



Research Article

Ethno-Pharmacological Profile of Weed Flora of Dir-Upper District, Khyber Pakhtunkhwa

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Abstract | This study explores and documents the traditional medicinal uses of weed flora commonly found in field crops (rice, vegetables, wheat, and maize) in District Dir Upper, Khyber Pakhtunkhwa. Many medicinal plants grow wild or as weeds worldwide, including in Pakistan. The Dir Upper district boasts a diverse weed flora with significant medicinal value for daily use. Surveys using semi-structured open-ended questionnaires were carried out in distant villages of the Larjam subdivisions, specifically interviewing 120 local respondents (85 males, including herbalists and pansiris, and 35 women) regarding the naturally occurring medicinal weeds in the area. During the field survey, traditional knowledge and the ethnobotanical relevance of seasonal weeds were collected. A total of 65 species from 24 families were recorded across the four different seasons (spring, summer, autumn, and winter) in 2021–2023, including 54 angiosperms, 10 tracheophytes, and one pteridophyte. The dominant family was Poaceae (25%), followed by Asteraceae (15%) and Asclepiadaceae (2%). Given the essential roles that these weed species play in medicine, future research on the use and conservation of indigenous weed flora is highly recommended.

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Keywords | Ethnobotany, Weed species, Medicinal uses, District Dir Upper



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Introduction

Plants have been used for therapeutic purposes since prehistoric times. Ancient Unani

documents, Egyptian papyrus, and Chinese traditional medicines mention herbs and weeds as therapeutic sources (Giannenas *et al.*, 2020). Weeds, often considered unwanted plants, can flourish

unexpectedly and mostly impact crop production. (Lemessa and Wakjira, 2015). However, not all weeds are unnecessary; in rangeland areas, annual grasses classified as weeds in agricultural fields are valuable as cattle feed and bird shelters (Bailey *et al.*, 2019). They also serve as animal food and shelter, mitigate land degradation as soil-binding agents, and are frequently used in medicine and nutrition (Gupta *et al.*, 2021). In Pakistan, weeds cause annual losses of 6.3 billion PKR in maize and 4.9 billion PKR in rice crops (Ahmed, 2022; Qadir, 2015). Weeds reduce agricultural productivity by competing with crops for natural resources such as water, nutrients, space, and sunlight. Consequently, local communities target the diversity of medicinal weeds (Rana and Rana, 2016). Instead of eliminating these weeds, it is recommended to investigate their therapeutic and ethnobotanical values. Traditional medical systems remain widely used due to population growth, insufficient medication availability, high treatment costs, complications of some synthetic drugs, and host responses to commonly used drugs for infectious diseases (Thomford *et al.*, 2015).

Medicinal plants are considered extremely healthy because not all weeds are toxic and useless (Ekor, 2014). Herbal medicines can be used by individuals of all ages and genders, as this is a universally applicable truth. Several indigenous medicinal plants can be found growing naturally or cultivated in specific locations in Pakistan (Khan *et al.*, 2013). Hence, conducting research on the flora and educating the local population about its significance are crucial steps to ensure the conservation of medicinal flora.

Ethnomedicinal data also aids taxonomists, pharmacologists, ecologists, wildlife managers, and watershed managers in their efforts to refine the economic status of residents in remote areas (Martinez *et al.*, 2019). Various techniques and methods are used to research medicinal herbs in a specific area or on a particular plant. The locals also think that weeds are reducing the yield of their crops, so they use toxic chemical treatments like herbicides to eradicate weeds permanently (Davis and Frisvold, 2017). However, due to their lack of awareness of the distinction between usual and therapeutic weeds, they treat them similarly, adversely affecting the continual existence of medicinal weeds. This study is the first systematic investigation of the medicinal plant flora in District Dir Upper. Its primary purpose was to

explore and document this flora. Our study aims to differentiate between medicinal and non-medicinal weeds in the study area. The current study strives to inform the general population about the medicinal potential of weeds, as they are commonly perceived as unwanted plants in the affected area.

Materials and Methods

Study area description

District Upper Dir is one of the largest districts and is a famous tourist spot in Khyber Pakhtunkhwa province. Before the establishment of Pakistan, Dir was an independent state that lasted until a presidential declaration in 1969; later, in 1996, it was separated into two Districts (Dir Upper and Lower). Dir Upper encompasses 3699 square kilometers (126500 hec). The Dir Upper district had a total population of 946,421, according to the 2017 census (Muhammad *et al.*, 2021). Figure 1 shows the study area's overall boundaries and geographic status. They are almost entirely Sunni Muslims, mostly Yousafzai Pathan, famous for hospitality and nobleness. The district is far from the capital; hence, no economic or business zone exists. Agriculture and herding is a vital source of the economy.

