Ethnobotanical study of medicinal plants used by Mocho community in the state of Chiapas, Mexico

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INTRODUCTION

About 80 % of the population in developing and 60 % in developed countries use traditional medicine as their primary health care to treat diseases(1). One third of the world's population does not have regular access to essential medicaments. In rural communities, traditional medicine are more affordable and cheaper sources (2,3).

Mexico is considered the second country with the greatest floristic diversity with medicinal importance (4). Also it has a great ethnic variety, with 68 ethnic groups and 25 million indigenous people (21.5% of the Mexican population) and in the State of Chiapas is inhabited by 11 ethnic groups (14.2%)(5,6,7).

Almost 70% of the main problems affecting the indigenous communities are: surgery (10.8%), pediatrics (15.6%), internal medicine (13%), gynecology and obstetrics (17.8%), trauma (9.9%) (8).

The main diseases faced by indigenous people in Chiapas are: heart disease (12%), malignant tumors (7.7%) accidents (6.3%), infectious intestinal diseases (5, .8%), diabetes mellitus (4.5%), renal failure (4.3%), pneumonia (3.9%) mainly liver (3.3 %%) and cerebrovascular (3.3%) diseases (9; 10).

This study aimed to collect valuable ancient knowledge of traditional medicine in Mocho communities. Currently, traditional knowledge is being lost, it due to high migration, there are not written records, lack of interest of new generations and loss of biodiversity of medicinal plants.

STUDY AREA

Chiapas is located in geographical coordinates: north 17°59', west 94°14' W. (Figure 1).

Figure 1.- location of the study area
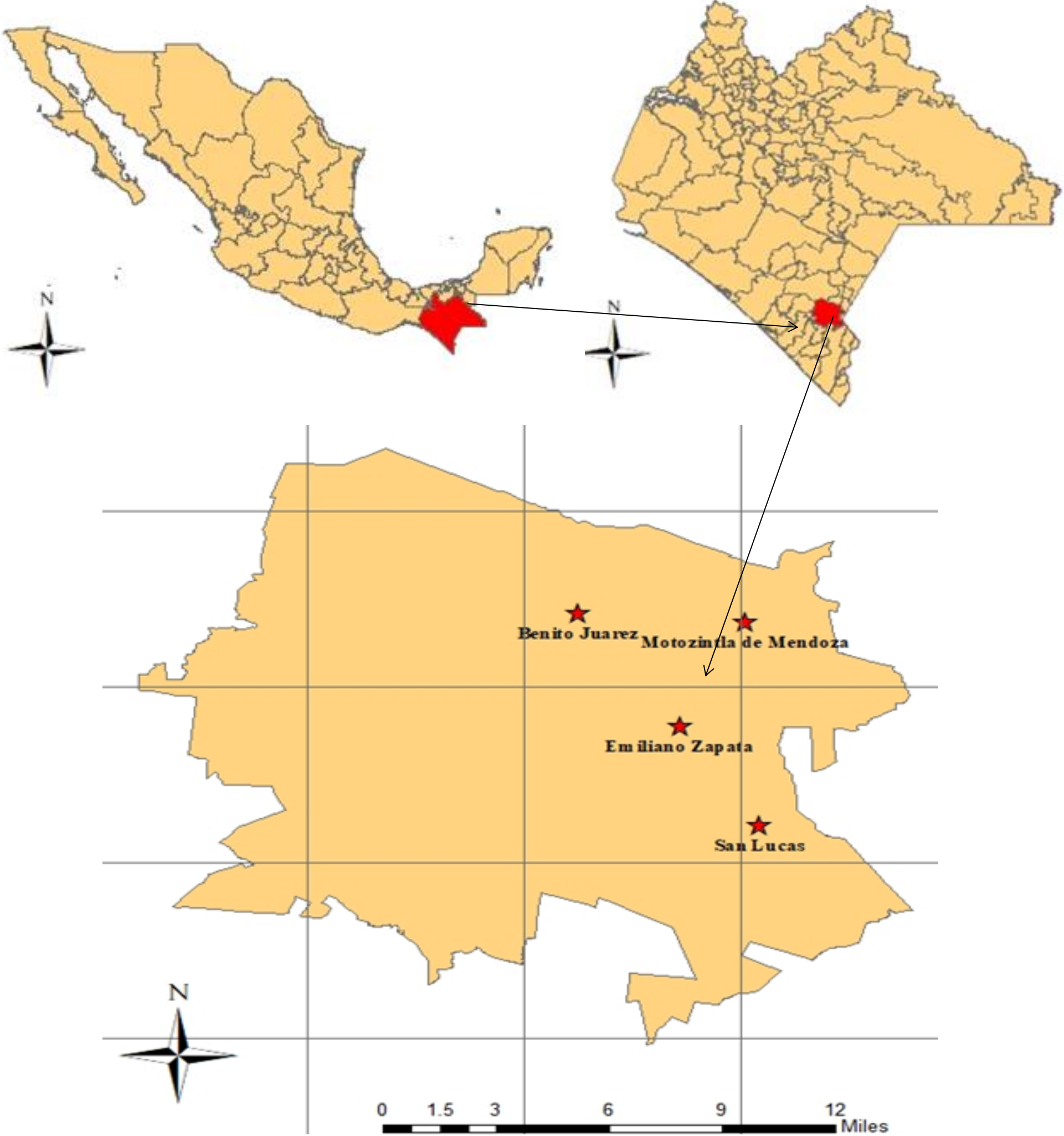
| Mocho language is almost extinct (≈400 speakers). | High biodiversity due to the tropical and humid climate. | Rainfall average can be 3000 mm per year. | Mocho comunnity depends on agriculture (57.7 %). |

