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SWERTIA CHIRAYITA: AN ENDANGERED MEDICINAL HERB OF THE HIMALAYAS

Bandan Thapa*, Pushkar Sharma and Sibdas Baskey
Regional Research Station, Hill Zone, Uttar Banga Krishi Viswavidyalaya,
Kalimpong 734301 West Bengal, India
*Corresponding author: bandhan.thapa@gmail.com

Abstract
Darjeeeling and Sikkim falls under the Himalayan hotspots of India and considered as one of the prime region for major biodiversity constituting of variety of endangered medicinal and other important ethnobotanical herbs. *Swertia chirayita* important indigenous medicinal herb has been lost from its natural habitat in the Western Himalayas but is in a vulnerable state in Eastern Himalayas. This plant is a treasure in a hub of medicinal plants in India because of its demand in the national and international market. The use of this plant as traditionary medicine in curing many ailments as well as being archived in the British, and the American pharmacopeias and Indian pharmaceutical codex, and in other traditional medicine like the Ayurveda, Unani, Siddha. Darjeeeling and Sikkim, where the study and efforts for conservation has been made is regarded as the denizen as of many species and population of *Swertia.* If efforts of in-situ and ex-situ conservation are not being made for the dwindling population of this medicinal plant, it is for sure to be getting extinct in the near future. Contemplating for its loss from the wild there has been many intrinsic and extrinsic factors which has to be taken into consideration. Conservation of this species utilizing conventional approaches alone cannot help this herb from being exploited, therefore various well contrived biotechnological strategies must be adopted for sustainable use, cultivation and reintroduction back to its habitat.

Introduction

Swertia chirayita, locally known as Chirauto or Chirayita is one of the highly demanded medicinal herbs from the Himalayan belt in the international and national market. The medicinal use of this herb is documented in the Indian pharmaceutical codex, the British, and the American pharmacopeias. For ages, its use has also been reported in different traditional medicine such as the Ayurveda, Unani, Siddha. *Swertia chirayita* is known for its bitter taste due to its main constituent called Amarogentin, which is the bitterest compound reported till date and other different bioactive compounds. Locally the decoction of this herb is used for malarial fever and indigestion. Regardless of its high requirement in the herbal industry, it is still being collected illicitly from the wild; as such the existing population of *S.chirayita* is dwindling at an alarming rate in the Himalayas. The IUCN (International Union for Conservation of Nature and Natural Resources) has categorized this species as critically endangered and also being listed as endangered in Indian Red Data Book and vulnerable in Darjeeling and Sikkim Himalayas. It has also been listed amongst the 32 prioritized medicinal plants of India by National Medicinal Plant Board, Ministry of AYUSH and also providing 75% subsidy to farmers for promoting its cultivation.

Plant Description

Swertia chirayita is an erect and profusely branching plant with a height ranging from 3 to 5.5feet, with dark green to purple colored stem with yellow colored roots. It is a pluri-annuals (flowering once in the third year) .It is a very slow growing plant which germinates after 3-4 months of sowing and comprises of more than two years of vegetative stage. The vegetative stage is characterized by large radical leaves (20-25cm in length) which sustains for more than two years and starts getting

old and dried at the emergence of the stem , which starts to develop only in the third year after sowing. After the emergence of stem small cauline leaves starts to appear with numerous flowers borne on leafy panicle.

Threat Perceptions

Extrinsic Factors:

- Growing demand for raw materials of medicinal plants by the pharmaceutical companies and their depleting resource base.
- More number of households depending economically on this herb for income generation through commercial collection.
- Lack of knowledge about sustainable harvesting and Good Agriculture Collection and Cultivation Practices **(GACP).**
- Habitat destruction due to construction of roads, overgrazing and local endemics like landslides, forest fire is identified as the main threat to its diversity.

Intrinsic Factors

- The major intrinsic factor causing threat to this herb is its propagation. It takes 3 years to complete its life cycle and can be propagated through sexual means only i.e. through seeds
- Due to its slow growth it cannot compete with other plants for nutrition in the wild.
- The seeds harvested also possess a problem of low viability and low germination percentage.
- This herb is highly location and temperature specific as per our observation and can grow suitably only above 1200m msl altitude and difficult to acclimatise in lower elevations.

Strategies for Conservation

Good Agricultural Collection and Cultivation Practices

It has become a necessity for conservation this herb and provide training and conservation program absolute necessary for all stake holders. We have to develop and provide guidelines and training on Good Agricultural Collection Practices (GACP) to the inhabitants dwelling near the forest and those who depend their livelihood for sustainable harvest so to add value to harvest over long time and aim towards conservation. Scalable cultivation is one of the best strategies for conservation meeting high demands of national and international market. Developing Good Agricultural Practices (GAP) for endangered herbs having high commercial demand has become a must and need of the hour. Cultivation of such medicinal plants will decrease the pressure on natural resources and wild collection and impede the use of unauthentic substitutes and adulterants, resulting in the decline of the standard of drugs of Indian systems of Medicine.

Micro propagation

Conservation of this species utilizing conventional approaches alone cannot help this herb from being exploited and on the verge of being extinct from its natural habitat. Tissue culture and micro propagation techniques are promising *in – vitro* techniques showing potential in managing and conserving this herb sustainably. The conventional propagation of the species is too slow and unable to overcome the threat of extinction. Therefore, *in vitro* propagation strategies are the only practical option for the rapid propagation.

***Ex-situ* Conservation and reintroduction in its natural habitat**

Adoption of conservation actions by local Research Institutes and Forest departments and maintaining such endangered plant species in their field gene banks as a measure for *Ex-situ* conservation can help in its management. Also producing quality planting material through seeds

and reintroduction in its natural habitat will reinforce the efforts on resurgence of the species in the areas facing risk of extinction. Trainings can also be provided to various stakeholders to popularize the Field Gene Bank (FGB) in order to strengthen and foster the integrated and sustainable utilization of this plant and its genetic resources.

References

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Conservation and Maintenance of *Swertia chirayita* being done at Regional Research Station,Hill Zone,Kalimpong, UBKV

Collection of Dried plants for seeds collection for maintaining accessions

Seedlings grown from seeds: FIRST YEAR

Seedlings grown from seeds : SECOND YEAR

Seedlings of different accessions being maintained at RRS,HZ,Kalimpong . Altitude : 1085 m

Maintenance of *Swertia chirayita* Accessions at Polyhouse at Dalapchand KVK Farm Altitude : 1450m

MAINTENANCE OF ACCESSIONS IN OPEN CONDITION AT DALAPCHAND