Ethnobotanical survey of plants used in magico-religious practices in Kullu district of Himachal Pradesh, India.

Smriti Thakur, Radhika Jamwal and Subodh Negi

Correspondence

Smriti Thakur*[1], Radhika Jamwal[2] and Subodh Negi[2]

[1]Department of Botany, 175001, Sardar Patel University, Mandi, H.P., India.
[2]Department of Zoology, 175001 Sardar Patel University, Mandi, H.P., India.

*Corresponding Author: drsmritithakur@gmail.com

Ethnobotany Research and Applications 25:39 (2023) - http://dx.doi.org/10.32859/era.25.39.1-18
Manuscript received: 23/01/2022 – Revised manuscript received: 25/03/2023 - Published: 26/03/2023

Research

Abstract

Background: Local inhabitants of Kullu region of Himachal Pradesh, use various sacred plants for pleasing and worshipping local '*devats*', in various religious ceremonies, but we are losing the sacred valuable knowledge at a rapid pace, hence the need to document and preserve this knowledge.

Method: Ethno-botanical survey, field visits were conducted in different parts of Kullu district. Indigenous people, shamans, tantric, and local elderly members of society were consulted to collect the data. Informal discussions and interviews were done for data collection. Different use categories, the basic variables like frequency of citation (FC), use reports (UR), the number of uses (NU) and the ethno-botanical indices like relative frequency of citations (RFC), relative importance index (RI), cultural importance index (CI), and cultural value index (CV) were determined and compared.

Result: The paper includes the list of 75 species under 46 families, used for Magico-religious beliefs along with their medicinal value. Most utilized parts were flowers, whole plant, leaves, seeds, followed by fruits. *Ficus religiosa* L. showed highest value in all the indices (CI =2, RFC=1, RI= 0.75), with highest number of citation (FC=25), Use report (UR=50), followed by *Ocimum sanctum* L.

Conclusion: To maintain the age-old faiths, people of these areas, harvest plants sustainably and economically, these practices contribute in the ex-situ conservation of plants while fulfilling their values in magico-religious beliefs, as well as sustainable development of the area. Study also reveals the status of 21 rare plant species which need conservation.

Keywords: Sacred Plants, Religious Ceremonies, Ex-situ Conservation, Magico-religious beliefs, Sustainable Development

Background

In India, the worshiping of trees has been prevalent since the third and fourth millennium BC during the Harappan advent of civilization. Even the pottery of the Indus valley civilization painted the palms and peepal trees (Bhatla *et al.* 1984). Our ancestors lived in close association for their whole life within nature. About 468 plants belonging to 133 families used for sacred and magico-religious plants across India are dealt with, in the compendium given by

Sood *et al.* 2005. Religious beliefs of local people about supernatural powers and about particular events or objects is referred Magico-religious beliefs and a religious interdict forbidden by custom or religious grounds is known as Taboo (Ahirwar 2015).

Around 30 plant species belonging to 23 families, used for both religious purposes as well as in the treatment of different ailments are studied and reported from Assam (Sharma & Pegu 2011). Likewise, different workers at different point of time kept studying the magico religious beliefs like Das *et al.* (2009), Dixit (1997), Ghate (1998), Kokane *et al.* (2020), Majumdar and Dutta (2007), Sahu *et al.* (2013), Singh (2011), Thakur *et al.* (2021) and so on. "More often the use of magico-religious healing speaks of remarkable, precise, ceremonial, and cultic practices of prayer, and faith is indicative of mystical intervention that heals the ailing. Beliefs, frames of mindset, and social spirit existing within the communities help in the development of its healing traditions" (Conwell 2003). The subservience of mankind to mystical entities is one of the most powerful factors governing the well-being of society and its surroundings (Alver 1995, Jakobsen 1999). Prevailing in close consortium with nature helped humans in becoming curious about its riches and wealth. The Himalayas, distinguished by the varied biophysical environment, rich cultural surroundings, and numerous indigenous and ethnic communities, has endured life, for eternity (Gupta 2012). But it has been witnessed that due to reasons like population growth, climate change rapid growth in urbanization, construction of roads and rapid expansion of the secondary and tertiary sectors, disease outbreak, ignorance of the people about their plant wealth, and due to over-exploitation of the wild flora, has led to the destruction of the floral diversity of the area and risking the environmental fragility (Padoch & Sunderland 2014)).

Since plants are utilized in all kinds of traditional rituals and practices, they are protected and preserved, by all means, hence preventing the ecological degradation and deforestation that is being increased in the area in the name of progress and tourism. This self-imposed restriction, taboo, fear, or reverence of the local society help a symbiotic relationship between biodiversity and human which contribute immensely towards preserving the plants in their natural environment and maintaining the delicate balance.

Kullu is one of the most beautiful districts in the center of Himachal Pradesh. It has an average elevation ranging from 1500 to 4800 m. The latitude of Kullu is 31.99°N and the longitude is 77.40°E with a humid subtropical type of climate with mild to harsh winters with snowfall. The average rainfall is around 80cm. The district is known for its unique culture and traditions. Popularly known as 'devbhoomi', the locals of the Kullu region consider their deities as supreme; hence shaman and tantric practices are very common here. Since ancient times shamans and tantric commonly called 'Gurs', were consulted by the local people for good health, and fortune, on auspicious occasions, even to ward off an evil eye and maintain good health. They use many kinds of plants for the several types of practices performed. They protect and conserve the plants, considering them as sacred 'devbriksh' (tree of God). It is their firm belief that 'Jogani Devi' resides in those trees and thus there is a complete restriction on cutting those trees. Plants grown near temples are also completely prohibited to cut, but fruits and flowers can be harvested sustainably so that it does not cause any harm to the plant.

The work done in and around the area of study earlier (Kaur *et al.* 2017, Kumari *et al.* 2022, Sharma & Samant 2014, Singh 1999, Thakur 2017, Uniyal & Chauhan 1982) is more based on the ethnomedicinal plants, although this region is famous for the magico-religious practices, no systematic study and evaluation has been carried out for the various plants that are used in this area (Pangging *et al.* 2019).

The aim of the present study is to document the plants used for magico-religious practices in various aspects along with their medicinal values in order to conserve the floral diversity of the area.

