

Swertia chirayita (Roxb. ex Fleming) Karsten on the verge of extinction in the Himalayan region

Himalaya is well known for its rich biodiversity in medicinal and aromatic plants. Owing to its unique geographical set-up, topography and undulant landscape, the climatic conditions varied along an altitudinal gradient which attributes diversified ecological habitat ranging from tropical forest, grassland to alpine meadow with vast and diverse natural resources. Unfortunately, some of the natural resources are unscientifically exploited for various purposes, particularly medicinal plants. Most of the medicinal plants are being extracted for drug and pharmaceutical industries, traditional use and research purposes from wild populations. These activities adversely affect the existence of a number of plants, particularly those of high commercial value. Further, with the developmental activities in the higher Himalayan region, the original populations of many of these valuable resources have been vanishing. *Swertia chirayita* (Figure 1) is among the several medicinal plant species growing in the Himalayan region. It is a critically endangered (CR) medicinal herb belonging to the family Gentianaceae and is now on the verge of extinction. Although extinction of species is a natural process, the current rate of extinction through human interventions is estimated approximately 100–1000 times faster than the natural speed of extinction¹. The species currently on Earth are the result of a natural selection process over the last three bil-

lion years, which has led to a large degree of specialization. Species diversity is therefore a prerequisite for ecosystem functioning; but how important are species and ecosystems for society? It can be analysed by studying the functions and associated goods and services of ecosystems that are important for human being.

S. chirayita is also mentioned in the literature as *S. chirata* Buch.-Ham.; *Ophelia chirata* Grisebach.; *Agathotes chirayita* Don.; *Gentiana chirayita* Roxburgh² and *Gentiana floribunda* Don³. The trade name of *S. chirayita* is chiretta^{1,4}.

S. chirayita is found distributed in temperate regions of the Himalaya at an altitude of 1200–3000 m from Kashmir to Nepal, Bhutan and grows in the slopes of moist shady places⁵. *S. chirayita* has an erect, about 2–3 ft long stem; the middle portion is round, whereas the upper is four-angled, with a prominent decurrent line at each angle. The stems are orange-brown or purplish and contain large continuous yellowish pith. The root is simple, tapering and stout, short, almost 7 cm long and usually half an inch thick. Among the different species of the genus, *S. chirayita* is considered the most important for its medicinal properties. The bitterness, antihelmintic, hypoglycaemic and antipyretic properties are attributed to amarogentin (most bitter compound isolated till date)⁶, swerchirin, swertiamarin and other active principles

of the herb. Herbal medicines such as Ayush-64, Diabecon, Mensturyl syrup and Melicon V ointment^{7,8} contain chirata extract in different concentrations for its antipyretic, hypoglycaemic, antifungal and antibacterial properties.

Despite its medicinal properties and use in the herbal industry, *S. chirayita* could not get much attention on conservation and cultivation, particularly in areas near its natural population. Therefore, the plant is still collected from the wild to meet industrial demand. A reconnaissance done by a team working in different research institutes of Uttarakhand, and others parts of the Garhwal Himalaya, reveals that only a few pockets or individuals of *S. chirayita* are now remaining in these areas under diverse climatic conditions. In fact, these patches are also decreasing rapidly due to invasion by several biotic and abiotic factors. Using available information based on field survey, it is assumed that the causes of its degradation are largely overexploitation, low regeneration in the natural habitats and clearing of forests for developmental activities. For example, construction of roads and canals in many natural habitats has been responsible for the major loss of biodiversity.

The government has imposed total ban on collection or removal of planting materials of this important species from their natural populations, but the question of declining populations still remains. Therefore, its long-term survival



Figure 1. **a**, Naturally growing *Swertia chirayita* in patches. **b**, An individual facing survival problem due to construction of road in natural habitat.

CORRESPONDENCE

is at risk in the Himalayan region. Keeping in view the importance and conservation value of *S. chirayita*, some conservation measures need to be taken, i.e. notify the natural populations for the protection of its habitats, detailed study on phenology with understanding of whole life cycle, sustainable collection of germplasm from natural populations for developing elite generations in future, rehabilitation of species before taking any developmental activities, establishment of nurseries in nearby areas of natural habitats, development of large-scale seedlings and their plantation, restrictions in field survey and collection in sensitive areas having natural populations and creation of awareness among the local healers to control over-exploitation in natural habitats to maintain its posterity for future. Since policy-makers and scientist cannot conserve the species without wider support from the local communities and government agencies, particularly the Forest Department, a multi-farious effort is required to conserve the species. The R&D institutions and universities working on conservation issues need to develop appropriate strategies for sharing their experiences and scientific information for the conservation of this important species. Loss of species can have important consequences for the well-being and prosperity of the human

population, because it reduces the strength and capacity of ecosystems to provide essential goods and services. This includes socio-cultural, religious, historical, scientific and educational resources.

