

Ethnoecological Studies of plants collected from Bagh, Pakistan

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Citation: Imtiaz, K., A. Khan, and A. Bibi. 2023. Ethnoecological Studies of plants collected from Bagh, Pakistan. Journal of Wildlife and Ecology 7(2):64-92.

SUMMARY

Azad Jammu and Kashmir district, Bagh, is rich in plant biodiversity. The current study was conducted to ethno-medicinal studies, enlisting the plants of Bagh, as well as other plant uses such as fuel, fodder, timber wood, agriculture tools, and honey bee attractant. The main aim of the study was to explore the local plants that the local people use for multiple purposes. A total of 107 plants from 53 families were collected; 80 plants were wild, 27 were cultivated, and 53% of the plants were herbs, 32% trees, and 15% were shrubs. The dominant family was Rosaceae, having the maximum number of plants, part of which is abundantly used for ethno-botany. During the study, it was noted that 24% of plants were used for stomach infection, 8% were for dysentery, 4% for mouth infection, 3% for typhoid, kidney problems, blood purification, 2% for respiratory disease, and 1% for cancer. It is also noted that *Melia azedarach* has the highest number of RFC values and *Juglans regia* has the highest value of use value (i.e. UV).

Keywords: Biodiversity, Bagh, Ethnomedicinal, Shrub

Received in March, 2023

Accepted in June, 2023

INTRODUCTION

Plants have played a vital role for humanity for a long time (Harris, 2021). The study of these plants provides a tool for understanding how different indigenous groups relate to natural resources, especially for medical and pharmaceutical applications (de Albuquerque and Hanazaki, 2009). Throughout history, human beings have always tried to develop policies for effectively managing and using natural resources to fulfill their needs. This is particularly true with reference to the use of plant resources that are available to every human being to fulfill their needs in different cultures of the world (Albuquerque et al., 2005). It is also noted that among 2500 medicinal plant species, 4 to 20% are traded worldwide (Schippmann et al., 2002).

Ethnobotany may be defined as the cultural knowledge of local people about their surrounding plants and how they use them. So, the definition of ethno botany can be summarized in four words i.e. people, plant interaction and use. Scientists tried to explore how the plants are useful as medicine, food, shelter, clothing, hunting and also for religious occasions (Ilyas et al., 2013). Ethnobotany plays an important role in discussing the dynamic relationship between biological diversity and social and cultural systems. About 80% of our people are still dependent on medicinal plants for their basic health care. Ethnobotany is the study of how the people of a particular culture use plants for medicine, clothing, and food. Ethnobotany is multidisciplinary.

The term "ethnobotany" was first used by American botanist Hershberger in 1895 to study primitive plants (Malik et al., 2010; Qasim et al., 2010; Altaf et al., 2017; Umair et al., 2019; Amjad et al., 2020a).

Ethnobotany is the science that studies the connection between a given community and its environment, particularly with plants. Ethnobotany has its roots in botany. It is collaboration between people and plants to discover new herbal drugs, edible plants, and other aspects of plants. The major benefit of ethnobotany is to conserve and improve knowledge for the conservation and usage of plants, mainly endangered species (Ajaib et al., 2012; Ilyas et al., 2013). One of the most important issues facing our environment is climate change. It is reported that climate change causes the deaths of 0.4 million people and economic losses of more than 1.2 trillion dollars globally every year. Climate change is being caused by greenhouse gases (CO_2 , CH_4 , and N_2O) in the atmosphere and is increasing global warming. Along with the increase in carbon dioxide levels, the temperature of the world has increased by 0.74 degrees. It is reported that climatic change is a threat to biodiversity and precipitation. Furthermore, human activities also cause temperature change, which badly affects biodiversity (Pappas, 2014).

Ethnobotany also helps in establishing communication between the local community and realizing the conservation of biological diversity. Ethnobotany is a source of food and health care for low-income classes and rural communities, and this folk medicine system is passed down from generation to generation (Ibrar et al., 2007; Ugulu et al., 2009). Medicinal plants are used to cure a variety of infections and disorders. It is reported that 70% of the AJ&K population depends upon medicinal plants for health care. Herbal remedies have been used by women for thousands of years to increase and protect their beauty (Khan and Khatoon, 2007; Shaheen et al., 2012). Azad Jammu and Kashmir had a wide range of medicinally significant plants that were used by the locals. So we have decided to know the cultural and medicinal uses of plants in Bagh, Azad Jammu and Kashmir, Pakistan.

MATERIAL AND METHODS

STUDY AREA

The Azad Jammu and Kashmir had a wide variety of medicinal plants (Amjad et al., 2020b; Naz et al., 2022), and it is reported that the use of these medicinal plants by the local people is increasing day by day (Qureshi and Bhatti, 2008). The present report is based upon ethnobotanical species of the district of Bagh (Figure 1) and also explores the valuable medicinal plants. Poverty and lack of awareness are the main causes of the depletion of flora, mainly in the areas surrounded by the forest (Gairola et al., 2008). Sustainable resources and awareness among the people are the most important factors for survival as well as climatic conditions (Cronin and Pandya, 2009). The ecology of the Himalayan forest is ignored by ecologists and hence poorly understood (Peer et al., 2007). The study enlists the main ethnomedicinal flora of Padder Syedain and Kanna Mohri and also checks the effect of environmental conditions and soil factors on that flora. The state of Azad Kashmir is between 73 to 75 degrees longitude and 35-36 degrees latitude. It is located in the Pir Panjal subrange of the western Himalayan foothills. The area of Bagh is about 10% of the

whole state. The average temperature is 2 in January and 40 degrees in July. Bagh is one of the ten districts of AJK which are rich in medicinal plants and floral diversity.

