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Research Paper

Ethnobotanical survey of wild plants of Samror and Khuiratta, District Kotli, Azad Jammu and Kashmir

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Abstract

An ethnobotanical survey was conducted to document the traditional and medicinal uses of wild flora of Samror and Khuiratta, District Kotli Azad Kashmir. Traditional uses of different plant species were recorded using a semi-structured questionnaire, interviews, and direct observations during fieldwork. A total of 100 medicinal plants belonging to 48 plant families were recorded. The most dominant plant families were Lamiaceae with 9 species followed by Poaceae and Asteraceae with 6 species respectively. Leaves were the most frequently used part of a plant against common diseases. Plants with high use value were *Oxalis corniculata* L, *Mentha royleana* Benth, *Cannabis sativa* L and *Malva sylvestris* L. There is a need to record overall diversity, ethnomedicinal applications and traditional knowledge of medicinal plants of the area.

Introduction

Ethnobotany is the study of how the people of a particular culture and region make use of indigenous plants, as food, shelter, medicine, clothing, hunting and religious ceremonies. It is the science, which studies the relationship between a given society and its environment, and in particular the plant world (Aumeerudy, 1996). In ancient times, plants had been used against common diseases (Silva et al., 2011; Lulekal et al., 2008). The world health organization (WHO) reported that 80 % of the population depend on traditional medicine for primary healthcare due to cost-effectiveness and affordability (Principe, 1991).

Plants are a vital source of life because they are not only providing food, shelter and oxygen but also a source of different chemical compounds used as drugs (Munawar et al., 2021). The ethnobotanical relationship between plants and indigenous people and how it is used for various diseases has been studied (Amjad et al., 2014; Arshad et al., 2014). Medicinal plants have been used countless times for curing diseases mainly in developing countries. They are easily available with little to no side effects when compared to modern medicine (Laldingliani et al., 2022). The literature perusal and field survey analysis depicted that older indigenous people of AJK have more ethnobotanical knowledge as compared to the new generation because of having a strong belief in traditional and cultural customs and prefer plant-based drugs which they deem safe and economic in use (Ahmad et al., 2017). The area of Azad Jammu and Kashmir (AJK) is rich in floral diversity because of the diverse habitats, such as forests, streams, rivers, meadows, wastelands, slopes, and cultivated fields (Ishtiaq et al., 2021; Mughal, 2016; Qureshi et al., 2007; Mahmood et al., 2011). But Kashmir's plant resources remain largely unexplored, particularly their ethnobotanical values. The remote, mountainous district of Kotli in central AJ&K is strongly influenced by old customs and traditions. The population is strongly dependent upon natural resources, especially plants, for healthcare needs and support. The local people, especially the old and traditional healers, have acquired their knowledge of plant uses over a long period, and this includes their use in treating various illnesses and other ailments. This study explored the detailed ethnobotanical resources of the Samror, Kotli District, AJ&K, specifically, it describes and analyses the indigenous traditional knowledge on the utilization of the most commonly used plants.

Materials and Methods

Study Area

The Kotli is one of the most biodiversity-rich areas of Azad Jammu and Kashmir (AJ&K) located some 141 km north of Islamabad, the capital of Pakistan (73° 47.180′ E to 74° 04.613′ E longitude; 33° 23.069′ N to 33° 29.344′ N latitude and altitude range of 450 m to 1900 m. The region is mountainous and covers an area of about 1860 km^2 and the total population is 0.588 million. Climatically, the area is dry, subtropical at lower altitudes and subtropical-humid at upper altitudes with a mean annual precipitation of 1250 mm. Three different forest types have been described from the area namely subtropical scrub forest, subtropical Chir pine forest and subtropical broad leaf humid forest. There is no formal marketing of medicinal plants in District Kotli which by implication benefits homegrown agents (middleman). Thus, poor collectors have no share in high-profit earning businesses. District Kotli, previously a sub-division of Mirpur Azad Jammu & Kashmir was given the status of district in September 1975. It is divided into Kotli, Khuiratta, Sehnsa, Tatta Pani, Charhoi and Nikyal.

Data collection

The materials mandatory in the field area included Notebook, Pencil, Polythene bags, Blotting paper, Top sheet & Plant presser, area maps, digital camera (Canon 1000D), GPS (Garmen).

Field survey and Market assessment

During the field survey, 130 local inhabitants of Samror and Khiratta villages of District Kotli, were interviewed using a questionnaire to document the ethnobotanical data on the plant resources, quantities of plant species available and their utilization by the local people, drug dealers, shopkeepers, timber dealers, fuel wood sellers, farmers, but priority were given to hakims (Herbal practitioners) and local elderly people usually with the age of more than 70 years.

Table 1. The Questionnaire used for data collection from rural informants.

S. No.	Information on medicinal plants	Respondent
i	Who Collects the plants, women or men?	-
ii	Types of plant species. Wild or cultivated?	-
iii	The folk name of each plant species being collected and its uses?	-
iv	Learning ways of traditional knowledge about medicinal plants?	-
v	Basic marketing channels of wild and cultivated edible/medicinal plants?	-
vi	Economic aspects of wild and cultivated edible plants in the studied area?	-
vii	Methods of processing and preservation of plants (freezing, sun drying, or salting?	-
viii	Therapeutic uses of medicinal plants in the traditional pharmacopeia of the region?	-
Ix	Part of plant used. Leaf stem, root or any other?	

Plant Collection, Preservation and Identification

Plant specimens collected both from the wild and cultivated areas were subsequently dried, pressed and mounted appropriately on herbarium sheets and identified with the help of Flora of Pakistan https://powo.science.kew.org/, & http://www.worldfloraonline.org Nasir & Ali (1970-1989), Ali & Nasir (1990-1992), Nasir & Rafiq (1995) and Ali & Qaisar (1992-2012) and were submitted to Herbarium University of Kotli AJK .

Preparation of Ethnobotanical Inventory

The ethnobotanical record acquired was thus compared with previously published and available literature on the uses of plants (Haqq & Hussain, 1995; Jain, 1995; Alexiades, 1996; Cotton, 1996; Cunningham, 2001; Yusuf et al., 2006 and 2007; Ajaib et al., 2010 and 2012; Mohiuddin et al., 2012). Ultimately, a checklist of plants with ethnobotanical uses, family names, vernaculars or common names was prepared.

Demographic data

The demographic information including age, sex, education level and occupation was recorded using a random sampling method. A total of 130 people (74 males and 56 females) from Samror village were interviewed.

Results

The present study was carried out from Samror village, District Kotli Azad Jammu and Kashmir. A total of 100 medicinal plants belonging to 48 plant families were collected and identified. A detailed list of collected plant species with their scientific name, local name, part used, habit and ethnobotanical uses was also given (Table. 2). The most dominant family recorded during the study was Lamiaceae with 9 species followed by Poaceae and Asteraceae with 6 species each. Euphorbiaceae with 5 species, Acanthaceae, Ranunculaceae, Scrophulariaceae, Fabaceae and Solanaceae with 4 species, Malvaceae, Brassiceae and Rosaceae with 3 species, Rhamnaceae, Polygonaceae, Liliaceae, Oxalidaceae, Geraniaceae, Cyperaceae, Boraginaceae, Apocynaceaeand Apiaceae with 2 species, Zygophyllaceae, Violaceae, Typhaceae, Saxifragaceae, Rubiaceae, Pteridaceae, Primulaceae, Pinaceae, Papilionaceae, Papaveraceae, Nyctaginaceae, Myrsinaceae, Moraceae, Mimosaceae, Loranthaceae, Lythracceae, Flacourtiacea, Elaegnaceae, Euphorbiaceae, Cuscutaceae, Convolvulaceae, Caryophyllaceae, Caprifoliaceae, Cannabaceae, Berberidaceae, Buxaceae and Amaranthaceae with 1 species each.

