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Aromatic wild-type plants at terai region of Uttar Pradesh with traditional knowledge

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Abstract

The present study was conducted of the North-Eastern Terai Region (NETR) in Shravasti, Lakhimpur-kheri and Balrampur districts of Uttar Pradesh, India with the major objective of identifying different food and medicinal plant species. The present work is the outcome of ethnobotanical field survey of two consecutive years (2012-2013) from different terai regions of Uttar Pradesh. An ethnobotanical field study reveals that the ethnic people have considerable traditional knowledge of wild-type plants and their utilization. Present study reports 35 wild-type plants which are consumed either as raw or after cooking, roasting or frying and some plant extract using for public health. These easily available plant species are chief sources of their essential nutrients such as proteins, vitamins, minerals, fats and carbohydrates. Production and productivity of many ethnobotanical plants have increase manifolds but the challenges of mal nutrition and threat of climate change continues by the time. In view of their conservation and management, the sustainable harvesting and management issue of ethnobotanical species are discussed. The scientific names, vernacular name/local name, life form, specimen number, chemistry and their economic importance are also given.

Key words: Ethnobotanical plants, traditional knowledge, wild source, field survey, terai region

1. Introduction

Plant products have been part of phytomedicines since time primeval and the plant kingdom is a treasure house of potential drugs (Yadav and Srivastava, 2014). Aromatic plants are part of a more general class of plants which emit a variety of secondary substances. Aromatic plants have had a wide variety of economic uses for many centuries, in areas such as cooking, medicine, cosmetics, and fuel (Margaris *et al.,* 1982). Uttar Pradesh is a state located in the northern part of India. The percentage of tribal's literacy only 0.4% among the total people in Uttar Pradesh. The vegetation growing in these forests plays a vital role in the life and economy of the tribal. World over tribal population still store a vast knowledge of using local plants as food material and other specific uses (Sundriyal *et al.,* 1998). Traditional knowledge of plants and their properties has always been transmitted from generation to generation through the natural course of everyday life (Mustafa *et al.,* 2008). Documentation of the indigenous knowledge through ethnobotanical studies is important for the conservation and utilization of biological resources (Muthu *et al.,* 2006). Therefore, establishment of the local names and indigenous uses of plants has significant potential societal benefits (Ugur *et al.,* 2011). In recent years, traditional use of plants for medical purposes has drawn the attention of researchers in our country as well (Altundag and Ozturk, 2011; Gonenc *et al.,* 2012; Tetik *at el.*, 2013; Erdogan *et al.,* 2014; Gonenc *at el.*, 2014; Hayta *at el.*, 2014).

During floristic survey of Uttar Pradesh, especially in the Shohelwa forest range lies in the sub-Himalayan region referred to as the terai belt. Shohelwa forest is tucked between India and Nepal in the Shravasti district of the Indian State of Uttar Pradesh. Bhinga forest range is the last remnant of terai region, one of the most endangered ecosystems on the planet. Medicinal plants have a grandly role in modulating glycemic responses (Devi and Urooj, 2014). Due to close association with the forest, the tribal peoples have learnt to utilize many plants and plant products for their food, medicine and fish poison, since time immemorial. Uttar Pradesh has a humid temperate climate and experiences four seasons. The importance of recording the uses of plants in this region is especially imperative because of rapid loss of forest wealth and traditional wisdom due to increase in tourism and modernization. Each and every village of Tharu community has got their indigenous deities like Bhuinyar and Gor-raja. The vegetation growing in these forests plays a vital role in the life and healthcare of the tribes. Plants being the important source of useful compounds are much sensitive to climate changes and neatly slow to adapt (Latif and Mohtar, 2014). The present investigation is an attempt to highlight the various ethnopharmacognosy and traditional uses as well as in folklore medicine for various therapeutic applications.

