Brazilian Journal of Biology®

ISSN 1519-6984 (Print)
ISSN 1678-4375 (Online)

Original Article

Ethnomedicinal uses of plants for various diseases in the remote areas of Changa Manga Forest, Pakistan

Usos etnomedicinais de plantas para várias doenças nas áreas remotas da Floresta Changa Manga, Paquistão

A. Sharif[a], N. A. Shah[b]*, A. Rauf[c], N. Hadayat[d], A. Gul[e], G. Nawaz[f], S. Sakhi[g], M. Iqbal[h], M. R. Khan[a], A. A. Shah[i], N. Azam[j], H. Iftikhar[k], S. A. Shah[l], S. Bahadur[m] F. Hussainn and M. Shuaib[o]*

[a]Quaid-i-Azam University, Faculty of Biological Sciences, Department of Biochemistry, Islamabad, Pakistan
[b]COMSATS University, Department of Biosciences, Islamabad, Pakistan
[c]University of AWAKUM, Department of Botany, Mardan, Pakistan
[d]University of Education, Division of Science and Technology, Department of Botany, Lahore, Pakistan
[e]Hazara University, Department of Botany, Manshera, Pakistan
[f]Kohat University of Science and Technology, Department of Botany, Kohat, Pakistan
[g]University of Swat, Centre of Plant Biodiversity, Swat, Pakistan
[h]University of Okara, Department of Botany, Okara, Pakistan
[i]Jazan University, Medical Research Centre, Jazan, Kingdom of Saudi Arabia
[j]University of Peshawar, Centre of Plant Biodiversity, Peshawar, Pakistan
[k]Bacha Khan University, Department of Agriculture, Charsdda, Pakistan
[l]National University of Medical Sciences, Department of Biological Sciences, Rawalpindi, Pakistan
[m]Hainan University, College of Forestry, Haikou, China
[n]Department of Botany, Islamia college Peshawar, Peshawar, Pakistan
[o]Yunnan University, School of Ecology and Environmental Science, Kunming, Yunnan, PR. China

Abstract

This study aims at reporting the indigenous knowledge of the medicinal flora from the inhabitants of surroundings of the World's largest artificial planted forest "Changa Manga", Pakistan. Data were collected by direct interviews and group meetings from 81 inhabitants including 32 local healers having information regarding the use of indigenous medicinal plants over a period of one year. Different statistical tools were applied to analyze the data including Frequency citation (FC), Relative frequency citation (RFC), Use Value, Factor of informants consensus and fidelity level. This study reported 73 plant species belonging to 37 plant families and 46 genera. The majority of plant species belong to compositae family. The most commonly used medicinal plants were *P. hysterophorus* L., *P. dactylifera* L., *S. indicum* L, *P. harmala* L., *P. emblica* L., and *A. indica* A.Juss. The greatest number of species was used to cure gastrointestinal disorders. The highest fidelity level (68.18%) was of *E. helioscopia* to cure gastrointestinal disorders. Maximum fresh uses (17) were reported by *C. dactylon* (L.) Pars. While the highest number of species reporting fresh uses in similar number was 13. In this study, five novel plants are being reported for the first time in Pakistan for their ethnomedicinal worth. Our data reflect unique usage of the medicinal plants in the study area. The statistical tools used in the study proved useful in pointing the most important and disease category specific plants. High use value plant and the new reported medicinal plants might prove an important source of the isolation of pharmacologically active compounds.

Keywords: use value, ethnobotanical, local healthcare system, indigenous knowledge, ethnopharmacology, Changa Manga.

Resumo

Este estudo tem como objetivo relatar o conhecimento indígena sobre a flora medicinal dos habitantes do entorno da maior floresta artificial plantada do mundo, a Changa Manga, no Paquistão. Os dados foram coletados por meio de entrevistas diretas e reuniões em grupo de 81 habitantes, incluindo 32 curandeiros locais, com informações sobre o uso de plantas medicinais indígenas durante o período de um ano. Diferentes ferramentas estatísticas foram aplicadas para analisar os dados, incluindo citação de frequência (FC), citação de frequência relativa (RFC), valor de uso, fator de consenso dos informantes e nível de fidelidade. Este estudo relatou 73 espécies de plantas pertencentes a 37 famílias de plantas e 46 gêneros. A maioria das espécies de plantas pertence à família Compositae. As plantas medicinais mais utilizadas foram *P. hysterophorus* L., *P. dactylifera* L., *S. indicum* L., *P. harmala* L., *P. emblica*

*e-mail: drnaseeralishah@gmail.com; zeyadz44@yahoo.com
Received: August 31, 2021 – Accepted: February 1, 2022

L. e *A. indica* A. Juss. O maior número de espécies foi usado para curar distúrbios gastrointestinais. O maior nível de fidelidade (68,18%) foi de *E. helioscopia* para cura de distúrbios gastrointestinais. Os usos máximos em fresco (17) foram relatados por *C. dactylon* (L.) Pars. enquanto o maior número de espécies relatando usos frescos em número semelhante foi de 13. Neste estudo, cinco novas plantas estão sendo relatadas pela primeira vez no Paquistão por seu valor etnomedicinal. Nossos dados refletem o uso exclusivo das plantas medicinais na área de estudo. As ferramentas estatísticas utilizadas no estudo mostraram-se úteis para apontar as plantas mais importantes e específicas da categoria de doença. Plantas de alto valor de uso e as novas plantas medicinais relatadas podem ser uma importante fonte de isolamento de compostos farmacologicamente ativos.

Palavras-chave: valor de uso, etnobotânica, sistema local de saúde, conhecimento indígena, etnofarmacologia, Changa Manga.

1. Introduction

Human beings are the only species in the world using various ingredients including plants, animals, insects and other compounds for the cure of various diseases. Usage of plants as medicine dates back to 5,000 years (Sofowora, 1982). Ethnobotany plays a key role to unravel the link between biological diversity, social and cultural dynamics (Husain et al., 2008). Medicinal plants have an important role in traditional medicinal systems of many countries and rural communities gain much benefit from these plants and they are an important source of many modern drugs. This customary herbal medicinal system is deeply rooted in the human cultures and habitats, and knowledge of folk remedies is conveyed accordingly to the descendants as the time goes (Majid et al., 2015). Many allopathic drugs of the modern world like aspirin, ephedrine, digoxin, atropine, morphine, reserpine, quinine, artemisinin, and tubocurarine were obtained from ethnobotanicals because of their enormous fidelity and use value in the local system of medicine (Gilani and Atta-ur-Rahman, 2005). In spite of the modern techniques in chemistry still, these medicines are not replaced and are regularly used for the cure of various ailments (Kumar et al., 2011). Although the synthetic products have surpassed their importance in the modern world, however, the use of herbal in the various local system of medicine, flavoring and for their aromatic qualities, throughout the world the herbals are considered safe and cost effective. On account of safety and security to human and environment, the herbals are gaining importance and people are returning to the naturals (Joy et al., 1998).

Bio-organic compounds have enormous therapeutic values and medicinal plants are a major source of organic constituents (Sajid et al., 2016). There are about 5700 plants among which many are used by the local population of Pakistan to treat and cure various diseases. The formulations are developed on their beneficial and curative potential that is based on the flora present in their vicinity. Although, tremendous efforts have been made in past to record the ethnobotanical data, the field of traditional medicines is still a virgin. Among 5700 ethnobotanicals nearly 372 are endemic whereas about 456 ethnobotanicals are used by the local healers and practitioners to synthesize nearly 350 formulated drugs for various diseases (Ahmad and Husain, 2008). Indigenous medicinal knowledge is a part of the Pakistani culture, and plant-based medicines are traditionally used by the majority of the Pakistani population (Qureshi et al., 2009). The rural population, in particular, is more dependent on folk medicine for their health related problems due to efficacy, minimal side effects, easy availability, and ease of use. This type of traditional medicinal knowledge is regularly practiced in homes, and it is transferred from generation to generation (Mahmood et al., 2011a). However, this tradition and associated knowledge are dwindling rapidly because the younger generation is either reluctant or less inclined to inherit this legacy of ethnomedicinal wealth from their forefathers. A fascination towards western lifestyles, industrialization, migration from rural to urban areas for jobs and education, allopathic medicine, and deforestation may underlie this change in behavior. Therefore, the need to collect and systematically document this valuable traditional knowledge is urgent for the interest of humanity before it is lost forever (Bhatia et al., 2014).

Floristic and ethnobotanical studies of Changa Manga forest have been reported earlier (Ahmad et al., 2014a, b). In these studies, traditional recipes that were practiced for years in this area were missing. Moreover, the whole area of this forest was not explored and the data were not statistically analyzed. The modern techniques of statistical analysis provide more elaborate use of the botanicals in treating and curing various ailments. There are gaps in ethnobotanical knowledge in this region. Therefore, there was a need to explore the whole territory of this forest using an advanced statistical approach. The present study was conducted for the following reasons: (i) to record the ethnobotanicals used by the local population for various health ailments; ii) to enrich the data regarding the formulation, dosage, and modes of administration; iii) pharmacological evaluation of candidate ethnobotanicals in subsequent studies; and iv) to inform the community about the diversity and conservation of medicinal plants.

2. Materials and Methods

2.1. Topography

The Changa Manga is the world's largest artificial planted forest of District Kasur, in Punjab province of Pakistan. It is situated 31°0833N and 73°9667E in the south of Lahore near Chunian (Ahmad et al., 2014b). The total area of Changa Manga forest is about 12,510 acres and its cultivation was started in 1864 for the provision of fuel wood (Ahmad et al., 2014a). This forest is situated in sub-tropical continental plains of Pakistan. Now it is maintained as national wildlife park (Shinwari and Gilani, 2003). In the forest *D. sissoo* (Shisham), *M. alba* (Tooth), *B. malabaricum* (Simbal), *A. nilotica* (Kikar), *P.tremula* (Popular)

are the most common trees species. The trees are irrigated from 17 channels of the main Upper Bari Doab Canal and Vahn distributary which starts from April till October (Shinwari and Gilani, 2003; Shuaib et al., 2021). Changa Manga forest also provides an important breeding center for wildlife and Asiatic vultures especially endangered *G. bengalensis* (Murn et al., 2008). A part of this forest has now been developed as a recreation site.

2.2. Climate

The Changa Manga has a semi-arid climate with annual average precipitation of 364 mm. Most precipitation falls in August, with an average of 104 mm. The driest month is November; with an average precipitation of 2 mm. The difference in precipitation is 102 mm between the driest and wettest months of the year. The average temperature of this area on annual basis is 24.2 °C. The hottest month is June (average 34.1 °C) whereas the lowest average temperature (12.2 °C) is recorded in January. The average temperatures varied during the year by 21.9 °C (Ahmad et al., 2014b).

2.3. Socio-demographic information

Kasur is one of the renowned districts of Punjab province in Pakistan, located on Ferozpur road, bordering 55Kilometers north with Lahore while India in the southeast. It got a separate distinction on July 1st, 1976 as it was a part of District Lahore formerly (Ahmad et al., 2014b). District Kasur is administratively subdivided into 5 tehsils, Pattoki, Chunian, Kot Radha Kishan, Raiwind, and Kasur. This district consists of several fortified territories named locally as Kots, which collectively form sizeable towns spreading nearly 4,796^2 Kilometers. Prominent and well-known kots and towns of the district are Change Manga, Wahnadhan, Wahnkhara, Doba, Pacca Qila, Kot Ghulam Muhammad, Kot Badar-ud-Din Khan, Kot Azam Khan, Kot Murad Khan, Kot Usman Khan, Kot Halim Khan, Kot Fateh Din Khan (City Kasur Welfare Organization, 2021). According to 2011 census population of the area is 3,466,000. Most of the population (56.22%) lives in rural areas. Of the total population, Muslims comprise 97%, Christians 2%, while the rest belong to Ahmadis, Hindus, and other religions. Punjabi is the major dialect of the district as it contributes 44% followed by Mewati (32%), Pashto (9%) and Gujarati (8%). Urdu is a common medium of communication in various ethnic groups throughout the study area (Wikipedia, 2021; Figure 1). Agriculture, textile and tanning industry is the major source of income for the people of Kasur (United Nations Development Programme, 2021).

2.4. Data collection

Data about the ethnobotanicals of Changa Manga were collected from April 2014 to March 2015 including the local area i.e. Chunian, Changa Manga, Pattoki, Janbar and Kot radhakishan. A total of 81 informants including 32 local healers were interviewed to obtain indigenous knowledge of the community as shown in Table 1. Uses and recipes of medicinal plant species for various ailments were recorded through various sources; interviews, meetings, discussions,and dialogues with the common people and

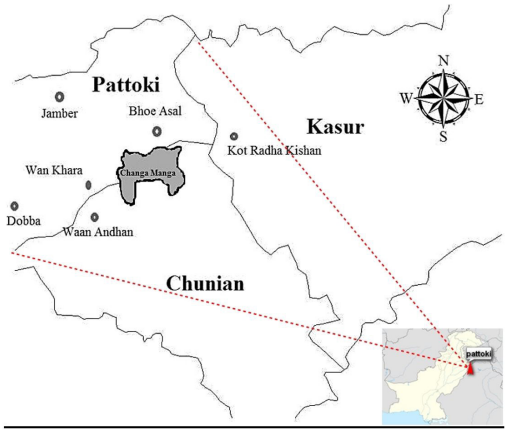

Figure 1. Map of the study area.

Table 1. Demographic information of the local informants.

Variable	Demographic categories	Percentage(%)
Gender	Male	75
	Female	25
Experience	Local people	83
	Herbalist	17
Age	20-40years	59
	41-60years	28
	61 and above years	9
Education	Illiterate	33
	Primary and middle	28
	Secondary and undergraduate	33
	Graduate and Postgraduate	8

with local practitioners and shepherds. Open-ended and semi-structured questionnaires were filled in the field. People were asked to provide information about each local medicinal plant, including the vernacular name, origin, flowering period, uses (particularly medicinal uses), route of administration, methods of preparation of various recipes specific to the community and plant parts that were used for therapeutic value. Interviews were performed in the local languages (Urdu and Punjabi).

2.5. Collection and identification of medicinal plants

Ethnobotanicals used by the local inhabitants in the surroundings of Changa Manga forest were identifiedby vernacular names and collected with the assistance of local farmers. The plants after collection were wrapped in blotting paper, and carefully taken to the Department of Plant Sciences, Quaid-i-Azam University Islamabad Pakistan. Specimens were pressed for dryness, accessed on a herbarium sheet and identified by Prof. Dr. Rizwana

Aleem Qureshi (plant taxonomist, Quaid-i-Azam University, Islamabad and Sayed Afzal Shah (plant taxonomist).

2.6. Data analysis

Three quantitative indices; use value (UV), Factor of informants consensus (FIC) and fidelity level (Fl) were determined on the collected data from the informants surrounding the Changa Manga forest. Relative importance (UVi) of each ethnobotanical was determined by estimating the use value by slightly modifying the formula described by O Phillips AH Gentry (Phillips and Gentry, 1993). A total number of disease categories were 17. The factor of use values was obtained by dividing 1 by this categories number (i.e. 1/17). By this each plant species "i" gets a use value factor of 0.059 for each disease category. Use value for plant species "i" is (Equation 1):

$$UVi = \frac{\sum \mathrm{Uf}}{\mathrm{ni}} \quad (1)$$

where "ΣUf" indicates the sum of use value factor of the specific ethnobotanical "i", and "ni" represents the number of informants interviewed for the specific plant species "i". The range of use value is from 0 to 1; higher values imply the importance of the ethnobotanical among the population while the low values indicate that there are fewer use reports. This Biostatistics does not differentiate for its single or multipurpose therapeutic use (Musa et al., 2011).

Citation of informants for the use of ethnobotanicals for a particular category of ailment recognizes the therapeutic importance. For this purpose prior to analysis of the data ailments were broadly categorized into various classes. To establish the homogeneity for the therapeutic use of medicinal plants Factor of informants consensus (Fic) was determined according to Heinrich et al. (1998). Fic was calculated as Equation 2:

$$Fic = \frac{\mathrm{nur} - \mathrm{nt}}{\mathrm{nur} - 1} \quad (2)$$

On the basis of number of use-reports "nur" for a specific ailment class and the number of taxa "nt" used for the specific ailment class by all the informants, a range of 0 to 1 is expected for the Fic value. Fic approximates near '0' if the taxa are randomly chosen or if there is not any exchange of information about their use among the informants. A well-defined selection criterion and/or the exchange of information in the local community render Fic near '1' (Sharma et al., 2012).

A specific class of ailment may be treated by a number of ethnobotanicals. Therefore it is utmost important to indicate the preferred ethnobotanical among the local population for the treatment of a particular ailment category (Musa et al., 2011). For this purpose, the biostatistics fidelity level "Fl" was determined according to Friedman et al. (1986) (Equation 3).

$$Fl\ (\%) = \frac{\mathrm{Np}}{\mathrm{N}} \times 100 \quad (3)$$

Number of use-reports for a specific ailment of a given medicinal plant species is indicated by "Np" whereas "N" refers to the total number of use-reports cited for any given species. If an ethnobotanical is most preferably used for a specific ailment class than a high Fl value (near100%) is obtained whereas multipurpose ethnobotanical renders low Fl value (Musa et al., 2011).