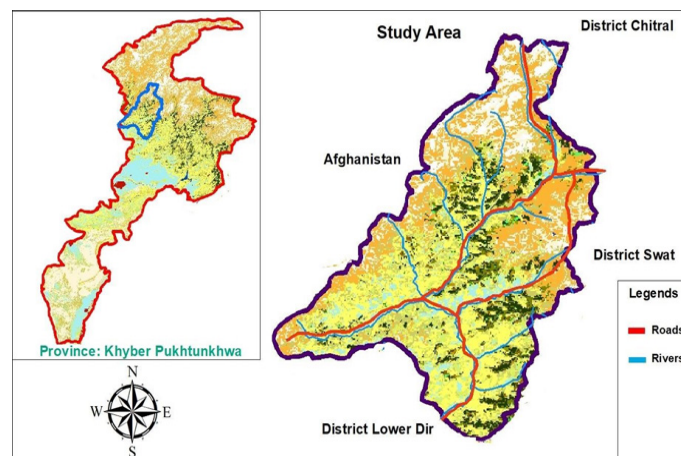


Figure 1: Study site map (Muhammad *et al.*, 2021).

Demographic profile

The researchers used a detailed questionnaire to collect information about the ethnomedicinal uses of plants from residents and Traditional Health Practitioners. Many locals were interviewed, including people of various occupations, ages, and gender. Most respondents were farmers or plant traders, indicating a rural lifestyle. The majority of urban respondents were educators and small business owners. When selecting informants, folk knowledge, location, occupation,

and age were all considered. Priority was given to older people and natives. Most participants were between 45 and 68, as shown in Table 1. All of the participants had extensive knowledge and experience with medicinal plants. Several suggestions and recommendations were made, including local names, traditional uses, and ethnobotanical information. We followed the ‘International Society of Ethnobiology’s guidelines for conducting ourselves ethically during the interview (Grasser *et al.*, 2016). To ensure clarity and simplicity, the survey was conducted in the area’s native language (Pashto).

Table 1: Demographic data of participants, informants.

Variable	Categories	No. of persons	Percentage
Informant category	Local health practitioners	10	8.33
	Local people	110	91.66
Gender	Female	35	29.16
	Male	85	70.83
Age	30-35	14	11.66
	35-40	13	10.83
	40-45	15	12.5
	45-50	22	18.33
	50-55	18	15
	55-60	20	16.66
	60>	18	15
Educational background	Illiterate	28	23.33
	Completed five years of education	18	15
	Completed eight years of education	15	12.5
	Completed 10 years of education	16	13.33
	Completed 12 years of education	17	14.16
	Completed 12 years of education	14	11.66
	Graduate (higher education)	12	10

Results and Discussion

Ethnobotanical diversity

A total of 65 species belonging to 24 families, in which 54 species of angiosperms, 10 species of Tracheophytes, and one of Pteridophyta were recorded. The Poaceae was the dominant family, having 16 species, followed by Asteraceae with (10 species), Brassicaceae (3

species), Amaranthaceae (5 species), Asclepiadaceae (1 species), Aizoaceae (1 species), Caryophyllaceae (2 species), Chenopodiaceae (3 species), Cucurbitaceae (1 species), Convolvulaceae (3 species), Cyperaceae (1 species), Euphorbiaceae (3 species). We found 58 herbs and 5 shrubs as their parts used as shown in (Figure 2). Family name, taxon name, common name, part used, habitat and ethnobotanical information were noted, as shown in Table 2.

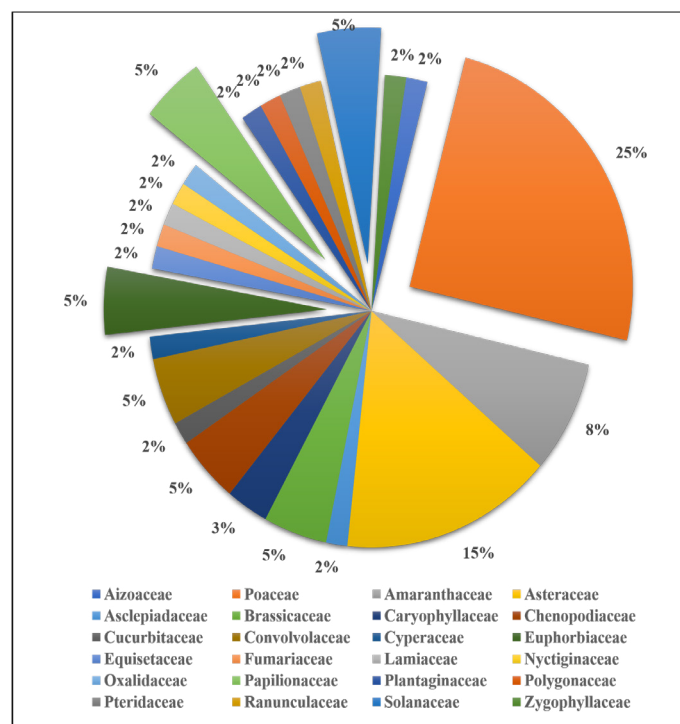


Figure 2: Ethnobotanical diversity of weeds.

Disease categories

Out of all medicinal weeds, the most plants are used for digestive issues, followed by skin diseases. *Cyperus rotundus* L. and *Convolvulus arvensis* L. are used to treat diarrhea malaria, and as laxatives. The latex produced by the euphorbia species is used to treat skin conditions. Fever, infections, and several other conditions are treated by using various species. Various herbs and shrubs cure wounds and lessen inflammation (Figure 3). *Euphorbia helioscopia* L. is used to cure digestive problems, athlete’s foot, and constipation. Wounds were treated with *Euphorbia prostrata* (Zahra and Rahman, 2018). Indigenous people employ the 173 medicinal plants identified by (Sen and Samanta, 2015) for various functions, including treating humans and animals. It is essential to assess and further explore the mentioned plant species utilizing their medicinal and biological properties.

