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## EXPERIMENTAL PAPER

# Ethnobotanical knowledge and folk medicinal significance of the flora of district Gujrat, Punjab, Pakistan

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## Summary

**Introduction:** Medicinal plants are the natural source of medicines used in treatment of many diseases among local communities of various countries. It is also the raw material for the pharmaceutical industry. Pakistan is a country with a variety of medicinal plants, comprehensively studied in some areas, while others still need more studies of their flora.

**Objectives:** The study was performed to catalogue the flora of district Gujrat, Punjab, Pakistan and to assess its ethnomedicinal importance.

**Methods:** A field survey was conducted in the Gujrat district (including Sarai Alamgir, Gujrat and Kharian) in 2019–2020 to collect the flora. Nearly 200 people of various age groups were interviewed and the questionnaire was filled, the gender and professions of the participants were also noted.

**Results:** The plant species collected belonged to 32 different Angiosperm families i.e. *Poaceae*, *Brassicaceae*, *Fabaceae*, *Asteraceae*, *Moraceae*, *Amaranthaceae*, *Apiaceae*, *Myrtaceae*, *Rutaceae*, *Solanaceae*, *Malvaceae*, *Euphorbiaceae* and *Lamiaceae*. The obtained material consisted of 30 herbs, 20 shrubs and 22 trees. The floral parts used most often were leaves (63%) followed by: flower (41%), fruit (28%), stem (16%), seed (16%), bark (14%), root (13%), whole plant (12%), underground part (3%) and latex (3%). According to the study, the highest RFC (Relative Frequency of Citation) values were 0.1 in *Cassia fistula* L. (0.25) and the smallest RFC values were observed in *Stellaria media* (L.) Vill. – 0.025. The highest UV (Use Values) were noted for *Achyranthes aspera* L. at 0.9. In disease category, the highest value (0.67) of ICF (Informant Consensus Factor) was observed for stomach and skin infections, while the lowest ICF value was noted for diabetes and gonorrhoea (0.27).

**Conclusions:** It was concluded that the Gujrat district is rich in useful plants that can be used in the preparation of various medicines as well as be sold on the herbal market.

Keywords: *District Gujrat, medicine, ethnomedicinal flora, survey, native people*

Słowa kluczowe: *provincia Gujrat, lek, rośliny lecznicze używane w medycynie ludowej, badanie ankietowe, rdzenni mieszkańcy*

## INTRODUCTION

Gujrat is a district of Pakistan, situated between the Jhelum and Chenab rivers. It is spread over an area of 3,192 km<sup>2</sup> and consists of three tehsils (townships): Sarai Alamgir, Kharian and Gujrat. It has a moderate climate but the temperatures vary significantly between seasons, with very warm summers and cold winters. During summer, temperatures rise up to 46°C, though only for a relatively short period due to the nearby hills of Azad Jammu and Kashmir. During winter temperatures drop below 2°C [1].

In Pakistan, there is a significant diversity of climate, geographical areas and conservation areas [2]. They contain a variety of large, speckled and various other kinds of plants. Almost 600 species of angiosperm flora are recorded in Kashmir and Pakistan [3]. It has been concluded in the study of ethnomedicinal flora, that these plants were utilized by the initial inhabitants of these areas [4]. In developing countries, almost 80% of people are utilizing traditional ethnomedicinal flora as cures for various ailments [5]. There are a number of plant species exhibiting pharmaceutical properties growing in the wild, making it easy for people to gather and utilize them [6]. By utilization of infective microorganisms, the flora and fauna act against bacteria and fungi by use of chemicals extraction from important deep enact flora [7].

There are approximately 6000 species which are gathered and used as cures for various diseases and 600 species are used as pharmaceutical sources [8]. For particular health disorders, the families of flora such as *Apiaceae*, *Fabaceae*, *Poaceae*, *Solanaceae* and *Moraceae* are consumed. They are involved in various cellular activities like radical scavenging, stimulant, alimentary canal, portliness diseases caused by microorganisms, inflammation, pain killers. They are also a good source for collection of bio pesticides [9]. According to latest Pharmacopoeia, approximately 25% of drugs are described due to its importance in medicinal plants. The chemicals that are obtained from pharmaceutical flora are almost 25% in their number. Pharmaceutical flora is also consumed by the native people of Gujrat to treat various ailments [10].

This study was undertaken to explore the flora in district Gujrat, Punjab, Pakistan and its medicinal importance through folk knowledge.

## MATERIALS AND METHODS

Field surveys were conducted in three tehsils of district Gujrat: Sarai Alamgir, Gujrat and Kharian in 2019 and 2020, to collect the flora. Map of the selected area is given in figure 1. A number of field tours were conducted. Approximately 200 people of different age groups, genders and professions were interviewed and filled a questionnaire for the documentation. Plants collected during the survey were dried and preserved in herbarium sheets. Plants were identified with the help of "Flora of Pakistan".

### Data analysis

The data was analysed for different parameters to find the ethnomedicinal importance of the flora.

### Use value (UV)

Use Value (UV) was used to determine the relative importance of a given species collected from the area. It was calculated by the following formula:

$$UV = \sum U/N,$$

where:

U – the number of citations per specific plant,  
N – the number of informants.

