

## THE ETHNOMEDICINAL PROFILE OF FAMILY ROSACEAE; A STUDY ON PAKISTANI PLANTS

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### Abstract

Keeping in view the growing interest of people worldwide towards the medicinal plants; it is of critical importance to document and authenticate the indigenous knowledge regarding medicinal plant administration for the treatment of various ailments. This will also enable the forth coming generation to conduct scientific studies using high throughput technologies to investigate the potential of such medicinal plants. Ethnobotany and ethnomedicine have attracted many scientists because it involves the struggle for cheaper, novel and effective therapeutics from plants. Since the beginning of humanity, plants are used for medicinal purposes in various forms. In the last few years herbal practices have attained global relevance. Among the different plant families, Rosaceae is well known for its therapeutic potential. Plants belonging to Rosaceae are common in Pakistan and used by the different ethnic groups to treat their ailments. The present communication deals with the different ethnomedicinal uses reported in the peer reviewed articles of the various species present in Pakistan.

**Key words:** Ethnobotany, Ethnomedicine, Rosaceae, Therapeutic.

### Introduction

Over a period of time people belonging to different cultures have developed a folk system to treat their diseases by consuming medicinal plants. Plants are the source of treatment for human beings since the time immemorial (Khalil *et al.*, 2014; Bourdy *et al.*, 2008). Human beings have always tried to find the cure of a disease within its habitat or nearby and develop different strategies depending upon the phytogeography, climate and faunal features as well as the type of culture and socio-structural typologies (Nichter, 1992). Different traditional medical practices (Chinese, Greco-Islamic, Ayurvedic, Greek etc) have been developed in many cultures that pertains to the use of different herbs and their preparations against various diseases (Khalil *et al.*, 2014). All the traditional knowledge regarding plants have been generated is by the trial and error method since ancient times. Such information is mostly passed to the next generation by oral rhetoric or by discipleship (Rastogi *et al.*, 1982). According to WHO, about 80% of the people fulfill their health requirements from medicinal plants while out of 250,000-500,000 plants, many of them are yet to be explored for the traditional use (Mahesh & Satish, 2008). Medicinal plants are still the foremost preferred traditional therapy for a large majority of people (Tagola *et al.*, 2005; Hoareau & Dasilva, 1999). Plants contain a mixture of bioactive compounds that can be exploited for its beneficial uses.

Over the years, the global market of herbal and aromatic plants has significantly increased and is expected to reach \$5 trillion by 2050 (Shinwari, 2010). Some of the modern allopathic therapeutants are based on medicinal plants. Some of the anticancer drugs like vinblastine, vincristine and taxol are isolated from plant sources like *Catharanthus roseaus* and *Taxus chinensis* (Micheal *et al.*, 1956). According to rough estimates, there are about 35,000-75,000 medicinal plants that can make a substantial contribution to fulfill the health

vacuum (Khalil *et al.*, 2013). Artemisinin and Quinine are the antimalarial drugs isolated from *Artemisia annua* and *Cinchona* tree respectively. The local tribes and population possess the treasure of indigenous knowledge that should be documented as well as critically examined using scientific principles for their authentication (Shinwari *et al.*, 2013).

Due to the overuse of antibiotics, the world now faces a dilemma of microbial strains becoming resistant to the existed cures and rapidly evolving against the currently used antibiotics (Khalil *et al.*, 2014). One of the major hindrances in the general acceptance of the herbal therapies is the amalgamation of the traditional knowledge in the modern day medical practices which is difficult because very little work has been done on the authentication of the indigenous knowledge. It should be the premier responsibility to document and brought the traditional knowledge to modern day scientific principles (Khalil *et al.*, 2014). Enhancing and preserving the ethnomedicinal knowledge is actually rescuing the global heritage.

Pakistan holds very unique position in the list of developing countries because of medicinal plants which is attributed to variable edaphic conditions, climatic factors and rich flora. Besides the country is blessed with numerous ecological zones and topographical regions which contributes significantly to rich biodiversity of Pakistan (Hussain *et al.*, 2009; Nisar *et al.*, 2011). Folk herbal medicines have deep roots in Pakistan. Greek and Greco-Islamic medicinal practices are popular and commonly used systems. Out of the 6000 flowering plants species, 2000 are considered to have medicinal potential while most of them are yet to be investigated (Shinwari, 1996). Conservational strategies are the need of the hour for medicinal plants as well as indigenous knowledge (Shinwari *et al.*, 2003; Shinwari & Qaiser, 2011). The massive literature on the subject indicates that plant based medicinal practices show prominence in the culture of Pakistan. Different herbs and plants are used in different combinations to treat a disease.

Table 1. Family rosaceae species along with their ethnomedicinal uses.

