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Traditional Medicinal Flora of the District Ghazipur (Uttar Pradesh, India)

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Ghazipur district (UP, India) is one of the floristically less studied regions of the central Gangetic plain. The district lacks dense forest, and its medicinal flora exclusively consists of dicot angiosperms. A total of 75 species belonging to 27 families were reported in the study. Majority of the plants were herbs, with highest contribution from family Fabaceae (11). Medicinal value of these plants was ascertained in consultation with traditional medicinal practiceners of the district. Plants and their part thereof were used to treat diseases such as - malaria, small pox, leprosy, diarrhea, diabetes, rheumatisms, hepatitis A, heart problems, elephantiasis, STDs, asthma, dysentery, in pregnancy complications and against snake and scorpion poisons. An effective therapeutic formulation often contains more than one plant or, plant parts. To preparation therapeutic formulations decoction was the preferred method. Findings will help in conservation and cultivation of these plants.

Key words - Dicot, Ghazipur district, Herbs, Traditional healer

Introduction:

Since prehistoric times, use of plants by human beings for basic preventive and curative health care has played a major role in shaping the human societies (Lewis & Elwin 2003). It is the oldest amongst the known form of treatments. According to the World Health Organization (WHO), over 80% of the world's population relies upon traditional plant-based systems of medicine for primary health care (Pushpangadan & Kumar 2005). One in four prescriptions of allopathic medicine is either synthesized form of or, derived from plant materials (Prajapati *et al* 2003). In recent years, both in developed and developing countries interest in natural materials and alternative approaches to health care has increased considerably owing to high prices and side-effects of allopathic medicines. It is estimated that the plant-based medicines market is doubling in size every 4-5 years. The WHO has estimated that the present demand of medicinal plants is approximately US$ 14 billions per year and is likely to be more than US$ 5 trillion in 2050 (Sharma 2004).

India is bestowed with a rich repository of plant-based natural resources, which are adored traditionally and consider as deism. It has a long tradition of traditional medicinal systems including AYUVEDA, UNANI, SIDDHA and TIBETAN systems with inexhaustive treasure of medicinal plants useful in the remedy of various ailments. The country has been an active participant in the global medicinal plants market as the world's largest supplier of raw materials (Mashelkar 2005). In the National Five Year Plans of India, the medicinal plant sector has been included as an integral part of the Indian System Medicines and Homeopathy. According to estimates, there are nearly 9,992 registered herbal industries; 717319 registered practitioners of traditional therapies, and a multitude of unregistered cottage-level herbal units in India relying upon the continuous supply of medicinal plants (Kala *et al* 2006; Ved & Goraya 2007). Prahalathan (2004) reported that the quantity of export of Ayurvedic products produced in India has tripled between the years 2001 to 2003. Taking cognizance of the rising importance of alternative medicines, in 1991, National Institute of Health (NIH) opened the Office of Alternative Medicine with an objective to provide the public with information on alternative treatments and to assess those therapies which have proven successful.

Apart from medicinal use, traditional plant knowledge (TPK) is also exploited for nutraceuticals (herbal medicines sold as food or dietary supplements). Local and indigenous communities use some of the medicinal plants as a source of food, fodder, timber and in animal husbandry. It often constitutes an alternate income-generating source of deprived communities (non-wood forest products sector) (Kala *et al* 2006). Poor documentation, ongoing patent wars amongst nations and multinational companies and illegal trafficking of medicinal plants to national and international markets have negative impacts on local economy as well as primary health care. The Biodiversity Act 2002 has framed many rules for sustainable utilization of medicinal plants and to mitigate the chances of bio-piracy (Pushpangadan & Kumar 2005).