Material and Methods

Study Area

The present study was conducted in the Kullu District of Himachal Pradesh, Kullu valley is sandwiched between the Pir Panjal, Lower Himalayan, and Great Himalayan Ranges and it is bound by Lahaul-Spiti, Kinnaur, Shimla, Mandi, and Kangra districts.

The area ranges from Bhuntar to Manali region, including three tehsils viz., Manali, Kullu, and Bhuntar. It lies between 31.2432°N and 32.2432°N latitude and 77.1455°E and 77.1892°E longitude covering an area of around 3,561 sq. km. All three regions are located on the bank of river Beas. The study is done in both rural and urban areas (Figs. 1a & b,2a& b & 3a &b)

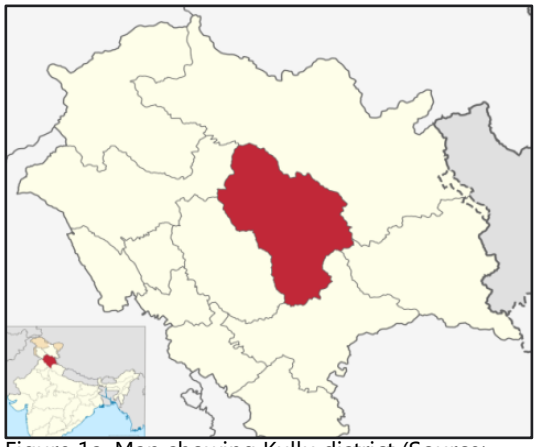


Figure 1a. Map showing Kullu district (Source: en.m.wikipedia.org).

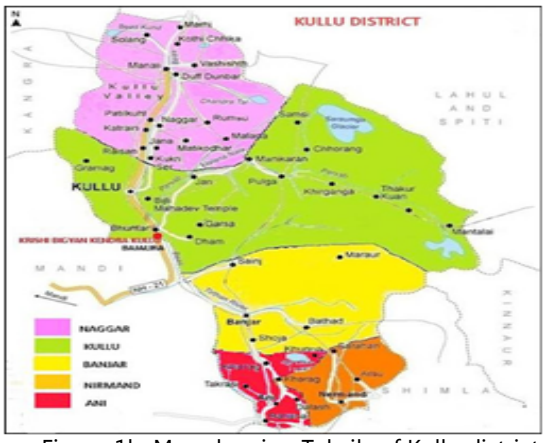


Figure 1b. Map showing Tehsils of Kullu district (Image source: www.hillarg.ac.in).

Figure 2a. Study area

Figure 2b. Study area.

Figure 3a. The procession of "Devtas"

Figure 3b. The procession of "Devtas"

The survey work and study was conducted between years 2021-2022. A general ethno-botanical survey was done, frequent field visits were conducted in different parts of Kullu, Manali and Bhuntar tehsils of Kullu district.

The total population is 206,716 with 106,128 men and 100,588 women; total population is 51,661 with 27,710 men and 23,951 women; total population is 4,475 with 2,364 men and 2,111 women in Kullu, Manali and Bhuntar, respectively (Census of India 2011).

Indigenous people, shamans of local deities, tantric, and local elderly members of society were consulted to collect the data. Informal discussions and interviews were done for data collection. The questionnaire is prepared in the way to address quires like vernacular name of plants plant parts used and how these plants are used for the magico-religious or any other purposes in the local dialect 'Kullvi' (Jain & Mudgal 1999). The data was collected in the form of photographs and plant samples, which were dried and pasted onto the herbarium sheets (Jain & Rao 1977). The plants were identified with standard literature (Chowdhery & Wadhwa 1984, Dhaliwal 1999, Singh 2018). The local experts were also consulted to identify the plants. The verification of plant genus, species, and family was done from the website of The Plant List database (http://www.theplantlist.org).

Demographic Data

The socio-economic information of 25 informants includes age, sex, education level and occupation (Table 1). The age ranges from 25-92; out of which 3 were women and 22 were men. Most of the informants in this study were engaged in tantric and shaman practices. Since the study includes Magico-religious aspects, the number of informants is restricted to 25.

Table 1. Demographic Characteristics of Informants (n=25)

Age	**Number**	**In Percent (%)**
Demographic Characteristics		
25-35	02	08
36-45	02	08
46-65	10	40
66-85	09	36
Above 85	02	08
Sex		
Male	22	88
Female	03	12
Educational Level		
Primary	03	12
Secondary	02	08
Higher Secondary	11	44
Graduate	07	28
Postgraduate	01	04
University	01	04
Occupation		
Women		
Housewife	02	08
Astrology shop	01	04
Men		
Tantric	03	12
Traditional shaman	13	52
Pujari	02	08
Traditional knowledge holder	04	16

Data analysis

The ethno-botanical information was categorized into eleven use categories (UC) Table 2, namely uses for tantric and shaman practices (TSP), sacred/offering /pooja/hawans/worshiping (SAC) magic beliefs / ward off evil spirits (MAG), Ceremonies /marriage/religious ceremony/faith (CER) medicinal uses (MU), alcoholic beverages (AB), insect repellant (IR), oil (O), vegetable (VEG), cleaning and washing (CW) and timber and wood craft (TW). (

Table 2 Documented plants under each UC (Use Category) and its percentage

Use Categories (UC)	**No. of sps**	**% of sps**
Tantric/Shaman practices (TPS)	13	10.0
Sacred/offering (SAC)	59	45.4
Magic belief/ward off evil spirits (MAG)	13	10.0
Ceremonies (CER)	09	6.9
Medicinal Uses (MED)	16	12.3
Alcoholic Beverage (AB)	05	3.8
Insect Repellant (IR)	02	1.5
Oil (O)	03	2.3
Vegetable (V)	05	3.8

Cleaning/Washing (CW)	02	1.5
Timber/ Woodcraft (TW)	03	2.3
Total	130	100.0

The basic variables like frequency of citation (FC), use reports (UR), the number of uses (NU) and the ethno-botanical indices like relative frequency of citations (RFC), relative importance index (RI), cultural importance index (CI), and cultural value index (CV) were determined and compared.

These above-cited ethno-botanical indices were determined by using Microsoft excel and formulae as given below (Tardio & Pardo-de-Santayana 2008).

Frequency of citation (FC)
Use Reports (UR):

$$UR_s = \sum_{u=u1}^{u_{NC}} \sum_{i=i1}^{i_N} UR_{ui}$$

Where, UR_s= use report of each specie UR_{ui}= sum of the uses reported for each species under each category.