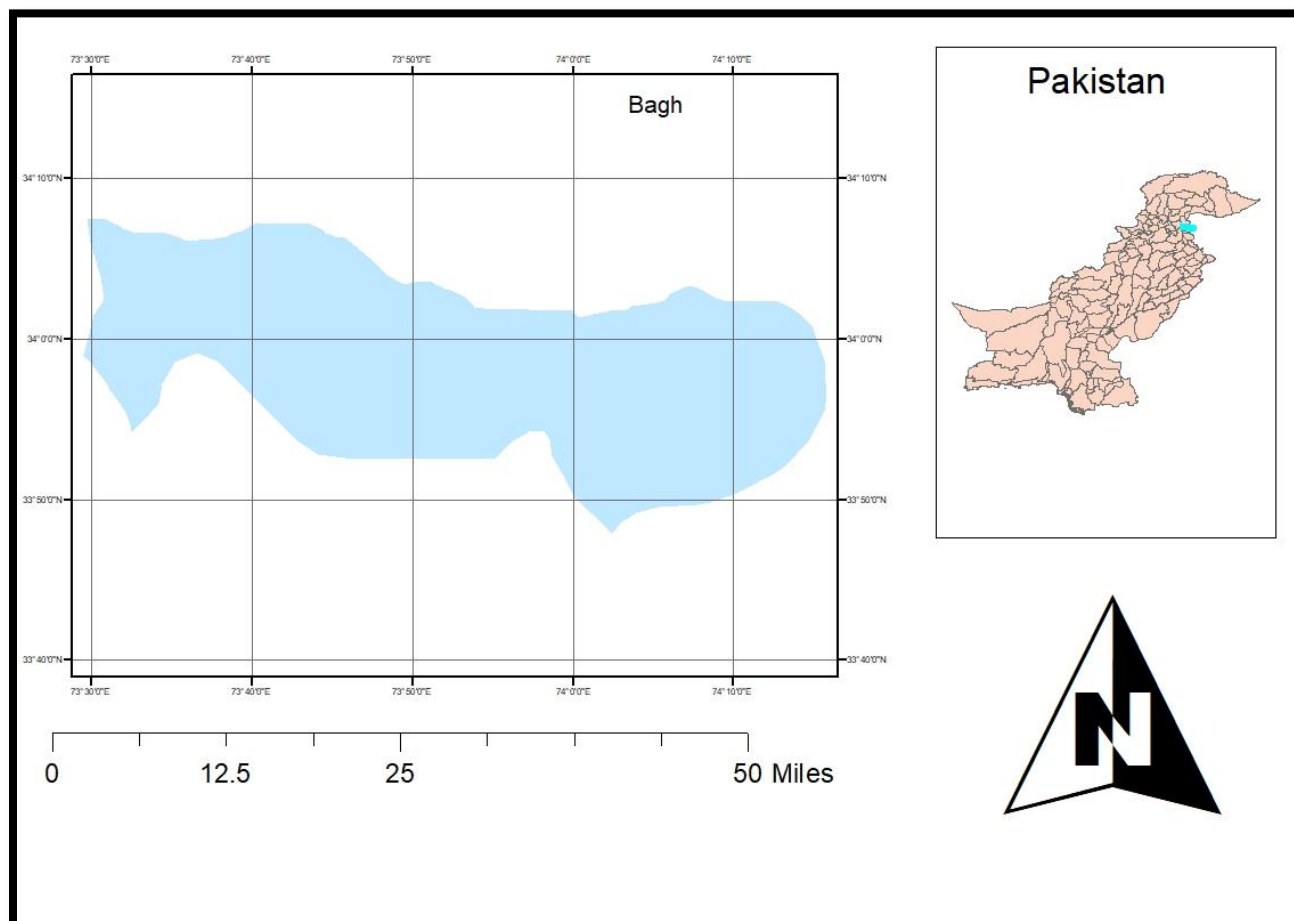


Figure 1: Map of Study area.

Different fields were visited in Bagh and different species were collected and identified from the herbarium of QAU Islamabad. The species were pressed, preserved, and attached to herbarium sheets. The medicinal uses of different species were determined by questionnaires and by asking local people. Then the herbarium sheets were submitted to the department of Botany at Women University of Bagh for future studies. This method includes two stages:

METHODOLOGY

Field Work

The ethnobotanical fieldwork for this study was conducted from January to May and from July to December 2017. The fieldwork was based on observations, interviews, and guided field trips. Plants were collected along with pictures and also noted the reading from the GPS. Two methods for collecting information were used during the fieldwork.

Observation

The observations were made during the herbal growth of the plant species, which were collected during harvesting time, processing, and utilisation. All the plants were collected during their flowering season. The specimens were deposited in the Department of Botany, Women's University of Azad Jammu & Kashmir Herbarium as voucher specimens.

Interviews

Extensive surveys were carried out during the fieldwork; interviews were conducted with the local inhabitants. About 50 informants were interviewed, including 40 females and 10 males. Demographic information revealed that the informants chosen for interview were between the ages of 40 and 45; some were between the ages of 50 and 55, and others were between the ages of 30 and 35. Status of informants revealed that 60% were illiterate, 20% were primary, 10% were middle, 5% were graduates, and 5% were master's degree holders. Most of the informants were housewives, shopkeepers, farmers, local healers, and teachers. The informants were chosen based on their popularity in the area, and they were well-known experts as local healers. It was observed that female informants had more information about the local usage of plants as compared to males.

DATA ANALYSIS

Ethnobotanical data was collected by using various quantitative as well as qualitative analysis, which are: Use value (UV) and relative frequency citation (RFC) in qualitative analysis: family contribution, part of plant used, foam of plant used and disease categories were discussed.

Use Values

The use value is the quantitative measure of relative importance of a species. It is used to record most important species of the study area based on the number of use cites by the number of people it was calculated by the formula:

$$UV = (U_i/N)$$

Whereas, “ U_i ” is the number of use reported by the people for a given species and “ N ” is the total number of informants.

Relative Frequency Citation

The relative frequency citation abbreviated as “RFC” indicated the local importance of medicinal species. It was calculated by the formula:

$$RFC = FC/N$$

Where “ FC ” is the number of informants who report the use of a particular plant and “ N ” is the total number of informants who participated in the survey.

RESULTS AND DISCUSSION

Table 1, contains the enlisting of plant from the district Bagh, Azad Jammu and Kashmir, Pakistan.

LIST OF HABIT, FAMILY, STATUS, PART USED, FODDER, TIMBER WOOD, VEGETABLE AND MEDICINAL USES OF PLANTS

Table 1 and Figure 2 represent the list of the plants of the study area and also their medicinal uses asked by the local inhabitants, their habit, family, status, (common, rare or endangered), part used, while use as agriculture tool or not, fodder, timber wood, vegetable or edible fruit, soil from which plant was collected and also represent that weather plant is use for herbal tea or not. In Figure 3 and 4 during the study noted that 104 medicinal plant are collected belonging to 56 families, while 53% are herbs, 32% trees and 15% shrubs are studied. Total 104 plants are medicinal, 61 plants are used as fodder, 31 plants used as fuel, 21 plants used as timber wood, 41 plants used as agriculture tool and 27 plants are honey attractant. Figure 5, also mentions the wild and cultivated plants of the study i.e. 80 plants are wild whereas 27 plants are cultivated.

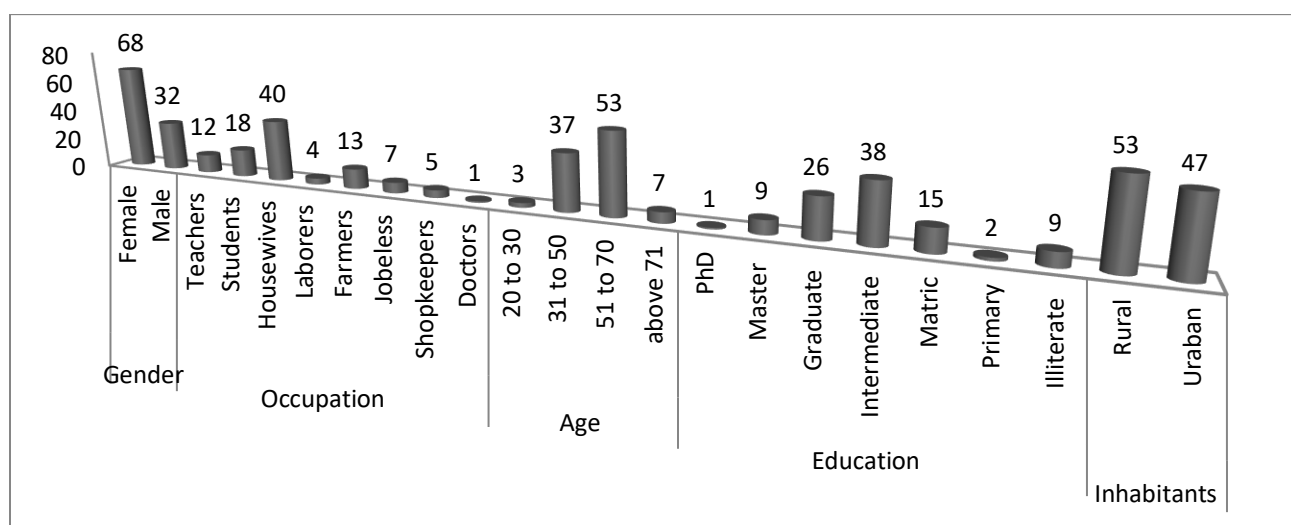


Figure 2: Data of respondents in study area.

