ISSN: 2322 - 0902 (P)
ISSN: 2322 - 0910 (O)

International Journal of Ayurveda and Pharma Research

Review Article

THERAPEUTIC APPLIANCE OF IMPERILED MEDICINAL PLANT PULLAS-*RHODODENDRON ARBOREUM* SM.: A SHORT PERIODICAL ANALYSIS FROM ANCIENT TO MODERN ERA

Santosh Kumar Thakur[1]*, Sumit Natthani[2], Mita Kotecha[3]

*[1]Ayurveda Physician, Department of Drug Administration, Kathmandu, Nepal.

[2]Assistant professor, [3]Professor & HOD, PG Department of Dravyaguna Vigyana, National Institute of Ayurveda, Amer Road, Jaipur, Rajasthan, India.

ABSTRACT

Rhododendron arboreum Sm. the world's most famous rhododendron, is known as national flower of Nepal. The word Rhododendron is derived from Greek word *rhodo* mean *rose* and *dendron* means tree. It is often called Rhodies. The flowers being sweet and sour taste are used in the preparation of squash, jams, jellies and local brew. It is used in folklore medicine to treat many disorders and often used as a substitute to another famous plant drug *Rohitaka*. Pharmaceuticals companies and traditional practitioners of Nepal are using its bark, as a substitute of *Rohitaka* i.e. *Tecomella undulate* (Sm.) Seem. The present review highlights some potential therapeutics from ancient to modern era in order to explore the gap as well as bring out certain suggestive approaches from exploration of its ancient traditional therapeutics/ properties to future conservation of this plant species.

KEYWORDS: *Rhododendron arboreum, Pullas,* Ayurveda*, Yakrit, Kurubak.*

INTRODUCTION

Rhododendron arboreum Sm. is an important medicinal plant usually found in Temperate Himalaya, from Kashmir to Bhutan at the altitude of 5000 to 11000 feet.[1] In Nepal the plant is commonly found throughout the length of country at the altitude of 2500-3300m. The plant is used often as substitute/adulterant of famous Ayurvedic plant *Rohitaka* and found as an ingredient of many popular Ayurvedic herbal preparations like- *Asokaristha*, *Rohitakyadi churna*, *Rohitakarista* etc. This beautiful medicinal plant is nominated as the national flower of Nepal. It is also represented on the national coat of arms and as the state flower of Himachal Pradesh (India).[2,3] The plant has been reported for its multidimensional pharmacological activities like- Anti-inflammatory and Anti-nociceptive activity, Hepatoprotective activity, Anti-diarrhoeal activity, Anti-diabetic activity, Antioxidant or Adaptogenic activity.[4] The studies are also opined that the extracts and pure compounds isolated from *R.arboreum* possess various therapeutic potentials. The study suggest the use of either extracts or pure compounds of *R.arboreum* in the development of drugs for the prevention and protection of various liver disorders.[5] Recently the advance of active components isolated from the medicinal plants and their biological actions in disease control has led to active interest in the plant across the globe.[6] There is need of researches in a systematic way on such ancient medicinal plants are the best method for the proper application of the traditional practices with evidence, with this view the present short appraisal is prepared in order to explicit the significance of imperiled medicinal plant *Pullas- Rhododendron arboreum* Sm.

History of Rhododendron

Rhododendron is predominantly a genus of Northern Hemisphere, extending from North America, across Europe and Asia to Japan. Rhododendrons are also found in south of the Equator in New Guinea, with a single species in Queensland, Australia. In Africa, Rhododendrons do not occur in the wild anywhere or in Central or a South America, although there is a substantial colony in few areas in Jamaica, which is possibly of garden basis. In 1650 *R.hirsutum* was the first documented nurtured Rhododendron that was cultivated in Britain. Subsequent species *R.ponticum*, primarily from the Pontus Mountains and the Black Sea region, is also a native of Portugal and southern Spain. In 1780 *R. dauricum* and *R. chrysanthumi* n 1796 came from Siberia. *R. luteum* was introduced from the Caucasus in 1792 and *R.caucasicum* in 1803. *R. camtschaticum* came from Kamtschatka in 1799 and grows on both sides of the Bering Straits. However in