Relative Frequency of Citation (RFC):

$$RFC_s = \frac{FC_s}{N} = \frac{\sum_{i=i1}^{i_N} UR_{ui}}{N}$$

Where, FC =frequency of citations, N is the number of informants, UR is the number of use reports.

Relative Importance Index (RI):

$$RI_s = \frac{RFC_{s(max)} + RNU_{s(max)}}{2}$$

Where,

$$RFC_{s(max)} = \frac{FC_s}{\max (FC)}$$

$$RNU_{s(max)} = \frac{NU_s}{\max (NU)}$$

Where,
$RFC_{s(max)}$= maximum relative frequency of citation $RNU_{s(max)}$= maximum relative number of uses, FC = frequency of citation NU = number of uses max (FC) = maximum frequency of citation max (NU) = maximum number of uses

Cultural Value Index (CV)

$$CV_s = \left(\frac{NU_s}{NC}\right) x \left(\frac{FC_s}{N}\right) x \left(\sum_{u=u1}^{u_{NC}} \sum_{i=i1}^{i_N} UR_{ui}/_N\right)$$

where,

$\frac{NU_s}{NC}$= relationship between the number of different uses reported for the species and the total number of use-categories

$\frac{FC_s}{N}$ = relative frequency of citation of the species

$\sum_{U=U1}^{U_{NC}} \sum_{I=i1}^{I_N} UR_{UI}/_N$ = Sum of the UR for the species, divided by N

Cultural Importance Index (CI):

$$CI_s = \sum_{u=u1}^{u_{NC}} \sum_{i=i1}^{i_N} UR_{ui}/_N$$

Where, UR = use report of each species under each category
N = the total informants

Table 3. Traditionally used magico-religious plants in the present study

Family	Botanical Name	Local Name	EHN	Habit	Present status	Part used	Uses
Acanthaceae	*Justicia adhatoda* L.	**vasuti**	EBH-1963	S	A	Fl	Flowers are offered to Lord Shiva during *'pooja'*. Flowers are also used to treat cold and cough.
Acoraceae	*Acorus calamus* L.	**bachh/ bochh**	EBH-2187	H	R	Rh	It is used to drag evil spirits and negativity away from children. Rhizome is used to treat cold.
Amaryllidaceae	*Narcissus poeticus* L.	**bodi**	EBH-2115	H	A	Fl	Flowers have a pleasant fragrance and are offered to local deities.
Anacardiaceae	*Mangifera indica*L.	**aam**	EBH-1973	T	R	Lf, St	Leaves are used in *'pooja'* as they are repelling negative energy and evil spirits and wood is used for *Hawan*.
Apiaceae	*Hymenidium brunonis* (DC.) Lindl.	**losar**	EBH-2224	H	R	Wp	The plant is used as incense in *hawans* and *poojas* and is also used to protect woolen clothes from attack by microorganisms.
Apocynaceae	*Nerium oleander* L.	**ner**	EBH-2219	S	A	Fl	The flower is offered to the Local deity *Piradi Mahadev* during local festivals.
Apocynaceae	*Wrightia tinctoria* R.Br.	**nangejau**	EBH-1937	T	R	Sd	Seeds are used in *Hawan* and other shaman practices.
Asphodelaceae	*Aloe vera* (L.) Burm. f.	**ghrit kumari**	EBH-2189	H	A	Wp	It is planted near the entrance of the house to drag away and repel evil spirits. Plant gel is eaten to treat stomach disorders and applied on skin infections too.
Asteraceae	*Aster himalaicus* C.B. Clarke	**himalayan aster**	EBH-2206	H	R	Fl	Flowers are used in various *'poojas'* of *Jogani Devi*.
Asteraceae	*Dolomiaea costus* (Falc.) Kasana & A.K.Pandey	**kunth**	EBH-2194	H	R	Wp	The whole plant is used in tantric practice and also used to repel insects.
Asteraceae	*Dolomiaea macrocephala* DC. ex Royle	**googal**	EBH-2212	H	R	Rt	Roots are burnt over coal and used as (*dhoop*) incense during '*hawan'* or *'pooja'* it removes negativity.
Asteraceae	*Saussurea obvallata* (DC.) Edgew.	**braham-kamal**	EBH-1962	H	R	Fl	The flower is offered to deities of the upper Kullu region.
Asteraceae	*Tagetes sps.*	**dolru**	EBH-1942	H	A	Fl	Flowers are used to decorate palanquins of local deities.
Asteraceae	*Taraxacum officinale* F.H.Wigg.	**long**	EBH - 1965	H	A	Fl	Flowers are used in worshiping *Jogani Devi*.
Berberidaceae	*Berberis lycium* Royle	**kashambal**	EBH - 2098	S	A	St	The stem is cut into 108 sticks and worshiped a day before '*Holi*'. The roots are powdered and used to treat stomach infections.
Betulaceae	*Betula utilis* D. Don	**bhojpatra**	EBH-2199	T	R	Ba	The bark is used in *Hawan* and is also used for making *Jantars* (Locket) to ward off the evil spirits.