S. No.	Botanical name	Folk name	Habit	Part used											Ethnomedicinal uses	Literature cited			
				R	S	St	Se	Fl	Fr	Rh	W	L	Ba	Gu					
1.	<i>Potentilla eriocarpa</i> Wall. ex Lehm.	Malli chaw	Herb	+	-	-	-	-	-	-	-	-	-	-	-	-	-	To cure toothache & as a carminative	Dar, 2003
2.	<i>Crataegus songarica</i> G. Koch.	Dakh	Shrub	-	-	-	-	+	-	-	-	-	-	-	-	-	-	Against constipation	Kumar <i>et al.</i> , 2009
3.	<i>Rubus hoffmeisterianus</i> Kunth & Bouch.	Assaa	Shrub	-	-	-	-	+	-	-	-	+	-	-	-	-	-	For skin diseases	Kumar <i>et al.</i> , 2009
4.	<i>Spiraea bella</i> Sims.	-	Shrub	-	-	-	+	-	-	-	-	-	-	-	-	-	-	Wash sores & wounds	Pala <i>et al.</i> , 2010
5.	<i>Prinsepia utilis</i> Royle.	-	Shrub	-	-	-	+	-	-	-	-	-	+	-	-	-	-	Rheumatic pains & diarrhoea	Pala <i>et al.</i> , 2010
6.	<i>Rubus fruticosus</i> L.	Akha	Herb	+	-	-	-	-	+	-	-	+	-	-	-	-	-	To treat infantile hepatitis & diarrhoea	Saeed <i>et al.</i> , 2004
7.	<i>Cotoneaster microphyllus</i> Wall. ex. Lindl.	-	Shrub	-	-	-	-	-	+	-	-	+	-	-	-	-	-	Diarrhoea, cuts & wounds	Pala <i>et al.</i> , 2010
8.	<i>Rosa alba</i> L.	Chitta Gulab	Shrub	-	-	-	-	-	-	-	+	-	-	-	-	-	-	Diabetes	Ahmad <i>et al.</i> , 2009
9.	<i>Amygdalus brahunica</i> subsp. <i>afghanica</i> (Pachomj) Browicz	Mazhmonk/ Mashmonk	Tree	-	-	-	-	-	-	-	-	-	-	-	-	+	-	To treat wounded eyes & chest infection.	Tareen <i>et al.</i> , 2010
10.	<i>Cotoneaster nummularia</i> Fisch & Mey.	Mekin	Shrub	-	-	-	+	-	-	-	-	-	-	-	-	-	-	Used as blood purifier	Hussain <i>et al.</i> , 2007
11.	<i>Crataegus songarica</i> C. Koch.	Ghonii	Shrub or small tree	-	-	-	-	-	-	-	+	-	-	-	-	-	-	To reduce labour pain during childbirth	Hussain <i>et al.</i> , 2007
12.	<i>Potentilla multifida</i> L.	-	Herb	+	-	-	-	-	-	-	-	-	-	-	-	-	-	Hepatitis, enterobiasis functional uterine hemorrhage, type 2 diabetes	Xue <i>et al.</i> , 2005
13.	<i>Crataegus oxyacantha</i> H.K.F.	Tampsa	Tree	-	-	-	-	-	+	-	-	+	-	-	-	-	-	Fodder and fencing	Sher <i>et al.</i> , 2011
14.	<i>Fragaria indica</i> Andr.	Da zamakay toot	Herb	-	-	-	-	-	+	-	-	-	-	-	-	-	-	Laxative	Sher <i>et al.</i> , 2011
15.	<i>Potentilla nepalensis</i> Hook.	Da ghar shalkhay	Herb	+	-	-	-	-	-	-	-	-	-	-	-	-	-	Fever, blood purifier	Sher <i>et al.</i> , 2011
16.	<i>Potentilla reptans</i> L.	-	Herb	-	-	-	-	-	-	-	+	-	-	-	-	-	-	Febrifuge and astringent, anti-inflammatory in uterine and intestinal infections	Sher <i>et al.</i> , 2011
17.	<i>Cydonia oblonga</i> Mill.	Bhae	Tree	-	-	-	-	-	+	-	-	-	-	-	-	-	-	Cough, piles, rectal bleeding and gums bleeding, kidney disorders and abdominal pains	Sabeen & Ahmad, 2009
18.	<i>Rosa brunonii</i> Lindl.,	Chahal	Shrub	-	-	-	-	+	-	-	-	-	-	-	-	-	-	Abdominal pain and constipation	Sabeen & Ahmad, 2009
19.	<i>Sorbaria tomentosa</i> (Lindl.) Rehder	Beree	Shrub	-	-	-	-	+	-	-	-	-	-	-	-	-	-	As an antiseptic & to treat skin rashes of new born babies	Hamayun <i>et al.</i> , 2006

Table 1. (Cont'd.).