India, it believes that *Rhododendron arboreum* was the first species discovered and identified by specialist near Srinagar in 1796, but there is no authentic record of its introduction before 1817. *R.campanulatum* was reported from Nepal in 1825 and *R.Barbatum* in 1829; whereas *R.formosum* was reported from Assam in 1843. It is found in literature that Pioneer botanist Joseph D. Hooker (1817- 1911) undertook a trip to Nepal but he could not see any Rhododendron blooming and continued his exploration in Northern India. He made extensive tour of the Sandakphur region and the Singalila range to the northwest of Darjeeling. His famous work, "The Rhododendrons of the Sikkim Himalaya," (1849) is considered as the standard test for the study of Himalayan rhododendron.[7-9]

Morphological Description: The plant *Rhododendron arboreum* Sm. belongs to family-Ericaceae, is an evergreen tree 7.5m to 14m in height.[10] *Lali Guras* is the tallest of Nepal's rhododendrons, reaching heights of more than 20m. It has the largest trunk and flowers, blossoming earlier and longer than the others. Trunk of the plant is often much branched, crooked or gnarled, bark pinkish brown, somewhat rough, exfoliating in thin flakes. Blaze is 5-13mm, white or pinkish in colour. Young shoot of plant is clothed with white scales. Leaves are 7.5 to 15cm in length and 3-5cm in width which are crowded towards the ends of the branches, lanceolate or oblong, narrowed at both ends and glabrous and glossy green surface above and pale beneath due to film of small white scales, prominent mid ribs and nerves present beneath the surface of leaves. Petiole is stout, 1.3 to 2.5cm in length and clothed with white scales at young age. The flowers of *R.arboreum* range in color from a deep scarlet, to red with white markings, to pink to white. Bearing up to twenty blossoms in a single truss this rhododendron is a spectacular sight when in full bloom. It is reported that the bright red forms of this rhododendron are generally found at the lower elevations. Flowers 2.5 to 5cm. long and deep red or pale pink in colour, which are crowded in large rounded corymbs. Pedicels are 0- 7.5mm. in length, corolla are campanulated, ovary mealy or rusty woolly. Fruit capsule oblong, curved, mealy, longitudinally ribbed, up to 3.8cm X 1.25cm; seeds minute, dark brown, compressed oblong.[10]

***Kurubak/Pullas* in Classics:** *Rhododendron arboreum* Sm. is often considered as the source of ancient plant *Kurabaka* described in *Charak Samhita chikitsa sthana* chapter 30. Another name given for this plant is *Pullas*; which is mentioned in Jejjat commentary instead of name *Kurabaka* which is mentioned in *Charaka samhita*. Acharya Sushruta revealed this plant under *Kashaya* group of drug. The name *Kurubka* is found in *Sushruta Samhita Sutrasthana* 11th chapter, verse no. 42 also in *Sutrasthana* 46th chapter, verse no.8-9. While modern commentators has expressed their opinion on botanical source of *Kuruvaka* or *Pullas* as *Rhododendron arboreum* Sm.[11]

करीरधवनिम्बार्कवेणुकोशाम्रजाम्बवैः| (च.चि.३०/८२)

करीरधवनिम्बार्कवूकपुल्लासजाम्बवैः | (जेज्जट सम्मत पाठ)

Description of *Pullas* in *Chandra Nighantu*: *Chandra Nighantu* is a handwritten manuscript of Nepal, written in *Devanagari* script. Sanskrit and Nepali languages are also used in the manuscript. This is a government recognized manuscript and kept in government authorized institution Singh Durbar Vaidya- Khana Vikas Samiti in Kathmandu Nepal. In *Chandra Nighantu* while describing the *Rohitaka*, the author has mentioned the Nepali name of *Rohitaka* as *Guransa*, which is botanically identified as *Rhododendron arboreum* Sm.