MATERIALS AND METHODS

Fieldwork was carried out from March to October 2016 in four communities of Motozintla, Chiapas.

The data were collected by semi-structured interviews, samplings were based on the methodology with a random sampling. All the informants were indigenous and permanent residents of the community "Mocho".

On the ethnobotanical information, it included sources of traditional knowledge, uses of the plants, mode of administration, plant parts harvested, and dosage for each remedy.

All plant material was collected and identified taxonomically with periodic visits to different botanical gardens and the herbariums.

DATA ANALYSIS

Collected data were transformed into Use Report (UR) and Relative Frequency of Citation (RFC). Then the data was analized using the next ethnomedicinal indixes.
- Medicinal Use Value (MUV) demonstrates the relative importance of the species for medicinal purposes.

$$(MUV) = \sum a\ MU\ /\ N$$

- Informant Consensus Factor (ICF) shows the homogeneity of knowledge about using the species in each disease's category.

$$(ICF) = (nur - nt)\ /\ (nur - 1)$$

RESULTS

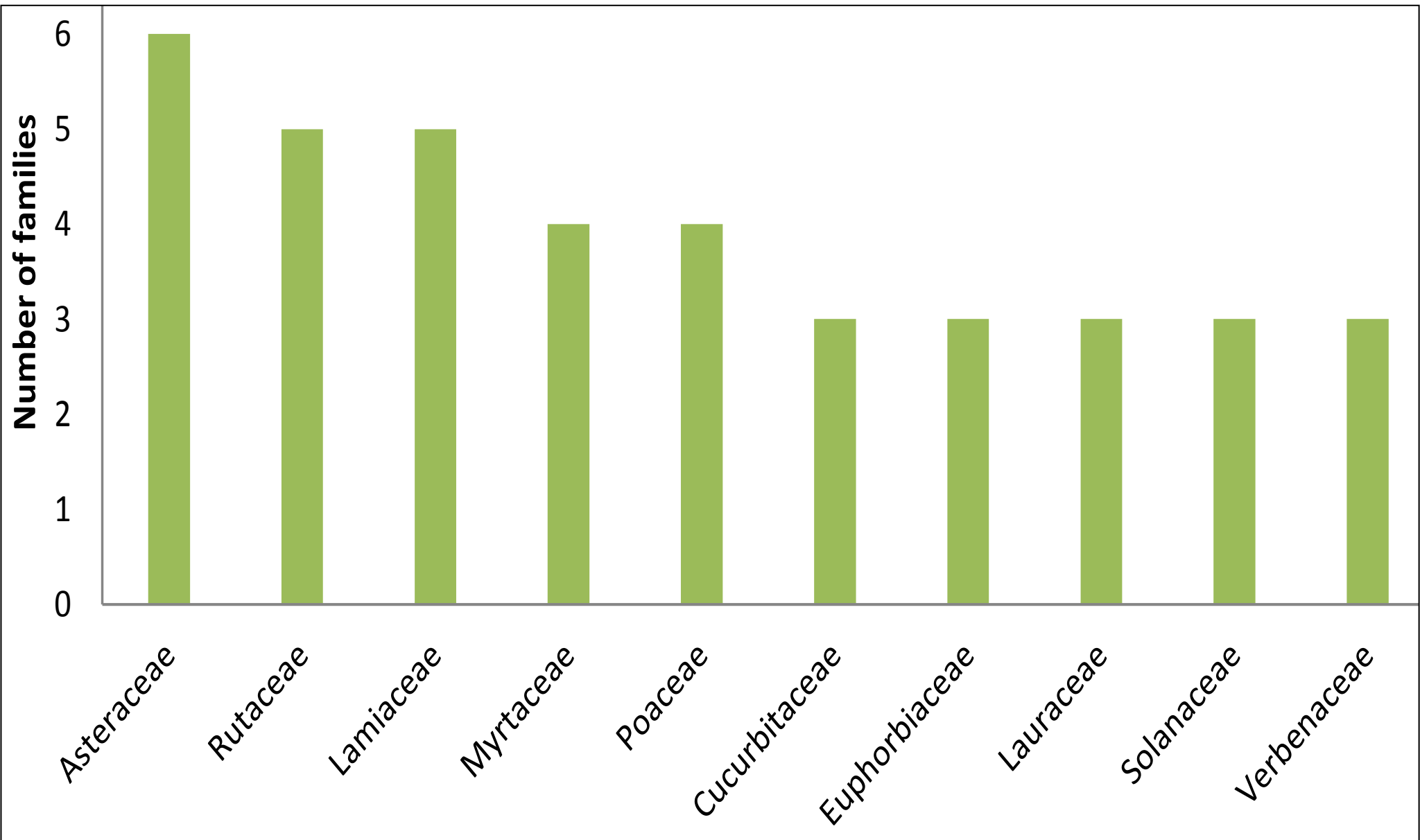In total 83 medicinal plant species, belonging to the 44 families were documented.

Figure 2.- The most cited botanical plant families in the study

Asteraceae was the most dominant family (six species), followed by *Lamiaceae* and *Rutaceae* (five species each), *Myrtaceae* and Poaceae (four species each). Verbenacea, *Solanaceae*, Lauraceae, Euphorbiaceae, Cucurbitaceae (three species each)(Figure 2).

