

Flora of Pakistan: An ethnopharmacological perspective

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A B S T R A C T

Ethnopharmacology relies on the knowledge and use of traditional medicinal plants in various human diseases. These plants are a source of nutritional, medicinal and financial support to a greater part of Pakistani population, both in rural and urban setting. Either in the crude form or prepared pharmaceutical formulations, these plants are considered an essential part of the health-care and support system. Being regulated mainly as a part of the Complementary and Alternate Medicine, the plants and their products are used for the treatment of ailments of different organ systems. Their applications vary from being used as tonics, protectants and aids to being used as cytotoxic and antibacterial agents. Pakistan has a variety of biogeographical components which serves as a rich source of medicinal plants. With a deep-rooted history of Unani and Ayurvedic systems in Pakistan, the empirical knowledge about these plants has passed from one generation to the next. Some of these have also been recorded in the historical books of medicine and the components derived from them, now form an essential part of the modern-day pharmaceutical industry. This review provides the information of the flora of medicinal importance acquired from the various parts of Pakistan. The detailed information will help the researchers to develop an understanding about the biological activity and efficacy of phytochemical present in these plants.

Keywords: Ethnopharmacology, therapy, phytochemical, complementary and alternate medicine.

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Introduction

The Islamic Republic of Pakistan is located in the western part of South Asia. It comprises of five main administrative regions stretching from the north to the south as Gilgit-Baltistan and Kashmir, Khyber Pakhtunkhwa, Punjab, Baluchistan and Sindh. There is a diverse climatic variation in these regions.¹ The country enjoys all the four seasons. However, there is a considerable variation in the temperature range and duration of each season.

Pakistan has an agriculture-based economy. Moreover, due to a variety of climatic and biogeographical conditions, the country enjoys a wide floral diversity. A greater part of the population is dependent on plants to derive their nutritional, medicinal and financial

sustenance. Due to the un-availability of basic medical facilities in the far-flung areas, these medicinal plants are used in a variety of formulations including extracts, decoctions, syrups, poultices, lozenges and elixirs. These plants, hence, form an essential component of the health-care system of the country. Due to an ever-changing climatic conditions, there is a constant threat of various biotic and abiotic stress factors to the food crops, cash crops and medicinal plants.^{2,3,4} Efforts should be made to ensure that such threats are addressed appropriately to continue and develop the health care system based on indigenous plants. The current manuscript reviews the flora of medicinal importance belonging to the various regions of Pakistan.

Gilgit Baltistan and Kashmir:

Gilgit Baltistan is the northern most part of Pakistan. The average altitude is 1500m and is a tourist destination in almost all seasons. Health care facilities are scarce especially in far flung areas and doctor to population ratio is alarmingly disproportionate. Due to lack of advance healthcare facilities the use of plants for treatment of various ailments is practiced since ages in the region.

Researchers have reported a number of local plants for medicinal use. The whole plant of *Equisetum arvense* L. (chihly) is used for kidney stones.⁵ *Allium carolinianum* DC. (khush) is used for swellings, dysentery and joints pain.⁶ The leaves and bulbs of *Allium cepa* L. (kashuh) are used as salads and in cooking. Bulbs are chief source of income. Medicinally bulbs are used as aphrodisiac and extract is used in ear pain, flatulence, bacterial infections and skin diseases.⁷ The whole plant of *Allium humile* Kunth (cherum) is used in blood purification and swellings. Similarly, *Allium victorialis* L. (faloon) is used for abdominal problems, swellings, asthma, respiratory problems and dysentery.⁸ The roots of *Asparagus filicinus* are internally used for uterine tumors, leucorrhoea, disturbed menstruation and nervous disorders.⁹ The roots of *Polygonatum geminiflorum* (saat Ashee) are used for dysmenorrhea, uterine tumor and swellings. Some people use its roots as general tonic with milk and ghee.¹⁰ *Zea mays* L. (makayi) belongs to family Poaceae and is the second chief source of food and straw. Its grain is also used medicinally for dysentery and cough.¹¹ *Lepidium sativum* L. (zachik) seeds are used in constipation, reproductive problems, uterine tumors and eye problems.¹² Similarly, the neighboring Jammu and Kashmir region, is rich in the local flora that can be exploited for medicinal purposes.

