

Provided for non-commercial research and education use.
Not for reproduction, distribution or commercial use.



This article appeared in a journal published by Elsevier. The attached copy is furnished to the author for internal non-commercial research and education use, including for instruction at the authors institution and sharing with colleagues.

Other uses, including reproduction and distribution, or selling or licensing copies, or posting to personal, institutional or third party websites are prohibited.

In most cases authors are permitted to post their version of the article (e.g. in Word or Tex form) to their personal website or institutional repository. Authors requiring further information regarding Elsevier's archiving and manuscript policies are encouraged to visit:

<http://www.elsevier.com/copyright>



Contents lists available at ScienceDirect

Journal of Ethnopharmacology

journal homepage: www.elsevier.com/locate/jethpharm

Ethnobotanical study of the medicinal plants from Tlanchinol, Hidalgo, México

Adolfo Andrade-Cetto*

Laboratorio de Etnofarmacología, Fac. Ciencias, Universidad Nacional Autónoma de México, Apartado Postal 70-359, 04511, México, DF, Mexico

ARTICLE INFO

Article history:

Received 11 November 2008
 Received in revised form 15 December 2008
 Accepted 16 December 2008
 Available online 25 December 2008

Keywords:

Ethnopharmacology
 Ethnopharmacological field study
 Medicinal plants
 Fidelity level
 Factor informant consensus

ABSTRACT

The people in Mexico still depend upon the use of medicinal plants to treat simple health problems, including those who live in regions like Tlanchinol Hidalgo, where it is still possible to find people who speak the pre-Hispanic Nahuatl language. This area is surrounded by rain forest, which is more or less well conserved, so ethnopharmacological field studies are quite relevant. The cultural knowledge about the use of medicinal plants converge with the richness in the surrounding flora making this region ideal for the selection of traditionally used medicinal plants.

Aim of the study: To present the results of an ethnopharmacological field survey conducted in the municipality of Tlanchinol Hidalgo, Mexico analyzed with two different quantitative tools, with the aim of selecting the most important species used in traditional medicine.

Materials and methods: Direct interviews with the people were performed in several short visits to the municipality of Tlanchinol Hidalgo. The plants were collected, and the species were determined. The interviews were analyzed with two quantitative tools. First, the factor informant consensus highlighted the agreement in the use of plants and the fidelity level defined as: the ratio between the number of informants who independently suggested the use of a species for the same major purpose and the total number of informants who mentioned the plant for any use. Furthermore, we analyzed the use-mentions for the plants.

Results: The results of the factor informant consensus showed that the gastrointestinal category had the greatest agreement, followed by the respiratory and dermatological categories. The most important species according to their fidelity are: *Coleus blumei*, *Plantago australis* and *Lippia dulcis* for the gastrointestinal category; *Borago officinalis*, *Foeniculum vulgare*, and *Eucalyptus globulus* for the respiratory category; and *Ageratum houstonianum* and *Solanum nigrescens* for the dermatological category.

Conclusion: As a result of the present study, we recommend the plants listed in Table 2 for further ethnopharmacological studies, especially *Lippia dulcis* var *Mexicana*.

© 2008 Elsevier Ireland Ltd. All rights reserved.

1. Introduction

The use of medicinal plants has occurred in Mexico since pre-Hispanic times. With the presence of nearly 10,000,000 indigenous people speaking nearly 85 different languages (MNM, 2008), who still depend upon plants for primary therapy from the diverse flora (almost 5,000 medicinal plants), Mexico is a good area to perform ethnopharmacological field studies. Studying the biological diversity of plants related to their traditional use as medicines can lead us to understand how they act and to assure the rational exploitation of the resources and their further development as phytomedicines. Because medicinal plants continue to be culturally suitable as treatments for several illnesses, it is important to doc-

ument their uses and perform studies about their pharmacological activities to assure their efficacy and safety.

Despite the vast literature that exists in Mexico (in Spanish) about ethnobotanical studies, only a few efforts to publish these data at an international level have been done. However, Heinrich and his group published more than 18 works (i.e. Weimann and Heinrich, 1997; Heinrich et al., 1998; Ankli et al., 1999) with a combination of adequate field work and appropriate interpretation of the data.

The aim of this work is to present the results of an ethnopharmacological field survey conducted between 2000 and 2004 in the municipality of Tlanchinol Hidalgo, Mexico, which was analyzed with two different quantitative tools in order to select the important species used in traditional medicine.

1.1. Background

The municipality Tlanchinol was populated by two ethnic groups "Nahuas" and "Huastecs" until the arrival of the Spaniard

Abbreviations: F_{IC}, factor informant consensus; FI, fidelity level; Um, use-mentions.

* Tel.: +52 5556224834; fax: +52 5556224828.

E-mail address: aac@ciencias.unam.mx.

monks in the XVI century, who started the evangelization and colonization of the zone. The name “Tlanchinol” came from the “Nahua” voice “Tlanchinolli,” which means “Burn House,” and “icpac,” which means “Over,” thus meaning “over the burn house” (EMM, 2008).

The area is 380 km² and is located at 21°10'N, 21°53'S latitude and 98°32'E, 98°46'W longitude, at 1590 m above sea level (INEGI, 2008). The weather is humid with an annual mean temperature of 18.9 °C and having an annual mean rain precipitation of 2601 mm. The population is composed mainly of “Nahuas” in the poorest zones and half-caste people in the richest areas. Although the main town is Tlanchinol, the actual municipality consists of 20 towns.

The Mexican government reported a population of near 32,000 people in 2000, of whom 54% speak Nahuatl. In 2003, according to official data from the total population, only 9% received an official health service free of charge and 67% received an official health service, but had to pay a small amount of money for the service (INEGI, 2008). Therefore, only 76% of the population accessed health services at least one time during that year, and the other 24% did not. The Nahuas who live in the poorest areas depend upon medicinal plants and traditional healers for primary health care.

The vegetation that surrounds the area is cloud forest “Bosque mesofilo de montaña,” according to Luna-Vega et al. (1994). The flora is composed of 306 species, 247 genera and 107 families.

2. Materials and methods

2.1. Data collection

Direct interviews with the people were performed in several short visits between 2000 and 2004 using a semistructured questionnaire, prior to the interviews the Informed Consent was obtained. We visited “Apantlazol,” “Olotla,” “Tierra Colorada,” “Cuatlatán,” and “Tlanchinol” and interviewed the general population house by house. We asked questions about the plants they use against diseases, which parts of the plants are used, the method of preparation, details of administration and the dosage. These towns have the presence of “Nahuas” and the same kind of vegetation, thus providing us with a rich cultural region to perform this study. With the help of the informants, the botanical material was collected, properly identified with the help from Biol. Ramiro Cruz Duran and MS Othon Alcantara Ayala, the plant names were revised, in the approved, international data bases. The voucher specimens were deposited at the Laboratory of Ethnopharmacology, “Facultad de Ciencias, UNAM”.