The *Asteraceae* family is apparently a crucial component of the floristic richness of the environment in Central Mexico and rainforest areas.
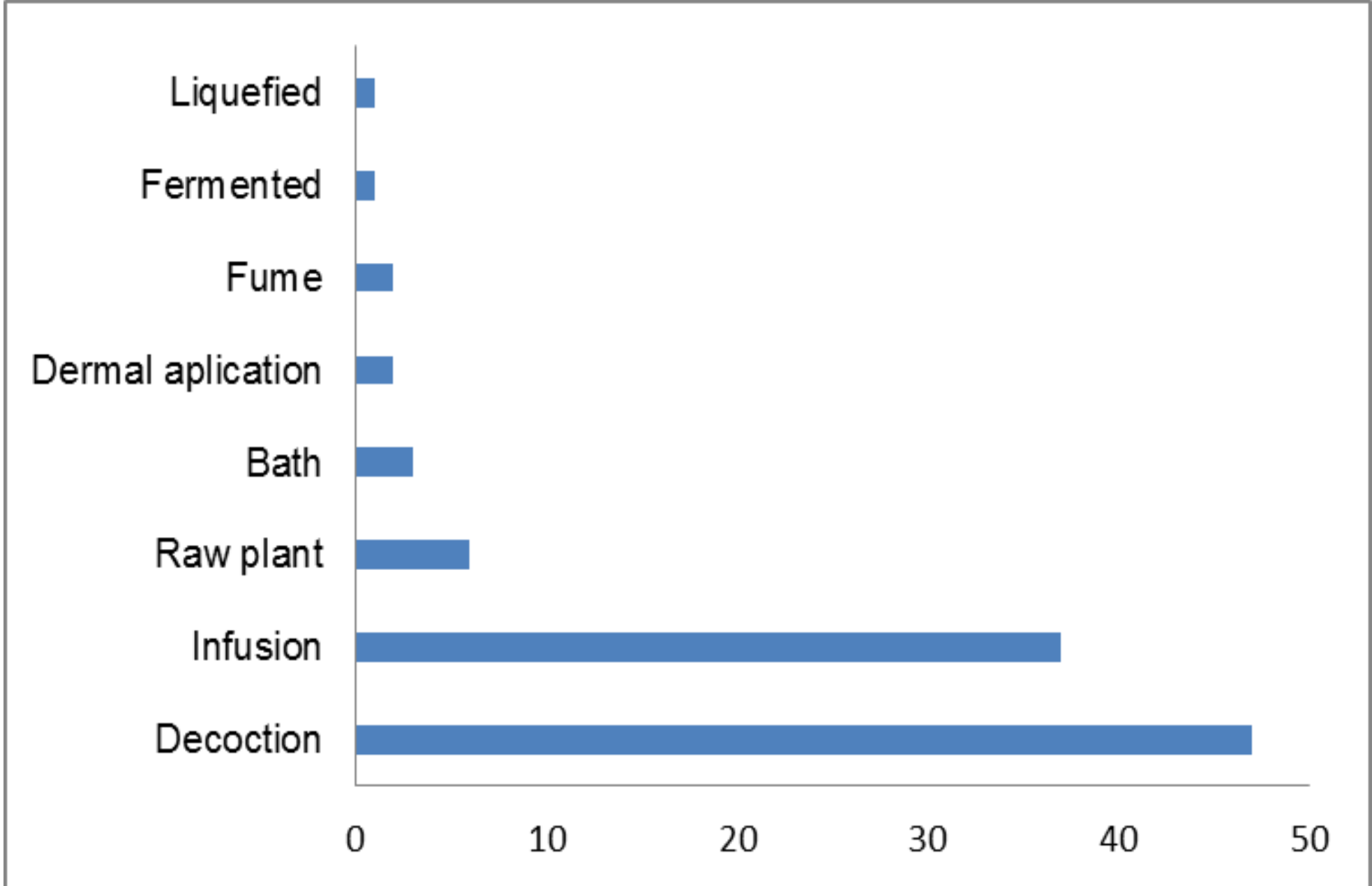

Figure 2.- Preparation mode (%)

The percentage of preparing plants is usually used in fresh (55%) and dried (30%) both (15%). Decoction is used commonly in traditional medicine.

The parts more used were leaves (46 %), awhole plant/stem (22 %), seed (9%), flower (8 %), root (6 %), and fruit (6 %) and bark (1 %).