Sub Species of *Rhododendron Arboreum* Sm[12]

1. *Rhododendron arboreum* spp. *Arboreum* (red or rose red flowers) found in Western Himalayas
2. *Rhododendron arboreum* spp. *Cinnamomeum* (white, pink or red flowers) found in Central Himalayas.
3. *Rhododendron arboreum* spp. *Delavayii* (red flowers) found in Eastern Himalayas.
4. *Rhododendron arboreum* spp. *Nilagiricum* (red flowers) found in Nilgiri.
5. *Rhododendron arboreum* spp. *Zeylancium* (orange red flowers) found in Sri Lanka.

Uses of *Rhododendron arboreum* Sm. in Homeopathy: In Homeopathic Materia Medica, the tincture of dried leaves of *R. arboreum* has been used in gout rheumatism.[13]

Traditional Uses of *Rhododendron arboreum* Sm[14]

- Traditionally, dried flowers fried with ghee were considered highly efficacious in checking diarrhea and blood dysentery and squash for the treatment of mental retardation.
- Flowers are popularly used for juice preparation. The flowers of the plant are used traditionally in the treatment of diabetes by rural Nepalese people.
- Paste of young leaves is applied to cure headache and rheumatic pain. Juice of flower is used as appetizer and also used for headache. Dye of dried leaves of *Rhododendron arboreum* is also used in gout & rheumatism.
- Dried flowers fried in ghee used to check blood dysentery. Petals are used in menstrual

disorders. About 5-10 flowers are eaten to take out fish bone from the throat. However the honey collected by of wild bee is called to be poisonous at the flowering time of *R.arboreum*.

- *Rhododendron arboreum* is also used for household works and it is economically also important. Flowers and leaves are fitted in long ropes made of *Munja* grass and tied around the houses including temples as decorations.

Pharmacological Studies

Adaptogenic activity: Adaptogenic activity of *R. arboreum* extract was evaluated *in vivo* in rat and mice animal models. The criteria taken were forced swimming test in rat and mice and tail suspension test in mice. The study revealed that the methanol extract of the leaves of *R. arboreum* possess significant adaptogenic activity which could be due the important phyto- constituents like flavonoids, flavonols, quercitin, gallic acid presents in the extract.[15]

Antifungal activity: In vitro study was done by agar well diffusion method at concentrations of 50, 25 and 12.5 mg/ml, the maximum inhibition recorded against fungi 17-32, 15-27 and 10-24mm for methanol extract, 16-28, 14-26 and10-22mm to ethyl acetate extract, 17-21, 8-18 and 10-16 to chloroform extract and 8-15 and 8-12mm to n-hexane extract respectively. The study concluded that the antifungal activity of the extracts may be due to the presence of 3β-acetoxyurs-11,12-epoxy-13β,28- olide, betulin, lupeol and taraxerol.[16]

Anti-hyperglycemic and Anti-hyperlipidemic activity: Antihyperglycemic and antihyperlipidemic activity of ethyl acetate fraction of R. arboreum flowers was evaluated in streptozotocin induced diabetic rats which showed significant antihyperglycemic effect due to promotion of insulin secretion and glycolysis and by decreasing gluconeogenesis. The study also showed antihyperlipidemic activity by decreasing in serum total cholesterol, triglycerides, low density lipoprotein cholesterol and very low density cholesterol level coupled together with elevation of high density lipoprotein cholesterol in the diabetic rats. Hypolipidemic effect of *Rhododendron arboreum* Sm. flower juice in experimentally induced hypercholestermic rabbits was also established.[17]

Antibacterial Activity: Study reported antibacterial activity of the methanolic extract of various parts of *R. arboreum* such as flowers, leaves, bark, stem and roots (Mohammad *et al* (2013)). The plant showed potency in the zone of inhibition against the tested bacterial strains such as *Escherichia coli, Staphylococcus aureus, Bacillus subtilus* and *Salmonella typhi.*[18]

Anti-diarrhoeal Activity: N. Verma *et al*, 2011 reported that the ethyl acetate fraction of *R. arboreum* (flowers) has strong anti-diarrheal activity. Oral administration of ethyl acetate fraction of *Rhododendron arboreum* in 100, 200 and 400mg/kg showed dose dependent and significant anti-diarrhoeal potential in castor oil and magnesium sulfate induced diarrhoea.[18]