2.2. Quantitative ethnobotany

The results of the direct interviews were analyzed using two quantitative tools.

For the analysis of the general use of plants, we used the factor informant consensus (F_{IC}) (Heinrich et al., 1998). The factor was originally used to highlight plants of particular intercultural relevance and the agreement in the use of plants. In order to use this tool, it was necessary to classify the illnesses into broad disease categories (several diseases based on the organ systems in one category) using the original categories proposed by Heinrich et al. (1998): (1) gastrointestinal, (2) respiratory, (3) pain/fiber, (4) dermatological, (5) muscular/skeletal, (6) cardiovascular, (7) urological, (8) diabetes, (9) reproductive, (10) cultural filiations, (11) oncologic, (12) others.

As a result of this analysis, it was possible to see if there was agreement in the use of plants in the illness categories between the populations. The F_{IC} was calculated as the number of use citations in each category (nur) minus the number of species used (nt), divided by the number of use citations in each category minus one (Heinrich

et al., 1998):

$$F_{IC} = \frac{nur - nt}{nur - 1}$$

The fidelity level (FI), which is the ratio between the number of informants who independently suggested the use of a species for the same major purpose and the total number of informants who mentioned the plant for any use, was calculated for the most frequently reported diseases or ailments for the categories with the highest F_{IC} :

$$FI(\%) = \frac{Np}{N \times 100},$$

where Np is the number of informants that claimed a use of a plant species to treat a particular disease, and N is the number of informants that used the plants as a medicine to treat any given disease (Friedman et al., 1986).

Simple use-mentions (Um) refer to the mentions for one plant given by all the informants for a specific disease.

With the help of these tools, we could determine which illness categories had populations with more “consensus” (using the F_{IC}) and the plants with major fidelity (using the FI).

3. Results

3.1. General analysis of the data

We performed 69 interviews with the inhabitants of the region. They mentioned 302 plants and their uses for medicinal purposes. After the taxonomical work, we could correlate 286 mentions with the respective plants (vouchers). These mentions (286 plants-uses) corresponded to 96 species of 84 genera and 47 families. The most prominent family was the Asteraceae with 15 reports (15.6%), followed by Lamiaceae with 12 reports (12.5%) and Rubiaceae with 5 reports (5%) (see Table 1).

3.2. Use of medicinal plants

Through the analysis of the interviews, we confirmed that the use of medicinal plants is a normal practice in the 69 visited houses, even though the municipality has a hospital and several private physicians. All of the informants (100%) use medicinal plants to treat at least some ailments. Even though all of the informants visit physicians or the clinics, they still use medicinal plants. They trust the plants and use them in three main scenarios: (1) without a visit to a physician, instead of normal medicine, (2) after visiting a physician, they take the medicinal plant instead of the prescribed medicine, or (3) after visiting a physician, they take the prescribed medicine and a medicinal plant. From the 96 species, only 17 (17%) have a Nahuatl name, and normally they also have a Spanish one.

The people get the plants from tree sources, home gardens, the surrounding forest and market places from abroad (they go to the next big town Huejutla de Reyes). At the home gardens, they usually get plants like *Borago officinalis*, *Matricaria recutita* or *Ruta chalepensis*. From the forest, they get plants like *Hamelia patens*, *Eryngium longifolium* or *Pedilanthus tithymaloides*. In the market, they buy plants like the ones that can be found at the home gardens, but in dry form. The complete data are presented in Table 1. In Table 2, we summarize the analyzed data.

The plants with the major number of use-mentions for any disease were *Ruta chalepensis* (25), *Aloe vera* (24), *Artemisia ludoviciana* (24), *Heterotheca inuloides* (23), *Hamelia patens* (21), *Matricaria recutita* (18), *Justicia spicigera* (18), *Agave atrovirens* (17), *Artemisa vulgaris* (16) and *Oenothera rosea* (16) (see Table 2, A).

Table 1
Used plants in Tlanchinol Hidalgo, México.