2. Methodology

The present work is the outcome of ethnobotanical field survey of two consecutive years (2012 - 2013) from different terai regions of

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Uttar Pradesh. Among the inhabitants, knowledgeable persons, primarily the aged ones, ethnic men and women were discussed. Through questionnaire and personal interviews, a total of 35 plant species used by tribal and non-tribal communities were documented, of these 14 tree species, 6 shrubs, 12 herbs, 2 climbers and 1 tuber species were used. Information on wild edible plants used for different purposes were recorded. Some plants were already known, but the modes of their uses are different and quite interesting. It was confirmed with the available literature (Singh and Maheshwari, 1985; Jain, 1991; Singh and Prakash, 1996; Singh, 1997). The voucher specimens are deposited in National Botanical Research Institute (NBRI), Lucknow herbarium with different specimen numbers which was tabulated in Table 1. Vernacular names of the plant species were obtained from the following ethnic people such as Tharu and Tangiya.

3. Results and Discussion

Medicinal plants are common and medicinally important to treat various diseases. The local people of Gauri-funta preferred preparing the medicines by plants either as single or as in a combination with two or more plants and plant parts, since the combination rapidly cures the diseases and also enhance the immunity power of the patients (Yadav and Prakash, 2014).

Present study reports 35 wild-type plants which are commonly found in the following areas, such as Shravasti, Lakhimpur-kheri and Balrampur districts of Uttar Pradesh. They are consumed either raw or after cooking, roasting or frying. These easily available plant species are chief source of their essential nutrients such as proteins, vitamins, minerals, fats and carbohydrates. These species available in the locality used by the tribal people are summarized in an alphabetical order by the botanical names with their respective families, locality, life form, parts used and collection number, followed by a brief note on uses by informants during field trips. The family-wise contribution of genera and species is given in Figure 1. The maximum numbers of plant species were identified for family, Moraceae and Malvaceae, followed by Rhamnaceae, Fabaceae, Euphorbiaceae, Dioscoreaceae, Convolvulaceae and Nelumbonaceae while minimum for most of the remaining families.

The recorded ethnobotanical species were distributed over various life forms, of which 14 were tree species, 12 were herbs, 6 were shrubs, 2 were climbers and 1 was tuber species and family-wise contribution of genera and species is given in Figure 1. This is constant with the other general observation which has been reported earlier in relation to medicinal plant studies by the Indian Traditional System of Medicine like Siddha and Ayurveda (Asolkar *et al.*, 1992;). The ethnobotanical data presented herein are only of one major head, namely; ethnobotanical species used by tribal people for various purposes (Table 1). The ethanol extract of *Dillenia pentagyna* Roxb. showed the most potent antitumor activity, *i.e.*, % ILS ~ 55% and % ILS ~ 48% at a dose of 50 and 100 mg/kg/day (Kumar and Baslas, 1980). Different plant parts of this species, such as root, leaf, fruit, bark and seed were used as medicine (Yadav and Prakash, 2014).

