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Ethno medicinal plant wealth of Saharanpur, Uttar Pradesh: Application of traditional knowledge in health care system

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ABSTRACT

A floristic survey of ethnomedicinal plants occurring in the rural area of Saharanpur district, Uttar Pradesh, India was conducted during 2020-2021 to document important flora and information from local community about their medicinal uses. The indigenous knowledge of local traditional uses was collected through open interviews and group discussions with local people of study area during The field trips. The local inhabitants mostly depend upon their indigenous knowledge to treat their various health problems. People collect useful plants from their surrounding plant communities in wild, semi-wild and some are cultivated as well. A total of 83 plant species were collected, of which 56 plants of medicinal importance were documented along with botanical name, local name, family, habit, parts used and utilization as herbal remedies. These 56 plant species belongs to 44 genera and 28 families. The main objective of the study was to explore traditional knowledge regarding uses of these plants for various medicinal purposes by the rural people of this area from time immemorial. It is evident from The present investigation that the most widely used plant part was leaves, followed by root, seed, whole plant, fruit, bark, stem, wood and flower. These plants are widely used to treat various ailments such as diabetes, rheumatism, dysentery, fever, urinary infection, asthma, paralysis, elephantiasis, kidney stones, snake bite, tuberculosis, leprosy, syphilis, leucorrhoea, eye infection and skin disorders by the local people of the study area.

Key words : *Ethnomedicinal, Local community, Indigenous knowledge, Ailments, Herbal remedies*

Introduction

Plants have been used since ancient times for the treatment of various ailments. The history of discovery and use of different medicinal plants is as old as the history of discovery and use of plants for food (Ibrar, 2002). In spite of the advent of the modern medicines, the traditional systems of medicine together with folklore systems continue to serve a large portion of the population, particularly in rural areas. Ethnobotany is defined as the investigation and evaluation of the knowledge of all phases of life amongst the primitive societies and plant environment with respect to life, customs, beliefs and history of the tribal people (Kshirsagar and Singh, 2001). The traditional medical practices based on plants are an important part of the primary healthcare system in the developing world (Sheldon *et al.*,1997). According to the World Health Organization (WHO) as many as 80% of world's population depends today on traditional medicine for their primary health care needs (Azaizeh *et al.*, 2003).

Recently, the practices and status of all herbal medicinal plants has been declined rapidly due to modernization of synthetic drugs which may lead to the loss of valuable information about healing herbs (Singh and Singh, 2009). Most of the traditional knowledge about these valuable plants, however is disappearing at a very fast rate as a consequence of socio-economic activities, industrialization and the migration of rural populations to urban areas (Signorini *et al.*, 2009). One of the most critical issues on the national and global agenda is need to preserve biodiversity for future generations while trying to understand and document the indigenous knowledge of resource management practices (Nehal *et. al*, 2004). In India, the traditionally used medication system plays an important role in health care of rural people. It has been estimated that only 5 to 10 % of the existing plant species in India have been surveyed for biologically active compounds. Only 25 % of the medical drugs are based on plants sources in the developed countries (Cragg *et al.*,1997).

Due to its unique geographical location and climatic conditions, the district Saharanpur of the state of Uttar Pradesh is well known for its medicinal plant wealth. Many plant species of this area were being used by local people for curing various diseases and to maintain their health (Nagiyan *et al.*, 2003; Dhiman *et al.*, 2006; Prachi *et al.*, (2009). Several other contributors have worked on phyto- diversity of Uttar Pradesh. Some of them includes Singh,(1982); Sharma, (1990); Maliya and Singh, (2003); Tomar, 2009 etc. The aim of the present study was to document the floristic diversity and indigenous uses of ethnomedicinal plants and encourage preservation of their culture, traditional knowledge and sustainable utilization of the plant wealth occurring in the study area. In the present paper, we reported some ethnomedicinal uses in the treatment of different ailments by the local community of Saharanpur district.

Materials and Methods

The district Saharanpur of Uttar Pradesh, India is selected for ethnomedicinal studies (Figure 1). The district is geographically located between 29° 34' and 30° 34' North latitude and 77° 7' and 87° 12' East longitude on the North-West edge of Uttar Pradesh. The area of district is 3869 sq. km. The study area is situated in the foothills of Shiwalik that forms a part of the outer Himalaya. The region is characterized with the Shiwalik, Bhabar, Tarai, Khadar and the plain. The southern part of the district constitutes a major part of plain area. This part is highly fertile and composed of alluvial soil. The climate of the region is tropical due to the proximity of the Himalayan region. Rainfall is most crucial climatic factor which directly affects the vegetation of this area. Approximately 90 percent rainfall occurs during monsoon season from June to September. Yamuna is the major river which flows on the western boundary of the district in south direction. This region forms the northern most part of Ganga-Yamuna Doab, therefore, being rich in irrigation facilities and fertility, the whole area enjoys rich diversity of valuable angiospermic medicinal plants.