Scientific name	Voucher	Family	Name	Form	Used part	Disease	Men	Preparation	Application	FI	Cat
<i>Achillea millefolium</i> L.	ETLA-1	Asteraceae	Plumajillo	He	Lv	Ear pain	3	Macerated Decoction	Topical	100.0	3 3
<i>Agastache mexicana</i> (Kunth) Linton et Epling	ETLA-2	Lamiaceae	Toronjil	He	Ap, Fl	Headache	2	Infusion	Oral	14.3	3
						Jaundice	3	Infusion	Oral	21.4	1
						Take fright	9	Macerated in alcohol	Oral	64.3	10
<i>Agave atrovirens</i> Karw. ex Salm-Dyck	ETLA-3	Amaryllidaceae	Maguey	Sh		Against pain	3	Macerated in alcohol	Topical	17.6	3
						Colic after childbirth	2	Macerated	Poultice Oral	11.8	3 9
						Heart ailments	1	Macerated	Oral	5.9	6
						Inflammation	4	Infusion Macerated	Oral Topical	23.5	5 5
						Sprain	2		Topical	11.8	5
						Wounds	5	Roast Infusion	Poultice	29.4	4 4
<i>Ageratum houstonianum</i> Mill.	ETLA-4	Asteraceae	Mostranzo	He	Ap, Fl	Skin infections	5	Decoction	Topical	100.0	4
			Hierba azul					Infusion			4
<i>Allium sativum</i> L.	ETLA-5	Liliaceae	Ajo	He	Ro	Warts	1	Macerated	Topical	25.0	4
						Rheumatism	2	Macerated	Topical	50.0	5
						Vermifuge	1	Infusion	Oral	25.0	1
<i>Aloe vera</i> (L.) Burm. f.	ETLA-6	Liliaceae	Sábila	Sh	St	Cough	6	Poultice	Topical	25.0	2
								Macerated in alcohol	Oral		2
						Dandruff	1	Macerated	Topical		4
						Diabetes	2	Liquidizer	Oral	8.3	8
						Erysipelas	1	Macerated	Topical		4
						Headache	3	Liquidizer	Topical	12.5	3
						Inflammation	2	Poultice	Topical	8.3	5
						Skin infections	1	Liquidizer	Oral	12.5	4
						Sore throat	2	Infusion	Oral	8.3	2
						Stomach pain	1	Liquidizer	Oral	4.2	1
						Weigh loss	1	Infusion	Oral	4.2	12
						Wounds	4	Poultice	Topical	16.7	4
<i>Annona cherimola</i> Mill.	ETLA-7	Annonaceae	Anona	Tr	Lv	Diarrhoea	1	Macerated	Oral		1
<i>Anoda</i> sp.	ETLA-8	Malvaceae	Violeta	He	Ap, Fl	Diarrhoea	1	Macerated	Oral	25.0	1
						Prevent vomit	2	Macerated	Oral	50.0	1
								Infusion	Oral		1
						Urinary problems		Infusion	Oral	25.0	7
<i>Apium graveolens</i> L.	ETLA-9	Apiaceae	Apio	He	St	Cough	1	Infusion	Oral	50.0	2
						Stomach pain	1	Infusion	Oral	50.0	1
<i>Artemisa vulgaris</i> L.	ETLA-10	Asteraceae	Ajenjo	He	Ap, Lv	Diarrhoea	3	Infusion	Oral	18.8	1
						Stomach pain	12	Infusion	Oral	75.0	1
<i>Artemisia ludoviciana</i> Nutt.	ETLA-11	Asteraceae	Estafiate	He	Ap, Lv	Diarrhoea	1	Infusion	Oral	4.2	1
						Headache	1	Infusion	Oral	4.2	3
						Stomach pain	19	Infusion	Oral	79.2	1
						Take fright	3	Infusion	Oral	12.5	10
<i>Bidens pilosa</i> L.	ETLA-12	Asteraceae	Aceitilla Mózotl	He	Ap	Cough	1	Infusion	Oral	12.5	2
						Diabetes	2	Infusion	Oral	25.0	8
						Diarrhoea	2	Infusion	Oral	25.0	1
						Stomach pain	1	Infusion	Oral	12.5	1
						Wounds	2	Infusion Macerated	Topical	25.0	4 4
<i>Bocconia frutescens</i> L.	ETLA-13	Papaveraceae	Hoja de toro	Tr	Le	Wounds	1	Infusion	Oral		4
<i>Borago officinalis</i> L.	ETLA-15	Boraginaceae	Borraja	He	Ap, Lv	Cough	6	Infusion	Oral	100.0	2
<i>Bougainvillea glabra</i> Cholsy	ETLA-16	Nictagynaceae	Bugambilia	Sh	Fl, Lv	cancer	1	Infusion	Oral	8.3	11
						Cough	9	Infusion	Oral	75.0	2
						Hypertension	1	Infusion	Oral	8.3	6
						Stomach pain	1	Infusion	Oral	8.3	1
<i>Brugmansia × candida</i> Pers.	ETLA-17	Solanaceae	Floripondio	He	Lv	Sore throat	1	Poultice	Topical	50.0	2
						Wounds	1	Macerated	Topical	50.0	4
<i>Buddleia cordata</i> Kunth	ETLA-18	Loganaceae	Nesahuashihuitl	Sh	Lv	Stomach pain	2	Infusion	Oral	66.7	1
						Wounds	1	Decoction	Topical	33.3	4
<i>Bursera simaruba</i> (L.) Sarg.	ETLA-19	Burseraceae	Chaca	Tr	Lv	Fever	5	Macerated	Topical	62.5	3

Table 1 (Continued)

Scientific name	Voucher	Family	Name	Form	Used part	Disease	Men	Preparation	Application	FI	Cat
						Grippe	1	Infusion	Oral		3
						Headache	2	Macerated	Topical	12.5	2
								Infusion	Oral	25.0	3
<i>Capsicum</i> sp.	ETLA-20	Solanaceae	Tlanxinal (chile)	Sh	Lv	Cough	1	Infusion	Oral		3
<i>Casimiroa edulis</i> La Llave & Lex.	ETLA-21	Rutaceae	Zapote blanco	Tr	Lv	Heart ailments	1	Infusion	Oral		2
<i>Cecropia obtusifolia</i> Bertol.	ETLA-22	Cecropiaceae	Palo chiflón	Tr	Lv	Diabetes	4	Infusion	Oral	85.7	8
<i>Cestrum fasciculatum</i> (Schltdl.) Miers	ETLA-23	Solanaceae	Nixtamaxihuitl blanco	Sh	Ap, Lv	Stomach pain	1	Infusion	Oral	14.3	1
						Fever	1	Infusion	Oral	33.3	3
						Headache	1	Macerated	Topical	33.3	3
<i>Cinnamomum verum</i> J. Presl	ETLA-24	Lauraceae	Canela	Tr	Cr	Warts	1	Infusion	Topical	33.3	4
						Childbirth inducer	1	Infusion	Oral	16.7	9
						Cough	2	Infusion	Oral	33.3	2
						Grippe	2	Infusion	Oral	33.3	2
<i>Cirsium mexicanum</i> DC.	ETLA-25	Asteraceae	Cardosanto	He	Ap	Wounds	1	Infusion	Oral	16.7	5
						cancer	1	Infusion	Oral	50.0	11
						Kidney problems	1	Infusion	Oral	50.0	7
<i>Cissampelos owariensis</i> Beauvais ex DC.	ETLA-26	Menispermaceae	Cintzo	He	Ap	Mal de ojo	1	Infusion	Oral		10
<i>Citrus aurantifolia</i> (Christm.) Swingle	ETLA-27		Naranja	Tr	Lv, Fl	Cough	2	Juice	Oral	25.0	2
						Diabetes	1	Infusion	Oral	12.5	8
						Kidney problems	1	Infusion	Oral	12.5	7
						Stomach pain	1	Juice	Oral	12.5	1
<i>Citrus maxima</i> (Burm. ex Rumph.) Merr.	ETLA-28	Rutaceae	Limón	Tr	Lv	Willies	3	Infusion	Oral	37.5	12
						Cough	3	Infusion	Oral	21.4	2
					Fr	Fever	1	Juice	Oral	7.1	3
					Fr	Grippe	8	Juice	Oral	57.1	2
					Lv			Infusion	Oral		2
					Fr	Mosquito bite	1	Juice	Topical	7.1	12
<i>Cnidioscolus acanitifolius</i> (Mill.) I.M. Johnst.	ETLA-29	Euphorbiaceae	Chaya	Sh	Lv	Willies	1	Infusion	Oral	7.1	10
<i>Coleus blumei</i> Benth.	ETLA-30	Lamiaceae	Copa de Rey	He	Ap	Diabetes	1	Infusion	Oral		8
<i>Costus pulverulentus</i> C. Presl	ETLA-31	Zingiberaceae	Cuapitzotl	He	Ap, St	Diarrhoea	2	Infusion	Oral	100.0	1
						Fever	1	Infusion	Topical	14.3	3
			Caña de jabalí			Kidney problems	6	Infusion	Oral	85.7	7
<i>Cuscuta corymbosa</i> Ruiz & Pav.	ETLA-32	Convolvulaceae	Fideos	He	Ap	Diabetes	1	Macerated	Oral		7
								Infusion	Oral	50.0	8
			Cordoncillo			Kidney problems	1	Infusion	Oral	50.0	7
<i>Cymbopogon citratus</i> (DC.) Stapf	ETLA-33	Poaceae	Té limón	He	Ap	Grippe	1	Infusion	Oral	33.3	2
<i>Dysphania ambrosioides</i> (L.) Mosyakin & Clemants	ETLA-34	Chenopodiaceae	Epazote	He	Ap	Cough	2	Infusion	Oral	66.7	2
						Erysipelas	3	Macerated	Topical	33.3	4
						Stomach pain	3	Infusion	Oral	33.3	4
<i>Equisetum myriochaetum</i> Schltdl. & Cham.	ETLA-35	Equicetaceae	Cola de caballo	He	Ap	Vermifuge	4	Infusion	Oral	40.0	1
						Diabetes	2	Infusion	Oral	28.6	8
						Kidney problems	5	Infusion	Oral	71.4	7
<i>Eriobotrya japonica</i> (Thunb.) Lindl.	ETLA-36	Rosaceae	Níspero	Tr	Lv	Cough	1	Infusion	Oral	50.0	2
<i>Eryngium longifolium</i> Cav	ETLA-37	Apiaceae	Piñuela	He	Ap	Diuretic	1	Infusion	Oral	50.0	7
						Diabetes	3	Infusion	Oral	60.0	8
						Kidney problems	2	Infusion	Oral	40.0	7
<i>Eucalyptus globulus</i> Labill.	ETLA-38	Myrtaceae	Eucalipto	Tr	Lv	Cough	9	Infusion	Oral	90.0	2
									Topical		2
						Grippe	1	Infusion	Oral	10.0	2

