Building evidence for conservation globally

Journal of Threatened Taxa

Open Access

10.11609/jott.2022.14.1.20311-20538
www.threatenedtaxa.org

26 January 2022 (Online & Print)
14(1): 20311-20538
ISSN 0974-7907 (Online)
ISSN 0974-7893 (Print)
Counting the cost: high demand puts *Bunium persicum* (Boiss.) B.Fedtsch. in jeopardy

Monika Sharma¹, Manisha Mathela², Rupali Sharma³, Himanshu Bargali⁴, Gurinderjit S. Goraya⁵ & Amit Kumar⁶

¹-⁵ Wildlife Institute of India, Dehradun, Uttarakhand 248002, India.

The mighty Himalaya has been identified as one of the 36 biodiversity hotspots due to its immense hoard of endemic species as well as the ever-increasing threats looming upon this region (Mittermier et al. 2004). The highly adapted and fragile ecosystems are rich in biodiversity, of which vegetation forms an important component. The stretch of Himalaya that constitutes the Indian Himalayan region (IHR) harbours ca. 11,157 species of flowering plants belonging to 2,359 genera under 241 families (Singh et al. 2019). IHR, an abode to various medicinal and aromatic plants (MAPs) accounts for >1,748 species of medicinal plants (23.4% of India) comprising 1,685 species of angiosperms, 12 gymnosperms, and 51 pteridophytes that have traditional and modern therapeutic uses (Samant et al. 1998). Owing to their high medicinal value, most of MAPs are at high demand and hence face immense pressure that has led to a decline in their wild populations, for instance Goraya & Ved (2017) enlisted 36 Himalayan medicinal plant taxa that are in high commercial demand by the herbal industries.

In the western Himalaya, the relative isolation and remoteness of high-altitude regions have made the ethnic communities the last bastions of traditional medicinal knowledge. MAPs serve as one of the major sources of subsistence and income generation for local communities and have found use in many culinary and medicinal practices since time immemorial. These ethnic communities inhabiting harsh environmental conditions practice unique traditions and customs including ethno-botanical dependence, thus, hold substantial ethno-botanical knowledge due to the regular use of medicinal plants for treatment of diseases, wounds, fractures, and other ailments (Samant et al. 1998; Samant & Palni 2000). The local traditional healers known as ‘Larjee’ or ‘Amchi’ practice traditional health care systems such as the Tibetan system of medicine (Sowa-Rigpa) for the treatment of various ailments based on their traditional knowledge.

With the rising growth in the demand and market of herbal medicines, the herbs-based healthcare wellness sector across the world including India is booming. This in turn has resulted in higher demand and thus puts higher pressure on the medicinal plant resources, both

---

**Editor:** Anonymity requested.

**Date of publication:** 26 January 2022 (online & print)

**Citation:** Sharma, M., M. Mathela, R. Sharma, H. Bargali, G.S. Goraya & A. Kumar (2022). Counting the cost: high demand puts *Bunium persicum* (Boiss.) B.Fedtsch. in jeopardy. *Journal of Threatened Taxa* 14(1): 20530–20533. https://doi.org/10.11609/jott.6831.14.1.20530-20533

**Copyright:** © Sharma et al. 2022. Creative Commons Attribution 4.0 International License. JoTT allows unrestricted use, reproduction, and distribution of this article in any medium by providing adequate credit to the author(s) and the source of publication.

**Funding:** Global Environment Facility (GEF) and United Nations Development Program (UNDP).

**Competing interests:** The authors declare no competing interests.

**Acknowledgements:** The authors would like to thank the Director and Dean, Wildlife Institute of India, Dehradun for institutional support. We wish to acknowledge the United Nations Development Programme and Global Environment Facility for funding. Ministry of Environment Forest & Climate Change, Government of India, Himachal Pradesh Forest Department, and Drs. G.S. Rawat, A.K. Gupta for constant support, guidance, and encouragements.
High demand puts *Bunium persicum* in jeopardy

Sharma et al.