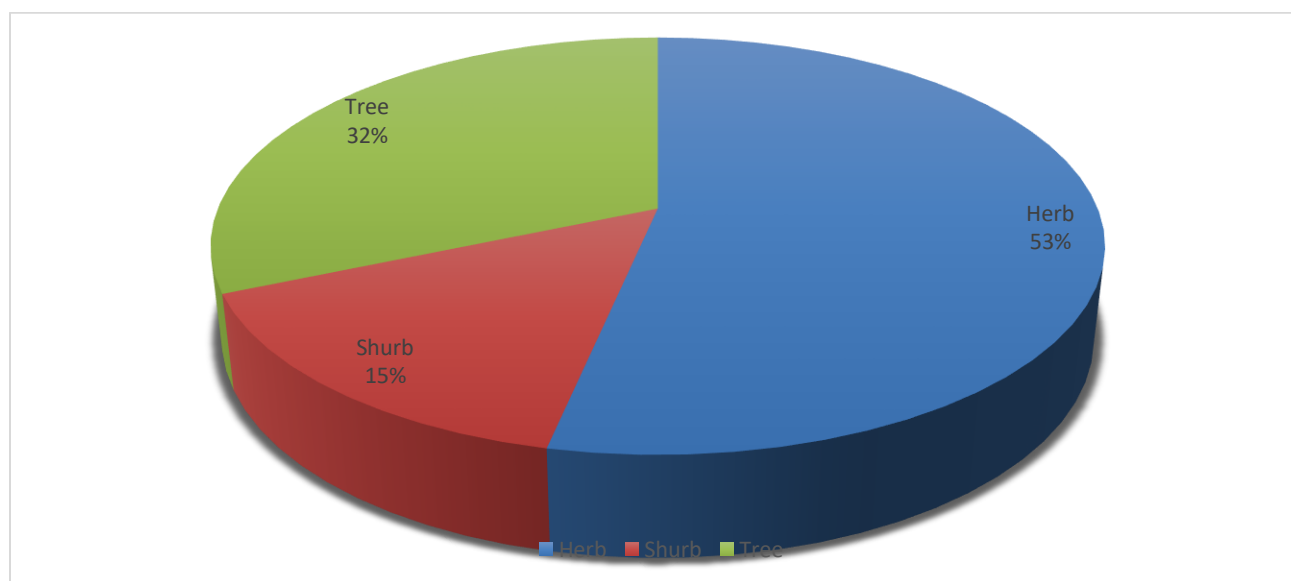


Figure 3: Family contribution of the plant.

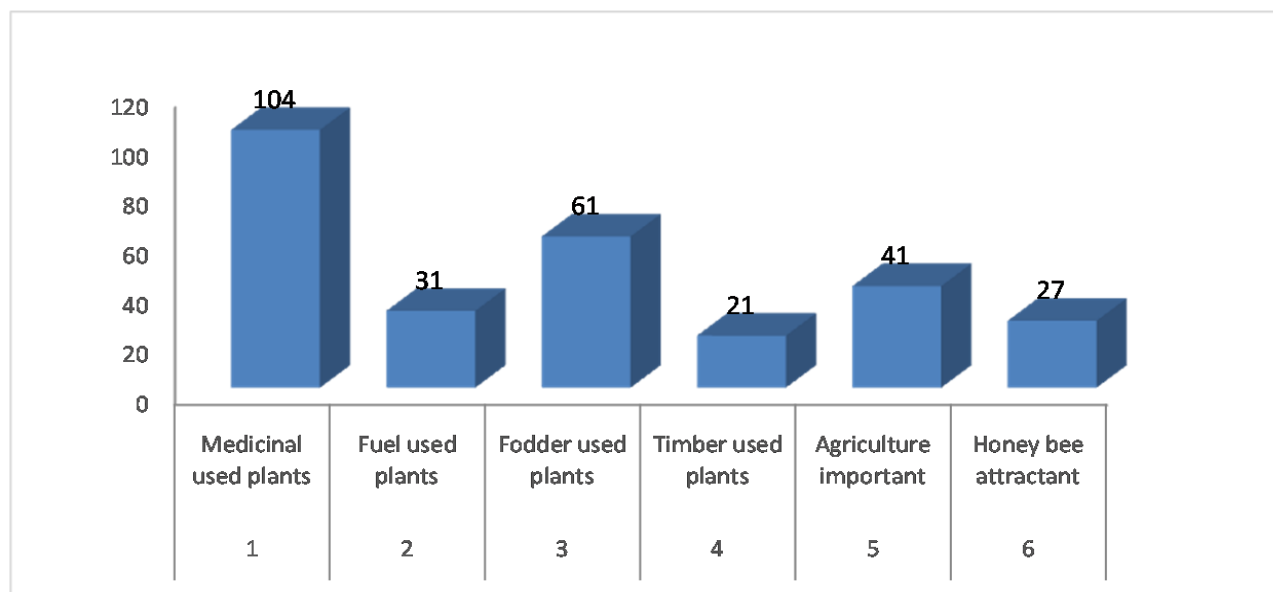


Figure 4: Ethnobotanical uses in study area.

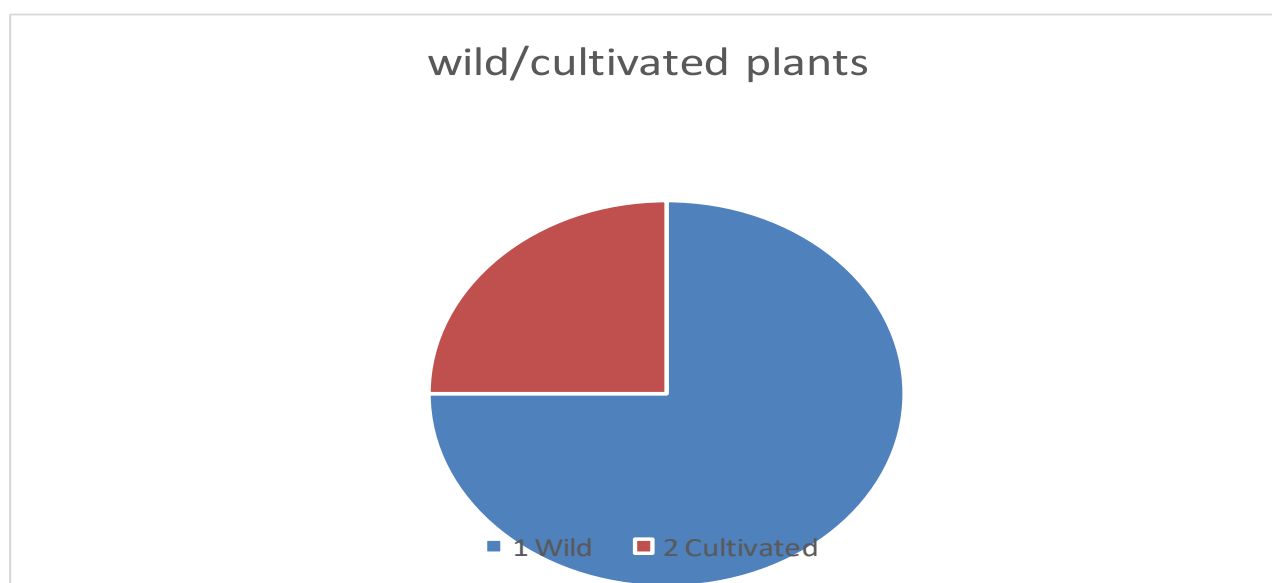


Figure 5: Number of wild and cultivated plants.

