A=aqueous, E=ethanolic))
ACR123, KMM525	c211	Cascarilla	Rubiaceae	<i>Cinchona officinalis</i> L.	0.5	0.1–250	950	>10000	OE
ACR160	c8	Noni	Rubiaceae	<i>Morinda citrifolia</i> L.	142	24–842	156	30–809	OA
AKT1218, ACR198	c295	Uña de Gato	Rubiaceae	<i>Uncaria tomentosa</i> (Willd. ex Roem & Schult.) DC.	>10000	>10000	644	4–>10000	OA/TA
KMM425	c63	Lima	Rutaceae	<i>Citrus limetta</i> Risso	>10000	224–>10000	198	22–1776	OA/TA
KMM424	c15	Limon	Rutaceae	<i>Citrus limon</i> (L.) Burm. f.	4111	131–>10000	483	63–3675	OA/TA
AKT1097, AKT1105, KMM430	c157	Ruda Seca	Rutaceae	<i>Ruta graveolens</i> L.	>10000	>10000	73	12–447	OA/TA
ACR42, AKT1706	c212	Sauce	Salicaceae	<i>Salix chilensis</i> Molina	>10000	332–>10000	1	>10000	OA/TA
KMM574	c27	Te de Judío	Scrophulariaceae	<i>Capriaria peruviana</i> Benthham	>10000	1075–>10000	7012	127–>10000	OA
ACR64	c678	Macacha	Scrophulariaceae	<i>Galvezia fruticosa</i> J. Gmelin	>10000	>10000	9848	142–>10000	OA/TE
KMM440	c207	Chicricoma	Scrophulariaceae	unidentified	>10000	>10000	1.3	>10000	OA
KMM516	c185	Palo china	Smilacaceae	<i>Smilax kaulthii</i> Killip & Morton	>10000	>10000	31	0.1–>10000	OA
KMM564	c312	Misha Blanca	Solanaceae	<i>Brugmansia candida</i> Pers.	3187	141–>10000	1.8	>10000	OA/TA
KMM528	c288	Misha	Solanaceae	<i>Brugmansia sanguinea</i> (Ruiz. & Pav.) D. Don	>10000	>10000	0.2	0.01–>10000	OA/TA
ACR90	c36	Misha	Solanaceae	<i>Brugmansia</i> sp.	>10000	>10000	67	9–476	OA/TA
AKT1116	c671	Floripondio (Flori pondio)	Solanaceae	<i>Brugmansia suaveolens</i> (Willd.) Bercht. & Presl	>10000	>10000	106	>10000	OA/TA
ACR36	c103	Hierba Santa (Sierra)	Solanaceae	<i>Cestrum auriculatum</i> L'Her.	1006	8–>10000	24	0.6–978	OA/TA
ACR83	c681	Hierba Santa	Solanaceae	<i>Cestrum humboldtii</i> Francey	>10000	>10000	28	>10000	OA/TA
AKT1121	c75	Agrosejo/ Cuncuno	Solanaceae	<i>Cestrum</i> sp.	>10000	210–>10000	80	5–1192	OA/TA
KMM426	c33	Hierba Santa	Solanaceae	<i>Cestrum</i> sp.	>10000	372–>10000	1.4	0.0045–435	OA/TA
KMM441, KMM582	c192	Floripondio	Solanaceae	<i>Datura ferox</i> L.	8677	59–>10000	234	15–8363	OA
KMM557	c209	Chilca Macho	Solanaceae	<i>Nicotiana tabacum</i> L.	7.5	0.1–>10000	>10000	>10000	OA/TA
KMM388, ACR53	c118	Tabaco	Solanaceae	<i>Nicotiana tabacum</i> L.	178	31–1005	39	4–337	OA/TA
AKT1124	c331	Hierba de Senorita	Solanaceae	<i>Nolana cf. humifusa</i> (Gouan) I.M. Johnston	>10000	>10000	>10000	>10000	OA
ACR99, ACR37	c333	Hierba Moro	Solanaceae	<i>Solanum americanum</i> Mill.	0.3	0.3–>10000	310	16–5788	OA/TA
AKT1138	c640	Torito	Solanaceae	<i>Solanum cammosum</i> L.	>10000	>10000	>10000	>10000	OA/TA
KMM561	c25	Palo Huaco	Ulmaceae	<i>Celtis toxensis</i> C.C. Berg	5388	58–>10000	508	70–3647	OA

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KMM402, ACR72	c92	Ortiga	Urticaceae	<i>Urtica magellanica</i> Juss. ex Poir.	>10000	>10000	2281	15→10000	OA/TA
ACR199	c234	Chin Chin	Urticaceae	<i>Urtica urens</i> L.	>10000	>10000	2494	0.2→10000	OA/TA
KMM491	c398	Boton de oro	Valerianaceae	<i>Belonanthus</i> cf.			>10000	>10000	OA/TA
KMM481, AKT1205	c186	Estrella	Valerianaceae	<i>Phyllactis rigida</i> (Humb. & Bonpl.) Pers.	201	0.1→10000	3	0.1→10000	OA/TA
AKT1117	c250	Valeriana estrella	Valerianaceae	<i>Phyllactis rigida</i> (Humb. & Bonpl.) Pers.	1	1→10000	1265	>10000	OA/TA
ACR181	c34	Fortuna	Valerianaceae	<i>Valeriana</i> cf. <i>bonplandiana</i> Wedd.	109	12-969	112	17-703	TA
AKT1140, ACR120	c324	Hornamo del Caballo	Valerianaceae	<i>Valeriana plantaginea</i> Kunth cf.	>10000	>10000	168	25-1122	OA/TA
AKT1141	c666	Omamo	Valerianaceae	<i>Valeriana</i> sp.			64	>10000	OA/TA
AKT1213	c253	Valeriana	Valerianaceae	<i>Valeriana</i> sp.	>10000	>10000	54	0.2-10591	OA/TA