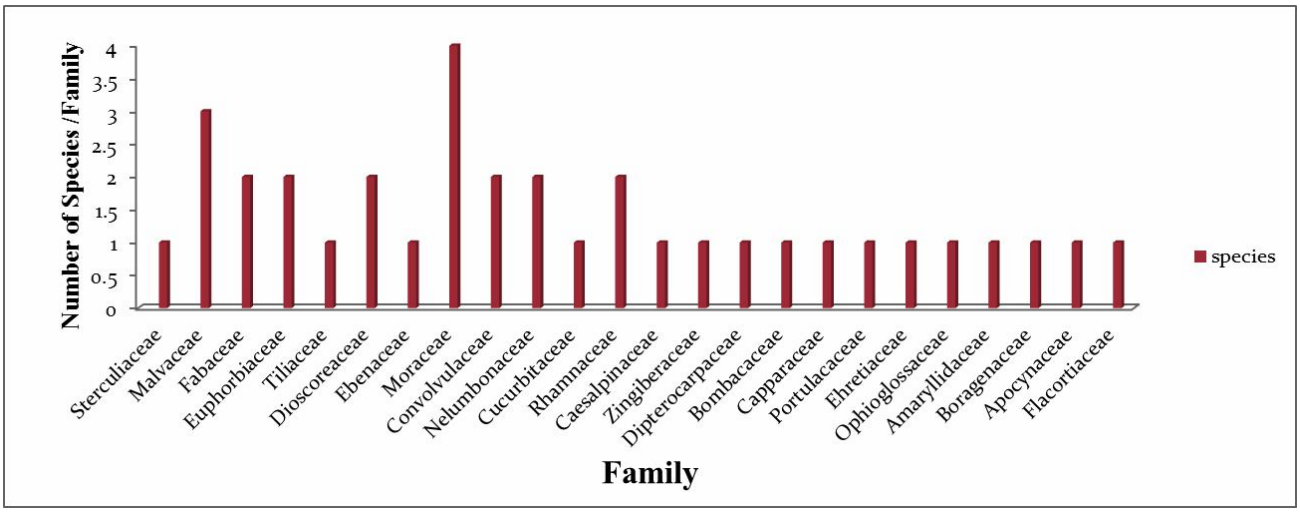

Figure 1: Family-wise contribution to ethnobotanical species from Bhinga forest range (U.P)

Table 1 : Ethnobotanical species used by tribal people for various purposes

S.No.	Botanical name/ Family	Local name / Life form	Specimen No.	Chemistry	Uses
1.	*Abelmoschus crinitus* Medic./ Malvaceae	Banbhendi / Herb	265256	Trans-2- trans-b fornesile acetate and ambrettolide determined by seed. β-Sitosterol and its β-D-Glucoside, myricotin and its glucoside obtained from leaves (Lai *et al.*, 2006).	Fruits are cooked as vegetable. Flowers are eaten by Tharu's children.

2.	*Abelmoschus esculentus* (L.) Moench/ Malvaceae	Bhindi / Herb	265257	Polyphenolic compounds, protein, phosphorous, calcium and iron (Rastogi and Mehrotra, 1991).	Fruits are used as vegetable.
3.	*Abrus precatorius* Linn./ Fabaceae	Gumachi / climber	253308	Two new steroids-abricin and abridin isolated from seeds (Ahmed *et al*., 1978).	Root powder is used for the treatment of scorpion bite.
4.	*Abutilon indicum* (L.) Sweet / Malvaceae	Kanghi / Shrub	255239	Amino acids, glucose, fructose and galactose isolated from leaves (Rastogi and Mehrotra, 1993).	Eat at least four to five leaves for regularity in menstrual cycle.
5.	*Antidesma acidum* Retz. / Euphorbiaceae	Dakhi / Shrub	265204	Sitosterol from trunk (Kaennakam *et al.,* 2013).	The ripe fruits are eaten by children.
6.	*Artocarpus lakucha* Roxb./ Moraceae	Barhal / Tree	265222	Cycloartenyl acetate cycloartenol and cycloartenone isolated from bark (Rastogi and Mehrotra, 1991).	The flower bud, flower and ripe fruits are eaten as vegetables.
7.	*Bombax ceiba* Linn / Bombacaceae	Semal / Tree	265202	Galactose and arabinose (Salim *et al*., 1987).	The young buds are cooked and eaten as vegetables.
8.	*Bauhinia malabarica* Roxb./ Caesalpinaceae	Sahul / Tree	265215	Quercitroside, isoquercitroside and rutoside isolated from plant (Rastogi and Mehrotra, 1993).	The flower bud and flower are eaten as vegetables.
9.	*Bridelia retusa* (L.) Spreng./ Euphorbiaceae	Khaja / Tree	265214	Triterpenoides, steroids, alkaloids, sugars, tannins and flavonoids isolated from bark (Ngueyema *et al*., 2009).	The ripe fruits are eaten.