S. No.	Botanical name	Folk name	Habit	Part used											Ethnomedicinal uses	Literature cited		
				R	S	St	Se	Fl	Fr	Rh	W	L	Ba	Gu				
20.	<i>Geum elatum</i> Wall. ex G. Don.	Shoonkar	Herb	+	-	-	-	-	-	-	-	-	-	-	-	-	As an astringent for treatment of dysentery & diarrhoea	Hamayun <i>et al.</i> , 2006
21.	<i>Potentilla anserina</i> L. H.K. F.	-	Herb	-	-	-	-	-	-	-	-	+	-	-	-	-	inflammations, wounds, cancer, infections due to bacteria, fungi and viruses, diarrhoea, diabetes mellitus and other ailments	Mari <i>et al.</i> , 2013
22.	<i>Crataegus oxyacantha</i> Jacq.	Bansangli	Shrub	-	-	-	+	-	-	-	-	-	-	-	-	-	For heart diseases, hypertrophy & also as a tonic	Hazrat <i>et al.</i> , 2011
23.	<i>Agrimonia eupatoria</i> L.	Kanachika	Herb	-	-	-	-	-	-	-	-	-	+	-	-	-	Astringent, tonic, diuretic, as mouth wash, bile retention, inflammation of kidneys & bladder and also stone removal from them	Adnan <i>et al.</i> , 2012
24.	<i>Prunus insititia</i> L.C.K. Schneid.	Alu balu	Tree	-	+	+	-	-	-	-	-	-	+	-	-	-	Laxative	Adnan <i>et al.</i> , 2012
25.	<i>Potentilla fulgens</i> wall. Ex. Hook.	-	Herb	+	-	-	-	-	-	-	-	-	-	-	-	-	Stomach disorders, certain forms of cancer, diabetes mellitus	Rosangkima & Prasad 2004; Chhetri <i>et al.</i> , 2005
26.	<i>Spiraea chinensis</i> Maxim.	Krachay	Herb	-	-	-	-	-	-	+	-	-	-	-	-	-	Used in pregnancy to ease delivery.	Ali <i>et al.</i> , 2011
27.	<i>Duchesnea indica</i> (Andr.) Focke	Budimewa	Herb	-	-	-	-	-	-	-	-	-	+	-	-	-	Fruit is edible but tasteless and looks beautiful	Awan <i>et al.</i> , 2011
28.	<i>Rosa webbiana</i> Wall ex Royle	Thorny	Shrub	-	-	-	-	-	-	+	-	-	-	-	-	-	Decoction is used to treat asthma.	Khan <i>et al.</i> , 2011
29.	<i>Comarum salexovianum</i> (Stephan) Asch. & Graebner	Noghurdooom woosh	Shrub	-	-	-	-	+	-	-	-	-	-	-	-	-	For eye infections	Khan <i>et al.</i> , 2011
30.	<i>Rosa indica</i> . Koehne.	Gullaab	Shrub	+	-	-	-	+	-	-	-	-	-	+	-	-	Astringent, tonic, anti helminthic, applied to wounds and injuries, vomiting, diarrhoea and nausea. Roots are astringent and are used as a tonic and antihelminthic.	Sabeen & Ahmad, 2009
31.	<i>Poterium sanguisorba</i> L.	-	Herb	-	-	-	-	-	-	-	-	-	-	+	-	-	Used as tonic & refreshing agent, aids digestion, mildly diuretic	Shimwari <i>et al.</i> , 2006
32.	<i>Prunus cornuta</i> L.	Guni	Tree	-	-	-	-	-	-	+	-	-	-	-	-	-	For asthma & cardiac problems.	Ahmad <i>et al.</i> , 2006.
33.	<i>Prunus domestica</i> L.	Aloooha	Tree	-	-	-	-	-	-	+	-	-	-	-	-	-	To treat constipation, leucorrhoea, irregular menstruation & debility	Yesilada <i>et al.</i> , 1999
34.	<i>Pyrus pashia</i> . Buch & Ham ex D. Don	Batangi	Tree	-	-	-	-	-	-	+	-	-	-	-	-	-	Sedative, astringent & as mouth wash. Used in pterygium disease to cure affected eyes of cattle	Pala <i>et al.</i> , 2010
35.	<i>Rosa macrophylla</i> L.	Wan Gulab	Shrub	+	-	-	-	-	-	-	-	-	-	-	-	-	For treating eye troubles & burns.	Kumar <i>et al.</i> , 2009

Table 1. (Cont'd.).

