

## Traditional Medicinal Plants Used for the Treatment of Gastrointestinal Diseases in Chiapas, México

*Liliana De la Cruz-Jiménez, Marco Guzmán-Lucio and Ezequiel Viveros-Valdez*

Universidad Autónoma de Nuevo León, Facultad de Ciencias Biológicas,  
San Nicolás de los Garza, Nuevo León. México

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**Abstract:** Traditional medicine has strong roots in the Mexican population, particularly in areas where the diversity of species of plants and ethnic groups is higher. Such is the case of the southern Mexican state of Chiapas, home to one of the largest indigenous populations in the country. The primary objective of this work is to summarize information regarding traditional applications of medicinal plants used for the treatment of gastrointestinal disorders in Chiapas, México. The study is based on a review of the literature published in scientific journals, books and reports from national, regional and international organizations, theses, conference papers and other grey literature. A total of 52 medicinal plants, grouped in 23 taxonomic families, in addition to their ethno medical information, popular uses, the part or parts employed and their biological activity are described. This study aims at emphasizing the profound importance of investigating those species of plants that have not been the subject of any pharmacological study, in spite of existing reports on their traditional use.

**Key words:** Chiapas • Ethnomedicine • Ethno botany • Mexico • Indigenous Americans

### INTRODUCTION

The use of medicinal plants as therapeutic elements against ailments is a millenary tradition; the World Health Organization (WHO) recognizes their importance to the world's population, reporting that 80% of it still employs them regularly [1]. Several research papers regarding medicinal plants have been developing in the last years; not only to preserve and had a register of traditions and uses between the population across the world [2-5], also to evaluate their biological [6-8] and toxic activities [9] for a validation purpose. There are focused normally on the properties and common parts of medicinal use [10,11] and many of them are focus in the treatment of gastrointestinal ailments, given that it is the most common target of traditional therapies [12-15]. Those validation and research studies could contribute to new medicines and alternative ways to treat health problems.

México, given its privileged geographical location has attained status as one of the biologically mega diverse countries. More than 30 vegetation types exist here and the country possesses at least 30,000 species of

higher plants, representing 10% of the world's flora [16]. Of this number, 5,000 species are used in traditional Mexican medicine [17]. Most of these plants are found in the Mexican southeast, where Chiapas is located. Chiapas is endowed with great bio-cultural richness and is ranked among the 4 most ecologically-and linguistically-diverse states [18]. This makes this region an auspicious location for ethno botanical studies [19].

Many ethnic groups still reside in Chiapas, keeping their traditions and folklore -along with their ancient herblore-alive to date. These ethnic groups are the Choles, Zoques, Tzeltales, Tzotziles, Mochos, Mames, Tojolabales, Lacandones, Chujes and Jacaltecos [20]; each one located in a particular region associated with unique vegetation. Of the 10,000 vascular plants in the state, at least 4,000 are medicinal [21]. However few of these plants have been the subject of scientific reports aiming to determine their biological and pharmacological properties.

The treatment of gastrointestinal ailments is of great importance in developing countries such as Mexico, where this problem still appears prominently in mortality

and morbidity rates. The annual mortality in the Mexican southeast due to gastrointestinal infections was about 3,767 deaths in 2011 [22]. The most common gastrointestinal disorders are indigestion, ulcers, diarrhea, stomach pain and dysentery. The common causes are contaminated food, nutritional factors and pathogens like bacteria, viruses, parasites and helminthes. In 2010, Chiapas reported 234,245 cases of gastrointestinal ailments [23] mostly in rural areas where medical attention and services are deficient. A survey undertaken in Mexico (1983-1985) mentioned that 50% of the medicinal plants are employed to treat these illnesses [24].

It is well known that natural products research is often based in preexisting ethno botanical studies and traditions, with many commercial drugs having been developed from medicinal plants commonly used among indigenous societies. These reasons justify the undertaking of studies like the present work. Here we compile information concerning some species that are employed for the treatment of gastrointestinal diseases and are registered in databases, collections and herbariums.