Researchers reported the use of various plants for their medicinal purposes. *Berberis lyceum royle* (kalam), belonging to family Berberidaceae, the roots and stem of which are used to treat dyspepsia, jaundice and sore throat.¹³ *Cassia occidentalis* (talwar phali or kaswandi) is applied on skin externally for treatment of fungal infections.¹⁴ The leaves of *Erenthemum pulchellum* (neeli booti) are boiled with mustard oil and used for cure of blisters and skin cracks.¹⁵ *Jasminum humile* (peeli chambeli) is used for treatment of skin inflammation and ring worm infection.¹⁶ *Myrsine africana* (gugul) is used for

detoxification and its fruit is used as laxative. The leaves of *Lonicera quinquelocularis* (phut) are grinded into powder form then used for healing of wounds.¹⁷



Figure 1: Indigenous trees and shrubs of Pakistan. A. *Rosa indica* (gulab), B. *Eucalyptus regnans* (safaida), C. *Thuja standishii* (mor pankh)

Khyber Pakhtunkhwa:

Khyber Pakhtunkhwa incorporates the northern mountainous regions and the plain regions of north western part of country bordering Afghanistan. Much similar to the Gilgit Baltistan, KP is scarcely resourced in terms of medical and healthcare facilities. The population is mainly dependent on natural remedies of flora of Khyber Pakhtunkhwa.

Accacia arabica (kekar) belonging to the family Mimosaceae, is widely used as wound dressing material.¹⁸ *Accacia modesta* (Palosa) is used as a tonic and stimulant. It is taken with milk and provides instant energy.¹⁹ *Allium sativum* (Ezzah) has anti-hyperlipidemic effect.²⁰ The underground part of *Arundo donax* (kalam) is burned and the resultant ash is used after boiling with water and filtration for diuretic effect.²¹ *Cyanon dactylon* (owshoo) is a simple herb, which is used to treat small pox by grinding it with rice and *Curcuma longa* and also used for the treatment of piles.²² *Dalbergia sissoo* (sheesham) is used as medicine for mental disorders.²³ The fruit of *Eugenia jambolana* (jaman) has got the medicinal property of lowering the blood glucose level thus used as an anti-diabetic agent. Non-edible part of this fruit (seeds) are used in powdered form for gastric problems.²⁴ *Echinops echinatus* (ont katara) is a member of family Asteraceae and is used for the treatment of liver problems.²⁵ Roots and rhizome of *Glycyrrhiza glabra* (mulathi) are used for cold and flu.²⁶ *Acacia catechu* (katha safaid) aqueous extract is used for treatment of diarrhea.²⁷ *Delphinium denudatum* (jadwar) is used as analgesic and anti-rheumatic agent.²⁸

Podophyllum hexandrum (kakora) is a member of family Berberidaceae and is used in the treatment of liver diseases.²⁹ *Sarcococca saligna* (Landanr) is used to relieve the muscular pain.³⁰ *Nasturtium officinale* (Talmera) is very famous due to its use against constipation and stomachache.³¹ *Chenopodium album* (sarmay) is used as carminative and diuretic agent.³² *Hypericum perforatum* (Shin chai), belongs to Clusiaceae and acts as a diuretic agent. Its tea is used as stimulant and also taken as an analgesic.³³ One of the medicinal plant of the family Cuscutaceae, *Cuscuta reflexa* (Zelai), is used for urinary incontinence and taken as antidiabetic and for blood purification.³⁴ *Dioscorea* spp. (kanis) belongs to Dioscoreaceae and is used for the treatment of jaundice and ulcers.³⁵ *Rumex dentatus* (shalkhay) is a member of Polygonaceae and is used for wound healing.³⁶ *Debregeasia saeneb* (Ajali) belongs to Urticaceae family. The leaves of this plant are ground into a paste which is applied on the blistered feet and is also used for eczema.³⁷

Punjab Region:

Punjab is the most populous province of the country. It stretches the lad between KP and Sindh and Indian Punjab and Baluchistan. Basic health facilities are mostly present but a number of people still follow complementary and alternative medicine specialists. They use their ethnobotanical knowledge to treat common ailments.