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36.	<i>Potentilla sundaica</i> Lindl.	-	Herb	+	-	+	-	-	-	-	-	-	-	-	-	-	-	Antidote to snake bite, applied on itches & abscesses.	Kumar <i>et al.</i> , 2009
37.	<i>Rosa moschata</i> L. J. Herm.	Zangali Gulab (Khwrach)	Shrub	-	-	-	-	+	-	-	-	-	-	-	-	-	-	To cure stomach disorders	Sher <i>et al.</i> , 2010
38.	<i>Cerasus avium</i> L. Moench.	-	Tree	-	-	-	-	-	+	-	-	-	-	-	-	-	-	Consumed as tea	Uzuna <i>et al.</i> , 2004
39.	<i>Prunus persica</i> L. Stokes.	Shaltalo	Tree	-	-	-	-	+	+	-	-	-	-	-	-	-	-	Sedative, expectorant & tonic. To treat jaundice	Wazir <i>et al.</i> , 2004
40.	<i>Prunus padus</i> Hook.f.	Barith	Tree or shrub	-	-	-	-	-	+	-	-	-	-	-	-	-	-	Anodyne, diuretic, febrifuge & sedative. For treatment of cold	Haq <i>et al.</i> , 2011
41.	<i>Rubus ellipticus</i> Smith.	Goraj	Tree	+	-	-	-	-	+	-	-	-	-	-	-	-	-	To treat fever, gastric troubles, diarrhoea, dysentery, colic, cough & sore throat.	Haq <i>et al.</i> , 2011
42.	<i>Rubus ulmifolius</i> Schott.	Karvara	Shrub	+	-	-	-	-	-	+	-	-	-	-	-	-	-	As a tonic & aphrodisiac. For treatment of skin diseases	Haq <i>et al.</i> , 2011
43.	<i>Prunus armeniaca</i> L.	Khubani	Tree	-	-	-	-	-	+	-	-	-	-	-	-	-	-	Laxative & purgative. Beneficial in fever, constipation, indigestion, anaemia & skin disorders	Sher & Hussain, 2009
44.	<i>Potentilla fruticosa</i> Linn.	-	Herb	-	-	-	-	-	-	-	-	-	+	-	-	-	-	Viral infections, impairment of immune system	Evstropov <i>et al.</i> , 2002
45.	<i>Prunus amygdalus</i> Stokes.	Badam	Tree	-	-	+	+	-	-	-	-	-	-	+	-	-	-	Brain tonic. Oil is used for massage on skin as well as used for facial complexion. Useful in constipation, impotency and skin disorders, oil is laxative	Adnan <i>et al.</i> , 2012
46.	<i>Rosa damascena</i> Mill.	Gulab	Shrub	-	-	-	-	+	-	-	-	-	-	-	-	-	-	Astringent, tonic, cephalic, cardiac, Aperients & reputed for removing bile and cold humors. Locally its paste is called as Gulqand" which is delicious. Extract of petals, "Arqe-Gulab" (rose water) is purgative	Iqbal & Sher, 2011
47.	<i>Malus domestica</i> Borkh.	Saib	Tree	-	-	-	-	-	+	-	-	-	-	-	-	-	-	Edible fruit & its syrup is used as tonic	Awan <i>et al.</i> , 2011
48.	<i>Pyrus pyrifolia</i> L.	Desi Nakh	Tree	-	-	-	-	-	+	-	-	-	-	+	-	-	-	Fruit edible while leaves are used as fodder	Awan <i>et al.</i> , 2011
49.	<i>Malus baccata</i> Borkh.	Beeha	Tree	-	-	-	-	-	-	+	-	-	-	-	-	-	-	Anodyne, to relieve headache	Sher <i>et al.</i> , 2010
50.	<i>Malus pumila</i> Mill.	Mamra	Tree	-	-	-	-	-	-	-	-	-	-	-	-	-	-	Purgative & expectorant. Reduces the risk of colon and lung cancer. Help in heart disease, weight loss & controlling cholesterol	Sher <i>et al.</i> , 2010

Table 1. (Cont'd.).