Anti-inflammatory Activity: N. Verma *et al* (2011) has observed that the ethyl acetate extract fraction of *R.arboreum* exhibit outstanding anti-inflammatory and anti-nociceptive potential in animal models.[18]

Hepatoprotective activity: Ethyl acetate fraction of *Rhododendron arboreum* flowers against CCl4-induced liver damage in preventive and curative models showed its hepatoprotective potential. Fraction at a dose of 100, 200 and 400 mg/kg was administered orally once daily for 14 days in CCl4-treated groups and the result indicated significant decrease in biomarker enzymes like serum levels of glutamic oxaloacetic transaminase (SGOT), glutamate pyruvate transaminase (SGPT), alkaline phosphatase (SALP), γ- glutamyl transferase (γ-GT), and bilirubin. The hepatoprotective potential of methanolic/ ethanolic extract of leaves of *Rhododendron arboreum* was also established in carbon tetrachloride induced hepatotoxicity in rats.[19-20]

Discussion and Conclusion

Conducting researches in a systematic way are the best method for the proper application of the traditional practices with evidence. Therefore it is very essential to explore the ancient therapeutic uses of various traditional herbs. These may be in the form of single or multidrug cost effective formulations. Effective researches on such therapeutics may provide the essential leads for future drug development.[21-24]

From this review it is found that the drug *Rhododendron arboreum* Sm. (*Pullas*) is not stated as acquiescently in *Vedas, Samhitas* and *Nighantus* except few scattered description in classical literature of Ayurveda. As per opinion of Acharya PV Sharma, in Sanskrit the drug is called as *Pullas* which is mentioned in the commentary of Achaarya Jejjata in *Niaranatarapadabyakhya*. Among the traditional physicians, the plant *Rhododendron arboreum* Sm. is a famous drug for prevention and control of wide range of hepatic ailments. Phytochemical analysis showed that sample of stem bark have primary and secondary metabolites (Carbohydrate, Alkaloids, Protein, Phenolic Compound, Tannins and Saponins etc). Further marker based quantification studies is required to identify the novel chemical compounds present in various parts of the plant in order to establish the potential traditional therapeutics of the

plant. Along with above to face the global demand and scarcity of medicinal plant is a burning area at present scenario. Hence it becomes obligatory to save the medicinal plants. In this regard it is requisite to find out the substitute of most useful parts like-root, heart wood, bark etc. which may destroy the plant. Therefore keeping in mind the endangered status of the medicinal plant *Rhododendron arboreum* Sm. it is also suggested further analysis on utilizing the leaves or flowers as potential useful part instead of bark/uprooting whole plant which may prevent the complete destruction of this important plant. [25-26]

The present review also recommends that there is no vivid description about *Rasapanchaka* (Ayurvedic pharmacological property) of *Pullas* in classical texts of Ayurveda. As the plant is used/ recommended as substitute of *Rohitaka* therefore a thorough comparative study of *Rasapanchaka* (Ayurvedic pharmacological property) of this drug is mandatory for its therapeutic use as per fundamental principles of Ayurveda[27]; hence the need for assessment of *Rasa* (Taste), *Guna* (Quality), *Veerya* (Active potency) & *Vipaka* (Metabolism) of *Pullas*. As the principles of Ayurveda therapy is based on proper analysis of *Dosha, Dushya, Bala, Kala, Agni*, and *Prakriti* of the patients/individuals. Therefore after analyzing the *Rasapanchaka* (Ayurvedic pharmacological property) it will be possible for proper assessment of the actions of *Pullas* in *Yakrit*/*Udararoga.*[28-32] Thus the review concludes along with exploration of ancient therapeutic significance of important medicinal plant *Pullas* there is need of lot of attentions of multidisciplinary scientific communities from exploration of its ancient traditional therapeutics/properties to future conservation of this species.