### Informant consensus factor (ICF)

Information of related homogeneity mixture of disease category obtained from informants was calculated by this formula:

$$ICF = (Nur - Nt) / (Nur - 1),$$

where:

Nur – the number of citations from informants

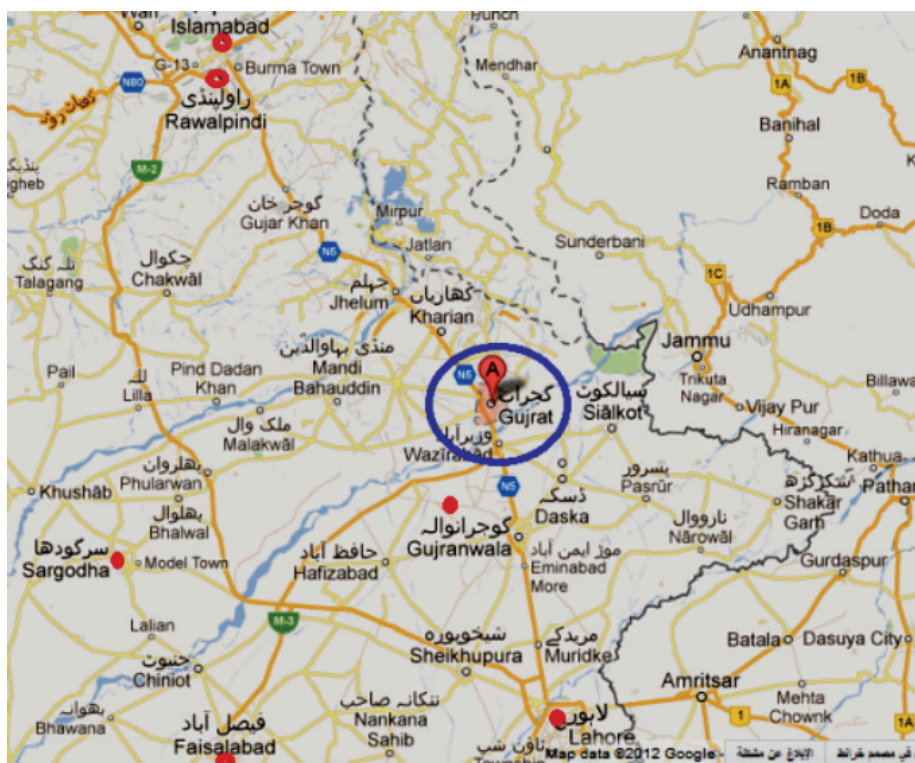


Figure 1

Map of study area (district Gujrat, Punjab, Pakistan)

for a particular plant-use category,

Nt – the number of species or taxa utilized by all the informants for that specific plant use category.

ICF had ranged from 0 to 1, where ICF value of 1 indicated the highest level of informant consensus and 0 was the lowest value.

### Fidelity level (FL)

The fidelity level was calculated to search out the value of the species related to medicines:

$$FL(\%) = (N_p/N) \times 100,$$

where:

N<sub>p</sub> – the number of species that is present in a specific category.

For accurate sum consumption for particular species, N was used.

### Relative frequency of citation (RFC)

RFC was calculated by the given formula:

$$RFC = FC/N,$$

where:

FC – the number of informants using that species,

N – the total number of informants in the survey.

*Ethical approval:* The conducted research is not related to either human or animal use.

## RESULTS

### Distribution of families

During the surveys, it was found that plant species collected belong to 32 angiosperm families. Ranking of families was based on the number of species present in the area, i.e. *Poaceae* was placed at 1<sup>st</sup> rank due to the presence of the highest number of species in the area which was 9 species. *Brassicaceae* and *Fabaceae* had 6 species each, and *Asteraceae* had 5 species in the study area.

There were 4 species for families *Moraceae* and *Amaranthaceae*. *Apiaceae*, *Myrtaceae* and *Rutaceae* had 3 species, *Euphorbiaceae*, *Lamiaceae*, *Malvaceae*, *Solanaceae*, *Amaryllidaceae* and *Apocyanaceae* had 2 plant species, while all the other identified families had only 1 plant species (fig. 2).

## Plant identification and ethnomedicinal uses

The data related to botanical name, family, local name, UV, RFC, local uses, part used, prescription, dosage, form of use and diseases is described in table 1. All these medicinal plants are traditionally used in healing, according to the informants. The most commonly collected plant at various locations was *Acacia modesta* which was used in healing wounds, once a day. Powder made from the bark of *Achras sapota f. asperma* was used during childbirth to control pain. Wounds and pimples were cured with the bulb of *Allium cepa*, *Aloe vera* was helpful in removing dandruff from hair with other ingredients like yoghurt, egg and oil. Stem and leaves of *Amaranthus viridis* were mixed with rice and used to ease menstrual pain. Seeds of *Bombax ceiba* mixed with black musli and sufeed musli were recommended in diarrhoea, used once a day. Oil obtained from the seeds of *Brassica campestris var. sarson*. was helpful for colds, joints and arthritis. For general body pain, oil from mustard plant mixed with the leaves of *Calotropis procera* were rubbed on the body surface. Oil obtained from *Carthamus oxycantha* was the best for respiratory tract problems. Decoction made from the bark of *Cassia fistula* was utilized for constipation. People used leaves of the *Chenopodium album* for the pain of joints and kidney. For fever, lemon water was used as herbal tea with other spices. Herbal tea made from the leaves of *Cymbopogon citratus* was used in cholera and stomach problems. Leaves of *Eucalyptus globulus* were ground to make powder that was helpful in

digestion. Poultice made from the leaves of *Lepidium bonariense* was used for body pain and diabetes. For digestive disorders, leaves of the *Mentha arvensis* was recommended thrice a day. For general body weakness, people used *Phoenix dactylifera* twice a day with milk. Leaves of the *Stellaria media* were directly applied on the surface of a wound for healing. The roots of *Withania somnifera* were used to control symptoms of stress. Fruit obtained from the *Ziziphus jujuba* was used for the treatment of stomach and hepatitis disorders (tab. 1).

According to this study, it can be concluded that use value (UV) was 0.23–0.9. *Achyranthes aspera* showed highest UV (0.6) whereas *Spinaciae oleraceae* had lowest UV (0.23) among all the species collected from the area (tab. 2). Relative frequency of citation (RFC) and UV were used to search floral species that can be utilized for the manufacturing of medicines. It has been observed that the flora of the area showed RFC value ranged from 0.025 to 0.1 (tab. 1). Floral species of low RFC value was *Stellaria media* (0.025) whereas the highest value was in *Cassia fistula* (0.25).

