Plants used as medicinal in Güémez, Tamaulipas, north-eastern Mexico

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Abstract

The use of medicinal plants in Mexico has a diverse and deeply-rooted tradition concerning. Plants play an important role in traditional medicine among the inhabitants of Güémez, Tamaulipas in northeastern Mexico. With the aim of obtaining quantitative information on the plants and their uses as medicinal sources, semi-structured interviews with 113 local residents were taken. In addition, Informant Consensus Factor (ICF) and Use Value (UV) were calculated. A total of 85 species of medicinal plants belonging to 44 families were identified. The most common families were Asteraceae, Lamiaceae and Euphorbiaceae. The most used part of the plant was the leaf and the most frequent preparation method was boiling, preparing as an infusion. A total of 50 medicinal uses were registered. Fever had highest ICF (0.93), whereas, according to UV, the most important plants were \textit{Artemisia ludoviciana} Nutt., \textit{Mentha spicata} L., \textit{Matricaria recutita} L. and \textit{Achillea millefolium} L. The information generated strengthens traditional knowledge, bringing new species and uses to the country’s records for future phytochemical studies that could lead to new medicines.

**Keywords:** ethnobotany, medicinal plants; quantitative analysis; traditional medicine; use value

Introduction

About 80% of the world’s population relies on traditional medicine to satisfy primary health care needs (Bermúdez \textit{et al}., 2005; Ayyanar and Ignacimuthu, 2011; Panyaphu \textit{et al}., 2011). The World Health Organization has registered approximately 21,000 plant species for medicinal uses around the world (Malla \textit{et al}., 2015). Medicinal plants are an important source of current drugs. About 25% of the world’s prescription drugs come from plants (Bulut and Tuzlaci, 2013).
Mexico has a diverse and deeply-rooted tradition concerning the use of medicinal plants (Estrada-Castillón et al., 2018). In Mexico, there are more than 23,400 vascular plants and 5,000 species are used for medicinal purposes and the most important families are Asteraceae, Lamiaceae, Fabaceae, and Euphorbiaceae (Casas et al., 2001; Camou-Guerrero et al., 2008; Alonso-Castro et al., 2012). Also is ranked sixth in the world regarding greatest cultural diversity (Mercado, 2013), as it has 62 ethnic groups (Juárez-Rosete et al., 2013). Most ethnic groups use medicinal plants because of their efficiency, tradition and low costs (Kayani et al., 2015; Tribess et al., 2015). In particular, rural areas contribute with most knowledge about medicinal plants (Kayani et al., 2015). These plants help communities to survive in remote areas (Gómez, 2012).

Nowadays, it’s recognized that in Mexico and many countries around the world the transmission of knowledge regarding the use of medicinal plants from old to new generations is declining are experiencing loss of useful plants due (Quesada, 2008; Calvo et al., 2011; Hassan-Abdallah et al., 2013) as well as losing entire villages and local populations due to lack of work, education and medical care (Panyaphu et al., 2011). This fact is also a reality in rural communities because of globalization and the use of allopathic medicine (Esquivel-García et al., 2018). Therefore, it is important to rescue this knowledge to prevent the loss of ethnomedical traditions, which is a scientific and cultural heritage important for future generations.

The municipality of Güémez, located in the northeast of Mexico, covers 1.5% of the Tamaulipas state. Its economy is based on agriculture (citrus, safflower, bean, maize, henequen and sorghum), cattle raising and forestry production also take place on smaller scale. However, there are no local inhabitants selling medicinal plants. The local people live in houses of ‘adobe’ (building material made from soil and often organic material), wood and concrete. Health services are scarce with little medicine and few doctors. Some villages do not have drainage, clean water, electricity, so migration is commonplace due to lack of security, education and employment.

The objective of this study is to know the most commonly used medicinal plants and their uses by the inhabitants of the municipality of Güémez with the purpose to revaluing and saving this traditional knowledge in this region of Mexico.

**Materials and Methods**

**Study area**

The municipality of Güémez is located within the Sierra Madre Oriental and is part of the central-western region of State of Tamaulipas (Figure 1) (24°06'-23°41’N and 99°30-98°45’W), its altitude is from 200 to 2,800 m. It covers 1,204.55 km², has 43 localities with a population of 15,659 inhabitants, of which 80% live in urban areas and 20% in small villages called ‘ejidos’. The climate of the region is temperate to sub-humid, in mountainous areas and semi-dry to very warm in the lowlands. The mean annual temperature ranges from 12 to 26 °C and the annual rainfall is 600 to 1,100 mm (INEGI, 2009).

**Fieldwork**

Wild and cultivated medicinal species in the study area were collected. Plant samples obtained were pressed and dried according to the method described by Sánchez-González and González (2007). Specimens were identified by the authors through the Manual of the Vascular Plants of Texas (Correll and Johnston, 1970), scientific names were consulted in The Plant List (http://www.theplantlist.org/). The complete collection of specimens was included in the CFNL herbarium (acronym according to Thiers, 2011). We include the common name in Spanish for all plants species registered during interviews.

**Data collection**

Direct interviews were conducted with the villages called “ejidos” Los San Pedros, La Esperanza, San Cayetano, Graciano Sánchez, La Yerbabuena, Constitución del 17, Servando Canales, San José de Las Flores.
and Viento Libre. A total of 113 inhabitants, 32 men and 81 women with ages ranging between 30 and 90 years old, were interviewed individually. The interviewees were housewives, cattle ranchers, loggers, farmers and healers. All the interviews were carried out through visits to homes and in the field. The information for the ethnomedicinal species was recorded in Spanish, as it is the only language spoken in the region, through semi-structured interviews. The questions were about common plant names, medicinal use, part of plant used, methods of preparation and route of administration.