Table 1 (Continued)

Scientific name	Voucher	Family	Name	Form	Used part	Disease	Men	Preparation	Application	FI	Cat
<i>Foeniculum vulgare</i> Mill.	ETLA-39	Apiaceae	Hinojo	He	Ap	Cough	2	Infusion	Oral	100.0	2
<i>Galium mexicanum</i> var <i>mexicanum</i> de Wit	ETLA-40	Rubiaceae	Pegarropa	He	Lv	Abortifacient	1	Infusion	Oral		9
<i>Gnaphalium oxyphyllum</i> DC.	ETLA-14	Asteraceae	Gordolobo	He	Lv, Fl	Cough	5	Infusion	Oral	71.4	2
						Respiratory ailments	1		Oral	14.3	2
						Headache	1		Oral	14.3	3
<i>Hamelia patens</i> Jacq.	ETLA-41	Rubiaceae	Madura zapote	Sh	Ap, Lv	Diuretic	2	Infusion	Oral	9.5	7
						Gastritis	10	Infusion	Oral	47.6	1
									Topical		1
						Kidney problems	1	Macerated	Oral	4.8	7
						Stomach ain	5	Infusion	Oral	23.8	1
						Wounds	3	Infusion	Oral	14.3	4
									Topical		4
<i>Heterotheca inuloides</i> Cass	ETLA-42	Asteraceae	Arnica	He	Lv, Fl	Diarrhoea	1	Infusion	Oral	4.3	1
						Erysipelas	2	Infusion	Oral	8.7	4
						Fever	1	Infusion	Oral	4.3	3
						Gastritis	3	Infusion	Oral	13.0	1
						Kidney problems	1	Infusion	Oral	4.3	7
						Muscular pain	1	Infusion	Topical	4.3	5
						Skin inflammation	6	Infusion	Oral	26.1	4
						Wounds	8	Infusion	Poultice		4
									Oral	34.8	4
									Poultice		4
									Topical		3
<i>Hoffmannia rotata</i> Donn. Sm.	ETLA-43	Rubiaceae	Calechilla	He	Lv	Ear Pain	1	Macerated			
<i>Hyptis mutabilis</i> (Rich.) Briq.	ETLA-44	Lamiaceae	Palo de menta	He	Ap, Lv	Air	1	Infusion	Topical	50.0	10
<i>Jatropha curcas</i> L.	ETLA-45	Euphorbiaceae	Piñón	Tr	Lv	Erysipelas	1	Infusion	Topical	50.0	4
						Mouth Eruption	1	Latex	Topical		4
<i>Juniperus flaccida</i> Schltldl.	ETLA-46	Cupressaceae	Cedro	Tr	Lv	Headache	1	Infusion	Oral	50.0	3
<i>Justicia spicigera</i> Schltldl.	ETLA-47	Acanthaceae	Mohuite	He	Ap, Lv	Take fright	1	Infusion	Oral	50.0	10
			Mohuitl.			Bronchitis	1	Infusion	Oral	5.6	2
						cancer	1	Infusion	Oral	5.6	11
						Circulatory ailments	6	Infusion	Oral	33.3	6
						Diarrhoea	1	Infusion	Oral	5.6	1
						Headache	1	Infusion	Oral	5.6	3
						Nervousness	1	Infusion	Topical	5.6	12
						Rheumatism	1	Macerated in Alcohol	Oral	5.6	3
						Skin inflammation	1	Macerated	Topical	5.6	4
						Stomach ain	1	Infusion	Poultice	5.6	1
						Take fright	4	Macerated	Oral	22.2	10
<i>Lepechina caulesens</i> (Ort.) Epling	ETLA-48	Lamiaceae	Bretónica	He	Lv	Cough	1	Infusion	Oral	33.3	2
						Diabetes	1	Infusion	Oral	33.3	8
						Heart ailments	1	Infusion	Oral	33.3	1
<i>Lippia dulcis</i> Trevir.	ETLA-49	Verbenaceae	Hierba dulce	He	Lv	Diarrhoea	2	Infusion	Oral	66.7	1
						Stomach pain	1	Infusion	Oral	33.3	1
<i>Lippia dulcis</i> var <i>mexicana</i> Wehmer	ETLA-50	Verbenaceae	Té de la abuela	He	Ap, Lv	Diarrhoea	12	Infusion	Oral	92.3	1
<i>Liquidambar macrophylla</i> Oerst.	ETLA-51	Hamamelidaceae	Suchiate	Tr	Cr, Lv	Stomach pain	1	Infusion	Oral	7.7	1
						Diarrhoea	1	Infusion	Oral	20.0	1
						Skin problems	3	Infusion	Topical	60.0	4
									Cataplasma		4
<i>Lophosoria quadripinnata</i> (J.F. Gmel.) C. Chr.	ETLA-52	Lophosoriaceae	Zarzaparrilla	Ap	Ro	Stomach pain	1	Infusion	Oral	20.0	1
<i>Malva parviflora</i> L.	ETLA-53	Malvaceae	Malva	He	Lv	Diuretic	1	Infusion	Oral		7
						Cough	1	Infusion	Oral	33.3	2
						Fever	1	Infusion	Rectal	33.3	3
						Wounds	1	Infusion	Oral	33.3	4