2.7. Relative frequency citation (RFC)

We determined the Relative frequency of citation (RFC) of reported species using the following index (Equation 4).

$$RFC = FC / N \ (0 < RFC < 1) \quad (4)$$

This index shows the local importance of each species and it is given the frequency of citation (FC, the number of informants mentioning the use of the species) divided by the total number of informants participating in the survey (N), without considering the use categories (Vitalini et al., 2013).

3. Results and Discussion

3.1. Diversity of medicinal plants

Plants are an important source of traditional and alternate cure for different diseases in our health care system. In the present study, we collected ethnopharmacological information of 73 plants species belonging to 37 families and 46 genera (Figure 2). The majority of the plant species were from Compositae (10) family, followed by Leguminosae (6) and Malvaceae (4). Remaining, 7 families (Amaranthaceae, Fabaceae, Capparidaceae, Moraceae, Myrtaceae, Poaceae, and Rutaceae) shared 3 species each and 6 families (Arecaceae, Brassicaceae, Euphorbiaceae, Meliaceae, Solanaceae, and Zygophyllaceae) consisted of 2 species each. The vast utilization of medicinal plants belonging to different important families might be because of the presence of effective bioactive constituents against ailments in various species (Gazzaneo et al., 2005). In a similar study by Ijaz et al. (2016), they reported 74 plant species belonging to 70 genera and 42 families in which Compositae was the dominant family used in the treatment of different diseases (8 species and 8 genera). Compositae was followed by Fabaceae having 7 spp. and 7 genera and Malvaceae having 3 spp. and 2 genera. Similarly, Lamiaceae was the major family possessing 9 genera and 11 species, followed by Brassicaceae (5 species), Apiaceae and Amaranthaceae (4 species each) indicating the frequent usage of medicinal plants belonging to these families in the investigation done by Shah et al. (2016).

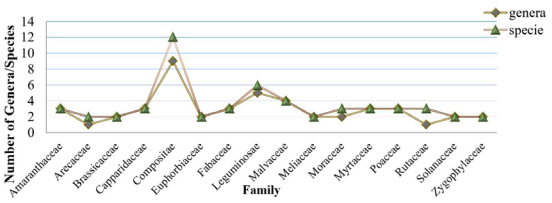

Figure 2. Number of genera and species present in different families.

3.2. Parts of plants used in the preparation of herbal recipes

The use of specific plant parts for curing various human diseases suggests that these parts have strongest medicinal properties but it needs further phytochemical analysis and phytopharmaceutical screening to cross-check the local information. Most frequently leaves, stem, roots, seeds, fruits, flowers, bark and whole plant were used. The local inhabitants of the area usually utilize every part of the plant. In our research different parts of plants were used like, leaves 29%, roots 13.70%, thewhole plant 11.50%, fruits 13%, seeds 8.40%, flowers and bark 7.60%, latex and twigs 3.10% and aerial part 2.30% (Figure 3). The use of whole plant and roots is not beneficial for plants population in nature so aerial parts are the safest. Medicinal plants are being threatened by the increasing population and agricultural expansions that may lead to areduction of plants population reported in other studies (Lulekal et al., 2008). Among the parts utilized for medicinal purposes, leaves of 13 species (28.85%), whole plant (15.38%), bark (13.46%), roots (11.54%), wood (9.62%), fruit (7.69%), flowers and seeds (5.77% each), and stem (3.85%) were utilized (Ahmad and Habib, 2014). Our findings of the frequent use of leaves corroborate the results of Sohel et al. (2016) and (Hasan et al., 2014a). Mostly local healers advised for ingestion of herbals for the treatment of different disorders but other routes like topical were of great importance for skin disorders, wounds, poisonous bites, rheumatism, weakness and body pain.

3.3. Use value of medicinal plants

The use value (UVi) is a quantitative method that demonstrates the relative importance of species or plant family for a population (Vendruscolo and Mentz, 2006). The highest use value reported in this study was 0.1, and the lowest value was 0.009. The most commonly used medicinal plants were *P. hysterophorus* (UVi=0.1), *C. viscosa* (UVi=0.016), *C. arvensis* (UVi=0.016), *D. sissoo* (UVi=0.017), *N. arbortristis* (UVi=0.03), *P.harmala* (UVi=0.028), *S. spontaneum* (UVi=0.023), *Z. nummularia* (UVi=0.018), *A. conyzoides* (UVi=0.019), *C.arvense* (UVi=0.024), *C. limon* (UVi=0.021) and *G. abutilifolia* (UVi=0.026), *M.arvensis* (UVi=0.02) and *S. cumini* (UVi=0.017) which indicates their extensive use in local medicine (Table 2). The plants with high UVis might be commonly found in wide areas and thelocal population is aware of their use for various ailments. Ijaz et al. (2016) reported the use value of medicinal plants species ranges from 0.21 to 0.91. The species with high used values were *B. lycium* (UVi=0.91), *C. sativa* (UVi=0.81), *Z. nummularia* (UVi=0.80), *F. carica* (UVi=0.78) and *G. mascatense* (UVi=0.77). Llah et al. (2014) reported the highest use values (UVi) for *P. ovata* (UVi =0.98), *L. inermis* (UVi=0.98), *C. Procera* and. (UVi=0.96) and *P. harmala* (UVi=0.95). In the above studies, UV was much higher than the present study because they followed the conventional method of finding use values of plants. Maximum use values of mentioned medicinal plants might be due to their common distribution and local practitioner's awareness which make the first choice for the ailment.

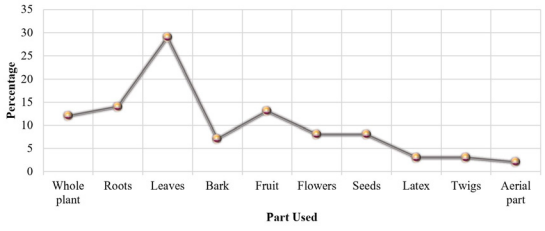

Figure 3. Percentage of plant parts used for herbal preparations in Changa Manga Forest.

3.4. Route of application

Results obtained in this study indicated that oral administration is the most favorite route of herbal application (45%) followed by topical application (35%) and gargles (9%). Among these herbal applications, the least type of herbal application is through optical route (2%) (Figure 4) This study supports the earlier studies where it was realized that in Pakistan the most preferred rout of herbal administration was the oral route (Mahmood et al., 2011a). The two preferred rout of herbal administration; oral and topical routs permit quick physiological action and enhance the curative power of herbal preparation. In Pakistan, most of the ethnobotanicals are used as a mixture with other medicinal plants and these preparations are taken with additions like honey, milk, butter, sugar, salt, water etc. to treat or cure various ailments. The present study also indicates that to cure a specific class of ailment more than one plant species were usually used by the local population. The most common preparations used were decoction (36.10%), paste (16.70%), juice (11.10%) followed by the bandage, steam, extract and ashes etc. as shown in Figure 5.

Our study demonstrated that local healers use these plants to treat different human disorders (Table 2). The use values of plants have the correlation with percentage of healers practicing the plants in different categories of diseases (Figure 6). Other communities also use these plants to treat various ailments. The roots of *C. avensis* are used for cathartic properties. However, thewhole plant is used as a fodder for goats and sheep (Panhwar and Abro, 2007), blood purifier, blood cancer and skin diseases (Marwat, 2008). The decoction of roots of *D. sissoo* is used to cure blood ailments while its leaves are used as a treatment of gonorrhea (Shah et al., 2016). Its bark decoction is used for

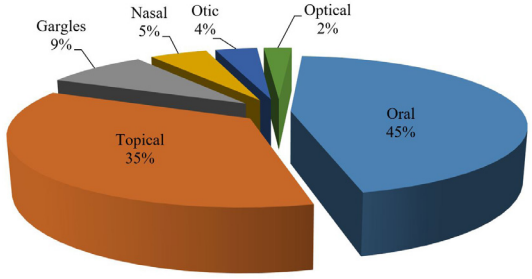

Figure 4. Mode of utilization for the preparation of medicine.

Table 2. List of indigenous medicinal plants used by the people of Changa Manga Forest.

Botanical name	Family	V.name	Habit	Part used	F.period	FC	RFC	Use value	%age of healers practicing	Medicinal uses
Abutilon theophrasti Medik.(CM 107)	Malvaceae	Pataer	Herb	L, R	Jul-Aug	45	0.55	0.26	84.4	**Ophthalmic, emollient, laxative, ulcer, demulcent,** antipyretic, diuretic, stomachic, dysentery (Ahmad et al., 2014b)
Acacia concinna (Willd.) DC (CM 11)	Leguminosae	Sikakai	Shrub	F, L, B	Sep-Oct	21	0.25	0.35	62.5	**Expectorant,** hair tonic, antimalarial (Akram et al., 2014), skin uses (Sharma et al., 2003)
Acacia nilotica (L.) Delile (CM 114)	Leguminosae	Kikar	Tree	B, G, L, Sd	Mar-May	12	0.14	0.17	71.9	**Astringent**, diarrhea, dysentery (Saqib et al., 2014), expectorant (Ahmad et al., 2013), toothache (Marwat, 2008), aphrodisiac, gonorrhea (Llah et al., 2014), gingivitis (Marwat, 2008)
Achyranthes aspera L. (CM 18)	Amaranthaceae	Puthkanda	Shrub	WP	Jul-Sep	7	0.086	0.09	75	**Blood purifier,** cough (Saqib et al., 2014), expectorant (Qureshi et al., 2010), wounds (Llah et al., 2014)
Aerva javanica (Burm.f.) Juss. ex Schult (CM 119)	Amaranthaceae	Kandyari	Herb	F,	Sep-Dec	5	0.06	0.06	78.1	**Cold, antitussive, antipyretic, ulcers, anti-inflammatory,** stomach problems (Llah et al., 2014), toothache (Qureshi et al., 2010), wounds (Marwat, 2008),
Ageratum conyzoides (L.) L. (CM 139)	Compositae	Bandotan,Sumatra	Herb	R, L, Fw	Jul-Sep	11	0.13	0.16	75	**Scabies, bruises**, Antilithic (Ahmad et al., 2014b), leprosy, cuts and wounds (Ahmad et al., 2014b)
Aloe vera (L.) Burm.f. (CM 146)	Xanthorrhoeaceae	Kawargandal	Herb	Lx	May-Jun	45	0.55	0.09	100	**Stomach ache, tonic, cathartic, stomachic**, dressing for boils (Llah et al., 2014)
Anagallis arvensis L.(CM 66)	Primulaceae	Balchar	Herb	L	May-Aug	60	0.74	0.95	90.6	**Cholagogue, nervine, antitussive, skin infection, purgative, stimulant, vulnerary,** epilepsy, expectorant, diuretic (Amjad, 2015), warts (Ahmad et al., 2014b)

Ethnobotanicals as Bold are introduced as new species; ethnomedicine uses as Bold are the newly introduced uses. AP = aerial part; B = Bark; F = fruit; Fw = flower; G= Gum Tw = twing; L = leaves; Lx = latex; Rt = root; R= Rhizhome, S= stem, Sd = seed; WP = whole plant.

Table 2. Continued...

Botanical name	Family	V.name	Habit	Part used	F.period	FC	RFC	Use value	%age of healers practicing	Medicinal uses
Azadirachta indica A.Juss.(CM 73)	Meliaceae	Neem	Tree	L, Fw, Sd, Tw	Apr-May	58	0.71	0.90	100	**Ear ache, leprosy, mouth dryness, hemorrhoids,** Scabies (Qureshi et al., 2011), rashes (Llah et al., 2014), antipyretic (Biswas et al., 2002)
Calotropis procera (Aiton) Dryand.(CM 82)	Apocynaceae	Akk	Shrub	WP	Mar-Oct	63	0.77	0.87	81.2	**Cholera**, toothache (Shah et al., 2013), cough (Kamal et al., 2009), vermifuge, stomach disease (Iqbal et al., 2005)
Cannabis sativa L. (CM 171)	Cannabaceae	Bhang	Herb	WP	Jul	71	0.87	0.95	100	**Tetanus, stomachic, whooping cough**, Diarrhea (Mahmood et al., 2013)
Capparis decidua (Forssk.) Edgew. (CM 190)	Capparaceae	Karrir, Karail	Shrub	AP	Mar-Apr	62	0.76	0.79	87.5	**Arthritis, dropsy, anemia, memory supplement, gout, diuretic,** back ache, general tonic, rheumatism (Marwat, 2008)
***Carissa carandas* L.** (CM 128)	Apocynaceae	Karonda	Shrub	R, F, L	Jan-Apr	57	0.70	0.79	68.75	**Digestive, dysentery, emphysematous**
Cassia fistula L. (CM 184)	Leguminosae	Amaltas	Tree	L, Fw, F	Mar-May	60	0.74	0.76	90.6	**Boils, cathartic, antipyretic,** Expectorant (Marwat, 2008), gastric problems (Kamal et al., 2009),
Chenopodium album L.(CM 53)	Amaranthaceae	Bathu	Herb	WP	Jan-Apr	49	0.60	0.73	96.8	**Hemorrhoids**, snake repellent (venom antidote), cardiac disorder, pepticulcer (Mahmood et al., 2013), dyspepsia (Ahmed et al., 2014), helminthiasis (vermifuge) (Sahreen et al., 2013), seminal weakness (Mahmood et al., 2013)
Cirsium arvense (L.) Scop. (CM 105)	Compositae	Bhurbhur,Leh	Herb	R, L	Jul-Sep	64	0.79	0.88	96.8	**Toothache, cardio tonic,** Astringent, hepatotonic, antiphlogistic, diuretic (Rehman et al., 2015)
***Cirsium horridulum* Michx.(CM 89)**	Compositae	Baramdandi	Herb	L, R	Annual	13	0.16	0.18	46.8	**General tonic, neuro tonic, blood purifier, typhoid fever, astringent, wounds, urticaria, warts, shivers, chest and throat infections**

Ethnobotanicals as Bold are introduced as new species; ethnomedicine uses as Bold are the newly introduced uses. AP = aerial part; B = Bark; F = fruit; Fw = flower; G= Gum Tw = twing; L = leaves; Lx = latex; Rt = root; R= Rhizhome, S= stem, Sd = seed; WP = whole plant.

Table 2. Continued...

Botanical name	Family	V.name	Habit	Part used	F.period	FC	RFC	Use value	%age of healers practicing	Medicinal uses
Citrus limon (L.) Osbeck (CM 60)	Rutaceae	Neboo	Tree	F	Aug-Nov	8	0.09	0.11	93.75	**Inflammation, malaria, cardio tonic, cholera, antiemetic**, **antidiarrhoeal**, antifungal, hyperpigmentation due to anemia (Ahmed et al., 2014),
Citrus maxima (Burm.) Merr. (CM 129)	Rutaceae	Narangi	Tree	F	Spring	16	0.19	0.21	65.62	**Refrigerant, relives hallucinations, skin toner, antiemetic,** carminative, abdominal cramps, diarrhea (Arias and Ramón-Laca, 2005)
Citrus paradisi Macfad. (CM 04)	Rutaceae	Chakotra	Tree	F	Spring	62	0.76	0.86	87.5	**Cholecystitis, skin toner, carminative, abdominal pain, diarrhea**, cardio tonic (Díaz-Juárez et al., 2009)
Cleome viscosa L. (CM 12)	Cleomaceae	Hulhul	Herb	Sd	Throughout year	39	0.48	0.52	78.12	**Tetanus, muscle relaxant,** vermifuge (Williams et al., 2003)
Convolvulus arvensis L.(CM 26)	Convolvulaceae	Hirankhari	Herb	WP	Jun-Sep	54	0.66	0.73	81.25	**Rashes, wounds, scabies**, bloodpurifier (Marwat, 2008)
***Conyza boelckei* Cabrera (CM 35)**	Compositae	Namkenbooti	Herb	WP	Feb -Nov	63	0.77	0.87	87.3	**Astringent, diuretic, tonic, antifungal, dermatitis**
Conyza canadensis (L.) Cronquist (CM 103)	Compositae	Giddarbuti	Herb	WP	Jun-Oct	27	0.33	0.44	90.6	**Insecticide, balsamic, styptic, vermifuge, bloody hemorrhoids, tonsillitis, emmanagogue, dysmenorrhea,** dysentery, diarrhea (Ishtiaq et al., 2012), astringent, diuretic (Saqib et al., 2014), antirheumatic (Ahmad et al., 2014b)
Coronopus didymus (L.) Sm. (CM 123)	Brassicaceae	Thandibooti, Halon	Herb	L, Sd	Jul-Sep	67	0.82	0.84	56.25	**Hiccups, asthma,** expectorant (Souza et al., 2004)
Crateva religiosa G.Forst. (CM 88)	Capparaceae	Barna	Tree	L, Tw	Mid summer	8	0.09	0.11	65.6	Renal disorder, tuberculosis (Souza et al., 2004)

Ethnobotanicals as Bold are introduced as new species; ethnomedicine uses as Bold are the newly introduced uses. AP = aerial part; B = Bark; F = fruit; Fw = flower; G= Gum Tw = twing; L = leaves; Lx = latex; Rt = root; R= Rhizhome, S= stem, Sd = seed; WP = whole plant.