REFERENCES

1. Utsala Shrestha. A case study on Uses of Rhododendron of Tinjure-Milke-Jaljale area, Eastern Nepal. Funded by: national rhododendron conservation management committee (norm), basantpur-4, terhathum. March 2009.p.11.
2. Kirtikar KR, Basu BD, Indian Medicinal Plants. Dehradun: International Book Distributors. 1987; 3:1455-56.
3. Utsala Shrestha. A case study on uses of Rhododendron of tinjure-milke-jaljale area, Eastern Nepal. Utsala Shrestha Department of Environment Science "Conservation Ecology" IAAS, Rampur, Chitwan. 2009; 11.
4. Srivastava P, Rhododendron arboreum: an overview. Journal of Applied Pharmaceutical Science, 2012; 02 (01):158-162.
5. Thakur S., Kotecha M., Natthani S., Mahajon B. Pharmacognostical Standardization of Stem Bark of Rhododendron arboreum Sm.(Pullas). Journal of Advances in Medicine and Medical Research. 2018;25(8),1-11.https://doi.org/10.9734/ JAMMR/2018/40391.
6. Mahajon B, A.B.Rema Shree, R.Remadevi. HPTLC comparison of leaf and heart wood of Pterocarpus marsupium ROXB - An endangered medicinal plant. Journal of Scientific and Innovative Research. 2015; 4(1): 27-32.
7. Kirtikar K.R., Basu B D, Indian Medicinal Plants vol-3, International Book Distributors-Dehradun: 1987.p.1455-56.
8. Utsala Shrestha. A case study on Uses of Rhododendron of Tinjure-Milke-Jaljale area, Eastern Nepal. Funded by: national rhododendron conservation management committee (norm), basantpur-4, terhathum. March 2009.p.11
9. Rhododendron Study home page on internet. [Available from https://en.wikipedia.org/wiki/ Rhododendron_arboreum] downloaded on 24/05/2020
10. Kirtikar K.R., Basu B D, Indian Medicinal Plants vol-3, International Book Distributors-Dehradun: 1987.p.1455
11. Chunekar K C, Yadav C L, Medicinal Plants of Sushruta Samhita, Volume 1, Vaidya Atreya Smith B. Sc. France-2005.p.127-128.
12. Srivastava P, Rhododendron arboreum: an overview. Journal of Applied Pharmaceutical Science, 2012; 02 (01):158-162.
13. JD Roy, AK Handique, CC Barua, ATalukdar, FA Ahmed, IC Barua. Evaluation of phytoconstituents and assessment of adaptogenic activity in vivo in various extracts of Rhododendron arboreum (leaves). Indian J. Pharm. Biol. Res., 2014; 2(2):49-56.
14. Laydong Lepcha, B.C. Basistha, Sushen Pradhan, K.B. Subba, Rajdeep Gurung, N.P. Sharma Understanding Significant Value of Rhododendron arboreum Smith Scarleti of Sikkim.IJESIT.2014; 3(4):554-559.
15. JD Roy, AK Handique, CC Barua, ATalukdar, FA Ahmed, IC Barua. Evaluation of phytoconstituents and assessment of adaptogenic activity in vivo in various extracts of Rhododendron arboreum (leaves). Indian J. Pharm. Biol. Res., 2014; 2(2):49-56.
16. Muhammad Nisar, Sajid Ali, Muhammad Qaisar, Syed Naeemuddin Gilani, Muhammad Raza Shah, Inamullah Khan and Gowhar Ali. Antifungal activity of bioactive constituents and bark

extracts of Rhododendron arboreum. Bangladesh J Pharmacol 2013; 8: 218-222.