Table 2: Ethnobotanical information of medicinal weeds.

Family name	Taxan name	Common name	Part used	Habitat	Ethno botanical uses
Aizoaceae					
	<i>Trianthema portulacastrum</i> L.	Black weed	Whole	Herb	It's used for analgesic treatment of blood disease and night blindness.
	<i>Achyranthes aspera</i> L.	Prickly chaff plant	Leaves	Herb	It's used for cough malarial fever, asthma, hypertension, and diabetes
	<i>Amaranthus polygonoides</i> L.	Chaurli	Whole	Herb	It's used for analgesic, antipyretic, anti cholesterlemic, asthma and venereal diseases
	<i>Alternanthera pungens</i> Kunth	Gidar sag	Weed	Herb	Used as painkiller, for stomachache, swelling and nasopharyngeal infections
	<i>Amaranthus viridis</i> L.	Churlyai	Leaves	Herb	Leaves are used cooked and vegetable.
	<i>Digera muricata</i> (L.) Mart.	Jangli saag	Whole	Herb	Used are digestive disorder
Asteraceae					
	<i>Calendula arvensis</i> (Vaill.) L.	Ziar gully	Whole	Herb	It is used for skin problems
	<i>Cirsium arvense</i> (L.) Scop.	Azghkay	Roots	Herb	A chewed as a remedy for toothache.
	<i>Cichorium intybus</i> L.	Chicory	Leaves	Herb	It is used for appetite stimulant
	<i>Conyza bonariensis</i> (L.) Cronquist	Skha botay	Leaves	Herb	It's used for the treatment of malaria
	<i>Conyza canadens</i> (L.) Cronquist	Dhnya-botay	Fruit seed	Herb	Leaves are cooked as vegetable, seed cooked in combination with rice.
	<i>Eclipta alba</i> (L.) Hassk.		Whole	Herb	Treatment of gastrointestinal disorder
	<i>Lactuca serriola</i> L.				as sedative, hypnotic, cough suppressant, expectorant, purgative, diuretic, vasorelaxant, demulcent, antiseptic and antispasmodic.
	<i>Silybum marianum</i> (L.) Gaertn.	Shana Ghana	Seed	Herb	It's used for liver problem, hepatitis and prostatic cancer.
	<i>Sonchus oleraceous</i> L.	Shwada botay	Leaves and roots	Herb	Treatment for general pain, headaches diarrhea and menstrual problem.
	<i>Xanthium strumarium</i> L.	Geshkay	Leaves and stem	Herb	Leaves are used antipyretic and respiratory disorder.
Asclepiadaceae					
	<i>Calotropis procera</i> (Aiton) R.Br.	Spalami	Roots	Shrub	Use against stomachache and diuretic, for muscular pain.
Brassicaceae					
	<i>Brassica campestris</i> L.	Sharsham	Whole plant	Herb	Fodder for cattle, leaves and flower use as vegetable. Seed oils can be used for body massage.
	<i>Coronopus didymus</i> (L.) Sm.		Whole	Herb	Used for lungs and malaria.
	<i>Raphanus raphanistrum</i> L.	Wild radish	Leaves, seed and old roots	Herb	Used for asthma and chest complaints.
Caryophyllaceae					
	<i>Cerastium glomeratum</i> Thuill.		Leaves and shoot	Herb	It's used for relieve headaches.
	<i>Stellaria media</i> (L.) Cirillo		Whole	Herb	It's used for itching skin. treat various gastrointestinal disorders, asthma, diarrhea, measles, jaundice, renal, digestive, reproductive and respiratory tracts inflammations

Table continued on next page.....