Declining traditional knowledge and increasing demand of plant based natural therapies has intensified the attempts to prepare global, regional and local database of medicinal plants. Rising demand of plant-based drugs has created heavy pressure on some selected high-value medicinal plants resulting in their over-harvesting (Kala *et al* 2006). Many of these plant species have slow growth rates, low population density and narrow geographical range making them prone to extinction. In contrast, there are number of herbs used for therapeutic purpose, but are not documented in details due to lack of communication and relatively low frequency of their use. In India, unfortunately the medicinal plant sector is less documented, and there is a need to collate all the available information regarding medicinal plants of the country. According to the All India Coordinated Project sponsored by the Ministry of Environment and Forest, New Delhi, 40% of 16000 recorded flowering plants in India have medicinal value, and only 10% of these are used by the pharmaceutical industries (Pushpangadan 1997). **Table 1** provides information on the distribution of medicinal plants globally as well in India. It indicates that India holds the highest proportion (44%) of medicinal plants in their total plant diversity. On the regional scale, the maximum species of medicinal plants have been reported from Uttaranchal followed by Sikkim and North Bengal (Kala *et al* 2006).

Table 1. Distribution of medicinal plants (Kala *et al* 2006).

Country/Region	Total number of species	Number of reported medicinal plants	% medicinal plants	References
World	297000	52885	10	Schippmann *et al* 2002
India	17000	7500	44	Shiva 1996
Indian Himalyas	8000	1748	22	Samant *et al* 1998

The increasing human population has posed serious challenge to global food and health security. During past 15 years, the continuous exploitation and loss of the habitats has resulted in the extinction and population decline (rarity) of many high-valued wild medicinal plants (FAO 2003). Therefore, we need to add more and more species to the *Materia Medica*, and expand the available database horizontally (new geographical areas) as well vertically (new species). Documentation and dissemination of relatively less-used but potential medicinal plants will also reduce the pressure from over-exploited species (Kala *et al* 2006). In India, amongst the various written documents on medicinal plants, Auyrveda contains description of over 2000 medicinally important plants, followed by Siddha and Unani (**Table 2**).

Table 2. Number of plants described in the different traditional medicinal systems in India (Kala *et al* 2006).

Medicinal Systems	Number of Plants

Ayurveda	2000
Siddha	1121
Unani	751
Tibetan	337
Homeopathy	482

Methodology:

The Area

The district Ghazipur ($25^0$19'-$25^0$54'N latitude, $83^0$4'-$53^0$58'E longitude; area 3381 sq km; slope: N-W to S-E) is a part of South-Eastern UP. The river Ganges and Karmnasa divide it from Bihar state. The district is circumvented by Ballia district of UP and Bihar state (North-East); Jaunpur and Varanasi districts (West); Azamgarh and Mau (North) and Chandauli (South), marked by conventional boundaries with hitherto natural features (**Fig. 1**). Topographically, the district is divided into Northern Uplands, Central Lowlands and Southern Uplands. Soil of the district is alluvial, and due to recent deposition lack distinct profile. However, local topographic and drainage differences have given it varying textures characterized by new alluvial (*Sandy-Kachhar* in central lowland) and old alluvial (*Bangar*, through out the district) type of soils. Besides the Ganga and Karmnasa, there are eight other rivers (Gomti, Gangi, Beson, Mangai, Bhaisahi, Ton *allies* Chhoti Sarju, Udanti, and Noni) either pass through or surrounds the district.