Table 2. Continued...

Botanical name	Family	V.name	Habit	Part used	F.period	FC	RFC	Use value	%age of healers practicing	Medicinal uses
Cynodon dactylon(L.) Pars. (CM 118)	Poaceae	Chhabar, Humrikbooti	Grass	R, L	Aug-Oct	27	0.33	0.38	93.8	**Antiseptic**, **dysentery, convulsions, cough, cramps, epilepsy, headache, kidney stones, snake bite, sore,astringent, hemorrhoids, aperient (constipation), demulcent, emollient, vulnerary, hysteria,** diuretic, diarrhea (Qureshi et al., 2010), wounds (Saqib et al., 2014)
Dalbergia sissoo DC. (CM 115)	Leguminosae	Shesham	Tree	L, B, T	Apr-May	12	0.14	0.16	100	**Blood purifier, rashes, burns, mouth dryness, hair tonic, refrigerant,** leprosy (Kamal et al., 2009),
Datura stramonium L. (CM 194)	Solanaceae	Dathura	Herb	L, F	Jul-Oct	16	0.19	0.23	90.6	**Neuralgia, cathartic, headache, laxative, antispasmodic** (Reported in Pakistan but with other uses) (Abbasi et al., 2010)
Desmostachya bipinnata (L.) Stapf (CM 144)	Poaceae	Daabh	Grass	L, R	Jul-Nov	21	0.25	0.33	87.3	**Refrigerant**, **cathartic, prickly heat, hemorrhoids, boils, warts, bleeding nose (epistaxis),** menorrhagia, dysentery, diuretic (Ismail and Nisar, 2010), cholera (Qureshi et al., 2010)
Eucalyptus globulus Labill.(CM 86)	Myrtaceae	Sufaida	Tree	WP	Jul-Aug	49	0.59	0.64	87.3	**Antiseptic, antiperiodic**, **stimulant, expectorant, diarrhea, astringent,** cough, cold (Ismail and Nisar, 2010), sorethroats (Mahmood et al., 2013)
Euphorbia helioscopia L. (CM 67)	Euphorbiaceae	Chhatridodak	Herb	Sd	May-Oct	53	0.65	0.69	90.6	**Febrifuge,** vermifuge, cholera (Ahmad et al., 2014b), anthelmintic, cathartic (Kamal et al., 2009)

Ethnobotanicals as Bold are introduced as new species; ethnomedicine uses as Bold are the newly introduced uses. AP = aerial part; B = Bark; F = fruit; Fw = flower; G= Gum Tw = twing; L = leaves; Lx = latex; Rt = root; R= Rhizhome, S= stem, Sd = seed; WP = whole plant.

Table 2. Continued...

Botanical name	Family	V.name	Habit	Part used	F.period	FC	RFC	Use value	%age of healers practicing	Medicinal uses
Fagonia arabica L.(CM 16)	Zygophyllaceae	Dhamasa	Herb	AP	Apr-Jun	47	0.58	0.65	78.1	**Antipyretic, blood purifier, wounds, urticaria, expectorant, antiseptic, diuretic, expectorant, astringent, antispasmodic, antiemetic, gingivitis, cough, gastrotonic, wounds, aphrodisiac,** hepatotonic, jaundice, aphthae (reported in other country) (Hammiche and Maiza, 2006)
Ficus benghalensis L. (CM 37)	Moraceae	Bohar	Tree	L, Lx	Apr-Jul	58	0.71	0.86	62.5	**Laxative, wounds,** aphrodisiac (Llah et al., 2014)
Ficus religiosa L.(CM 132)	Moraceae	Peppal	Tree	Sd, F, B, L, Tw	Feb	64	0.79	0.87	43.7	**Boils, antiemetic (** reported internationally with other studies and uses) (Singh et al., 2011)
Fumaria officinalis L.(CM 156)	Papaveraceae	Patpapra	Herb	WP	May-Sep	71	0.87	0.89	84.4	**Blood purifier, urinary bladder problem, typhoid fever, warts, urticaria, hepatotonic, neurological disorders**, stomach disorders, antipyretic (Ahmad et al., 2014b)
Galinsoga ciliata (Rafin.) Blake. (CM 98)	Compositae	Roendarpodina	Herb	WP	Mar-May	66	0.81	0.89	78.1	**Leucorrhea, jaundice, kidney problems, dysentery,** urinogenital problems, toothache (Ahmad et al., 2014b), anticancer and internal wounds (Qureshi et al., 2009)
Grewia abutilifolia Vent. ex Juss. (CM 175)	Malvaceae	Karnjwa	Shrub	WP	Mar-May	73	0.90	0.96	96.8	**Colic, abdominal cramps, carminative, shivers, convulsions, tetanus, anthelmintic**, boils, warts (Joshi et al., 1980)
Helianthus annuus L.(CM 25)	Compositae	Surajmukhi	Shrub	F, L	Jul-Sep	68	0.83	0.86	81.2	**Bronchial and lyrrengial problems, migraine, asthma, chronic obstructive disease**, **expectorant,** seasonal fever, diuretic (Mahmood et al., 2013), hypertension (Ahmed et al., 2014)

Ethnobotanicals as Bold are introduced as new species; ethnomedicine uses as Bold are the newly introduced uses. AP = aerial part; B = Bark; F = fruit; Fw = flower; G= Gum Tw = twing; L = leaves; Lx = latex; Rt = root; R= Rhizhome, S= stem, Sd = seed; WP = whole plant.

Table 2. Continued...

Botanical name	Family	V.name	Habit	Part used	F.period	FC	RFC	Use value	%age of healers practicing	Medicinal uses
Hibiscus rosa-sinensis L.(CM 181)	Malvaceae	Gharal	Shrub	F	Throughout year	63	0.77	1.08	93.8	**Refrigerant, blood purifier, hallucination**, cardio tonic (Mahmood et al., 2013)
Kalanchoe Pinnata (Lam.) Pers. (CM 172)	Crassulaceae	Pathar-chatta	Herb	L	Jun-Sep	54	0.66	0.75	93.8	**Purgative, kidney stones, jaundice, cholelithiasis (gall stones), urinary bladder stone,** arthritis, inflammation (Pattewar, 2012)
Malvastrum coromandelianum (L.) Garcke (CM 166)	Malvaceae	Jhar, pathakha	Herb	AP	Sep-Oct	59	0.83	0.79	81.2	**Inflammation, analgesic,** wounds, dysentery (Shah et al., 2013), diaphoretic, sores (Ahmad et al., 2014b)
Mangifera indica L.(CM 191)	Anacardiaceae	Aam	Tree	F	Dec-Apr	62	0.76	0.83	87.3	**Stomach problem, diarrhea, kidney problem, urinary bladder problem,** intestinal problem (Ahmed et al., 2014)
Melia azedarach L.(CM 77)	Meliaceae	Bakain	Tree	L, F	Jun	58	0.71	0.78	93.8	**Typhoid, old dry wounds, hemorrhoids, analgesic,** blood purifier (Mahmood et al., 2013)
Mentha arvensis L.(CM 15)	Lamiaceae	Podina	Herb	L	Jul-Sep	8	0.09	0.10	100	**Abdominal cramps, mouth freshener, appetizer, dyspepsia, cholera, weight loss, dysmenorrheal,** heart burn, carminative (Llah et al., 2014)
Mimusops elengi L.(CM 133)	Sapotaceae	Molseri	Tree	B, F	Mar-Jul	17	0.20	0.22	93.8	**Desiccant, headache**, cardio tonic, laxative, gingivitis (Baliga et al., 2011)
Morus nigra L.(CM 100)	Moraceae	Shehtoot	Tree	L,R	May-Jun	12	0.14	0.15	96.8	**Laxative, hypotensive, warts, mouth dryness, refrigerant, blisters, diphtheretis,** hoarsen (throat pain) (Saqib et al., 2014)
Nyctanthes arbor-tristis L.(CM 22)	Oleaceae	Harsinghar	Shrub	L, S, Fw	Jun-Oct	26	0.32	0.35	100	**Analgesic, laxative, sciatica, aphrodisiac, cathartic,** arthritis, typhoid fever (Saxena et al., 1987)

Ethnobotanicals as Bold are introduced as new species; ethnomedicine uses as Bold are the newly introduced uses. AP = aerial part; B = Bark; F = fruit; Fw = flower; G= Gum Tw = twing; L = leaves; Lx = latex; Rt = root; R= Rhizhome, S= stem, Sd = seed; WP = whole plant.

Table 2. Continued...

Botanical name	Family	V.name	Habit	Part used	F.period	FC	RFC	Use value	%age of healers practicing	Medicinal uses
Oxalis corniculata L. (CM 149)	Oxalidaceae	Khatibooti	Herb	L	Jun-Sep	32	0.39	0.43	87.3	**Analgesic, antiemetic**, refrigerant (Ahmad et al., 2014b), stomachic (Saqib et al., 2014)
Parthenium hysterophorus L. (CM 80)	Compositae	Gajarbooti	Herb	L	Annual	68	0.83	0.91	100	**Regulate menstruation, muscular weakness, backache,** warmify liver (Ahmad et al., 2014b)
Peganum harmala L.(CM 180)	Zygophyllaceae	Harmal	Herb	L, R	Mar-Apr	39	0.48	0.54	93.75	**Digestive, diuretic, uterine stimulant, menstrual problems, epilepsy, mental and nervous illness, vermifuge, hemorrhoids, baldness, rheumatism, anti-parasitic,** aphrodisiac (Abu-Irmaileh and Afifi, 2003)
***Phoenix canariensis* hort. ex Chabaud** (CM 92)	Arecaceae	Kanair	Tree	L, Rt	Summer	40	0.49	0.56	81.2	**Anti-inflammatory, hemorrhoids, wound dryness, heals wounds, blood purifier, aphrodisiac**
Phoenix dactylifera L.(CM 34)	Arecaceae	Khajur	Tree	Frt	Apr,May	55	0.67	0.82	84.4	**Respiratory disorder, gestrointestinal disturbances, antipyretic, antidiarrhoeal, hepatotonic, antitussive, arthritis**, carminative, antacid, general tonic backache (Llah et al., 2014), aphrodisiac (Kamal et al., 2009; Zahoor et al., 2009)
Phyllanthus emblica L. (CM 150)	Euphorbiaceae	Amala	Tree	Brk, L	Apr-May	63	0.77	0.87	93.8	**Hair tonic, blood purifier, laxative, antidote, antiflatulent, antiemetic, mouth dryness, hemorrhoids, appetizer, neuro tonic,** antidiarrhoeal (Krishnaveni and Mirunalini, 2010)
Pongamia pinnata (L.) Merr(CM 189)	Leguminosae	Sukh chain	Tree	Sd, L, F, Fw	Mar-Apr	7	0.08	0.08	62.5	**Apthae**, skin disease, antisepsis (Ayyanar and Ignacimuthu (2005)
Prosopis cineraria (L.) Druce (CM 120)	Leguminosae	Jand, Jhao	Tree	Fw, B	Apr-Aug	14	0.17	0.18	90.6	**Scorpion sting, snake bite, cough, cold,** Rheumatism (Shah et al., 2013), asthma (Ahmad et al., 2014b)

Ethnobotanicals as Bold are introduced as new species; ethnomedicine uses as Bold are the newly introduced uses. AP = aerial part; B = Bark; F = fruit; Fw = flower; G= Gum Tw = twing; L = leaves; Lx = latex; Rt = root; R= Rhizhome, S= stem, Sd = seed; WP = whole plant.

Table 2. Continued...

Botanical name	Family	V.name	Habit	Part used	F.period	FC	RFC	Use value	%age of healers practicing	Medicinal uses
Psidium guajava L. (CM 14)	Myrtaceae	Amrood	Tree	B, Fw, Sd	Spring	76	0.93	0.61	87.3	**Hemorrhoids, flu**, Dysentery, laxative (Mahmood et al., 2013)
Punica granatum L. (CM 32)	Lythraceae	Anar	Tree	F	Apr-Jul	68	0.83	0.86	90.6	**Antitussive, antiseptic, antibacterial, tuberculosis, refrigerant, dyspepsia, heart burn, strengthens teeth and gums, gingivitis, hepatitis, jaundice, hemorrhoids**, cardio tonic (Ahmed et al., 2014), antipyretic (Mahmood et al., 2013)
Ranunculus muricatus L.(CM 40)	Ranunculaceae	Sadabahar	Herb	WP	Feb- May	65	0.80	0.82	90.6	**Bronchial and laryngeal problems, urticaria, mouth ulcer, diabetes,eye irritations and infections, cold, gingivitis,** hypertension (Ahmed et al., 2014)
Rosa indica L. (CM 177)	Rosaceae	Gulab	Shrub	B, Fw, L	Apr-Oct	62	0.76	0.79	90.6	**Throat infection, liver tonic,, dysentery, anti-flatulent,, laxative, throat infection**, cardio tonic, conjunctivitis (Hussain et al., 2010)
Rumex crispus L. (CM 09)	Polygonaceae	Palakbooti	Herb	L, Sd, Rt	Jun-Oct	58	0.71	0.72	81.2	**Astringent, sores, ulcer, cholagogue, depurative, hemoptysis, hemorrhoids, diarrhea, wounds, cough**, Laxative (Ahmad et al., 2014b)
Saccharum spontaneum L. (CM 45)	Poaceae	Kansi	Grass	WP	Sept-Jan	62	0.76	0.78	100	**Astringent, emollient, diuretic, aphrodisiac, dyspepsia, piles, gynecological troubles,** respiratory problems, refrigerant, heart burn, purgative (Hussain et al., 2008)
Sapindus mukorossi Gaertn. (CM 43)	Sapindaceae	Retha	Tree	Sd	Jul-Aug	58	0.71	0.73	46.9	Astringent, sores, ulcer, cholagogue, depurative, hemoptysis, hemorrhoids, diarrhea, wounds, cough (Chakraborty et al., 2010)

Ethnobotanicals as Bold are introduced as new species; ethnomedicine uses as Bold are the newly introduced uses. AP = aerial part; B = Bark; F = fruit; Fw = flower; G= Gum Tw = twing; L = leaves; Lx = latex; Rt = root; R= Rhizhome, S= stem, Sd = seed; WP = whole plant.

Table 2. Continued...

Botanical name	Family	V.name	Habit	Part used	F.period	FC	RFC	Use value	%age of healers practicing	Medicinal uses
Sesamum indicum L.(CM 55)	Pedaliaceae	Til, Kanjnd	Herb	Sd, R	Jul-Sep	62	0.76	0.78	96.8	**Aphrodisiac, emollient, diuretic, catarrh, bladder problems, astringent, hemorrhoids, dysentery, cholera, dirrhoea, ulcer, liver and kidney tonic,** amenorrhea (Parveen et al., 2007)
Sisymbrium irio L. (CM 57)	Brassicaceae	Khubkalon, Saggbooti	Herb	WP	Jun-Aug	64	0.79	0.82	96.8	**Whooping cough, soother, measles, small pox, antiemetic**, antipyretic (Marwat, 2008),
Solanum melongena L. (CM 63)	Solanaceae	Katai	Herb	R, L	Jul-Sep	74	0.91	0.92	93.8	**Hypertension, hemorrhoids, antidote, astringent, abscess, hemorrhoids, toothache, urticaria, expectorant, asthma,** anti-cholesterol (Lans, 2006)
***Sonchus arvensis* L. (CM 79)**	Compositae	Bhangra	Herb	R, L	Jul-Oct	63	0.77	0.85	62.5	**Aphrodisiac, scorpion sting, hair tonic, toothache, strengthens eye sight, hepatotonic, skin disease**
Sonchus oleraceus L. (CM 96)	Compositae	Sadi	Herb	Lx, S, G, L, R	Jun-Aug	55	0.67	0.69	90.6	**Amenorrhea, emmanagague, hydrogague, cathartic, hepatotonic, colic,** tenesmus, antinflammatory, warts (Ahmad et al., 2014b)
Stellaria media (L.) Vill. (CM 135)	Caryophyllaceae	Kafilumba	Herb	WP	Apr-Aug	63	0.77	0.85	90.6	**Urticaria, antiemetic, expectorant, astringent, carminative, demulcent, refrigerant, vulnerary, kidney problem**, laxative (Ahmad et al., 2014b)
Syzygium cumini (L.) Skeels (CM 140)	Myrtaceae	Jaman	Tree	F	Mar-Apr	58	0.81	0.79	96.8	**Hepatotonic, antidiarrhoeal,** diabetes (Ismail and Nisar, 2010)

Ethnobotanicals as Bold are introduced as new species; ethnomedicine uses as Bold are the newly introduced uses. AP = aerial part; B = Bark; F = fruit; Fw = flower; G= Gum Tw = twing; L = leaves; Lx = latex; Rt = root; R= Rhizhome, S= stem, Sd = seed; WP = whole plant.