Family name	Taxan name	Common name	Part used	Habitat	Ethno botanical uses
Chenopodiaceae					
	<i>Chenopodium album</i> L.	Churlayai	Whole	Herb	Used for digestive, cardio tonic and anthelmintic.
	<i>Chenopodium ambrosioides</i> L.	Bathu	Tea	Herb	Treatment for lungs problem and infusion for inflammatory problem.
	<i>Chenopodium murale</i> L.	Karund	Leaf	Herb	Used for digestive problems hair loss and depression.
Cucurbitaceae					
	<i>Citrullus colocynths</i> (L.) Schrad.	Anda botay	Seed, root, fruit	Herb	Used as a digestive agent, for digestive disorder
Convolvulaceae					
	<i>Convolvulus arvensis</i> L.	Peer khattoony	Seed	Herbaceous	Used for laxative and cough and skin problem
	<i>Ipomoea eriocarpa</i> R.Br		Stem oil	Herb	Treatment for headache, epilepsy, leprosy and fever.
	<i>Ipomoea hederacea</i> Jacq.		Seeds	Herb	Its use for blood purifier, anthelmintic and anti-inflammatory action.
Cyperaceae					
	<i>Cyperus rotundus</i> L.	Della	Roots	Herb	It's used for diarrhea, malaria and stomach.
Euphorbiaceae					
	<i>Euphorbia helioscopia</i> L.	Mandanu	Milky sap	Herb	Latex is used to treat burns and skin eruption.
	<i>Euphorbia hirta</i> L.	Shawda boaty	Shoot	Herb	Latex is used against skin problems, shoot as fodder
	<i>Euphorbia prostrata</i> Aiton	Shawdy boaty	Latex, shoot	Herb	Shoots as used for against itching.
Equisetaceae					
	<i>Equisetum arvense</i> L.	Bandakay	Whole	Herb	Used against kidney stone, fever, small intestine and urinary inflammation
Fumariaceae					
	<i>Fumaria indica</i> (Hauskn.) Pugsley	Karachay	Root and leaves	Herb	It's used for aches and pain, diarrhea fever, influenza.
Lamiaceae					
	<i>Lamium amplexicaule</i> L.		Leaves and shoot	Herb	It's used for antispasmodic, astringent, and antiviral.
Nyctiginaceae					
	<i>Boerhavia diffusa</i> L.	Abi gul	Whole plant	Herb	Diuretic, wound healing
Oxalidaceae					
	<i>Oxalis corniculata</i> L.	Kahttami-tha	Leaves	Herb	It's used for anti-inflammatory, digestive and anti-bacterial.
Papilionaceae					
	<i>Sesbania sesban</i> (L.) Merr.	Jantar	Root and leaves.	Shrub	The root and leaves used medicinally for scorpings, stings and abscesses. The leaves are used for sore throat.
	<i>Trifolium resupinatum</i> L.	Barseen	Whole plant	Herb	
	<i>Vicia sativa</i> Guss.	Rodi	Leaves	Herb	Its provide palatable forage fresh and grain to livestock.
Plantaginaceae					
	<i>Plantago lanceolata</i> L.	Jabea	Seed	Herb	Treatment for skin, respiratory tract and insect bites.

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Family name	Taxan name	Common name	Part used	Habitat	Ethno botanical uses
Polygonaceae					
	<i>Rumex dentatus</i> L.	Jangli palak	Leaves and stem	Herb	It's used as an anti-inflammatory, antitumor, and anti-dermatitis medication.
Poaceae					
	<i>Avena fatua</i> L.	Jamadr	Seed	Herb	It's used as nerve stimulant
	<i>Cynodon dactylon</i> (L.) Pers.	Kabal	rhizome	Herb	It's used for cancer, cough, diarrhea and epilepsy.
	<i>Cenchrus ciliaris</i> L.	Siti grass	Whole	Herb	It's used for body pain menstrual disorder and urinary infection.
	<i>Desmostachya bipinnata</i> (L.) Stapf	Halfa grass	Seed, stem, leaves	Herb	Decoction of seed used to relive pain in the region of kidney; stem and leaves applied treatment of ulcer.
	<i>Dichanthium annulatum</i> (Forssk.) Stapf	Murga ghaa	Rhizome	Herb	It's commonly used as a forage for livestock.
	<i>Digitaria ciliaris</i> (Retz.) Koeler	Summer grass	Whole	Herb	Use as a fodder for cattle
	<i>Eleusine indica</i> (L.) Gaertn.	Wiregrass	Whole	Herb	Is used in antipyretic for all herbivore domestic species of animals.
	<i>Hordeum murinum</i> L.	Barley	Seed	Herb	Seed cooked used as pinole. Only use when easier and better food were not available. The seed can be ground into a flour and used as a cereal and making bread, porridge.
	<i>Imperata cylindrica</i> (L.) P. Beauv.	Cogongrass	Whole	Herb	It has medicinal properties can be used as a construction and fiber as an ornamental. Young inflorescence and shoot may be eaten cooked. Root contains starch and sugar and therefore are easy to chew.
	<i>Phalaris minor</i> Retz.	Sittee boti	Whole	Herb	It's used as a fodder or forage for livestock and birdseed, but it's poisonous for some mammal and is a potential contaminant of seed crops.
	<i>Poa annua</i> L.	Bluegrass	Whole	Herb	It's used to treat unspecified medicinal disorder, as animals food and a medicine and has environmental uses
	<i>Polygogon monspeliensis</i> (L.) Desf	Foot grass	Whole	Herb	Fodder medicinal use of annual foot grass. Infusion of the ashes has been used in the treatment of heart palpitation.
			Whole	Herb	Used as fodder
	<i>Rostraria cristata</i> (L.) Tzvelev		Whole	Herb	Use as forage, nutritive value
	<i>Saccharum griffithii</i> Munro ex Hole		Whole	Herb	
	<i>Saccharum munja</i> Roxb.		Roots	Herb	Saccharum munja is used to cure bleeding wounds.
	<i>Setaria pumila</i> (Buse) B.K.Simon		Seeds	Herb	Consumed by millions of humans across the world, as well as forage and bird feed
Pteridaceae					
	<i>Pteris vittata</i> L.	Chines brake	Whole	Herb	Wound healing

Table continued on next page.....