17. Vijayaragavan Thangaraj Hypolipidemic effect of Rhododendron arboreum Sm. linn flower juice in experimentally induced hypercholestermic rabbits. Vijayaragavan Thangaraj, Int J Pharm Biomed Res 2013, 4(1), 46-49.
18. Shagun Gill1, Preeti Panthari and Harsha Kharkwal. Phytochemical Investigation of High Altitude Medicinal Plants Cinnamomum tamala (Buch-Ham) Nees and Eberm and Rhododendron arboreum Smith. AJPCT. 2015 3(6): 512-528.
19. Verma N, Singh AP, Amresh G, Sahu PK, Rao CV. Protective effect of ethyl acetate fraction of Rhododendron arboreum flowers against carbon tetrachloride-induced hepatotoxicity in experimental models. Indian J Pharmacol 2011; 43: 291-5.
20. T. Prakash, Snehal Dayalal Fadadu, Uday Raj Sharma, V. Surendra1, Divakar Goli, Perfect Stamina and D. Kotresha. Hepatoprotective activity of leaves of Rhododendron arboreum in CCl4 induced hepatotoxicity in rats. Journal of Medicinal Plants Research, 2008; 2(11):315-320.
21. Rupashri Nath, Bidhan Mahajon, Sisir Kumar Mandal. Therapeutic uses of Pippali [Piper longum Linn.] In ancient literature. World Journal of Pharmacy and Pharmaceutical Sciences. 2016; 5(8):364-372 DOI: 10.20959/wjpps20168-7278
22. Bidhan M, Rupashri N, Ramadevi R. A scientific analysis on single drug remedies in Chakradutta (a convenient Ayurvedic transcript). J Pharm SciInnov 2014;3(6):492–494. DOI: 10.7897/ 2277-4572.036202.
23. Mahajon B, Remadevi R. Folk medicine for Yakrit Vikaara (Liver Disorder)-A Scientific Review. IAMJ. 2015; 3(6):1828-47.
24. Mahajon B., Murthy R. Traditional Herbal Remedies for Complications of Diabetes Mellitus. SciFed Journal of Herbal Medicine, 2017; 1(1).10.23959/sfjhm-1000004.
25. Bidhan M, Deepak M, AB Rema Shree, Remadevi R. Comparative phytochemical analysis of different parts of Sthiraa- Desmodium gangeticum (L.) DC. World Journal of Pharmaceutical Research. 2015; 4(8):1821-1828.
26. Bidhan M, Deepak M, ABRema Shree, Remadevi R. Phytochemical analysis of Ayurvedic kashaaya residues to assess its reusability. European Journal of Biomedical and Pharmaceutical Sciences. 2015; 2 (4):1049-1059.
27. Rupashri N, Bidhan M, Apala S, Abichal C, Remadevi R. A review on clinical examination of Agnibala (digestive power). Int. J. Ayur. Pharma Research. 2014;2(2):79-82.
28. Mahajon B, Ravishankar B, Remadevi R. Assessment of Vipaka (metabolism) of a new medicinal plant in animal model. Glob J Res Med Plants Indig Med. 2014; 3:427–34.
29. Mahajon B, Nath R, Remadevi R. A Scientific Review on Dietetics in Ayurveda According to Prakriti (Innate Constitution). Intern Ayurvedic Med J. 2014; 2(6):1031-6.
30. Nath R, Mahajon B, Sengupta A, Chattopadhyay A. Manifestation of Signs and Symptoms in Agnidusti. Int J Res Ayurveda Pharm. 7(2):150-3.
31. Nath R, Mahajon B, Mandal SK. Pathogenesis of Sadhya Udara Roga-An Ayurvedic View. J Drug Res. 2016; 5(2):30-40.
32. Nath R, Mahajon B, Sengupta A, Chaterjee A, R. Remadevi. A Review on Clinical Examination of Agnibala (Digestive Power). Int J AyurPharma Res. 2014; 2(2):79-82.

Cite this article as:
Santosh Kumar Thakur, Sumit Natthani, Mita Kotecha. Therapeutic Appliance of Imperiled Medicinal Plant Pullas-Rhododendron Arboretum Sm.: A Short Periodical Analysis From Ancient To Modern Era. International Journal of Ayurveda and Pharma Research. 2020;8(8):46-50.

Source of support: Nil, Conflict of interest: None Declared

***Address for correspondence**
Dr Santosh Kumar Thakur
Ayurveda Physician,
Department of Drug Administration,
Kathmandu, Nepal.
Email: drsantosh2030@gmail.com
Mobile- +977 9855013240