Most of these drugs are derived from plants. *Achyranthes aspera* (puth kanda) belongs to family Amaranthaceae. Its different parts are used for medicinal purposes, such as in the treatment of kidney problems and cough.³⁸ The leaves and seeds of *Mangifera indica* (Aam) are used to treat earache and vomiting. *Nerium indicum* Mill (Kanhera) is member of family Apocynaceae. The roots of plant are grinded into powder and are used for abortion.³⁹ Arecaceae family has the medicinal plant *Phoenix dactylifera* (Khajur) that is used to decrease the general body weakness.⁴⁰ *Calotropis procera* (Ak) is used in the treatment of asthma.⁴¹ *Aloe vera* (kwargandal) belongs to Asphodelaceae family. These plants are used to treat the rheumatism, body weakness and in the treatment of pimples or acne.⁴² *Artemisia scoparia* (jhahoo) is used as a purgative.⁴³ The seeds of *Carthamus oxycantha* (poli) are grinded into

flour which is used to treat complications associated with ulcer.⁴⁴ The paste of *Eclipta alba* (Sofed Bhangara) leaves is applied to treat allergy, athlete's foot and ringworm. *Rosa indica* (Gulab) is used in treatment of eye disorders and heart disease.⁴⁵ *Citrus limon* (nimboo) belongs to family Rutaceae and is used as toothpowder for dental infections. *Dodonaea viscosa* (sanatha) is used to treat gastritis and skin allergy.⁴⁶ *Datura innoxia* (*Datura*) is used to treat the gonorrhoea.⁴⁷ Dried seeds of *Planago ovata* (ispaghul) is used as laxative and demulcent. *Foeniculum vulgare* (Saunf) belongs to family Umbelliferae and its dried fruit is used as carminative, stimulant and expectorant.⁴⁸ A number of plants also form the basis of many antiviral strategies.⁴⁹

Achyranthes aspera (puth kanda) belongs to family Amaranthaceae. Asthma is treated with the help of plant ash. It is also used for the treatment of skin diseases.⁵⁰ *Digera muricata* (tandla), is used in treatment of constipation.⁵¹ *Agave americana* (kanwar phara) belongs to Amaryllidaceae, Jaundice is treated with the help of plant pulp.⁵² The seeds of *Anethum graveolens* (soy) are given to females for increased lactation.⁵³ *Cannabis sativa* (bhang) is a member of Cannabinaceae family, it is used as an anti-lice agent.⁵⁴ *Calotropis procera* (Aak) is used for the treatment of asthma. It is also used against snakebite and treatment of jaundice.⁵⁵ *Bombax malabaricum* (sumbul) belongs to Bombacaceae family. Its decoction prepared from roots has killing effects on abdominal worms.⁵⁶ *Eruca sativa* (taara mira / jamahoon). It is used to treat constipation and to kill the abdominal worms. Plant oil is widely used as anti-lice agent. Jaundice is also treated with the help of taara mira.⁵⁷ *Capparis decurva* belongs to family Capparidaceae, is used as blood purifier and the twig is used as a tooth stick (*Miswak*) to relieve toothache and pyorrhoea.

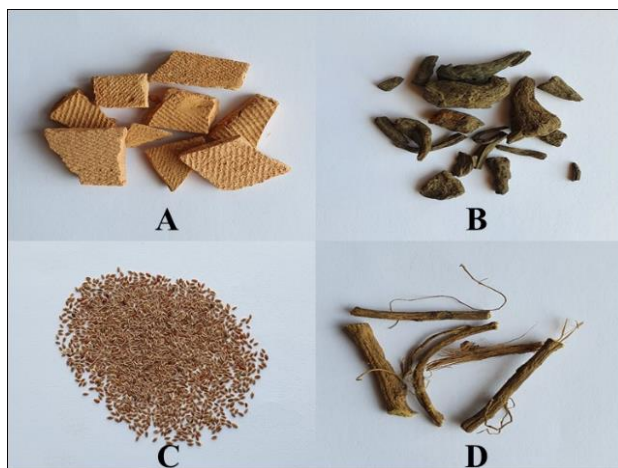


Figure 2: Indigenous crude drugs of Pakistan. A. *Acacia catechu* (katha safaid), B. *Delphinium denudatum* (jadwar), C. *Planago ovata* (ispaghhol), D. *Glycyrrhiza glabra* (mulathi).