S. No.	Botanical name	Folk name	Habit	Part used											Ethnomedicinal uses	Literature cited		
				R	S	S	St	Se	Fl	Fr	Rh	W	L	Ba			Gu	
51.	<i>Prunus avium</i> L.	Cherry	Tree	-	-	+	-	-	-	+	-	-	-	-	-	-	Astringent.	Sher <i>et al.</i> , 2010
52.	<i>Pyrus communis</i> L.	Naakh/ Nashpati	Tree	-	-	-	-	-	-	+	-	-	-	-	-	-	Laxative	Sabeen & Ahmad, 2009
53.	<i>Rubus micropetalus</i>	Sohnepbah	Shrub	-	-	-	-	-	-	+	-	-	-	+	-	-	Edible fruits are taken for cough. Crushed bark is used for mouth ulcers.	Yogendra & Hynniewata 2008
54.	<i>Prunus dulcis</i> (Mill.) D.A. Webb.	Kandu	Tree	-	-	-	-	+	-	-	-	-	-	-	+	-	The kernel of wild almond is bitter and not edible, oil is used for massaging and as hair oil and gums are also used for similar purposes	Khan <i>et al.</i> , 2011.
55.	<i>Prunus cerasifera</i> Ehrh.	Alubukhara	Tree	-	-	+	-	-	-	-	-	-	-	-	-	-	Fruits are laxatives	Sher <i>et al.</i> , 2010
56.	<i>Rosa canina</i> L.	-	Shrub	-	-	-	-	-	-	+	-	-	-	-	-	-	To pass kidney stone, to treat diabetes mellitus, to heal eye disorders.	Yesilada <i>et al.</i> , 1999
57.	<i>Rosa sericea</i> Lindley	Zangali gulab	Shrub	-	-	-	-	-	+	-	-	-	-	-	-	-	To treat eye diseases	Radha <i>et al.</i> , 2013
58.	<i>Rubus sanctus</i> Schreber.	Alish	Shrub	-	-	-	-	-	-	-	-	+	-	-	-	-	Healing of wounds, infected insect bites & pimples	Sütiar <i>et al.</i> , 2011
59.	<i>Geum urbanum</i> L.	Bohay	Herb	+	-	-	-	-	-	-	-	-	-	-	-	-	For fever	Matin <i>et al.</i> , 2001
60.	<i>Rubus pedunculosus</i> D. Don	Karwarva	Shrub	-	-	-	-	-	-	+	-	-	-	-	-	-	Improves the blood circulation.	Matin <i>et al.</i> , 2001
61.	<i>Padus cornuta</i> (Royle) Cart.	Kalakat	Tree	-	-	-	-	+	-	-	-	-	-	-	-	-	Oil from the kernel is best substitute for bitter almond oil	Shinwari <i>et al.</i> , 2006.
62.	<i>Rubus moloccanus</i> L.	-	Shrub	+	-	-	-	-	-	+	-	-	-	-	-	-	Astringent, nocturnal micturition of children and fistula	Hynniewata & Yogendra, 2008.
63.	<i>Filepedula ulmaria</i> L. Maxim.	-	Herb	-	-	-	-	-	+	-	-	-	-	-	-	-	Used for febrile conditions as influenza, rheumatism, generalized oedema and for diarrhoea, as an astringent & mildly diuretic	Shinwari <i>et al.</i> , 2006
64.	<i>Potentilla microphylla</i> D. Don.	Zatsping	Herb	-	-	-	-	+	-	-	-	-	+	-	-	-	Used to cure wounds & bone fractures in livestock. As an insect repellent.	khan <i>et al.</i> , 2011
65.	<i>Fragaria nubicola</i> L. Ex. Laticaita.	Punjakha	Herb	+	-	-	-	-	-	+	-	-	-	-	-	-	To treat stomach ulcers & external wounds	Saeed <i>et al.</i> , 2004
66.	<i>Eriobotrya japonica</i> Lindl. Thunb.	Lokat	Tree	-	-	-	-	-	+	-	-	-	-	-	-	-	Flower is expectorant, fruit is sedative used to reduce thirst and vomiting, its excessive use causes diarrhoea	Shinwari <i>et al.</i> , 2006
67.	<i>Fragaria vesca</i> L.	Jangali meva	Herb	-	-	-	-	-	-	-	-	+	-	-	-	-	Digestive, backache, vomiting, astringent, diuretic. Are astringent and diuretic, used in children diarrhoea and infection of urinary organs	Sabeen & Ahmad, 2009

R. (Root), S (Shoots), St (Stem), Se (Seed) Fl (Flower), Fr (Fruit), Rh (Rhizome), L (Leaves), W (Whole plant), Ba (Bark), Gu (Gum)

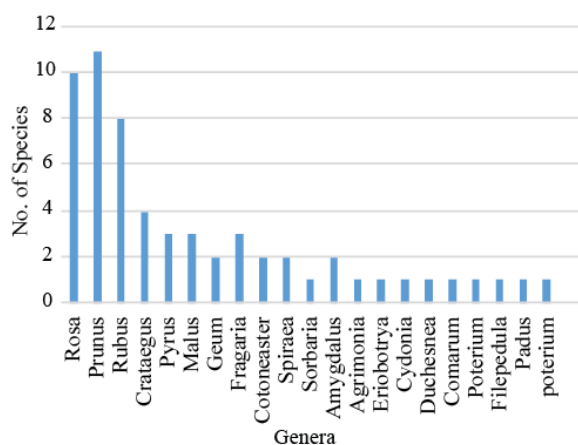


Fig. 1. Total number of genera explored.

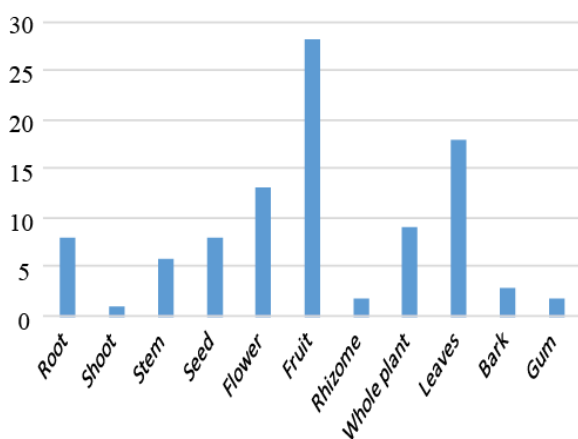


Fig. 2. Parts of plants used for medicinal purposes.