Habit

Plant habit, also known as a plant life form, is the characteristic shape, appearance, or growth form of a plant species. It develops from specific genetic patterns of growth in combination with environmental factors and is part of the organization of every plant. In the study area, herbs were dominating with 68 %. *Cannabis sativa, Euphorbia helioscopia, Solanum nigarum, Chenopodium album, Parthenium hysterphorus,* were the most dominant herbs in study area. Shrub were almost 17% and the most dominant shrubs were *Malvastrum coromandelianum*, *Justicia adhatoda* in study area. Trees with 13% and Grasses like *Saccharum spontaneum, Erioscirpus comosus, Dactyloctenium aegyptium* and *Dichanthium annulatum* with an average 5%. In the present study, a total of 100 plant species were recorded, 68% were herbs, 16% were shrubs, 10% were trees, and 6%were grasses.

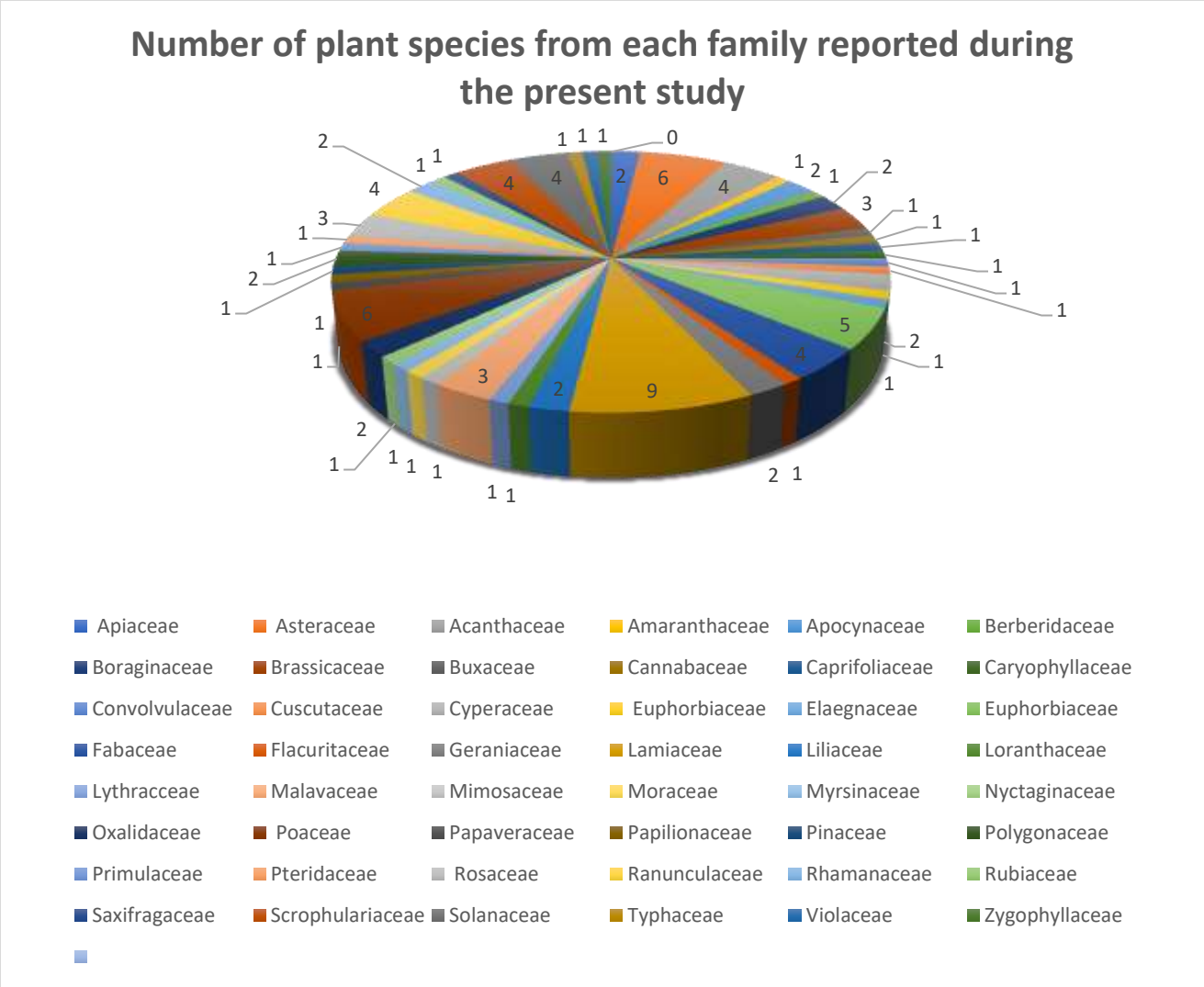

Fig 1: Number of Plant families recorded from the study area.

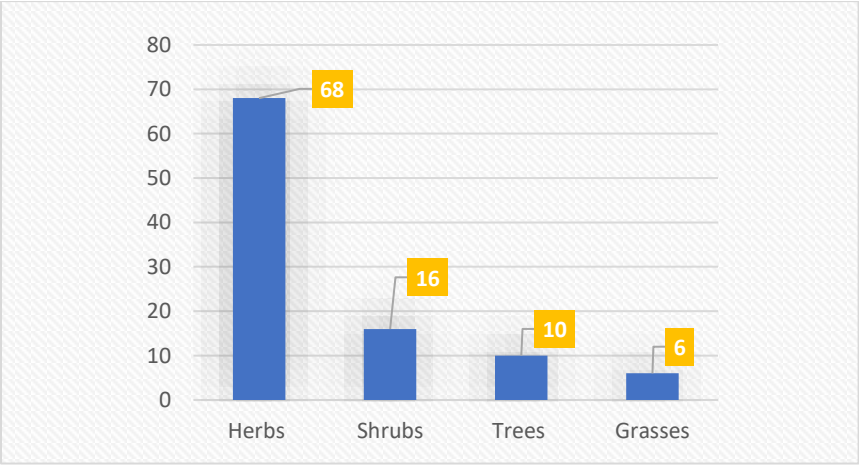

Fig 2: Number of plant species reported from the study area

Medicinal uses of plants

The present study showed the ethnobotanical uses of common medicinal plants used among local inhabitants of Samror against a variety of ailments. 18 diseases /aliments were treated by 100 plant species with 39 species predominantly used in stomach disease,14 species being used in fever,14 species used in wound healing, 14 species being used in Anthelmintic and anti-inflammatory,13 were used in Blood purifiers, 12 were used in skin disease, 11 were used in cough,11 were used in Insect bites and Burns, 11 were used in Urinary infection and Kidney stones, 8 were used in Antitumor and anticancer, 7 were used in Asthma,7 were used in Liver cirrhosis and Lung problems, 6 were used in Anti-rheumatic, 6 were used in Headache& nervous disorders, 5 were used in Respiratory diseases, 3 were used in Malaria, 3 were used in Toothache and 2 were used in Diabetes. In the study, it was reported that Oxalis *corniculata, Mentha royleana* Benth*, Cannabis sativa* L. *and Malva sylvestris* L have high medicinal value.