Baluchistan:

Baluchistan forms the western most province of Pakistan and is the largest province in terms of land area. Due to the harsh climate and unfertile land, flora of the province is not as diverse in comparison to other areas but the locals utilize available plants and use their ethnobotanical knowledge to treat minor ailments.

Among the various medicinal plants of Baluchistan, *Pimpinella ranunculifoli* (washboo), belonging to family Apiaceae, is used for digestion and is also used to treat heart burn or stomachache. *Stewartiella baluchistanica* (mashlakh) is used as carminative. *Heliotropium baluchistanicum* (daroo) and *Heliotropium ulophyllum* (sag daroo) is used to treat the eye diseases.⁵⁸ The fruit of *Berberis* spp. (karwasakai) is used to treat Snake bite and gynecological problems.⁵⁹ One of the medicinal plant of family Chenopodiaceae is *Atriplex* which is used to treat the skin diseases, as a thirst quencher and for joints pain. *Astragalus khalifatensis* (jib) and *Astragalus lowarensis* are used in colic pain, leprosy treatment and also as an anti-cancer agent. *Berchemia pakistanica* (spera butae) is used in treatment of fever, headache and muscleache.⁶⁰

Sindh:

The southern-most province of the country is Sindh which has a variety of sociological aspects. From extremely under developed regions like the desert of Thar to the cosmopolitan like Karachi, the province's medical and healthcare facilities vary widely.

Abutilon indicum (khangli) is used to relieve the menstrual pain, painful urination and gynecological problems.⁶¹ *Acacia nilotica* (Babool/Desi Keekar) belonging to family Mimosaceae, is used to treat dysentery, diarrhea and vomiting. *Acacia Senegal* (kumbat) is used to treat the burns and inflammation and applied on the skin in the form of a paste.⁴¹ *Achyranthes aspera* (kandii) is used for treatment of abdominal cramps, ulcers and also in vomiting and dysentery.⁶² *Aeluropus lagopoides* (pooji) is used for wound healing and as an analgesic.⁶³ *Aerva javanica* (boo) is used to treat asthma, headache and as a diuretic.⁶⁴ *Aizoon canariense* (Welaiti battar/Dotak) belongs to family Aizoaceae and is used in the treatment of hepatitis and jaundice. *Caesalpinia bonduc* (karbat) belongs to family Caesalpiniaceae and is used in treatment of joints pain associated with trauma and arthritis.⁶⁵ *Launaea resedifolia* (badtar) belongs to family Asteraceae and is used in the treatment of leucorrhoea and jaundice.

Future Perspectives and Conclusion:

The rich diversity of flora in Pakistan and the use of these plants for pharmaceutical purposes calls for the incorporation of modern scientific techniques and procedures to establish the safety and efficacy of these phytochemicals. These plants form the basis of a number of Complementary and Alternative Medicine (CAM) systems. Integration of advanced biological and pharmacological sciences like bioinformatics and pharmacogenomics can help in deciphering the molecular mechanisms involved in the activity of these phytochemicals.⁶⁶ Efforts shall be made to develop the phytochemical based pharmaceutical industry in order to ensure the availability of safe and therapeutically effective medicinal options to a larger population base.