The present communication is an effort to document the different reported uses of the members of family Rosacea belonging to Pakistan. All the information about the plant species was collected from the flora of Pakistan (Landrein *et al.*, 2009).

**Geographical and climatic features:** Climatic conditions of Pakistan show variation in different regions of the country and even the difference of temperatures between day and night is also substantial. The temperature of the southern parts may go up to 45 degree Celsius or more while receive scanty rain and comprises of deserts. The northern part is quite cold and comprises peaks, mountains and glaciers. The country enjoys four seasons (summer, winter, autumn and spring).

**Ethnomedicinal profile of Rosaceae:** The ethnomedicinal knowledge was documented by reviewing literature from peer reviewed research articles retrieved through Google Scholar, Science direct and BioMed central. The ethnomedicinal uses of 67 plants belonging to family Rosaceae are presented along with their folk names. The information reveals

that there are reports available on the therapeutic potential of family Rosaceae across the world. The number of Genera and species from Family Rosaceae used as traditional medicine are summarized as Fig. 1 and the part used as Fig. 2. The information about its uses are summarized as Table 1.

## Conclusion

In the present world, plants are an exclusive source of medicinal compounds and are used by many people. The expensive allopathic drugs pose a great challenge for the scientific community to search for the novel, safe, effective and cheaper medicines. Medicinal applications in the present study provide new vistas for the scientist to investigate the therapeutic potential of family Rosaceae by elucidating the phytochemical profile as well as pharmacology.

The modern studies carried out about family Rosaceae reveals an extraordinary therapeutic potential and the research on the family may produce some high value therapeutants. Conservational strategies should be implemented all over the world to save the medicinal plants heritage from extinction. Beside the use of medicinally important plants of the family should be brought under stricter regulations.

Ethnomedicinal uses of the family Rosaceae are reported across the world but only few reports are available from Pakistan. It is important to document the indigenous knowledge relevant to Rosaceae from Pakistan.

**Competing interests:** The authors declare that they have no competing interests.

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## References

- Adnan, M., S. Begum, A.L. Khan, A. M. Tareen and I.J. Lee. 2012. Medicinal plants and their uses in selected temperate zones of Pakistani Hindukush-Himalaya. *J. Med. Plants. Res.*, 6: 4113-4127.
- Ahmad, M., R. Qureshi, M. Arshad, M.A. Khan and M. Zafar. 2009. Traditional herbal remedies used for the treatment of diabetes from district Attock (Pakistan). *Pak J. Bot.*, 41(6): 2777-2782.
- Ahmad, S., A. Ali, H. Beg, A.A. Dasti and Z.K. Shinwari. 2006. Ethnobotanical studies on some medicinal plants of Booni Valley, District Chitral Pakistan. *Pak. J. Weed Sci. Res.*, 12(3): 183-190.
- Ali, H., J. Sannai, H. Sher and A. Rashid. 2011. Ethnobotanical profile of some plant resources in Malam Jabba valley of Swat, Pakistan. *J. Med. Plants. Res.*, 5(17): 4676-4687.
- Awan, M.R., Z. Iqbal, S.M. Shah, Z. Jamal, G. Jan, M. Afzal and A. Gul. 2011. Studies on traditional knowledge of economically important plants of Kaghan Valley, Mansehra District, Pakistan. *J. Med. Plants. Res.*, 5(16): 3958-3967.