Figure 1. Location of the municipality of Güémez, Tamaulipas, Mexico

Data analysis
The diseases treated with medicinal plants were classified into 13 categories: (1) gastrointestinal system (gastritis, poor digestion, constipation, intestinal ulcer, diarrhea, vomiting, stomach inflammation, flatulence, nausea, stomach pain, lack of appetite, toothache, mouth infection, bad breath), (2) respiratory system (bronchitis, asthma, cough), (3) blows and wounds (external blows, wounds, internal blows, sunken
fontanelles, extraction of thorns), (4) dermatological (rashes, ringworm, herpes virus, baldness, fungus feet), (5) endocrine system (diabetes, cancer), (6) nervous system (insomnia, headaches, nerves, stress, dizziness), (7) muscular skeletal system (rheumatism, osteoporosis), (8) circulatory system (hemorrhoids, varicose veins, anemia, impaired immune system), (9) fever (high temperature, typhoid), (10) intestinal parasites (worms), (11) ophthalmologic (eye infections), (12) urinary system (Kidney, urinary infections), (13) female reproductive system (Menstrual cramps, infertility, abortion).

The ICF adapted by Heinrich et al. (1998), is calculated according to following formula: $ICF = \frac{(Nur-Nt)}{(Nur - 1)}$ where Nur refers to number of citations of uses given in each category and Nt to number of species used. This method is used to test the homogeneity of information. The ICF offers a range of 0-1, where high values (about 1) are obtained, when there is a well-defined selection criterion in the community and/or if information is exchanged between informants, and the values are low (near zero) if plants are chosen at random or if there is no exchange of information about their use among informants.

The use value (Trotter and Logan, 1986), demonstrates the relative importance of locally known species and is calculated according to the following formula: $UV = \frac{U}{N}$, where U refers to number of citations per species and N to number of informants.

**Results**

**Richness of medicinal plants**

According to the results of specimen identification, 85 species with medicinal uses, belonging to 41 families were reported by interviewees. Among them, 45 species are cultivated and 40 species are wild. The most common families of medicinal plants are Asteraceae (17.64%), Lamiaceae (11.76%), Euphorbiaceae (7.05%) and Rutaceae (4.70%). During the study, 126 samples were collected in the study area. Plants used for medicinal purposes in Güémez are presented in Appendix 1 in alphabetical order according to family and scientific name.

The most commonly mentioned species were *Artemisia ludoviciana* (n = 51), *Mentha spicata* (n = 44), *Matricaria recutita* (n = 37), *Achillea millefolium* L. (n = 30) and *Ruta graveolens* L. (n = 28). Herein, we report eight native species of Mexico considered as new records of traditional medicinal plants in this country, which are: *Boerhavia spicata* Choisy, *Cirsium texanum* Buckley, *Cynanchum barbigerum* (Scheele) Shinners, *Dalea scandens*, *Oenothera brachycarpa* A. Gray, *Smallanthus maculatus* (Cav.) H. Rob., *Stevia origanoides* Kunth and *Tauschia madrensis* M. Coul. & Rose (Appendix 1).

The biological forms of the medicinal species mentioned by the interviewees were herbaceous (47 species), shrubs (21 species) and trees (17 species).

The most frequently used plant parts for the preparation of medicines were leaves (42 plants), branches (leaf and stem) (21 plants), roots (8 plants), whole plants (6 plants), flowers (6 plants), fruits (5 plants), tree bark (4 plants) (Appendix 1).

**Disease categories**

In the region, a total of 50 illnesses or diseases are treated with medicinal plants. Local people choose to use plants, mainly for stomachaches (22 plants), kidney diseases (13 plants), diarrhea (12 plants), coughs (11 plants), spots on skin (9 plants) and others (Appendix 1).

Other medicinal plants in Güémez such as *Glandularia bipinnatifida* (Schauer) Nutt., *Smilax bona-nox* L., *Cestrum tomentosum* L.f., *Ruta graveolens*, *Rosmarinus officinalis* L. and *Ocimum basilicum* L. are used for magical purposes, mainly to remove bad luck and cleanse the soul.
Use value (UV)

Use values range from 0.008 to 0.44. The highest values were reported for *Artemisia ludoviciana* (UV = 0.44), *Mentha spicata* (UV = 0.38), *Matricaria recutita* (UV = 0.32), *Achillea millefolium* (UV = 0.26), *Marrubium vulgare* L. (UV = 0.22), *Azadirachta indica* A. Juss. (UV = 0.22), *Psidium guajava* L. (UV = 0.21), *Ruta graveolens* (UV = 0.20) (Appendix 1).

Informant consensus factor (ICF)

There were 13 main categories of ailments based on ICF data. The ICF interval was 0.1 to 0.93. The results showed that the highest ICF was reported for the fever category with a value of 0.93, followed by ophthalmological problems (mainly eye infections) (0.75), intestinal parasites (mainly worms) (0.75), respiratory ailments (mainly colds) (0.72) and endocrine system (mainly diabetes) (0.66), gastrointestinal system (0.59) and bumps and wounds (0.59) (Table 1).