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References

- Khan S. Climate classification of Pakistan. *Int J Eco and Environ Geol.* 2019; 10(2):60-71.
- Khan DA, Ali Z, Iftikhar S, Amraiz D, Sadaf Zaidi NUS, Gul A, et al. Role of phytohormones in enhancing antioxidant defense in plants exposed to metal/metalloid toxicity. *Plants Under Metal and Metalloid Stress: Responses, Tolerance and Remediation*, 1st Ed. Singapore: Springer; 2018,367-400.
- Iftikhar S, Ali Z, Khan DA, Zaidi NUS, Gul A, Babar MM. Arsenic toxicity: A south asian perspective. *Mechanisms of Arsenic Toxicity and Tolerance in Plants*, 1st Ed. Singapore: Springer; 2018,483-502.
- Babar MM, Tariq A. Status of arsenic toxicity in the world. *Mechanisms of Arsenic Toxicity and Tolerance in Plants*, 1st Ed. Singapore: Springer; 2018, 457-81.
- Turker H, Turkay M. Effects of Equisetum arvense plant extracts on the kidney stones and its diuretic action. *Cell Mol Biol.* 2016; 1(1):1-8.
- Kala CP. Medicinal plants of the high altitude cold desert in India: Diversity, distribution and traditional uses. *Int J Biodivers Sci Manag.* 2006; 2(1):43-56.
DOI: <https://doi.org/10.1080/17451590609618098>
- Hussein S, Dhabe A. Ethnobotanical study of folk medicinal plants used by villagers in Hajjah district, Republic of Yemen. *J. Med. Plants Stud.* 2018; 6(5):24-30.
- Khan SW, Khatoon SU. Ethnobotanical studies on some useful herbs of Haramosh and Bugrote valleys in Gilgit, northern areas of Pakistan. *Pak. J. Bot.* 2008; 40(1):43-58.
- Negi JS, Singh P, Joshi GP, Rawat MS, Bisht VK. Chemical constituents of Asparagus. *Pharmacogn Rev.* 2010; 4(8):215–20.
DOI: <https://doi.org/10.4103/0973-7847.70921>
- Singh SK, Singh S, Verma SK, Jain P, Dixit VK, Solanki S. A review on plants of genus polygonatum. *Int J Res Dev Pharm L Sci.* 2013; 2:387-97.
- Wang K-J, Zhao J-L. Corn silk (*Zea mays L.*), a source of natural antioxidants with α -amylase, α -glucosidase, advanced glycation and diabetic nephropathy inhibitory activities. *Biomed Pharmacother.* 2019; 110:510-7.
DOI: <https://doi.org/10.1016/j.biopha.2018.11.126>
- Al-Yahya MA, Mossa JS, Ageel AM, Rafatullah S. Pharmacological and safety evaluation studies on *Lepidium sativum L.*, Seeds. *Phytomedicine.* 1994; 1(2):155-9.
DOI: [https://doi.org/10.1016/S0944-7113\(11\)80035-8](https://doi.org/10.1016/S0944-7113(11)80035-8)
- Ali H, Uddin S, Jalal S. Chemistry and Biological Activities of *Berberis lycium Royle*. *J Biol Act Prod from Nat.* 2015; 5(5):295-312.
DOI: <https://doi.org/10.1080/22311866.2015.1073627>
- Caceres A, Lopez BR, Giron MA, Logemann H. Plants used in guatemala for the treatment of dermatophytic infections. 1. Screening for antimycotic activity of 44 plant extracts. *J Ethnopharmacol.* 1991; 31(3):263-76.
DOI: [https://doi.org/10.1016/0378-8741\(91\)90011-2](https://doi.org/10.1016/0378-8741(91)90011-2)
- Aadhan K, Anand S. Traditional remedial plants utilized in the Paliyar's tribe handling of different skin diseases from Sadhuragiri hills, Tamil Nadu, india. *J Drug Deliv Ther.* 2019; 9(1):275-85.
DOI: <https://doi.org/10.22270/jddt.v9i1-s.2348>