QUANTITATIVE ANALYSIS OF ETHNOMEDICINAL PLANTS

Values of RFC, UV and Ui

Table 2, represent the RFC, VU and Ui values of the study plants. The maximum RFC value is 0.38 while minimum RFC value is 0.2 plants having maximum RFC value are: *Melia azedarach* L. and *Solunam nigrum* L. Both of the plants have maximum RFC had great medicinal important and well known to the local people for their medicinal uses also use as fodder fire wood and *Melia azedarach* is also used as timber wood. Whereas the plant having lowest RFC value are: *Cymbopogon citratus*,

Celtis eriocarpa Decne. *Ailanthus excels*, *Cannabis sativa* L. *Ulmis villesn*. And *Barleria cristata* L. the lowest RFC value does not mean that these plant are not medicinally important but it mean that people dose not aware of their importance.

The UV represents the use valve of the specie that, how much species is important based upon its uses. It ranges from 0.6 to 0.05 the plants having maximum UV are: *Juglans regia* and *Pinus roxbergii* sarg. Whereas theplants having minimum UV are: *Euphorbia thymifolia* L. and *Rosa canina* L (Table 2).

CATEGORIES OF STUDIED PLANT ON BASIS OF THEIR USES

Most of the plants which are under discussion were medicinal then, fodder then, agriculturally important then timber wood and lastly the honey bee attractant. 103 plants are medicinal, 61 fodder, 41 are used as agriculture tool, 31 plants are used as fuel wood, 27 plants are honey bee attractant and 21 plants are used as timber wood.

Similarly, other scientists study the ethnobotany of district Kharan and observed that people use plants for multi-purpose, i.e: medicine, fodder, fuel, food, timber wood, wheel and carts etc. Most of the plants are used for multi-purpose e.g: *Indegofera heterantha* is used for abdominal pain, shoots are used for fodder, branches are used for making ropes and brooms are used for cleaning roof and lawns (Khan et al., 2015).

RELATIVE FREQUENCY CITATION (RFC)

Relative frequency citation is commonly occurring specie according to the informants of the study area. According to the RFC reported by the informants the most consumed plants are: *Melia azedarach* 0.38, *solanum nigrum* 0.38, *Malva sylvestris* 0.3, *Mentha arvensis* 0.3, *Olea cuspidate* 0.34, *Beringia cilitata* 0.34, *Rosa canina* 0.36, *Buxus papilllosa* 0.36, *Rubus ellipticus* 0.3 whereas have lowest values are: *Cymbopogon citratus* 0.2, *Celtis eriocarpa* 0.2, *Ailanthus excels* 0.2, *Cannabis sativa* 0.2, *Ulmis villesn* 0.2, *Barleria cristata* 0.2 similar results were found in another research and conducted that: *Melia azedarach* have the highest value of RFC due to high medicinal importance but people also use this plants for fuel, fodder and construction purpose (Rehman et al., 2017).

USED VALUE (UV)

Used value is the most important specie of the study area based upon the number of citation. Plants having high value of UV are: *Juglans regia* L. (0.6) and *Pinus roxbergi* sarg (0.6). Which were utilized by the people to fulfil all their eight major categories uses that are: food, medicine, fodder, fire wood, timber wood, honey bee attractant, agriculture tool and roof touching and followed by *Melia azedarach* L., *Qrucus Montana* Willd, *Olea europaea* subsp. *Cuspidata* (Wall & G. Don) Cif, *Dalhergia rirsoo* and *Capsella bursa partoresis* (L.) Medik have value of (0.5) Similar were found in another paper having high value of *Juglans regia* (Ilyas, 2015). Most of the plants were used for more than one purpose but other is only use for folk medicine. Because these plants are the native and very popular in the area so, their UV was high. UV is dynamic and its changes with area to area and some time in same area at different time.

CONCLUSION AND RECOMMENDATION

During study, thick vegetations in areas were selected with great altitudinal variation. The area lies in temperate zone and characterized by cold climate. The present study concluded that plants were not only used for medicine, fire wood, timber wood and fodder but also for many other multipurpose by the local people. On the basis of present analysis we conclude that people use plants in diverse ways and fulfil their needs. In addition to local use the plants are also used for herbal medicine and business at large scale by the government. Information about the medicinal use of the plant transfer from generation to generation. Mostly plant were analyzed are developing wild and no regular effort had made to improve plants growth. Plants resources are limited and need efficient steps for sustainable management and conservation strategies. Necessary steps should be taken out to store original vegetation and also improve it. The present study provide useful data and following are the some recommendation made on the basis of current studies. The indigenous knowledge is only confined to the elderly people and is therefore, on the risk of extinction. This is a valuable culture and scientific source which need a proper documentation and preserve for the future. The local people should be trained to collect medicinal plant at right time and properly used them so, that excessive spoilage and loss can be overcome. The area near to the forest should cultivate medicinal plants instead of other crop to improve the economy. Local people should be trained about the In-situ conservation of plants to conserve threaten medicinal plants so, that those plants which cannot be conserve in outside their environment can protect in their own environment. Ex-situ conservation should be carried out to conserve endangered plant by the help of local people and government organization. The benefit archive from the medicinal plant should be equally distributed between the provider (which provide information and plant) and other organization which utilize that plant so, that people cannot be disappointed. Gene bank should be established for threaten species. Local must be stop over grazing and deforestation and provide them alternate source and aware them some other benefits. Colleges, universities and other agricultural department should organized special event or seminars to aware people about the importance of medicinal and other plants. Extensive reforestation should be needed in area of low altitude for the plant like: *Olea Ferruginea*, *Morus alba*, and *Juglans regia* etc.

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Competing interests: Authors have declared that no competing interests exist.

Funding: Authors have no source of funding for this work.

Authors' contributions: Imtiaz has designed this project, collected data and written this article; while Khan and Bibi have critically analyzed this article and approved as final.



Table 1: Ethnobotanical uses in Bagh, Azad Jammu and Kashmir, Pakistan

Botanical name	Family	Habit	Soil	Status	Wild or Cultivated	Medicinal	Fodder	part used	used form	Uses
<i>Solanum surattense</i> Burn F.	Solanaceae	Herb	Sandy	Rare	Wild	Medicinal	Non	Leaves	Paste	Decoction is used for sore throat, body pain and fever. Seed are smoked like cigarette and used for expel tooth worm.
<i>Coriandrum sativum</i> Linn.	Apiaceae	Herb	Sandy	Common	Cultivated	Medicinal	Non	Leaves	Paste	Leaves are used for certain eye disorder. Seeds are used for food.
<i>Rubus ellipticus</i> Sm	Rosaceae	Shrub	Sandy	Common	Wild	Medicinal	Fodder	Fruits	Orally	Fruit is good for stomach and also refresh the skin. Also good for throat infection roots are grind and used for tonsilsAlso use as laxative.
<i>Cymbopogon citratus</i>	Poaceae	Herb	Clay	Common	Cultivated	Medicinal	Fodder	Leaves	Infusion	Leaves are used for making tea for weight loss and also good for health.
<i>Gamharria medindia</i>	Papilionaceae	Herb	Clay	Common	Wild	Medicinal	Fodder	Leaves	Leaf juice	Leaf juice mixed with seven drops of mustard oil and used for eye pain.
<i>Ipomoea hederacea</i> Jacq.	Convolvulaceae	Herb	Clay	Common	Wild	Non	Fodder	Wood	Fodder	ornamental as well as fodder