Family name	Taxan name	Common name	Part used	Habitat	Ethno botanical uses
Ranunculaceae					
	<i>Ranunculus muricatus</i> L.	Chambel	Fruits	Herb	Used in the treatment of intermittent fever and asthma
Solanaceae					
	<i>Datura innoxia</i> Mill.	Datura	Leaves and fruits	Shrub	Leaf as bandage to control bleeding, boiled seed used against asthma.
	<i>Solanum nigrum</i> L.	Karmacho	Fruits	Herb	Fruits are used against joint pain and fever.
	<i>Withania somnifera</i> (L.) Dunal	Khamazoo ra	Seed	Shrub	Seeds for wounds, to regulate body temperature
Zygophyllaceae					
	<i>Tribulus terrestris</i> L.	Markon-dayai	Seed, flower	Herb	Seeds are used urinary infection

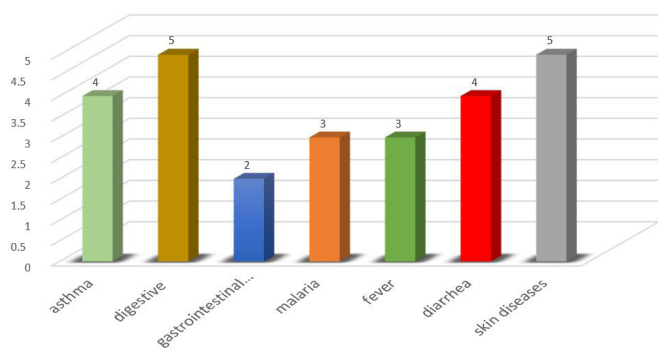


Figure 3: Disease category.

Forms and mode of utilisation

Out of 65 plants, 49 were medicinal and could treat respiratory, viral, and bacterial conditions, while 3 species were used as wild vegetables, as shown in (Figure 4). The eight plant species benefited as fodder for livestock to fulfill their nutritional value. In addition to their nutritional significance, the plant’s leaves and fruits are frequently consumed in cooking and were termed wild vegetables. The 1% is applied for ornamental purposes and the making of baskets and ropes (Nedelcheva *et al.*, 2011). The area’s valuable commercial and ethnomedicinal vegetation is disappearing. The area’s vegetation is strongly advised to be used and conserved sustainably.

Part used

The parts of plant species, i.e., leaves, roots, stems, milky latex, and seeds, were introduced for medicinal purposes. Weeds in different forms were utilised to develop remedies such as extracts, powdered pastes, and decoctions. 17% of the leaves were utilized as a hemostatic agent to halt bleeding. Additionally, the seeds had therapeutic effects in treating injuries and

regulating body temperature, as depicted in Figure 5. Poaceae was recorded as a dominant family, consumed as cow fodder as shown in Figure 6. The natives used aerial parts, bark, bulbs, cones, fruit, flowers, gum, husks, leaves, needles, nuts, rhizomes, roots, seeds, shoots, and the entire plant for various ethnobotanical purposes (Ur-Rahman *et al.*, 2019).

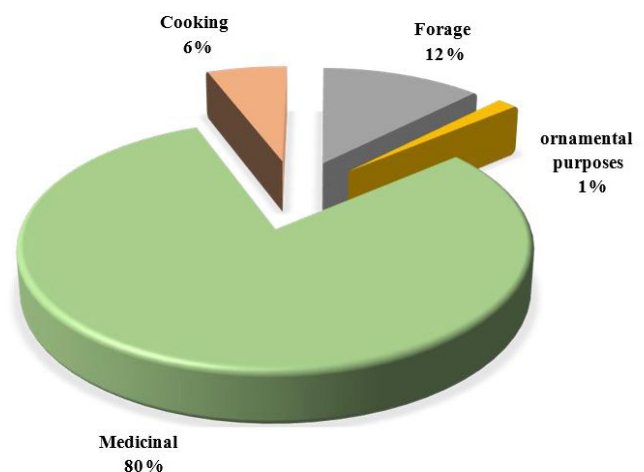


Figure 4: Form and mode of utilization.

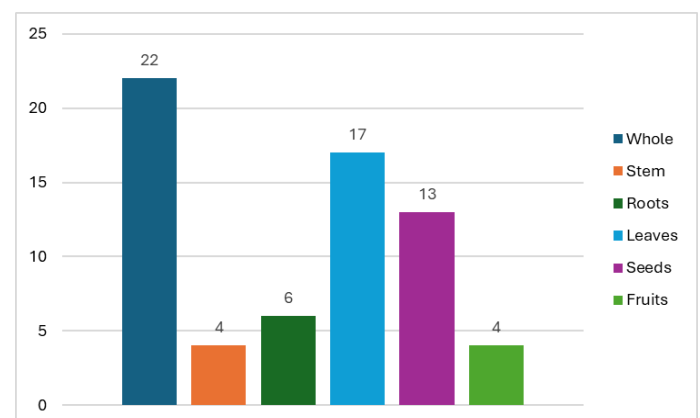


Figure 5: Plant parts used.