Table 2. Continued...

Botanical name	Family	V.name	Habit	Part used	F.period	FC	RFC	Use value	%age of healers practicing	Medicinal uses
Taraxacum officinale F.H.Wigg. (CM 160)	Compositae	Bhattar, Kasnijangli	Herb	L, R, Lx	Apr-May	63	0.77	0.80	87.3	**Cholagogue, depurative, gall stone, eczema, acne,** stomachic, laxatives (Ullah et al., 2013), diuretic (Mahmood et al., 2011b), jaundice (Saqib et al., 2014), dyspepsia (Ahmad et al., 2014b)
Terminalia arjuna (Roxb. ex DC.) Wight & Arn. (CM 199)	Combretaceae	Arjan	Tree	B, L	Apr-Jul	64	0.79	0.80	81.2	**Ear ache, analgesic,** cardio-tonic, laxative (Dwivedi, 2007).
Ziziphus nummularia (Burm.f) Wight & Arn. (CM 125)	Rhamnaceae	Desibaer	Tree	F, L, Rt	Jul-Sep	63	0.77	0.79	84.14	**Antidiarrhoeal, antiemetic, hemorrhoids, hair tonic, wounds**, blood purifier (Ahmad et al., 2014b)

Ethnobotanicals as Bold are introduced as new species; ethnomedicine uses as Bold are the newly introduced uses. AP = aerial part; B = Bark; F = fruit; Fw = flower; G= Gum Tw = twing; L = leaves; Lx = latex; Rt = root; R= Rhizhome, S= stem, Sd = seed; WP = whole plant.

dysentery. Leaf juice of *D. sissoo* is used as an emollient and as an infusion during fever and for cooling purposes and in emesis while bark powder is used for pyorrhea (Mahmood et al., 2013). A decoction of the leaves of *M. arvensis* is used in afever while its plants extract is given in diarrhea, cholera, and vomiting (Ahmad and Habib, 2014). *S. cumini* plant powder is used for diabetes (Mahmood et al., 2013). Fruits of *M. nigra* are useful for the treatment of bad thorax and expulsion of stomach worms (Ullah et al., 2010) and its leaves juice are used for a sore throat and in a cough while leaves infusion is used for stomach worms. It's powder can also be used as a blood purifier and as a carminative (Mahmood et al., 2013). *C. canadensis* is used as homeostatic, stimulant, astringent and diuretic (Ahmad and Habib, 2014). Different ethnobotanical reports have indicated the same medicinal characteristics as that are reported in the ethnopharmacological study. Previously, Kumar and Roy (2007) gave experimental proof that the latex of *C. procera* gives protection against inflammation. Along with this, Yesmin et al. (2008) explained that the leaves of *C. procera* contain strong antibacterial and antioxidant properties. Iqbal et al. (2005) validated the anti-helminthic activity against sheep nematodes using flowers of *C. procera*. The leaves of *A. chtaindica* possess strong antibacterial activities and leaves of this plant are extensively used to remove the parasitic load in animals and humans (Tipu et al., 2006; Akram et al., 2011). Akram et al. (2011) reported the use of *M. arvensis*as carminative, anti-peptic ulcer agent and as antispasmodic. Pods of *Cassia fistula*are given as such or in the form of decoction for curing constipation (Sharma et al., 2012). In addition, its use also has been explained in Bangladesh in asthma, chlorosis, in fever, as a purgative, anti-bilious and as anti-amoebiasis (Hasan et al., 2014b). *P. guajava* is used traditionally in stomach problems and other gastrointestinal infections, nausea, and vomiting (Heinrich et al., 1998). *H. annuus* is used to treat respiratory infections, bronchitis, and flue (Ishtiaq et al., 2012).

Plants with smaller UVi values are *C. didymus* (UVi=0.009) *F. religiosa* (UVi=0.012), *S. mucoross* (UVi=0.015). *P. pinnata* (UVi=0.015), these should not be neglected as they can imply potential effects to health.

3.5. Factor of informants consensus (FIC)

Ailments were first classified into 17 different categories according to Heinrich et al. (1998), before factor of informants consensus was determined (Table 3). The greatest number of locally used species (51 of 73) were used to treat gastrointestinal problems, followed by 32 species for the treatment of dermatological ailments, 26 species for the treatment of respiratory disorders, 22 species for circulatory disorders, 12 species for the andrological/gynecological disorders, 9 species for the treatment of fever, 10 species for the treatment of liver disorders, 6 species for the treatment of cardiovascular and 7 species for the treatment of dental disorders, 11 species for neurological and brain disorders, and six and eleven species for the treatment of inflammation and pain problems respectively. A large number of plant species for the treatment of gastrointestinal ailments were also reported in other ethnobotanical surveys (Llah et al., 2014; Ullah et al., 2013). However, these findings are consistent with Revathi et al. (2013), who reported that more species were used for the treatment of dermatological disorders. Generally, a greater success rate with one species as a remedy for a disorder produces

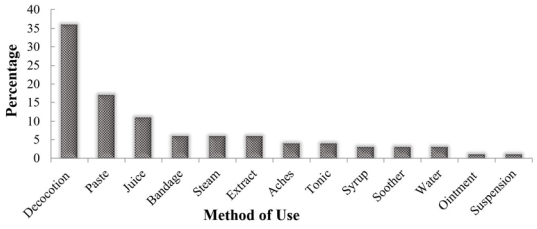

Figure 5. Percentage of preparation used.

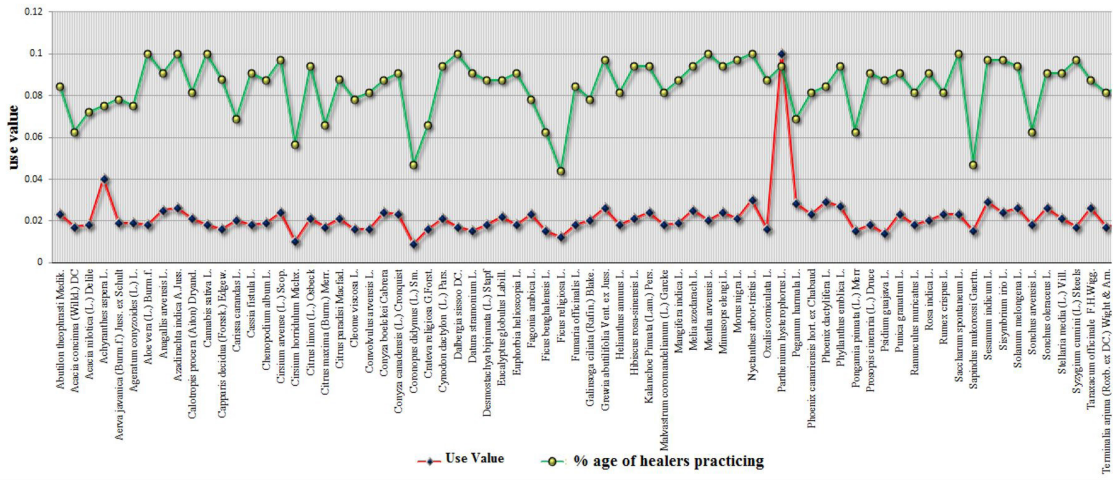

Figure 6. Use value and percentage of healers practicing of medicinal plants for various diseases.

Table 3. Fidelity level (Fl %) and factor informant consensus (Fic) of important species for various ailment categories.

Category	Important plants	Fl %	Fic	Number of new species	Name of species
Cardiovascular	*Hibiscus rosa-sinensis* L.	29.54%	0.84	6	*Abutilon theophrasti* Medik.
					Cirsium arvense (L.) Scop.
	Syzygium cumini	22.72%			*Citrus limon* (L.) Osbeck
	(L.) Skeels *Cirsium arvense* (L.)	18.18%			*Morus nigra*
	Scop. *Mimusops elengi* L.	15.90%			*Phoenix dactylifera*L.
	Citrus paradisi Macfad.	15.90%			*Solanum melongena* L.
Dermatological	*Convolvulus arvensis* L.	59.09%	0.87	32	*Abutilon theophrasti* Medik.
	Azadirachta indica A.Juss	52.27%			*Ageratum conyzoides* (L.) L.
	Ageratum conyzoides (L.) L.	45.54%			*Anagallis arvensis* L
	Dalbergia sissoo DC.	31.81%			*Azadirachta indica* A.Juss.
	Pongamia pinnata (L.) Merr.	31.81%			*Cassia fistula* L.
					Cirsium horridulum Michx.
					Citrus maxima (Burm.) Merr.
					Citrus paradisi Macfad.
					Convolvulus arvensis L.
					Conyza boelckei Cabrera
					Cynodon dactylon(L.) Pars.
					Dalbergia sissoo DC.
					Desmostachya bipinnata (L.) Stapf
					Fagonia arabica L.
					Ficus benghalensis L.
					Ficus religiosa L.
					Fumaria officinalis L.
					Melia azedarach L.
					Morus nigra L.
					Peganum harmala L.
					Phoenix canariensis hort. ex Chabaud *Ranunculus muricatus* L
					Rumex crispus L.
					Saccharum spontaneum L.
					Sapindus mukorossi Gaertn,
					Sesamum indicum L.
					Sisymbrium irio L.
					Solanum melongena L.
					Sonchus arvensis L.
					Stellaria media (L.)
					Vill.
					Taraxacum officinale F.H.Wigg.
					Ziziphus nummularia (Burm.f) Wight & Arn.

Table 3. Continued...

Category	Important plants	Fl %	Fic	Number of new species	Name of species
Respiratory	*Coronopus didymus* (L.) Sm.	61.36%	0.85	26	*Acacia concinna* (Willd.) DC
	Prosopis cineraria (L.) Druce	38.6%			*Aerva javanica* (Burm.f.)
	Eucalyptus globulus Labill.	25%			Juss. ex Schult
	Helianthus annuus L.	25%			*Anagallis arvensis* L.
	Achyranthes aspera L.	22.72%			*Cannabis sativa* L.
					Carissa carandas L.
					Cirsium horridulum Michx.
					Conyza canadensis (L.)
					Cronquist
					Coronopus didymus (L.) Sm.
					Crateva religiosa G.Forst.
					Cynodon dactylon (L.) Pars.
					Desmostachya bipinnata (L.) Stapf
					Eucalyptus globulus Labill.
					Fagonia arabica L.
					Helianthus annuus L.
					Morus nigra L.*Phoenix dactylifera* L.
					Prosopis cineraria (L.) Druce
					Psidium guajava L.
					Punica granatum L.
					Ranunculus muricatus L.
					Rosa indica L.
					Rumex crispus L
					Sapindus mukorossi Gaertn *Sisymbrium irio* L.
					Solanum melongena L.
					Stellaria media (L.) Vill.
Ophthalmological	*Abutilon theophrasti* Medik.	11.36%	0.84	3	*Abutilon theophrasti* Medik.
	Sonchus arvensis L.	9.09%			*Ranunculus muricatus* L
	Rosa indica L.	9.09%			*Sonchus arvensis* L.
	Ranunculus muricatus L.	4.5%			
Dental disorders	*Mimusops elengi* L.	18.18%	0.76	7	*Galinsoga ciliata (Rafin.)*
	Acacia nilotica (L.) Delile	18.18%			*Blake. Cirsium arvense* (L.) Scop.
	Punica granatum L.	9.09%			*Fagonia arabica* L.
	Ranunculus muricatus L.	9.09%			*Punica granatum* L.
	Cirsium arvense (L.) Scop.	9.09%			*Ranunculus muricatus* L
					Solanum melongena L.
					Sonchus arvensis L.

Table 3. Continued...

Category	Important plants	FI %	Fic	Number of new species	Name of species
Andrological/ Gynecological	*Peganum harmala* L.	20.45%	0.82	12	*Galinsoga ciliata (Rafin.)*
	Sonchus oleraceus L.	18.18%			*Blake. Conyza canadensis* (L.)Cronquist
	Saccharum spontaneum L.	18.18%			*Cynodon dactylon*(L.) Pars.
	Conyza canadensis(L.)	15.90%			*Fagonia arabica* L.
	Cronquist *Parthenium hysterophorus* L.	13.63%			*Mentha arvensis* L.
	Galinsoga ciliata (Rafin.) Blake.	13.63%			*Nyctanthes arbor-tristis* L.
					Parthenium hysterophorus L.
					Peganum harmala L.
					Phoenix canariensis hort. ex Chabaud
					Saccharum spontaneum L.
					Sesamum indicum L.
					Sonchus arvensis L.
					Sonchus oleraceus L.
Renal and Urological disorders	*Crateva religiosa* G.Forst.	29.54%	0.77	15	*Galinsoga ciliata (Rafin.)*
	Kalanchoe Pinnata (Lam.) Pers.	29.54%			*Blake.*
	Conyza boelckei Cabrera	20.45%			*Capparis decidua* (Forssk.) Edgew.
	Mangifera indica L.	18.18%			*Crateva religiosa* G.Forst.
	Galinsoga ciliata (Rafin.) Blake.	18.18%			*Cynodon dactylon*(L.) Pars.
					Fagonia arabica L.
					Fumaria officinalis L.
					Kalanchoe Pinnata (Lam.) Pers.
					Mangifera indica L.
					Parthenium hysterophorus L.
					Peganum harmala L.
					Saccharum spontaneum L.
					Sesamum indicum L.
					Stellaria media (L.) Vill.
Skeleton-muscular disorders	*Cleome viscosa* L.	38.63%	0.84	7	*Cannabis sativa* L.
	Grewia abutilifolia Vent. ex Juss.	27.27%			*Capparis decidua* (Forssk.) Edgew.
	Capparis decidua (Forssk.) Edgew.	18.18			*Cleome viscosa* L.
	Prosopis cineraria (L.)	15.90%			*Cynodon dactylon* (L.) Pars.
	Druce *Parthenium hysterophorus* L.	13.63%			*Grewia abutilifolia* Vent. ex Juss.
					Parthenium hysterophorus L.
					Phoenix dactylifera L.

Table 3. Continued...

Category	Important plants	Fl %	Fic	Number of new species	Name of species
Gastrointestinal	*Euphorbia helioscopia* L.	68.18%	0.91	51	*Abutilon theophrasti* Medik.
	Aloe vera (L.) Burm.f.	59.09%			*Aerva javanica* (Burm.f.) Juss. ex Schult
	Carissa carandas L.	54.54%			*Aloe vera* (L.) Burm.f.
	Mentha arvensis L.	54.5%			*Anagallis arvensis* L
	Datura stramonium L.	47.73%			*Azadirachta indica* A.Juss.
					Galinsoga ciliata (Rafin.) Blake.
					Calotropis procera (Aiton) Dryand.
					Cannabis sativa L.
					Carissa carandas L.
					Cassia fistula L.
					Chenopodium album L.
					Citrus limon (L.) Osbeck
					Citrus maxima (Burm.) Merr.
					Citrus paradisi Macfad.
					Conyza canadensis (L.) Cronquist
					Cynodon dactylon (L.) Pars.
					Datura stramonium L.
					Desmostachya bipinnata (L.) Stapf
					Eucalyptus globulus Labill.
					Fagonia arabica L.
					Ficus benghalensis L.
					Ficus religiosa L.
					Grewia abutilifolia Vent. ex Juss.
					Kalanchoe Pinnata (Lam.) Pers.
					Mangifera indica L.
					Melia azedarach L.
					Mentha arvensis L.
					Mimusops elengi L.
					Morus nigra L.
					Nyctanthes arbor-tristis L.
					Oxalis corniculata L.
					Parthenium hysterophorus L.
					Peganum harmala L.
					Phoenix canariensis hort. ex Chabaud
					Phoenix dactylifera L.
					Phyllanthus emblica L.
					Pongamia pinnata (L.) Merr.
					Psidium guajava L.
					Punica granatum L.
					Rosa indica L.
					Rumex crispus L
					Saccharum spontaneum L.
					Sapindus mukorossi Gaertn
					Sesamum indicum L.
					Sisymbrium irio L.
					Sonchus arvensis L.
					Sonchus oleraceus L.
					Stellaria media (L.) Vill.
					*Taraxacum officinale*F.H.Wigg.
					Syzygium cumini (L.) Skeels
					Ziziphus nummularia (Burm.f) Wight & Arn.

Table 3. Continued...