- Prescott TAK, Ariño J, Kite GC, Simmonds MSJ. Inhibition of human calcineurin and yeast calcineurin-dependent gene expression by *Jasminum humile* leaf and root extracts. *J Ethnopharmacol.* 2012 ; 140(2):293-7.
DOI: <https://doi.org/10.1016/j.jep.2012.01.020>
- Jammu A, Shoaib Amjad M, Arshad M, Saboor A, Page S, Khalil Chaudhari S, et al. Ethnobotanical profiling of the medicinal flora of Kotli, Azad Jammu and Kashmir, Pakistan: Empirical reflections on multinomial logit specifications. *Asian Pac J Trop Med.* 2017; 10:503-14.
DOI: <https://doi.org/10.1016/j.apjtm.2017.05.008>
- Bhatnagar M, Parwani L, Sharma V, Ganguli J. Hemostatic, antibacterial biopolymers from *Acacia arabica* (Lam.) Willd. and *Moringa oleifera* (Lam.) as potential wound dressing materials. *Indian J. Exp. Biol.* 2013; 51(10):804-810.
- Shinwari MI, Khan MA. Folk use of medicinal herbs of Margalla Hills National Park, Islamabad. *J Ethnopharmacol.* 2000; 69(1):45-56.
DOI: [https://doi.org/10.1016/S0378-8741\(99\)00135-X](https://doi.org/10.1016/S0378-8741(99)00135-X)
- Hosseini A, Hosseinzadeh H. A review on the effects of *Allium sativum* (Garlic) in metabolic syndrome. *J Endocrinol Invest.* 2015; 38(11):1147-57.
DOI: <https://doi.org/10.1007/s40618-015-0313-8>
- Al-Snafi AE. The constituents and biological effects of *Arundo donax-A* review. *Int. J. Phytopharm.* 2015; 6(1):34-40.
- Liji K, Arya V. Study on medicinal properties of common plants used in Ayurveda. *Int. J. Botany Stud.* 2018; 3(1):39-43.
- Nain J, Saini V, Dhahiya S, Nain P. Evaluation of Anxiolytic Effects of Various Bark Extracts of *Dalbergia Sissoo* in Mice. *J. Pharm. Res.* 2011; 4(12):4485-7.
- Grover JK, Yadav S, Vats V. Medicinal plants of India with anti-diabetic potential. *J Ethnopharmacol.* 2002; 81(1):81–100.
DOI: [https://doi.org/10.1016/S0378-8741\(02\)00059-4](https://doi.org/10.1016/S0378-8741(02)00059-4)
- Murad W, Ahmad A, Gilani SA, Khan MA. Indigenous knowledge and folk use of medicinal plants by the tribal communities of Hazar Nao Forest, Malakand District, North Pakistan. *J. Med. Plants Res.* 2011; 5(7):1072-86.
- Sharma VA, Agrawal RC. *Glycyrrhiza glabra-a* plant for the future. *Mintage J Pharm Med Sci.* 2013; 2(3):15-20.
- Das PR, Akter S, Islam MT, Kabir MH, Haque MM, Khatun Z, et al. A selection of medicinal plants used for treatment of diarrhea by folk medicinal practitioners of Bangladesh. *Am Eurasian J Agric Environ Sci.* 2012; 6(3):153-61.
- Zaheer I, Rahman SZ, Khan RA, Parveen M, Ahmad M. Evaluation of Analgesic Activity of Extracts of *Delphinium denudatum* in Animal Models: A Dose Dependent Pre-Clinical Trial. *J. clin. diagn. res.* 2018; 12(12):01-04.
DOI: <https://doi.org/10.7860/JCDR/2018/37415.12322>
- GANIE SA, ZARGAR BA, MASOOD A, ZARGAR MA. Hepatoprotective and Antioxidant Activity of Rhizome of *Podophyllum hexandrum* against Carbon Tetra Chloride Induced Hepatotoxicity in Rats. *Biomed Environ Sci.* 2013; 26(3):209–21.
DOI: <https://doi.org/10.3967/0895-3988.2013.03.008>
- Ahmad B, Naz S, Rauf A, Bashir S, Khan A, Farooq U, et al. In vivo study on analgesic, gastrointestinal tract (GIT) motility, and anti-termite potential of methanolic extract of *Sarcococca saligna* (D. Don) Muell. fruits. *South African J Bot.* 2018; 114:40-3.
DOI: <https://doi.org/10.1016/j.sajb.2017.10.013>

