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Swertia L. (Gentianaceae) in Nepal: Ethnobotany and Agenda for Sustainable Management

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Swertia L. is a morphologically diverse but taxonomically distinct genus of the family Gentianaceae with ca150 species. In Nepal, *Swertia* L. comprises of 29 species with one endemic species (*Swertia acaulis* H. Sm.) which are widely distributed in the mountainous terrains of Eastern, Central and Western regions at altitude ranging from 600 to 5500m. (Joshi, 2007). The plants are economically important and comprise a major portion in the trade of medicinal plants. Recently more attention has been paid to the species of *Swertia* due to their usefulness to cure various ailments, their increasing price, and use of the plant as raw materials for preparation of Ayurvedic and Allopathic medicines. However, at present, the vast store of ethnopharmacobotanical information is being eroded as a result of habitat destruction, unsustainable land use practices and unscientific as well as over-exploitation of plant resources by the collectors and traders recklessly beyond its regeneration capacity. The present rate of exploitation has rendered some species to the status of threatened species (Joshi and Joshi, 2005; Joshi, Joshi and Joshi, 2000; Joshi, Shrestha and Joshi, 2003).

Information on taxonomy, biogeographical distribution, ethnobotany and conservation of the *Swertia* species are very limited (Bhattarai, 1992; Joshi, 1988, Joshi, K., 2000, 2004; Joshi and Joshi, 2005; Manandhar, 2002; Sacherer, 1979). An attempt has been made in this paper to enumerate the *Swertia* species which are being used by local communities of some hilly villages and surrounding areas of the Central Development Region of Nepal.

Materials and Methods

The present study was undertaken during material collection phase of a Post Doc. Research

Project during August to October 2007. Field trips were conducted to various villages and adjoining areas of Rasuwa, Sindhupalchok, Dolakha, Makwanpur, Kathmandu, and Lalitpur Districts in Central Development Region to document ethnomedicinal knowledge. Ethnobotanical information including people perception and conservation status of the *Swertia* species was gathered using various techniques such as interviews, discussion with local people, traders and direct observation on the way the useful plants and their parts were being collected and used (Joshi and Edington, 1990). The plant specimens have been collected and identified with the help of local floras. Voucher specimens are deposited in Biodiversity Research Center, EMA Group, Nepal and in Herbarium, Harvard University Herbaria, Cambridge, USA.

Results and Discussion

During the field survey, ethnobotanical information of nine species of *Swertia* has been collected. For the purpose to treat diseases, various forms of preparation are used. The most popular medicinal preparations are infusion, decoction, paste and juice. The plant enumerated below are in botanical name followed by English name (Eng.), Nepali name (Nep.), part used, mode of preparation of drug, administration/application, ailments, habitat and village name respectively.

Swertia angustifolia Buch.-Ham ex D. Don

Eng. Chiretta; Nep. Chiraito, Bhale chiraito, Gotha Tite.

Parts used: Whole plant, root

Uses: Plant is crushed and boiled in water and two teaspoonful decoction is given to treat malaria fever 2-3 times a day; root juice is taken to give relief from cold and cough.

Habitat and Specimen collected areas: Open slopy land especially on the sides of the walking trail, relatively drier area. Way to Marming from Chaku, 1600m, Sindhupalchok district; Charikot, 2000m, Dolakha district.

Swertia chirayita (Roxb. ex Fleming) H. Karstrn

Eng. Chiretta, Brown chiratte, White chirette; Nep. Chiraito, Tite, Pothi chiraito.

Parts used: Whole plants, root.

Uses: The plants are dipped in water overnight and the bitter juice is taken the next morning to cure malarial fever; decoction of the plant is used as tonic that influence on the digestive organs and also used as anthelmintic, especially for children; Juice of the root is taken to cure liver diseases; paste of the plant is also used in common ailments like cough, cold, asthema, headach and fever; roots crushed and paste rubbed over joints for quick relief; leaves warmed and paste prepared with mustard oil applied over boils and scabies.

Habitat and Specimen collected areas: Forest and Open scrub area, pasture, slopes of the hills, open slopy land under the little canopy with more moisture. Barmoche, 2360m, Sindhupalchok district; Manichur, 2150m, Kathmandu district; Phulchoki, 2300m, Lalitpur district.

Swertia ciliata (D. Don ex G. Don) B.L. Burtt

Eng. Chiretta; Nep. Chiraito, Kalo Chiraito

Part used: Whole plant

Uses: Decoction of plant is given three times a day for 5-7 days to control cough, cold and fever. Plant is also used as a substitute for *S. chirayita.*

Habitat and Specimen collected area: open flat as well as slopy area. In between Chandanbari to Cholangpati, 3530m, Rasuwa district.

Swertia deltata* var *pilosa C.B. Clarke

Eng. Chiretta; Nep. Chiraito, Sirlinge

Part used: Whole plant

Uses: Paste is applied locally to get relief from joint pains; extract is used to treat scabies; juice of plant is taken orally twice a day before meal to treat fever and headache.