### Table 1. Informant consensus factor (ICF)

| No | Category                      | Ailments and diseases                                                                 | Number of citations | Number of species | ICF |
|----|-------------------------------|--------------------------------------------------------------------------------------|---------------------|-------------------|-----|
| 1  | Gastrointestinal system       | Gastritis, bad digestion, constipation, intestinal ulcers, diarrhea, vomiting, stomach inflammation, flatulence, nausea, stomach pain, lack of appetite, toothache, mouth infection, bad breath | 95                  | 39                | 0.59 |
| 2  | Respiratory system            | Bronchi, asthma, cough                                                               | 45                  | 13                | 0.72 |
| 3  | Blows and wounds              | External blows, wounds, internal blows, sunken fontanelle, extraction of thorns      | 28                  | 12                | 0.59 |
| 4  | Dermatological                | Rash, ringworm, herpes virus, baldness, foot fungus                                  | 14                  | 16                | 0.15 |
| 5  | Endocrine system              | Diabetes, cancer                                                                      | 25                  | 9                 | 0.66 |
| 6  | Nervous system                | Insomnia, headache, nervousness, stress, dizziness                                   | 15                  | 10                | 0.32 |
| 7  | Muscular skeletal system      | Rheumatism, osteoporosis                                                             | 6                   | 3                 | 0.6  |
| 8  | Circulatory system            | Hemorrhoids, varicose veins, anaemia, impaired immune system                         | 14                  | 7                 | 0.53 |
| 9  | Fever                         | High temperature, typhoid                                                              | 16                  | 2                 | 0.93 |
| 10 | Intestinal parasites          | Worms                                                                                | 9                   | 3                 | 0.75 |
| 11 | Ophthalmologic                | Eye infection                                                                        | 5                   | 2                 | 0.75 |
| 12 | Urinary system                | Kidney, urinary tract infections                                                     | 24                  | 13                | 0.47 |
| 13 | Female reproductive system    | Menstrual cramps, infertility, abortion                                              | 10                  | 10                | 0.1  |

Method of preparation of the traditional medicines

The medicinal plants used by the local inhabitants are prepared and administered in different ways. Various methods of preparation and application are presented. According to ailment, preparation differs such as being boiled (62 plants), taken raw (17 plants), fermented in water (6 plants), cooked (3 plants), fermented in alcohol (2 plants), and fried (1 plant) (Appendix 1). Boiled and crude are the most commonly used methods for preparation of remedies. As a result of the records of the interviews, 50 species of plants are prepared for consumption, 15 plants are prepared for external use, while 20 species are used to alleviate both internal and external ailments.
The main routes of administration of the plants are oral (76%), followed by intestinal washes (24%) and poultices (4%). We do not include the exact proportions used for each medicinal plant, because there is a contradiction with respect to the exact dosage. The dose is usually measured by cups of infusion.

Most remedies are based on the use of a plant. However, Table 2 shows eleven combinations of medicinal plants reported by informants. Most are composed of six species, of which *Mentha spicata* is the plant most used in several combinations, followed by *Psidium guajava*, *Ocimum basilicum*, *Ruta graveolens*, *Matricaria recutita* and *Poliomintha longiflora*. The combination of the species *Crataegus tracyi* and *Arctostaphylos pungens* is the most recorded one found during the interviews. The main ailments treated with these mixtures are gastrointestinal diseases.

**Table 2. Combinations of plant species used for medicinal purposes in Güémez, Tamaulipas, Mexico**

| Recipe | Plants and used part | Ailment / Symptoms | Preparation | Number of mentions |
|--------|----------------------|-------------------|-------------|-------------------|
| 1      | *Mentha spicata* (leaves), *Quercus polymorpha* (treebark), *Rosa gallica* (flower) | Stomach pain | Boiled, drink solution | 1 |
| 2      | *Psidium guajava* (leaves), *Cinnamomum sp.* (tree bark), *Majorana hortensis* (branch), *Achillea millefolium* (leaves) | Diarrhea | Boiled, drink solution | 1 |
| 3      | *Crataegus tracyi* (root), *Arctostaphylos pungens* (root) | Kidney | Boiled, drink solution | 6 |
| 4      | *Ocimum basilicum* (leaves), *Mentha spicata* (leaves) | Cough | Boiled, drink solution | 1 |
| 5      | *Agave celsii* (leaves), *Citrus limon* (fruits) | Fever | | 3 |
| 6      | *Mentha spicata* (Leaves), *Matricaria recutita* (branch), *Ruta graveolens* (branch) | Stomach pain | Boiled, drink solution | 1 |
| 7      | *Prosopis glandulosa* (tree bark), *Ebenopsis chano* (tree bark), *Opuntia spp.* (cactus leaves) | Diarrhea | Boiled, drink solution | 1 |
| 8      | *Eucalyptus globulus* (leaves), *Poliomintha longiflora* (leaves) | Cough | Boiled, drink solution | 1 |
| 9      | *Ocimum basilicum* (leaves), *Poliomintha longiflora* (branch) | Stomach pain | Boiled, drink solution | 1 |
| 10     | *Psidium guajava* (leaves), *Prunus persica* (leaves) | Stomach pain | Boiled, drink solution | 1 |
| 11     | *Cynodon dactylon* (whole plant), *Matricaria recutita* (branch), *Ruta graveolens* (branch) | Digestion | Mix these plants, apply some heat, place on a flannel with ashes and pieces of brick, put over the stomach | 1 |

**Discussion**

The Asteraceae family has been reported as the most used in several regions of Mexico (Cervantes and Valdés, 1990; Camou-Guerrero *et al*., 2008; Alonso-Castro *et al*., 2012; Estrada-Castillón *et al*., 2014, 2018; García-Hernández *et al*., 2015; Pérez-Nicolás *et al*., 2017; Esquivel-García *et al*., 2018), as well as worldwide (Ghorbani *et al*., 2011; Bulut and Tuzlaci, 2013; Leto *et al*., 2013; Nawash *et al*., 2013; Bolson *et al*., 2015), probably due to the high diversity of its phytochemical constituents. Some studies have reported that this family
has a wide range of biologically active compounds and has high species richness worldwide (Heinrich et al., 1998; Thomas et al., 2009).

