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Species Diversity and Ethnobotanical Uses of Family Moraceae in District Bilaspur, Himachal Pradesh (India)

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ABSTRACT: Ethnobotany is the study of past and present interrelationships between human cultures and the plants. An ethnobotanical survey of rural areas of Bilaspur district was carried out to enumerate the species diversity and traditional uses of family Moraceae. The district Bilaspur lies between 31° 12' 30" and 31° 35' 45" North latitudes and between 76° 23' 45" and 76° 55' 40" East longitudes in the Shivalik hills of the Himalayas next to Punjab plains in the basin of river satluj. In present study 22 species belonging to 4 genera of the family, Moraceae have been recorded in district Bilaspur. Genus *Ficus* has represented by 15 species, *Morus* by 4, *Artocarpus* by 2 and *Broussonetia* by one species. As per ethnobotanical uses 15 species edible, 12 fodder, 8 timber, 8 medicinal, 5 ornamental/avenue and 3 sacred plants have been documented. Each plant species has been provided with information on botanical names, common names, habit, availability status, parts used and ethnobotanical uses. *Ficus religiosa* and *F. benghalensis* are considered as sacred plants and no one can cut them for their individual interest. This study also indicates that the district Bilaspur has rich floral diversity and inhabitants still rely on plants for their livelihood. But due to gradual socio-cultural transformation, the rural inhabitants losing the traditional knowledge which is a cause of neglect of conservation of floral diversity. Hence, there is an urgent need to conserve traditional knowledge as well as invaluable plant resources.

Keywords: Bilaspur; Diversity; Ethnobotany; *Ficus. Morus and* Moraceae.

INTRODUCTION: Ethnobotany is the study of past and present interrelationships between human cultures and plants. Indigenous people are precious treasures of ethnobotanical knowledge, which is passed on verbally through generations. Humans have been relied on plants for their basic needs of food, flavour, shelter, clothing and medicine, since time immemorial. India have about 2.4% of the world's total landmass, it harbours a total of 47,513 plant species, representing as much as 11.4% of world flora.[1] It is recognized as one of the megabiodiversity hotspots of the world representing about 17527 species under 2991 genera and 251 families of angiosperms.[2] According to Nayar (1996) about 5725 species under 147 genera of flowering plants are endemic to India.[3]

Himachal Pradesh is a small hilly state of India situated in Northwestern Himalaya with an altitude ranging from 350-7000 meters. It has a deeply dissected topography, complex geological structure, and a rich temperate-subtropical flora. The district Bilaspur lies between 31° 12' 30" and 31° 35' 45" North latitudes and between 76° 23' 45" and 76° 55' 40" East longitudes in the outer hills (Shivalik hills) of the Himalayas next to Punjab plains in the basin of river satluj. Geomorphology shows lesser hills and comparatively wider valleys, drained by khadds and nallahs with average rain fall of 1478.8 mm.[4] Most of the soil of the Bilaspur district is somewhat sandy and is usually deficient, shallow and at times severely eroded. The hills and valleys along the Khads are quite dry and hot in summer, but are humid and sultry during rainy season. Winters are cold and a thick blanket of fog envelops the valleys in the early hours of the day. All the geographical, edaphic and climatic features have a bearing on the flora of the area. According to the classification of Champion and Seth Bilaspur district has three types of forest namely Northern Tropical Dry Deciduous Forests, Himalayan Sub-Tropical Pine Forest, and Lower Western Himalayan Temperate Forests.[5] The 93% population of the district resides in rural areas, with agriculture, animal husbandry and horticulture as their major occupation. Peoples of the area are hardworking, ecofriendly, religeous and God fearing. The indigenous knowledge of Bilaspur district has been documented by some workers during last few years, but for complete exploration still comprehensive efforts are required.[4, 6, 7, 8, 9, 10&11] The present study is an effort to explore the diversity and traditional knowledge about the family Moraceae in Bilaspur district.

Moraceae is also known as "mulberry" or "fig" family. The representative species can be found as shrub,

tree, herb or subshrub, feature woody stem, alternate leaves, unisexual flowers and fruits in small nuts form. The Moraceae now treated as an independent family under the order Rosales with seven tribes Artocarpeae, Antiaropsideae, Castilleae, Dorsteniaeae, Ficeae, Moreae and Soroceae represents about 37 genera comprising more than 1100 species.[12] The major centre of distribution of the family is in the Old World tropics, particularly Asia and the Indo-Pacific Islands.[13 & 14] The family Moraceae comprises the well known fruit yielding species like *Artocarpus heterophyllus, Ficus auriculata, F. carica, F. semicordata, Morus alba*, etc. having ecological, economical and socio-cultural relationships with people of that area. In India, the "Flora of British India", "Indian Trees″ and ″Flora of Assam″ are the noteworthy texts regarding taxonomy and ethnobotany of Moraceae.[15, 16 &17] The scrutiny of various flora published from different parts of the country indicate that the species of Moraceae are distributed throughout the country.[18, 19 & 20] The North East India has more than 75 species under 7 genera out of the total 140 Indian species reported under 12 genera, among these, the genus *Ficus* is the dominant with more than 80% species followed by the genera *Artocarpus, Morus, Broussonetia, Strebulus* and *Maclura*.[21] In India genus, *Ficus* is represented by 89 species[22] and *Morus* by four species[23]. According to Dutta (2000) four species of mulberry, namely *Morus alba, M. indica. M. serrata* and *M. laevigata* grow wild in the Himalayas.[24]