Parts Used

Leaves of medicinal plants were used as an herbal medicine with an average of 40%. Leaves were dried and grinned into a fine powder before use. Plant species, *Ranunculus arvensis, Scandix pectin-veneris, Veronica polita*, and *Silene conidia* were mostly used whole plants against different ailments with 39%. *Fumaria parviflora Emblica officinalis, Capsella bursa-pastoris*, *Ranunculus sceleratus, Erigeron canadensis* were collected for flowers and *Avena sativa, Berberis Lycium, Tribulus terrestris*, *Eremostachys superba* Royle, *Flacourtia indica* were collected for other uses like seed, fruits, rhizome, and roots.

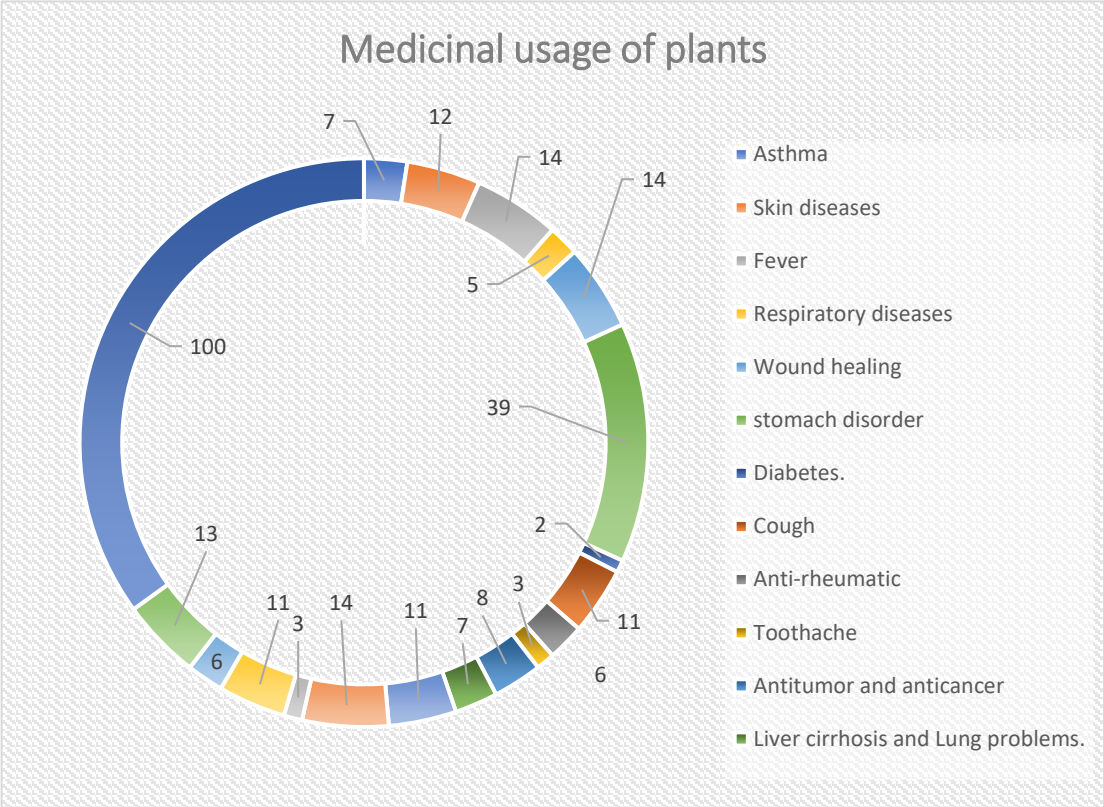

Fig 3: Number of plant species used against different diseases.

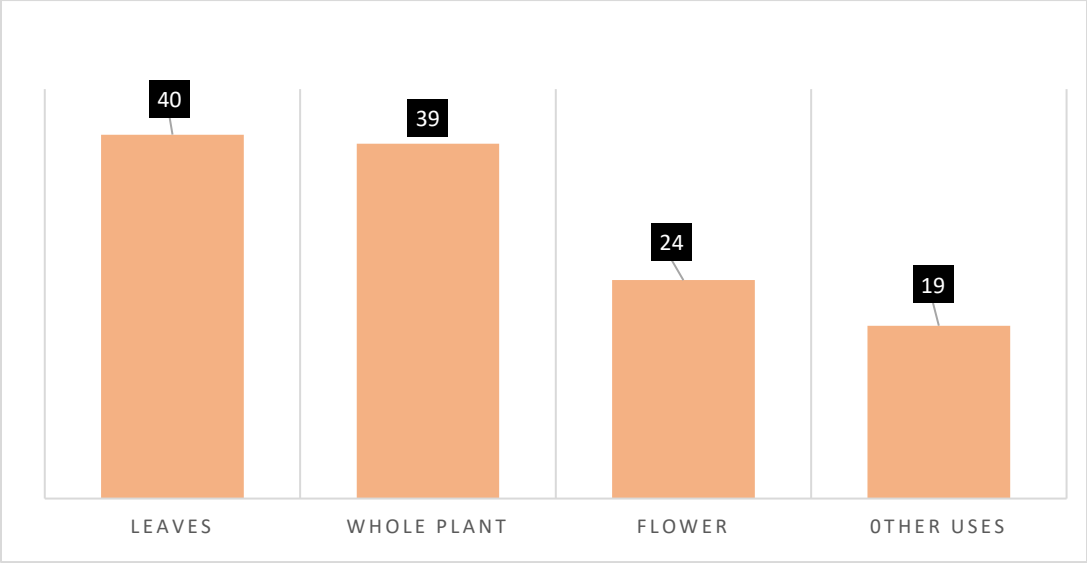

Fig 4: Plant parts used for medicinal purposes.

Table 2. List of Medicinal Plants Used By People of Sarsawa and Khuirata, District Kotli.

Sr. No	Scientific Name	Common Name	Family	Habit	Used	Part Used	Cooked as Food	Fodder	References
1	*Ranunculus arvensis* L.	Corn butter cup	Ranunculaceae	Herb	It is frequently prescribed to treat arthritis, asthma, hay fever, rheumatism, psoriasis, and gastrointestinal disorder	Whole plant body	×	✓	(Orak et al.,2009)
2	*Scandix pectin-veneris*	Shepherd's needle	Apiaceae	Herb	The plant has been used as a remedy for toothache	Whole plant body	✓	✓	(Present study)
3	*Biden Pilosa* L.	Blackjack	Asteraceae	Herb	Used for treating malaria, skin infections, stomach and liver disorders	Leaves	×	×	(Silva et al., 2011)
4	*Lathyrus aphaca* L.	Yellow pea or yellow vetch	Fabaceae	Herb	Widely used in medicines for treating wounds, in the treatment of rheumatism, and various human diseases	Seed	×	✓	(Altundag and Ozturk, 2011)
5	*Euphorbia helioscoppia* L.	Madwoman's milk	Euphorbiaceae	Herb	Used for Cough treatment.	Leaves and stem	×	×	Present study
6	*Veronica polita* Fr.	Speedwell	Scrophulariaceae	Herb	*Veronica* is *used* as a tonic, to cause sweating, to "purify" blood, and to increase metabolism.	Whole plant.	×	✓	(Salehi et al., 2019)
7	*Silene conidia* L.	Cone catchfly	Caryophyllaceae	Herb	Used in the treatment of fever.	Whole plant	×	✓	(Present study)
8	*Fumaria parviflora* L.	Fine leaf	Papaveraceae	Herb	Utilized during constipation.	Whole plant	×	✓	(Mehmood, et al. 2012)
9	*Emblica officinalis* Gaertn.	Amla	Euphorbiaceae	Tree	To improve the digestion process, timber, leaves, petals, fruit, and seeds are used. Purifying blood and to treat the asthma	Fruit, leaf, flower and seed	×	×	(Gantait, et al., 2021).
10	*Malvastrum coromandelianum (*L) Gracke.	false mallow	Malvaceae	Sub-shrub	Used to treat diabetes.	Whole plant	×	×	(Present study)
11	*Capsella bursa-pastori* (L) Medik.	Shepherd,s purse	Brassicaceae	Herb	It is used to treat headaches diarrhea and bladder infections.	Leave and flower	×	×	(Present study)
12	*Sonchus asper* Hill. L.	Spiny sow thistle	Asteraceae	Herb	For stomach infection	Whole plant body	✓	✓	(Present study)
13	*Ranunculus sceleratus* L.	Celery leaves or butter cup	Ranunculaceae	Herb	Quick recovery of wounds.	Leaves and flower	×	✓	(Present study)
14	*Solanum nigrum* L.	Black nightshade	Solanaceae	Herb	antiproliferative, anti-inflammatory, antiseizure and hepatic protective hepatitis	Whole plant	✓	✓	(Gabrani et al., 2012)