Journal of Threatened Taxa | www.threatenedtaxa.org | 26 January 2022 | 14(1): 20530–20533

Wild and cultivated (Goraya & Ved 2017). Unfortunately, due to the absence of sustainable harvesting and collection protocols, and cultivation tools and techniques, the MAPs are harvested indiscriminately (Kumar et al. 2021). In some cases, though there are no locally known uses of the MAPs, they are harvested unsustainably, solely to be sold in the market, the trade of which serves as a lucrative source of income for the plant collectors (Dorji 2016; Mathela et al. 2020). Hence, the heavy and increased demand on high value MAPs in the wild, coupled with destructive harvesting and competitive wild collection has resulted in the rapid decline of the wild populations (Goraya & Ved 2017). The market prices at which these MAPs are sold can easily paint a picture of the demand, for instance, *Fritillaria cirrhosa* D.Don (Jangli lehsun) sells at 12,000–15,000 INR kg⁻¹, *Aconitum heterophyllum* Wall. ex Royle (Kaur) 3,000–4,000 INR kg⁻¹, *Pichorhiza kurroa* Royle ex. Benth (Kadu) 900–1,500 INR kg⁻¹, and *Daedylorhiza hatagirea* (D.Don) Soó (Hathajadi) 2,200–6,000 INR kg⁻¹ (Mathela et al. 2020; Mathela et al. 2021; Kumar et al. 2021). Due to the extremely high demand, increased illegal trade, destructive wild collection and dwindling populations, these MAPs are threatened and many are on the brink of extinction from the wild (Goraya & Ved 2017; Mathela et al. 2020). The unorganized and illegal trade is increasing day by day in the western Himalayan region in spite of strict government instructions on the trade and transportation.

Noticeably, in the recent decade, there have been several reports of medicinal species being reported in peril in the western Himalaya, such as well-known insect fungus *Ophiocordyceps sinensis* (Berk.) G.H. Sung, J.M. Sung, Hywel-Jones & Spatafora commonly called ‘Keerajadi’ and ‘Yarstagunba’ with multiple medicinal uses, which received high attention in terms of increased trade, excessive harvesting, and dependency of local communities, especially in Uttarakhand (India), Nepal, and China. The increasing exploitation has led to rising pressure on the species leading to decrease in the wild population (Yadav et al. 2019). Similarly, the population of *Nardostachys jatamansi* (D.Don) DC. has declined by 60–80% in the wild from IHR, hence categorized as endangered in Arunachal Pradesh, Sikkim, & Himachal Pradesh and critically endangered in Uttarakhand as per CITES. Another species with high market demand and dwindling wild population is *Trillium govanianum* Wall. ex D.Don (Nagchatri) native to the western Himalaya. Another species worth mentioning is *Daedylorhiza hatagirea* commonly known as ‘Salampanja’ or ‘Hathajadi’, which is in high medicinal demand in national and international markets. The annual demand of Salampanja has been recorded at ca. 5,000 tons (Bhatt et al. 2005). The regeneration capacity of this orchid is rather poor due to pollinator specificity and requirement of mycorrhizal association, therefore, over-extraction from the wild poses a serious threat (Pant et al. 2012).

Keeping the sudden spurt in price and high demand of yet another highly threatened MAP *Bunium persicum* (Boiss.) B.Fedtsch. commonly known as ‘Kalazeera’ or black cumin of Himachal Pradesh in view, the current communication attempts to raise high conservation concern to preserve the species in the wild (Images 1–4). Based on intensive market surveys and individual interactions with the local populace and traders comprising 255 respondents in the Lahaul and Pangi landscape of Himachal Pradesh covering 12 villages, namely, Sural Bhatori, Hundan Bhatori, Chasak Bhatori, Killar, Punto, Mindhal, Sechu, Ghisal, Kuthal, Sach, Dharwas & Karyas of Pangi and five villages, namely, Khanjar, Udaipur, Urgos, Tindi, & Thanpattan of Lahaul; the predominant factors that pose a major threat to...
the wild populations of the species include high market demand, increased illegal trade, destructive harvesting, relentless collection of seeds, competitive wild collection and its restricted population. Due to high medicinal and aromatic properties, the species is facing tremendous population decline from the wild and has been reported to sell like hot cakes in the markets. The species also faces identity crisis as it is often mistaken with *Carum bulbocastanum* (L.) W.D.J.Koch or *Carum carvi* L. Also, it is often adulterated with *Cuminum cymimum* L. (Bansal et al. 2018). Additionally, according to Sofi et al. (2009), low productivity mainly due to the poor crop management practices, inadequate planting density, high weed incidence, diseases, insect damage, low germination percentage of seeds, uncertain quality and lack of trade standards are the other issues responsible for its vulnerability in the Himalayan region.