## MATERIALS AND METHODS

**Study Area:** Chiapas is located in southern Mexico (Fig.1) and is one of the country's 32 federal entities. It's located between the parallels 14°32'-17° 59' north latitude and the meridians 90° 22'-94° 14' longitude. With an area of 75,344 km<sup>2</sup>, the state represents 3.8 % of Mexico's territory

[25]. Chiapas borders the republic of Guatemala to the east; the Pacific Ocean to the south; the state of Tabasco to the north and Veracruz and Oaxaca to the west. It is home to a population of 4, 796, 580 people that are distributed in 124 municipalities [25].

Its vast surface presents a varied orography and hydrography; the state is geographically divided into seven zones: the Pacific Coast Plains, the Sierra Madre de Chiapas, the Central Depression, the Central Highlands, the Eastern Mountains, the Northern Mountains and the Gulf Coast Plains [26]. Its capital, Tuxtla Gutierrez, lies near the center of the state. The weather of Chiapas is based more on elevation than latitude. It has an elevation of 4, 080 meters above sea level and its wide orographic range gives rise to a diversity of climatic zones. The vegetation varies according to weather and soil conditions. The total territory can be grossly divided into 34% jungle, 29% pine forest and 16% pasture land [25].

**Format:** The present work is based on a review work. The information on plants used for gastrointestinal disorders having a folkloric origin was gathered through a bibliographical search concerning traditional uses of medicinal plants; the search was performed in databases such as PubMed, in scientific journals, books, theses, conferences and the NAPRALERT database. Corresponding literature research was also undertaken to document the biological and pharmacological reports of the documented species.

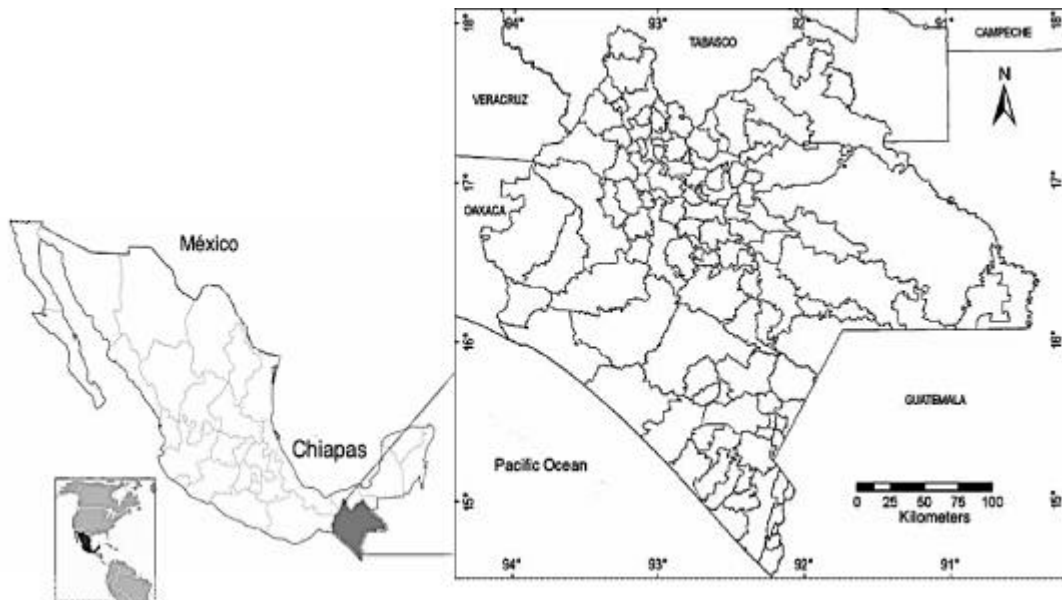


Fig. 1: Geographical location of Chiapas, México.

## RESULTS AND DISCUSSION

The present investigation reports 52 species commonly employed as remedies for gastrointestinal ailments in Chiapas. These medicinal plants were distributed among 23 taxonomic families. The families with more medicinal species were: the Lamiaceae family, previously named Labiatae, with 11 species (21.15%), followed by the Asteraceae family with 10 species (19.23%) of the total, Malvaceae with 4 species (7.69%), Fabaceae and Verbenaceae with 3 species each, Solanaceae, Boraginaceae and Lauraceae with 2 species each; the rest of the families were represented by one species each (Table 1). The information of these 52 plants is compiled in Table 2, where the plant species were arranged in alphabetical order, with their scientific names, botanical family, the common names, the part of use, the popular way of use and biological activities reports.