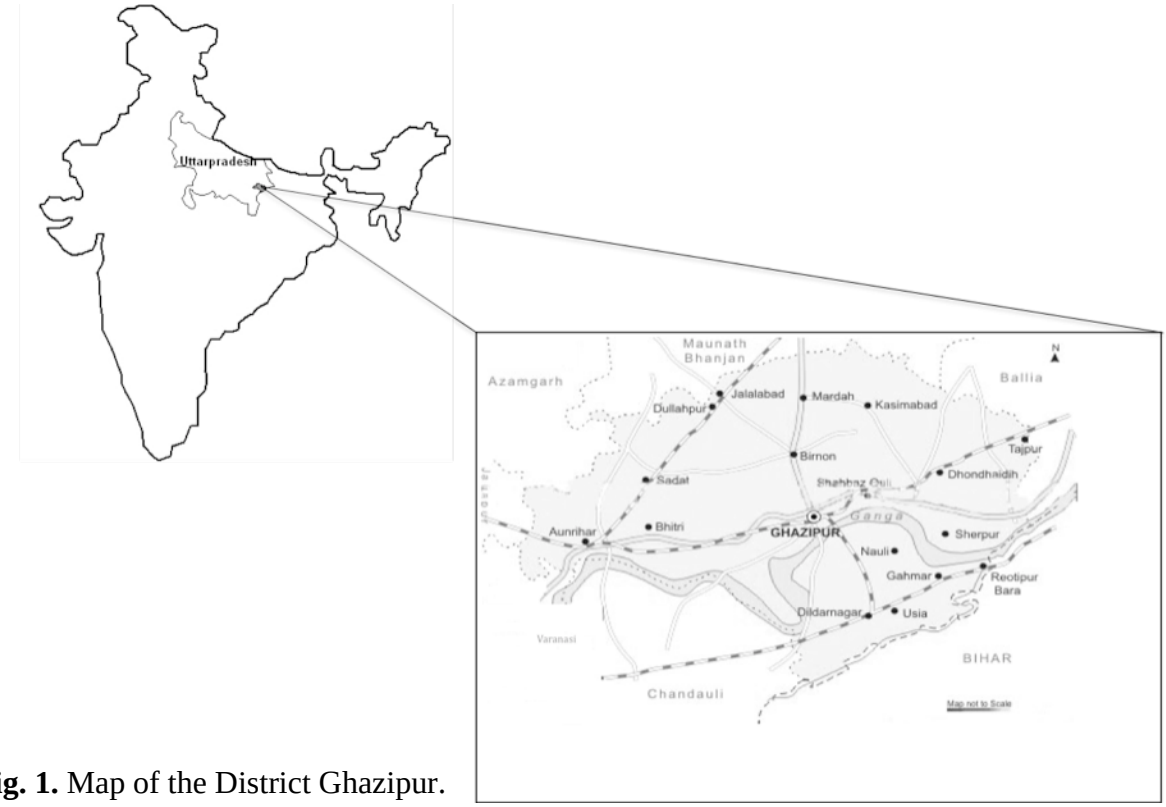

Fig. 1. Map of the District Ghazipur.

Data collection

Data were collected through survey-based field observations. To collect plant samples, several field trips to different parts of the District Ghazipur were conducted from March 2009 to December 2011. Traditional medicine practitioners and locales were interviewed to know the medicinal importance of these plants.

Collected plants were pressed and latter on identified with the help of floras, herbaria as well as in consultation with experts.

Results & discussion:

The districts Ghazipur is a part of the South-Eastern UP ($23^0$52'-$26^0$40'N latitude, $80^0$52'-$84^0$35'E longitude, area 453992 km), which in turn is a part of central Gangetic plains. The general elevation of the region is eastward with 80 m above the mean sea level (AMSL) causing eastern flow of rivers. Climate of the area is mild and shows distinct pattern of seasonality (winter, summer and rainy seasons with three i.e., R-W, W-S and S-R transitive seasons). Rainfall is characterized by summer monsoon.

The results of the study are presented in **Table 3**. During the investigation a total of 75 species belonging to 27 families has been reported. Traditional medicinal flora of the district is exclusively consists of dicot Angiosperms. With highest number (11) of species are from family Fabaceae, followed by Asteraceae (7), Solanaceae (7) and Euphorbiaceae (5) (**Fig. 2**). The district Ghazipur lacks dense forest, therefore, majority of the plants are herbs followed by tree, climbers and shrubs (**Fig. 3**).

Table 3. A list of medicinal plants used by traditional health practiceners of the district Ghazipur (UP, India).

Sl. no.	Botanical name	Family	Vernacular name	Method of preparation and medicinal use
1	*Azadirachtha indica*	Meliaceae	Neem	Bark powder used in malaria, leaf paste in small pox, root powder in leprosy, and aqueous leaf extract as antiseptic
2	*Melia azadirach*	,,	Mahaneem	Flower paste in labor pain, aqueous extract of seed and bark in skin diseases
3	*Euphorbia officinarum*	Euphorbiaceae	-------	Milky sap used in ear ache and as emetic
4	*Putranjiva roxburghii*	,,	Pitaujiya	Fruit and leaf decoction used in fever, seed pasted on boils to relieve pain
5	*Euphorbia hirta*	,,	Duddhi	Milky sap in skin disease and ring-worm, root decoction in dysentery and vomiting
6	*Acalypha indica*	,,	Kuppi/ Amabhaji	Whole plant used as emetic and also in skin-disease