15	*Polygonum barbatum* Walter Fl. Carol.	Common marsh buckwheat	Polygonaceae	Herb	diuretic	Whole plant	×	✓	(Abdul et al., 2009)
16	*Adiantum incisum* Forssk.	Maidenhair ferns	Pteridaceae	Herb	Used for relief against scorpion venom	Leaves	×	✓	(Abdul et al., 2009)
17	*Oxalis corniculate* L.	Yellow wood sorrel	Oxalidaeae	Herb	burns	Leaves	✓	✓	Present study
18	*Euphorbia hitra* L.	Hairy spurge	Euphorbiaceae	Herb	Used for the treatment of cholera, jaundice disorders, breathing problems, such as congestion, coryza, pneumonia	Leave and flower	×	✓	(Kumar e t al., 2010)
1 9	*Anagallis arvensis* L	Scarlet pimpernel	Primulaceae	Herb	*Used* for the treatment of gallstones, liver cirrhosis, lung problems, urinary infection, and kidney stones.	Whole plant	×	✓	(Bajaj, 1999)
20	*Colebrookea oppositifolia* Sm.	Lansa	Lamiaceae	Shrub	Leaves are used to treat injuries	Leaves	×		(Ajaib et al., 2014)
21	*Erigeron canadensis* Brot.	Horseweed	Scrophulariaceae	Herb	Used for the treatment of gastrointestinal problems.	Leaves and flower	×	×	(Present study)
22	*Lepidium didymium* L.	Lesser swinecress	Brassicaceae	Herb	Used to treatment for allergies and wounds.	Brassicaceae	×	✓	(Present study)
23	*Chenopodium ambrosioides* L.	Mexican tea	Amaranthaceae	Herb	Laxative and anthelmintic	Leaves and flower	✓	✓	(Present study)
24	*Tulipa stellata* Hook.	Lady tulip	Liliaceae	Herb	U*sed* as diuretic, laxative and for fever	Whole plant	✓	✓	(Present study)
25	*Convolvulus arven,sis* L	Creeping jenny	Convolvulaceae	Herb	Skin disorders.	Whole plant	×	✓	(Present study)
26	*Rumex dentatus* L.	Toothed dock	Polygonaceae	Herb	Used in traditional medicines to relieve acariasis, eczema, diarrhea, and dehydration.	Roots	×	×	(Li et al., 2003)
27	*Lamium amplexicaule* L.	Common henbit	Lamiaceae	Herb	Used as anti-rheumatic, laxative and diaphoretic	Flower and leaves	×	✓	(Rehman et el., 2015)
28	*Malva* sp.	Common mallow	Malvaceae	Herb	Used to treat digestive problems	Leaves and flower	×	✓	(Foster & Duke, 1990)
29	*Saussurea heteromalla* (D. Don) Hand-Mazz.	Kaliziri	Asteraceae	Herb	Anti-inflammatory	Whole plant	×	✓	(Present study)
30	*Cannabis sativa* L.	Hemp, Bahng	Cannabaceae	Herb	Anti-inflammatory, and anti-nausea	Leaves	×	✓	(Present study)
31	*Malva sylvestris* L.	Common mallow	Malvaceae	Herb	Wound healing, dermal infected wounds, bronchitis, digestive problems, and inflammations	Leaves and flower	×	✓	(Pirbalouti et al., 2009)
32	*Fragaria vesca* L.	Wild strawberry	Rosaceae	Herb	Used to cure diarrhea and infections of the urinary bladders in children.	Whole plant	×	✓	(Present study)
33	*Datura stramonium L.*	Diarrhea and	Solanaceae	Herb	Small dose is used for mental relaxation for epilepsy patients	Flower and leaves	×	✓	(Soni et al., 2012)
34	*Cichorium intybus* L.	chicory	Asteraceae	Herb	Against oedema	Leaves and flower	✓	✓	Present study

35	*Borago officinalis* L.	Borage, star flower	Boraginaceae	Herb	Used to treat bronchitis, and respiratory infections.	Flowers	×	✓	(Gupta & Singh, 2010)
36	*Ballota nigra* L.	Black horehound	Lamiaceae	Herb	Used in the treatment of arthritis.	Flower and leaves	×	✓	Present study
37	*Avena sativa* L.	Oats	Poaceae	Herb the	Used as Food and fodder	Seed, stem and leaves	✓	✓	Present study
38	*Anethum graveolens* L.	Dill	Apiaceae	Herb	Used for abdominal discomfort, colic and for digestion problems.	Flowers	×	✓	(Jana and Shekhawat, 2010)
39	*Silybum marianum* L.	Milk-thistle	Asteraceae	Herb	used to treat liver and cardiac disorders	Whole plant	×	×	Present study
40	*Agrimonia eupatoria* L.	Common agrimony	Rosaceae	Herb	Used to treat infections of the urinary system, digestive tract issues, and chronic wounds.	Whole plant	×	✓	(Paluc, 2020)
41	*Dicliptera zeylanica* Nees.	Bhaikar	Acnthaceae	Shrub	Leaves used to manage asthma, cough and fever.	Leave	×	✓	(Amjad and Arshad, 2014)
42	*Rhus aromaticus* L.	Tilian	Acnthaceae	Shrub	Skin diseases and blood purification.	Flower and leaves	×	×	(Arshad, 2014)
43	*Nerium* Indicummill.	Kandira	Apocynaceae	Shrub	As Miswak, (toothbrush) branches are applied. Leaf juice is given in snake and other venomous bites.	Branches and leaves	×	✓	(Amjid and Arshad, 2014)
44	*Carissa opaca* stapf ex haines.	Granda	Apocynaeae	Shrub	Used as food	Fruit	✓	✓	(Amjad and Arshad, 2014)
45	*Berberis lycium* Royle.	Sumblu/komal	Berberidaceae	Shrub	Bone injuries and lesions are usually handled externally with root bark paste. Dry powdered material is used for cough, chest and throat troubles.	Root, stem and leaves	✓	✓	(Amjad and Arshad, 2014)
46	*Sarcococca saligna* (D. Don) Muel.	Nathrooni	Buxaceae	Shrub	Aqueous extract is used as antipyretic and relaxant	Leaf	×	✓	(Amjad and Arshad, 2014)
47	*Viburnum grandiflorum* Wallich ex DC.	Okloo	Caprifoliaceae	Shrub	Leaves and fruits are used to to relieve constipation.	Leaf, fruit	✓	✓	(Amjad and Arshad, 2014)
.48	*Pinus Roxburghii* Sargent	Chir	Pinaceae	Tree	diarrhoea	Stem	×	✓	(Amjad and Arshad, 2014)
49	*Elaegnus umbellata var. parvifolia* Wall. Ex.	Kankoli	Elaegnaceae	Shrub	Seeds are used to cure coughing, lung infections, anticancer, and heart stimulant.	Whole plant	✓	✓	(Amjad and Arshad, 2014)
50	*Mallotus philipinensis* Muell.	Kamila	Euphorbiaceae	Tree	Mashed fruits are used to treat bloody diarrhoea	Leaves	✓	✓	(Amjad and Arshad, 2014)
51	*Butea monosperma* Lam.	Chichra	Fabaceae	Tree	Root is beneficial for the treatment of piles, ulcer and tumours.	Roots and flowers	×	✓	(Amjad et al., 2014)
52	*Indigofera heterantha* Wall.ex Brandis.	Kanthi	Fabaceae	Shrub	ulcers	Flower and leaves	×	✓	(Amjad and Arshad, 2014)