Table 1: Principal taxonomic families with medicinal plants for the treatment of gastrointestinal problems in Chiapas, Mexico.

Family*	Number of medicinal plants	%
Lamiaceae/Labiatae	11	21.15%
Asteraceae	10	19.23%
Malvaceae	4	7.69%
Fabaceae	3	5.77%
Verbenaceae	3	5.77%
Solanaceae	2	3.84%
Boraginaceae	2	3.84%
Lauraceae	2	3.84%

\*Only families with more than 2 species are showed.

The most commonly used plant parts correspond to the apical section such as leaves or stems, followed by flowers and roots, with only a few species producing useful seeds or bark. Processing of the vegetable material varies according to the disease, but infusions or decoctions are most commonly employed (Table 2).

Table 2: Synopsis of medicinal plants species for popular use in treatment of gastrointestinal disease in Chiapas, México.

Scientific name	Popular name(s)	Family	Part	Gastrointestinal disorder	Biological activity	Form of use
<i>Acacia angustissima</i> (Mill.)	Timbre	Fabaceae	St/B	Diarrhea Gastroenteritis [13]	Antibacterial antifungal [27]	Decoction
<i>Ageratina ligustrina</i>	Verbena/Chate	Asteraceae	L	Stomach pain Diarrhea [13]	Antibiotic, spasmolytic, anticancer [28]	Decoction
<i>Asterohyptis mocianiana</i> (Benth) Epling	-No common name identified-	Labiatae	F/L	Gastroenteritis	Anti-inflammatory [14]	Infusion
<i>Baccharis serraefolia</i> DC	ch'ail pox hierba del carbonero	Asteraceae	L	Abdominal pain Diarrhea [27]	Antispasmodic antibacterial [14,15]	Infusion
<i>Bocconia gracilis</i> Hutch.	Llora-sangre	Papaveraceae	L	Diarrhea	Antibacterial [15]	Decoction
<i>Brugmansiacandida</i> Pers.						Infusion
Flor de campana		Solanaceae	L	Stomach pain	Antibacterial [14,29]	Decoction
<i>Calliandra portoricensis</i> (Jacq.) Benth						
Cabeza de vieja		Fabaceae	R	Astringent [27]	Astringent [27]	Infusion
<i>Ceanothu scoeruleus</i> Lag.						
ik'alpomos		Rhamnaceae	L	Diarrhea Anti-inflammatory	Antibacterial Anthelmintic [15]	Infusion
<i>Chenopodium ambrosioides</i>						
Epazote		Chenopodiaceae	L	Parasites [27]	Amoebicide, analgesic, anthelmintic, antiseptic, diaphoretic. [15]	Crude
<i>Chromolaena collina</i> (DC) K. & H. R.						
bik'itch'a-te		Asteraceae	L	Parasites [30]	Antibacterial [14]	Infusion
<i>Cissampelo spareira</i> Curarina		Menispermaceae	St	Diarrhea Dysentery	Diuretic, antifungal, expectorant, stimulant [14,15]	Infusion
<i>Cochlospermum vitifolium</i> (Willd)						
Spreng Pomposhuti		Cochlospermaceae	B	Abdominal pain Diarrhea [31]	Fever Anti-inflammatory [31]	Infusion
<i>Cordia dodecandra</i> Cupapé		Boraginaceae	B	Diarrhea [32]	Antibacterial [33]	Infusion
<i>Gaultheria odorata</i> Arrayán		Ericaceae	L/F/ St	Fever Diarrhea Stomach pain [34]	Antibacterial [35]	Infusion
<i>Guazuma ulmifolia</i> Lamm caulote		Malvaceae	R/L/F	Dysentery Depurative [36]	Antibacterial [36]	Infusion
<i>Helianthemum glomeratum</i> Damiana		Cistaceae	L/F	Parasites Diarrhea Stomach pain	Anthelmintic, antimicro bial, anti-candida, "caustic" [15]	Infusion