7	*Phyllanthus niruri*	,,	Bhui-Amla	Hot infusion of whole plant in malaria and ascites, root powder with milk in hepatitis-A
8	*Butea monosperma*	Fabaceae	Palas	Root decoction in tuberculosis, gum in diarrhea and dysentery, leaf poultice on boils
9	*Cassia fistula*	,,	Amaltas	Seed used as emetic, resin with sanai (*Cassia angustifolia)* used as mild laxative, jam used in constipation
10	*Acacia Arabica*	,,	Babul/Kiker	Gum used to cure diarrhea, diabetes and dysuria
11	*Caesalpinia crista* Syn *(C. bonducella*)	,,	Kant-Karanj	Seed powder with black piper (*Piper nigrum*) used in malaria, powdered seed mixed with *Riccinus* oil applied externally to reduce inflammation
12	*Abrus precatorius*	,,	Gunja/Rati	Seed paste used in ring-worm and itch
13	*Alhagi pseudalhagi*	,,	Yawasa	Smoke in bronchial asthma, sun-dried paste and decoction in piles
14	*Desmodium gangeticum*	,,	Sariwan/ Salwan	Leaf decoction with black piper (*Piper nigrum*) used as blood purifier, and to cure fever
15	*Cassia sophera*	,,	Kasaudi	Root as diuretic, leaf paste used in wound, ring-worm and skin irritation
16	*Cassia tora*	,,	Chakwad	Seed powder with *Citrus limon* fruit juice in Ring-worm, seed powder with whey in eczema

17	*Pongamia glabra*	,,	Karanj	Oil with *Citrus limon* fruit juice used in eczema, ring-worm and scabies, fresh juice of root in gonorrhea, hot infusion of flower in diabetes
18	*Mucuna puriens*	,,	Kewach	Pod hair with ghee, gum and honey in cholera
19	*Feronea limonea* / Syn. *Elephantum*	Rutaceae	Kath	Bark decoction in asthma and bronchitis, unripe fruit in diarrhea and dysentery
20	*Aegle marmalose*	,,	Bel	Fruit flesh in diarrhea, root powder as sedative, leaf decoction in asthma, fresh leaf juice with black piper (*Piper nigrum*) in jaundice. Fruit flesh and *Piper cubeba* (fruit) with milk in gonorrhea
21	*Alstonia scholaris*	Apocynaceae	Satwan	Bark decoction in diarrhea and dysentery, milky sap in skin disease
22	*Rauvolfia sepentina*	,,	Nakulkand	Root decoction used in bronchial asthma and hyperpiesis, root powder with bark powder of kutaj (*Holarrhena antidysenterica*) in dysentery
23	*Nyctanthes arbor-tristris*	Oleaceae	Harsingar	Leaf fresh juice with sugar in ascariasis, seed paste in baldness, and leaf decoction in sciatica
24	*Terminalia*	Combretaceae	Arjun	Bark boiled with

	arjunae			milk is useful in heart disease
25	*Boerhavia diffusa*	Nyctaginaceae	Punarnava	Fresh root juice in jaundice, root decoction with kutki (*Picrorhiza kurroa*), chirayata (*Swertia chirata*) and sonth (*Zingiber officinale*) in ascites
26	*Cleome viscose*	Capparidaceae	Peela-Hurhur	Seed in ascariasis, leaf paste as refrigerant
27	*Abutilon indicum*	Malvaceae	Kanghi	Seed and leaf decoction in gonorrhea and dysuria, root powder with sugar and honey in abnormal menstrual bleeding
28	*Sida cordifolia*	,,	Bariyar	Root bark powder with sugar and milk in leucorrhea and gonorrhea
29	*Sida acuta*	,,	Jangli Methi	Leaf paste with coconut oil in dandruff and eczema and leaf paste with salt in panaris
30	*Sida rhomboidea/* Syn. O*rientalis*	,,	Dhamni	Root paste with As_2S_3 (Arsenic trisulphide) in elephantiasis
31	*Tribulus terrestris*	Zygophyllaceae	Chhota gokharu/Hathi-Chinghar	Bark paste in scabies and itch
32	*Calotropis gigantean*	Asclepiadaceae	Safed madar	Bark of the root with betel leaf (*Piper betel*) in malaria
33	*Calotropis procera*	,,	Lal Madar	Flower decoction in cough and asthma, root bark in diarrhea, dysentery and skin diseases
34	*Lippia*	Verbenaceae	Jalpipal	Hot leaf infusion in