53	*Qurecus dilatata* Lind.	Rein	Fagaceae	Tree	used to treat persistent diarrhea, joint swelling	Leaves	×	✓	(Amjad and Arshad, 2014)
54	*Viola canescens* Wall. ex Roxb.	Banafsha	Violaceae	Herb	Diaphoretic, antipyretic & also used in epileptic seizures & nervous system disorders.	Flowers	×	✓	(Ajaib et al., 2014)
55	*Vicia sativa* L.	Common vetch	Papilionaceae	Herb	Diaphoretic, used against neurological & nervous disorders.	Flower	×	✓	(Ajaib et al., 2014)
56	*Veronica polita* Fries.	Sriri	Scrophulariaceae	Herb	enhance metabolism	Whole plant	×	✓	Present study
57	*Verbascum thapsus* L.	Gidar tobacco	Scrophulariaceae	Herb	Used in cough & pulmonary diseases	Leaf and flower	×	×	(Ajaib et al., 2014)
58	*Typha domingensis* Pers.	Barya	Typhaceae	Herb	Fodder	Whole plant	×	×	(Ajaib et al., 2014)
59	*Trichodesma indica* R. Br.	Gao Zuban	Boraginaceae	Herb	Tonic for refreshment of brain	Flower	×	×	(Ajaib et al., 2014)
60	*Tribulus terrestris* L.	Pakhra	Zygophyllaceae	Herb	used in urinary disorders, chronic cystitis	Flower and root	×	✓	(Ajaib et al., 2014)
61	*Themeda anathera (*Nees).	Bhari ghass	Poaceae	Herb	*Used* for lumbago and rheumatism.	Whole plant	×	✓	(Present study)
62	*Thalictrum foliolosum* DC.	Beni	Ranunculaceae	Herb	Anti-pyretic & blood purifier	Whole plant	×	✓	(Ajaib et al., 2014)
63	*Taraxacum officinale* Weber.	Hund	Asteraceae	Herb	Tonic, anti-constipation & for long term liver & renal diseases.	Shoot and leaf	×	✓	(Present study)
64	*Barleria cristata* L.	Cheka	Acanthaceae	Herb	treatment for toothache, anaemia, snake venom, diabetes, and lungs disorders	Whole plant	×	✓	(Present study)
65	*Bergenia* spp	Zakhm-e-Hyat	Saxifragaceae	Herb	Used for wound healing.	Whole plant	×	✓	(Present study)
66	*Boerhavia procumbens* Banks.	Snati, Itsit	Nyctaginaceae	Herb	Tonic, & remove iron deficiency	Whole plant	×	✓	(Ajaib et al., 2014)
67	*Cuscuta reflexa* Roxb.	Neela Dhari/ Dodder	Cuscutaceae	Herb	Anti-lice, anti-anaemia and also used in skin diseases & other conditions and deficiencies in children.	Whole plant	×	✓	(Ajaib et al., 2014)
68	*Cynodon dactylon* L.	Khabal/ Lawn Grass	Poaceae	Grass	Used for cancer, cough, diarrhea, epilepsy, headache, hypertension, snakebite, stones, tumours, and wounds	Whole plant	×	✓	(Ajaib et al., 2014)
69	*Cyperus rotundus* L.	Muthri/ Nut grass	Cyperaceae	Grass	Anti-inflammatory, anti-pyretic, anti-emetic, painkiller, and muscle relaxant	Whole plant	×	✓	(Ajaib et al., 2014)
70	*Dactyloctenium aegyptium* L.	Madhana Ghass	Poaceae	Grass	Wound healing properties	Whole plant	×	✓	(Present study)
71	*Desmostachya bipinnata* L.	Dhib/ Haifa Grass	Poaceae	Grass	Diuretic and anti-amenorrhea	Whole plant	×	✓	(Ajaib et al., 2014)
72	*Dichanthium annulatum* Forssk.	Ghass/ Ringed Dichanthium	Poaceae	Grass	Used as a medication for hypertension, antidiabetic and anti-inflammatory.	Whole plant	×	✓	(Moreira et al., 2010)
73	*Dicliptera bupleuroides* Nees.	Kaali buti	Acanthaceae	Herb	anti-inflammatory, analgesic, anticancer, antimicrobial and antioxidant	Whole plant	×	✓	(Shamala et al., 2016; Kumari et al., 2016).

74	*Ducehsnea indicia* Andr.	Surkh Akhra	Rosaceae	Herb	Used for stomach diseases	Leaf and flower	×	✓	(Present study)
75	*Eremostachys superba* Royle ex Benth.	Gurganna	Lamiaceae	Herb	Used for fish poisoning.	Seed	×	✓	(Present study)
76	*Erioscirpus comosus* Wall.	Babya	Cyperaceae	Grass	Used for kidney pain	Whole plant	×	✓	(Present study)
77	*Erodium cicutarium* L.	Moni jamain	Geraniaceae	Herb	Used to treat skin diseases and typhoid fever	Whole plant	×	✓	(Moerman, 1998)
78	*Eruca sativa* Garsault.	Tara mera	Brassicaeae	Herb	Used for Blood purifier	Whole plant	✓	✓	(Present study)
79	*Euphorbia prostrata* Ait.	Dudhli, Hazar Dani	Euphorbiaceae	Herb	Anti-diarrhea & also used in skin diseases	Whole plant	×	×	(Ajaib et al., 2014)
80	*Euphorbia hirta* L.	Dudhli	Euphorbiaceae	Herb	Used for cough and other pulmonary disorders	Whole plant	✓	×	(Present study)
81	*Geranium ocellatum* Camb.	Jandorunu	Geraniaceae	Herb	Astringent and diuretic	Whole plant	×	✓	(Ajaib et al., 2014)
82	*Galium aparine* L.	Lahndra	Rubiaceae	Herb	Cure urinary bladder & kidney infection.	Whole plant	×	×	(Ajaib et al., 2014)
83	*Ziziphus jujuba* Mill.	Jujube	Rhamnaceae	Tree	Antioxidant, Immunostimulant	Fruit and leaves	×	✓	(Ajaib et al., 2014)
84	*Leucas cephalotes* (Roth) Spereng.	Chatra	Lamiaceae	Herb	Plant is useful in bronchitis, inflammation, asthma, dyspepsia and paralysis.	Whole plant	✓	✓	(Sailor Girish et al., 2010)
85	*Linum usitatissimum* L.	Alsi	Linaceae	Herb	Anti-allergic, anti-inflammatory and also useful for cardiovascular problems and difficulty in breathing	Seed	×	✓	Present study
86	*Mentha royleana* Benth.	Jangli Podina	Lamiaceae	Herb	Anti-dyspeptic and mouth freshener.	Leaf	✓	✓	(Ajaib et al., 2014)
87	*Oxalis corniculata* L.	Khati	Oxalidaceae	Herb	Fever, urinary tract infections, enteritis, diarrhea, traumatic injuries, and snake bites are all treated with it	Leaf	✓	×	(Ajaib et al., 2014)
88	*Physalis divaricata* D. Don.	Wild tomato	Solanaceae	Herb	It is utilised for the treatment of fever, urinary tract infections	Leaf	×	✓	(Srikanth et al., 2012)
89	*Ranunculus muricatus* L.	Kor kandoli	Ranunculaceae	Herb	Heal snake & scorpion bite	Whole plant	×	×	(Present study)
90	*Solanum surratense* Burm.	Mohkri	Solanaceae	Herb	Used for cough & chest pain.	Whole plant	×	✓	(Present study)
91	*Flacourtia indica* (Brum.f) Merriu.	Governor's plum	Flacourtiaceae	Tree	Fruits are used to cure diuretic, digestive, in jaundice and enlarged spleen. Intermittent fever can be controlled using barks.	Fruits and Bark	×	✓	(Amjad and Arshad, 2014)
92	*Otostegia limbata* (Bth) Boiss.	Ghawareja	Lamiaceae	Shrub	To treat mouth ulcers, leaves are cooked, and the resulting extract is taken orally.	Leaves	×	✓	(Amjad and Arshad, 2014)
93	*Pogonomyrmex rugosus wall* .	Safiad Manja	Lamiaceae	Shrub	Used in fever	Leaves	×	✓	(Amjad and Arshad, 2014)
94	*Rabdosia rugosa* (Wall. ex Benth.) H. Hara.	Wrinkled Leaf Isodon	Lamiaceae	Shrub	The leaves are crushed and consumed to ease stomach pain.	Leaves	×	✓	(Amjad and Arshad, 2014)