Table 1 (Continued)

Scientific name	Voucher	Family	Name	Form	Used part	Disease	Men	Preparation	Application	FI	Cat
<i>Matricaria recutita</i> L.	ETLA-54	Asteraceae	Manzanilla	He	Ap, Lv	Cough	1	Infusion	Oral	5.6	2
						Diarrhoea	1	Infusion	Oral	5.6	1
						Liver problems	1	Infusion	Oral	5.6	1
<i>Mentha spicata</i> L.	ETLA-55	Lamiaceae	Hierbabuena	He	Ap, Lv	Stomach pain	15	Infusion	Oral	83.3	1
						Air	1	Infusion	Topical	7.1	10
						Stomach pain	6	Infusion	Oral	42.9	1
						Vermifuge	7	Infusion	Oral	50.0	1
<i>Mentha × piperita</i> L.	ETLA-56	Lamiaceae	Menta			Stomach pain	1	Infusion	Oral	50.0	1
						Vermifuge	1	Infusion	Oral	50.0	1
<i>Myrica cerifera</i> L.	ETLA-57	Myricaceae	Ahuaxochitl	He	Ap, Fr	Air	1	Infusion	Topical	50.0	10
						Heart ailments	1	Infusion	Oral	50.0	6
<i>Ocimum basilicum</i> L.	ETLA-58	Lamiaceae	Albahaca	He	Ap, Lv	Headache	1	Macerated	Oral	11.1	3
						Heart ailments	2	Infusion	Oral	22.2	6
						Stomach pain	6	Infusion	Oral	66.7	1
						Cataract	1	Maceración	Topical	50.0	12
<i>Ocimum selloi</i> Benth.	ETLA-59	Lamiaceae	Siempreviva	He	Lv	Fever	1	Infusion	Oral	50.0	3
<i>Oenothera rosea</i> L'Hér. ex Aiton	ETLA-60	Onagraceae	Hierba cólica	He	Ap, Lv	Cough	2	Macerated	Oral	12.5	2
						Diarrhoea	1	Infusion	Oral	6.3	1
						Headache	2	Macerated	Topical	12.5	3
						Inflammation	1	Infusion	Oral	6.3	5
						Liver problems	1	Infusion	Oral	6.3	1
						Skin problems	1	Macerated	Topical	6.3	4
						Stomach pain	8	Infusion	Oral	50.0	1
<i>Opuntia streptacantha</i> Lem.	ETLA-61	Cactaceae	Nopal	Sh	St	Diabetes	7	Liquate	Oral	77.8	8
						Grippe	2	Infusion	Oral	22.2	2
<i>Origanum vulgare</i> L.	ETLA-62	Lamiaceae	Mejorana	He	Ap	Take fright	1	Infusion	Oral	50.0	10
						Sourness	1	Infusion	Oral	50.0	1
<i>Pedilanthus tithymaloides</i> (L.) Poit.	ETLA-63	Euphorbiaceae	Tamaulipas	He	Ap, Lv	cancer	4	Infusion	Oral	28.6	11
						Diabetes	1	Infusion	Oral	7.1	8
						Ovarian pain	2	Infusion	Oral	14.3	9
						Wounds	8	Infusion	Oral	57.1	4
								Macerated	Topical		4
<i>Peperomia</i> sp.	ETLA-64	Piperaceae	Tarbatillo	Sh	Ap	Cough	1	Infusion	Oral		2
<i>Persea americana</i> Mill.	ETLA-65	Lauraceae	Aguacate	Tr	Lv	Bronchitis	1	Infusion	Oral	14.3	2
						cancer	1	Infusion	Oral	14.3	11
						Cough	1	Infusion	Oral	14.3	2
						Fever	1	Macerated	Oral	14.3	3
						Skin problems	1	Infusion	Oral	14.3	4
<i>Phlebodium aureum</i> (L.) J. Sm.	ETLA-66	Polypodiaceae	Costilla de león	He	Lv	Stomach pain	2	Infusion	Oral	28.6	1
						Heart ailments	1	Infusion	Oral	50.0	6
<i>Piper auritum</i> Kunth	ETLA-67	Piperaceae	Tehuacachitihuitl	He	St	Rheumatism	1	Infusion	Oral	50.0	3
						Liver problems	1	Raw	Oral		1
<i>Piper sanctum</i> (Miq.) Schltl. ex C. DC.	ETLA-68	Piperaceae	Hoja santa	He	Lv	Wounds	1	Infusion	Oral		4
<i>Plantago australis</i> Lam.	ETLA-69	Plantaginaceae	Llantén	He	Ap, Lv	Diarrhoea	2	Infusion	Oral	100.0	1
						<i>Platanus mexicana</i> Moric.	ETLA-70	Platanaceae	Chote	Tr	Cr, Lv
						Ear pain	1	Macerated	Topical	33.3	3
						Kidney problems	1	Decoction	Oral	33.3	7
<i>Plumeria acutifolia</i> Poiret	ETLA-71		Cacahuaxóchitl			Stomach pain	1	Infusion	Oral		1
<i>Prunus persica</i> (L.) Batsch.	ETLA-72	Rosaceae	Durazno	Tr	Lv	Diarrhoea	1	Infusion	Oral	50.0	1
						Wounds	1	Infusion	Oral	50.0	4
<i>Psidium guajava</i> L.	ETLA-73	Myrtaceae	Guayaba	Tr	Lv	Diarrhoea	10	Infusion	Oral	76.9	1
						Stomach pain	2	Infusion	Oral	15.4	1
						Wounds	1	Infusion	Oral	7.7	4
<i>Pteridium aquilinum</i> (L.) Kuhn	ETLA-74	Dennstaedtiaceae	Pesma	Sh	Lv	Cough	1	Infusion	Oral	33.3	2
						Diabetes	2	Infusion	Oral	66.7	8
<i>Ricinus communis</i> L.	ETLA-75	Euphorbiaceae	Higuerilla	Sh	Lv	Air		Macerated	Topical	33.3	10
						Anginas		Infusion	Oral	33.3	2
						Muscular pain		Macerated	Topical	33.3	5

Table 1 (Continued)