	nodiflora			common cold and diarrhea
35	*Cissampelos pareira*	Menispermaceae	Patha /Velvet leaf	Root's hot infusion in renal disorder and stone
36	*Cycclea peltata*	,,	Rajpatha	Root powder in diarrhea and dysentery
37	*Tinospora cordifolia*	,,	Guruch/Tinospora	Fresh juice in diabetes, gonorrhea and renal disorder, fresh juice with honey in jaundice and hot infusion of *Tinospora* and *Hemidesmus* root as diuretic
38	*Coculus villosus (= hirsutus)*	,,	Jalajamani	Root decoction in snake-bite, fresh juice with mishri in gonorrhea
39	*Papaver somniferum*	Papaveraceae	Posta/Opium	Unripe fruit in diarrhea, asthma, inflammation and stone
40	*Argemone Mexicana*	,,	Shailkanta/Mexican Ppoppy	Oil in ring-worm, scabies and inflammation, latex with (*Aristolochia bracteata*) juice in gonorrhea, root decoction and paste in skin disease
41	*Fumaria indica*	Fumariaceae	Pittpapra	Root decoction in fever, skin disease and leprosy, root decoction with black piper (*Piper nigrum*) in cough
42	*Lepidium sativum*	Brassicaceae	Chanshur	Hot seed infusion in hiccough and diarrhea, seed boiled in milk as contraceptive
43	*Portulaca quadrifida*	Portulacaceae	Pasali	Seed hot infusion in dysuria
44	*Polygonum*	Polygoniaceae	Muniyara	Root powder in

	plebajum			intestinal disorder and pneumonia
45	*Ammania baccifera*	Lythraceae	Pashanbhed	Root in renal stone, root powder on boils
46	*Chenopodium album*	Chenopodiaceae	Bathua	Leaf paste on burn
47	*Chenopodium murale*	,,	Chamarbathua	Hot leaf infusion in asthma
48	*Achyranthes aspera*	Amaranthaceae	Latjira	Root with starch and honey in piles, root as tooth-stick in pyorrhea
49	*Amaranthus spinosus*	,,	Chaulai	Root decoction with *Glycyrrhiza glabra* root and *Achyranthus aspera* root in gonorrhea, root with *Emblica officinalis* fruit and *Saraca indica* bark in abnormal menstrual bleeding
50	*Amaranthus viridis*	,,	Jangali Chaulai	Leaf paste on scorpion and snake-bite
51	*Eclipta alba*	Asteraceae	Bhringaraja	Fresh juice in jaundice and piles, leaf paste on boils, fresh juice with honey in cough
52	*Spillanthus achmella*	,,	Akarkara	Hot root infusion in common cold and cough, leaf paste on scabies and flower head chewed in toothache
53	*Tridax procumbens*	,,	Tal muria	Leaf paste on boils, and in skin disease
54	*Ageratum coenyzoides*	,,	Visadodi	Leaf paste on burn and wound
55	*Gnaphalium indicum*	,,	Balraksha	Leaf juice in gastric disorder
56	*Cichorium intybus*	,,	Kasni Vanya	Seed decoction in dysuria
57	*Bidens pilosa* Syn. *Biternata*	,,	Ara-kajhar/ Samsa	Leaf paste on leprosy and scabies,