Brassicaceae	*Brassica rapa* L.	**shai/ sarson**	EBH-2190	H	A	Sd	Seeds are used in various Shaman and Tantric practices and oil extracted from the seed is used for lightning *jot-batti* (lamps).
Buxaceae	*Buxus wallichiana* L.	**shamshad**	EBH- 2195	T	R	Wp	The tree is considered sacred and is planted near temples. Wood is used for wood craft.
Cannabaceae	*Cannabis sativa* L.	**bhang/ bhong**	EBH - 1834	H	A	Lf, Sd	Leaves are offered to Lord Shiva and seeds and leaves are used for making a drink called *'Ghota'* and is offered to Lord Shiva during Shivratri.
Caprifoliaceae	*Valeriana hardwickii* Wall.	**nihani**	EBH-2137	H	R	Wp	The whole plant is used in *'Hawan'* and also in other Shaman practices.
Caprifoliaceae	*Valeriana jatamansi* Jones ex Roxb.	**mushkbala**	EBH-2132	H	R	Fr	It is a major component of *'Hawan-samagri'*.
Cucurbitaceae	*Benincasa hispida* Cogn.	**petha**	EBH 2188	C	A	Fr	Fruits are used for sacrifice in tantric practices and also eaten as a vegetable, especially during marriages.
Cupressaceae	*Juniperus macropoda* Boiss.	**bethar**	EBH-2220	T	R	Lf	Leaves have a characteristic aroma and are burnt over coal to be used as incense for it removes negativity.
Ericaceae	*Rhododendron arboreum* Sm.	**brah, buransh**	EBH-2216	T	A	Fl, Lf	Flowers and leaves are offered to local deities. Flower juice is also used to treat gastritis, flowers are also used to make *'chutney'*
Fabaceae	*Bauhinia petersiana* Bolle	**tatra/ tat**	EBH-2210	T	R	Sd	The flat seeds of the plant are put together with the help of needle and sacred thread and offered to the deities.
Fabaceae	*Robinia pseudoacacia* L.	**kikar**	EBH - 1931	T	A	Fl, Ba	Flowers are offered to local deities and bark is used to make a wine called *'lugdi'* and is offered to local deities *Nanda Narayan.*
Fabaceae	*Vigna mungo* (L.) Hepper	**mah, mash**	EBH-1965	C	A	Sd	Seeds are offered to *Shani Dev* on Saturday and are also used in various shaman and tantric practices.
Fagaceae	*Quercus floribunda* Lindl. ex A. Camus	**mohru**	EBH- 2118	T	A	Wp	The whole plant is considered sacred; thus, it is planted near the temples.
Iridaceae	*Crocus sativus* L.	**kesar**	EBH-2192	H	R	Stg	It is used as a food dye and used for making *Tilaka* for *'pooja'*
Juglandaceae	*Juglans regia* L.	**akhrot/ khod**	EBH-2018	T	A	St	Timber is used in the construction of temples and is considered sacred.
Lamiaceae	*Ocimum tenuiflorum* L.	**tulsi**	EBH-1816	H	A	Wp	Leaves and flowers are used in *'Poojas'* and this plant is considered sacred and have medicinal properties against cough and cold.
Lamiaceae	*Salvia coccinea* Buc'hoz ex Etl.	**ram tulsi**	EBH - 2108	H	A	Wp	The whole plant is considered sacred and also shows medicinal properties against skin disorders.

Lythraceae	*Lagerstroemia indica* L.	**ner/kaner**	EBH-1977	S	A	Fl	Flowers are used for various *'poojas'* and are also offered to Local Deities *Piradi Mahadev.*
Lythraceae	*Punica granatum* L.	**daddu**	EBH - 2100	S	A	Wp	The whole plant is considered sacred, and twigs are worshiped by newly married couples at their wedding for a good life ahead.
Malvaceae	*Gossypium hirsutum* L.	**rui**	EBH- 1980	S	R	Fl	Flowering bud is used for making divine thread called *Dori* and is also used for making *batti* of lamps.
Malvaceae	*Hibiscus rosa-sinensis* L.	**gudahal**	EBH- 1892	S	A	Fl	Flowers are offered to Goddess Kali.
Malvaceae	*Pterospermum acerifolium* (L.) Willd.	**-**	EBH-2101	T	A	Fl	Flowers are offered to local deities.
Meliaceae	*Melia azedarach* L.	**jek**	EBH - 2142	T	A	Fr	Fruits are used by tantrics in the treatment of skin diseases.
Menispermaceae	*Tinospora cordifolia* (Willd.) Miers ex Hook.f. & Thomson	**glo, giloe**	EBH - 2028	C	A	St	The stem is used in the preparation of *'Hawan-samagri'* and is useful to treat increased levels of uric acid.
Moraceae	*Ficus palmata* Forssk.	**fagda**	EBH - 1966	T	A	Lf	Its immature leaves are boiled and cooked as a vegetable. It is considered that a person, who eats this, will have good fortune throughout the year. Used in religious ceremonies for making container to keep sacred items, plant is also used for sacred offerings
Moraceae	*Ficus religiosa* L.	**peepal**	EBH-2029	T	A	Wp, Lf	Whole plant is considered sacred, and leaves are used in *'pooja'* and leaves are considered as representative of Braham Dev, hence helping to ward off the evil spirits.
Musaceae	*Musa paradisiaca* L.	**kela**	EBH-1987	T	A	Lf, Fr	Fruits are offered to *Devi Kushmanda* on the fourth day of Navratri and in many *'poojas'*, its leaves are considered sacred as Lord Vishnu resides on the tree.
Nelumbonaceae	*Nelumbo nucifera* Gaertn.	**kamal**	EBH-2120	H	R	Fl	Flowers are offered to Goddess Laxmi.
Oleaceae	*Jasminum grandiflorum* L.	**malti**	EBH - 2102	S	A	Fl	Flowers are offered to Lord *Nahar Singh* and it is supposed that his sister Divine *Jogani Devi* resides in those flowers.
Oleaceae	*Jasminum officinale* L.	**janglichameli**	EBH-2105	S	A	Fl	Flowers are offered to Lord Hanuman.
Pedaliaceae	*Sesamum indicum* L.	**til**	EBH- 2016	H	A	Sd	Seeds are used in *Hawan* and offered to *Shani dev* on Saturday.
Pinaceae	*Cedrus deodara* (Roxb. ex D. Don) G. Don	**diyar/ devdar**	EBH-1943	T	A	Wp	The tree is considered *Devbriksh* (Tree of God) and it is believed that *Devi Jogani* resides in the tree and is planted near temples. Timber is also used in temple construction, oil is also extracted.