- Bourdy, G., M. L. Willcox, H. Ginsburg, P. Rasoanaivo, B. Graz and E. Deharo. 2008. Ethnopharmacology and malaria: New hypothetical leads or old efficient antimalarials? *Int. J. Parasitol.*, 38(1): 33-41.
- Chhetri, D.R., P. Parajuli, and G.C. Subba. 2005. Antidiabetic plants used by Sikkim and Darjeeling Himalayan tribes, India. *J. Ethnopharmacol.*, 99(2): 199-202.
- Dar, M.E.U.I. 2003. Ethno botanical uses of Plants of Lawat District Muzaffarabad, Azad Jammu and Kashmir. *Asian. J. Plant. Sci.*, 2(9): 680-682.
- Evstropov, A.N., L.G. Burova, O.R. Greck, L.N. Zakharova and T.A. Volkhonskaia. 2002. The employment of polyphenol complexes extracted from *Pentaphylloides fruticosa* (L.) O. Schwarz for prophylactic of Coxsackie-virus infection. *Bulletin of the Siberian Medicine*, 4: 27-31.
- Hamayun, M., S. Afzal and M.A. Khan. 2006. Ethnopharmacology, indigenous collection and preservation techniques of some frequently used medicinal plants of Utror and Gabral, district Swat, Pakistan. *Afr. J. Tradit. Complem.*, 3(2): 57-73.
- Haq, F., H. Ahmad and M. Alam. 2011. Traditional uses of medicinal plants of Nandiar Khuwarr catchment (District Battagram), Pakistan. *J. Med. Plants. Res.*, 5(1): 39-48.
- Hazrat, A., M. Nisar, J. Shah and S. Ahmad. 2011. Ethnobotanical study of some elite plants belonging to Dir, Kohistan valley, Khyber Pakhtunkhwa, Pakistan. *Pak. J. Bot.*, 43(2): 787-795.
- Hoareau, L. and E.J. DaSilva. 1999. Medicinal plants: a re-emerging health aid. *Electron. J. Biotechno.*, 2(2): 3-4.
- Hussain, F., S.M. Shah and H. Sher. 2007. Traditional resource evaluation of some plants of Mastuj, District Chitral, Pakistan. *Pak. J. Bot.*, 39(2): 339-354.
- Iqbal, H. and Z. Sher. 2011. Medicinal plants from salt range Pind Dadan Khan, district Jhelum, Punjab, Pakistan. *J. Med. Plants. Res.*, 5: 2157-2168.
- Khalil, A.T., I. Khan, K. Ahmad, Y.A. Khan, J. Khan and Z.K. Shinwari. 2014. Antibacterial activity of honey in northwest Pakistan against select human pathogens. *J. Tradit. Chin. Med.*, 34: 86-89.
- Khalil, A.T., I. Khan, K. Ahmad, Y.A. Khan, M. Khan and M.J. Khan. 2013. Synergistic antibacterial effect of honey and Herba Ocimi Basilici against some bacterial pathogens. *J. Tradit. Chin Med.*, 33: 810-814.
- Khalil, A.T., Z.K. Shinwari, M. Qaiser and K.B. Marwat. 2014. Phyto-therapeutic claims about euphorbiaceous plants belonging to Pakistan; an ethnomedicinal review. *Pak. J. Bot.*, 46(3): 1137-1144.
- Khan, B., A. Abdulkadir, R. Qureshi and G. Mustafa. 2011. Medicinal uses of plants by the inhabitants of Khunjerab National Park, Gilgit, Pakistan. *Pak. J. Bot.*, 43(5): 2301-10.
- Khan, N., M. Ahmed, A.J. Ahmed, S.S. Shaukat, M. Wahab, M. Ajaib and M. Nasir. 2011. Important medicinal plants of chitral gol National park (cgnp) Pakistan. *Pak. J. Bot.*, 2: 797-809.
- Kumar, M., Y. Paul and V.K. Anand. 2009. An ethnobotanical study of medicinal plants used by the locals in Kishtwar, Jammu and Kashmir, India. *Ethno. Leaf*, (10): 5.
- Landrein, S., R. Borosova, J. Osborne, Kew, M. Shah, Mansehra, M.T.M Rajput and S.S. Tahir, Jamshoro, J. Zielinski, Kornik and edited by S. I. Ali and M. Qaiser. 2009. Flora of Pakistan, no. 216.
- Mahesh, B. and S. Satish. 2008. Antimicrobial activity of some important medicinal plant against plant and human pathogens. *World J. Agri. Sci.*, 4(5): 839-843.
- Mari, A., D. Lyon, L. Fagner, P. Montoro, S. Piacente, S. Wienkoop and W. Weckwerth. 2013. Phytochemical composition of *Potentilla anserina* L. analyzed by an integrative GC-MS and LC-MS metabolomics platform. *Metabolomics.*, 9(3): 599-607.
- Matin, A., M.A. Khan, M. Ashraf and R.A. Qureshi. 2001. Traditional use of herbs, shrubs and trees of Shogran valley, Mansehra, Pakistan. *Pak. J. Biol. Sci.*, 4: 1101-1107.
- Micheal, A., C. Thompson and M. Abramovitz. 1956. *Artemia salina* as a test organism for bioassay. *Science*, 123: 464.
- Nichter, M. (Ed.). 1992. *Anthropological approaches to the study of ethnomedicine* (Vol. 2). Taylor & Francis.
- Nisar, M.F., S. Ismail, M. Arshad, A. Majeed and M. Arfan. 2011. Ethnomedicinal Flora of District Mandi Bahaudin, Pakistan. *Middle East J. Sci. Res.*, 9: 233-238.
- Pala, N.A., A.K. Negi and N. P. Todaria. 2010. Traditional uses of medicinal plants of Pauri Garhwal, Utrakhand. *New York Sci J.*, 3(6): 61-65.
- Radha, B., S. Dinesh, J.K. Tiwari and P. Tiwari. 2013. Diversity and availability status of ethno-medicinal plants in the lohba range of Kedarnath Forest Division (KFD), Garhwal Himalaya. *Global J Res. Med. Plants & Indigen. Med.*, 2(4): 198-212.
- Rastogi, R.P. and B.N. Dhawan. 1982. Research on medicinal plants at the Central Drug Research Institute, Lucknow (India). *Ind J. Medi. Res.*, 76: 27-45.
- Rosangkima, G. and S.B. Prasad. 2004. Antitumour activity of some plants from Meghalaya and Mizoram against murine ascites Dalton's lymphoma. *Indian. J. Exp. Biol.*, 42(10): 981-988.
- Sabeen, M. and S.S. Ahmad. 2009. Exploring the folk medicinal flora of Abbotabad city, Pakistan. *Ethno. Leaf*, (7): 1.
- Saeed, M., M. Arshad, M. Ahmad and E. Ahmad. 2004. Ethnophytotherapies for the Treatment of Various Diseases by the Local People. *Pak. J. Biol. Sci.*, 7(7): 1104-1108.
- Sher, H. and F. Hussain. 2009. Ethnobotanical evaluation of some plant resources in Northern part of Pakistan. *Afr. J. Biotechnol.*, 8(17): 4066-4076.
- Sher, H., M.N. Alyemeni, L. Wijaya and A.J. Shah. 2010. Ethnopharmacologically important medicinal plants and its utilization in traditional system of medicine, observation from the Northern Parts of Pakistan. *J. Med. Plants. Res.*, 4 (18): 1853-1864.
- Sher, Z., Z. Khan, Z and F. Hussain. 2011. Ethnobotanical studies of some plants of Chagharzai valley, district Buner, Pakistan. *Pak. J. Bot.*, 43(3): 1445-1452.
- Shinwari Z.K and M. Qaiser. 2011. Efforts on conservation and sustainable use of medicinal plants of Pakistan. *Pak. J. Bot.*, 43(SI): 5-10.
- Shinwari Z.K, T. Watanabe, M. Rehman and T. Yoshikawa. 2006. A pictorial guide to the medicinal plants of Pakistan, Publish by Kohat University of Science and technology.
- Shinwari, Z.K and S.S. Gilani. 2003. Sustainable harvest of medicinal plants at Bulashbar Nullah, Astore (Northern Pakistan). *J. Ethnopharmacol.*, 84: 289-298.
- Shinwari, Z.K. 1996. Ethnobotany in Pakistan: Sustainable and participatory approach. In Proceedings Ethnobotany and its application to conservation, p. 14-25, Ethnobotany and its application to conservation. NARC, NARC, Islamabad, Pakistan.
- Shinwari, Z.K. 2010. Medicinal plants research in Pakistan. *J. Medi. Plants. Res.*, 4: 161-176.
- Shinwari, Z.K., M. Salima, R. Faisal, S. Huda and M. Asrar. 2013. Biological screening of indigenous knowledge based plants used in diarrreal treatment. *Pak. J. Bot.*, 45(4): 1375- 1382.