Scientific name	Voucher	Family	Name	Form	Used part	Disease	Men	Preparation	Application	FI	Cat
<i>Rosmarinus officinalis</i> L.	ETLA-76	Lamiaceae	Romero	He	Ap, Lv	Cough	2	Infusion	Oral	40.0	2
						Stomach pain	2	Infusion	Oral	40.0	1
<i>Ruta chalepensis</i> L.	ETLA-77	Rutaceae	Ruda	He	Ap	Wounds		Infusion	Oral	20.0	4
						Abortifacient	2	Infusion	Oral	8.0	9
						Air	2	Macerated in Alcohol	Oral	8.0	10
						Cough	2	Infusion	Oral	8.0	2
						Diarrhoea	4	Infusion	Oral	16.0	1
						Grippe	1	Macerated in Alcohol	Topical	3.8	2
						Headache	3	Infusion	Oral	12.0	3
						Heart ailments	2	Infusion	Oral	8.0	6
						Hypertension	2	Infusion	Oral	8.0	6
						Stomach pain	8	Infusion	Oral	32.0	1
<i>Salvia coccinea</i> Buc'hoz ex Etl.	ETLA-78	Lamiaceae	Mirto	He	Ap, Lv	Diarrhoea	7	Infusion	Oral	43.8	1
<i>Salvia mexicana</i> L.	ETLA-79	Lamiaceae	Tlanchichinole	He	Lv	Stomach pain	9	Infusion	Oral	56.3	1
						Diarrhoea	1	Infusion	Oral	25.0	1
						Kidney problems	1	Infusion	Oral	25.0	7
						Stomach pain	1	Infusion	Oral	25.0	1
<i>Sambucus mexicana</i> C. Presl ex DC.	ETLA-80	Caprifoliaceae	Sauco	TR	Lv	Wounds	1	Infusion	Topical	25.0	4
						Cough	2	Infusion	Oral	20.0	2
						Diarrhoea	2	Infusion	Oral	20.0	1
						Fever	1	Macerated	Topical	10.0	3
						Grippe	1	Infusion	Oral	10.0	2
						Headache	1	Macerated	Topical	10.0	3
						Hypertension	2	Infusion	Oral	20.0	6
						Sore throat	1	Infusion	Oral	10.0	2
						Diabetes	1	Infusion	Oral	50.0	8
						<i>Sechium edule</i> (Jacq.) Sw.	ETLA-81	Cucurbitaceae	Chayote	He	Fr
Inflammation	1	Macerated	Oral	25.0	5						
<i>Sedum</i> L.	ETLA-82	Crassulaceae	Yahualchit	Sh	St	Vaginal infections	2	Infusion	Oral	50.0	9
<i>Smallanthus maculatus</i> (Cav.) H. Rob.	ETLA-83	Asteraceae	Flor de margarita	He	Fl	Wounds	1	Infusion	Topical	25.0	4
						Stomach pain	1	Infusion	Oral		1
<i>Solanum esculentum</i> Dunal	ETLA-84	Solanaceae	Jitomate	He	Fr	Cough	1	Roasted	Topical	25.0	2
<i>Solanum nigrescens</i> M. Martens & Galeotti	ETLA-85	Solanaceae	Tomatillo	He	Fr	Headache	1	Macerated	Topical	25.0	3
						Sore throat	2	Roasted	Topical	50.0	2
						Wounds	2	Macerated	Topical	100.0	4
<i>Sphaeralcea angustifolia</i> (Cav.) G. Don	ETLA-86	Malvaceae	Hierba del negro	He	Ap, Lv	Rheumatism	1	Macerated in Alcohol	Topical	50.0	5
<i>Tagetes erecta</i> L.	ETLA-87	Asteraceae	Cempasúchitl Cempasúchitl	He	Lv	Wounds	1	Decoction	Oral	50.0	12
						Bronchitis	1	Infusion	Oral	25.0	2
						Erysipelas	1	Infusion	Poultice	25.0	4
						Stomach pain	1	Infusion	Oral	25.0	1
						Wounds	1	Macerated	Topical	25.0	4
<i>Tagetes micrantha</i> Cav.	ETLA-88	Asteraceae	Anís	He	Ap	Stomach pain	1	Infusion	Oral		1
<i>Tanacetum parthenium</i> (L.) Sch. Bip.	ETLA-89	Asteraceae	Santamaría	He	Ap, Lv	Abortifacient	2	Infusion	Oral	40.0	9
						Inflammation	1	Infusion	Topical	20.0	5
						Stomach pain	2	Infusion	Topical	40.0	1
<i>Taraxacum officinale</i> Weber ex F.H. Wigg.	ETLA-90	Asteraceae	Diente de león	He	Ap	Cough	1	Infusion	Oral	16.7	2
						Hypertension	1	Infusion	Oral	16.7	6
						Kidney problems	4	Infusion	Oral	66.7	7
						Air	1	Macerated	Topical		10
<i>Tectaria heracleifolia</i> (Willd.) Underw.	ETLA-91	Dryopteridaceae	Hierba del monte	He	Ap						
<i>Tilia mexicana</i> Schlttdl.	ETLA-92	Tiliaceae	Tila	Tr	Fl, Lv	Hypertension	2	Infusion	Oral	33.3	6
						Nervousness	3	Infusion	Oral	50.0	12
						Stomach pain	1	Infusion	Oral	16.7	1
<i>Urera caracasana</i> (Jacq.) Gaudich. ex Griseb.	ETLA-93	Urticaceae	Ortiga real	Sh	Lv	Cough	1	Infusion	Oral	50.0	2
						Muscular pain	1	Infusion	Oral	50.0	5
						Abortifacient	1	Infusion	Oral	33.3	9
<i>Zaluzania triloba</i> (Ort.) Pers.	ETLA-94	Asteraceae	Hierba amarga	He	Ap, Lv						

Table 1 (Continued)

Scientific name	Voucher	Family	Name	Form	Used part	Disease	Men	Preparation	Application	FI	Cat
			Chichitzihuatl			Diarrhoea	1	Infusion	Oral	33.3	1
						Stomach pain	1	Infusion	Oral	33.3	1
<i>Zea mays</i> L.	ETLA-95	Poaceae	Cabello de elote	He	Fl	Diuretic	3	Infusion	Oral	100.0	7
<i>Zebrina pendula</i> Schnizl.	ETLA-96	Commelinaceae	Matlali	He	Ap	Fever	1	Infusion	Topical	50.0	3
						Take fright	1	Infusion	Oral	50.0	10

Abbreviations: Form: He, herb; Sh, shrub; Tr, tree. Used part: Ap, aerial part; Cr, cortex; Fl, flower; Fr, fruit; Lv, leaf; Ro, root; St, stem; Tr. Men = number of mentions; Cat = category for the F_{IC} .