Following the IUCN Red List of Threatened Species, the only species under protection status is Dalea scandens (Mill.) R.T. Clausen assessed as being of Least Concern (Groom, 2012).

The possible reasons that herbaceous plants have the highest frequency of use is because bioactive compounds can be easily extracted (Lulekal et al., 2013; Kayani et al., 2015) and their high availability (planted in gardens, wild habitat and roadsides) (Tsobou et al., 2013). Similar conclusions are drawn from other studies in other parts of the world (Ghorbani et al., 2011; Sivasankari et al., 2014; Yaseen et al., 2015).

The medicinal species best known by the population in the study area were those that were used for uncomplicated ailments, similar findings are reported by Pérez-Nicolás et al. (2017) for the state of Oaxaca in southeaster Mexico.

The most frequently used plant parts for the preparation of medicines were leaves. Several ethnomedicinal studies in Mexico, Bangladesh, China, Colombia and India have reported that leaves are the most used parts of plants (Singh and Singh, 2009; Teklehaymanot, 2009; Packer et al., 2012; Sivasankari et al., 2014; Pérez-Nicolás et al., 2017; Estrada-Castillón et al., 2018). This is because they are the most abundant part of a plant and they are easier to collect (Giday et al., 2003). It may also be due to their greater effectiveness, since leaves have increased amounts of secondary metabolites like alkaloids, tannins and inulins, which are active components of many medicines (Yemele et al., 2015). In addition, the use of leaves favors the conservation of plants, since the collection of roots can kill the plant and endanger the species (Telefo et al., 2012; Kadir et al., 2013).

In the study area the most frequently used medicinal species are Artemisia ludoviciana, Mentha spicata, Matricaria recutita and Ruta graveolens, in the same way such plants are used by the inhabitants of Santiago Camotlán, Oaxaca (Pérez-Nicolás et al., 2017).

**Disease categories**

Ethnobotanical studies reveal that stomach pain is the most frequent ailment treated by medicinal plants (Polat and Satil, 2012; Kayani et al., 2015; Tribess et al., 2015; Estrada-Castillón et al., 2018). Globally, gastrointestinal diseases account for 2.2 million deaths each year and are caused by viruses, bacteria or parasites (Monigatti et al., 2013). The second most notable illness was related to the kidneys, which may be due to low intake of water during the cold season and the hard-agricultural work (Kayani et al., 2015).

In the study area medicinal plants are also used for magical purposes, like to remove bad luck. This is a common practice in the Mexican tradition (Frei et al., 1998; Andrade-Cetto, 2009). Since ancient times in Mexico, people have believed that diseases were caused by evil spirits, witchcraft and magic (Gallardo-Arias, 2004). Local healers prescribe medicinal plants, through a ritual of prayers while rubbing medicinal plants on the body of sick person. Most informants mentioned that such traditional knowledge was transmitted by their parents and grandparents over the years.

**Use Value (UV) and Informant Consensus Factor (ICF)**

Most of the plant’s species registered in this study are native to Europe and Asia and their use may have been popularized in Mexico because of their efficiency, adaptation and fast growth (Juárez-Rosete et al., 2013).

The high values of ICF could indicate that these diseases are common in the studied population, where there is a need to cure these diseases, and, thus, there is knowledge among the local population about the uses of medicinal plants (Nawash et al., 2013).

**Method of preparation of the traditional medicines**

Oral is the most routes of administration of plants used by the inhabitants of this study area because of their ease, similar findings have been reported in countries such as Pakistan (Kadir et al., 2012, 2013) and India (Ayyanar and Ignacimuthu, 2011).
Most remedies are based on the use of a plant and other is combinations of medicinal plants reported by informants. This can be attributed to the fact that any one plant can contain several compounds that perform different functions in the body (Focho et al., 2009). The plants are combined because people believe that the blend could improve the synergistic effect of the pharmacological effects of plants (Igoli et al., 2005; Giday et al., 2010).

Conclusions

This study reveals that for the inhabitants of the municipality of Güémez, the use of traditional medicine is frequent, and most local people still rely on plant-based remedies for common health problems. Thus, we emphasize the need to develop actions to avoid the loss of traditional knowledge of medicinal plants, not only to preserve this cultural heritage but also to record information on useful species that could be used to develop new medicines and provide other benefits, while contributing to protecting local biodiversity.

Authors’ Contributions

Conceptualization: EEC and SNJG; Data curation: SNJG and JRAS; Funding acquisition: EEC, Investigation: SNJG and JAED; Methodology: EEC, SNJG and JAVQ; Project administration: JRAS and EEC; Supervision: JAVQ and JAED; Writing - original draft: SNJG; Writing - review and editing: JAED. All authors read and approved the final manuscript.

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Conflict of Interests

The authors declare that there are no conflicts of interest related to this article.