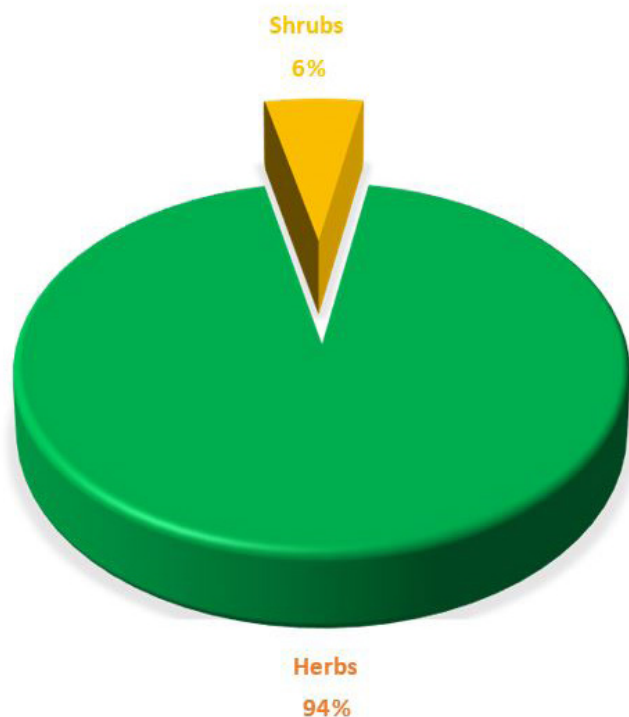


Figure 6: Life form of flora.

The study revealed that weed species in District Dir Upper possess significant medicinal properties, contributing to traditional healthcare practices. These findings underscore the importance of further research and conservation efforts to protect these valuable plant resources. Such efforts can help preserve traditional knowledge and ensure the sustainable use of medicinal weeds.

The study findings emphasize the varied use of different plant components for medical purposes, resulting in the development of numerous medicines from these sources. Leaves were employed as a hemostatic agent, while seeds had medicinal properties in treating injuries and regulating body temperature. The family Poaceae was recognised as the most prevalent, mostly used as feed, as reported by the indigenous people, who employed a diverse array of plant components for ethnobotanical objectives, demonstrating their profound traditional wisdom. Considering the crucial functions these plant species fulfil in medicine, it is strongly advised to conduct further investigations on the utilisation and preservation of native weed flora.

The study found that digestive and skin illnesses are treated with the most medicinal weeds.

Xanthium strumarium leaves are used antipyretic and respiratory disorder (Mouhamad, 2022). *Brassica campestris* fodder for cattle, leaves and flower use

as vegetable, seed oils can be used for body massage (Dilshad *et al.*, 2008; Shankar *et al.*, 2019). According to (Jahan *et al.*, 2014) *Eclipta alba* species is used to treatment of gastrointestinal disorder (Jahan *et al.*, 2014). *Digera muricata* are used digestive disorder (Manimekalai *et al.*, 2020). *Calotropis procera* use against stomachache and diuretic, for muscular pain (Ghosh *et al.*, 2010). *Stellaria media* it's used for itching skin treat various gastrointestinal disorders, asthma, diarrhea, measles, jaundice, renal, digestive, reproductive and respiratory tracts inflammations (Gulshan *et al.*, 2012; Singh *et al.*, 2020).

Euphorbia species latex treat skin disorders. *Euphorbia helioscopia* L. and *Euphorbia prostrata* treat further ailments, while herbs and shrubs treat wounds and inflammation (Alsaffar *et al.*, 2021; Salehi *et al.*, 2019). Indigenous people use medicinal weeds from prior research to heal humans and animals, demonstrating the depth of traditional knowledge and the necessity to further study these valuable weed species (Kunwar *et al.*, 2019; Uprety *et al.*, 2012).

The leaves of *Conyza canadensis* were cooked as vegetables, and the seeds were eaten with rice. The Poaceae family, which was predominated, can treat both acute and chronic illnesses like cancer, cough, diarrhea, and epilepsy (Ngoua-Meye-Misso *et al.*, 2019). Diabetes, hepatitis, cardiac difficulties, diarrhea, dysentery, piles, constipation, premature ejaculation, cold/flu/fever, respiratory tract problems, digestive problems, ulcers, tumour, and headaches were only a few conditions treated using recorded medicinal plants (Kadir *et al.*, 2014). According to Kumari *et al.*, (2019) some herbs were used to treat various ailments such as bronchitis, TB, and asthmatic cough. Diarrhea, dyspepsia, persistent constipation, vomiting, ulcers, skin inflammations, and many male and female sexual diseases (Kumari *et al.*, 2019). Aproxemety 70% of people consume weed species for primary healthcare, making them essential natural resources with the potential to yield safe drugs and treatments (Smith-Hall *et al.*, 2012).

Conclusions and Recommendations

According to this survey, most people depended on agriculture for a living, and current services were deficient in the area. Despite some weeds potential therapeutic benefits, local farmers frequently used several techniques to eradicate weeds and ultimately

increase crop productivity. Toxic sprays like herbicides and weedicides seriously endanger the medicinal weed flora. Some species of plants, like *Taraxacum*, *Chenopodium*, and *Rumex*, are versatile and need careful management and conservation care. A few things directly affected the local flora, mainly the medicinal weeds and the vegetation in universal. Both immediate conservation efforts and local public awareness campaigns are urgently needed. Seminars and conferences are a couple of examples of these programs. Future research should focus on using and conserving indigenous weed flora to preserve traditional knowledge and promote sustainable use of these medicinal plants. Such efforts are crucial for maintaining biodiversity and supporting local healthcare practices.

Acknowledgement

We are thankful to the participants of the study area for their cooperation.