Globally, Kalazeera is distributed in Baluchistan, Afghanistan, and India. In India, it is distributed in Kashmir and the high-altitude regions of Himachal Pradesh including the Padder valley, Chamba, Kinnaur, Lahaul, Pangi, and Spiti at elevations ranging between 1,500–3,500 m (Chauhan 1999; Gupta et al. 2012; Ravikumar et al. 2018). It grows mainly in grassy slopes and low alpine pastoral lands (Sofi et al. 2009). As a whole plant, it is an economically important culinary crop that is cultivated for its seed which matures in the months of late July to August (Chauhan 1999). The seeds are darkish-brown, ribbed with pointed ends and have a deep aroma (Image 2). *B. persicum* has been kept under red-listed Himalayan forest species and is listed amongst the 100 species of conservation concern in commercial demand for use as a herbal raw drug in India (Goraya & Ved 2017). Interestingly, it is also among the few wild species in the western Himalaya which has been recommended for commercial cultivation (Singh et al. 2009). This species with considerable knowledge and literature on its usage, is harvested and traded extensively in Himachal Pradesh. Owing to low volume, high value, and as a non-perishable commodity, it is one the most preferred species for indigenous use and trade in Lahaul and Pangi valley (Singh et al. 2009). The species has diuretic, digestive, anticonvulsive, and anthelmintic effects (Stappen et al. 2017). Owing to these properties, the plant finds use in several medicinal, culinary, and aromatic practices (Sofi et al. 2009), the seeds are widely used as a food additive, tea making condiment and a popular spice and flavoring agent. Due to its therapeutic effect on digestive and urinary tract disorders, it is used for chronic cholangitis and kidney stone, and is useful in treating diabetes (Hassanzadazar et al. 2018), diarrhea, dyspepsia, curing fever, flatulence, stomach-ache, haemorrhoids, and obstinate hiccups (Chauhan 1999).

*B. persicum* has been traditionally used as an appetizer, to reduce cholesterol, anxiety, depression, to alleviate indigestion, bronchitis, diseases of blood & ear, leprosy, convulsions, foul breath, joint pain, lumbago, and weak memory (Singh et al. 2009).

Kalazeera is facing enormous threats not only due to the illegal trade and unscientific harvesting it is subjected to, but also due to loss of its habitats, featuring unique topography and climatic conditions, due to development and degradation resulting in drastic decline in the wild populations (Kala 2000; Goraya & Ved 2017). According to Chauhan (1999), the market price of Kalazeera was 300–400 INR kg$^{-1}$ in the state of Himachal Pradesh, whereas the report of 2,200–4,200 INR kg$^{-1}$ as per Kumar et al. (2021) indicates that the price has increased 10 fold in the last 20 years. According to Goraya & Ved (2017), the estimated annual trade of Kalazeera in...
High demand puts *Bunium persicum* in jeopardy

Sharma et al.

Journal of Threatened Taxa | www.threatenedtaxa.org | 26 January 2022 | 14(1): 20530–20533

Dorji, K. (2016). *References* natural resource management.
and local plant traders can help in community based respective forest department, locals, traditional healers, populations among the various stakeholders. Identifying and building the capacities of stakeholders including respective forest department, locals, traditional healers, and local plant traders can help in community based natural resource management.

References

Bansal, S., S. Thakur, M. Mangal, A.K. Mangal & R.K. Gupta (2018). DNA barcoding for specific and sensitive detection of *Cuminum cyminum* adulteration in *Bunium persicum*, *Phytomde* 50: 178–183. https://doi.org/10.1016/j.phymed.2018.04.023

Bhatt, A., S.K. Joshi & S. Gairola (2005). *Dactylorhiza hatagirea* (D.Don) Soo—a west Himalayan orchid in peril. *Current Science* 89(4): 610–612.

Chauhan, N.S. (1999). *Medical and aromatic plants of Himachal Pradesh*. Indus Publishing, 632 pp.