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### Appendix 1. List of species used in traditional medicine in Güémez, Tamaulipas, Mexico. Specimens herbarium collected by Sindi J. Gandara (SJG)

| Family / Scientific name | Common name | Uses | Part used | Method of use | Numbers of use reports | Use Value (UV) |
|--------------------------|-------------|------|-----------|---------------|------------------------|---------------|
| Amaranthaceae            | *Amaranthus palmeri* S. Watson (SJG 034) | Quelite | Leaves | Cooked and eat | 1 | 0.008 |
|                          | *Chenopodium ambrosioides* L. (SJG 041) | Epazote | Leaves | Boiled, drink solution | 10 | 0.08 |
|                          |            | Stomach ache | Leaves | Boiled, drink solution | 1 | 0.008 |
|                          |            | Intestinal parasites | Leaves | Boiled, drink before breakfast | 1 | 0.008 |
| Anacardiaceae            | *Rhus virca* Lindh. ex. A. Gray (SJG 67) | Lantrisco | Diabetes | Boiled, drink solution | 7 | 0.06 |
| Apiaceae                 | *Tauschia madrensis* J.M. Coult. & Rose (SJG 0126) | Acocotillo | Cough | Boiled, drink solution | 1 | 0.008 |
| Apocynaceae              | *Cynanchum barbigerum* (Scheele) Shinners (SJG 0115) | Pico de pájaro | Kidney diseases | Root | Boiled, drink solution | 1 | 0.008 |
| Asparagaceae             | *Agave celsii* Hook. (SJG 0120) | Maguey de peña | Diarrhea | Leaves | Roasted, squeeze and drink juice | 11 | 0.09 |
|                          |            | Headache | Leaves | Roasted, squeeze and drink juice | 1 | 0.008 |
|                          |            | Fever | Leaves | Roasted, squeeze and drink juice | 1 | 0.008 |
|                          |            | Internal pains | Leaves | Roasted, squeeze and drink juice | 1 | 0.008 |
|                          |            | Vomit | Leaves | Roasted, squeeze and drink juice | 1 | 0.008 |
|                          | *Agave lechuguilla* Torr. (SJG 0121) | Lechuguilla | Kidney diseases | Root | Fermented in water, drink solution | 2 | 0.01 |
| Asphodelaceae            | *Aloe vera* (L.) Burm. f. (SJG 0121) | Sibila | External wounds | Leaves | Poultice on wound | 12 | 0.1 |
|                          |            | Hair loss | Leaves | Cataplasm on hair | 1 | 0.008 |
|                          |            | Anti-inflammatory for stomach | Leaves | Eating raw pieces | 1 | 0.008 |
|                          |            | Rheumatism | Leaves | Cataplasm on affected area | 1 | 0.008 |
|                          |            | Gastritis | Leaves | Eating raw pieces | 1 | 0.008 |
|                          |            | External pains or injuries | Leaves | Cataplasm on affected area | 1 | 0.008 |
| Asteraceae               | *Achillea milkefolium* L. (SJG 016) | Real de oro | Toothache | Leaves | Boiled, mouthwash | 30 | 0.26 |
|                          |            | Stomach ache | Leaves | Boiled, drink solution | 1 | 0.008 |
|                          |            | Vomit | Leaves | Boiled, drink solution | 1 | 0.008 |
|                          | *Ambrosia confertiflora* DC. (SJG 047) | Altamisa | Anti-inflammatory stomach | Branch | Boiled, drink solution | 2 | 0.01 |
| Family / Scientific name | Common name | Uses | Part used | Method of use | Numbers of use reports | Use Value (UV) |
|--------------------------|-------------|------|-----------|---------------|------------------------|----------------|
| *Artemisia ludoviciana* Nutt. (*SJG 044*) | Estafiate | Hemorrhoids | Stems and leaves | Moisten and rub on the affected area | 51 | 0.44 |
| *Bidens pilosa* L. (*SJG 069*) | Picaro | Diarrhea | Leaves | Boiled, drink solution | 1 | 0.008 |
| *Calypsoctopus vialis* Less. (*SJG 025*) | Hierba de la hormiga | Kidney diseases | Stems and leaves | Boiled, drink solution | 1 | 0.008 |
| *Cirsium texanum* Buckley (*SJG 0123*) | Escobilla | Abortive | Leaves and flower | Boiled, drink solution | 1 | 0.008 |
| *Matricaria recutita* L. (*SJG 07*) | Manzanilla | Menstrual colic | Stems, leaves and flower | Boiled, drink solution | 37 | 0.32 |
| *Parthenium hysterophorus* L. (*SJG 075*) | Amargoso | Gastritis | Stems and leaves | Moisten, squeeze and drink solution | 4 | 0.03 |
| *Senecio confusus* Britten (*SJG 0104*) | Árnica | External wounds | Leaves and flower | Boiled, wash | 23 | 0.2 |
| *Smallanthus maculatus* (Cav.) H. Rob. (*SJG 0124*) | Capitana | Rash | Leaves | Boiled, wash | 1 | 0.008 |
| *Spetia oreoanoides* Kunth (*SJG 068*) | Hierba de la mula | Rheumatism | Leaves | Fermented in alcohol, put in the affected area | 1 | 0.008 |
| *Tagetes erecta* L. (*SJG 0101*) | Cempasúchil | Stomach ache | Flower | Boiled, drink solution | 2 | 0.01 |
| *Tagetes lucida* Cav. (*SJG 015*) | Hierbanis | Nervousness | Stems, leaves and flower | Boiled, drink solution | 4 | 0.03 |
| *Tagetes micrantha* Cav. (*SJG 029*) | Anís | Menstrual colic | Stems, leaves and flower | Boiled, drink solution | 1 | 0.008 |