Novelty Statement

This study represents the first systematic investigation of the medicinal plant flora in District Dir Upper, a region that has received limited attention in the existing literature on medicinal weeds in Pakistan. By differentiating between medicinal and non-medicinal weeds in the study area, this research provides novel insights into the underexplored medicinal weeds diversity of this region, contributing to a better understanding of the ethnobotanical knowledge and potential therapeutic applications of the local flora. Through this comprehensive assessment of the medicinal weeds resources in District Dir Upper, the study fills an important gap in the scientific understanding of the medicinal plant wealth of this understudied area of Pakistan.

Author's Contribution

All authors contributed equally in the manuscript.

Conflict of interest

The authors have declared that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

References

- Ahmed, A., 2022. Modelling farmer and consumer preferences for cleaner food production Durham University.
- Alsaffar, D.F., A. Yaseen, R. Mahmud and N.H.K.A. Aziz. 2021. Wound healing studies of selected euphorbia species: A review. *Ann. Roman. Soc. Cell Biol.*, 25(6): 15542-15555.
- Bailey, D.W., J.C. Mosley, R.E. Estell, A.F. Cibils, M. Horney, J.R. Hendrickson and E.A. Burritt. 2019. Synthesis paper: Targeted livestock grazing: Prescription for healthy rangelands. *Rangel. Ecol. Manage.*, 72(6): 865-877. <https://doi.org/10.1016/j.rama.2019.06.003>
- Davis, A.S. and G.B. Frisvold. 2017. Are herbicides a once in a century method of weed control? *Pest Manage. Sci.*, 73(11): 2209-2220. <https://doi.org/10.1002/ps.4643>
- Dilshad, S.M.R., Z. Iqbal, G. Muhammad, A. Iqbal and N. Ahmed. 2008. An inventory of the ethnoveterinary practices for reproductive disorders in cattle and buffaloes, Sargodha district of Pakistan. *J. Ethnopharmacol.*, 117(3): 393-402. <https://doi.org/10.1016/j.jep.2008.02.011>
- Ekor, M., 2014. The growing use of herbal medicines: Issues relating to adverse reactions and challenges in monitoring safety. *Front. Pharmacol.*, 4: 66193. <https://doi.org/10.3389/fphar.2013.00177>
- Ghosh, K.C., H. Rahman, J. Alam, M.O. Faruque and M. Mahamudul. 2010. A comparative analysis of medicinal plants used by folk medicinal healers in villages adjoining the Ghaghot, Bangali and Padma Rivers of Bangladesh. *Am. Eurasian J. Sustain. Agric.*, 4(1): 70-85.
- Giannenas, I., E. Sidiropoulou, E. Bonos, E. Christaki and P. Florou-Paneri. 2020. The history of herbs, medicinal and aromatic plants, and their extracts: Past, current situation and future perspectives. In: *Feed additives*. Elsevier. pp. 1-18. <https://doi.org/10.1016/B978-0-12-814700-9.00001-7>
- Grasser, S., C. Schunko and C.R. Vogl. 2016. Children as ethnobotanists: Methods and local impact of a participatory research project with children on wild plant gathering in the Grosses Walsertal Biosphere Reserve, Austria. *J. Ethnobiol. Ethnomed.*, 12: 1-17. <https://doi.org/10.1016/j.jep.2008.02.011>