Category	Important plants	Fl %	Fic	Number of new species	Name of species
liver disorders	*Cirsium arvense* (L.) Scop.	15.9%	0.75	10	*Galinsoga ciliata (Rafin.) Blake. Fagonia arabica* L.
	Parthenium hyteophorousi L.	11.30%			*Fumaria officinalis* L.
	Rosa indica L.	9.09%			*Kalanchoe Pinnata* (Lam.) Pers.
	Kalanchoe Pinnata (Lam.) Pers.	9.09%			*Punica granatum* L.
	Taraxacum officinale F.H.Wigg.	9.09%			*Rosa indica* L.
					Sesamum indicum L.
					Sonchus arvensis L.
					Sonchus oleraceus L.
					Syzygium cumini (L.) Skeels
Fever	*Fumaria officinalisi* L.	20.45%	0.8	9	*Aerva javanica* (Burm.f.) Juss. ex Schult
	Acacia concinna (Willd.) DC	18.18% 18.18% 11.36% 11.36%			*Cassia fistula* L.
	Melia azadirach L.				*Cirsium horridulum* Michx.
	Azadirachta indica A.Juss.				*Citrus limon* (L.) Osbeck
	Eucalyptus gubulus Labill.				*Eucalyptus globulus* Labill.
					Euphorbia helioscopia L.
					Fagonia arabica L.
					Melia azedarach L.
					Phoenix dactylifera L.
Inflammation	*Sisynbrium irio* L.	11.36%	0.77	6	*Aerva javanica* (Burm.f.) Juss. ex
	Cirsium arvense (L.) Scop.	11.36%			Schult *Capparis decidua* (Forssk.)
	Malvastrum coromandelianum (L.) Garcke	11.36%			Edgew.
	Dalbergia sissoo DC.	9.09%			*Citrus limon* (L.) Osbeck
	Citrus limon (L.) Osbeck	9.09%			*Malvastrum coromandelianum (*L.) Garcke
					Phoenix canariensis hort. ex Chabaud *Sisymbrium irio* L.
CNS / neurological	*Peganum harmala* L.	27.27%	0.83	11	*Anagallis arvensis* L.*Cirsium horridulum* Michx.*Citrus maxima* (Burm.) Merr. *Cynodon dactylon* (L.) Pars. *Datura stramonium* L. *Fumaria officinalis* L.*Helianthus annuus* L *Hibiscus rosa-sinensis* L*Nyctanthes arbor-tristis* L.*Peganum harmala* L. *Phyllanthus emblica* L.
	Sapindus mucoross Gaertn.	20.4%			
	Hibiscus rosa-sinensis L.	18.18%			
	Nyctanthes arbor tristis L.	15.90%			
	Citrus maxima (Burm.) Merr.	11.3%			

Table 3. Continued...

Category	Important plants	Fl %	Fic	Number of new species	Name of species
Physical pain	*Terminalia arjuna* (Roxb. ex DC.) Wight & Arn. *Nyctanthes arbor tristis* L.	25%	0.8	11	*Azadirachta indica* A.Juss.*Cirsium horridulum* Michx.*Cynodon dactylon*(L.) Pars. *Datura stramonium* L.*Malvastrum coromandelianum* (L.) Garcke *Melia azedarach* L.*Mimusops elengi* L.*Nyctanthes arbor-tristis* L.*Oxalis corniculata* L. *Parthenium hysterophorus* L. *Terminalia arjuna* (Roxb. ex DC.) Wight & Arn.
	Cassia fistula L.	22.71%			
	Oxalis cornicultala L .	20.45%			
	Melia azadirach L.	15.90%			
		15.90%			
Poisoning	*Prosopis cineraria* (L.) Druce	27.27%	0.8	5	*Cynodon dactylon* (L.) Pars.
	Phylanthus emblica L.	9.09%			*Phyllanthus emblica* L.
	Sonchus arvensis L.	9%			*Prosopis cineraria* (L.)
	Chenopodium album L.	6.81%			Druce*Solanum melongena* L.
	Cynodon dactylon (L.) Pars.	2.27%			*Sonchus arvensis* L.
Cirulatory	*Convolvulus arvensis* L.	18.18%	0.77	22	*Acacia nilotica* (L.) Delile
	Conyza canadensis (L.)	18.18%			*Achyranthes aspera* L
	Cronquist*Melia azadirach* L.	15.90%			*Ageratum conyzoides* (L.) L.
	Phoenix canariensis hort. ex Chabaud	15.90%			*Capparis decidua* (Forssk.) Edgew.
	Conyza boelckei Cabrera	15.90%			*Cirsium horridulum* Michx.
					Conyza boelckei Cabrera
					Conyza canadensis (L.) Cronquist
					Cynodon dactylon (L.) Pars.
					Dalbergia sissoo DC.
					Eucalyptus globulus Labill.
					Fagonia arabica L.
					Fumaria officinalis L.
					Hibiscus rosa-sinensis L
					Phoenix canariensis hort. ex
					Chabaud *Phyllanthus emblica* L.
					Rumex crispus L
					Saccharum spontaneum L.
					Sapindus mukorossi Gaertn
					Sesamum indicum L.*Solanum melongena* L.
					Stellaria media (L.) Vill.
					Taraxacum officinale F.H.Wigg.

Table 3. Continued...

Category	Important plants	Fl %	Fic	Number of new species	Name of species
Others	*Dalbergiasissoo* DC.	22.73%	0.78	25	*Aloe vera* (L.) Burm.f (tonic)
	Eucalyptus globules Labill.	20.45%			*Anagallis arvensis* L.*(stimulant)*
	Conyzaboelckei Cabrera	18.18%			*Azadirachta indica* A.Juss.*(mouth dryness)*
	Acacia concinna (Willd.) DC	18.18%			*Capparis decidua* (Forssk.)
	Phyllanthusemblica L.	15.91%			Edgew. (memory supplement)
					Cirsium horridulum Michx.*(shiver)*
					Citrus maxima (Burm.)
					Merr. (refrigerant)
					Conyza boelckei Cabrera (tonic)
					Conyza canadensis (L.)
					Cronquist (insecticide, balsamic)
					Cynodon dactylon (L.)
					Pars (antiseptic).
					Dalbergia sissoo DC. (refrigerant, hair tonic, mouth dryness)
					Desmostachya bipinnata (L.)
					Stapf (refrigerat, prickly heat)
					Eucalyptus globulus Labill.*(antiseptic, stimulant)*
					Fagonia arabica L.(antiseptic*)*
					Grewia abutilifolia Vent. ex Juss. (shivers)
					Hibiscus rosa-sinensis L*(refrigerant)*
					Mentha arvensis L. (mouth freshner, weight loss)
					Morus nigra L.(refrigerant, mouth dtyness)
					Peganum harmala L.(antiparasitic)
					Phyllanthus emblica L. (hair tonic, mouth dryness)
					Punica granatum L.(antiseptic,antibacterial, refrigerant)
					Ranunculus muricatus L.*(mouth ulcer),(diabetes)*
					Sonchus arvensis L (hair tonic).
					Sonchus oleraceus L. (hydrogague)
					Stellaria media (L.) Vill. (refrigerant)
					Ziziphus nummularia (Burm.f) Wight & Arn. (hair tonic)

a high scoring rate, which indicates that this plant might contain bioactive constituents and demands a bioassay-guided pharmacological investigation. Gastrointestinal problems had the highest (Fic=0.91) scores. Comparatively, our informants showed medium consensus in the treatment of dermatological ailments (Fic=0.87) and respiratory disorders (Fic=0.85) and less agreement for the treatment of dental disorders (Fic=0.76) and liver disorders (Fic=0.75) (Table 3).

3.6. Fidelity level (Fl)

Fidelity level is used to identify species that are most preferred by the inhabitants for the treatment of certain ailments. Fidelity level in the present study varied from 4.5% to 68.18%. *E. helioscopia* (Fl=68.18%), *A.vera* (Fl=59.09%), *C. carandas* (Fl=54.54%), *M. arvensis* (Fl=54.5%), *D. stramonium* (Fl=47.73%) and *C.paradise* (Fl=15.90%) had high fidelity levels (Fl) for the treatment of gastrointestinal disorders. *C. arvensis* (Fl=59.09%), *A. indica* (Fl=52.27%), *A. conyzoides*(Fl=45.54%), *D. sissoo* (Fl=31.81%) and *P. pinnata* (Fl=31.81%) were reported to cure dermatological disorders. Respiratory complaints were treated mainly by *C. didymus* (Fl=61.36%),*P. cineraria* (Fl=38.6%), *E. gubulus* (Fl=25%), *H. annuus* (Fl=25%) and *A. Aspera* (Fl=22.72%), while *C. viscose* (Fl=38.63%), *G. abutilifolia* (Fl=27.27%), *C. deciduas* (Fl=18.18%), *P. cineraria*(Fl=15.90%) and *P. hysterophorus*(Fl=13.63%) for the treatment of skeleton-musculardisorders (Table 3).

Four medicinal plants expressed Fl value greater than 55%. Gastrointestinal disorders had the maximum of two species with a Fl> 55% and dermatological disorders had one species with a Fl> 55% and Respiratory disorders have one species with a Fl> 55%. A low Fl value indicates that the same or different parts of the same plant are used for other medicinal purposes. Other communities also showed fidelity levels for the use of some plant species against different categories of ailments, as mentioned in the present work. Bhatia et al. (2014) reported Fl of 37.5% for *A. indica* for dermatological disorders, 100% for *M. arvensis* against gastrointestinal disorders and 37.2% of *V. odorata*and 36.4% *E. prostrate* against respiratory disorders. Similarly, Ayyanar and Ignacimuthu (2011) reported a 100% Fl for *A. indica* against itching and wounds, and 100% for *R. communis*an against joint and muscle pain. Islam et al. (2014) reported a Fl of 100% for *D. metel* and91.11% for *A. indica*against dermatological disorders. Ishtiaq et al. (2012) reported a 51% Fl for *C. orientalis* for andrological/gynecological and a 21% Fl for *A. sativum*against the cardiovascular disorders.

3.7. Relative frequency citation (RFC)

Different ethnobotanical tools such as relative frequency citation (RFC) were calculated in themost common occurring medicinal plant used for various disorders. Based on RFC value number of informants who cite the different plant species for the different disorders at various localities in the local area, the most consumed medical species includes *P. guajava* (0.93), *S. melongena* (0.91), *G. abutilifolia*(0.90), *F. officinalis, C. sativa* (0.87), *P. granatum, P. hysterophorus, M. coromandelianum* and *H. annuus* (0.83), *C. didymus* (0.82), *G. ciliate* and *S.cumini* (0.81), *R. muricatus* (0.80), *T. arjuna, S. irio, F. religiosa, C. arvense* (0.79), *Z. nummularia, T. officinale, S. media, S. arvensis, P. emblica, H. rosa-sinensis, C. boelckei Cabrera, C. procera* (0.77), *S. indicum, S. spontaneum, R. indica, M.indica, C. paradise, C. decidua* (0.76) *C. fistula, A. arvensis* (0.74) *S. mukorossi, R. crispus, M. azedarach, F. benghalensis, A. indica* (0.70) and *C. carandas*(0.70), *S. oleraceus, P. dactylifera* (0.67), *K. Pinnata, C. arvensis* (0.66) (Table 2). The plant species have utilized for maximum disorders in the local area. The high values of RFC show the fact that these ethnobotanicals species were well known to maximum numbers of informants. The least Relative frequency citation represented by *A. javanica, P.pinnata, A. aspera, C. limon, C. religiosa, M. arvensis, A. conyzoides, A. nilotica, D. sissoo, M. nigra, Cirsium horridulum, P. cineraria, C. maxima, D. stramonium, M. elengi, A. concinna, D. bipinnata, N. arbor-tristis, C. Canadensis, C. dactylon, O. corniculata, C. viscosa, P. harmala, P.canariensis, A. theophrasti, A. vera, F. Arabica, E. globulus, C. album* and *E.helioscopia.*

3.8. New medicinal uses

The number of species with fresh uses in each category of diseases has been highlighted in Table 4 and Figure 7. The highest number of new species has been reported in curing gastrointestinal disorders (51) followed by dermatological disorders (32), respiratory (26), and others disease category (25). Least numbers of new plants species have been reported in ophthalmological disorders (3). The majority of the medicinal plants listed in Table 2 are well known for their medicinal uses and cited for different uses in many ethnomedicinal studies. However, in the present study, all the 73 species have been reporting fresh uses. Maximum fresh uses (17) has been reported for *C. dactylon*, while the highest number of species reporting fresh uses in similar number was 13 (Figure 8). No specific trend of fresh uses against a number of species was observed here; however (Shah et al., 2016) in their study reported a trend of maximum new use with aminimum number of plant species. In addition to the new uses documented here for the certain species, *C. carandas, C. horridulum, C. boelckei, P. canariensis*and *S. arvensis*are reported for the first time as medicinal plants. These plants are used against different ailments and need thorough pharmacological investigations. The plethora of medicinal uses given in Table 2 reflects two declarations (1) the previously reported medicinal uses (showing a majority in the table) are also known from other cultures signifying the authenticity of these medicinal plants (2) the new uses for the known medicinal plants are either unique to our study area or they are still not explored from other cultures. Therefore, there is a need to scientifically validate the fresh ethnomedicinal uses documented here.

Plants are an important source of traditional and alternate cure for different diseases in our health care system. In the present study, we collected ethnopharmacological information of 73 plants species belonging to 37 families and 46 genera (Figure 2). The majority of the plant species were from Compositae (10) family, followed by Leguminosae (6) and Malvaceae (4).Remaining, 7 families (Amaranthaceae, Fabaceae, Capparidaceae, Moraceae, Myrtaceae, Poaceae, and

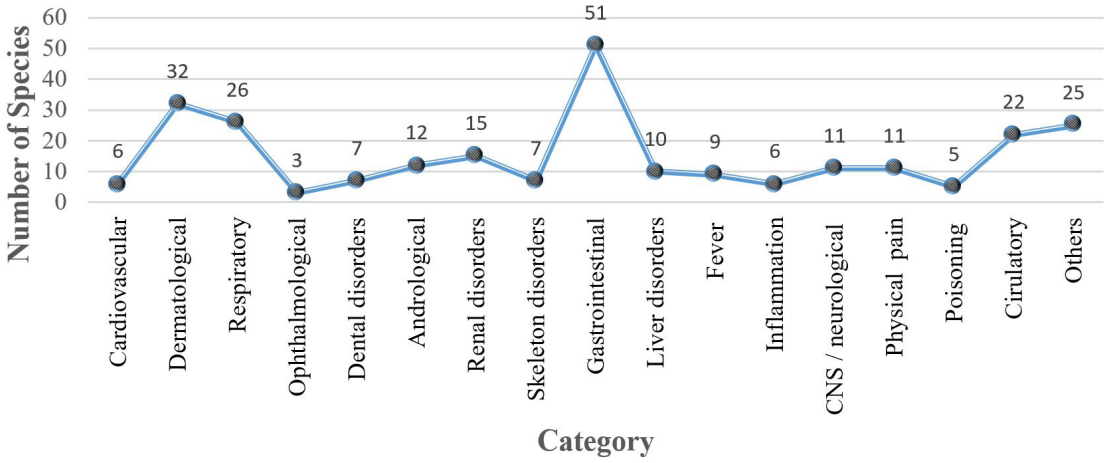

Figure 7. Number of new species in each category.

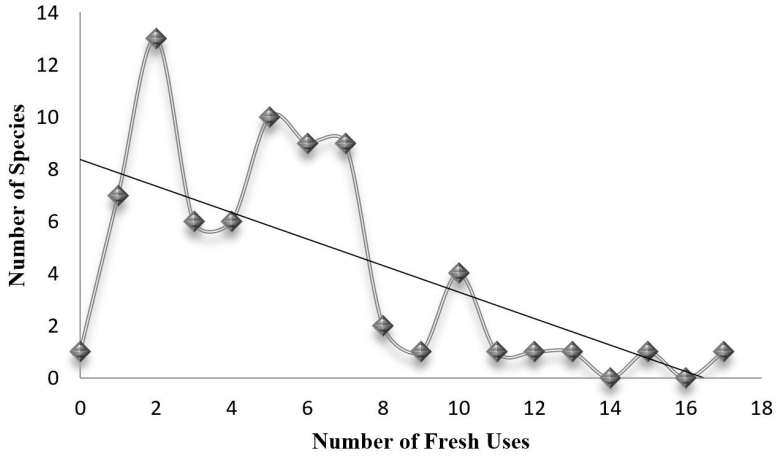

Figure 8. Number of plants reporting new uses in the study area.