A survey of the study area was carried out from July 2020 to August 2021 to get ethnomedicinal information following the prescribed protocols for the collection of ethno-botanical facts (Martin, 2004). In order to obtain traditional ethnomedicinal information, interviews and group discussions were organized with rural people of the study area. These informants included recognized healers, villagers, plant collectors, elder people and social workers. Field visits were arranged in different seasons for the collection of maximum number of plant specimens in their flowering and fruiting stages. Floristic diversity, local name of plants, parts of the plant used, method and forms of preparation were recorded and documented by successive visit to villages. Plant specimens were photographed at site for describing their basic details. Whole data of collected specimens were maintained in field note book.

The collected plant samples were further processed following the standard protocols of collection, preservation and maintenance of plant specimens in the herbarium (Jain and Rao, 1977). Identification of the collected specimens was done with the help of important taxonomic literatures and available monographs and floras (Duthie, 1903-29; Kanjilal,1928; Kanjilal, 1933; Hooker, 1973). The name of the collected plants were further verified following the website http://www.theplantlist.org

The collected ethnomedicinal information was documented on the basis of plant part used for the treatment of different diseases. The collected species were arranged in alphabetical order with their botanical names, local names, family, habit, plant parts used and ethnomedicinal significance (Table 1).

Table 1. List of Plant Species with Ethnomedicinal Uses

Name of Species	Local Name	Family	Habit	Parts Used	Ethnomedicinal Uses
Alstonia scholaris (L.) R. Br.	Sapt parni	Apocynaceae	Tree	Bark, Root	Bark is used as blood purifier. Bark powder is applied in chronic skin ulcers. Decoction of bark is useful in fever to reduce body temperature. Root decoction is used to prevent vomiting.
Amaranthus viridis L.	Kantili Cholai	Amaranthaceae	Herb	Whole Plant	Plant is considered as a good source of iron and act as appetizer. Whole plant is given to cure kidney stone.
Argemone mexicana L.	Peeli Katili	Papaveraceae	Herb	Seed	Seeds are used as antidote against snake bite. Latex is used to treat eye infection and jaundice. Seed oil is used to treat cutaneous infections.
Barleria prionitis L.	Vajradanti	Acanthaceae	Shrub	Leaf	Raw leaves are chewed to get relief in tooth ache. Leaf ash is used with honey for cough. Leaves paste is useful in boils and cracked heel.
Boerhavia diffusa L.	Punarnava	Nyctaginaceae	Herb	Leaf, Root	Root paste is used to cure boils and dropsy. Root paste is applied on pubic area for easy delivery. Leaf juice of is used in treatment of jaundice.
Calotropis gigantea (L.) Dryand. R. Br.	Safed Aak, Madar	Asclepiadaceae	Shrub	Leaf, Root	Milky juice is applied on ring worm, eczema and swelling. Fresh root twigs are used as tooth brush in toothache. Leaves of the plant are used in treatment of paralysis. Root bark is used in elephantiasis.
Calotropis procera (Ait.) Dryand. R. Br.	Aak, Madar	Asclepiadaceae	Shrub	Whole Plant	Leaves are used in dysentery, mumps, rheumatism and snake bite. Root and latex are used to treat asthma. Flowers are used in anorexia. Powdered root is used to treat leprosy and elephantiasis.
Celosia argentea L.	Makhmali	Amaranthaceae	Herb	Flower Seed	Flowers are used for the treatment of diarrhea. Seeds are used to cure painful micturition and dysentery.
Centella asiatica L.	Brahmi buti	Apiaceae	Herb	Leaf	Powdered leaves with cow's milk are given to improve memory. Leaf decoction is given in the treatment of leprosy. Leaves are also used to overcome fatigue, stress and mental confusion.
Cordia dichotoma G.Forst.	Lisora	Boraginaceae	Tree	Leaf, Bark	Bark is employed for cough and chest diseases. Leaves juice and honey is given in foot and mouth disease of cattles.
Cuscuta reflexa Roxb.	Amarbel	Convolvulaceae	Herb	Stem	Decoction of stem is employed in constipation and flatulence. Stem paste is given with curd to cure diarrhea.
Dalbergia sissoo DC.	Shisham	Papilionaceae	Tree	Leaf, Wood	Fresh leaves and dried bark is used in bleeding piles. Leaf decoction is given in gonorrhea. Wood is useful in leprosy, boils, and eruptions.
Datura innoxia Mill.	Safed Datura	Solanaceae	Herb	Leaf, Seed	Seeds are used to treat hydrophobia. Seeds are said to be smoked in asthma.Roasted leaves are applied on enlarged testicles.
Datura metel L.	KalaDhatura	Solanaceae	Herb	Leaf, Seed	Leaves are used as narcotic and anti-spasmodic. Seeds are said to be smoked in asthma. Purified seeds used in jaundice and anemia.
Datura stramonium L.	Dhatura	Solanaceae	Herb	Leaf, Seed	Seeds are used as cerebral depressant. Also used in muscular pain and rheumatism. Leaves are useful in asthma and pulmonary infections.
Delonix regia (Hook.) Raf.	Gul Mohar	Caesalpiniaceae	Tree	Seed,Bark	The seeds are carminative, and also used to purify the blood. Decoction of bark is useful in fever and diarrhoea.