Pinaceae	*Pinus wallichiana* A.B. Jacks.	**kail**	EBH-1967	T	A	Co, Lf	Cones are used in various aspects as it repels negative energy and is hung on outer walls or doors of houses to repel evil spirits. Leaves are used as brooms to drag negativity out.
Piperaceae	*Piper betle* L.	**paan**	EBH-1936	C	R	Lf	Leaves are used to worship Goddesses on various religious occasions.
Poaceae	*Cynodon dactylon* (L.) Pers.	**dhroov**	EBH- 1996	H	A	Wp	It is used in various *'poojas'* as thread and also offered to local deities during *Saja* (Sankranti).
Poaceae	*Hordeum vulgare* L.	**jau**	EBH- 2218	H	A	Sd	Seeds are used in various *'poojas'* and also used to make *Hawan-Samagri*, used during marriage and other religious ceremonies.
Poaceae	*Oryza sativa* L.	**dhan, chaul, chaval**	EBH-2017	H	A	Sd	It is used in various sacred ceremonies and rice is given in the form of blessing to devotees of local deities.
Poaceae	*Paspalum scrobiculatum* L.	**kodra**	EBH-2104	H	R	Sd	Seeds are used to prepare a strong wine locally known as *'Soor'* and offered to the deities of Lug sari valley of Kullu tehsil.
Poaceae	*Saccharum officinarum* L.	**ganna**	EBH-1989	H	A	Wp	The whole plant is considered sacred as Lord Vishnu resides on it. Juice is use in treatment of jaundice.
Poaceae	*Triticum aestivum* L.	**gehun**	EBH-2222	H	A	Sd	Seeds are used in Navgrah '*Pooja*' and various other *'poojas'*.
Ranunculaceae	*Aconitum heterophyllum* Wall.	**atish**	EBH-2193	H	R	Wp	The plant is used by Tantric for its antispasmodic and anti-diarrhea properties for which it is boiled, and the decoction is used.
Rhamnaceae	*Ziziphus mauritiana* Lam.	**ber**	EBH - 1809	S	A	Fr	Fruits are used to extract Wine and are offered to local deities and various other tantric practices.
Rosaceae	*Eriobotrya japonica* (Thunb.) Lindl.	**lokat**	EBH - 2027	T	A	Lf	Leaves are used in *'poojas'* and are tied in are used of doors to drag evil spirits and negativity away from the house.
Rosaceae	*Prinsepia utilis* Royle	**bhekhal**	EBH - 2130	S	A	Wp	The whole plant is considered sacred as it drags evil spirits from the house; a twig is hung in the frame of the door in *Bhadrapad* and *Posh* months (Local Months) as it doesn't allow evil spirits to enter the house.
Rosaceae	*Prunus cerasoides* D.Don	**pajja**	EBH - 1945	T	A	Lf, St.	Leaves are used to decorate palanquins of local deities. Wood is sacred hence used in marriage ceremonies.
Rosaceae	*Rosa sps*.	**gulab**	EBH-1872	S	A	Fl	Flowers are used in various *'poojas'* and rose water is prepared using petals is also used in various *'poojas'* and religious ceremonies.
Rutaceae	*Citrus jambhiri* Lush.	**jhamirdi**	EBH- 2196	S	A	Fr	Fruits are used for sacrifice in tantric practices.

Rutaceae	*Citrus medica* L.	**nimbu**	EBH- 2194	S	A	Fr	Fruits are used for sacrifice in tantric practices.
Rutaceae	*Zanthoxylum armatum* DC.	**tirmira**	EBH - 1981	S	A	St, Sd.	Stem is used in temples for various sacred purposes and is used for teeth and gum problems and is considered that seeds are used to cure toothache.
Sapindaceae	*Aesculus indica* (Wall. ex Cambess.) Hook.	**khanor**	EBH- 2191	T	A	Fl, Fr	Flowers are used for different types of *'poojas'* and fruits are used to cure cramps during menstruation.
Sapindaceae	*Sapindus mukorossi* Gaertn.	**reetha**	EBH - 1948	T	A	Sd	Seeds are used to wash the utensils of the temples and also have medicinal properties for curing skin disorders.
Solanaceae	*Capsicum annuum* L.	**mirch/ pipadi**	EBH-1933	H	A	Fr	It is used for dragging out evil spirits from children, for this it is rotated 3 times over the head and then burnt over flames.
Solanaceae	*Cestrum nocturnum* L.	**raat ki rani**	EBH - 1913	S	A	Wp	Due to its fragrance, it is planted near temples, and it is considered that Divine resides in these flowers. Thus, they are considered sacred.
Solanaceae	*Datura stramonium* L.	**dhatura**	EBH - 1825	H	A	Fl	Flowers are offered to Lord Shiva's *'pooja'*.
Solanaceae	*Solanum donianum* Walp.	**jangalitambakhu**	EBH-1949	H	A	Lf	Leaves are dried and used in various practices and are offered to Local deities *Nar Singh.*
Taxaceae	*Taxus contorta* Griff.	**rakhal**	EBH-2167	T	R	Wp	The whole plant is considered sacred as deities reside on these trees. Tea of its bark is useful to treat allergic rhinitis, cough and cold.
Urticaceae	*Urtica dioica* L.	**aahan**	EBH - 2123	H	A	Wp	Twigs are used by shamans in various practices, and it drags away the evil spirits. Leaves are used to treat joint aches and they are cooked as vegetables also.
Violaceae	*Viola pilosa* Blume	**banaksha**	EBH - 1917	H	A	Fl	Flowers are offered to local deities and used to cure coughs and colds.
Vitaceae	*Vitis vinifera* L.	**aangoor**	EBH-2223	C	A	Fr	Fruits are used to extract wine called *'angoori'* and used in tantric practices.
Zingiberaceae	*Curcuma longa* L.	**haldi**	EBH- 2200	H	A	Rh	The rhizome is dried, and powder is mixed with water to clean utensils and statues of sacred deities and used in other *'poojas'* and religious ceremonies.

R=rare, A=abundant, C=Climber, H=Herb, S=Shrub, T=tree, Ba=Bark, Co=Cone, Lf=Leaf, Fl.=flower, Fr=Fruit, Rh= Rhizome, Rt= Root, Sd=Seed, Stg=stigma, St=Stem, Wp=Whole Plant

Results and Discussion

From the survey 75 plant species of 46 plant families have been reported, Asteraceae and Poaceae are dominant over other families; among these 54 species are abundant whereas 21 species are rare (Fig. 4.)