Rutaceae) shared 3 species each and 6 families (Arecaceae, Brassicaceae, Euphorbiaceae, Meliaceae, Solanaceae and Zygophyllaceae) consisted of 2 species each. The vast utilization of medicinal plants belonging to different important families might be because of the presence of effective bioactive constituents against ailments in various species (Gazzaneo et al., 2005). In a similar study by Ijaz et al. (2016), they reported74 plant species belonging to 70 genera and 42 families in which Compositae was the dominant family used in the treatment of different diseases (8 species and 8 genera). Compositae was followed by Fabaceae having 7 spp. and 7 genera and Malvaceae having 3 species and 2 genera. Similarly, Lamiaceae was the major family possessing 9 genera and 11 species, followed by Brassicaceae (5 species), Apiaceae and Amaranthaceae (4 species each) indicating the frequent usage of medicinal plants belonging to these families in the investigation done by Shah et al. (2016). Other supporting information such as the botanical names, family, plant parts used, applications, administration routes, use value and average of healer practicing are presented. *A. vera*, *A. indica*, *D.sissoo* shows100 percent healer practice in the survey areas. *Peganum harmala*L,*Anagallis arvensis* were the most cited plants by the locals with 0.028 and 0.025. Barkatullah and Ibrar (2011) have reported the use value of many herbs of which is in line with the present report. Tolossa et al. (2013) reported that oral route is the most preferred mode of administration, the present finding also showed oral route is the preferred mode of administration. Barkatullah and Ibrar (2011) reported the oral route administration. The uses of medicinal plant are much common in rural than urban areas because there were no health facilities. Murad et al. (2013) reported that the people of district Karak also depend on the medicinal flora because of their multipurpose same is true in the present finding. The current results showed that plant are locally used for various purposes including medicine, fuel, wood, fodder, edible, shelter, vegetable, fences and hedges, timber wood and furniture, Ali et al. (2016) reported that the people of Khyber agency also depend on their native flora for fuel, medicine, vegetable, vegetable etc. that's what the present report show Nadeem et al. (2013) reported the

Table 4. List of different recipes used by people of the Changa Manga Forest.

Plant name	Method	Route of Adminsitration	Recipes
Abutilon theophrasti Medik.	Decoction, powder	Oral, topical	A tea made from the dried leaves is used in the treatment of dysentery and fevers. A poultice of the leaves is applied to ulcers. A tea made from the dried root is used in the treatment of dysentery and urinary incontinence. The seed is powdered and eaten in the treatment of dysentery, stomach-aches etc.
Acacia concinna (Willd.) DC	Tonic	Topical	1.5 Oz of the fruit is boiled in 625 ml of water and used as hair tonic.
Acacia nilotica (L.) Delile	Extract, powder	Gargles, oral	Bark is boiled with water and its extract is used in toothache. Its powder along with cumin and pomegranate is given in pregnancy. Powder of its tannins is used leucorrhea premature ejaculation and hemorrhages.
Achyranthes aspera L	Decoction, paste, ashes	Oral	Roots, leaves and twigs of the plant boil in water and used in colic, cough, asthma, piles and warts. Whole plant is dried and burnt to ashes; this ash is mixed with dromedary milk and is used in dropsy and productive cough.
Ageratum conyzoides (L.) L.	Paste, juice, decoction	Topical, oral	A paste of the root, mixed with the bark of *Schinus wallichii*, is applied to set dislocated bones. Leaves are dried and applied as a powder to cuts, sores and the ruptures caused by leprosy. A paste made of the leaves mixed with equal amounts of *Bidens pilosa, Drymaria cordata, Galinsoga parviflora* and the rhizome of *Zingiber officinale* is used to treat snakebites. The juice of the flower heads is used externally to treat scabies, whilst a paste of them is used to treat rheumatism. A tea made from the flower heads mixed with *Ocimum tenuifolium* is used to treat coughs and colds.
Aloe vera (L.) Burm.f.	Soother	Topical,optical	Fruit is cut into 2 pieces and sprinkled with *Circumalonga* powder and roasted for some time. This recipe is very effective unction and heals wounds. Latex of *Aloe vera* is mixed with *Cuminum cyminuni* linn. and potash alum, tied in a clean cloth and placed repeatedly on eyes to cure watery eyes in allergic rhinitis.
Azadirachta indica A.Juss.	Steam, decoction, powder	Nasal, topical	Leaves of the plant are boiled in water and stem is used to cure otitis and its decoction is used to wounds. Twigs of the plant along with black pepper are powdered in water and given orally to cure pruritus.
Calotropis procera (Aiton) Dryand.	Bandage, steam	Nasal	Plant is boiled in cow milk and its steam is used to cure inflammation and pain in piles then plant material separated from milk and tied on piles.
Cannabis sativa L.	Paste, ashes	Topical	Its woods are burnt to ashes, mixed with *Brassica campestris* oil and used in warts. Its woods are burnt to ashes, mixed with ghee and used orally for backache and joint pain.
Capparis decidua (Forssk.) Edgew.	Decoction, paste	Oral, otic	Decoction made from the leaves is used in intermittent fever, diarrhea, oral inflammation and earache. A paste of the pounded roots serves as a fly repellent.
Carissa carandas L.	Decoction,	Gargles, oral	Gargles of plant Fruits boiled in milk are useful in throat infection and diphtheritis. Decoction of its fruit along with Saffron and *Rosa indica* is used in sterility and expulsion of chorion.
Chenopodium album L.	Decoction, paste	Oral	A decoction of the roots is used to treat worms in children. A paste of the roots, combined with an equal quantity of the root paste of *Amaranthus spinosus*, is used in the treatment of indigestion.
Cirsium arvense (L.) Scop.	Decoction	Oral	A tea made from the leaves of the plant is used as neuro tonic and has astringent effect.
Cirsium horridulum Michx.	Juice	Oral	Lemon fruit is applied with salt and *Piper nigrum* and suck to cure malaria. 1 Oz lemon juice + 1 Oz onion juice is mixed with 1 gm camphor (*Cinnamomum camphora*) to cure severe cholera.

Table 4. Continued...

Plant name	Method	Route of Adminsitration	Recipes
Citrus limon (L.) Osbeck	Paste	Topical	Peel of its fruit is dried, powdered and paste of this powder removes black spots and wrinkles from face.
Citrus maxima (Burm.) Merr.	Paste	Topical	Its peel is powdered and used to glow skin.
Citrus paradisi Macfad.	Syrup	Topical, oral	Leaves of *Clatropis procera* are washed with *Brassica campestris* oil and used as relief of pain of joints. Roots of plant are roasted till ashes then dissolve in water and repeatedly shaken for few hours and water is lixiviated in a frying pan till all the water is evaporated and salt is left behind. This salt is used with betel leaf as antitussive.
Cleome viscosa L.	Paste, powder	Topical, oral	Seeds of the plants are mixed with sugar and used as vermifuge. Seeds are mixed with vinegar and ground to make paste, which is applied to comfort sprain.
*Convolvulus arvensis*L.	Paste, powder	Oral, topical	Its powder itself or along with black pepper is used orally to cure eczema, pruritus or rashes and its paste is used to diminish worms and warts.
Conyza Canadensis (L.) Cronquist	Decoction	Oral	A tea of the boiled roots is used to treat menstrual irregularities.
Crateva religiosa G.Forst.	Decoction, bandage	Oral, topical	Decoction of the cortex or twigs is added with brown sugar and is given in gall and kidney stone. Leaves and cortex are boiled in water and used as bandage to remove warts. 2 Oz of fresh leaves are boiled in ½ liter water until it evaporates to half quarter, then 10 Oz of goat milk along with brown sugar is added and given t.i.d to cure tuberculosis.
Cynodon dactylon (L.) Pars.	Decoction, juice	Oral, topical	A decoction of the root is used as a diuretic in the treatment of dropsy and secondary syphilis. An infusion of the root is used to stop bleeding from piles. The juice of the plant is astringent and is applied externally to fresh cuts and wounds. When mixed with the powder of a clove (*Syzygium aromaticum*), it is used as an anthelmintic.
Dalbergia sissoo DC.	Powder	Topical, oral	Its wood is powdered and syrup is made to cure pruritus. Fresh twigs of the plant is mixed with 1 Oz of black pepper, ground in water and filtered which is used in mania.
Datura stramonium L	Juice	Topical	The juice of the fruit is applied to the scalp to treat dandruff.
Desmostachya bipinnata (L.) Stapf	Paste	Topical	Its paste is applied on forehead to stop epistaxis. It is crushed along with rice and *Circumalonga* in *jasminum* oil and applied as paste to treat small pox.
Eucalyptus globulus Labill.	Steam, ointment	Nasal, topical	4 drops Eastern hemlock oil, 2 drops eucalyptus oil, 2 drops peppermint oil and 4 drops chamomile oil. Add to steaming water and inhale several times daily, or add to 1/2 Oz unscented balm and rub on chest as needed to relieve blocked nose and wheezy chest.
Euphorbia helioscopia L.	Powder	Oral	The seeds, mixed with roasted pepper, have been used in the treatment of cholera.
Ficus benghalensis L.	Bandage	Topical	Bandage of fresh latex is used to resolve worms and warts. Leaves are burned and sprinkled to cure worms. Latex and clads of the plant are used as aphrodisiac and in premature ejaculation in different combinations.
Ficus religiosa L.	Water, ashes	Oral	Pale fallen leaves of the plant are boiled in water and given in vomit and nausea. Juice of the plant along with candied is used in oliguria. Wood is burnt to ashes and ground along with opium and is given in chronic dysentery. Its fruit is dried, powdered and given orally with water to cure asthma.

Table 4. Continued...

Plant name	Method	Route of Adminsitration	Recipes
Fumaria officinalis L.	Decoction	Oral	Its decoction is used to cure many blood diseases either alone or in combination with other herbal medicines.
Galinsoga ciliata (Rafin.) Blake.	Juice, powder	Otic, oral	A juice or powder of the whole plant is used to treat urinary troubles. The juice of the leaves is used as drops to relieve earaches. The root juice is used to treat coughs and colds, hemorrhoids, asthma and urinary problems.
Grewia abutilifolia Vent. ex Juss.	Juice	Otic, oral	Yellow leaves of the plant are warmed and its juice is extracted which is used to cure ear ach and ear discharge. Its shrub is crushed in water and mixed with stone sugar to cure urinary problems. Leaf juice is mixed with *Pipernigrum* powder and given for few days to treat piles and hemorrhoids.
Hibiscus rosa-sinensis L.(CM 181)	Powder	Oral	5 seeds of *Piper nigrum* are crushed to powder along with leaves or seed of *Helianthus annus* and 1 gram is given t.i.d to cure persistent fevers.
Melia azedarach L.	Tonic, decoction,	Topical	Its fruit is boiled in water and this water is used as hair tonic and anti-lice. To relieve pain steam of decoction of its leaves is used or its boiled leaves are tightened at the place of pain.
Mentha arvensis L.	Decoction	Oral	Decoction of its leaves is given in menstrual disorders and its water is used to cure cholera.
Morus nigra L.	Decoction	Gargles	Gargles of the decoction of its roots and leaves are used in sore throat and pharyngitis.
Oxalis corniculata L.	Soother	Topical	Its leaves are rubbed on the skin to cure scorpion stings.
Peganum harmala L.	Decoction	Oral	A decoction of the leaves is used in the treatment of rheumatism.
Phoenix canariensis hort. ex Chabaud	Extract, powder	Oral	Roots of the plant are boiled in milk and butter is obtained from that milk which is used as effective aphrodisiac recipe. Its leaves are crushed and used with yogurt or cream to cure hemorrhoids.
Phyllanthus emblica L.	Decoction	Oral	Its decoction is used as hair tonic. Leaves of the plant along with *Trigonella foenum-graecum* are used in chronic dysentery and its bark is used constipation.
Pongamia pinnata (L.) Merr.	Bandage, decoction	Topical, oral	Paste of its clads is used as bandage for curing nodes of hemorrhoids. Equal quantity of fruits and leaves is boiled in water and this decoction is used to remove gas trouble. Flowers of plant are used in diabetes.
Psidium guajava L.	Decoction, powder	Gargles, topical	Decoction of its bark is useful in gingivitis. Paste of its flowers is used in uveitis. Powder of its seeds is used as vermifuge.
Punica granatum L.	Syrup	Oral	5 Oz of bark of its root is boiled in 1/2 liter water, when water remains quarter liter then it is filtered and preserved, 5 Oz of this water is given empty stomach every 2 hours till 12 hours which expels tapeworm out of the body. 2, 3 grams of its petal's powder is used in cough and fever and is also effective in tooth ache and gingivitis. Its water is mixed with sugar and used to cure jaundice. Its juice is boiled till it attains thickness and used to strengthen eyesight.
Ranunculus muricatus L	Paste	Topical	Paste of its leaves is used to cure and dry wounds.
Rosa indica L.	Water	Gargles, optical	Gargles of its decoction are used in throat infection. Its water along with antimony is used in eye diseases. Water of *Rosa indica* is used in many recipes that are used as cardio tonic, hepatotonic, gastro tonic and dysentery etc.

Table 4. Continued...

Plant name	Method	Route of Adminsitration	Recipes
Rumex crispus L.	Suspension	Oral	The infusion administered in wineglassful doses is made by pouring 1 pint of boiling water on 1 Oz of the powdered root which is useful as antitussive. A useful homoeopathic tincture is made from the plant before it flowers, which is of particular service to an irritable tickling cough of the upper air-tubes and the throat and good to cure urticaria.
Sapindus mukorossi Gaertn.	Steam ,powder	Nasal, gargles	Its seeds are grinded in water and inhaled to start sneezing which helps to get rid of migraine. Powder of its seeds is mixed in water and gargles of this mixture are used to cure diphtheritis.
Sesamum indicum L.	Decoction,	Topical, oral	Its oil mixed with lime water and is used externally to treat burns, boils and ulcers. A decoction of the root is used to treat asthma and coughs.
Sisymbrium irio L.	Decoction	Oral	Decoction of the plant is used in measles and small pox. Plant is boiled in rose water and use in dysentery.
Solanum melongena L.	Decoction	Oral, topical	A decoction is applied to discharging sores and internal hemorrhages. The ashes of the peduncle are used in the treatment of intestinal hemorrhages, piles and toothache. A decoction of the root is astringent.
Sonchus arvensis L.	Juice	Oral	Two drops of its juice is mixed with 8 drops of honey and given to newborns to cure flu and chest infection. Its juice is fried in coconut oil till all the juice dries and only oil is left behind. This oil is used as hair tonic.
Sonchus oleraceus L.	Tonic, paste	Topical	The leaves are applied as a poultice to inflammatory swellings. An infusion of the leaves and roots is febrifuge and tonic.
Stellaria media (L.) Vill.	Decoction, juice, extract	Oral, topical, optical	An infusion of the fresh or dried herb can be added to the bath water and its emollient property will help to reduce inflammation - in rheumatic joints for example - and encourage tissue repair. A decoction of the whole plant is taken internally as a post-partum depurative, emmenagogue, galactogogue and circulatory tonic.The decoction is also used externally to treat rheumatic pains, wounds and ulcers. The expressed juice of the plant has been used as eyewash.
Taraxacum officinale F.H.Wigg.	Decoction	Oral	A tea can be made from the leaves or, more commonly, from the roots. The latex contained in the plant sap can be used to remove corns, warts and verrucae. The latex has a specific action on inflammations of the gall bladder and is also believed to remove stones in the liver. A tea made from the leaves is laxative.
Terminalia arjuna (Roxb. ex DC.) Wight &Arn.	Decoction, extract	Topical, oral	Its decoction prepared in milk is good in cardiac problems. Worms and warts are washed with its decoction. Oils from its leaves are used to cure earache. Powder of its bark is given with raw sugar along with milk in bone injuries. Its decoction resolves blue coloration of skin due to blood clots.
Ziziphus nummularia (Burm.f) Wight& Arn.	Powder,decoction	Oral, topical	Fruits are roasted and given orally to cure diarrhea. Powder of flowers is used to cure hemorrhoids. Decoction of leaves is used as hair tonic. Powder of roots are mixed with black pepper and given orally to cure diarrhea.

medicinal flora of the change manga forest in his report which are same with the present finding. Result have also proved that the features and uses of the traditional plants for improving the livelihood by giving various medicine and other ethnobotanical uses the same result were also reported by the Habib-Ul-Hassan et al. (2015). Many workers reported ethnobotanical and ethnomedicinal study in remote area Changa Manga forest. The same results about the traditional uses of medicinal species reported from Changa Manga forests by Kayani et al. (2014) they collected 37 ethnomedicinal species belonging to 22 families, 11 plant species were common known to the peoples and have constant usage. The identified plant is commonly used for fever, intestinal infections, skins diseases, throat infections, eye problems, stomach problems, liver problems and many common pains. It was noted that various parts of medicinal flora were used for the treatment of many ailments. A large number of people harvest the entire plant for medicinal and other purpose as well. Habib-Ul-Hassan et al. (2015) reported the same issue of harvesting the whole plant from the Malakand division same is true in the present finding. Harvesting the plant greatly reduces the number of plant and cause great threat to extinction of these medicinal floras. Khan et al. (2013) reported the medicinal flora of the Naran Valley which face the same problem and in line with the recent finding. Leaves of 39 plants are being more frequently utilized in the research area. The high uses of the leaves may be due to its relative ease of finding. The excessive utilization of leaves may show the presentation of medicinal value but it need Scientific screening is required to explore these medicinal properties. Barkatullah and Ibrar (2011) have also reported the utilization of leaves for many disorders which is in line with present report. Mostly the people used the whole plant for ethnobotanical purpose. Khan et al. (2013) and Shuaib et al. (2014) also reported the people of the Naran Valley also utilized the whole plant same is true in the present finding. 17 fruit 12 root bark 7 are utilized for the medicinal purpose, Habib-Ul-Hassan et al. (2015) also reported the use of different parts including root fruit bark etc. same is true in the present finding. This survey also showed that some medicinal plant recorded have been found to cure more than one diseases like *A. nilotica*Astringent, diarrhea, dysentery, expectorant, toothache, aphrodisiac, gonorrhea, gingivitis.*C. decidua, F. officinalis, C. horridulum* etc are the different plant which are used for more than one diseases, this is because some plant contain many important chemicals due to which its medicinal value become diverse. Simbo (2010) have also reported the similar findings.