Table 1. *Continued ...*

Name of Species	Local Name	Family	Habit	Parts Used	Ethnomedicinal Uses
Eclipta prostrata L.	Bhringraj	Asteraceae	Herb	Whole Plant	Plant juice is applied in fever, jaundice, anemia and diabetes. Whole plant is used to treat skin problems and urinary tract infections. Leaf paste mixed with coconut oil is used in hair loss.
Evolvulus alsinoides L.	Phooli	Convolvulaceae	Herb	Leaf	It is used to prepare tonics and medicine for fever. Also used in treat ment of syphilis, diarrhoea, bronchitis and asthma.
Ficus benghalensis L.	Bargad, Bar	Moraceae	Tree	Whole Plant	Root paste is applied in leucoderma and ringworm. Fruits are employed in indigestion, sexual debility, piles and general debility. Stem decoction is used to get relief from piles and exudation of puss. Bark infusion used as a tonic and in treatment of dysentery and diabetes.
Ficus racemosa L.	Gular	Moraceae	Tree	Fruit, Root	Unripe fruits are used in jaundice and diarrhoea. Root juice is applied in case of mumps and other glandular swellings.
Ficus religiosa L.	Peepal	Moraceae	Tree	Whole Plant	Twigs are used as tooth brushes. Unripe fruits are useful in premature ejaculation and general debility. Stem bark is used in skin problems and urinary infections. Leaf powder mixed with water is taken orally to get relief from body pain.
Fumaria indica (Haussk.) Sabnis	Papra	Fumariaceae	Herb	Whole Plant	The decoction is used as a blood purifier. It is also used against fever and as anthelmentic.
Indigofera linifolia (L. f.)Retz.	Torki	Papilionaceae	Herb	Root	Root paste is applied on swellings. Plant decoction is given in fever. It is also used as a vermifuge.
Indigofera tinctoria L. in	Neel	Papilionaceae	Undershrub	Leaf, Root	Roots are used in urinary complaints and jaundice. Leaf juice is useful epilepsy and nervous disorders.
Ipomoea cairica (L.) Sweet	Morning Glory	Convolvulaceae	Climber	Leaf	The plant is useful in treatment of cough, asthma and tuberculosis. Leaf paste is applied in skin diseases.
Justicia adhatoda L.	Bansa	Acanthaceae	Shrub	Leaf	Leaf ash is used for the treatment of cough. Leaf juice is useful in treatment of dysentery, diarrhoea and tumors.
Justicia procumbens L.	Makhania Ghas	Acanthaceae	Shrub	Leaf	Leaves juice is squeezed into the eyes for treatment of ophthalmia. Plant infusion used in asthma, cough, rheumatism and liver disorders.
Leucas cephalotes (Roth) Spreng.	Gubha	Lamiaceae	Herb	Root, Flower Seed	Juice of root is given in rheumatism. Juice of flowers is given in coughs, colds and jaundice. Seeds yield an oil, used as an illuminant.
Mimosa pudica L.	Lajwanti, Chhuimui	Mimosaceae	Shrub	Leaf, Root	Plant powder is used as good medicine for asthma. Plant paste is applied on fistula and piles. Root decoction is used in urinary disorders. Leaves juice is helpful in glandular swellings.
Moringa oleifera Lam.	Sahjan	Moringaceae	Tree	Leaf, Root	Root decoction is given to treat asthma and bronchitis. Leaves juice along with honey is dropped into eyes in conjunctivitis.
Morus alba L.	Shahtoot	Moraceae	Tree	Fruit, Leaf	Leaf paste is useful for healing of wounds. Fruits are eaten and also used for sore throat, dyspepsia and melancholia.
Nicotiana rustica L. and	Tambaku	Solanaceae	Herb	Leaf	The plant leaves contains strong narcotic. Leaves are used for chewing smoking in the form of hukkas and acts as mental stimulant.