- Süntar, I., U. Koca, H. Keles and E. K. Akkol. 2011. Wound healing activity of *Rubus sanctus* Schreber (Rosaceae): preclinical study in animal models. *J. Evid. Based. Complementary. Altern. Med.*, doi:10.1093/ecam/nep137.
- Tareen, R. B., T. Bibi, M.A. Khan, M. Ahmad and M. Zafar. 2010. Indigenous knowledge of folk medicine by the women of Kalat and Khuzdar regions of Balochistan, Pakistan. *Pak. J. Bot.*, 42(3): 1465-1485.
- Togola, A., D. Diallo, S. Dembélé, H. Barsett and B.S. Paulsen. 2005. Ethnopharmacological survey of different uses of seven medicinal plants from Mali, (West Africa) in the regions Doila, Kolokani and Siby. *J. Ethnobiol. Ethnomed.*, 1(1): 7.
- Uzuna, E., G. Sariyar, A. Adersen, B. Karakoc, G. Ötük, E. Oktayoglu and S. Pirildar. 2004. Traditional medicine in Sakarya province (Turkey) and antimicrobial activities of selected species. *J. Ethnopharmacol.*, 95(2): 287-296.
- Wazir, S.M., A.A. Dasti and J. Shah. 2004. Common medicinal plants of chapursan valley, Gojal II, Gilgit-Pakistan. *J Res Sci.*, 15: 41-43.
- Xue, P.F., G. Luo, W.Z. Zeng, Y.Y. Zhao and H. Liang. 2005. Secondary metabolites from *Potentilla multifida* L. (Rosaceae). *Biochem. Sys. Ecol.*, 33: 725-728.
- Yeşilada, E., E. Sezik, G. Honda, Y. Takaishi, Y. Takeda and T. Tanaka. 1999. Traditional medicine in Turkey IX: Folk medicine in north-west Anatolia. *J. Ethnopharmacol.*, 64(3): 195-210.
- Yogendra. K. and S.R. Hynniewta. 2008. Herbal remedies among the Khasi traditional healers and village folks in Meghalaya. *Ind. J. Trad. Know.*, 7(4): 581-586.

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