<i>Celtis eriocarpa</i> Decne.	Ulmaceae	Tree	Clay	Common	Wild	Medicinal	Fodder	Leaves	Paste	Seeds are used for dysentery, wood for furniture and leaves are for furniture.
<i>Eriobotrya japonica</i> Roxb.	Rosaceae	Tree	Clay	Common	Cultivated	Medicinal	Non	Fruits	Edible fruit	fruit is edible which is rich in vitamin c
<i>Platinus oricutalis</i>	Platinacece	Tree	Clay	Rare	Wild	Medicinal	Fodder	Wood	Timber wood	Leaves are used for constipation and bark powder is for diarrhea.
<i>Artemisia fragrans</i> Willd.	Compositae	Herb	Clay	Common	Wild	Medicinal	Fodder	leaves and fruit	Paste	use for appetizer leaves are carminative and astringent
<i>Pyrus malus</i> L.	Rosaceae	Tree	Clay	Common	Cultivated	Medicinal	Non	Fruits	Fresh or dried fruit	fruit is edible which is rich with iron and magnesium
<i>Ailanthus excels</i>	Simaroubaceae	Tree	Sandy	Common	Wild	Medicinal	Fodder	Leaves	Paste	leaves are good for malaria
<i>Pridium suajana</i>	Mytracea	Tree	Clay	Common	Cultivated	Medicinal	Non	Fruits	Edible fruit	edible fruit good for digestion

<i>Cucurbita pepo L.</i>	Cucurbitaceae	Herb	Clay	Common	Cultivated	Medicinal	Non	Fruits	Vegetable	Use as vegetable good for uric acid and stomach
<i>Zea mays L.</i>	Poaceae	Herb	Clay	Common	Cultivated	Medicinal	Fodder	whole plant	Fresh or dried fruit	Fruit is use for making flour which is nutritious
<i>Calocasia esculanta L.</i>	Araecae	Herb	Clay	Common	Cultivated	Medicinal	Non	whole plant	Vegetable	Use as vegetable for ulcer and respiratory disorder
<i>Araucaria excels</i>	Araucariaceac	Tree	Clay	Common	Cultivated	Non	Non	Leaves	Wood	Ornamental
<i>Prunus Americana</i>	Rosaceae	Tree	Sandy	Common	Cultivated	Medicinal	Fodder	Wood	Edible fruit	Edible fruit good for constipation
<i>Convolvulus arvensis L.</i>	Convolvulaceae	Herb	Sandy	Rare	Wild	Medicinal	Fodder	Fruits	Paste	Use for releasing intestinal worm
<i>Cynodon dactylon (L.)Pers.</i>	Poaceae	Herb	Sandy	Rare	Wild	Medicinal	Fodder	leaves and fruit	Paste	Use for healing wounds

<i>Bauhinia variegata L.</i>	Caesalpinaceae	Shrub	Clay	Common	Cultivated	Medicinal	Non	whole plant	Vegetable	Use as vegetable good for dysentery and diarrhea
<i>Buxus papillosa L.</i>	Buxaceae	Herb	lomi	Rare	Wild	Medicina	Non	Flowers	Fresh leaves	Use for toothache.
<i>Rosa canina L.</i>	Rosaceae	Shrub	Sandy	Rare	Wild	Medicinal	Non	Stem and leaves	Paste	Flowers are used for skin disease
<i>Canabis sativa L.</i>	Canabiace	Herb	Clay	Rare	Wild	Medicinal	Non	Flowers	Oil and paste of	Seed and leaves are used for muscular and stomach pain
<i>Morus indica L.</i>	Moraceae	Tree	Clay	Common	Wild	Medicinal	Fodder	seeds and leaves	Fruit	Edible fruit and good for throat irritation
<i>Syzygium sp R.Br .ex aertn</i>	Myrtaceae	Tree	Sandy	Rare	Wild	Medicinal	Non	Fruits	Edible fruit	Fruit are edible good for lips colour and skin and leaves are used for stomach pain.
<i>Ulmis villesn</i>	Ulmaceae	Tree	Clay	Rare	Wild	Medicinal	Fodder	leaves and fruit	Fodder	Pala table for goat and sheep.

<i>Pinus roxbergii sarg.</i>	Pineace	Tree	Sandy	Rare	Wild	Medicinal	Fodder	Leaves	Decoction of leaf and	Resin are good for tumors and bleeding wounds. Leaves and bark are used for dysentery.
<i>Berginia ciliata L.</i>	Saxifragaceae	Herb	lomi	Rare	Wild	Medicinal	Non	leaves and bark	Tea	Leaves are used for making tea for stomach pain root are grind and use for wound healing.
<i>Qrucus montana Willd.</i>	Fagaceae	Tree	Sandy	Rare	Wild	Medicinal	Fodder	leaves and bark	Fodder	Use as fodder good for cattle health.
<i>Olea europaea subsp. Cuspidata(Wall & .G.Don) Cif</i>	Oleaceae	Tree	Sandy	Common	Wild	Medicinal	Fodder	Leaves	Decoction	Leaves are used for making coffee which is blood purifier and also good for mouth infection. And also good for diabetes.
<i>Morigna sp</i>	Moringaceae	Tree	lomi	Common	Wild	Medicinal	Non	leaves and fruit	Paste	Flowers are used to control sugar level of the blood.
<i>Cucumis sativus L.</i>	Cucurbitaceae	Herb	Sandy	Common	Cultivated	Medicinal	Non	Flowers	Edible fruit	Fruits are edible and good for skin freshness.
<i>Diospyrus lotus L.</i>	Ebenaceae	Tree	Clay	Common	Wild	Medicinal	Fodder	Fruits	edible fruit	Fruits are good for stomach disorder.

<i>Malva sylvestris L.</i>	Malvaceae	Herb	Sandy	Common	Wild	Medicinal	Fodder	Fruits	Vegetable	Use as vegetable for constipation.
<i>Euphorbia sp L.</i>	Euphorbiaceae	Herb	lomi	Common	Wild	Medicinal	Non	Leaves	Paste	Leaves are used for digestive disorder and skin ailments.
<i>Rubus furticosa L.</i>	Rosaceae	Shrub	Sandy	Common	Wild	Medicinal	Non	Leaves	edible fruit	Fruits are full of vitamins.
<i>Pyrus pashia L.</i>	Rosaceae	Tree	Clay	Common	Wild	Medicinal	Fodder	Fruits	edible fruit	Fruit are laxative and blood purifier.
<i>Ajuga parviflora Benth.</i>	Lamiaceae	Herb	lomi	Rare	Wild	Medicinal	Fodder	Fruits	Decoction.	For hepatitis and high fever.
<i>Achyranthes eudantata</i>	Amaranthaceae	Herb	Clay	Common	Wild	Medicinal	Fodder	whole plant	Decoction of leaf	Diuretic decoction of leaves is used as cooling agent and also use for cough.
<i>Solanum pseudocapsicum</i>	Solanaceae	Tree	Clay	Rare	Wild	Medicinal	Fodder	Leaves	Edible fruit	Fruit is edible with fatal results.

<i>Punica granatum L.</i>	Punicaceae	Shrub	Sandy	Common	Wild	Medicinal	Fodder	Fruit	Edible fruit	Fruit is good for liver disorder.
<i>Purnus persica (L.) Batsh.</i>	Rosaceae	Tree	Sandy	Common	Wild	Medicinal	Non	Fruit	Edible fruit	Fruit is appetizer and good for digestion.
<i>Euphorbia thymifolia L.</i>	Euphorbiaceae	Herb	lomi	Common	Wild	Medicinal	Non	Fruit	Internal fluid	Internal milky fluid is good for skin infection.
<i>Mentha arvensis L.</i>	Lamiaceae	Herb	lomi	Common	Wild	Medicinal	Non	internal fluid	Decoction of leaves	Leaves are boil with water and use for stomach pain And gastric problem.
<i>Duchesnia medica</i>	Rosaceae	Herb	Clay	Common	Wild	Medicinal	Non	Leaves	Edible fruit	Fruit are good for eye side.
<i>Aloe vera (L.) Burm F.</i>	Liliaceae	Herb	Sandy	Common	Wild	Medicinal	Non	Fruit	Internal fluid	Internal fluid is good for hair strength and also are skin acne.
<i>Tagetes minuta L.</i>	Asteraceae	Herb	lomi	Common	Wild	Medicinal	Non	internal fluid	Paste	Flowers are used for realizing kidney stone.