Table 1. *Continued ...*

Name of Species	Local Name	Family	Habit	Parts Used	Ethnomedicinal Uses
Ocimum americanum L.	Tulsi, Krishna Tulsi	Lamiaceae	Herb	Leaf, Seed	The leaves mixed with the tea are used in fever. Seed decoction in potash water is used as coolant in fever. Seed powder is used in case of leucoderma and other skin diseases.
Ocimum basilicum L.	Tulsi, Sweet Basil	Lamiaceae	Herb	Leaf	Leaf along with honey is used as decoction to cure cold, cough and fever. Plant is considered antipyretic, expectorant and stimulant.
Oxalis corniculata L.	Khatti- Booti	Oxalidaceae	Herb	Leaf	The leaves are good source of vitamin C. Juice of its leaves act as antidote against Datura poisoning. Leaf juice is used to treat piles and skin problems.
Parthenium hysterophorus L.	Gajar ghas	Asteraceae	Herb	Root	Decoction of roots is used as tonic. Root decoction is also used in treatment of dysentery and skin diseases.
Polygonum plebeium R. Br.	Machechi	Polygonaceae	Herb	Whole Plant	Plant decoction is given in pneumonia and bowel complaints. Plant ash mixed with oil is applied on eczema, wounds and ulcers.
Pongamia pinnata (L.) Pierre.	Karanj	Papilionaceae	Tree	Seed, Bark	Bark powder is used in treatment of diabetes. Plant decoction is used to cure'Beri-beri'. Seed oil is antiseptic and useful in cure of skin diseases.
Portulaca oleracea L.	Luni	Portulacaceae	Herb	Leaf	Leaves are used in the treatment of kidney, bladder and spleen disor ders. It is also used to treat mouth ulcer.
Putranjiva roxburghii Wall.	Putranjiva	Euphorbiaceae	Tree	Fruit, Seed,	Fruits are used for treatment of rheumatism, fever and cold. Seeds are believed to be conception-promoting. It is also used against vaginal infection and urino-genital disorders.
Ranunculus sceleratus L.	Jaldhania	Ranunculaceae	Herb	Leaf, Stem, Seed	Leaf juice is applied for the treatment of eczema and ringworm. Stem juice is used in asthma and rheumatism. Seeds are used in treatment of stomach pain and kidney problems.
Ruellia prostrata Poir.	Bell weed	Acanthaceae	Herb	Whole Plant	Plant decoction is used in cough, indigestion, fever and liver disorders.
Ruellia tuberosa L.	Blue bell	Acanthaceae	Shrub	Whole Plant	Plant is used as anti-diabetic, analgesic and gastric tonic. Also useful in treatment of gonorrhea and skin disorders.
Senna occidentalis L.	Kasaundhi	Caesalpiniaceae	Herb	Leaf, Stem, Seed	Seeds are used for treatment of cough and whooping cough. Roasted seeds mixed with coffee are given for strength. Decoction made of stem, leaf and seed is used as a purgative.
Sida acuta (Burm. f.) Bross.	Baraira	Malvaceae	Shrub	Leaf, Root	Boiled leaves are used against elephantiasis. Roots are used for nervous and urinary disorders.
Sida cordata (Burm. f.) Boiss.	Baharbuta, Adia bel	Malvaceae	Herb	Leaf, Root, Fruit	Fruit decoction is used in sexual debility. Decoction of root is given in leucorrhoea and gonorrhea. Leaves are crushed and applied on cuts.
Sida cordifolia L.	Kharenti	Malvaceae	Herb	Root	Roots infusion is given in nervous and urinary disorders. Root powder is given with milk in frequent micturition.
Sida ovata Forsk.	Dabi	Malvaceae	Herb	Root	Root decoction is given in sexual debility. Seeds in powdered form mixed with jaggery are given in lumbago.
Solanum nigrum L.	Makoi	Solanaceae	Herb	Whole Plant	The plant used in fevers, diarrhoea and eye troubles. The herb decoction used as narcotic and antispasmodic. The leaf extract is taken orally for whooping cough.