4. Conclusion

This study provides valuable information on the use of ethnobotanicals by the local population surrounding the Changa Manga forest of District Kasur, Pakistan in their traditional health system for the treatment and cure of various disorders. This information might provide a basic knowledge to the forthcoming generations. In this study ethnopharmacological data on 73 plant species belonging to 46 genera of various families have been documented. The most useful plant species were *E. helioscopia, C. carandas, A. vera* and *C. paradisi* with high fidelity levels for the treatment of gastrointestinal disorders. Dermatological disorders were treated by *C. arvensis*, *A. indica, A. conyzoides*, *D. sissoo* and *P. pinnata.* Respiratory complaints were treated mainly by *C. didymus*, *P. cineraria*, *E. globulus*, *H. annuus* and *A. aspera. C. viscosa*, *G. abutilifolia*, *C. decidua*, *P. cineraria* and *P. hysterophorus* are used for the treatment of skeleton-muscular disorders. Fresh uses of each plant reported for the first time against that plant species in Pakistan has been written in bold in Table 2. This extensive study resulted in five new medicinal plants being reported for the first time in Pakistan. These novel plants are *C. carandas* (Apocynaceae), *C.horridulum* (Compositae), *C. boelckei* (Compositae), *P. canariensis (*Arecaceae) and *S. arvensis* (Compositae) To conclude, there is a need to scientifically investigate the plants fresh uses and new medicinal plants for their respective use.

Acknowledgements

Not Applicable.

References

ABBASI, A.M., KHAN, M., AHMAD, M., ZAFAR, M., JAHAN, S. and SULTANA, S., 2010. Ethnopharmacological application of medicinal plants to cure skin diseases and in folk cosmetics among the tribal communities of North-West Frontier Province, Pakistan. *Journal of Ethnopharmacology*, vol. 128, no. 2, pp. 322-335. http://dx.doi.org/10.1016/j.jep.2010.01.052. PMid:20138210.

ABU-IRMAILEH, B.E. and AFIFI, F.U., 2003. Herbal medicine in Jordan with special emphasis on commonly used herbs. *Journal of Ethnopharmacology*, vol. 89, no. 2-3, pp. 193-197. http://dx.doi.org/10.1016/S0378-8741(03)00283-6. PMid:14611882.

AHMAD, K., AHMAD, M. and WECKERLE, C., 2013. Ethnobotanical studies of the eastern plains of Takht-e-Sulaiman hills. *Pakistan Journal of Botany*, vol. 45, pp. 197-205.

AHMAD, K.S. and HABIB, S., 2014. Indigenous knowledge of some medicinal plants of Himalaya region, Dawarian village, Neelum valley, Azad Jammu and Kashmir, Pakistan. *Universal Journal of Plant Science*., vol. 2, no. 2, pp. 40-47. http://dx.doi.org/10.13189/ujps.2014.020203.

AHMAD, S.S. and HUSAIN, S.Z., 2008. Ethno medicinal survey of plants from salt range (Kallar Kahar) of Pakistan. *Pakistan Journal of Botany*, vol. 40, pp. 1005-1011.

AHMAD, S.S., ERUM, S., KHAN, S.M. and NAWAZ, M., 2014a. An appraisal of ecological distribution of herbaceous flora at Changa Manga park Lahore, Pakistan. *Pakistan Journal of Botany*, vol. 46, pp. 19-25.

AHMAD, S.S., ERUM, S., KHAN, S.M., NAWAZ, M. and WAHID, A., 2014b. Exploring the medicinal plants wealth: a traditional medico-botanical knowledge of local communities in Changa Manga Forest, Pakistan. *Middle East Journal of Scientific Research*, vol. 20, pp. 1772-1779.

AHMED, N., MAHMOOD, A., MAHMOOD, A., TAHIR, S., BANO, A., MALIK, R.N., HASSAN, S. and ISHTIAQ, M., 2014. Relative importance of indigenous medicinal plants from Layyah district, Punjab Province, Pakistan. *Journal of Ethnopharmacology*, vol. 155, no. 1, pp. 509-523. http://dx.doi.org/10.1016/j.jep.2014.05.052. PMid:24942673.

AKRAM, M., ASIF, H.M., AKHTAR, N., SHAH, P.A., UZAIR, M., SHAHEEN, G., TAHIRA SHAMIM, S.M., SHAH, A. and AHMAD,

K., 2011. *Tribulus terrestris* Linn.: a review article. *Journal of Medicinal Plants Research*, vol. 5, no. 16, pp. 3601-3605. https://doi.org/10.5897/JMPR.9001271.

AKRAM, M., HAMID, A., KHALIL, A., GHAFFAR, A., TAYYABA, N., SAEED, A., ALI, M. and NAVEED, A., 2014. Review on medicinal uses, pharmacological, phytochemistry and immunomodulatory activity of plants. *International Journal of Immunopathology and Pharmacology*, vol. 27, no. 3, pp. 313-319. http://dx.doi.org/10.1177/039463201402700301.

ALI, K., SHUAIB, M., HUSSAIN, Z., SAJJAD, W., ALI, F. and FAZIL, M., 2016. Ethnobotanical assessment of the medicinal flora of Khyber agency, Pakistan. *Pakistan Journal of Weed Science Research*, vol. 22, pp. 607-616.

AMJAD, M.S., 2015. Ethnobotanical profiling and floristic diversity of Bana Valley, Kotli (Azad Jammu and Kashmir), Pakistan. *Asian Pacific Journal of Tropical Biomedicine*, vol. 5, no. 4, pp. 292-299. http://dx.doi.org/10.1016/S2221-1691(15)30348-8.

ARIAS, B.A. and RAMÓN-LACA, L., 2005. Pharmacological properties of citrus and their ancient and medieval uses in the Mediterranean region. *Journal of Ethnopharmacology*, vol. 97, no. 1, pp. 89-95. http://dx.doi.org/10.1016/j.jep.2004.10.019. PMid:15652281.

AYYANAR, M. and IGNACIMUTHU, S., 2005. Traditional knowledge of kani tribals in Kouthalai of Tirunelveli hills, Tamil Nadu, India. *Journal of Ethnopharmacology*, vol. 102, no. 2, pp. 246-255. http://dx.doi.org/10.1016/j.jep.2005.06.020. PMid:16054791.

AYYANAR, M. and IGNACIMUTHU, S., 2011. Ethnobotanical survey of medicinal plants commonly used by Kani tribals in Tirunelveli hills of Western Ghats, India. *Journal of Ethnopharmacology*, vol. 134, no. 3, pp. 851-864. http://dx.doi.org/10.1016/j.jep.2011.01.029. PMid:21291981.

BALIGA, M.S., PAI, R.J., BHAT, H.P., PALATTY, P.L. and BOLOOR, R., 2011. Chemistry and medicinal properties of the Bakul (*Mimusops elengi* Linn): a review. *Food Research International*, vol. 44, no. 7, pp. 1823-1829. http://dx.doi.org/10.1016/j.foodres.2011.01.063.

BARKATULLAH, B. and IBRAR, M., 2011. Plants profile of Malakand Pass Hills, District Malakand, Pakistan. *African Journal of Biotechnology*, vol. 10, no. 73, pp. 16521-16535. http://dx.doi.org/10.5897/AJB11.1258.

BHATIA, H., SHARMA, Y.P., MANHAS, R. and KUMAR, K., 2014. Ethnomedicinal plants used by the villagers of district Udhampur, J&K, India. *Journal of Ethnopharmacology*, vol. 151, no. 2, pp. 1005-1018. http://dx.doi.org/10.1016/j.jep.2013.12.017. PMid:24365639.

BISWAS, K., CHATTOPADHYAY, I., BANERJEE, R.K. and BANDYOPADHYAY, U., 2002. Biological activities and medicinal properties of neem (*Azadirachta indica*). *Current Science*, vol. 82, pp. 1336-1345.

CHAKRABORTY, A., AMUDHA, P., GEETHA, M. and SINGH, N., 2010. Evaluation of anxiolytic activity of methanolic extract of *Sapindus mukorossi* Gaertn. in mice. *International Journal of Pharma and Bio Sciences*, vol. 1, no. 3, pp. PS51ref.23.

CITY KASUR WELFARE ORGANIZATION [online], 2021 [viewed 31 August 2021]. Available from: http://citykasur.tripod.com/citynetcafe/id12.html

DÍAZ-JUÁREZ, J., TENORIO-LÓPEZ, F., ZARCO-OLVERA, G., VALLE-MONDRAGÓN, L.D., TORRES-NARVÁEZ, J.C. and PASTELÍN-HERNÁNDEZ, G., 2009. Effect of Citrus paradisi extract and juice on arterial pressure both in vitro and in vivo. *Phytotherapy Research*, vol. 23, no. 7, pp. 948-954. http://dx.doi.org/10.1002/ptr.2680. PMid:19153985.

DWIVEDI, S., 2007. Terminalia arjuna Wight & Arn.: a useful drug for cardiovascular disorders. *Journal of Ethnopharmacology*, vol. 114, no. 2, pp. 114-129. http://dx.doi.org/10.1016/j.jep.2007.08.003. PMid:17875376.

FRIEDMAN, J., YANIV, Z., DAFNI, A. and PALEWITCH, D., 1986. A preliminary classification of the healing potential of medicinal plants, based on a rational analysis of an ethnopharmacological field survey among Bedouins in the Negev Desert, Israel. *Journal of Ethnopharmacology*, vol. 16, no. 2-3, pp. 275-287. http://dx.doi.org/10.1016/0378-8741(86)90094-2. PMid:3747566.

GAZZANEO, L.R.S., DE LUCENA, R.F.P. and DE ALBUQUERQUE, U.P., 2005. Knowledge and use of medicinal plants by local specialists in an region of Atlantic Forest in the state of Pernambuco (Northeastern Brazil). *Journal of Ethnobiology and Ethnomedicine*, vol. 1, no. 1, pp. 9. http://dx.doi.org/10.1186/1746-4269-1-9. PMid:16270911.

GILANI, A.H. and ATTA-UR-RAHMAN, 2005. Trends in ethnopharmacology. *Journal of Ethnopharmacology*, vol. 100, no. 1-2, pp. 43-49. http://dx.doi.org/10.1016/j.jep.2005.06.001. PMid:16127805.

HABIB-UL-HASSAN, W.M., AHMAD, N., TARIQ, A., KHAN, I., AKHTAR, N. and JAN, S., 2015. Indigenous uses of the plants of Malakand valley, district Dir (Lower), Khyber Pakhtunkhwa, Pakistan. *Pakistan Journal of Weed Science Research*, vol. 21, pp. 83-99.

HAMMICHE, V. and MAIZA, K., 2006. Traditional medicine in Central Sahara: pharmacopoeia of Tassili N'ajjer. *Journal of Ethnopharmacology*, vol. 105, no. 3, pp. 358-367. http://dx.doi.org/10.1016/j.jep.2005.11.028. PMid:16414225.

HASAN, M.N., FERDOUSHI, A., ARA, N., RAHMAN, S., HOSSAN, M.S. and RAHMATULLAH, M., 2014a. Preliminary phytochemical screening, toxicity, antihyperglycemic and analgesic activity studies with *Curcuma longa* leaves. *World Journal of Pharmacy and Pharmaceutical Sciences*, vol. 3, pp. 81-91.

HASAN, S.A., UDDIN, M., HUDA, K.N.-U., DAS, A., TABASSUM, N., HOSSAIN, R., MAHAL, M.J. and RAHMATULLAH, M., 2014b. Ethnomedicinal plants of two village folk medicinal practitioners in Rajshahi district, Bangladesh: comparison of their folk medicinal uses with Ayurvedic uses. *American-Eurasian Journal of Sustainable Agriculture*, vol. 8, no. 1, pp. 10-19.

HEINRICH, M., ANKLI, A., FREI, B., WEIMANN, C. and STICHER, O., 1998. Medicinal plants in Mexico: Healers' consensus and cultural importance. *Social Science & Medicine*, vol. 47, no. 11, pp. 1859-1871. http://dx.doi.org/10.1016/S0277-9536(98)00181-6. PMid:9877354.

HUSAIN, S.Z., MALIK, R.N., JAVAID, M. and BIBI, S., 2008. Ethonobotanical properties and uses of medicinal plants of Morgah biodiversity park, Rawalpindi. *Pakistan Journal of Botany*, vol. 40, pp. 1897-1911.

HUSSAIN, K., SHAHAZAD, A. and ZIA-UL-HUSSNAIN, S., 2008. An ethnobotanical survey of important wild medicinal plants of Hattar district Haripur, Pakistan. *Ethnobotanical Leaflets*, vol. 12, pp. 29-35.

HUSSAIN, K., NISAR, M.F., MAJEED, A., NAWAZ, K. and BHATTI, K.H., 2010. Ethnomedicinal survey for important plants of Jalalpur Jattan, district Gujrat, Punjab, Pakistan. *Ethnobotanical Leaflets*, vol. 2010, pp. 11.

IJAZ, F., IQBAL, Z., RAHMAN, I.U., ALAM, J., KHAN, S.M., SHAH, G.M., KHAN, K. and AFZAL, A., 2016. Investigation of traditional medicinal floral knowledge of Sarban Hills, Abbottabad, KP, Pakistan. *Journal of Ethnopharmacology*, vol. 179, pp. 208-233. http://dx.doi.org/10.1016/j.jep.2015.12.050. PMid:26739924.

IQBAL, Z., LATEEF, M., JABBAR, A., MUHAMMAD, G. and KHAN, M.N., 2005. Anthelmintic activity of *Calotropis procera* (Ait.) Ait. F. flowers in sheep. *Journal of Ethnopharmacology*, vol. 102, no. 2, pp. 256-261. http://dx.doi.org/10.1016/j.jep.2005.06.022. PMid:16085379.

ISHTIAQ, M., MUMTAZ, A.S., HUSSAIN, T. and GHANI, A., 2012. Medicinal plant diversity in the flora of Leepa Valley,

Muzaffarabad (AJK), Pakistan. *African Journal of Biotechnology*, vol. 11, pp. 3087-3098.

ISLAM, M.K., SAHA, S., MAHMUD, I., MOHAMAD, K., AWANG, K., JAMAL UDDIN, S., RAHMAN, M.M. and SHILPI, J.A., 2014. An ethnobotanical study of medicinal plants used by tribal and native people of Madhupur forest area, Bangladesh. *Journal of Ethnopharmacology*, vol. 151, no. 2, pp. 921-930. http://dx.doi.org/10.1016/j.jep.2013.11.056. PMid:24342778.

ISMAIL, S. and NISAR, M.F., 2010. Ethnomedicinal survey for important plants of district Lodhran, Punjab, Pakistan. *BIOL (E-Journal of Life Sciences)*, vol. 1, no. 3, pp. 52-58.

JOSHI, M., PATEL, M. and MEHTA, P., 1980. Some folk medicines of Dangs, Gujarat state. *Bulletin of Medico Ethno Botanical Research*, vol. 1, pp. 8-14.

JOY, P., THOMAS, J., MATHEW, S. and SKARIA, B.P., 1998. Medicinal plants. *Tropical Horticulture.*, vol. 2, pp. 449-632.

KAMAL, M., WAZIR, S.M., HASSAN, M., SUBHAN, M., KHAN, S., MUHAMMAD, A. and TAJ, S., 2009. Ethnobotanically important plants of district Bannu, Pakistan. *Pakistan Journal of Plant Sciences*, vol. 15, pp. 87-93.

KAYANI, S., AHMAD, M., ZAFAR, M., SULTANA, S., KHAN, M.P.Z., ASHRAF, M.A., HUSSAIN, J. and YASEEN, G., 2014. Ethnobotanical uses of medicinal plants for respiratory disorders among the inhabitants of Gallies–Abbottabad, Northern Pakistan. *Journal of Ethnopharmacology*, vol. 156, pp. 47-60. http://dx.doi.org/10.1016/j.jep.2014.08.005. PMid:25153021.

KHAN, S.M., PAGE, S., AHMAD, H., SHAHEEN, H., ULLAH, Z., AHMAD, M. and HARPER, D.M., 2013. Medicinal flora and ethnoecological knowledge in the Naran Valley, Western Himalaya, Pakistan. *Journal of Ethnobiology and Ethnomedicine*, vol. 9, no. 1, pp. 4. http://dx.doi.org/10.1186/1746-4269-9-4. PMid:23302393.