<i>Helianthus annuus L.</i>	Asteraceae	Herb	Clay	Common	Wild	Medicinal	Non	Flowers	Oil	Seed are used for extracting oil use cooking.
<i>Melia azedarach L.</i>	Meliaceae	Tree	Clay	Common	Wild	Medicinal	Fodder	seeds and leaves	Decoction	Leave and fruit are boil and use for high fever especially typhoid.
<i>Jasminum mesnyi L.</i>	Oleaceae	Herb	Clay	Common	Cultivated	Medicinal	Non	leaves and fruit	Paste	Flowers are used for wring worm.
<i>Almoschus esculantus (L.) Moench</i>	Malvaceae	Herb	Clay	Common	Cultivated	Medicinal	Non	Flowers	Vegetable	Use as vegetable good for constipation
<i>Zanthoxylum armatum Mill.</i>	Rutaceae	Shrub	Sandy	Common	Wild	Medicinal	Fodder	Fruit	Powder	Fruit is use for making sauce good for digestion. Fruit is also used for treatment of pile. Young shoots are good for gum disease.
<i>Capsicum annum L.</i>	Solanaceae	Herb	Sandy	Common	Cultivated	Medicinal	Non	Fruit	Condiment	Use as condiment and good for constipation.
<i>Physalis minima L.</i>	Solanaceae	Herb	Clay	Common	Cultivated	Medicinal	Non	Fruit	Vegetable	Use as vegetable good for kidney.

<i>Zigypplus maurifima</i>	Rhamnaceae	Shrub	Clay	Common	Wild	Medicinal	Fodder	Fruit	Edible fruit	Fruit is good for mouth infection.
<i>Amarcmthus hylaridus</i>	Amaranthaceae	Herb	Clay	Common	Wild	Medicinal	Fodder	Fruit	Vegetable	Use as vegetable for constipation.
<i>Purnus domestica L.</i>	Rosaceae	Tree	Clay	Common	Cultivated	Medicinal	Non	Leaves	Edible fruit	Fruit is edible good for stomach.
<i>Cynoglossum lonceolatum Forssk.</i>	Boraginaceae	Herb	Clay	Common	Wild	Medicinal	Fodder	Fruit	Paste	Flowers are used for wound healing.
<i>Rosa indica L.</i>	Rosaceae	Shrub	Clay	Common	Cultivated	Medicinal	Non	Flowers	Paste	Leaves and flowers are used for making extract good for skin and also for Murabah.
<i>Acassia nilotica (L.) Dellile.</i>	Mimosaceae	Tree	Clay	Common	Wild	Medicinal	Fodder	leaves and flowers	Paste	Flowers and leaves are used for sexual disorder. Soup is made from bark to treat tuberculosis
<i>Cuppressurs sempervires L.</i>	Cupressaceae	Shrub	Clay	Common	Cultivated	Non	Non	leaves and bark	Internal fluid	Extract is anathematic and astringent.

<i>Berberis lycium Royle.</i>	Berberidaceae	Shrub	Clay	Common	Wild	Medicinal	Fodder	Leaves	Paste	Use for dysentery. Decoction is used for internal wounds especially for fractures and berries are good for stomachache.
<i>Citrus limon L. Osbeck</i>	Rutaceae	Shrub	Clay	Common	Cultivated	Medicinal	Non	Fruit	Juice	Fruit are used for hypertension and good for vitamin c
<i>Ocimum omericanum L.</i>	Lamiaceae	Herb	Clay	Common	Wild	Medicinal	Non	Fruit	Paste	Leaves are used for stomach coolness in cold drinks.
<i>Ficus carisa L.</i>	Moraceae	Tree	Clay	Common	Wild	Medicinal	Fodder	Leaves	Edible fruit	Good for stomach.
<i>Dodenea viscosa Jacq.</i>	Sapindaceae	Shrub	Sandy	Common	Wild	Medicinal	Fodder	Fruit	Paste	Leaves are used for wound healing.
<i>Conyza sp (L.)</i>	Asteraceae	Herb	lomi	Common	Wild	Medicinal	Fodder	Leaves	Oil	Source of essential oil and also cause skin allergy.
<i>Solunum nigrum L.</i>	Solanaceae	Herb	Sandy	Common	Wild	Medicinal	Fodder	Seeds	Vegetable	Leaves and fruit are used as vegetable good for mouth infection and also for hypertension. Good for liver disorder.

<i>Juglanus regia L.</i>	Juglandaceae	Tree	Clay	Common	Cultivated	Medicinal	Fodder	leaves and fruit	Decoction	Fruit is edible and good for memory. Decoction is antiseptic.
<i>Oxalis corniculata L.</i>	Oxalidaceae	Herb	Sandy	Common	Wild	Medicinal	Non	Fruit	Paste	Leaves are used for mouth infection.
<i>Nerium oleander L.</i>	Apocynaceae	Shrub	Sandy	Common	Wild	Medicinal	Fodder	Leaves	Decoction	The plant is used to treat scabies, eye disease, and also for parasitic infection. Leaf decoction is used for treatment of diabetes.
<i>Euclaptus commalacensis</i>	Myrtaceae	Tree	Clay	Common	Cultivated	Medicinal	Fodder	Leaves	Paste	Leaves are use on flu or common cold.
<i>Taraxicum officinales Weber.</i>	Asteraceae	Herb	Sandy	Rare	Wild	Medicinal	Non	Leaves	Decoction	Good for skin and stomach.
<i>Allium sativum L.</i>	Liliaceae	Herb	Clay	Common	Wild	Medicinal	Fodder	Leaves	Vegetable	Use as vegetable good for high blood pressure.
<i>Acasia modesta (Wall).</i>	Mimosaceae	Herb	Clay	Common	Cultivated	Medicinal	Non	Leaves	Vegetable	Internal gum is use as tonic for mothers after give birth to child.

<i>Capsella bursa pastoresis (L.) Medik.</i>	Brassicaceae	Tree	Clay	Common	Wild	Medicinal	Fodder	Internal gum	Internal gum	Leaves and flowers are used in cosmetics.
<i>Fumaria indica (Hasskn.) Pugsley</i>	Fumariaceae	Herb	Sandy	Common	Wild	Medicinal	Fodder	leaves and flowers	Decoction	Decoction of plant is used three by day for adults for fever and as blood purifier and chest pain.
<i>Cullirtemom citrinus</i>	Myrtaceae	Herb	Clay	Common	Wild	Medicinal	Fodder	whole plants	Decoction	Ornamental and Pain.
<i>Argyrolalium rosam</i>	Pahilionaceae	Shrub	Clay	Common	Cultivated	Medicinal	Non	Wood	Wood	Use for kidney pain with boil water.
<i>Myrrace Africans</i>	Myrsinaceae	Herb	Clay	Common	Wild	Medicinal	Non	leaves	Decoction	Use for cattle on stomach disorder.
<i>Portulaca oleracea</i>	Portulacaceae	Shrub	Clay	Common	Wild	Medicinal	Fodder	Leaves	Fodder	Use for stomach disorder.
<i>Alcea rosea L.</i>	Malvaceae	Herb	Clay	Common	Wild	Medicinal	Fodder	Leaves	Paste	Use as vegetable for constipation.