Table 1. *Continued ...*

Name of Species	Local Name	Family	Habit	Parts Used	Ethnomedicinal Uses
Stellaria media (L.) Vill.	Godal	Caryolhyllaceae	Herb	Whole Plant	Paste of the plant applied to cuts and wounds. It also helps to treat constipation. Paste of plant mixed with plaster of paris is applied on the broken bones for healing.
Tephrosia purpurea (L.) Pers.	Sharpunkhada	Papilionaceae	Herb	Root, Seed, Fruit	Root decoction is used to cure bleeding piles, diarrhoea and dyspepsia. Seed oil is applied on eczema. Pod decoction is given in bronchitis.
Terminalia arjuna (Roxb. *ex* DC.) Wt. & Arn.	Arjun	Combretaceae	Tree	Bark, Leaf, Fruit	The bark is considered to be a tonic for heart. Decoction of leaves is useful in diabetes. Fruit is also helpful in high blood pressure control. Twigs are used as tooth brush in dental disorders.
Tinospora cordifolia (Willd.) Miers.	Giloy, guduchi	Menispermaceae	Climber	Whole Plant	Leaf decoction is given in the treatment of gout. Fruit is used to treat jaundice and rheumatism. Dried stem used in polyurea and skin diseases. Stem juice used in general debility and urinary problems.
Tribulus terrestris L.	Gokhru	Zygophyllaceae	Herb	Fruit, Leaf, Root	Fruit decoction is used for the treatment of impotency. Raw leaves are used to treat stone problems. Mixture of fruits and root is used to treat leucorrhoea and urinary problems.
Urena lobata L.	Bachita	Malvaceae	Shrub	Stem, Root	The decoction of stem and roots is used for flatulence.
Withania somnifera (L.) Dunal *in* DC.	Ashwagandha	Solanaceae	Shrub	Root, Leaf	Powdered roots are employed to improve sexual power. Leaf decoction is used to cure painful swelling. Root powder is used to get relief in inflammation.

Results and Discussion

The floristic description of the collected plant species along with their ethnomedicinal uses is depicted in Table 1. During the survey, a total of 83 plant species were collected from different locations, of which 56 species of ethnomedicinal importance belonging to 44 genera and 28 families were documented. Solanaceae was reported the most dominant family with 6 species followed by Acanthaceae, Malvaceae and Papilionaceae (5 species each), Moraceae (4 species), Convolvulaceae and Lamiaceae (3 species each). Rest of the families were represented by less than 3 species. The distribution of plant specimens on the basis of habit revealed that herbs constitute the major proportion (55.36%) in the study area, followed by trees (21.43%), shrubs (17.86 %), climbers (3.57%) and under shrubs (1.79%).

The study area is rich in medicinal plant resources. In The present study, an attempt was made to document the ethnomedicinal information present with the local people of study area about the sustainable utilization of medicinal plants. The present study revealed that for various ethnomedicinal purposes the leaves (31.52%) were the most commonly used part followed by roots (18.48%), seeds (14.13%), whole plant (11.96%), fruits (8.70%), bark (6.52%), stem (5.43%), flower (2.17%) and wood (1.09%).

The rural people of Saharanpur district are mostly dependent on these plants for fulfilling their basic needs as well as medicinal requirements as these are easily available and highly effective against various human ailments such as diabetes, rheumatism, dysentery, fever, urinary infection, asthma, paralysis, elephantiasis, kidney stones, snake bite, tuberculosis, leprosy, syphilis, leucorrhoea, eye infection and skin disorders. In spite of the advancement in science and technology, most of them are depends on their traditional knowledge for primary health care needs. The documentation of traditional knowledge of local community about utilization of wild medicinal plants is highly important for understanding of indigenous knowledge system. Several ethnobotanical studies were conducted to take record of the species used by the residents of different regions for healthcare. The study has also been compared with important

published literature (Jain, 1991; Chandel *et al.*, 1996; Khare, 2007).

Documentation of this traditional information is highly significant in understanding the biodiversity and making of policies for conservation of ethnobotanically important plants (Singh, 1999). Several studies revealed that the traditional knowledge about these valuable plants, however disappearing at very fast rate as a consequence of socio-economic activities, industrialization and the migration of rural populations to urban areas. Therefore, there is urgent need to document the floristic diversity and indigenous uses of ethnomedicinal plants and encourage preservation of their culture, traditional knowledge and sustainable utilization of the plant wealth occurring in the study area.

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Conflict of Interest

Both the authors declare that there are no financial/commercial conflicts of interest regarding the information in this article.

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