Dorji, K. (2016). Ecological status of high-altitude medicinal plants and their sustainability: Lingshi, Bhutan. *BioMed Central Ecology* 16(1): 45. https://doi.org/10.1186/s12898-016-0100-1

Goraya, G.S. & D.K. Ved (2017). Medicinal plants in India: An assessment of their demand and supply. National Medicinal Plants Board, Ministry of AYUSH, Government of India, New Delhi and Indian Council of Forestry Research and Education, Dehradun, 430pp.

Gupta, V., D. John, V.K. Razdan & S.K. Gupta (2012). First report of tuber rot disease of *Kalazeera* caused by a member of the *Fusarium solani* species complex in India. *Plant Disease* 96(7): 1067–1067.

Hassanzadazar, H., B. Taami, M. Aminzare & S. Daneshamooz (2018). *Bunium persicum* (Boiss.). F.Bedtchs: An overview on phytochemistry, therapeutic uses and its application in the food industry. *Journal of Applied Pharmaceutical Science* 8(10): 150–158. https://doi.org/10.1094/PDIS-02-12-0148-PDN

Kala, C.P. (2000). Status and conservation of rare and endangered medicinal plants in the Indian trans-Himalaya. *Biological Conservation* 93(3): 371–379. https://doi.org/10.1016/S0006-3207(99)00128-7

Mathela, M., H. Bargali, M. Sharma, R. Sharma & A. Kumar (2020). Brainstorming on the future of the highly threatened medicinal plants of the Western Himalaya, India. *Current Science* 118(10): 1885–1865.

Mathela, M., A. Kumar, M. Sharma, & G.S. Goraya (2021). Hue and cry for *Fritillaria cirrhosa* D.Don, a threatened medicinal plant in the Western Himalaya. *Discover Sustainability* 2(38). https://doi.org/10.1007/s43621-021-00048-5

Mittermeier, R.A., P.R. Gilis, M. Hoffmann, J. Pilgrim, T. Brooks, C.G. Mittermeier, J. Lamoreaux & G.A.B. da Fonseca (2004). Hotspots Revisited. Earth’s Biologically Richest and Most Endangered Terrestrial Ecosystems. CEMEX, USA.

Pant, S. & T. Rinchin (2012). *Dactylorhiza hatagirea*: A high value medicinal orchid. *Journal of Medicinal Plants Research* 6(19): 3522–3524. https://doi.org/10.5897/JMPR12.097

Ravikumar, K., S.N. Begum, D.K. Ved, J.R. Bhatt & G.S. Goraya (2018). *Compendium of Traded Indian Medicinal Plants*. Foundation for Revitalization of Local Health Traditional, Bengaluru, India.

Samant, S.S., U. Dhar & L.M.S. Palni (1998). *Medicinal plants of Indian Himalaya*: diversity distribution potential values. Nainital, India, Gyanodaya Prakashan, 161 pp.

Samant, S.S. & L.M.S. Palni (2000). Diversity, distribution and indigenous uses of essential oil yielding plants of Indian Himalayan Region. *Journal of Medicinal and Aromatic Plant Sciences* 22(18): 671–684.

Singh, A., M. Lal & S.S. Samant (2009). Diversity, indigenous uses and conservation prioritization of medicinal plants in Lahaul valley, proposed Cold Desert Biosphere Reserve, India. *International Journal of Biodiversity Science & Management* 5(3): 132–154.

Singh, P., S.S. Dash & B.K. Sinha (2019). *Plant of Indian Himalayan region* (an annotated checklist and pictorial guide). Botanical Survey of India, Kolkata, 650 pp.

Sofi, P.A., N.A. Zeerak & P. Singh (2009). Kala zeera (*Bunium persicum* Bios.). a Kashmirian high value crop. *Turkish Journal of Biology* 33(3): 249–258.

Stappen, I., N. Tabanca, A. Ali, D.E. Wedge, J. Wanner, V.戈chev, V. Jaitak, B. Lal, V.K. Kaul, E. Schmidt & L. Jirovetz (2017). Biological activity of *Bunium persicum* essential oil from Western Himalaya. *Planta Medica International Open* 4(2): 52–58. https://doi.org/10.1055/s-0043-106857

Kumar, A., S. Sathyakumar, G.S. Goraya, A.K. Gupta, B.S. Adhikari & G.S. Rawat (2021). Assessment of medicinal and aromatic plant species on their collection, usage, demand, markets, price trends and life cycle in Lahaul and Pangi landscape, Himachal Pradesh. A report submitted to Himachal Pradesh Forest Department and United Nations Development Programme, 141 pp.