## Parts used in ethnomedicine

The plants parts used in medicines were leaves, roots, stem, latex, seeds and whole plant (tab. 1). For the preparation of basic medications, floral species were used in the form of herbal tea, distillation, decoction and paste powder. Percentage of the used parts was as follows: leaves (63%), flower (41%), fruit (28%), stem

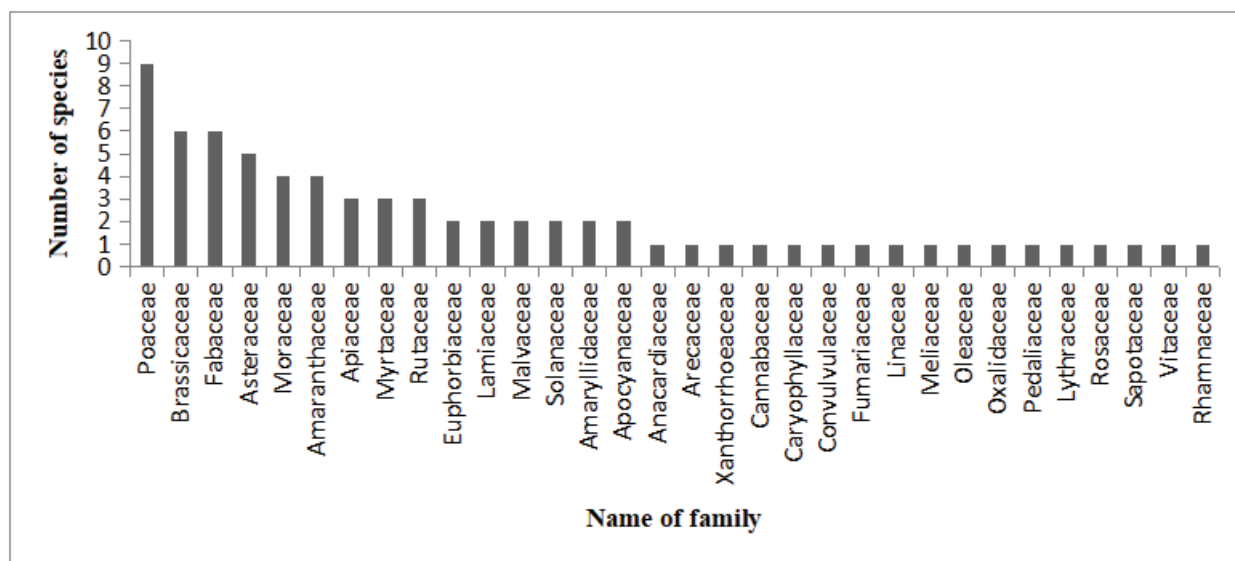


Figure 2

Family index with highest number of species used in study area

**Table 1**  
Identification of plants, medicinal values and methods of use

Botanical name	Family	Common name	UV	RFC	Local use	Part use	Prescription	Time of use	Form of use	Use of drug
<i>Acacia modesta</i> Wall.	<i>Fabaceae</i>	Phulai, jangli kikar	0.733	0.075	Teeth problems, cure gastric problems	Bark and stem	Take bark and gum of this plant and make solution	1 time per day	Dry and also fresh form	Use for wound
<i>Acacia nilotica</i> (L.) Delile.	<i>Fabaceae</i>	Kikar, Gum Arabic	0.66	0.055	Pyrexia, digestive problems, gonorrhoea, antiseptic, skin infections and blood purification	Flower bark, seed, gum twinges	Bark and sodium chloride heat up to make mixture	3 times per day	Fresh form	Toothache
<i>Achras sapota</i> f. <i>asperma</i> M. Gómez	<i>Sapotaceae</i>	Chiku	0.33	0.045	Diuretic and useful in fever.	Bark, fruit, seed	Bark is use to make powder that is used on the body of female after birth	1 time per day	Dry form	For delivery purpose in female
<i>Achyranthes aspera</i> L.	<i>Amaranthaceae</i>	Puth Kanda	0.9	0.08	Cough, kidney problem, dysentery, skin disease, rheumatism, stomach pain and toothache	Whole plant body	Puthkanda leaves and honey bee	3 times per day	Dry form	Cough
<i>Albizia lebeck</i> (L.) Benth	<i>Fabaceae</i>	Shrin	0.6	0.065	Lung problems, blood purification abdominal tumours, boils, cough, hernia, secondary infertility, eye infections, flu and tonic	Stem, bark	Leaves boil in water	1 time per day	Fresh leaves	Showering baby after birth
<i>Allium cepa</i> L.	<i>Amaryllidaceae</i>	Piyaz, Onion	0.33	0.05	Diabetes, blood sugar level, diuretic, arteriosclerosis	Bulb	After boiling the bulb of onion use for wound	1 time per day	Fresh form	Use form pimple treatment
<i>Allium sativum</i> L.	<i>Amaryllidaceae</i>	Garlic, Thom	0.6	0.06	Liver disorder, bronchitis, fever, cancer disease, low blood pressure	Leaves, bulbils	Use sap after gridding the lissan	2 times per day	Dry form	Eyes treatment
<i>Aloe vera</i> (L.) Burm.f.	<i>Xanthorrhoeaceae</i>	Kawar gandal	0.42	0.1	Skin disorders, inflammation, itchiness, skin disorder, stomach problem and gum bleeding	Leaves	Yoghurt, egg, <i>Aloe vera</i> jel and oil homogenize it	1 time per week	Fresh form	Remove dandruff
<i>Amaranthus viridis</i> L.	<i>Amaranthaceae</i>	Green amaranth, Cholai	0.33	0.055	Fever, asthma, liver disorder, urinary, eye problem and menstrual problem in female	Leaves and stem	Stem and leaves after grinding are mixed with the rice water	1 time per day	Fresh form	To control menstruation
<i>Avena sativa</i> L.	<i>Poaceae</i>	Jai, Oat	0.43	0.06	Constipation, cure of tension and skin allergies	Seed	Gridding seed, sugar and water	1 time per day	Dry form	To control temperature of body