				root decoction in toothache
58	*Physalis peruviana*	Solanaceae	Rashbhari	Leaf fresh-juice in abdominal disorder during pregnancy
59	*Datura alba*	,,	Safed-Dhatura	Leaf paste in skin disease
60	*Datura metel*	,,	Kala-Dhatura	Seed in gall bladder stone, leaf-paste in hydrocele
61	*Datura stramonium*	,,	Raj-Dhatura	Leaf smoke in bronchial asthma, leaf paste as anti inflammatory
62	*Solanum surattense*	,,	Kantkari	Decoction of its root and *Tinospora cordifolia* in fever, root decoction with honey in cough, root powder and *Ferula foetida* along with honey in bronchial asthma
63	*Solanum nigrum*	,,	Makoi	Leaf paste in psoriasis and other skin disease and fruit in diarrhea
64	*Withania somnifera*	,,	Ashagandha	Root powder in leucorrhea seed decoction as diuretic
65	*Evolvulus alsinoides*	Convolvulaceae	Neel-Shankhpushpi/Vishnukranta	Root in tumor, leaf fresh juice in dysuria
66	*Convolvulus pleuricaulis*	,,	……..	Leaf fresh juice in constipation
67	*Ipomoea nil*	,,	Kala-Dana	Seed as purgative and galactagogue
68	*Operculina turpethum*	,,	Nisot	Eaten as vegetable in piles and tumor, root as mild laxative
69	*Peristrophae bicalyculata* Syn. *Paniculata*	Acanthaceae	Masi	Root decoction in gout and rheumatism
70	*Rungia parviflora*	,,	Khadsaliyo	Leaf paste on small-pox and leaf fresh-

				juice as diuretic
71	*Asteracantha longifolia*	,,	Talmakhana	Root decoction in liver cirrhosis and as diuretic
72	*Adhatoda vasica*	,,	Adusa/Bakas	Antimicrobial, leprosy, pulmonary disease, expectorant, diuretic, malaria, asthama
73	*Ocimum sanctum*	Lamiaceae	Swet-Tulsi	Hot leaf infusion as wound wash, seed in dysuria, leaf-fresh juice in common cold
74	*Ocimum canum*	,,	Kali-Tulsi	Leaf paste in skin-disease, leaf fresh juice in hemorrhage
75	*Leucas aspera*	,,	Chotahalkusha	Leaf paste in wart, scabies and psoriasis

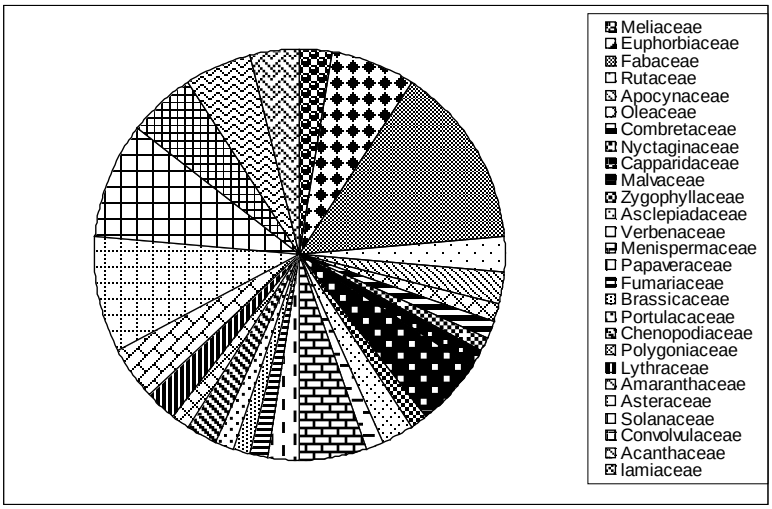

Fig. 2. Relative contribution of the families in the medicinal flora of the district Ghazipur.