10.	*Capparis zeylanica* Linn./ Capparaceae	Zakhambel / Tree	265244	Alkaloid, aphytosterol and water soluble acid (Karanayil *et al*., 2011).	Leaf and fruits are edible.
11.	*Cordia dichotoma* Forst. / Boragenaceae	Lasoura / Tree	265216	Macrophylline-β-sitosterol, α-linolenic, palmitic, linoleic and oleic acids (Rastogi and Mehrotra, 1991).	Ripe fruits are eaten.
12.	*Coccinia grandis* (L.) Voigt / Cucurbitaceae	Kunduru / Climber	265211	Hypoglycaemia, glycogen (Munasinghe, *et al*., 2011).	Unripe fruits are largely cooked and eaten as vegetables.
13.	*Costus speciosus* Sm./ Zingiberaceae	Kust / Herb	265217	Chloroform, saponin, uterine, papaverine, tigogenin, diosgenin, β-sitosterol, α-amyrin, β-amyrin, lupeol and sapogenin (Pawar and Pawar, 1997).	The rhizome is edible and is used after cooking.
14.	*Crotalaria juncea* Linn./ Fabaceae	Sunhemp / Herb	265206	Galactomannon, galactose, mannose and cardenolide or pyrrolizidine alkaloids (Tiwari and Pandey, 1979).	Leaves are fed as a high protein supplement to other poorer feeds.
15.	*Curculigo orchioides* Gaertn/ Amaryllidaceae	Kalimusari / Herb	265241	A new glucoside- 5,7dimethoxydi hydromyricetin-3-o-α-L-xylopyra nosyl (4'!1)- β-D- glucopyranoside(I) isolated from rhizomes (Nema and Ramawat, 2010).	The roots are making powder and mix with milk. These mixtures are used in courageous power in human.
16.	*Dillenia pentagyna* Roxb./ Discoreaceae	Agai / Tree	265233	Diploloic acid isolated from stem. Alkaloids, flavonoids, tanins and Saponin are isolated from fruits (Altundag and Ozurk, 2011).	Fruits are used for the treatment of tumor and stomachache. The unripe fruits are used as vegetables.
17.	*Dioscorea bulbifera* Linn./ Dioscoreaceae	Ratalu / Tuber	265282	4-hydroxy-2-6-methoxy-acetophenon, 4,6-dihydroxy-2-o-acetophenone (Wang *et al*., 2009).	The bulbils are boiled, and fried in oil with chillies, condiments and salt to a taste eaten as a vegetables.
18.	*Diospyros exsculpta* Buch./ Ebenaceae	Tendu / Tree	265268	Lupeol, betulin, betulinic acid and β-sitosterol (Ietidal *et al*., 2009).	Fruits are used as eaten by tribes.
19.	*Ehretia laevis* Roxb. / Ehretiaceae	Chamror / Tree	265226	Bauerenol, bauerenol acetate, α- amyrin, betulin, lupeol, and betulinic acid and β-sitosterol from stem (Gijbels *et al*., 1982).	The ripe fruits are eaten by the children of tribes.