MATERIALS AND METHODS: To collect first hand information on plant species of family Moraceae and their ethnobotanical uses, the extensive exploratory survey had been carried in 24 villages of district Bilaspur, H.P. during 2015-2017. Information was recorded according to the methodology suggested by Jain and Goel through questionnaires, interviews and discussion among villagers in their local dialect.[25] The plant specimens were collected and photographed with the help of local informants. Herbarium specimens of all the plants were prepared and identified with the help of floras of Himalayan regions, India, various plant books and previous works.[10, 15, 20, 26 & 27] Furthermore, the information regarding botanical names, synonyms, common names, habit, availability and ethnobotanical uses has enumerated in Table 1.

Table 1: Diversity, availability status and ethnobotanical uses of the family Moraceae in Bilaspur, Himachal Pradesh.

Sr. No.	Botanical Name	CN	HB	AS	Ethanobotanical Uses
1	***Artocarpus heterophyllus* Lam.** Syn. *A. integra* (Thunb.) Merrill, *A. integrifolia* L.f..	Kathal	T	+	Unripe fruits are used as vegetable or pickled and ripe fruits are eaten raw.
2	***Artocarpus lakoocha* Roxb.** Syn. *A. lacucha* Buch.-Ham., *A. mollis* Wall.	Dheu	T	+	Unripe fruits are pickled and ripe fruits are eaten fresh, Leaves are used as fodder.
3	***Broussonetia papyrifera* (L.) L'Her. Ex Vent.**	Japanitoot	T	+++	Leaves are used as fodder. The plant is used as cheap timber and fuel wood source.
4	***Ficus arnottiana* (Miq.) Miq.** syn. *Urostigma arnottiana* Miq.	Paraspipal	T	+	Leaves are used as fodder. Wood is used as fuel.
5	***Ficus auriculata* Lour.** Syn. *F. roxburghii* Wall. Ex Miq., *F. macrophylla* Roxb.	*Tiambli*	T	+++	Leaves are lopped for fodder and also used to make plates (*pattal* and *dunas*) by stitching 3-4 leaves together for taking food during feasts in the villages. Immature leaves are also used for the preparation of green vegetable. Ripe fruits are eaten and unripe fruits are used to make vegetable. Wood is used as poor timber and fuel.
6	***Ficus bengalensis L.***	Bar/ Bargad	T	++	Its leaves are used as fodder. Ripe fruits are eaten. Wood is used for agricultural implements and as fuel. Plant is considered as a sacred tree, planted near temples and resting places. It is a good shade and avenue tree. Latex applied in rheumatism and lumbago.

7	***Ficus carica L.***	Anjeer	T	+	Ripe fruits are eaten.
8	***Ficus elastica* Roxb. Ex Hornem.** Syn. *Urostigma elasticum Miq., Visiania elastica* Gasp.	Rabar Plant	T	+	Plant is grown as ornamental and avenue tree.
9	***Ficus hispida* L. f.** Syn *F. oppositifolia* Roxb., *F. daemonum* Koenig	Dabarnya	T	+++	Leaves are used as fodder and wood is used as a fuel. Ripe fruits are eaten. Latex is applied to treat toothache.
10	***Ficus nerifolia* Sm.,** syn. *F. nerifolia* J.E. Smith var. *nemoralis* (Wall. Ex Miq.) Corner, *F. nemoralis* Wall, *F. gemella* Wall, *F. fieldingii* Miq., *F. trilepis* Miq.		T	+	Leaves are used as fodder. Wood is used for house building and as fuel. Ripe fruits are eaten.
11	***Ficus palmata* Forssk.** syn. *F. caricoides* Roxb., *F. virgata* Roxb., *F. pseudo-sycamorus* Done.	Dagala, Phegda	T	+++	Leaf ash mixed with honey is given to cure cough. Ripe fruits are eaten. Unripe fruits are used to make vegetable. Latex applied to draw out thorn from skin and fruits used for constipation. Wood is used for making agricultural implements and as fuel.
12	***Ficus pumila* L.**		C	+	Plant is used for decorating walls.
13	***Ficus racemosa* L.** Syn. *F. glomerata* Roxb., *F. chittagonga* Miq., *F. mollis* Miq., *F. goolereea* Roxb., *Covellia glomerata* Miq.	Ambrya/ Umrya	T	++	Latex is applied as grease on threads used in Charkha. Root used in diarrhea and diabetes. Plant is also used in religious ceremonies.
14	***Ficus religiosa* L.** Syn. *F. affinior* Griff., *Urostigma religiosum* Gaspar; *U. affine* Miq.	Peepal	T	++	Plant considered as God Brahma and worshiped. Leaves and twigs are used in religious activities. Ripe fruits are eaten. Ashes of bark and leaves are used to mature the boil.
15	***Ficus rumphii* Blume.** Syn. *F. cordifolia* Roxb., *Urostigma rumphii* Miq., *U. cordifloium* Miq.	Paplakh	T	+	Leaves are used as fodder.
16	***Ficus sarmentosa* Buch.-Ham. *ex* J. E. Smith** Syn. *F. foveolata* Wall. *Ex* Miq.	Phegdi	T	+	Ripe fruits are eaten fresh and unripe fruits are used to make vegetable.
17	***Ficus semicordata* Buch-Ham. Ex J.E. Smith** Syn. *F. cunia* Buch.-Ham. Ex Roxb.	Khainu	T	++	Leaves are lopped for fodder. Ripe fruits are eaten.
18	***Ficus virens* Dyrand.** syn. *F. infectoria* Roxb., *F. lacor* Ham., *F. lucescens* Blume., *F. venosa* Wall., *Urostigma infectoria* Miq.		T	+	Leaves are used as fodder.
19	***Morus alba L.***	Toot	T	+++	Ripe fruits are refrigerant, edible and used for the cure of sore throat and skin infections. Young leaves are used to make "*pakodas*" with gram flour. Leaves are used as fodder for cattle and silk worm. Twigs are used for making baskets. Wood is used for furniture, house-building, tool handles and other goods.