31. Al-Khalil S. A Survey of Plants Used in Jordanian Traditional Medicine. *Int J Pharmacogn.* 1995; 33(4):317–23.
DOI: <https://doi.org/10.3109/13880209509065385>
32. Ibrahim LF, Kawashty SA, Baiuomy AR, Shabana MM, El-Eraky WI, El-Negoumy SI. A comparative study of the flavonoids and some biological activities of two *Chenopodium* species. *Chem Nat Compd.* 2007; 43(1):24-8.
DOI: <https://doi.org/10.22159/ajpcr.2019.v12i1.28418>
33. Kumar V, Singh P, Bhattacharya S. Anti-inflammatory and analgesic activity of Indian *Hypericum perforatum* L. *Indian J. Exp. Biol.* 2001; 39(4):339-343.
34. Rahmatullah M, Sultan S, Toma T, Lucky S, Chowdhury M, Haque W, et al. Effect of *Cuscuta reflexa* stem and *Calotropis procera* leaf extracts on glucose tolerance in glucose-induced hyperglycemic rats and mice. *Afr. J. Tradit. Complement. Altern. Med.* 2010; 7(2):109-112.
DOI: <https://doi.org/10.4314/ajtcam.v7i2.50864>
35. Mustafa A, Ahmad A, Tantray AH, Parry PA. Ethnopharmacological Potential and Medicinal Uses of Miracle Herb *Dioscorea* spp. *J. Ayu. Her. Med.* 2018; 4(2):79-85.
36. Haq F, Ahmad H, Alam M. Traditional uses of medicinal plants of Nandiar Khuwarr catchment (District Battagram), Pakistan. *J. Med. Plants Res.* 2011; 5(1):39-48.
37. Rashid S, Ahmad M, Zafar M, Sultana S, Ayub M, Khan MA, et al. Ethnobotanical survey of medicinally important shrubs and trees of Himalayan region of Azad Jammu and Kashmir, Pakistan. *J Ethnopharmacol.* 2015 ; 166:340-51.
DOI: <https://doi.org/10.1016/j.jep.2015.03.042>
38. Krishnaveni A, Thaakur SR. Pharmacognostical and preliminary phytochemical studies of *achyranthes aspera* linn. *Anc Sci Life.* 2006; 26(1):1-5.
39. Oommachan M, Khan SS. Plants in aid of family planning programme. *Anc Sci Life.* 1981; 1(1):67-9.
40. Baliga MS, Baliga BRV, Kandathil SM, Bhat HP, Vayalil PK. A review of the chemistry and pharmacology of the date fruits (*Phoenix dactylifera* L.). *Food Res Int.* 2011; 44(7):1812-22.
41. Qasim M, Abideen Z, Adnan MY, Ansari R, Gul B, Khan MA. Traditional ethnobotanical uses of medicinal plants from coastal areas. *J coast life Med.* 2014; 2(1):22-30.
42. Aburjai T, Natsheh FM. Plants used in cosmetics. *Phyther Res.* 2003; 17(9):987-1000.
DOI: <https://doi.org/10.1002/ptr.1363>
43. Kapoor R, Ali M, Mir SR, Rafiullah MRM. Essential oil constituents of aerial parts of *Artemisia scoparia* Waldst. & Kit. *Flavour Fragr J.* 2004; 19(2):109-11.
<https://doi.org/DOI:10.1002/ffj.1278>
44. Ahmad M, Waheed I, Khalil-ur-Rehman M, Niaz U, Hassan SS. A review on *Carthamus oxycantha*. *Pak J Pharm.* 2007; 1:20-3.
45. Quratulain MA, Rafique MK, Ahmad MA, Mahmood R. Management of *Macrosiphum rosae* L. on different cultivars of *Rosa indica* L. by using different botanical extracts and detergent solution. *Pak Entomol.* 2015; 37:15-20.
46. Arun M, Asha VV. Gastroprotective effect of *Dodonaea viscosa* on various experimental ulcer models. *J Ethnopharmacol.* 2008; 118(3):460-5.
DOI: <https://doi.org/10.1016/j.jep.2008.05.026>
47. Ismail S, Nisar MF. Ethnomedicinal survey for important plants of district Lodhran, Punjab, Pakistan. *BIOL (E-Journal of Life Sciences).* 2010; 1(3):52-8.
48. Saddiqi HA, Iqbal Z. Usage and significance of fennel (*foeniculum vulgare* mill.) seeds in eastern medicine. *Nuts and Seeds in Health and Disease Prevention*, 1st Ed. Academic Press, Elsevier Inc.; 2011,461–7.
49. Babar M, Najam-us-Sahar SZ, Ashraf M, Kazi AG. Antiviral drug therapy-exploiting medicinal plants. *J Antivir Antiretrovir.* 2013; 5(02):028-36.
DOI: <https://doi.org/10.4172/jaa.1000060>