Among these plant species, use of herbs (32) were dominant over trees (22), followed by shrubs (16), and then climbers (4), (Fig. 5). The plant species are documented with their scientific names, vernacular names, plant families, parts used, different parts of the plant species were used in the magico-religious belief, and medicinal property. Flowers are used in the highest percentage followed by the complete plant. Seeds and leaves are used in similar percentages, followed by fruits stem, bark and rhizome. The least usage is seen for the stigma, root and cone, (Fig. 6). (

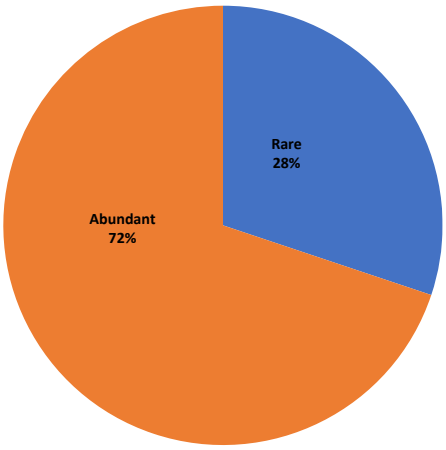


Figure 4. Pie chart showing availability of plants in the study area

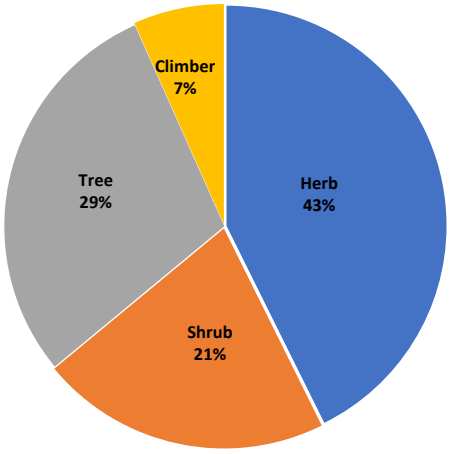


Figure 5. Pie chart showing distribution of plants

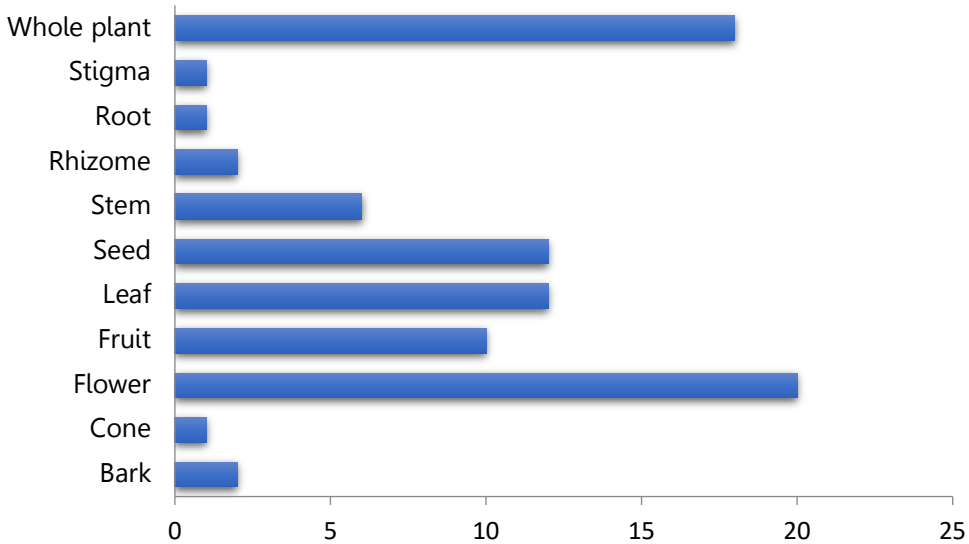


Figure 6. Histogram showing uses of different plant parts

Due to traditional uses and beliefs, these plants are harvested carefully and sustainably by the local people to prevent any harm to plants. Some trees planted near temples are completely restricted in order to conserve nature. Some areas are also converted into sacred grooves and entry of humans is strictly prohibited in some of those areas in order to protect them from human activities. The study shows that due to respect for their 'deities' people don't even dare to cause any harm to these plants. Some of the pictures of the plants used in *pooja* or shaman practices are show in Fig.7. In this way, they are protecting the environment and are helping in some of the endangered plant species. Likewise, in the prior work by Pandey and Pandey 2016, also emphasized the role as to how the sacred beliefs, traditional links of the deity helped the local inhabitants of Indo-Gangetic plains to conserve and preserve the nature and ecological balance.

Palanquin decorated with *Tagetes* sp.

Incense of *Juniperus macropoda*

Use of *Curcuma longa* powder

Wine of *Vitis vinifera* (Angoori)

Cones of *Pinus wallichiana*

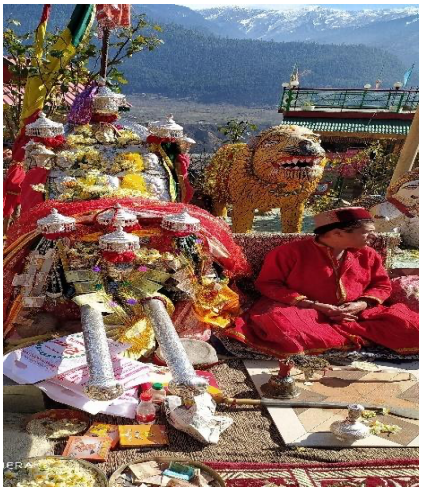
Hawan (Shaman practice)

Prinsepia utilis

Urtica dioica

Taraxacum officinale

Bark of *Betula utilis*

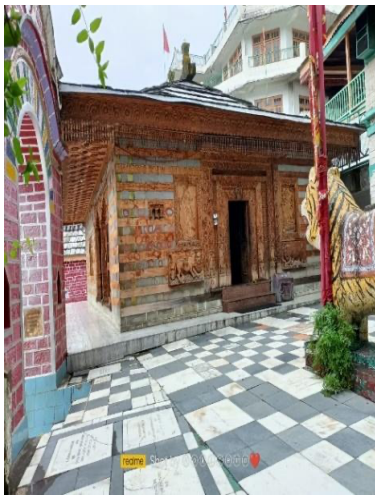


Palanquin decorated with Daffodil and Shaman performing rituals

Leaves of *Ficus religiosa*

Flowers made with *Bauhinia* sp.

Leaves of *Cannabis* offered to lord Shiva



Temple constructed with *Cedrus* wood

Figure 7. Images of some of the Plants being used for used for Magico-religious purpose

Each use category to the total cultural importance index (CI) of 36 most relevant species found in the study area (Table 4).