Yadav, P.K., S. Saha, A.K. Mishra, M. Kapoor, M. Kanaer, M. Kanaer, S. Dasgupta & U.B. Shrestha (2019). Vartsoagun: transforming people’s livelihoods in the Western Himalaya. *Oryx* 53(2): 247–255. https://doi.org/10.1017/S0030060518000674
**Journal of Threatened Taxa** is indexed/abstracted in Bibliography of Systematic Mycology, Biological Abstracts, BIOSIS Previews, CAB Abstracts, EBSCO, Google Scholar, Index Copernicus, Index Fungorum, JournalSeek, SCOPUS, Stanford University Libraries, Virtual Library of Biology, Zoological Record.

*NAAS rating (India) 5.64*
New distribution record of globally threatened Ocean Turf Grass Halophila beccarii: a study from the coast of southern Sri Lanka – Arun Pratap Singh, Pp. 20311–20322

A floristic survey across three coniferous forests of Kashmir Himalaya, India – a checklist – Ashfaq Ahmad Dar, Akhtar Hussain Malik & Narayanatsamy Parthasarathy, Pp. 20323–20345

Associations of butterflies across different forest types in Uttarakhand, western Himalaya, India: implications for conservation planning – Arun Pratap Singh, Pp. 20333–20370

Comparison of bird diversity in protected and non-protected wetlands of western lowland of Nepal – Jagan Nath Adhikari, Janak Raj Khatiwada, Dipendra Adhikari, Suman Sapkota, Bishnu Prasad Bhattarai, Deepak Rijal & Lila Nath Sharma, Pp. 20371–20386

Local hunting practices and perceptions regarding the distribution and ecological role of the Large Flying Fox (Chiroptera: Pteropodidae: Asota) in western Sarawak, Malaysian Borneo – Jayasenthil Mohamed, Joon Yee Yong, Nabila Norshuhadah Mohd Hazzrol, Philovenny Pengiran, Ariantul Atong & Sheema Abdul Aziz, Pp. 20387–20399

Communications

Macrolichens of Mathikettan Shola National Park, Western Ghats: a preliminary investigation with some new records – Aswathi Anilkumar, Stephen Sequeria, Arun Christy & S.M. Arsha, Pp. 20400–20405

New distribution record of globally threatened Ocean Turf Grass Halophila beccarii –Swapnani Gole, Prasad Gaidhani, Srabani Bose, Anant Pande, Jeyaraj Antony Johnson

An inventory of new orchid (Orchidaceae) records from Kozhikode, Kerala, India – M. Sulaiman, C. Murugan & M.U. Sharief, Pp. 20413–20425

Abundance and spatial distribution analyses of Stereocarpus moonii (Dipterocarpaceae) - a critically endangered species endemic to Sri Lanka – K.A.M.R.P. Atappat, H.D.D.C. Perera, H.S. Kathiriarchachi & A.R. Gunawardena, Pp. 20426–20432

Plant diversity of Point Calimere Wildlife Sanctuary and fodder species grazed by the Blackbuck Antelope cervicapra L. – Ashutosh Kumar Upadhyay, A. Andrew Emmanuel, Ansa Sarah Varghese & D. Narasimhan, Pp. 20433–20443

Observes (1983–2016) in National Chambal Gharial Sanctuary: semi-arid biogeographic region suggestions for parametric studies on ecological continuity in Khathiar-Gir Ecoregion, India – L.A.K. Singh, R.K. Sharma & Udayan Rao Pawar, Pp. 20444–20460

Nesting success of Sharpe’s Longclaw (Macronyx sharpei Jackson, 1904) around the grasslands of lake O’bolosat Nyandarua, Kenya – Hamisi Ann Risper, Charles M. Warui & Peter Njoroge, Pp. 20461–20468