95	*Loranthus pulverulentus* Wall in Roxb.	Parwikh	Loranthaceae	Shrub	Diabetes can be Treated using leaf. Juice. Wound healing is aided. By powder from Leaves.	Leaves	×	✓	(Amjad and Arshad, 2014)
96	*Woodfordia fruticosa* (L) Kurz.	Samu	Lythracceae	Shrub	Utilized in fever and to reduce menstrual pain.	Flower and leaves	×	✓	(Amjad and Arshad, 2014)
97	*Acacia modesta* Wall.	Palahi	Mimosaceae	Tree	The gum is taken as tonic and given in general weakness.	Whole plant	×	✓	(Amjad and Arshad, 2014)
98	*Ficus carica* Linn.	Tosi	Moraceae	Tree	Fresh and dried fruits are consumed. Being laxative and used in constipation.	Whole plant	×	✓	(Amjad and Arshad, 2014)
99	Myrsine *africana* L.	Gugal	Myrsinaceae	Shrub	Leaves are used to purify the blood.	Leaves	×	✓	(Amjad and Arshad, 2014)
100	*Ziziphus mauritiana Lam.*	Beri	Rhamanaceae	Tree	Fruits are consumed and used as a digestive stimulant.	Fruits	×	✓	(Amjad and Arshad, 2014)

Discussion

Interaction between plants and human is quite natural and strong. Plants supply food, fodder, fuel wood and countless other beneficial activities, especially medication. Pakistan is rich in wild medicinal flora in various regions, but certain areas are still unexplored. During the current study, it is reported that local inhabitants of Samror, District Kotli mostly use plants to treat various ailments such as asthma, stomach disorders, fever, wound healing, anti-anthelmintic, anti-inflammatory, skin disease, cough, insect bites, burns, urinary infection, kidney stones, antitumor and anticancer, anti-rheumatic, headache, nervous disorders, respiratory diseases, malaria, toothache and diabetes. The native population is quite knowledgeable about plant species for treating diseases. The native people rely on plants for variety of treatments, but they are not familiar with proper collection methods. They waste most of the medicinal plants during harvesting and processing. Deforestation is one of the major threats to the flora of the area. In a previous study, it is found that the frequently occurring herbs in the area belonged to Family Poaceae, Labiatae and Asteraceae (Ajaib et al., 2014). It is undoubtedly a fact that restorative plants are essential for creating a variety of drugs and treating diseases as affirmed by Qureshi et al., 2007; Hanif et al. 2013.

The residents of the area apply the herbs to treat a variety of ailments like diabetes, hypertension, jaundice, gonorrhea, eczema, rheumatism, and impotency as well as against hemorrhagic septicemia, prolepsis, and anemia in cattle. *Mentha royleana* Benth. and *Mentha spicata* L., were reported to be effective against gastrointestinal disorders (like constipation, vomiting, diarrhea, dysentery, dyspepsia, etc.). Comparable uses of these plants had also been stated by Baquar (1989); Badshah et al. (1996); Ajaib et al. 2013; Zareen et al. 2013; Ajaib et al. 2014. Plants were exploited as a cooling agent, refrigerant, diuretic and useful remedies in urinary tract diseases. *Berginea cilliata (Haw.)* Sternb*., Solanum nigrum* L*., Taraxacum oficinale* Weber. and *Viola canescens* Wall. ex Roxb. Most of the recorded species possess similar uses; however, 16 species had novel uses that had not been recorded before. These include *Conyza bonariensis* (Wound), *Carthamus tinctorius* (Pneumonia), *Celti australis* (Smallpox, anti-allergic), *Dodonaea viscosa* (Toothache, diabetes), *Ipomoea carnea* (Athlete foot), *Launaea taraxacifolia* (Diabetes, pain*), Leucaena leucocephala* (Sexual debility), *Olea ferruginea* (Mouth ulcer, throat pain), *Pinus roxburghii* (Diabetes), *Isodon rugosus* (Mouth infection (Qassim et al., 2019). The current findings are in accordance with the study of earlier researches on the medicinal plants from the Kotli region of AJK.

Plant species, *Biden pilosa*, *Fumaria parviflora*, *Emblica officinalis*, *Sonchus asper*, *Rumex dentatus*, *Fragaria vesca*, *Cichorium intybus, Agrimonia eupatoria, Butea Monosperma*, *Cynodon dactylon*, *Euphorbia prostrata*, *Linum usitatissimum* and *Mentha royleana* have been reported to be used against common diseases. Horiuchi et al., in 2010 reported *Biden pilosa* used in stomach disorder. Gilani et al., in 1996 reported *Fumaria parviflora* used against stomach disorders. Similarly, Wintola et al., 2017

reported *Sonchus asper* and *Rumex dentatus* used in stomach problems. *Fragaria vesca* and *Cichorium intybus* were found effective against digestive tract infection (Enkari et al., 2020). Plant species *Ranunculus arvensis, Emblica officinalis, Borago officinalis* were found effective against fever (Chang et al., 2017). *Oxalis corniculata, Galium aparine* and *Dactyloctenium aegyptium* were used by the rural people to heal wounds (Salehi et al., 2019). Ajaib et al. (2016) reported *Veronica polita* used as blood purifier. *Polygonum barbatum, Polygonum barbatum, Elaegnus umbellata*, *Butea monosperma*, *Cynodon dactylon* have been reported to use as anticancer (Kowsalya et al., 2015).