<i>Bombax ceiba</i> L.	Malvaceae	Simbel	0.7	0.08	Snake bites, dysentery, inflammation, blood purification, genital organs treatment, stimulant, gonorrhoea and ulcer of bladder	Bark, flower, roots and seeds	Seed combine with black musli and sufeed musli	1 time per day	Dry form	Best for diarrhoea, dysentery
<i>Brassica campestris</i> L.	Brassicaceae	Musturd, Saag	0.46	0.04	Skin disorders, cure of snake bites	Flowers	Oil got from seeds of mustard plant is mix with leaf of akk plant and rubbed	3-4 times per day	Dry form	Abdominal pain
<i>Brassica oleracea</i> L.	Brassicaceae	Cauliflower	0.43	0.045	Laxative, inflammation, anticancer, antioxidant and neuro-degenerative disease	Leaves	Take 1 cup of chopped cauliflower leaves and then cooked properly	1 time per week	Fresh leaves	Control diabetes
<i>Brassica rapa</i> L.	Brassicaceae	Gonglu, Shalgam, turnip	0.46	0.055	Stomach problem, asthma, boosts immune system, atherosclerosis and cardiovascular disease	Leaves, fleshy tap root, seed	Take leaves, seed and then ground it to make powder. This power is recommended for cancer treatment	2 times per day	Fresh also dry form	Cancer treatment
<i>Brassica campestris</i> var. <i>sarson</i> . Prain	Brassicaceae	Toria	0.56	0.07	Cold, influenza, fever, bronchitis and rheumatic pains	Seed	Oil obtained from the seed of toria plants are used as medicine to treat number of diseases	1 time per day	Dry form	Cold, joints and arthritis
<i>Calotropis procera</i> (Aiton) Dryand.	Apocyanaceae	Akk, Sodom apple, rubber tree	0.66	0.095	Deafness, piles, baldness, wound healing, toothache, pain reducing and skin disease	Leaves, seed, flower root and latex	Oil got from seeds of mustard plant is mix with leaf of akk plant and rubbed	3-4 times per day	Dry form	For any type of body pain
<i>Cannabis sativa</i> L.	Cannabaceae	Bhaang	0.8	0.075	Intoxication, loss of appetite, control inflammation of body, asthma, bronchitis, headache, flu, cough and pains	Whole plant	Seed and leaf use to make poultice	Twice a day	Fresh form	For burn and muscular pain
<i>Carthamus oxyacantha</i> M. Bieb.	Asteraceae	Poli	0.5	0.058	Treat ulcer problems, stomach infertility, ulcer, problems jaundice and also cure scabies	Whole plant	Oil is used as tonic	1 time per day	Dry form	Respiratory problem
<i>Carthamus roseus</i> L.	Apocyanaceae	Sada bahar, Periwinkle	0.53	0.095	Pain, headache, immunity, anticancer, antidiabetics, skin infection and cardiovascular disease	Root, shoot, leaves	Take sada bhar leaves, boil them and make poultice	Twice a day	Fresh leaves	Blood cancer, diabetes, Alzheimer
<i>Cassia fistula</i> L.	Fabaceae	Amaltas, Golder tree	0.66	0.065	Skin infection, fever, ageusia, constipation purposes and for pain reliving	Bark, fruit, leaves roots	5 g fruit, 2 g bark, 1g leaves and roots to make decoction use with water	Twice a day	Fresh form	Constipation

<i>Chenopodium album</i> L.	Amaranthaceae	Bathu	0.7	0.08	Urinary problems, skin problems, constipation, jaundice and laxative	Leaves and stem	3 g leaves and mix with water and use for kidney stone	Twice a day	Dry form	Kidney store, joint, skeleton
<i>Cirsium arvense</i> (L.) Scop.	Asteraceae	California thistle, Lay	0.5	0.05	Toothache, tonic, diuretic, liver disorder and treat worm in children	Roots				
<i>Citrus limon</i> (L.) Osbeck	Rutaceae	Lemon	0.43	0.025	Teeth infection, stomach problem	Fruits	Take lemon water 6 g and add in herbal tea	Twice a day	Fresh form	For fever control and hepatitis
<i>Citrus paradise</i> Macfad.	Rutaceae	Grape fruit	0.4	0.07	Antiseptic, astringent and treat muscle fatigue	Whole plant body	Juice is use for fever	Twice a day	Fresh	Fever control
<i>Citrus sinensis</i> (L.) Osbeck	Rutaceae	Orange, Malta	0.36	0.05	Fever, scurvy, inflammation and nervous disorders	Flower	Juice of orange	Thrice a day	Fresh	For liver and kidney
<i>Convolvulus arvense</i> L.	Convolvulaceae	Lali, Vahri, Bind Weed	0.63	0.075	Constipation, immunity, anti-diabetics, control anaemia, menstrual problem, laxatives, fever and also improve poor vision	Whole plant	Dry form of leaves use with milk	Twice a day	Fresh form	For cough and asthma, heart problem
<i>Coriandrum sativum</i> L.	Apiaceae	Dania	0.6	0.085	Stomach problem, loss of appetite, diarrhoea, joints problem, toothache, measles and haemorrhoids	Stems and leaves	Dania leaves and seed	Twice a day	Fresh	Increase memory of human brain, and cool up body
<i>Cymbopogon citratus</i> (DC.) Stapf	Poaceae	Lemon grass	0.7	0.02	Stomach problem, obesity control, headaches, respiratory problem, CNS problem, fever, insect repellent and indigestion	Leaves	Make herbal tea from the leaves of lemon grass in which also add sabaz ilachi and dal chini	Twice a day	Fresh leaves	Cholera and stomach problem
<i>Cynodon dactylon</i> (L.) Pers.	Poaceae	Bermuda/bham grass	0.53	0.055	Laxative, wounds problem, bronchial disorders, and also kidney disorder	Whole plant	Paste of bham grass plant is useful to cuts and wounds	2-3 times per day	Fresh part	Peripheral bleeding
<i>Dactylis glomerata</i> L.	Poaceae	Barnyard grass	0.43	0.035	Fever, tumours, kidney and bladder ailments	Flower and stem	Take leaves fresh and dry	1 time per day	Fresh	Fever
<i>Dalbergia sissoo</i> DC.	Fabaceae	Tali, Shisham	0.7	0.075	Nose bleed, gonorrhoea, stop vomiting, boils and skin disorder	Leaves	Take 2 g leaves and fruit	Twice a day	Fresh form	Epilepsy
<i>Eclipta prostrata</i> (L.) L.	Asteraceae	White twin head	0.56	0.52	Allergy, athlete's foot and ringworm, constipation, fever, body pain, bp problem	Leaves	Plant juice mix with essential oil	1 time per day	Fresh form	Use for jaundice