Table 4.Cultural importance index (CI) for 75 species with the CI component of each use category

Name of Species	TPS	SAC	MAG	CER	MED	AB	IR	O	V	CW	TW	Total CI
Ficus religiosa		1	1									2
Ocimum sanctum		0.88			0.88							1.76
Oryza sativa		0.68		0.68								1.36
Pleurospermum brunonis		0.68					0.68					1.36
Juniperus macropoda		0.6	0.6									1.2
Jurinea macrocephala		0.6	0.6									1.2
Aseculus indica	0.52				0.52							1.04
Urtica dioica	0.32		0.32		0.32				0.08			1.04
Cynodon dactylon		0.92										0.92
Betula utilis	0.44	0.44										0.88
Punica granatum		0.44		0.44								0.88
Rosa sp.		0.44		0.44								0.88
Rhododendron arboretum		0.24			0.24				0.32			0.8
Prinsepia utilis			0.72									0.72
Tagetes sp.		0.68										0.68
Capsicum annuum			0.64									0.64
Hordeum vulgare		0.32		0.32								0.64
Juglens regia		0.32									0.32	0.64
Taxus contorta		0.32			0.2							0.52
Valeriana hardwickii	0.32	0.32										0.64
Mangifera indica		0.2	0.2	0.2								0.6
Cucurbita alba	0.16								0.44			0.6
Adhatoda vasica		0.28			0.28							0.56
Prunus cerasoides		0.28		0.28								0.56
Triticum aestivum		0.56										0.56
Wrightia tinctoria	0.28	0.28										0.56
Brassica rapa	0.08							0.44				0.52
Ficus palmata		0.04		0.24					0.24			0.52
Narcissus poeticus		0.52										0.52
Cannabis sativa		0.28				0.2						0.48
Datura stramonium		0.24	0.24									0.48
Eriobotrya japonica		0.24	0.24									0.48
Tinospora cordifolia		0.24			0.24							0.48
Robinia pseudoacacia		0.28				0.16						0.44
Gossypium sp.				0.4								0.4
Paspalum scrobiculatum		0.2				0.2						0.4

TPS =Tantric/Shaman practices, SAC=Sacred/offering, MAG=Magic belief/ward off evil spirits, CER=Ceremonies, MED=Medicinal Uses, AB=Alcoholic Beverage, IR= Insect Repellant, O=Oil, V=Vegetable, CW=Cleaning/Washing, TW=Timber/ Woodcraft

Ficus religiosa is the most culturally significant plant under the category of sacred/offering /pooja/ hawans/worshiping (SAC) with a CI index value of 1.0 since it includes all the citations (FC=25), followed by *Cynodon dactylon* with a CI of 0.92 and *Ocimum sanctum* with CI of 0.88. *Ficus religiosa* also stood out in the use category of magico-religious beliefs /ward off evil spirits (MAG), with a CI of 1.0, followed by *Prinsepia utilis* (CI 0.72) and *Capsicum annuum* (CI 0.64). Under the category of Tantric/Shaman practices (TPS) *Aseculus indica*, and *Betula utilis* showed the highest CI's values of 0.52 and 0.44 respectively, followed by *Urtica dioica* and *Valeriana hardwickii* with CI of 0.32 each. Under the use category of Ceremonies/marriage/religious ceremony/faith (CER), *Oryza sativa* showed the highest CI of 0.68, whereas *Punica granatum* and *Rosa* sp. were second with a CI of 0.44 each. Under the minor use categories like Medicinal uses (MU), *Ocimum sanctum* showed CI of 0.88 followed by *Aseculus indica* with CI of 0.52, then *Taxus contorta* and *Urtica dioica* with CI of 0.32 each, under the category of Alcoholic beverage (AB) *Cannabis sativa* and *Paspalum scrobiculatum* showed CI of 0.2 for each. For the categories of Insect repellant (IR), oil (O), Vegetable (V), Cleaning/Washing (CW), Timber/ Woodcraft (TW), *Pleurospermum brunonis* (CI 0.68), *Brassica rapa* (CI 0.44), *Cucurbita alba* (CI 0.44), *Curcuma longa* (CI 0.12) *Juglens regia* (CI 0.32) stood out distinctly. However, if we see the overall highest CI index value, it was *Ficus religiosa* with CI 2, followed by *Ocimum sanctum* with CI 1.76, *P. brunonis*, and *Oryza sativa* with CI of 1.36 each. The 36 plants with the highest CI score (0.4 or greater) included 17 Herbs, 04 Shrubs, and 13 Trees.

Table 5 shows the basic values (FC, UR, and NU), ethno-botanical indices (CI, RFC, and RI), and ranking of species on the basis of ethno-botanical values. The FC value considered only the number of people that mention them as useful, the other indices also consider multiplicity of use mentioned for a species.

Table 5. Evaluation of useful plants using four quantitative indices. List of the first 36 species following the CI index and plant ranking, based on each index

	Basic values			**Indices**				**Ranking**			
Name of Species	**NU**	**FC**	**UR**	**CI**	**RFC**	**RI**	**CV**	**CI**	**R FC**	**RI**	**CV**
Ficus religiosa	2	25	50	2.00	1	0.75	3.64E-01	1	1	1	1
Ocimum sanctum	2	22	44	1.76	0.88	0.69	2.82E-01	2	3	2	2
Oryza sativa	2	17	34	1.36	0.68	0.59	1.68E-01	3	5	4	3
Pleurospermum brunonis	2	17	34	1.36	0.68	0.59	1.68E-01	3	5	4	3
Juniperus macropoda	2	15	30	1.20	0.6	0.55	1.31E-01	4	7	5	4
Jurinea macrocephala	2	15	30	1.20	0.6	0.55	1.31E-01	4	7	5	4
Urtica dioica	4	8	26	1.04	0.32	0.66	1.21E-01	5	12	3	5
Aesculus indica	2	13	26	1.04	0.52	0.51	9.83E-02	5	9	8	6
Cynodon dactylon	1	23	23	0.92	0.92	0.59	7.69E-02	6	2	4	7
Betula utilis	2	11	22	0.88	0.44	0.47	7.04E-02	7	10	11	7
Punica granatum	2	11	22	0.88	0.44	0.47	7.04E-02	7	10	11	7
Rosa sp.	2	11	22	0.88	0.44	0.47	7.04E-02	7	10	11	7
Rhododendron arboreum	3	8	20	0.80	0.32	0.54	6.98E-02	8	13	6	8
Prinsepia utilis	1	18	18	0.72	0.72	0.49	4.71E-02	9	4	9	11
Tagetes sp.	1	17	17	0.68	0.68	0.47	4.20E-02	10	5	11	12
Capsicum annuum	1	16	16	0.64	0.64	0.45	3.72E-02	11	6	12	14
Hordeum vulgare	2	8	16	0.64	0.32	0.41	3.72E-02	11	13	13	14
Juglans regia	2	8	16	0.64	0.32	0.41	3.72E-02	11	13	13	14
Valeriana hardwickii	2	8	16	0.64	0.32	0.41	3.72E-02	11	13	13	14
Cucurbita alba	2	11	15	0.60	0.44	0.47	4.80E-02	12	10	11	10
Mangifera indica	3	5	15	0.60	0.2	0.48	3.27E-02	12	16	10	14
Triticum aestivum	1	14	14	0.56	0.56	0.41	2.85E-02	13	8	13	16
Prunus cerasoides	2	7	14	0.56	0.28	0.39	2.85E-02	13	14	14	16
Wrightia tinctoria	2	7	14	0.56	0.28	0.39	2.85E-02	13	14	14	16
Adhatoda vasica	2	7	14	0.56	0.28	0.39	1.83E-02	13	14	14	21