| *Tanacetum parthenium* (L.) Sch. Bip. (*SJG 012*) | Altamis | Diabetes | Leaves | Boiled, drink solution | 5 | 0.04 |
| | | Stomach ache | Leaves | Boiled, drink solution | | |
| | | Hemorrhoids | Leaves | Boiled, wash | | |
| Family / Scientific name | Common name | Uses | Part used | Method of use | Numbers of use reports | Use Value (UV) |
|--------------------------|-------------|------|-----------|---------------|------------------------|----------------|
| Bignoniaceae             |             |      |           |               |                        |                |
| *Crescentia alata* Kunth (SJG 0111) | Guajecirial Bronchia Fruit | Open the fruit, put some honey and leave to ferment, eat only internal part | 1 | 0.008 |
| Boraginaceae             |             |      |           |               |                        |                |
| *Cordia boissieri* A. DC. (SJG 091) | Anacahuita Cough Fruit | Boiled, drink solution | 5 | 0.04 |
| Burseraceae              |             |      |           |               |                        |                |
| *Bursera fagaroides* (Kunth) Engl. (SJG 092) | Salsafras Diabetes Leaves | Boiled, drink solution | 2 | 0.01 |
| Equisetaceae             |             |      |           |               |                        |                |
| *Equisetum hyemale* L. (SJG 060) | Cosa de caballo Kidney diseases Root | Boiled, drink daily as infusion | 4 | 0.03 |
| Ericaceae                |             |      |           |               |                        |                |
| *Arctostaphylos pungens* Kunth (SJG 072) | Pingüica Kidney diseases Root | Fermented in water, drink solution | 13 | 0.11 |
| Euphorbiaceae            |             |      |           |               |                        |                |
| *Acalypha lindheimeri* Müll. Arg. (SJG 02) | Hierba del cáncer Prevent cancer Leaves and flower | Boiled, drink solution | 5 | 0.04 |
|                          | External pains | Leaves and flower | Boiled, wash |            |
|                          | External wounds | Leaves and flower | Boiled, wash |            |
|                          | Rash | Leaves and flower | Boiled, wash |            |
|                          | Stomach ache | Leaves and flower | Boiled, drink solution |            |
| *Cnidoscolus aconitifolius* (Mill.) LM. Johnst. (SJG 088) | Chaya Gastritis Leaves | Macerated in water, drink solution | 3 | 0.02 |
| *Cnidoscolus texanus* (Müll. Arg.) small (SJG 081) | Mano santa Kidney diseases Leaves | Boiled, drink solution | 1 | 0.008 |
| *Croton incanus* Kunth (SJG 051) | Palillo Ringworm Leaves | Macerated, put on the affected area | 1 | 0.008 |
| *Croton suaveolens* Torr. (SJG 107) | Salvia Gastritis Leaves | Boiled, drink solution | 19 | 0.16 |
|                          | Anaemia | Leaves | Boiled, drink solution |            |
|                          | Menstrual colic | Leaves | Boiled, drink solution |            |
| *Euphorbia prostrata* Aiton. (SJG 066) | Hierba de la golondrina Gastritis Steam, leaves and flower | Boiled, drink solution | 4 | 0.03 |
| Fabaceae                 |             |      |           |               |                        |                |
| *Ebenopsis ebano* (Berland.) Barney & J.W. Grimes (SJG 0109) | Ébano Diarrhea Tree bark | Boiled, drink solution | 2 | 0.01 |
|                          | Antioxidants | Seed | Boiled or toasted |            |
|                          | Diabetes | Seed | Boiled or toasted |            |
| Family / Scientific name | Common name | Uses | Part used | Method of use | Numbers of use reports | Use Value (UV) |
|--------------------------|-------------|------|-----------|---------------|------------------------|---------------|
| **Dalea scandens** (Mill.) R.T. Clausen (SJG 0114) | Hierba del burro | Hemorrhoids | Leaves | Boiled, drink solution | 1 | 0.008 |
| **Prosopis glandulosa** Torr. (SJG 099) | Mezquite | Diarrhea | Tree bark and fruit peel | Boiled, drink solution | 5 | 0.04 |
| **Senna sp. Mill.** (SJG 087) | Palo santo | Foot Fungi | Leaves and flower | Macerated with alcohol, wash | 1 | 0.008 |
| **Fagaceae** | | | | | | |
| **Quercus polymorpha** Schidl. & Cham. (SJG 070) | Encino prieto | Diarrhea | Tree bark | Fermented in water, drink solution | 2 | 0.017 |
| **Hydrangeaceae** | | | | | | |
| **Hydrangea macrophylla** (Thunb.) Ser. (SJG 020) | Hortensia | Prevent disease (helps the immune system) | Root | Fermented in water, drink solution | 1 | 0.008 |
| **Juglandaceae** | | | | | | |
| **Carya illinoinensis** (Wangen.) K. Koch. (SJG 0108) | Nogal | Anaemia | Tree bark | Boiled, drink solution | 5 | 0.04 |
| **Krameriaceae** | | | | | | |
| **Krameria ramosissima** (A. Gray) S. Watson (SJG 0117) | Calderona | Anti-inflammatory of stomach | Leaves | Boiled, drink solution | 4 | 0.03 |
| **Lamiaceae** | | | | | | |
| **Hedeoma drummondii** Benth. (SJG 064) | Poleo | Insomnia | Leaves | Put under the pillow, released oils can produce relaxation and sleep | 5 | 0.04 |