<i>Eucalyptus globulus</i> Labill.	Myrtaceae	Safeeda, Eucalyptus	0.76	0.08	Common cold, nose infections, antiseptic	Leaves	Grind leaves to make powder	1 time per day	Dry leaves	Use for wounds and itchiness
<i>Euphorbia helioscopia</i> L.	Euphorbiaceae	Wolf's milk	0.56	0.052	Asthma, anthelmintic, throat, anticancer properties, vermifuge, fever, cholera and tumours	Leaves, stem, roots, seeds, oil	2 g leaves of wolfs milk, 4 g sharbaty bazuri.	1 time per day	Fresh form	Intestinal problem
<i>Ferula communis</i> L.	Apiaceae	Soyae	0.33	0.04	Skin diseases, vermifuge, an anti-hysteric, for dysentery, and as an aphrodisiac	Inflorescence, root	Make Joshanda of soyae	1 time per day	Dry from	For uterus pain and pain of kidney
<i>Ficus benghalensis</i> L.	Moraceae	Bohar	0.6	0.045	Cough, flu, chronic flu and influenza, gonorrhoea	Latex	Take latex 20 g, milk 10 g, gum of kikar 20 g and mosli safaid 20 g and satawar 20 g to make tablets	Two tablets per day	Dry form	Makes body strong and enhances the production of sperm in male
<i>Ficus carica</i> L.	Moraceae	Fig	0.63	0.055	Asthma, gonorrhoea, piles, heart diseases, diabetes and ulcer and urinary tract infection	Leaf, bark, fruit	Use two to three piece of fruit	1 time per day	Fresh and dry form	For constipation
<i>Ficus religiosa</i> L.	Moraceae	Peepal	0.66	0.095	Nervous problems, gonorrhoea	Bark	Milky latex obtained from the bark of peepal and mix with honey bee and ghee	1 time per day	Dry form	To treat impotency and conceiving ability of female
<i>Foeniculum vulgare</i> Mill.	Apiaceae	Sonaf, Fennal	0.7	0.035	Digestive problem, vomiting, heart burn (Pyrosis) and dyspepsia, breast enlargement and cancer treatment	Seed	A decoction of seed is obtained by boiling of 6- 7 seed with water	2 to 3 times per day	Dry form	Headache, laxative
<i>Fumaria indica</i> (Hauskn.) Pugsley	Fumariaceae	Papra	0.33	0.41	Diarrhoea, influenza, vomiting, blood purification, skin disease, constipation, fever and pimples	Whole plant	Take papra in fresh or dry form and make decoction and boil with water	Use twice a day	Fresh or dry form	Effective for fever, cold dengue
<i>Jasminum sambac</i> (L.) Aiton	Oleaceae	Motia, jasmine	0.3	0.09	Removing intestinal worms, jaundice and venereal diseases	Flower	Oil make from the flower and leaves of the jasmine use to alleviate pain	1 time per day	Dry form	Alleviates pain and inflammation
<i>Lepidium bonariense</i> L.	Brassicaceae	Argentine pepper	0.23	0.035	Asthma, bronchitis, cough, enhancement of memory, skin and hair care, pain, diabetes	Leaves	Poultice of the leaves was used to applied on the treatment of croup	Twice a day	Fresh	Croup, pain, diabetes
<i>Linum usitatissimum</i> L.	Linaceae	Alsi	0.33	0.055	Inflammation, scalds and swellings, emollient, demulcent, pectoral, and diuretic	Seed	Take 2 teaspoon of seed and mix with water	1 time per day	Dry form	Cure constipation