3.3. Factor informant consensus

The results of the F_{IC} showed that the gastrointestinal category had the greatest agreement with a F_{IC} of 0.79, followed by respiratory (0.66), dermatological (0.64), cardiovascular (0.57), diabetes (0.57), and urological (0.56). The least agreement between the informants was observed in the muscular/skeletal category with an F_{IC} of 0.35, followed by reproductive (0.42), oncologic (0.43) and pain/fiber (0.43), see Table 3. Within the gastrointestinal category, the main reported ailments were stomach pain (32 reports) and diarrhoea (21), in the respiratory category, there were 29 reports of cough and 9 reports of gripe. Within the dermatological category, there were 22 wound reports and 7 reports of skin problems (Tables 1 and 3).

3.4. Fidelity level

We analyzed the categories with the major agreements to highlight the most important plants in each category. For this analysis, the plants only mentioned once were not considered. For the gastrointestinal category, we found that the most important species, according to their fidelity, were *Coleus blumei* (FI = 100), *Plantago australis* (FI = 100), and *Lippia dulcis* (FI = 92). They were *Borago officinalis* (FI = 100), *Foeniculum vulgare* (FI = 100) and *Eucalyptus globulus* (FI = 90) for the respiratory category. They were *Ageratum houstonianum* (FI = 100), *Solanum nigrescens* (FI = 100) and *Liquidambar macrophylla* (FI = 60) for the dermatological category. The most important plants in the cardiovascular category were *Casimiroa edulis* (FI = 60) and *Phlebodium aureum* (FI = 50). For the diabetes category, *Cecropia obtusifolia* (FI = 60) and *Eryngium longifolium* (FI = 50), were the most important. In the urological category, we found *Zea mays* (FI = 100) and *Costus pulverulentus* (FI = 86) as the most important (see Table 2, B).

3.5. Correlation between use-mentions and fidelity level

The species with the major fidelity levels were determined by an analysis of the data through the FI. For the main gastrointestinal category, we found that the plants with the highest fidelity level were not the ones with the major number of mentions (Um). Basically, the plants with an FI of 100 had only a couple of mentions, which is in contrast with plants with a high number of mentions (19 and 15), but had only FI of 80 and 84, respectively. To avoid this problem, we correlated all categories of the plants with more use-mentions (for one purpose) with their fidelity level, for these analysis we take 10% of the sample. The plants with the most Um for all categories were *Artemisia ludoviciana* with 19 mentions for stomach pain (FI = 80), *Matricaria recutita* with 15 mentions for stomach pain (FI = 84), *Artemisa vulgaris* with 12 mentions for stomach pain (FI = 75), *Lippia dulcis var mexicana* with 12 mentions for diarrhoea (FI = 93), *Psidium guajava* with 10 mentions for diarrhoea (FI = 77), and *Hamelia patens* with 10 mentions for gastritis (FI = 48). *Eucalyptus globulus* had 9 mentions for cough (FI = 90), *Agastache mexicana* had 9 mentions against Take fright (FI = 64), *Bougainvillea glabra* had

9 mentions for cough (FI = 75) and *Salvia coccinea* had 9 mentions for stomach pain (FI = 56) (see Table 2, C).

The plants with a high fidelity level (FI = 100) and a Um for one ailment were *Borago officinalis* for cough (100, 6), *Ageratum houstonianum* for skin infections (100, 5), *Achillea millefolium* for ear pain (100, 3), *Zea mays* used as a diuretic (100, 3), *Coleus blumei* for diarrhoea (100, 2), *Foeniculum vulgare* for cough (100, 2) *Plantago australis* for diarrhoea (100, 2) and *Solanum nigrescens* to treat wounds (100, 2). Plants with FI between 80 and 99 were *Lippia dulcis var mexicana* for diarrhoea (92, 12) *Eucalyptus globulus* for cough (90, 9), *Cecropia obtusifolia* for diabetes (86, 4), and *Coleus blumei* (85, 6) and *Matricaria recutita* for stomach pain (83, 15) (see Table 2, D).

4. Discussion

One of the goals of an ethnopharmacological field study is to provide the main plants in a region used to perform further phytochemical and pharmacological studies. In this work, we used two quantitative tools to perform the selection. With the F_{IC} , we detected the main categories of used plants, and with the FI and the Um, we selected the most important species from these categories.

In the present work, we found that the gastrointestinal, respiratory and dermatological categories used the most plants, which was in agreement with the categories in the work of Heinrich et al. (1998). Because none of the areas studied by Heinrich (Zapotec, Maya or Nahuatl) are close to the studied region herein, we can assume that the main problems treated by traditional medicine in Mexico fall into these categories.

If we considered the plants with the highest number of mentions for a single use (Table 2, C), meaning that we placed more value on the number of reports than on FI, we saw that seven of these plants were used for gastrointestinal disorders and two for respiratory problems. If we considered the plants with the highest FI together with the use-mentions (Table 2, D), meaning that we placed more value to the FI, we saw that four plants were used for gastrointestinal, three for respiratory, and two for dermatological ailments. In both cases, the most species were in the gastrointestinal category, which was followed by the respiratory category. If we analyzed the data through the F_{IC} , the FI or the use-mentions, we got the same categories as being the most prominent. The FI and the use-mentions support the F_{IC} . Therefore, based on this observation, we can say that the F_{IC} is a good analytical tool to select categories of illness when analyzing the data as they are presented here.

After selecting the categories, we analyzed the important plants with three further criteria: the plants with the highest FI for each category (Table 2, B), the plants with the greatest number of mentions for all categories (Table 2, C), and the plants with the highest FI (Table 2, D). If we perform a cross-link analysis between the plants in Table 2, C and D, which means that we considered both the FI and the use-mentions as final factors, we observed the following plants on both lists: *Lippia dulcis var mexicana* used to treat diarrhoea,

Table 2
Analysis of the main used plants.