Leaves store most of the chemical compounds in the form of secondary metabolites with biological activity

Table 1.- Most important medicinal plants in study area

No	Scientific name	Treated for diseases
1	*Matricaria chamomille L*	respiratory system, digestive system, colic pains, fever, diaphoretic, emollient charges and eye problems
2	*Verbena litoralis Kunth*	stomach pain, stomach cramps, ulcers, vomiting,diarrhea, cough infections, typhoid, bronchitis, dermattis, malaria, diabetes, fever, and some sexually transmitted diseases
3	*Bursera simaruba (L.)*	skin affections like sores, measles, sunburns, insect bitesand rashes
4	*Dysphania ambrosioides*	intestinal parasites of humans and domestic animals antifungal activity against different ailments, microorganisms, intestinal parasites, cramps, ulcers, indigestion, colds, asthma, flu and pneumonia
5	*Ruta graveolens*	menstrual pain, anxiety, stress, stomach acheand cold. gastrointestinal complains, bronchitis, antidiabetic

| *Matricaria chamomille L* | *Verbena litoralis Kunth* | *Bursera simaruba (L.)* |
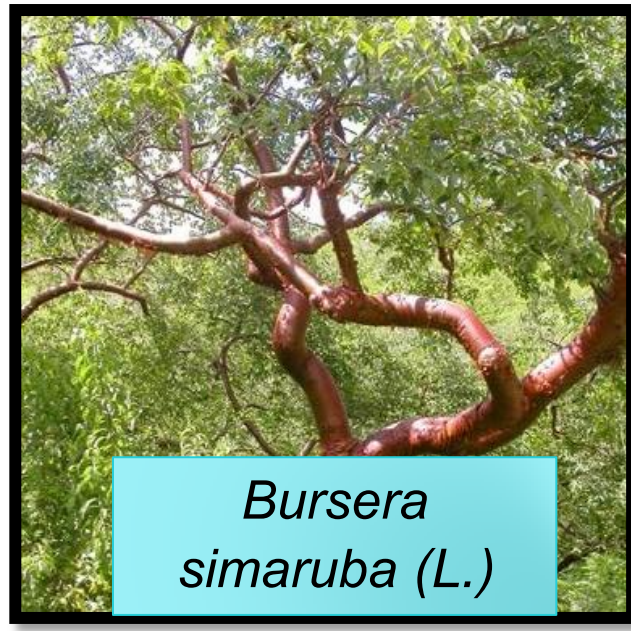
According to the results, 93% of the total participants used traditional medicine to solve health problems.To calculate ICF, the reported ailments were classified to 11 different disease categories (Table 2).

MUV of recorded plant species have been calculated with the highest numberof values for *Verbena litoralis* – 0.186 MUV, *Matricaria chamomilla*– 0.163 MUV, *Foeniculum vulgare*, *Bursera simaruba*, *Ananas comosus*, *Ruta graveolens*, Dysphaniaambrosioides, *Mentha × piperita* – 0.140 MUV each.

Table 2. ICF of reported plant species

No	Diseases category	ICF	No. of species	No. UR	% total UR
1	Reproductive system	0.76	6	22	5.95
2	Diseases of the skin	0.75	11	41	11.08
3	Diseases of the musculoskeletal system	0.75	2	5	1.35
4	Diseases of the respiratory system	0.69	17	52	14.05
5	Diseases of the nervous system	0.67	11	31	8.38
6	Auto immune	0.67	2	4	1.08
7	Digestive and gastrointestinal system	0.65	36	102	27.57
8	Urinary tract	0.64	6	15	4.05
9	General problems	0.63	26	69	18.65
10	Chronic degenerative	0.6	7	16	4.32
11	Diseases of the cardiovascular system	0.4	7	11	2.97

CONCLUSION

For treating 11 categories of diseases, 83 species of medicinal plants were registed. Among all the categories, diseases of gastrointestinal and gastroimtestinalsystems had the highest number of references and use-reports. The highest ICF index had diseases of the reproductive system (0.76), diseases of the skin and muculoskeletal system (0.75) .

It is necessary to carry out more ethnobotanical studies and inventories to preserve this knowledge for future generations, then traditional medicine could be a good source of information for the developing new drugs.
There is not control in the wild gathering of the used plants by the locals, and it could affect the future availability of the plants in the surronding ecosystems.

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