<i>Lycopus exaltatus</i> L.f.	<i>Lamiaceae</i>	Cut leaves	0.5	0.065	Skin problem, astringent, sedative and also for tuberculosis, narcotic, contraceptive effect	Flower, stem and leaves	Leaves of this plant applied directly to healing of wounds	2-3 times per day	Fresh	Healing of wound
<i>Malva sylvestris</i> L.	<i>Malvaceae</i>	Blue mallow, Pick-cheese	0.33	0.095	Wound healing, ulcers and bladder, indigestion, gastric mucus, relaxing activity and diuretic	Leaves, flower	Take leaves and flower of this plant and put into warmly water for few hour	2-3 times per day	Fresh form	Cough cure
<i>Mangifera indica</i> L.	<i>Anacardiaceae</i>	Amm, Mango	0.4	0.085	Improper digestion, ear pain, vomiting and stomach disorder	Leaf, seed	1 seed pulp of mango and 1 teaspoon of corn flour mixed with it	Take one time in morning in a day	Fresh form	To control diabetes
<i>Medicago sativa</i> L.	<i>Fabaceae</i>	Barseen, Shatala, alfalfa	0.43	0.045	High cholesterol level and asthma, osteoarthritis, diabetes, upset stomach, bleeding disorder	Flower and seed	Take 10 g each as ginseng, oat, alfalfa and use to make syrup	Adult take twice a day	Fresh	To control mental fatigue, loss of appetite
<i>Melia azedarach</i> L.	<i>Meliaceae</i>	Dareek	0.46	0.065	Ulcer and skin problems, gout, inflammation	Leaves and root	Leaves of dareek, Gandak amla saar, jamal gota of equal volume to prepare tablets	4 times per day with milk	Dry form	Ulcer, itchiness
<i>Mentha arvensis</i> L.	<i>Lamiaceae</i>	Podina, Mint	0.63	0.06	Cough, mouthwash, herbal tea and digestive problem	Leaves and stem	Take podina leaves and ajwain, ginger and noshadar 10 g and black paper 10 g to make decoction	Trice a day	Dry form	For digestive purpose
<i>Morus nigra</i> L.	<i>Moraceae</i>	Shatoot	0.6	0.09	Colds, eye infections and nose bleeds, asthma, influenza, cough, bronchitis and diabetes	Bark and leaves	Shatoot fruit and malathi	Trice a day	Fresh form	Sore of throat and for cough
<i>Oxalis corniculata</i> L.	<i>Oxalidaceae</i>	Miyan, Creeping wood-sorrel	0.63	0.045	Dysentery, digestive problems, diuretic, diarrhea, urinary tract infections, skin rashes, digestive problems, fever and influenza	Leaves	Dry leaves grind to make powder	2 times per day	Dry form	Use for snake bite
<i>Parthenium hysterophorus</i> L.	<i>Asteraceae</i>	Santa maria, Gandi booti	0.36	0.07	Treat toothache, kill tape worm, cure malaria	Leaves and flower	Decoction of gandi booti is use in traditional medicine	1 times per day	Fresh form	Fever, urinary track infection
<i>Pedaliium murex</i> L.	<i>Pedaliaceae</i>	Pakhra, Gokhru	0.26	0.055	Cough, cold, antiseptic and gonorrhoea	Leaves	Take leaves of pakhra and seed of two gram grind to make powder	2 times per day	Dry or fresh form	Purification of blood
<i>Pennisetum mezianum</i> Leeke	<i>Poaceae</i>	Lynda, Barner grass	0.33	0.055	Appetizer, tonic, heart diseases and pimples, cataracts and wound healing	Leaves and stem	Plant leave use to make powder and mix with honey	3 times per day	Fresh form	For cough

<i>Phoenix dactylifera</i> L.	<i>Arecaceae</i>	Date, Khajur	0.7	0.075	Fever, diarrhea, general body weakness, respiratory diseases and also help to reduce blood pressure	Fruits	Kajor, badam, pista, karamphal and sonaf are homogenize	2 times per day with milk	Take dry sample	Control general weakness
<i>Psidium guajava</i> L.	<i>Myrtaceae</i>	Amrood, Guava	0.73	0.175	Cancerous disease and also improve appetite, cure stomach problem	Fruit	Recent research observed that eating of large amount of guava daily up to 12 weeks its lowering the blood pressure	3-4 times per day	Fresh	Control high blood pressure
<i>Punica granatum</i> L.	<i>Lythraceae</i>	Anaar, pome granate	0.63	0.058	Stomach disorders, menstrual irregularities	Fruit, bark	12 g Japanese fruit, 12 g bark of anaar, 12 g kutraj are mix with 1 l water to make 250 g solution	3 times per day	Fresh form	Intestinal infection
<i>Raphanus sativus</i> L.	<i>Brassicaceae</i>	Mooli, radish	0.33	0.05	Liver and stomach problem, weight loss, antidiabetics, intestinal disease and for renal problem	Underground part	Take moli leaves and sugar grind it to get sap	1 time per day	Fresh form	Hepatitis
<i>Ricinus communis</i> L.	<i>Euphorbiaceae</i>	Andol, Castor oil	0.6	0.055	Bowels problems, constipation and stomach problem	Seed	6 g root and milk	1 time per day	Dry form	Liver and hepatitis
<i>Rosa indica</i> L.	<i>Rosaceae</i>	Rose, Ghulaab	0.73	0.075	Heart disorders, eye infection, asthma, break stone from kidney and gall bladder	Seed and flower	Gulgand 1 g, badam 50 g and sagmonia 10 g	Only night time	Dry form	For constipation and appetizer
<i>Saccharum officinarum</i> L.	<i>Poaceae</i>	Shorgum, Gana	0.7	0.045	Skin, urinary tract infections, syrup, jaundice, hemorrhage, baked product and other urinary disease	Stem	Unripe fruit of grapefruit and gana juice is mixed up	One cup per day for	Fresh sample	Dysentery
<i>Saccharum spontaneum</i> L.	<i>Poaceae</i>	European beach grass, saroot	0.4	0.04	Appetite, antimicrobial, antibacterial and antifungal.	Whole plant	Leave grinder to make joshanda	Twice a day		For constipation
<i>Solanum lycopersicum</i> L.	<i>Solanaceae</i>	Tomato	0.33	0.05	Skin disease, toothache	Fruit and leaves	Gridded tomato	1 time per day	Fresh	Produce RBCs
<i>Spinacia oleracea</i> L.	<i>Amaranthaceae</i>	Palak	0.23	0.04	Anti-diabetic, anti-bacterial and liver treatment, blood builder, promoting growth in children and appetite stimulant	Leaves	Salan of palak	2 times per day	Fresh	Inflammation of stomach
<i>Stellaria media</i> (L.) Vill.	<i>Caryophyllaceae</i>	Common chickweed	0.36	0.025	Cough, kidney irregularities, treat itchy skin conditions and pulmonary diseases	Leaves and flowers	Take chickweed leaves and applied directly to the surface of skin	2 times per day	Fresh leaves	Cure skin problem and ulcer
<i>Syzygium cumini</i> (L.) Skeels	<i>Myrtaceae</i>	Jamanu	0.5	0.08	Sore throat, diabetics and ulcers	Seeds, fruit barks, leaves	1 to 2 g powder of jaman seed mixed with 1 g water for one night. Helpful for high BP	Use in the morning for 15 days	Dry form	Diabetes