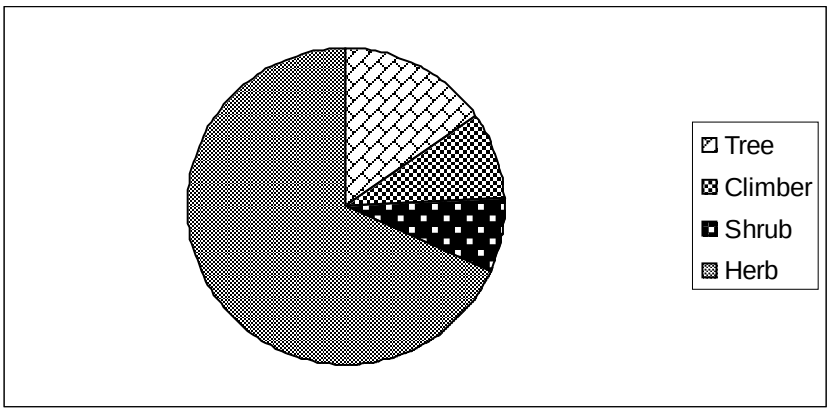

Fig. 3. Habit of the plants reported in the present study

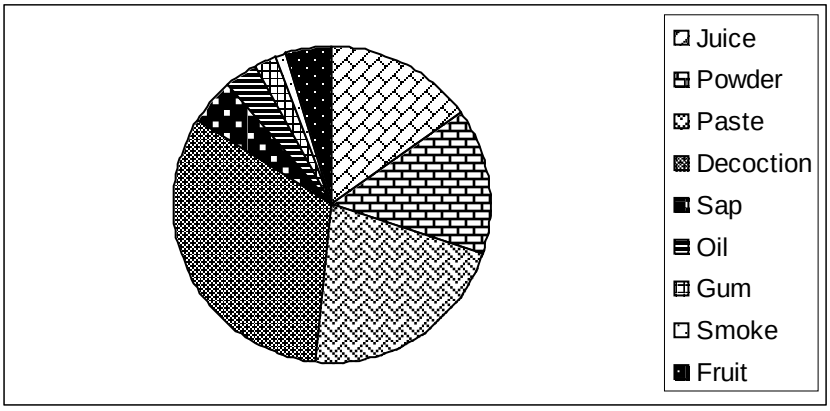

Fig. 4. Relative contribution of methods used to prepare formulations

Ethanomedicinal data revealed that plant preparations were used to treat skin problems, malaria, small pox, leprosy, cough, headache, diarrhea, toothache, wounds, diabetes, rheumatisms, hepatitis A, heart problems, elephantiasis, STDs, asthma, dysentery, hair loss, in pregnancy, and against snake and scorpion poisons etc., An effective therapeutic formulation often contains more than one plant, and plant parts (**Table 3**). Leaves and roots were most widely used in the treatments. For the preparation of formulations decoction was the preferred method, followed by paste powder and juice (**Fig. 4**). In many cases a particular plant part was to treat different diseases; and different part of the same plant was used to treat single or more than one diseases. Preparations via different methods from the same plant, or same plant part were used to treat different ailments. For example, leaf paste of *Azadirachtha indica* is used against small pox, while its aqueous extract as antiseptics. Agricultural expansion was the principal threatening factor affecting the distribution of medicinal plants in the district.

Documentation of the indigenous knowledge through ethanobotanical studies is important for the conservation and utilization of plant resources. The Council of Scientific and Industrial Research (CSIR), New Delhi has taken an initiative to build up a Traditional Knowledge Digital Library, which will contain >35,000 herbal medical formulation used in Ayurvedic system of medicine (Pushpangadan & Kumar 2005). In India, studies on medicinal plants have mainly been conducted in mountains and hilly areas of the country that harbors rich plant diversity. Survey and enumeration of the medicinal flora of the Gangetic plain (area 300,000 sq miles, 90-300 miles wide), which is amongst the most populous regions of the world, remain largely untouched. There are a few studies published from this region - Kirtikar & Basu (1935), Singh & Maheshwari (1983), Sebastian & Bhandari (1984), Singh & Prakash (1996), Singh *et al* (1996), Paranjape (2001), Khan & Ali (2003). A majority of these are super-fluent.

Floristic composition of the district is largely constituted of roadside flora. Arora and Nayar ((1984) argued that crop plants could also constitute a source of traditional medicine. Earlier study by Singh (1984) reported a total of 129 angiospermic families including 103 dicots (D) and 26 monocots (M), with 478 genera (382 D + 96 M) and 734 species (579 D + 155 M) from the district. In addition, 78 species belonging to gymnosperm, pteridophytes, bryophytes algae and fungi have also been reported.

A great majority of global (≈ 80%) population use traditional medicinal plants to cure illness and ailments. Traditional people may not understand the scientific rational of the use, but they do know their proper use from

personal experience that are passed on by the ancestors to the next generation. It is generally believed that such preparations have less or no side effects compared to that of modern medicines. Moreover, they are easily available, and sometimes due to various socio-economic reasons the only source of healthcare available to the people. In many Asian countries, local and indigenous communities manufacture and sell the product based on their traditional knowledge, to earn their livelihood. Conclusively, traditional medicinal knowledge not only play important role in community health care but is also important for the present and future drug development plans.

Acknowledgements

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