- [org/10.1186/s13002-016-0119-6](https://doi.org/10.1186/s13002-016-0119-6)
- Gulshan, A.B., A.A. Dasti, S. Hussain, M.I. Atta and M. Amin-ud-Din. 2012. Indigenous uses of medicinal plants in rural areas of Dera Ghazi Khan, Punjab, Pakistan. *J. Agric. Biol. Sci.*, 7(9): 750-762.
- Gupta, A.K., J. Tomar, R. Kaushal, D. Kadam, A. Rathore, H. Mehta and P. Ojasvi. 2021. Aromatic plants based environmental sustainability with special reference to degraded land management. *J. Appl. Res. Med. Aromat. Plants*, 22: 100298. <https://doi.org/10.1016/j.jarmap.2021.100298>
- Jahan, R., A. Al-Nahain, S. Majumder and M. Rahmatullah. 2014. Ethnopharmacological significance of *Eclipta alba* (L.) hassk. (Asteraceae). *Int. Sch. Res. Notices*, 2014(1): 385969. <https://doi.org/10.1155/2014/385969>
- Kadir, M.F., M.S.B. Sayeed, N.I. Setu, A. Mostafa and M. Mia. 2014. Ethnopharmacological survey of medicinal plants used by traditional health practitioners in Thanchi, Bandarban Hill Tracts, Bangladesh. *J. Ethnopharmacol.*, 155(1): 495-508. <https://doi.org/10.1016/j.jep.2014.05.043>
- Khan, S.M., S. Page, H. Ahmad, H. Shaheen, Z. Ullah, M. Ahmad and D.M. Harper. 2013. Medicinal flora and ethnoecological knowledge in the Naran Valley, Western Himalaya, Pakistan. *J. Ethnobiol. Ethnomed.*, 9: 1-13. <https://doi.org/10.1186/1746-4269-9-4>
- Kumari, R., A. Kumar and B. Kumar. 2019. Ethnobotanical investigation of medicinal plants used by rural communities of district Chatra, Jharkhand, India. *J. Biotechnol. Biochem.*, 5(6): 34-49.
- Kunwar, R.M., K. Shrestha, S. Malla, T. Acharya, A.J. Sementelli, D. Kutal and R.W. Bussmann. 2019. Relation of medicinal plants, their use patterns and availability in the lower Kailash Sacred Landscape, Nepal. *Ethnobot. Res. Appl.*, 18: 1-14. <https://doi.org/10.32859/era.18.7.1-14>
- Lemessa, F. and M. Wakjira. 2015. Cover crops as a means of ecological weed management in agroecosystems. *J. Crop Sci. Biotechnol.*, 18: 123-135. <https://doi.org/10.1007/s12892-014-0085-2>
- Manimekalai, P., R. Kaveena, S. Naveena, S. Nivetha and N. Nivetha. 2020. A review on pharmacognostical and phytochemical study of (*Digera muricata* L.). *J. Med. Plants*, 8: 52-56. <https://doi.org/10.22271/plants.2020.v8.i5a.1196>
- Martinez, J.L., A. Muñoz-Acevedo and M. Rai. 2019. Local Knowledge and Traditions.
- Mouhamad, R.S., 2022. Evaluate the influence of *Xanthium strumarium* L. Extract on blood sugar levels in healthy and diabetic mice. *J. Clin. Cases Rep.*, pp. 72-81.
- Muhammad, M., L. Badshah, A.A. Shah, M.A., Shah, A. Abdullah, R.W. Bussmann and A. Basit. 2021. Ethnobotanical profile of some useful plants and fungi of district Dir Upper, Tehsil Darora, Khyber Pakhtunkhwa, Pakistan. *Ethnobot. Res. Appl.*, 21: 1-15. <https://doi.org/10.32859/era.21.42.1-15>
- Nedelcheva, A., Y. Dogan, D. Obratov-Petkovic and I.M. Padure. 2011. The traditional use of plants for handicrafts in southeastern Europe. *Hum. Ecol.*, 39: 813-828. <https://doi.org/10.1007/s10745-011-9432-9>
- Ngoua-Meye-Misso, R.L., C. Sima-Obiang, J.D.L.C. Ndong, G.R. Ndong-Atome, J.P. Ondo, F.O. Abessolo and L.C. Obame-Engonga. 2019. Medicinal plants used in management of cancer and other related diseases in Woleu-Ntem province, Gabon. *Eur. J. Integr. Med.*, 29: 100924. <https://doi.org/10.1016/j.eujim.2019.05.010>
- Qadir, U., 2015. Political economy of technology acquisition in Pakistan: policy and constraints in the automotive industry SOAS, University of London.
- Rana, S.S. and M. Rana. 2016. Principles and practices of weed management. Department of Agronomy, College of Agriculture, CSK Himachal Pradesh Krishi Vishvavidyalaya, Palampur, pp. 138.
- Salehi, B., M. Iriti, S. Vitalini, H. Antolak, E. Pawlikowska, D. Kręgiel and K. Czopek. 2019. Euphorbia-derived natural products with potential for use in health maintenance. *Biomolecules*, 9(8): 337. <https://doi.org/10.3390/biom9080337>
- Sen, T. and S.K. Samanta. 2015. Medicinal plants, human health and biodiversity: A broad review. *Biotechnol. Appl. Biodiv.*, pp. 59-110. https://doi.org/10.1007/10_2014_273
- Shankar, S., G. Segaran, R.D.V. Sundar, S. Settu and M. Sathivelu. 2019. Brassicaceae-A classical review on its pharmacological activities. *Int. J. Pharm. Sci. Rev. Res.*, 55(1): 107-113.

- Singh, M., N. Kumari, M. Sharma, M. Thapliyal and S. Guleri. (2020). Floristic composition, species diversity and therapeutic potential of plant resources of agricultural fields of Shri Guru Ram Rai University, Dehradun, Uttarakhand, India.
- Smith-Hall, C., H.O. Larsen and M. Pouliot. 2012. People, plants and health: a conceptual framework for assessing changes in medicinal plant consumption. *J. Ethnobiol. Ethnomed.*, 8: 1-11. <https://doi.org/10.1186/1746-4269-8-43>
- Thomford, N.E., K. Dzobo, D. Chopera, A. Wonkam, M. Skelton, D. Blackhurst and C. Dandara. 2015. Pharmacogenomics implications of using herbal medicinal plants on African populations in health transition. *Pharmaceuticals*, 8(3): 637-663. <https://doi.org/10.3390/ph8030637>
- Uprety, Y., H. Asselin, A. Dhakal and N. Julien. 2012. Traditional use of medicinal plants in the boreal forest of Canada: Review and perspectives. *J. Ethnobiol. Ethnomed.*, 8: 1-14. <https://doi.org/10.1186/1746-4269-8-7>
- Ur-Rahman, I., H. Sher and R. Bussmann. 2019. Reference guide on high value medicinal and aromatic plants—sustainable management and cultivation practices. University of Swat, Pakistan.
- Zahra, F. and A.M. Rahman. 2018. Medicinal us Bangladesh. *Sci. Technol.*, 4: 52-70.