20	***Morus australis* Poir.** Syn. *M, indica* Linn.	Toot	T	++	Ripe fruits are refrigerant, edible and used for the cure of sore throat and skin infections. Young leaves are used to make "*pakodas*" with gram flour. Leaves are used as fodder for cattle and silk worm. Twigs are used for making baskets. Wood is used for furniture, house-building, tool handles and other goods.
21	***Morus macroura* Miq.** syn. *M. laevigata* Wall. Ex. Brandis, *M. glabrata* Wall.	Toot	T	++	Ripe fruits are refrigerant, edible and used for the cure of sore throat and skin infections. Young leaves are used to make "*pakodas*" with gram flour. Leaves are used as fodder for cattle and silk worm. Twigs are used for making baskets. Wood is used for furniture, house-building, tool handles and other goods.
22	***Morus serrata* Roxb.**	Toot/ Cheemu	T	+	Ripe fruits are eaten. Leaves are used as fodder. Wood is used for furniture, house-building, tool handles and other goods.

Abbreviations used: AS = Availability Status, C = Climber, CN = Common Name, Hb = Habit, Sr. No. = Serial Number, Syn = Synonyms, T = Trees, +++ = Abundant, ++ = Common, + = Uncommon

RESULTS AND DISCUSSION: In the present study 22 species belonging to 4 genera of the family, Moraceae have been recorded in district Bilaspur of Himachal Pradesh. The information on scientific name, local name, habit, part used, availability status, and ethnobotanical uses obtained during the survey through individual's interviews have been provided in Table-1. Genus *Ficus* was represented by 15 species, *Morus* by 4, *Artocarpus* by 2 and *Broussonetia* by one species, and habit wise 21 trees and one climber were recorded. Among these species are 5 abundant, 6 common and 11 uncommon in this area. As per ethnobotanical uses 15 species edible, 12 fodder, 8 timber, 8 medicinal, 5 ornamental/avenue and 3 sacred plants were documented. *Ficus religiosa* and *F. benghalensis* are considered as sacred plants and no one can cut them for their individual interest. *Morus alba* and *M. australis* are cultivated for silk moth rearing. Fruits of 15 species of moraceae belonging to 3 genera were recorded as edible which either eaten as raw or used to prepare vegetable and pickle. During survey, it was also noticed that the younger generation is almost ignorant about ethnobotanical uses of plants, but elder people above 50 years of age are well equipped with traditional knowledge.

Many of the species of Moraceae that are used by the people of Bilaspur were also reported by other workers while exploring ethnobotany of different areas of Himachal Pradesh almost with similar uses.[20, 26 & 28] In district Bilaspur different ethnobotanical studies already have been reported 20 species of Moraceae.[4,8,10&11] The present study provides the detailed information on the diversity and indigenous uses of species of Moraceae. This study also indicates that the district Bilaspur has rich floral diversity and inhabitants still rely on plants for their livelihood. More investigations need to be carried out in the area to document and preserve valuable traditional knowledge and efforts must be done to protect and conserve such plants from being lost due to deforestation and urbanization.

CONCLUSION: The present study provides comprehensive information on diversity, availability status and indigenous uses of species of family Moraceae. Based on the results, it can be concluded that the area has high floral diversity and rich ethnobotanical heritage. But due to gradual socio-cultural transformation and more dependence on modern market resources, the rural inhabitants losing the traditional knowledge. This erosion of traditional knowledge is the cause of neglect of conservation of floral diversity. Hence, there is an urgent need to conserve traditional knowledge as well as invaluable plant resources.

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