1. Chapin, F. S. *et al.*, *Nature*, 2000, **405**, 234–242.
2. Anon., In *The Wealth of India: Raw Materials*, CSIR, New Delhi, 1982, vol. X, pp. 78–81.
3. Clarke, C. B., In *The Flora of British India* (ed. Hooker, J. D.), L. Reeve and Co, London, 1885, vol. IV, p. 124.
4. Kirtikar, K. R. and Basu, B. D. (eds), *Indian Medicinal Plants*, Allahabad, 1984, vol. III, pp. 1664–1666.
5. Gaur, R. D., *Flora of the District Garhwal*, North West Himalaya (with ethnobotanical notes). Transmedia, Srinagar (Garhwal), 1999, p. 408.
6. Karan, M., Vasisht, K. and Handa, S. S., In *Supplement to Cultivation and Utilisation of Medicinal Plants* (eds Handa, S. S. and Kaul, M. K.), RRL, Jammu-Tawi, 1996, pp. 349–354.
7. Edwin, R. and Chungath, J. I., *Indian Drugs*, 1988, **25**, 143–146.
8. Mitra, S. K., Gopumadhavan, S. and Muralidhar, T. S., *Phytother. Res.*, 1996, **10**, 433.

ACKNOWLEDGEMENTS. We thank the Uttarakhand State Biotechnology Department, Government of Uttarakhand, for financial

support, and the Director, High Altitude Plant Physiology Research Centre, H.N.B. Garhwal University, Srinagar Garhwal for providing facilities. We also thank Mr Vikram Singh Rawat and Mr Durga Prasad for assistance during the field survey.

VIJAY K. PUROHIT^{1,*}
YATEESH M. BAHUGUNA¹
DEEPTI TIWARI¹
ALKA TIWARI¹
HARISH C. ANDOLA²
JAGMOHAN S. NEGI³
RAJENDRA S. CHAUHAN⁴

¹High Altitude Plant Physiology
Research Centre,
H.N.B. Garhwal University
(A Central University),
Srinagar Garhwal 246 174, India

²Centre for Aromatic Plants,
Industrial Estate,
Selaqui Dehradun 248 197, India

³Herbal Research & Development
Institute,

Mondal, Gopeshwar,
Chamoli 246 401, India

⁴Veer Chandra Singh Garhwali,
College of Horticulture,
Uttarakhand University of Horticulture
and Forestry,

Bharsar,
Pauri 246 123, India

*e-mail: vijaykantpurohit@rediffmail.com

Confirmation of Higgs boson – a limerick in tribute*

- Behold the doughty scientists at CERN
Doing their utmost to clearly discern
Happenings at dawn of time
In the primordial soup and grime
Assured ancient events are of great concern.
- Set up super circular way sans central divider
With opposing traffic to make it
Hadron Collider
Speeding particles to Giga Electron
Volts
That's a unit of energy (for the dolts)
Watching screens for collisions, with
eyes wider and wider.
- Round and round the protons racing
madly went

Clockwise or counter, precisely as they
were sent

Across borders, French and Swiss
Giving laws of visas complete
miss
Customs and health rules without scrup-
les bent.

- Finally we have proof of the elusive
Higgs boson
Explaining why all worldly things put
their mass on
One secret of big bang, we're told, has
been found
Until its anti-secret pops up in the next
round!
As for me, damned if I knew what the
devil goes on.

*Limerick is a verse form in which lines 1, 2 and 5 must rhyme as should lines 3 and 4. All the lines must also have the required number of syllables, conveying the meaning usually in a humorous way. See [http://en.wikipedia.org/wiki/Limerick_\(poetry\)#Variations](http://en.wikipedia.org/wiki/Limerick_(poetry)#Variations) (accessed on 3 November 2012) for more details.

K. G. NARAYANAN

'Malhaar',
903, 2K Cross, 9th Main Road,
Kalyan Nagar I Block,
Bangalore 560 043, India
e-mail: kgnarayanan2@gmail.com