KRISHNAVENI, M. and MIRUNALINI, S., 2010. Therapeutic potential of Phyllanthus emblica (amla): the ayurvedic wonder. *Journal of Basic and Clinical Physiology and Pharmacology*, vol. 21, no. 1, pp. 93-105. PMid:20506691.

KUMAR, S., KUMAR, R. and KHAN, A., 2011. Medicinal plant resources: manifestation and prospects of life-sustaining healthcare system. *Cont J Biol Sci.*, vol. 4, pp. 19-29.

KUMAR, V.L. and ROY, S., 2007. Calotropis procera latex extract affords protection against inflammation and oxidative stress in Freund's complete adjuvant-induced monoarthritis in rats. *Mediators of Inflammation*, vol. 2007, pp. 47523. http://dx.doi.org/10.1155/2007/47523.

LANS, C.A., 2006. Ethnomedicines used in Trinidad and Tobago for urinary problems and diabetes mellitus. *Journal of Ethnobiology and Ethnomedicine*, vol. 2, no. 1, pp. 45. http://dx.doi.org/10.1186/1746-4269-2-45. PMid:17040567.

LLAH, S., RASHID KHAN, M., ALI SHAH, N., AFZAL SHAH, S., MAJID, M. and ASAD FAROOQ, M., 2014. Ethnomedicinal plant use value in the Lakki Marwat District of Pakistan. *Journal of Ethnopharmacology*, vol. 158, no. Pt A, pp. 412-422. http://dx.doi.org/10.1016/j.jep.2014.09.048. PMid:25448507.

LULEKAL, E., KELBESSA, E., BEKELE, T. and YINEGER, H., 2008. An ethnobotanical study of medicinal plants in Mana Angetu District, southeastern Ethiopia. *Journal of Ethnobiology and Ethnomedicine*, vol. 4, no. 1, pp. 10. http://dx.doi.org/10.1186/1746-4269-4-10. PMid:18442379.

MAHMOOD, A., MAHMOOD, A., MALIK, R.N. and SHINWARI, Z.K., 2013. Indigenous knowledge of medicinal plants from Gujranwala district, Pakistan. *Journal of Ethnopharmacology*, vol. 148, no. 2, pp. 714-723. http://dx.doi.org/10.1016/j.jep.2013.05.035. PMid:23707336.

MAHMOOD, A., MAHMOOD, A., SHAHEEN, H., QURESHI, R.A., SANGI, Y. and GILANI, S., 2011a. Ethno medicinal survey of plants from district Bhimber Azad Jammu and Kashmir, Pakistan. *Journal of Medicinal Plants Research*, vol. 5, pp. 2348-2360.

MAHMOOD, A., RIFFAT, N., ZABTA, K. and AQEEL, M., 2011b. Ethnobotanical survey of plants from Neelum, Azad Jammu and Kashmir, Pakistan. *Pakistan Journal of Botany*, vol. 43, pp. 10.

MAJID, M., KHAN, M.R., SHAH, N.A., HAQ, I.U., FAROOQ, M.A., ULLAH, S., SHARIF, A., ZAHRA, Z., YOUNIS, T. and SAJID, M., 2015. Studies on phytochemical, antioxidant, anti-inflammatory and analgesic activities of Euphorbia dracunculoides. *BMC Complementary and Alternative Medicine*, vol. 15, no. 1, pp. 349. http://dx.doi.org/10.1186/s12906-015-0868-0. PMid:26445953.

MARWAT, S.K., 2008. Ethnophytomedicines for treatment of various diseases in DI Khan district. *Sarhad Journal of Agriculture*, vol. 24, pp. 293-303.

MURAD, W., AZIZULLAH, A., ADNAN, M., TARIQ, A., KHAN, K.U., WAHEED, S. and AHMAD, A., 2013. Ethnobotanical assessment of plant resources of Banda Daud Shah, District Karak, Pakistan. *Journal of Ethnobiology and Ethnomedicine*, vol. 9, no. 1, pp. 77. http://dx.doi.org/10.1186/1746-4269-9-77. PMid:24267174.

MURN, C., KHAN, U. and FARID, F., 2008. Vulture populations in Pakistan and the Gyps vulture restoration project. *Vulture News.*, vol. 58, pp. 35-43.

MUSA, M.S., ABDELRASOOL, F.E., ELSHEIKH, E.A., AHMED, L.A., MAHMOUD, A.L.E. and YAGI, S. M., 2011. Ethnobotanical study of medicinal plants in the Blue Nile State, South-eastern Sudan. *Journal of Medicinal Plants Research*, vol. 5, pp. 4287-4297.

NADEEM, M., SHINWARI, Z.K. and QAISER, M., 2013. Screening of folk remedies by genus Artemisia based on ethnomedicinal surveys and traditional knowledge of native communities of Pakistan. *Pakistan Journal of Botany*, vol. 45, pp. 111-117.

PANHWAR, A.Q. and ABRO, H., 2007. Ethnobotanical studies of Mahal Kohistan (Khirthar National Park). *Pakistan Journal of Botany*, vol. 39, pp. 2301-2315.

PARVEEN, UPADHYAY, B., ROY, S. and KUMAR, A., 2007. Traditional uses of medicinal plants among the rural communities of Churu district in the Thar Desert, India. *Journal of Ethnopharmacology*, vol. 113, no. 3, pp. 387-399. http://dx.doi.org/10.1016/j.jep.2007.06.010. PMid:17714898.

PATTEWAR, S.V., 2012. Kalanchoe pinnata: phytochemical and pharmacological profile. *International Journal of Pharmaceutical Sciences and Research*, vol. 3, pp. 993.

PHILLIPS, O. and GENTRY, A.H., 1993. The useful plants of Tambopata, Peru: I. Statistical hypotheses tests with a new quantitative technique. *Economic Botany*, vol. 47, no. 1, pp. 15-32. http://dx.doi.org/10.1007/BF02862203.

QURESHI, R., BHATTI, G.R. and MEMON, R.A., 2010. Ethnomedicinal uses of herbs from northern part of Nara desert, Pakistan. *Pakistan Journal of Botany*, vol. 42, pp. 839-851.

QURESHI, R., MAQSOOD, M., ARSHAD, C.A. and CHAUDHRY, A.K., 2011. Ethnomedicinal uses of plants by the people of Kadhi areas of Khushab, Punjab, Pakistan. *Pakistan Journal of Botany*, vol. 43, pp. 121-133.

QURESHI, R.A., GHUFRAN, M.A., GILANI, S.A., YOUSAF, Z., ABBAS, G. and BATOOL, A., 2009. Indigenous medicinal plants used by local women in southern Himalayan regions of Pakistan. *Pakistan Journal of Botany*, vol. 41, pp. 19-25.

REHMAN, K., MASHWANI, Z.U., KHAN, M.A., ULLAH, Z. and CHAUDHARY, H.J., 2015. An ethno botanical perspective of traditional medicinal plants from the Khattak tribe of Chonthra Karak, Pakistan. *Journal of Ethnopharmacology*, vol. 165, pp. 251-259. http://dx.doi.org/10.1016/j.jep.2015.02.035. PMid:25732837.

REVATHI, P., PARIMELAZHAGAN, T. and MANIAN, S., 2013. Ethnomedicinal plants and novel formulations used by Hooralis tribe in Sathyamangalam forests, Western Ghats of Tamil Nadu, India. *Journal of Medicinal Plants Research*, vol. 7, no. 28, pp. 2083-2097. http://dx.doi.org/10.5897/JMPR2013.5074.

SAHREEN, S., KHAN, M.R., KHAN, R.A. and SHAH, N.A., 2013. Estimation of flavoniods, antimicrobial, antitumor and anticancer activity of Carissa opaca fruits. *BMC Complementary and Alternative Medicine*, vol. 13, no. 1, pp. 372. http://dx.doi.org/10.1186/1472-6882-13-372. PMid:24373124.

SAJID, M., KHAN, M.R., SHAH, N.A., SHAH, S.A., ISMAIL, H., YOUNIS, T. and ZAHRA, Z., 2016. Phytochemical, antioxidant and hepatoprotective effects of Alnus nitida bark in carbon tetrachloride challenged Sprague Dawley rats. *BMC Complementary and Alternative Medicine*, vol. 16, no. 1, pp. 268. http://dx.doi.org/10.1186/s12906-016-1245-3. PMid:27488054.

SAQIB, Z., MAHMOOD, A., NASEEM MALIK, R., MAHMOOD, A., HUSSIAN SYED, J. and AHMAD, T., 2014. Indigenous knowledge of medicinal plants in Kotli Sattian, Rawalpindi district, Pakistan. *Journal of Ethnopharmacology*, vol. 151, no. 2, pp. 820-828. http://dx.doi.org/10.1016/j.jep.2013.11.034. PMid:24286963.

SAXENA, R., GUPTA, B., SAXENA, K., SRIVASTAVA, V. and PRASAD, D., 1987. Analgesic, antipyretic and ulcerogenic activity of Nyctanthes arbor tristis leaf extract. *Journal of Ethnopharmacology*, vol. 19, no. 2, pp. 193-200. http://dx.doi.org/10.1016/0378-8741(87)90041-9. PMid:3497308.

SHAH, A., MARWAT, S.K., GOHAR, F., KHAN, A., BHATTI, K.H., AMIN, M., DIN, N.U., AHMAD, M. and ZAFAR, M., 2013. Ethnobotanical study of medicinal plants of semi-tribal area of Makerwal & Gulla Khel (lying between Khyber Pakhtunkhwa and Punjab Provinces), Pakistan. *American Journal of Plant Sciences*, vol. 4, no. 01, pp. 98-116. http://dx.doi.org/10.4236/ajps.2013.41015.

SHAH, S.A., SHAH, N.A., ULLAH, S., ALAM, M.M., BADSHAH, H., ULLAH, S. and MUMTAZ, A.S., 2016. Documenting the indigenous knowledge on medicinal flora from communities residing near Swat River (Suvastu) and in high mountainous areas in Swat-Pakistan. *Journal of Ethnopharmacology*, vol. 182, pp. 67-79. http://dx.doi.org/10.1016/j.jep.2016.02.008. PMid:26869542.

SHARMA, L., AGARWAL, G. and KUMAR, A., 2003. Medicinal plants for skin and hair care. *Indian Journal of Traditional Knowledge*, vol. 2, no. 1, pp. 62-68.

SHARMA, R., MANHAS, R. and MAGOTRA, R., 2012. Ethnoveterinary remedies of diseases among milk yielding animals in Kathua, Jammu and Kashmir, India. *Journal of Ethnopharmacology*, vol. 141, no. 1, pp. 265-272. http://dx.doi.org/10.1016/j.jep.2012.02.027. PMid:22366093.

SHINWARI, Z.K. and GILANI, S.S., 2003. Sustainable harvest of medicinal plants at Bulashbar Nullah, Astore (northern Pakistan). *Journal of Ethnopharmacology*, vol. 84, no. 2-3, pp. 289-298. http://dx.doi.org/10.1016/S0378-8741(02)00333-1. PMid:12648828.

SHUAIB, M., KHAN, I., SHARIFULLAH, R.K., HASHMATULLAH, S.M. and NAZ, R., 2014. Ethnobotanical studies of spring flora of Dir Lower, Khyber Pakhtunkhwa, Pakistan. *Pakistan Journal of Weed Science Research*, vol. 20, pp. 37-49.

SHUAIB, M., HUSSAIN, F., RAUF, A., JAN, F., ROMMAN, M., PARVEZ, R., ZEB, A., ALI, S., ABIDULLAH, S., BAHADUR, S. AND SHAH, A.A., 2021. TRADITIONAL KNOWLEDGE ABOUT MEDICINAL PLANT IN THE REMOTE AREAS OF WARI TEHSIL, DIR UPPER, PAKISTAN. *Brazilian Journal of Biology*, VOL. 83, E246803.

SIMBO, D.J., 2010. An ethnobotanical survey of medicinal plants in Babungo, Northwest Region, Cameroon. *Journal of Ethnobiology and Ethnomedicine*, vol. 6, no. 1, pp. 8. http://dx.doi.org/10.1186/1746-4269-6-8. PMid:20156356.

SINGH, D., SINGH, B. and GOEL, R.K., 2011. Traditional uses, phytochemistry and pharmacology of Ficus religiosa: A review. *Journal of Ethnopharmacology*, vol. 134, no. 3, pp. 565-583. http://dx.doi.org/10.1016/j.jep.2011.01.046. PMid:21296646.

SOFOWORA, A., 1982. *Medicinal plants and traditional medicine in Africa*. Ibadan: Spectrum Books.

SOHEL, M., KAWSAR, M., SUMON, M. and SULTANA, T., 2016. Ethnomedicinal studies of Lalmohan Thana in Bhola District, Bangladesh. *Alternative & Integrative Medicine*, vol. 5, pp. 1.

SOUZA, G.C., HAAS, A., VON POSER, G., SCHAPOVAL, E. and ELISABETSKY, E., 2004. Ethnopharmacological studies of antimicrobial remedies in the south of Brazil. *Journal of Ethnopharmacology*, vol. 90, no. 1, pp. 135-143. http://dx.doi.org/10.1016/j.jep.2003.09.039. PMid:14698521.

TIPU, M., AKHTAR, M., ANJUM, M. and RAJA, M., 2006. New dimension of medicinal plants as animal feed. *Pakistan Veterinary Journal*, vol. 26, pp. 144-148.

TOLOSSA, K., DEBELA, E., ATHANASIADOU, S., TOLERA, A., GANGA, G. and HOUDIJK, J.G., 2013. Ethno-medicinal study of plants used for treatment of human and livestock ailments by traditional healers in South Omo, Southern Ethiopia. *Journal of Ethnobiology and Ethnomedicine*, vol. 9, no. 1, pp. 32. http://dx.doi.org/10.1186/1746-4269-9-32. PMid:23680260.

ULLAH, M., KHAN, M.U., MAHMOOD, A., MALIK, R.N., HUSSAIN, M., WAZIR, S.M., DAUD, M. and SHINWARI, Z.K., 2013. An ethnobotanical survey of indigenous medicinal plants in Wana district south Waziristan agency, Pakistan. *Journal of Ethnopharmacology*, vol. 150, no. 3, pp. 918-924. http://dx.doi.org/10.1016/j.jep.2013.09.032. PMid:24120747.

ULLAH, R., IQBAL, Z.H.Z., HUSSAIN, J., KHAN, F.U., KHAN, N., MUHAMMAD, Z., AYAZ, S., AHMAD, S., REHMAN, N.U. and HUSSAIN, I., 2010. Traditional uses of medicinal plants in Darra Adam Khel NWFP Pakistan. *Journal of Medicinal Plants Research*, vol. 4, no. 17, pp. 1815-1821.

UNITED NATIONS DEVELOPMENT PROGRAMME – UNDP, 2021 [viewed 31 August 2021]. *Kasur Tannery Pollution Control (KTPC)* [online]. Available from: http://www.soc.titech.ac.jp/~sakano/atiq/kasur/ktwma.html

VENDRUSCOLO, G.S. and MENTZ, L.A., 2006. Estudo da concordância das citações de uso e importância das espécies e famílias utilizadas como medicinais pela comunidade do bairro Ponta Grossa, Porto Alegre, RS, Brasil. *Acta Botanica Brasílica*, vol. 20, no. 2, pp. 367-382. http://dx.doi.org/10.1590/S0102-33062006000200012.

VITALINI, S., IRITI, M., PURICELLI, C., CIUCHI, D., SEGALE, A. and FICO, G., 2013. Traditional knowledge on medicinal and food plants used in Val San Giacomo (Sondrio, Italy): an alpine ethnobotanical study. *Journal of Ethnopharmacology*, vol. 145, no. 2, pp. 517-529. http://dx.doi.org/10.1016/j.jep.2012.11.024. PMid:23220197.

WIKIPEDIA, 2021 [viewed 31 August 2021]. *Kasur* [online]. Available from: http://en.wikipedia.org/wiki/Kasur

WILLIAMS, L., VASQUES, E., REID, W., PORTER, R. and KRAUS, W., 2003. Biological activities of an extract from *Cleome viscosa* L. (Capparaceae). *Naturwissenschaften*, vol. 90, no. 10, pp. 468-472. http://dx.doi.org/10.1007/s00114-003-0460-1. PMid:14564407.

YESMIN, M.N., UDDIN, S.N., MUBASSARA, S. and AKOND, M.A., 2008. Antioxidant and antibacterial activities of *Calotropis procera* Linn. *American-Eurasian Journal of Agricultural & Environmental Sciences*, vol. 4, pp. 550-553.

ZAHOOR, M., WAZIR, S., MOHAMMAD, A. and MOHAMMAD, S., 2009. Ethnobotany of some plants from Darra'e Pezo, District Lakki Marwat, Pakistan. *Pak J Pl Sci.*, vol. 15, pp. 75-80.