<i>Tagetes erecta</i> L.	<i>Asteraceae</i>	Marigold, gutta	0.43	0.045	Treat indigestion, pyrexia, earache, intestinal parasites, muscular pain, antifungal and cure piles	Flower and leaves	Paste of marigold use for cut of wound	2 times per day	Fresh leaves	External bleeding
<i>Triticum aestivum</i> L.	<i>Poaceae</i>	Wheat, gandum	0.26	0.06	Constipation, control colon diseases, reducing risk of cancer and gallbladder	Seeds	Take seed of gandum and then heat up in the oil. Obtained sab is rubbed on the wounds	2 to 3 times per day	Dry form	Cure wounds
<i>Vitis vinifera</i> L.	<i>Vitaceae</i>	Angoor, grapes	0.33	0.065	Fever, vomiting, weight loss and heart diseases	Fruit	2 g leaves and 1 g water to make one cup and then mix fruit of angoor	Use twice a day	Fresh	Hematemesis
<i>Withania somnifera</i> (L.) Dunal	<i>Solanaceae</i>	Aksan, Ashwaghandha	0.63	0.035	Asthma, spasm, rheumatism, artherosclerosis and sedation	Leaves and flowers	Take root of aksan about 300 g daily after food	Twice a day	Fresh	Improves symptoms of stress
<i>Zea mays</i> L.	<i>Poaceae</i>	Makai, maize	0.66	0.095	Bladder, urinary disorders and kidney disorders	Stigma of female flower	Makai is used as flour	Thrice a day	Dry	Weakness overcome, vomiting
<i>Ziziphus jujuba</i> Mill.	<i>Rhamnaceae</i>	Beri	0.63	0.057	Skin infection and control deficiency of iron	Leaves and fruits	Use fruit of beri plant in present form	Twice a day	Dry form	Hepatitis, stomach disorder

(16%), seed (16%), bark (14%), root (13%), whole plant (12%), underground part (3%) and latex 3% (fig. 3).

### Informant consensus factor (ICF) and fidelity level (FL)

According to this study it was noted that ICF value ranged from 0.27 to 0.67 (tab. 2) with the lowest

values for gonorrhoea and diabetes (0.27), and the highest values were noted in stomach and skin infection (0.67). Fidelity level was used to find out the floral species for pharmaceutical purposes. The FL value ranged from 21 to 91. *Magnifera indica* had the highest FL of 91, whereas *Allium sativum* had the lowest, at 21. Collected ethnomedicinal flora had numerous curative stuffs (tab. 3). *Achyranthes aspera* was used mostly to treat cough,

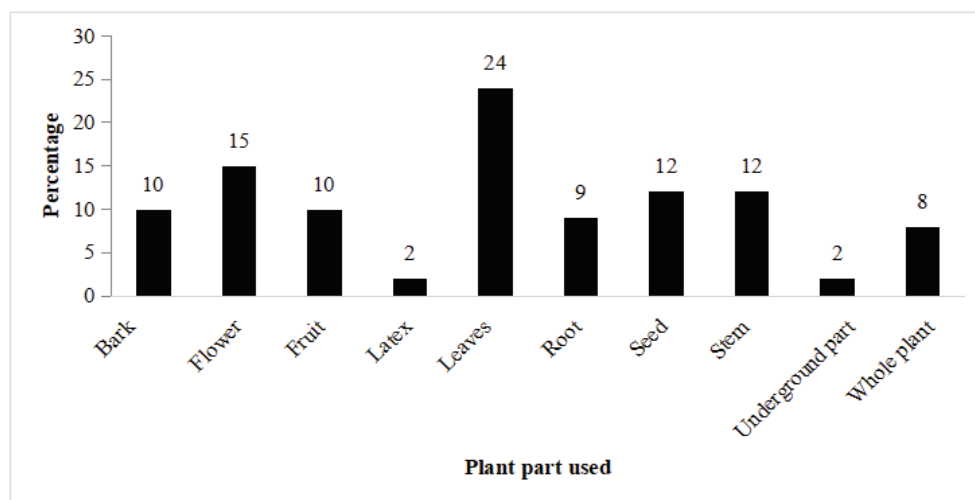


Figure 3

Family index with highest number of species used in study area

kidney problems, dysentery, skin disease, rheumatism, stomach pain and toothache. *Mangifera indica* was recommended to treat improper digestion, ear pain, vomiting and stomach disorder. *Phoenix dactylifera* was used to cure fever, diarrhoea, general body weakness, respiratory diseases and to reduce blood pressure. *Ricinus communis* was medicated in bowel, constipation and stomach diseases. According to respondent, these ethnomedicinal flora was also suggested in the treatment of different types of other diseases including: cardiovascular disorders, respiratory diseases, hepatitis, gastric problems, kidney, urogenital problems, liver disorders, constipation, diarrhoea, cold, fever, cough, asthma, bronchitis, flu, intestinal problems, vomiting, headache, arthritis, hypertension, paralysis, malaria, cancer, allergies, tumor, male infertility, piles, sexual disorders, snake bite, rheumatism, toothache, stomach problems, insect bite, body pain, nervous disorders infections, diabetes, swellings, eye problems, pneumonia, bone pain, jaundice and joint swellings.