Table 2: Continued

<i>Heliotropium angiospermum</i>			Gastroenteritis Indigestion		
Cola de alacrán	Boraginacea	F/L	Diarrhea Stomachache [34]	Antibacterial [37]	Infusion
<i>Hibiscus uncinellus</i> DC					
ch'xjolak'	Malvaceae	L	Laxant [27]	Emolient [27]	Infusion
<i>Hyptisverticillata</i>					
Hierba de san martin	Labiatae	L	Stomach pain [38]	Antibacterial [38]	Infusion
<i>Hampeato mentosa</i>					
Majagua	Malvacea	L	Parasites [39]	Anthelmintic [39]	Infusion
<i>Iresine celosia</i> L.					
makalakanwamal	Amaranthaceae	F	Fever Parasites [40]	Anti-inflam matory[14]	oilment
<i>Justicia spicigera</i>					
Muicle	Acantacea	L	Dysentery, diarrhea, vomit, stomachache and anticancer properties [40]	Antibacterial [41,42]	Infusion
<i>Kearnemalvastrum lacteum</i> (Aiton)					
Malva	Malvaceae	L	Gastroenteritis Stomach pain [27]	Analgesic, laxative [27]	Infusion
<i>Lantana camara</i> L. Cinco negritos					
	Verbenaceae	St	Diarrhea Parasites Abdominal pain	Antibiotic, Antispasmodic, Diaphoretic, Digestive, Expectorant, Sedative [15]	Infusion
<i>Lantana hispida</i> HBK.					
ok'alak'	Verbenaceae	L/ St	Diarrhea Stomach pain Vomit Dysentery	Antibacterial [14]	Infusion
<i>Leonoru ssibiricus</i>					
Marijuanilla	Labiatae	L	Analgesic	Antibacterial [15]	Inhaled
<i>Lepechinia schiediana</i>					
Hierba del cáncer	Labiatae	L	Stomach pain, Abdominal pain [43]	AntibacterialAntifungic [43]	Infusion
<i>Leucaena collinsii</i> spp. <i>collinsii</i>					
Guash	Fabacea	Se	Indigestion Parasites [32]	Anthelmintic [14,44] *	Crude
<i>Litsea glaucescens</i> HBK.					
Laurel	Lauraceae	L	Diarrhea Indigestion	Antimicro bial and spasmolytic activity [15]	Infusion
<i>Litsea neesiana</i> (Schauer) Hemsley					
tzisuch	Lauraceae	L	Diarrhea	Antimicro bial and spasmolytic activity [15]	Infusion
<i>Monnina xalapensis</i> HBK.					
pitz'otz	Polygonaceae	St	Fever Stomachache	Spasmolytic [15]	Infusion
<i>Myrica cerifera</i> L.					
Satin	Myricaceae	St	Diarrhea Colics Astringent	Antihelmin thic, deobstruent, febrifuge, laxative [15]	Infusion
<i>Ocimum basilicum</i>					
Albahaca de los santos	Labiatae	L	Carminative [39]	Antibacterial [39]	Decoction
<i>Ocimum micranthum</i>					
Albahacacriolla	Labiatae	L	Gastritis Dysentery Indigestion Fever Parasites [45]	Anthelmintic, Spasmolytic [45]	Crude
<i>Piptothrix areolaris</i> (DC.) K. & H. R.					
batz'ik'an'ich	Asteraceae	L	Diarrhea Parasites	Antibacterial [14]*	Crude
<i>Pseudobombax ellipticum</i>					
Flor de sospó	Bombaceae	F	Gastritis	Antipyretic [26,46]	Infusion
<i>Psidium guineense</i>					
Guayaba	Myrtaceae	Fr	Dysentery colics	Strong spasmolytic, antimicrobial [15]	Crude
<i>Prunella vulgaris</i>					
yaxalnichtz'i'lel	Labiatae	L	Fever, anti-inflammatory, abdominal pain [47]	Antibacterial antioxidant [47]	Infusion
<i>Prunus capuli</i>					
Capulin	Rosaceae	F	Fever Diarrhea Colics [48]	Antibacterial [48]	Crude