<i>Sapndus mulsorosii</i>	Sapindaceae	Herb	Sandy	Common	Wild	Medicinal	Non	Leaves	Vegetable	Fruit is use for making soap which give strength to hairs.
<i>Woodfordia fruticosa (L.) Kurz.</i>	Lythraceae	Tree	Clay	Common	Wild	Medicinal	Fodder	Fruit	Soap	Leaves are used for cattle as fodder.
<i>Solunum melongena L.</i>	Solanaceae	Tree	Sandy	Common	Wild	Medicinal	Fodder	Leaves	Fodder	Use as vegetable and rich in iron
<i>Lycopersicum esculentum L.</i>	Solanaceae	Herb	Clay	Common	Cultivated	Medicinal	Non	Fruit	Vegetable	Use as vegetable good for hypertension.
<i>Feoniculum vulgare Mill.</i>	Apiaceae	Herb	Clay	Common	Cultivated	Medicinal	Non	Fruit	Vegetable	Root leaves and seeds are used for making syrup helpful in relief cough also make tea of it.
<i>Zingiber officinale Mill.</i>	Zingiberaceae	Herb	Clay	Rare	Wild	Medicinal	Fodder	leaves, root and seed	Cough syrup	Use in vegetable to overcome weight.
<i>Viola canarens</i>	Violaceaceae	Herb	lomi	Rare	Cultivated	Medicinal	Non	Rhizome	Vegetable	boil with water and use for stomach coolness

<i>Cidrus deodara (Roxb.ex D.Don)G. Don</i>	Punicaceae	Herb	Sandy	Common	Wild	Medicinal	Non	Leaves	Decoction	Decoction of roots is used as diaphoretic, anti-rheumatism anti renal to snake bite.
<i>Dalhergia rirsoo</i>	Papilionaceae	Tree	Sandy	Common	Wild	Medicinal	Fodder	Wood	Wood	Wood is boiled with water and use as blood purifier, irritation, tumors and pimples.
<i>Borago officinalis L.</i>	Boraginaceae	Tree	lomi	Common	Wild	Medicinal	Fodder	Wood	Fodder	Rhizome are used for joints pain, stomach pain and ulcer.
<i>Bidens biternata (Lour.) Merr .& Sherff</i>	Asteraceae	Tree	Clay	Rare	Wild	Medicinal	Fodder	Rhizome	Decoction	Use for making tea which is antibacterial and also use for bronchial disease.
<i>Clematuis oricntalis (Linn).</i>	Ranculaceae	Herb	Clay	Common	Wild	Medicinal	Fodder	Leaves	Tea	Dried flower is use for rheumatism along with honey. Root extract is use
<i>Trichodesma indica (L.).R.Br</i>	Boraginaceae	Herb	Sandy	Common	Wild	Medicinal	Fodder	whole plant	Paste	Leaves decoction is used for fever and dysentery. Paste is used for swelling of joints
<i>Pteris ensiformis Burm.f</i>	Pteridaceae	Herb	Sandy	Common	Wild	Medicinal	Non	leaves	Herbal drinks	Use as in herbal drinks as cooling agent.

<i>Olea ferruginea</i> Royle.	Oleaceae	Tree	Sandy	Common	Wild	Medicinal	Fodder	Leaves	Edible fruit	Fruit are used for stomach pain oil is use for cooking.
<i>Cerastium foentanum</i> Baumg.	Caryophyllaceae	Herb	Sandy	Common	Wild	Medicinal	Fodder	Fruit	Paste	Leaves are diuretics.
<i>Vitex negunda</i> L.	Lamiaceae	Herb	Sandy	Common	Wild	Medicinal	Fodder	Leaves	Paste	Leaves are aromatic, tonic and diuretic and dried leaves smoke is used for give relief to headache.
<i>Oenothera rosea</i> L'Her.ex	Onagraceae	Herb	Sandy	Common	Wild	Medicinal	Fodder	Leaves	Infusion	whole plant is used as infusion for internal inflammation and also for swelling
<i>Diospyrus kaki</i> L.	Ebenaceae	Tree	Sandy	Common	Wild	Medicinal	Non	whole plant	Edible fruit	Fruit is edible good for digestion.
<i>Elaeagnus parvifolia</i> Wall. ex Royle.	Elaeagnaceae	Shrub	Clay	Common	Wild	Medicinal	Fodder	Leaves	Edible fruit	Fruit is edible which is anti-cancerous. Also good for heart disease.
<i>Listsea glutinosa</i> (Lour.)C.B.Rob	Lauraceae	Tree	Sandy	Rare	Wild	Medicinal	Fodder	Fruit	Oil	Use for essential oil and also use in perfume.

<i>Artemisia absinthium L.</i>	Asteraceae	Herb	Sandy	Common	Cultivated	Medicinal	Fodder	whole plant	Tea	Whole herb is used for making tea which is tonic and internal fluid extract and boil with water and used for jaundice.
<i>Barleria cristata L.</i>	Acanthaceae	Herb	Sandy	Common	Wild	Medicinal	Fodder	whole plant	Decoction	Use for essential oil and also use in perfume.
<i>Silax alba</i>	Rutaceae	Tree	Sandy	Common	Wild	Medicinal	Fodder	Bark and leaves	Decoction	Decoction of bark is used for hypertension and also for fever, and pain.

Note: W (Wild) or C (Cultivated)

Table 2: Qauntitative analysis of data of ethnoecology.

Sr. no	Botanical name	Family	RFC=FC/N	UV=Ui/N	Ui
1	<i>Solunum suratteme</i> Burn F.	Solanacec	0.24	0.16	2
2	<i>Coriandurm sativum</i> Linn.	Apiaceae	0.22	0.27	3
3	<i>Rubus ellipticus</i> Sm	Rosaceae	0.3	0.26	4
4	<i>Cymbopogon citrates</i>	Poaceae	0.2	0.4	4
5	<i>Gamharia medindia</i>	Papilionacec	0.22	0.18	2
6	<i>Ipomoea hederacea</i> Jacq.	Convolvulaceae	0.2	0.3	3
7	<i>Celtis eriocarpa</i> Decne.	Ulmaceae	0.2	0.4	4
8	<i>Eriobotrya japonica</i> Roxb.	Rosaceae	0.26	0.3	4
9	<i>Platinus oricutalis</i>	Platinacece	0.3	0.46	7
10	<i>Artemisia fragrans</i> Willd.	Compositae	0.3	0.2	3
11	<i>Pyrus malus</i> L.	Rosaceae	0.26	0.4	6
12	<i>Ailanthus excels</i>	Simaroubaceae	0.2	0.33	5

13	<i>Pridium suajana</i>	Mytracea	0.3	0.33	5
14	<i>Cucurbita pepo</i> L.	Cucurbitaceae	0.3	0.26	4
15	<i>Zea mays</i> L.	Poaceae	0.26	0.3	4
16	<i>Calocasia esculanta</i> L.	Araecae	0.22	0.27	3
17	<i>Araucaria excels</i>	Araucariaceac	0.24	0.33	4
18	<i>Prunus Americana</i>	Rosaceae	0.24	0.53	8
19	<i>Convolvulus arvensis</i> L.	Convolvulaceae	0.24	0.16	2
20	<i>Cynodon dactylon</i> (L.)Pers.	Poaceae	0.2	0.4	4
21	<i>Bauhinia variegata</i> L.	Caesalpinaceae	0.26	0.23	3
22	<i>Buxus papillosa</i> L.	Buxaceae	0.36	0.1	2
23	<i>Rosa canina</i> L.	Rosaceae	0.36	0.05	1
24	<i>Canabis sativa</i> L.	Canabiace	0.2	0.1	1
25	<i>Morus indica</i> L.	Moraceae	0.26	0.46	6
26	<i>Syzygium</i> sp R.Br .ex Gaertn	Myrtaceae	0.26	0.46	6
27	<i>Ulmis villesn</i>	Ulmaceae	0.2	0.5	5
28	<i>Pinus roxbergi</i> sarg.	Pineace	0.2	0.6	6
29	<i>Berginia ciliata</i> L.	Saxifragaceae	0.34	0.11	2
30	<i>Qurcus montana</i> Willd.	Fagaceae	0.2	0.5	5
31	<i>Olea europaea</i> subsp. <i>Cuspidata</i> (Wall & G.Don) Cif	Oleaceae	0.34	0.5	7
32	<i>Morigna</i> spp.	Moringaceae	0.2	0.2	2
33	<i>Cucumis sativus</i> L.	Cucurbitaceae	0.26	0.3	4
34	<i>Diospyrus lotus</i> L.	Ebenaceae	0.24	0.58	7
35	<i>Malva sylvestris</i> L.	Malvaceae	0.3	0.26	4
36	<i>Euphorbia</i> sp L.	Euphorbiaceae	0.24	0.16	2
37	<i>Rubus furticosa</i> L.	Rosaceae	0.26	0.23	3
38	<i>Pyrus pashia</i> L.	Rosaceae	0.2	0.4	7
39	<i>Ajuga parviflors</i> Benth.	Lamiaceae	0.3	0.2	3
40	<i>Achyranthes eudantata</i>	Amaranthaceae	0.24	0.25	3