Population, distribution and diet composition of Smooth-coated Otter Lutrogale perspicillata – Nagarajan Baskaran, Raman Sivaraj Sundarraj & Raveendranathanpillai Sanil, Pp. 20469–20477

Utilization of home garden crops by primates and current status of human-primate interface at Galigamuwa Divisional Secretariat Division in Kegalle District, Sri Lanka – Charmalie Anuradha Dona Nahallage, Dahanakge Ayeshia Madushani Dasanayake, Dilan Thisarawewa & Dissanayakalage Tharaka Harshini Ananda, Pp. 20478–20487

Revision of Eastern Swamp Deer Rucervus duvaucelii ranjitsinhi (Grosves, 1982) in Manas National Park of Assam, India – Nazrul Islam, Aftab Ahmed, Ratih Barman, Sanatan Deka, Bhaskar Choudhury, Prasanta Kumar Saikia & Jyothishman Deka, Pp. 20488–20493

Trypanosoma evansi infection in a captive Indian Wolf Canis lupus pallipes – molecular diagnosis and therapy – Manojita Dash, Sarat Kumar Sahu, Santosh Kumar Gupta, Niranjana Sahoo & Debarat Mohapatra, Pp. 20494–20499

View Point

COVID-19 and civil unrest undoing steady gains in karst conservation and herpetological research in Myanmar, and an impediment to progress – Evan S.H. Quah, Lee L. Grismer, Perry L. Wood, Jr., Aung Lin & Myint Kyaw Thura, Pp. 20500–20502

Short Communications

Morphological characterization and mt DNA barcode of a tiger moth species, Asota fuscus (Fabricius, 1775) (Lepidoptera: Noctuoidea: Erebidae: Aganainae) from India – Aparna Sureshchandra Kalawate, K.P. Dinesh & A. Shabnam, Pp. 20503–20510

Distribution of Smooth-coated Otters Lutrogale perspicillata (Mammalia: Carnivora: Mustelidae): in Ratnagiri, Maharashtra, India – Swarnand Patil & Kranti Yadav, Pp. 20511–20516

Wildlife at the crossroads: wild animal road kills due to vehicular collision on a mountainous highway in northwestern Himalayan region – Muzaffar A. Kichloo, Asha Sohil & Neeraj Sharma, Pp. 20517–20522

Notes

Robiquetta gracilis (Lindl.) Garay—a new record to the flora of Anamalai Hills, Tamil Nadu, India – B. Subbaiyan, V. Ganesan, P.R. Nimal Kumar & S. Thangaraj Panneerselvam, Pp. 20523–20525

Ipomoea laxiflora H.J. Chowdhery & Debta (Convolvulaceae): new records for the Western Ghats and semiarid regions – Sachin M. Patil, Ajit M. Vasava, Vinay M. Raole & Kishore S. Rajput, Pp. 20526–20529

Counting the cost: high demand puts Bunium persicum (Boiss.) B.Fedtsch. in jeopardy – Monika Sharma, Manisha Mathela, Rupali Sharma, Himanshu Bargali, Gurinderjit S. Goraya & Amit Kumar, Pp. 20530–20533

First record of Parasitic Jaeger Stercorarius parasiticus (aves: Charadriiformes: Stercorariidae) from inland freshwater Inle Lake, Myanmar – Sai Sein Lin Oo, Myint Kyaw Thura, L.C.K. Yun, Min Zaw Tun, Yar Zar Lay Naung, Soe Naing Aye & Sven C. Renner, Pp. 20534–20536

Book Review

Capparis of India – V. Sampath Kumar, Pp. 20537–20538

The Journal of Threatened Taxa (JoTT) is dedicated to building evidence for conservation globally by publishing peer-reviewed articles online every month at a reasonably rapid rate at www.threatenedtaxa.org. All articles published in JoTT are registered under Creative Commons Attribution 4.0 International License unless otherwise mentioned. JoTT allows unrestricted use, reproduction, and distribution of articles in any medium by providing adequate credit to the author(s) and the source of publication.

ISSN 0974-7907 (Online) | ISSN 0974-7893 (Print)

January 2022 | Vol. 14 | No. 1 | Pages: 20311–20538

Date of Publication: 26 January 2022 (Online & Print)

DOI: 10.11609/jott.2022.14.1.20311-20538