KMM394	c244	Valeriana Delgada	Valerianaceae	<i>Valeriana</i> sp.	>10000	>10000	40	3-408	OA/TA
KMM396	c194	Valeriana gruesa	Valerianaceae	<i>Valeriana</i> sp.	>10000	260→10000	0.8	>10000	OA/TA
ACR43	c113	Santa Maria	Verbenaceae	<i>Aloysia scorodonioides</i> (Kunth) Chamisso	>10000	>10000	0.6	0.006-59	OA/TA
ACR159	c178	Cedron	Verbenaceae	<i>Aloysia triphylla</i> Royle	390	54-2818	1897	>10000	OA/TA
KMM398	c283	Cedron	Verbenaceae	<i>Aloysia triphylla</i> Royle	>10000	>10000	0.01	>10000	OA/TA
ACR50, AKT1223	c112	Pacha Rosa	Verbenaceae	<i>Lantana scabiosaeflora</i> Kunth	>10000	>10000	92	13-650	OA
AKT1202	c205	Hierba del Hombre	Verbenaceae	<i>Lantana</i> sp.	>10000	>10000	>10000	>10000	OA
ACR25	c167	Salvia Real	Verbenaceae	<i>Lantana</i> sp.	290	36-2293	23	2-256	OA
ACR13	c3	Verbena	Verbenaceae	<i>Verbena littoralis</i> Kunth	>10000	>10000	120	21-678	OA/TA
ACR154	c78	Sabadilla	Verbenaceae	<i>Verbena</i> sp.	2750	87→10000	34	2-390	OA
AKT1210	c153	Hierba de Susto	Verbenaceae	<i>Viola</i> sp.	>10000	>10000	22	2-208	OA
KMM423	c345	Violeta	Violaceae	<i>Viola</i> sp.	>10000	>10000	410	69-2440	OA
ACR195, AKT1203	c174	Cinta de Novia	Violaceae	<i>Viola tricolor</i> L.	>10000	>10000	>10000	>10000	OA
ACR27	c330	Pensamiento	Violaceae	<i>Viola tricolor</i> L.	>10000	>10000	728	19→10000	OA
ACR189	c325	Suelda con suelda	Viscaceae	<i>Phoradendron</i> sp.	>10000	>10000	11	>10000	OA
KMM485	c20	Chimipampana Blanca	Zingiberaceae	unidentified	>10000	0.62→10000	234	32-1679	OA
KMM518	c105	Ajo Caspi	unidentified	unidentified	6919	>10000	74	7-926	OA

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KMM403	c334	Anga macha	unidentified	unidentified	>10000	>10000			OA
ACR101	c38	Anguarate	unidentified	unidentified	>10000	235->10000	>10000	114->10000	OA
AKT1219	c150	Anti ajo	unidentified	unidentified	>10000	>10000	1621	100->10000	OA
ACR193	c314	Arnica (Solo la corteza)	unidentified	unidentified	>10000	>10000	164	23-1155	OA
ACR206	c83	Balsa blanca	unidentified	unidentified	>10000	>10000	178	20-4171	OA
ACR173	c275	Bejuco de montaña	unidentified	unidentified	>10000	>10000	>10000	>10000	OA
KMM501	c53	Beldaco	unidentified	unidentified	42	2-696	13	0.2-818	OA
ACR143	c273	Canchalagua Morada	unidentified	unidentified	>10000	>10000	395	>10000	OA
KMM508	c21	Cardo Bendito	unidentified	unidentified	>10000	>10000	780	55-11043	OA
AKT1139	c259	Chimipanpama	unidentified	unidentified	>10000	>10000	716	>10000	OA
KMM569	c301	Chivato	unidentified	unidentified	>10000	>10000	17	0.7-406	OA
ACR84	c675	Choloque	unidentified	unidentified	>10000	102->10000	>10000	>10000	OA
ACR106	c52	Contra hechizo	unidentified	unidentified	>10000	>10000	>10000	>10000	OA
ACR141	c339	Estiagra	unidentified	unidentified	>10000	>10000			OA
ACR200	c326	Hercampuri	unidentified	unidentified	>10000	>10000	1.8	>10000	OA
ACR65	c89	Huamanripa	unidentified	unidentified	5893	5->10000	3693	12->10000	OA
AKT1209	c154	Huarate	unidentified	unidentified	1329	122-14481	3873	146->10000	OA
AKT1231	c270	Llanten Blanco	unidentified	unidentified	>10000	>10000	1219	>10000	OA
AKT1130	c254	Milagroso	unidentified	unidentified	>10000	>10000	1205	3->10000	OA
ACR93	c315	Orillo de Brujo	unidentified	unidentified	>10000	233->10000	30948	2->10000	OA
ACR104	c309	Paja del gusto	unidentified	unidentified	>10000	>10000	>10000	>10000	OA
ACR60	c256	Pegajosa	unidentified	unidentified	>10000	>10000	0.43	>10000	OA
ACR202	c161	Tuapure blanco	unidentified	unidentified	322	0.1->10000	252	48-1308	OA
ACR110	c351	Yetama	unidentified	unidentified	672	84-5335	216	35-1314	OA
AKT1136	c222	Zarzaparrilla	unidentified	unidentified	750	>10000	1	0.1->10000	OA
ACR182	c486		unidentified	unidentified			141	27-733	OA