Conclusion

An ethnobotanical study on the medicinal plant of Samror, District Kotli Azad Kashmir was carried out. A survey was conducted to collect data on the traditional uses of medicinal plants. Ethnobotanical data were collected through questionnaires and interviews with local people. During survey100 medicinal plants belonging to 48 plant families were collected and identified. The most dominant families were Lamiaceae with 9 species, followed by Poaceae and Asteraceae with 6 species respectively. The most frequently used plant parts were leaves 40%, followed by the whole plant 39%, flowers 24%, and seeds, fruits, and roots 19%. The species with the highest use value were *Oxalis corniculata, Mentha royleana, Cannabis Sativa* and *Malva sylvestris*. The most important medicinal uses of plants include, stomach disease, fever, wound healing, Anthelmintic and anti-inflammatory, Blood purifier, skin disease, cough, Insect bites and Burns, Urinary infection, and Kidney stones. The present study showed that the area is rich with diversity of medicinal plants used by the local people against various common diseases. Therefore, it is a need to record the overall diversity of plants in the area and their ethno medicinal and traditional uses. It is also important to create awareness among the local people about the conservation of these medicinal plant species and training for collection and processing to enhance the economic benefits.

References

Abdul MM, Datta BK, Nahar L, Khairul Bashar SAM, Bachar SC and Sarker SD (2009). Antinociceptive, anti-inflammatory and diuretic properties of *Polygonum barbatum* (L.) Hara var. barbata. Rev. Bras.Farmacogn., Joao Pessoa July/Sept, 19(3): 117-119.

Ahmad KS, Abdul H, Fahim N, Mansoor H, Farooq A, Jiabin D, et al. (2017). Ethnopharmacological studies of indigenous plants in Kel village, Neelum Valley, Azad Kashmir, Pakistan. Journal of Ethnobiology and Ethnomedicines. 2017; 13:68. pmid:29191238

Ajaib, M., Haider, S.K, Zikrea, A. & Siddiqui, M.F., (2014). Ethnobotanical Studies of Herbs of Agra Valley Parachinar, Upper Kurram Agency, Pakistan. International Journal of Biology and Biotechenology. 11 (1): 71-83.

Ajaib, M., Khan Z., Khan N. & Wahab, M., (2010). Ethnobotanical Studies on useful Shrubs of District Kotli, Azad Jammu & Kashmir, Pakistan. Pakistan Journal of Botany. 42(3): 1407-1415

Ajaib, M., Khan, Q. & Khan, Z., (2013). A contribution to the ethnobotanical studies of some plants of Loralai District, Baluchistan. Biologia (Pakistan), 59(2): 323-327.

Alexiades, MN., (1996). Selected guidelines for ethnobotanical research: A field manual. New York, NY, USA: The New York Botanical Garden.

Ali, SI. & Qaisar, M., (1992-2012). Flora of Pakistan. Nos. 194-219. Islamabad, ISL, Pakistan: University of Karachi and National Herbarium, PARC

Al-Snafi, AE. (2019). Medical benefit of Malva neglecta-A review. IOSR Journal of Pharmacy, 9(6), 60-67.

Altundag, E., & Ozturk, M. (2011). Ethnomedicinal studies on the plant resources of east Anatolia, Turkey. Procedia-Social and Behavioral Sciences, 19, 756-777

Amjad MS. & Arshad M., (2014). Ethnobotanical inventory and medicinal uses of some important woody plant species of Kotli, Azad Kashmir, Pakistan. Asian Pacific Journal of Tropical Biomedicine 4, 952–958

Arshad M., Ahmad M., Ahmed E., Saboor A., Abbas A., Sadiq S., (2014). An ethnobiological study in Kala Chitta hills of Pothwar region, Pakistan: multinomial logit specification. Journal of Ethnobiology and Ethnomedicine 10, 13. pmid:24467739.

Aumeerudy, Y. (1996). Ethnobotany, Linkages with Conservation and Development. In: Proceedings of First Training Workshop on "Ethnobotany and its application to conservation" NARC, Islamabad, pp. 152-157.

Badshah, L, Hussain, F. & Mohammad, Z., (1996). Floristic and Ethnobotanical study on some plants of Pirgarh Hills, South Waziristan Agency, Pakistan. Pakistan Journal of Botany. 2(2): 167- 177.

Bajaj, YPS. (1999). *Anagallis arvensis* L.(Common Pimpernel): In vitro culture, regeneration of plants, and the formation of anagalline and other saponins. In Medicinal and Aromatic Plants XI (pp. 1-10). Springer, Berlin, Heidelberg

Baquar, SR., (1989). Medicinal and Poisonous Plants of Pakistan. Karachi, KHI, Pakistan: Printas.

Chang, N., Luo, Z., Li, D., & Song, H. (2017). Indigenous uses and pharmacological activity of traditional medicinal plants in Mount Taibai, China. Evidence-Based Complementary and Alternative Medicine, 2017.

Cotton, CM., (1996). Ethnobotany: Principles & Applications. London, LDN, UK: John Wiley.

Cunningham, AB., (2001). Applied Ethnobotany: People, wild plant use and conservation. London, LDN, UK: Earthscan.

Enkari, M., Goodarzi, S., & Ansari, K. (2020). Study of antioxidant effect of rosemary leaf extract (*Rosmarinus officinalis*) and strawberry fruit extract (*Fragaria vesca*) on stomach cancer cells. Applied Biology, 10(40), 5-22.

Gabrani, R., Jain, R., Sharma, A., Sarethy, I. P., Dang, S., & Gupta, S. (2012). Antiproliferative effect of Solanum nigrum on human leukemic cell lines. Indian Journal of Pharmaceutical Sciences, 74(5), 451

Gantait, S., Mahanta, M., Bera, S., & Verma, S. K. (2021). Advances in biotechnology of Emblica officinalis Gaertn. syn. *Phyllanthus emblica* L.: a nutraceuticals-rich fruit tree with multifaceted ethnomedicinal uses. 3 Biotech, 11(2), 1-25

Gupta, M., & Singh, S. (2010). Borago officinalis Linn. an important medicinal plant of Mediterranean region: a review. International Journal of Pharmaceutical Science Review and Research, 5(1), 27-34

Gilani, AH. K. H. Janbaz & Akhtar, M. S. (1996). "Selective Protective Effect of the Extract from Fumaria parviflora on Paracetamol-Induced Hepatotoxicity," General Pharmacology, 27(6): 979-983.

Hanif, U., Mushtaq, S., Ajaib, M. & Ishtiaq, S. (2013). Ethnobotanical studies on some wild plants of head Qadir Abad and adjoining areas, Pakistan. International Journal of Phytomedicine., 5(3): 373-377.

Haqq, I. & Hussain, Z., 1995. Medicinal plants of Palandri, District Poonch (Azad Kashmir). Pakistan Journal of Science. 1: 115-126

Horiuchi, T., Mitoma, H., Harashima, S. I., Tsukamoto, H., & Shimoda, T. (2010). Transmembrane TNF-α: structure, function and interaction with anti-TNF agents. Rheumatology, 49(7), 1215-1228.

Ishtiaq M, Maqbool M, Ajaib M, Ahmed M, Hussain I & Khanam H. (2021). Ethnomedicinal and folklore inventory of wild plants used by rural communities of valley Samahni, District Bhimber Azad Jammu and Kashmir, Pakistan. PLoS ONE, 16(1): e0243151.

Jain, S.K., (1995). A Manual of Ethnobotany. Jodhpor, JDH, India: Scientific Publishers

Jana, S., & Shekhawat, G. S. (2010). Anethum graveolens: An Indian traditional medicinal herb and spice. Pharmacognosy Reviews, 4(8), 179.