Brassica rapa	2	13	13	0.52	0.52	0.51	4.92E-02	14	9	8	9
Ficus palmata	3	7	13	0.52	0.28	0.52	3.97E-02	14	14	7	13
Taxus contorta	2	8	13	0.52	0.32	0.41	3.03E-02	14	13	13	15
Narcissus poeticus	1	13	13	0.52	0.52	0.39	2.46E-02	14	9	14	17
Cannabis sativa	2	7	12	0.48	0.28	0.39	2.44E-02	15	14	14	18
Datura stramonium	2	6	12	0.48	0.24	0.37	2.09E-02	15	15	15	20
Eriobotrya japonica	2	6	12	0.48	0.24	0.37	2.09E-02	15	15	15	20
Tinospora cordifolia	2	6	12	0.48	0.24	0.37	2.09E-02	15	15	15	20
Robinia pseudoacacia	2	7	11	0.44	0.28	0.39	2.24E-02	16	14	14	19
Paspalum scrobiculatum	2	5	10	0.40	0.2	0.35	1.45E-02	17	16	16	22
Gossypium sp.	1	10	10	0.40	0.4	0.33	1.45E-02	17	11	17	22

NU: No. of uses; FC: Frequency of Citation; UR: Use report; CI: Cultural Importance; RFC: Relative Frequency of Citation; RI: Relative Important Index; CV: Cultural Value Index

There are clear differences in species ranking yielded by the various indices given in Table 5. Although the first specie i.e., *Ficus religiosa* is the same in all of them, as all the informants were in consensus with similar two uses, however for other plants species, the order varies depending on the chosen index. *Ocimum sanctum* stood out in all the indices except for relative frequency index (RFC), where *Cynodon dactylon* took second place with more informants as compared to *O. sanctum*. *Oryza sativa* was third as far as Cultural value and Cultural importance index, where it has shown the maximum utilization in sacred and religious ceremonies.

Under the RI value, *Urtica dioica* took third place, as RI takes the number of uses into account and this plant has recorded for a maximum of four uses. *Aster himalaicus*, *Pterospermum* spp, *Solanum verbascifolium,* and *Taraxacum officinale* were the least important species as they have a minimum value for informant (FC=1), use category (NU=1), and use report (UR=1).

Conclusion

Land use means the utilization of land by humans for different activities including settlements or build-up areas, agricultural land, transport, and other infrastructure activities. This type of human interaction degrading the ecological delicate balance, thus enhancing the vulnerability of the area to more disaster-prone (Chandel *et al.* 2013). The study is expected to add new depth to accentuate the unfolding issues regarding sustainability in this mountain region, and how the flora around can be preserved through people's sacred beliefs, taboos, or self-imposed restrictions in this region, which can help steadily to conserve and preserve the fragile yet intricate balance between nature and mankind. A recent quantitative conversation analysis in ethnomedicine for Van Gujjar tribe was conducted in the Uttarakhand region for evaluating and depicting the same concerned about the over-exploitation and human activities disturbing the delicate ecological balance (Gupta 2023).

The present study shows that 75 plant species of 46 families are used for various aspects of Magico-religious beliefs by the local people of the Kullu region. Various ethnobotanical indices of these plants were studied to find out the most culturally relevant species under each use category. This study also helped us to uncover the concealed and secretive uses of the flora of this region especially for the tantric and shaman practices, along with plants used in various sacred rituals and ceremonies. Minor uses were also taken into consideration for knowing the overall uses and importance of the plant species of the area under study. Most of the time these practices and knowledge remain hidden within the families as their sacred secrets, but for the betterment of society, the dissemination of culture and knowledge should go beyond the family successions. The study is one step forward in an attempt to make the people aware of the availability status, the scientific documentation of these plant species with their habits, habitat, and traditional indigenous uses. This will encourage the local people, for the conservation and sustainable use of these plants, for fulfilling the need of ever-increasing population demands who are directly or indirectly dependent on biodiversity around, for maintenance of diversity will also enhance the health of the watershed areas in the vicinity of the study area.

Future implementations

The documentation of such sacred and religious beliefs of the people help the mankind in future to connect to the floral diversity and increasing the forest cover, hence help to reduce the carbon footprint in the near future, since it is increasing fast due to many developmental projects in the area. The status of 21 plant species is shown to be rare, which were, if overexploited further and used unsustainably, the number of these plants will gradually decrease

henceforth an awareness in the people is a must and the Government should develop sustainable strategies to nurture and conservation these plant species so as to protect and maintain the ethnobotanical diversity, ecological balance and adequate land cover, for the generations to come.

Declarations

Ethics Approval: Verbal prior informal information consent was obtained before the survey.
Consent for publication: People shown in images gave their prior informed consent for the publication of the image.
Availability of Data Materials: All the supporting data available in article.
Competing Interest: Authors should declare no competing or conflict of interest.
Funding: Not applicable.
Authors Contribution: ST designed and analyzed the data, framed the final manuscript. **RJ** prepared the manuscript and proofread the manuscript. **SN c**arried out the survey and collected the data. All authors read and approved the final manuscript.

Acknowledgments

The authors are highly thankful to Shamans, Tantric, Pujari, and inhabitants of the Kullu District of Himachal Pradesh, India, for providing valuable information during field surveys. The authors are also thankful to the Department of Botany, Sardar Patel University, Mandi, Himachal Pradesh, India, for providing the facilities and encouragement.

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