(A) Plants with high total use-mentions.	
<i>Ruta chalepensis</i>	(25)
<i>Aloe vera</i>	(24)
<i>Artemisia ludoviciana</i>	(24)
<i>Heterotheca inuloides</i>	(23)
<i>Hamelia patens</i>	(21)
<i>Matricaria recutita</i>	(18)
<i>Justicia spicigera</i>	(18)
<i>Agave atrovirens</i>	(17)
<i>Artemisa vulgaris</i>	(16)
<i>Oenothera rosea</i>	(16).
(B) Plants with high fidelity level by category.	
Gastrointestinal	
<i>Coleus blumei</i>	(FI = 100)
<i>Plantago australis</i>	(FI = 100)
<i>Lippia dulcis</i>	(FI = 92)
Respiratory	
<i>Borago officinalis</i>	(FI = 100)
<i>Foeniculum vulgare</i>	(FI = 100)
<i>Eucalyptus globulus</i>	(FI = 90)
Dermatological	
<i>Ageratum houstonianum</i>	(FI = 100)
<i>Solanum nigrescens</i>	(FI = 100)
<i>Liquidambar macrophylla</i>	(FI = 60)
Cardiovascular	
<i>Casimiroa edulis</i>	(FI = 60)
<i>Phlebodium aureum</i>	(FI = 50)
Diabetes	
<i>Cecropia obtusifolia</i>	(FI = 60)
<i>Eryngium longifolium</i>	(FI = 50)
Urological	
<i>Zea mays</i>	(FI = 100)
<i>Costus pulverulentus</i>	(FI = 86)
(C) Plants with high use-mentions for all categories.	
<i>Artemisia ludoviciana</i>	19
Stomach pain	(FI = 80)
<i>Matricaria recutita</i>	15
Stomach pain	(FI = 84)
<i>Artemisia vulgaris</i>	12
Stomach pain	(FI = 75)
<i>Lippia dulcis var mexicana</i>	12
Diarrhoea	(FI = 93)
<i>Psidium guajava</i>	10
Diarrhoea	(FI = 77)
<i>Hamelia patens</i>	10
Gastritis	(FI = 48)
<i>Eucalyptus globulus</i>	9
Cough	(FI = 90)
<i>Agastache mexicana</i>	9
Take fright	(FI = 64)
<i>Bougainvillea glabra</i>	9
Cough	(FI = 75)
<i>Salvia coccinea</i>	9
Stomach pain	(FI = 56)
(D) Plants with a high fidelity level and their use-mentions for one ailment.	
<i>Borago officinalis</i>	(FI, 100)
Cough	(6)
<i>Ageratum houstonianum</i>	(FI, 100)
Skin infections	(5)
<i>Achillea millefolium</i>	(FI, 100)
Ear pain	(3)
<i>Zea mays</i>	(FI 100)
Diuretic	(3)
<i>Coleus blumei</i>	(FI, 100)
Diarrhoea	(2)
<i>Foeniculum vulgare</i>	(FI, 100)
Cough	(2)
<i>Plantago australis</i>	(FI, 100)
Diarrhoea	(2)
<i>Solanum nigrescens</i>	(FI, 100)
Wounds	(2)
<i>Lippia dulcis var mexicana</i>	(FI, 92)
Diarrhoea	(12)
<i>Eucalyptus globulus</i>	(FI, 90)
Cough	(9)
<i>Cecropia obtusifolia</i>	(FI, 86)
Diabetes	(4)
<i>Matricaria recutita</i>	(FI, 83)
Stomach pain	(15)

Table 3
Factor informant consensus.

	Categories	Taxons	Uses	F _{ic}
1	Gastrointestinal	45	211	0.79
2	Respiratory	33	95	0.66
4	Dermatological	28	75	0.64
6	Cardiovascular	10	22	0.57
8	Diabetes	14	31	0.57
7	Urological	15	33	0.56
10	Cultural filiations	14	28	0.52
12	Others	6	11	0.50
3	Pain/fiber	26	45	0.43
11	Oncologic	5	8	0.43
9	Reproductive	8	13	0.42
5	Muscular/skeletal	12	18	0.35
	Total	216	590	

Eucalyptus globulus used to treat cough, and *Matricaria recutita* used to treat stomach pain. Because the last two plants are widely used and there are a lot of studies about their pharmacological activities, we will select the first one for further studies.

The data showed that the main problems treated by traditional medicine in Tlanchinol, Hidalgo are stomach pain, cough, wounds and diarrhoea, and there is also a consensus about the plants to treat these ailments. A possible explanation may be due to a couple of observations: (A) traditional medicine is used to treat “daily” health problems, and (B) traditional medicine better treats simple health problems. It must be considered that this work was based on interviews with the general population. A different kind of analysis could be done if we focused on specific diseases or interviewed people with these diseases, instead of the general population (see Andrade-Cetto et al., 2006).

As a result of the present study, we can recommend the plants listed in Table 2 for further ethnopharmacological studies, especially *Lippia dulcis var Mexicana*.

Acknowledgments

We are thankful to Don Isabel Escalante from Tlanchinol Hidalgo for his help with the ethnobotanical aspects of the plants and years of friendship and to Yoli Medina-Romero for her collaboration. This work was partially supported by the DGAPA, PAPIIT project IN204703 and CONACyT; AC-2006-52075.

References

- Ankli, A., Sticher, O., Heinrich, M., 1999. Medical ethnobotany of the Yucatec Maya: healers' consensus as a quantitative criterion. *Economic Botany* 53, 144–160.
- Andrade-Cetto, A., Becerra-Jiménez, J., Martínez-Zurita, E., Ortega-Larrocea, M.P., Heinrich, M., 2006. Disease-consensus index as a tool of selecting potential hypoglycemic plants in Chikindzonot, Yucatan, México. *Journal of Ethnopharmacology* 107, 199–204.
- EMM, 2008. Página de la Enciclopedia de los municipios de México, Gobierno del Estado de Hidalgo, web page, <http://intranet.e-hidalgo.gob.mx/> (accessed: September, 2008).
- Friedman, J., Yaniv, Z., Dafni, A., Palewitch, D., 1986. A preliminary classification of the healing potential of medicinal plants, based on a rational analysis of an ethnopharmacological field survey among Bedouins in the Negev desert, Israel. *Journal of Ethnopharmacology* 16, 275–287.
- Heinrich, M., Ankli, A., Frei, B., Wiemann, C., Sticher, O., 1998. Medicinal plants in Mexico: healer's consensus and cultural importance. *Social Science and Medicine* 47, 1859–1871.
- INEGI, 2008. Página del instituto nacional de geografía estadística e informática, Cuaderno estadístico Municipal, Tlanchinol, web page, www.inegi.gob.mx (accessed: September, 2008).
- Luna-Vega, I., Ocegueda-Cruz, S., Alcántara-Ayala, O., 1994. Florística y notas biogeográficas del bosque mesófilo de montaña del municipio de Tlanchinol, Hidalgo, México. *Anales del Instituto de Biología, Serie Botánica* 65, pp. 3162.
- MNM, 2008. Página del programa universitario, México nación Multicultural, UNAM, web page, www.nacionmulticultural.unam.mx (accessed: September, 2008).
- Weimann, C., Heinrich, M., 1997. Indigenous medicinal plants in Mexico: the example of the Nahuatl (Sierra de Zongolica). *Botanica Acta* 110, 62–72.