Kowsalya, R., Kaliaperumal, J., Vaishnavi, M., & Namasivayam, E. (2015). Anticancer activity of Cynodon dactylon L. root extract against diethyl nitrosamine induced hepatic carcinoma. South Asian Journal of Cancer, 4(02), 083-087.

Kumari, S., M. Deori, R. Elancheran, J. Kotoky and R. Devi (2016). In vitro and in vivo antioxidant, antihyperlipidemic properties and chemical characterization of *Centella asiatica* L. extract. Frontiers in Pharmacology, 7: 400

Laldingliani, T. B. C., Thangjam, N. M., Zomuanawma, R., Bawitlung, L., Pal, A., & Kumar, A. (2022). Ethnomedicinal study of medicinal plants used by Mizo tribes in Champhai district of Mizoram, India. Journal of Ethnobiology and Ethnomedicine, 18(1), 1-29.

Litvinenko YA, MuzychKina RA (2003). Phytochemical investigation of biologically active substances in certain Kazakhstan *Rumex* species. Chemistry of Natural Compounds. 5: 368-370.

Lulekal, E.; Kelbessa, E.; Bekele, T.; Yineger, H. 2008. An Ethnobotanical Study of Medicinal Plants in Mana Angetu District, Southeastern Ethiopia. Journal of Ethnobiology and Ethnomedicine. 2008, 4, 10.

Mahmood A, Qureshi RA, Mahmood A, Sangi Y, Shaheen HM, Ahmad I, et al. (2011). Ethnobotanical survey of common medicinal plants used by people of District Mirpur, AJK, Pakistan. Journal of Medicinal Plants Research. 5(18):4493-4498.

Mahmood, A., A. Mahmood and A. Tabassum. (2011a). Ethnomedicinal survey of plants from District Sialkot, Pakistan. Journal of Applied Pharmcy., 2(3): 212-220

Mehmood, M. H., Al-Rehaily, A. J., Mothana, R. A., & Gilani, A. H. (2012). Species and tissue-specificity of prokinetic, laxative and spasmodic effects of Fumaria parviflora. BMC Complementary and Alternative Medicine, 12(1), 1-8.

Mohiuddin, M., Alam, M.K., Basak, S.R. & Hossain, M.K., (2012). Ethno-Medico botanical study among the four indigenous communities of Bandarban, Bangladesh. Bangladesh Journal of Plant Taxonomy. 19(1): 45-53.

Moreira, F. V., Bastos, J. F., Blank, A. F., Alves, P. B., & Santos, M. R. (2010). Chemical composition and cardiovascular effects induced by the essential oil of *Cymbopogon citratus* DC. Stapf, Poaceae, in rats. Revista Brasileira de Farmacognosia, 20(6), 904-909.

Mughal R. (2016). Taxonomical studies on arboreal flora of Poonch district in Jandk state India. Journal Pleione, 11(1) 367–388.

Munawar T, Anwar K, Bibi Y & Ahmad F. (2021) "*Brighamia insignis*" a Hawaiian endangered species, current status and future prospects: a review. Proceedings of Pakistan Academy of Sciences: B Life Environ Sci. 3;58(2):17–22.

Nasir, E. & Ali, S.I., (1970-89). Flora of Pakistan. No. 1-190. Islamabad, ISL, Pakistan: University of Karachi and National Herbarium, PARC.

Nasir, Y.J. & Rafiq, A.R., (1995). Wild Flowers of Pakistan. Karachi, KHI, Pakistan: Oxford University Press.

Orak, M., Ustundag, M., Guloglu, C., Tas, M., & Baylan, B. (2009). A skin burn associated with Ranunculus arvensis (wedding bloom). Indian Journal of Dermatology, 54(5), 19.

Pirbalouti, A. G., Yousefi, M., Nazari, H., Karimi, I., & Koohpayeh, A. (2009). Evaluation of burn healing properties of *Arnebia euchroma* and Malva sylvestris. Electronic Journal of Biology, 5(3), 62-66

Principe, P. Monetising (1991). the Pharmacological Benefits of Plants; US Environmental protection Agency: Washington, DC.

Qaseem, M., Qureshi, R., Amjad, M. S., Ahmed, W., Masood, A., & Shaheen, H. (2019). Ethno-botanical evaluation of indigenous flora from the communities of Rajh Mehal and Goi union councils of district Kotli, Azad Jammu Kashmir Pakistan. Applied Ecology and Environmental Research, 17(2), 2799-829.

Qureshi, R.A., Gilani, S.A. & Ghufran, M.A., (2007). Ethnobotanical studies of plants of Mianwali District Punjab, Pakistan. Pakistan Journal of Botany., 39(7): 2285-2290.

Qureshi, R.A., M.A. Ghufran and S.A. Gilani. (2007). Ethnobotanical studies of selected medicinal plants of Sudhan Gali and Ganga Chotti Hills, district Bagh, Azad Kashmir. Pakistan Journal of Botany., 39(7): 2275-2283.

Rehman, K., Khan, M. A., Ullah, Z., & Chaudhary, H. J. (2015). An ethno botanical perspective of traditional medicinal plants from the Khattak tribe of Chonthra Karak, Pakistan. Journal of Ethnopharmacology, 165, 251-259.

Sailor Girish, U., Parmar, G., Ashvin, V. D., Seth, N. R., & Seth, A. K. (2010). Research paper pharmacognostical and preliminary phytochemical investigation of *Leucas cephalotes* (Roth) Spreng. Int Journal of Pharmaceutical Research, 2(1).

Salehi, B., Shivaprasad Shetty, M., V. Anil Kumar, N., Živković, J., Calina, D., Oana Docea, A., ... & Sharifi-Rad, J. (2019). Veronica plants—Drifting from farm to traditional healing, food application, and phytopharmacology. Molecules, 24(13), 2454.

Shamala, S., B. Gunasekaran, M.Y. Shukor, M.Z. Bakarb and S.A. Ahmad (2016). Phytochemical investigation, hypocholesterolemic and anti-atherosclerotic effects of *Amaranthus viridis* leaf extract in hypercholesterolemia-induced rabbits. RSC Advances, 6: 32685-96.

Silva, F. Ramos, M. A.; Hanazaki, N.; Albuquerque, U. P. (2011). Dynamics of Traditional Knowledge of Medicinal Plants in a Rural Community in the Brazilian Semi-arid Region. Rev. Bras. Farmacogn. 21(3), 382–391. DOI: https://doi.org/10.1590/S0102-695X2011005000054.

Soni, P., Siddiqui, A. A., Dwivedi, J., & Soni, V. (2012). Pharmacological properties of Datura stramonium L. as a potential medicinal tree: an overview. Asian Pacific Journal of Tropical Biomedicine, 2(12), 1002-1008

WHO, Traditional medicine, (2012). http://www.who.int/mediacentre/factsheets/fs134/en

WHO (2002).Traditional Medicine: Growing Needs and Potentials.

Wintola, O. A., Otang, W. M., & Afolayan, A. J. (2017). The prevalence and perceived efficacy of medicinal plants used for stomach ailments in the Amathole District Municipality, Eastern Cape, South Africa. South African Journal of Botany, 108, 144-148.

Yusuf, M., Wahab, M.A. & Chowdhury, J.U. (2006). Ethno-medico-botanical knowledge from Kauhkali Proper and Betbunia of Rangamati District. Bangladesh Journal of Plant Taxonomy. 13(1):55-61.

Zareen, A., Khan, Z. & Ajaib, M. (2013). Ethnobotanical evaluation of the shrubs of Central Punjab, Pakistan. Biologia (Pakistan), 59(1): 139-147.