50. Hasan S. Pharmacological and medicinal uses of *Achyranthes aspera*. *Int. J. Environ. Sci. Technol.* 2014; 3(1):123-9.
51. Qasim M, Gulzar S, Khan MA. Halophytes as medicinal plants. *Urbanisation, Land Use, Land Degradation and Environment.* 1st Ed. New Delhi: Daya Publishing House; 2011, 330-343.
52. Adnan M, Bibi R, Azizullah A, Andaleeb R, Mussarat S, Tariq A, et al. Ethnomedicinal plants used against common digestive problems. *African J Tradit Complement Altern Med.* 2015; 12(5):99-117.
DOI: <https://doi.org/10.4314/ajtcam.v12i5.15>
53. Javan R, Javadi B, Feyzabadi Z. Breastfeeding: A Review of Its Physiology and Galactagogue Plants in View of Traditional Persian Medicine. *Breastfeed Med.* 2017; 12(7):401-9.
DOI: <https://doi.org/10.1089/bfm.2017.0038>.
54. Bahmani M, Rafeian-Kopaei M, Karamati SA, Bahmani F, Bahmani F, Bahmani E, et al. Antiparasitic herbs used in west regions of Ilam province located in west of Iran. *Asian Pacific J Trop Dis.* 2014; 4:S764-9.
DOI: [https://doi.org/10.1016/S2222-1808\(14\)60724-6](https://doi.org/10.1016/S2222-1808(14)60724-6)
55. Khan MI, Hanif W. Ethnoveterinary medicinal uses of plants from S am aii ni Valley Dist. Bhimber,(Azad Kashmir) Pakistan. *Asian J Plant Sci.* 2006; 5(2):390-6.
DOI: <https://doi.org/10.3923/ajps.2006.390.396>
56. Hossain E, Chandra G, Nandy AP, Mandal SC, Gupta JK. Anthelmintic effect of a methanol extract of *Bombax malabaricum* leaves on *Paramphistomum explanatum*. *Parasitol Res.* 2012; 110(3):1097-102.
DOI: <https://doi.org/10.1007/s00436-011-2594-y>.
57. El-Ghazali GE, Al-Khalifa KS, Saleem GA, Abdallah EM. Traditional medicinal plants indigenous to Al-Rass province, Saudi Arabia. *J Med Plants Res.* 2010; 4(24):2680-3.
DOI: <https://doi.org/10.5897/JMPR09.556>
58. Ghori MK, Ghaffari MA, Hussain SN, Manzoor M, Aziz M, Sarwer W. Ethnopharmacological, phytochemical and pharmacognostic potential of genus *Heliotropium* L. *Turk. J. Pharm. Sci.* 2016; 13:143-68.
59. Akhtar S, Akhtar N, Kazim S, Khan T. Study of ethnogynecologically important medicinal and other plants used for women specific purposes in Murtazaabad, Hunza, Pakistan. *Nat Sci.* 2016; 14:36-9.
DOI: <https://doi.org/10.7537/marsnsj140616.07>
60. Guo L-C, Zhao M-M, Sun W, Teng H-L, Huang B-S, Zhao X-P. Differentiation of the Chinese minority medicinal plant genus *Berberis* spp. by evaluating three candidate barcodes. *Springerplus.* 2016; 5(1):658(1-10).
DOI: <https://doi.org/10.1186/s40064-016-2207-4>.
61. Sahu TR. An Ethnobotanical study of Madhya Pradesh 1: Plants used against various disorders among tribal women. *Anc. Sci. Life* 1982; 1(3):178-81.
62. Londonkar R. Potential Antibacterial and Antifungal Activity of *Achyranthes aspera* L. *Recent res. sci. technol.* 2011; 3(4):53-57.
63. Phondani PC, Bhatt A, Elsarraj E, Horr YA. Ethnobotanical magnitude towards sustainable utilization of wild foliage in Arabian Desert. *J Tradit Complement Med.* 2016; 6(3):209-18.
DOI: <https://doi.org/10.1016/j.jtcme.2015.03.003>
64. Kumar D, Prasad DN, Bhatnagar SP. Comparison of Diuretic activity of ethanolic extract of *Aerva lanata* (linn.) juss. ex. Schult & *Aerva tomentosa* forsk. Family: *Amaranthaceae*. *Anc. Sci. Life* 2005; 25(2):66-68.

65. Simin K, Khaliq-uz-Zaman SM, Ahmad VU. Antimicrobial activity of seed extracts and bondenolide from *Caesalpinia bonduc* (L.) Roxb. *Phyther Res.* 2001; 15(5):437-40.
DOI: <https://doi.org/10.1002/ptr.756>.
66. Babar MM, Kazi AG. Plant Pharmacogenomics: From Drug Discovery to Personalized Ethnomedicine. *PlantOmics: The Omics of Plant Science*, 1st Ed. New Dehli: Springer; 2015, 699-730.