20.	*Ficus racemosa* Linn. / Moraceae	Gular / Tree	265229	β-Sitosterol glucoside, friedel in and lupeol isolated from stem bark (Baslan and Agha, 1985).	Unripe receptacles are cooked and used as vegetables.
21.	*Ficus virens* Ait. / Moraceae	Pakar / Tree	227496	Hydrocarbons, alcohols, and sterols. Alcohol fraction contained α-and β-amyrin and lupeol (Tripathi and Sikarwar, 2015).	The buds are cooked and used as vegetables.
22.	*Flacourtia indica* Merr./ Flacourtiaceae	Kankar/ Tree	227491	A new phenolic glucoside ester-flacourtin isolated from bark (Chopra *et al.*, 1956).	The ripe fruits are eaten.
23.	*Grewia elastica* Royle/ Tiliaceae	Phalsa/Shrub	265276	Linoleic acid, linolenic, meristic, oleic, palmitic and stearic acid. Sucrose, glucose and galactose isolated from root (Khajuria and Singh, 1967).	The fruits are eaten. Ripe as fruits are collected and sold in market.
24.	*Helminthostachys zeylanica* Hook. f. / Ophioglossaceae	Kamraj / Herb	265250	Four flavonoids-ugonins A, B, C, And D isolated from rhizome (Wen *et al.*, 1967).	Whole plant used as vegetables.
25.	*Helicteres isora* Linn./ Sterculiaceae	Bendu / Shrub	265285	A new ester- tetratriacontanyl and tetratriacontanoate isolated from leaves. Cucurbitacine B and isocu-curbitacin B identified in roots (Nakanishi *et al.*, 1985).	Seed powder is used for the treatment of stomach pain.
26.	*Holarrhena pubescens* Wall. ex G. Don / Apocynaceae	Kurchi /Herb	265263	Two new aminoglucosteroids-holantosines A and B isolated from leaves (Rani and Mathew, 1987).	The roots are edible.
27.	*Ipomoea aquatica* Forsk./ Convolvulaceae	Karemua / Herb	265266	β-Carotene, lutein, vioaxanthin, neoxanthin, phytol, palmitic acid, (Z) 3-hexen-l-ol, α-humulene, n-hexacosane (Mital and Desai, 2013).	The young shoot and leaves are cooked and eaten as vegetable.
28.	*Ipomoea muricata* (L.) Jacq./ Convolvulaceae	Tilbhona /Tree	253304	Isolation of five resin glycosides Mb-1, Mb-2, Mb-3 Mb-4 and Mb-5 from seeds (Gupta *et al.*, 1967)	Seed powder used in fever.
29.	*Morus alba* Linn. / Moraceae	Tut / Shrub	265283	Three new flavone derivatives - morusin, cyclomorusin and compound are isolated from root bark (Rastogi and Mehrotra, 1991).	The fruits are eaten by children.
30.	*Nelumbo nucifera* Gaertn./ Nelumbonaceae	Kamalgatta/ Herb	265268	Methylcorypalline, neferine, isoliensinine and lotusine isolated from embryo (Rastogi and Mehrotra, 1991).	Eaten raw by children and used in the day of a religious vow.
31.	*Nymphaeae nouchali* Koen./ Nelumbonaceae	Seruki/ Herb	265248	Analysis of rhizomes-protein, fat, starch, carbohydrates and fibre. Analysis of seed-protein, fat, carbohydrates and fibre (Raja *et al.*, 2010).	Collected in the shallows by local people and cooked as a vegetable.
32.	*Portulaca oleraceae* Linn. / Portulacaceae	Lunia / Herb	265249	Oleracin 1&2 acylated betacyanins, galacturonic acid, arabinose, galactose, rhamnose (Aboutaleb *et al.*, 1985).	The entire plant is cooked and eaten as vegetable.
33.	*Physales minima* Linn. / Rhamnaceae	Mangoecha /Herb	265209	New dihydroxyphysalin B, isolated from leaves along with physalin A, B and C (Rastogi and Mehrotra, 1993).	Eaten raw by children.
34.	*Shorea robusta* Gaertn./ Dipterocarpaceae	Sakhu / Tree	265242	Crystal structure of 12α-hydroxy -3-oxo oleanano-28, 13-lactone (Obodovskaya *et al.*, 1987).	Seed edible and leaves used in intoxication.
35.	*Ziziphus oenoplia* (L.) Mill./ Rhamnaceae	Daurai / Shrub	265228	Zizyphinine, zizyphines C,D and E, and abyssinines A and B (Eckhardt *et al.*, 1974).	Eaten raw by children and used in the day of a religious vow.

4. Conclusion

Thirty five taxa are reported from terai region of U.P. in which *Antidesma acidum, Artocarpus lakoocha, Bauhinia malabarica, Dillenia pentagyna, Ehretia laevis, Helminthostachys zeylanica,* and *Flacourtia jangomas* are very rare and they are in immediate danger of extinction. Further, some species such as *Artocarpus lakoocha* (Badahar), *Dillenia pentagyna* (Agai), *Grewia elastica* (Phalsa), *Bridelia retusa* (Khaja), *Diospyros exsculpta* (Tendu) are most potent nutraceuticals as reported. Out of all these plant sources, maximum numbers of plants belong to the family Moraceae and then Malvaceae which showed a significant ethnobotanical diversity in different regions of northern part of India. The selected above said plants are the source of many active compounds that are belong to important secondary metabolites, *viz*., alkaloids, flavonoids, carbohydrates, proteins, steroids, tannins and saponins, *etc*. Our attempts are to be made for the conservation of these plants and furthermore there is need to survey more extensively in different grey areas before the habitats are threatened due to over exploitation of resources.

Conflict of interest

We declare that we have no conflict of interest.

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