| **Hedeoma palmeri** Hemsl. (SJG 045) | Poleo | Insomnia | Leaves | Put under the pillow, released oils can produce relaxation and sleep | 3 | 0.02 |
| **Majorana hortensis** Moench. (SJG 048) | Mejorana | Stomach ache | Stems and leaves | Boiled, drink solution | 1 | 0.008 |
| **Marahabo vulgaris** L. (SJG 022) | Marrubio | Increases appetite | Leaves | Boiled, drink solution | 26 | 0.22 |
| **Mentha x piperita** L. (SJG 038) | Menta | Stomach ache | Leaves | Boiled, drink solution | 2 | 0.01 |
| **Mentha spicata** L. (SJG 017) | Yerbabuena | Menstrual colic | Leaves | Boiled, drink solution | 44 | 0.38 |
| Family / Scientific name | Common name | Uses | Part used | Method of use | Numbers of use reports | Use Value (UV) |
|--------------------------|-------------|------|-----------|---------------|------------------------|--------------|
| Ocimum basilicum L. (SJG 080) Albacar | Anti-inflammatory of stomach | Leaves | Boiled, drink solution | 22 | 0.19 |
| Ocimum basilicum L. (SJG 080) Albacar | Stomach ache | Leaves | Boiled, drink solution | 16 | 0.13 |
| Ocimum basilicum L. (SJG 080) Albacar | Stress | Leaves | Boiled, drink solution | | |
| Ocimum basilicum L. (SJG 080) Albacar | Foot Fungi | Leaves | Boiled, wash | | |
| Ocimum basilicum L. (SJG 080) Albacar | Remove bad luck and cleanse soul | Leaves | Touching the body of person with leaves | | |
| Ocimum basilicum L. (SJG 080) Albacar | Vomit | Leaves | Boiled, drink solution | | |
| Ocimum basilicum L. (SJG 080) Albacar | Bad breath | Leaves | Boiled, mouthwash | | |
| Ocimum basilicum L. (SJG 080) Albacar | Digestive | Leaves | Boiled, drink solution | | |
| Poliomintha longiflora A. Gray (SJG 053) Orégano | Cough | Leaves | Boiled, drink solution | 19 | 0.16 |
| Rosmarinus officinalis L. (SJG 05) Romero | Menstrual colic | Stems and leaves | Boiled, drink solution | 16 | 0.13 |
| Teucrium cubenseJacq. (SJG 040) Verbena | Diarrhea | Stems and leaves | Boiled, drink solution | 13 | 0.11 |
| Teucrium cubenseJacq. (SJG 040) Verbena | Headache | Stems and leaves | Macerated in water, drink solution | | |
| Teucrium cubenseJacq. (SJG 040) Verbena | Stomach ache | Stems and leaves | Boiled, drink solution | | |
| Teucrium cubenseJacq. (SJG 040) Verbena | Fever | Stems and leaves | Macerated in water, drink solution | | |
| Teucrium cubenseJacq. (SJG 040) Verbena | Rash | Stems and leaves | Boiled, wash | | |
| Teucrium cubenseJacq. (SJG 040) Verbena | Typhoid | Stems and leaves | Macerated in water, drink solution | | |
| Teucrium cubenseJacq. (SJG 040) Verbena | Gastritis | Stems and leaves | Boiled, drink solution | | |
| Lauraceae | Litsea glaucescens Kunth (SJG 066) Laurel | Dizziness | Leaves | Boiled, drink solution | 3 | 0.02 |
| Lythraceae | Punica granatum L. (SJG 073) Granada | Diarrhea | Fruit peel and leaves | Boiled, drink solution | 2 | 0.01 |
| Malvaceae | Abutilon fruticosum Guill. & Perr. (SJG 042) Catana | Kidney diseases | Root | Boiled, drink solution | 1 | 0.008 |
| Malvaceae | Malva parviflora L. (SJG 010) Malva | External wounds | Leaves | Boiled, wash | 3 | 0.02 |
| Family / Scientific name | Common name | Uses | Part used | Method of use | Numbers of use reports | Use Value (UV) |
|-------------------------|-------------|------|-----------|---------------|------------------------|---------------|
| **Meliaceae**           |             |      |           |               |                        |               |
| *Azadirachta indica* A. Juss. (SJG 056) | Nim | Diabetes | Leaves | Boiled, 2 or 3 leaves, drink solution | 26 | 0.22 |
| **Moraceae**            |             |      |           |               |                        |               |
| *Ficus carica* L. (SJG 032) | Higo | Varicose veins | Fruit | Macerated, like cataplasm | 1 | 0.008 |
| **Moringaceae**         |             |      |           |               |                        |               |
| *Moringa oleifera* Lam. (SJG 082) | Moringa | Diabetes | Leaves | Boiled, drink solution | 1 | 0.008 |
| **Myrtaceae**           |             |      |           |               |                        |               |
| *Eucalyptus globulus* Labill. (SJG 097) | Eucalipto | Cough | Leaves | Boiled, drink solution | 15 | 0.13 |
| *Psidium guajava* L. (SJG 0106) | Guayaba | Diarrhea | Leaves | Boiled, drink solution | 25 | 0.21 |
| **Nyctaginaceae**       |             |      |           |               |                        |               |
| *Boerhavia spicata* Choisy (SJG 057) | Hierba de la hormiga | Rash | Stems and leaves | Boiled, wash | 3 | 0.02 |
| **Onagraceae**          |             |      |           |               |                        |               |
| *Oenothera brachycarpa* A. Gray (SJG 0113) | Hierba de la culebra | Herpes virus | Leaves | Cooked, macerated as cataplasm | 1 | 0.008 |
| *Oenothera rosa* L. ´Hér. ex Aiton (SJG 059) | Hierba del golpe | Bangs | Leaves | Macerated, like cataplasm | 7 | 0.06 |
| **Papaveraceae**        |             |      |           |               |                        |               |