Table 2: Continued

<i>Rosmarinu officinalis</i>					
Romero	Labiatae	L /St	Colics Indigestion	Spasmolytic [15]	Infusion
<i>Ruta graveolen sL.</i>					
Ruda	Rutaceae	L/St	Colics Stomach pain	Spasmolytic [15]	Infusion
<i>Salvia cinnabarina</i> Martens & Galeotti					
tzajalpomt'zun	Labiatae	L/St	colics	Antibacterialspasmolytic [14,15]	Infusion
<i>Salvia hispanica</i> L.					
Chía	Labiatae	Se	Laxant Indigestion [49]	Spasmolytic Antioxidant [49]	Crude
<i>Satureja macrostema</i> (Benth)					
Satureja	Labiatae	L/St	Stomach pain Indigestion Colics [50]	Spasmolytic [15]	Infusion
<i>Stevia ovata</i>					
Pericón	Asteracea	L	Abdominal pain	Antibacterial [15]	Infusion
<i>Smallanthu smaculatus</i> (Cav.)					
H. Robinson K'ail	Asteraceae	L/R	Parasites [51]	Spasmolytic [15]	Infusion
<i>Solanum nigrescens</i> Martens & Galeotti					
Hierbamora	Solanaceae	L	Laxant Gastritis	Antifungal [14]	Infusion
<i>Tagetes erecta</i> L.					
xpujuk	Asteraceae	L	Diarrhea Stomach pain [52]	Antibacterial [52]	Infusion
<i>Tagetes nelsonii</i> Kunth					
Chilchahua	Asteraceae	L/St	Diarrhea Parasites Abdominal pain	Antibacterial [53]	Infusion
<i>Talisia oliviformis</i>					
Guaya	Asteraceae	L	Abdominal pain Fever Diarrhea	Antibacterial [54]	Infusion
<i>Verbena litoralis</i>					
Verbena	Verbenaceae	L	Stomach pain Vomit	Spasmolytic [15]	Infusion
<i>Vernonia leiocarpa</i> DC.					
batz'itzelo-pat	Asteracea	L/F	Stomach pain Nauseas Diarrhea	Antibacterial [29]	Infusion

Abbreviations: (L) Leaf, (St) Stem, (Se) seed, (B) Bark, (F) flower, (Fr) Fruit, (R) Root.

(\*) Activity reports only for the generous.

Dialect names [55].

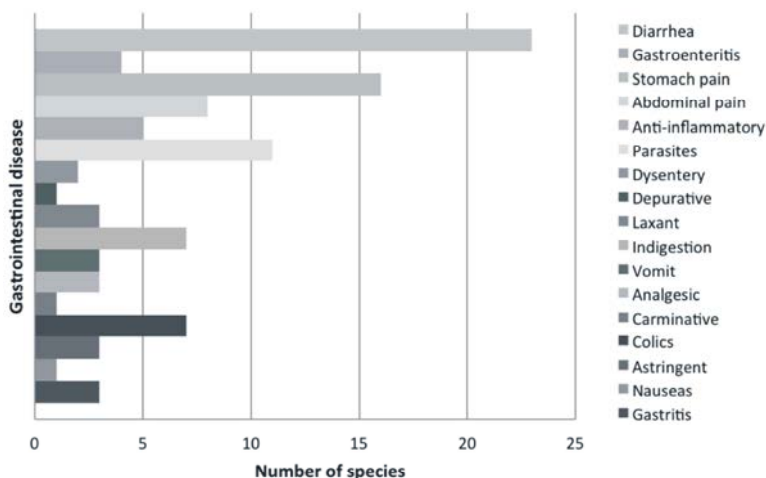


Fig. 2: Principal gastrointestinal diseases and number of species for treat them.

In this study 16 gastrointestinal ailments were found to be treatable with medicinal plants. The five main disorders that these 52 plants can cure are: diarrheas (44.23%), stomach pain (30.76%), parasitosis (21.15%), abdominal pain (15.38%) and colics (13.46%) (Figure 2). The medicinal uses of 49 species (94.23%) are supported

by reports that evaluate their biological activity. But we have recorded 3 medicinal plants that have not been reported in the available literature, with only general descriptions of the activities presented by the genus to which they belong: *Gaultheria odorata*, *Leucaena collinsii* spp. *collinsii* and *Tagetes nelsonii*.

## CONCLUSION

This work emphasizes the importance of studies regarding medicinal plants in México. The traditional knowledge of traditional remedies employed in Chiapas does not adequately document their properties and functions. This study provides supporting information about the biological activity and ethno botanical data of 52 medicinal plants used for the treatment of gastrointestinal diseases. Efforts focused on its pharmacological validation and also on the active compounds of these herbal medicines are warranted. Documentation of plants used as traditional medicines in Chiapas is needed so that this veritable treasure of knowledge can be preserved, shared and exploited sustainably.

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