It was observed that *Achyranthes aspera* had the lowest fidelity level (FL) of 63% and was used for kidney problems, cough, dysentery, rheumatism, skin disease, stomach pain and toothache but mainly recommended to get relief from cough using its leaves and honey thrice a day. *Calotropis procera* had 68% FL and was used to cure piles, skin diseases, deafness and pain reducing. Majority of people consume the leaves of this plant mixed with mustard oil in wound healing and body pain for 3 to 4 times a day. The FL calculated

for *Chenopodium album* and *Psidium guajava* was 69% which plays a vital role in the treatment of various health disorders, i.e. jaundice, laxative and urinary problems and improving appetite. *Phoenix dactylifera* exhibited 75% FL. It was widely used for reducing blood pressure, fever and respiratory ailments. *Syzygium cumini* showed 81% FL, and was used for various purposes such as ulcer and sore throat. *Cannabis sativa* exhibiting FL 84%, was used for the control of cough, pains, asthma and bad appetite. It was noted from the data that *Cynodon dactylon* had 86% FL and was utilized to cure kidney, wound and respiratory disorders. The fidelity level of *Mangifera indica* was 91% and it was used to cure stomach disorders, vomiting and improper digestion. *Rosa indica* had the highest FL of 95% and was utilized in kidney, gall bladder and heart diseases (tab. 3).

## DISCUSSION

This study has shown that district of Gujrat is rich in a variety of plants which are used by native people to cure many diseases. They also can be used in pharmaceutical industry. Local residents rely on floral species for the traditional ingesting. Consequently, bulk of labours termed the diversity of species in diverse zone and scrutinizes their pharmaceutical uses. Mahmood *et al.* [11] designated that *Withania somnifera* was recycled to treat spasms, sexual disorder, sedate patients and rheumatic. *Amaranthus viridis* was very useful in curing eye disorders, urinary

**Table 2**  
Informant Consensus Factor (ICF) by disease category in the study area

Disease category	No. of use reports (Nur)	No. of species used (Nt)	Nur-Nt	Nur-1	ICF
Flu, fever, cough, cold	22	13	9	21	0.42
Heart, kidney, urinary, ulcer and liver problem	26	15	11	25	0.44
Gonorrhoea, diabetes, diarrhoea	19	12	5	18	0.27
Nose, ear, eye and teeth problems	13	5	8	12	0.66
Asthma, rheumatism, lungs, bronchitis, jaundice, blood problems	21	13	8	20	0.4
Appetizer, constipation, inflammation, hair problem	17	7	10	16	0.62
Stomach problems, skin problems, sexual problems	35	12	23	34	0.67
Piles, arthritis, atherosclerosis, female problems	10	5	5	9	0.55

**Table 3**  
Fidelity Level (FL) value of commonly reported medicinal plants

Scientific name	Common name	Major ailment	Fidelity level (FL) [%]
<i>Achyranthes aspera</i> L.	Puth Kanda	Cough, kidney problem, dysentery, skin disease, rheumatism, stomach pain and toothache	63
<i>Calotropis procera</i> (Aiton) Dryand.	Akk	Deafness, piles, baldness, wound healing, toothache, pain reducing and skin disease	68
<i>Cannabis sativa</i> L.	Bhaang	Intoxication, loss of appetite, control inflammation of body, asthma, bronchitis, headache, flu, cough and pains	84
<i>Chenopodium album</i> L.	Baathu	Urinary problems, skin problems, constipation, jaundice and laxative	69
<i>Cynodon dactylon</i> (L.) Pers.	Bermuda/bham grass	Laxative, wounds problem, bronchial disorders, and also kidney disorder	86
<i>Mangifera indica</i> L.	Amm, Mango	Improper digestion, ear pain, vomiting and stomach disorder	91
<i>Phoenix dactylifera</i> L.	Khanjoor, Date	Fever, diarrhoea, general body weakness, respiratory diseases and also help to reduce blood pressure	75
<i>Psidium guajava</i> L.	Amrood, guava	Cancerous disease and also improve appetite, cure stomach problem	69
<i>Syzygium cumini</i> (L.) Skeels	Jamaan	Sore throat, diabetics and ulcers	81
<i>Ricinus communis</i> L.	Andola, Castor oil	Bowels problems, constipation and stomach problem	77
<i>Rosa indica</i> L.	Rose, ghulaab	Heart disorders, eye infection, asthma, break stone from kidney and gall bladder	95

disorders and menstrual problems [12]. *Mangifera indica* was useful for vomiting, ear pain and stomach disorders [13]. *Calotropis procera* was used for baldness, piles, deafness, wound healing, reduction of pain, toothache and skin diseases [14].

During ethnomedicinal study, it was observed that *Cynodon dactylon* was used to treat all types of bleeding, laxative, bronchial disorders, wounds problem, kidney disorder and also skin troubles [15]. *Bombax ceiba* was used against inflammation, snake bites, blood purification, dysentery, as a stimulant, in gonorrhoea, genital organs treatment and ulcer of bladder [14]. *Avena sativa* was useful in the treatment of tension, constipation and skin allergies [16].

Albuquerque *et al.* [17] conducted a study to show that the most common therapeutic properties were performed by plants with the values (UV) as follows: *Psidium guajava* (2.52), *Cannabis sativa* (0.98) and of *Cordyline fruticose* (0.03). The highest fidelity level displayed the prominence of specific floral species by instinctive persons to treat explicit disease. The high FL value presented the use of

a specific ethnomedicinal plants by the indigenous people to treat a complex disease [18]. Amiri and Joharchi [9] testified that *Tagetes erecta* was valuable to cure earache, indigestion, pyrexia, intestinal washes, intestinal parasites, antifungal, muscular pain and cure piles. *Syzygium cumini* was used as a remedy of sore throat, diabetes and ulcers [19]. *Euphorbia helioscopia* was used for handling of breathing disorders including asthma, anthelmintic, bronchitis, chest congestion, throat, vermifuge. It has also anti-cancer properties, cures cholera, fever and tumours [20]. The study of all these ethnomedicinal plants showed the noteworthy value of innate inhabitants of the community. It shows that medicinal plants must be activated rather than to be left as surplus. This flora can be vended to several herbal industry for the preparation of voluminous brands that are also favourable to get money [2]. It has also been described that Gujrat district had many plants that are considered as weeds but are important medicinal plants of the area used by local community [1].

## CONCLUSIONS

It was concluded that there were many useful plants in this area. These plants are of great significance among the local community and are used to cure many diseases.

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