| *Argemone mexicana* L. (SJG 011) | Chicalote | Eye Infection | Sap | Mix with milk, smear on the eyes | 1 | 0.008 |
| **Passifloraceae**      |             |      |           |               |                        |               |
| *Passiflora edulis* Sims Wild. ex Schult. (SJG 0116) | Hierba del venado | Fertility | Stems and leaves | Boiled, drink solution | 3 | 0.02 |
| **Poaceae**             |             |      |           |               |                        |               |
| *Cymbopogon citratus* (DC.) Stapf (SJG 039) | Zacate limón | Anti-inflammatory of stomach | Leaves | Boiled, drink solution | 8 | 0.06 |
| **Psylliostomataceae**  |             |      |           |               |                        |               |
| *Cynodon dactylon* (L.) Pers. (SJG 027) | Gramilla | Digestive | Stems and leaves | Mix with chamomile and rue, apply some heat, place on a flannel with ashes and pieces of brick, put over the stomach | 3 | 0.02 |
| Family / Scientific name | Common name | Uses | Part used | Method of use | Numbers of use reports | Use Value (UV) |
|--------------------------|-------------|------|-----------|---------------|-------------------------|---------------|
| Rosaceae                 |             |      |           |               |                         |               |
| *Crataegus tracyi* Ashe ex Eggl. (SJG 0126) | Tejocote | Kidney diseases | Root | Fermented in water, drink solution | 6 | 0.05 |
| *Rosa gallica* L. (SJG 0102) | Rosa de castilla | Diarrhea | Flower | Boiled, drink solution | 5 | 0.04 |
| Rubiaceae                |             |      |           |               |                         |               |
| *Randia rhagocarpa* Standl. (SJG 0103) | Brasil | Diabetes | Stems and leaves | Boiled, drink solution | 2 | 0.01 |
| Rutaceae                 |             |      |           |               |                         |               |
| *Citrus* sp. L. (SJG 086) | Naranjo agrio | Nervous | Leaves | Boiled, drink solution | 1 | 0.008 |
| *Murraya paniculata* L. Jack (SJG 084) | Limonaria | Diabetes | Stems and leaves | Boiled, drink solution | 1 | 0.008 |
| *Ruta graveolens* L. (SJG 030) | Ruda | Menstrual colic | Stems and leaves | Boiled, drink solution | 28 | 0.2 |
| *Zanthoxylum fagara* (L.) Sarg. (SJG 0122) | Uña de gato | Kidney diseases | Tree bark | Boiled, drink solution | 1 | 0.008 |
| Scrophulariaceae         |             |      |           |               |                         |               |
| *Leucophyllum revolutum* Rzed. (SJG 049) | Cenizo | Rash | Stems and leaves | Boiled, wash | 3 | 0.02 |
| *Selaginellaceae*        |             |      |           |               |                         |               |
| *Selaginella lepidophylla* (Hook. & Grev.) Spring (SJG 06) | Flor de peña | Kidney diseases | Whole plant | Fermented in water, drink solution | 5 | 0.04 |
| *Simaroubaceae*          |             |      |           |               |                         |               |
| *Castela erecta* Turpin (SJG 076) | Bizbirinda | Constipation | Stems and leaves | Boiled, drink solution | 13 | 0.11 |
| *Smilacaceae*            |             |      |           |               |                         |               |
| *Smilax bona-nox* L. (SJG 058) | Hierba del ojo | Remove bad luck and cleanse soul | Stems and leaves | Touching the body of person with leaves | 3 | 0.02 |
| *Solanaceae*             |             |      |           |               |                         |               |
| *Cestrum tomentosum* L.f. (SJG 019) | Palo hediondo | Remove bad luck and cleanse soul | Stems and leaves | Touching the body of person with leaves | 5 | 0.04 |

Urine infections | Whole plant | Fermented in water, drink solution
Ulcers | Whole plant | Fermented in water, drink solution

Rash | Leaves | Macerated, wash with solution
| Family / Scientific name | Common name | Uses         | Part used | Method of use | Numbers of use reports | Use Value (UV) |
|--------------------------|-------------|--------------|-----------|---------------|------------------------|----------------|
| Solanum americanum Mill. (SJG 01) | Hierba mora | External wounds | Steam, leaves and flower | Boiled, mouthwash | 1 | 0.008 |
| Verbenaceae               |             |              |           |               |                        |                |
| Aloysia citriodora Palau (SJG 062) | Cedrón de castilla | Stomach ache | Leaves | Boiled, drink solution | 3 | 0.02 |
| Glandularia bipinnatifida (Schauer) Nutt. (SJG 063) | Moradilla | Remove bad luck and cleanse soul | Whole plant | Touching the body of the person with leaves then put these in water, if the water consistency is gelatinous, the evil will come out | 2 | 0.01 |
| Viburnaceae               |             |              |           |               |                        |                |
| Sambucus nigra L. (SJG 031) | Sauco | Cough | Flower | Boiled, drink solution | 3 | 0.02 |