41	<i>Solanum psedocaprdium</i>	Solanaceae	0.2	0.3	3
42	<i>Punica granatum</i> L.	Punicaceae	0.24	0.5	6
43	<i>Purnus persica</i> (L.) Batsh.	Rosaceae	0.24	0.4	5
44	<i>Euphorbia thymifolia</i> L.	Euphorbiaceae	0.24	0.08	1
45	<i>Mentha arvensis</i> L.	Lamiaceae	0.3	0.2	3
46	<i>Duchesnia medica</i>	Rosaceae	0.24	0.16	2
47	<i>Aloe vera</i> (L.) Burm F.	Liliaceae	0.3	0.13	2
48	<i>Tagetes minuta</i> L.	Asteraceae	0.24	0.25	3
49	<i>Helianthus annuus</i> L.	Asteraceae	0.3	0.26	4
50	<i>Melia azedarach</i> L.	Meliaceae	0.38	0.5	5
51	<i>Jasminum mesnyi</i> L.	Oleaceae	0.24	0.33	4
52	<i>Alelmoschus esculantus</i> (L.) Moench	Malvaceae	0.26	0.23	3
53	<i>Zanthoxylum armatum</i> Mill.	Rutaceae	0.24	0.5	6
54	<i>Capsicum annum</i> L.	Solanaceae	0.24	0.23	3
55	<i>Physalis minima</i> L.	Solanaceae	0.24	0.23	3
56	<i>Zigyphlus maurifima</i>	Rhamnaceae	0.26	0.46	6
57	<i>Amarcmthus hyleridus</i>	Amaranthaceae	0.26	0.23	3
58	<i>Purnus domestica</i> L.	Rosaceae	0.24	0.4	5
59	<i>Cynoglossum lonceolatum</i> Forssk.	Boraginaceae	0.26	0.15	2
60	<i>Rosa indica</i> L.	Rosaceae	0.24	0.4	5
61	<i>Acassia nilotica</i> (L.) Dellile.	Mimosaceae	0.26	0.46	6
62	<i>Cuppressurs sempervires</i> L.	Cupressaceae	0.2	0.2	2
63	<i>Berberis lycium</i> Royle.	Berberidaceae	0.24	0.4	5
64	<i>Citrus limon</i> L. Osbeck	Rutaceae	0.3	0.2	3
65	<i>Ocimum omericanum</i> L.	Lamiaceae	0.26	0.3	4
66	<i>Ficus carisa</i> L.	Moraceae	0.24	0.46	7
67	<i>Dodenea viscosa</i> Jacq.	Sapindaceae	0.2	0.4	4
68	<i>Conyza</i> sp (L.)	Asteraceae	0.2	0.2	2

69	<i>Solanum nigrum</i> L.	Solanaceae	0.38	0.21	4
70	<i>Juglanus regia</i> L.	Juglandaceae	0.24	0.6	8
71	<i>Oxalis corniculata</i> L.	Oxalidaceae	0.26	0.15	2
72	<i>Nerium oleander</i> L.	Apocynaceae	0.26	0.15	2
73	<i>Euclaptus commalacensis</i>	Myrtaceae	0.2	0.46	7
74	<i>Taraxicum officinales</i> Weber.	Asteraceae	0.2	0.1	1
75	<i>Allium sativum</i> L.	Liliaceae	0.26	0.23	3
76	<i>Acasia modesta</i> (Wall).	Mimosaceae	0.26	0.23	3
77	<i>Capsella bursa pastoresis</i> (L.) Medik.	Brassicaceae	0.2	0.5	5
78	<i>Fumaria indica</i> (Hauuskn). Pugsley	Fumariaceae	0.2	0.2	2
79	<i>Cullirtemom citrinus</i>	Myrtaceae	0.24	0.16	2
80	<i>Argyrolalum rosaeum</i>	Papilionaceae	0.2	0.4	4
81	<i>Myrsine Africana</i>	Myrsinaceae	0.24	0.16	2
82	<i>Portulaca oleracea</i>	Portulacaceae	0.22	0.27	3
83	<i>Alcea rosea</i> L.	Malvaceae	0.22	0.18	2
84	<i>Sapindus mulsorosii</i>	Sapindaceae	0.22	0.18	2
85	<i>Woodfordia fruticosa</i> (L.) Kurz.	Lythraceae	0.24	0.4	5
86	<i>Solanum melongena</i> L.	Solanaceae	0.24	0.33	4
87	<i>Lycopersicon esculentum</i> L.	Solanaceae	0.3	0.2	3
88	<i>Foeniculum vulgare</i> Mill.	Apiaceae	0.24	0.25	3
89	<i>Zingiber officinale</i> Mill.	Zingiberaceae	0.24	0.25	3
90	<i>Viola canariensis</i>	Violaceaceae	0.34	0.23	4
91	<i>Citrus deodara</i> (Roxb.ex D.Don)G. Don	Punicaceae	0.2	0.3	3
92	<i>Dalbergia sissoo</i>	Papilionaceae	0.2	0.5	5
93	<i>Borago officinalis</i> L.	Boraginaceae	0.24	0.33	4
94	<i>Bidens biternata</i> (Lour.) Merr .& Sherff	Asteraceae	0.26	0.15	2
95	<i>Clematis orientalis</i> (Linn).	Ranunculaceae	0.28	0.14	2
96	<i>Trichodesma indica</i> (L.)R.Br	Boraginaceae	0.26	0.33	2

97	<i>Pteris ensiformis</i> Burm.f	Pteridaceae	0.24	0.08	1
98	<i>Olea ferruginea</i> Royle.	Oleaceae	0.3	0.46	7
99	<i>Cerastium foentatum</i> Baumg.	Caryophyllaceae	0.24	0.16	2
100	<i>Vitex negunda</i> L.	Lamiaceae	0.24	0.16	2
101	<i>Oenothera rosea</i> L'Her.ex	Onagraceae	0.24	0.16	2
102	<i>Diospyrus kaki</i> L.	Ebenaceae	0.24	0.16	2
103	<i>Elaeagnus parvifolia</i> Wall. ex Royle.	Elaeagnaceae	0.3	0.2	3
104	<i>Listsea glutinosa</i> (Lour.) C.B.Rob	Lauraceae	0.24	0.25	3
105	<i>Artemisia absinthium</i> L.	Asteraceae	0.2	0.3	3
106	<i>Barleria cristata</i> L.	Acanthaceae	0.2	0.3	3
107	<i>Silax alba</i>	Rutaceae	0.24	0.41	5