Habitat and Specimen collected areas: open flat sunny area (meadows) or shady places. Manichur, 2100m, Kathmandu district; Simbhanjyang, 2000m, Makawanpur district.

Swertia multicaulis D. Don

Eng. Chiretta; Nep. Chiraito, Sarma guru (Sarmagu).

Part used: Whole plant

Uses: Plant ground and paste applied over wounds for healing; two to three teaspoonful of decoction of plant is given twice a day to cure fever, cough and cold; decoction of plant is also given for 2-3 days as anthlmintic.

Habitat and Specimen collected area : open and sunny area on the soil rich in pieces of rock, sloppy as well as flat land. Suryakunda, 4650m, Rasuwa district.

Swertia nervosa (Will. ex G. Don) C.B. Clarke

Eng. Chiretta; Nep. Chiraito, Tite, Kalo Choraito, Aullo ghans

Parts used: Whole plant, root.

Uses: Decoction of root is applied in skin diseases; plant is crushed and boiled in water and two teaspoonful decoction is given twice a day in empty stomach to treat malaria fever; extract of the plant is also given in the morning to cure ‘Gano” (Gasball) and stomach problem.

Habitat and Specimen collected areas: South facing open and relatively drier areas. In between Deurali and Dhimsa, 2830, Rasuwa district; Phulchoki, 2600m, Lalitpur district; Simbhanjyang, 2000m, Makawanpur district.

Swertia paniculata Wall.

Eng. Chiretta; Nep. Chiraito, Tite

Part used: Whole plant

Uses: Decoction of the plant is used as tonic; plant is also used as substitute for *S. chirayita* in the treatment of malarial and other fever.

Habitat and Specimen collected area: open flat sunny area. Phulchoki, 2300m, Lalitpur district .

Swertia pedicellata Banerji

Eng. Chiretta; Nep. Chiraito

Part used: Whole plant

Uses: plant paste is applied externally on forehead to get relief from headache.

Habitat and Specimen collected areas: open flat as well as slopy area, sometimes under slight canopy of larger trees like *Abies* and *Pinus*. Barmoche, 2360m, Sidhupalchok district; Baghkhor, 2635m, Dolakha district.

Swertia racemosa (Wall. ex Griseb.) C.B. Clarke

Eng. Chiretta; Nep. Chiraito

Part used: Whole plant

Uses: Plant is tonic; two teaspoonful of decoction of plant is given twice a day to treat fever and cough; paste of the plant is applied locally to treat eczema and pimples; juice of aerial part is taken orally twice a day before meals to treat jaundice.

Habitat and Specimen collected areas: open sunny area generally on the flat land and sometimes on the slopes. near Gosaikunda, 4360m, Rasuwa district; Kalinchowk, 3750m, Dolakha district.

The present study indicates that the inhabitants of the study areas rely on traditional medicine for their primary health care needs. They have developed unique indigenous practices on the use of existing plant resources due to constant association with the forest and agro-ecosystems. Especially, women have significant knowledge regarding the identification of medicinal herbs and their therapeutic uses.

The species of *Swertia* are very effective as the traditional medicine due to the presence of unique combination of the phytochemicals like xanthones, decussatin and swertinin. Among the enumerated species, *S. chirayita* is especially used as the main ingredient in the Ayurvedic medicine i.e. the plants or parts are mixed in Mahasudarshana Churna (a remedy containing more than 50 herbs) in India

(Chevallier 1996), and in "Chandra Prabati" which is an Ayurvedic drug for cancer (Shrestha, 1991) However, screening of chemical and pharmacological aspects of these medicinal plants are essential to determine the effectiveness of the plants.

Agenda for Sustainable Management

Due to the high price of *Swertia* plants and their parts, villagers (collectors) have high competition for collection. The plants are collected during the late stages of flowering. The whole plant is pulled out, sun-dried for a few days, wrapped by bamboo slip and sold to the local traders as dried brownish stems with root and leaves intact. Unsustainable harvesting without considering the age of the plant and seed maturity reduces regeneration significantly. Extensive collection of these plants from the natural habitat leads to an increasing danger of extinction (Bhattarai and Shrestha, 1996; Edwards, 1993). According to the villagers and traders, production of *Swertia chirayita* is decreasing every year in the Central and Eastern parts of the country. Therefore, appropriate conservation measures for these species are urgently needed.

Some important measures for the sustainable management of *Swertia* species are recommended as follows:

1. Though there are some policies relating to non-wood forest products in Nepal, there is urgent need of specific national comprehensive policy with action plan and programs for sustainable management of these plants facing severe threats.

2. Emphasis should also be given to initiate an extensive inventory of the plants including their distribution, chemical constituents, genetic level, regeneration capacity and ecological aspects of the suitable habitats and their potential utilization.

3. High priority should be given to the conservation (*in-situ* and *ex-situ*) of the plants and their habitats.

4. *Swertia* species is one the important sources of income for rural people. Therefore, effort should be initiated to develop sustainable harvesting methods and appropriate agro- techniques for promoting its domestication and cultivation.

5. Awareness creation programs aiming at sustainable management and utilization of the species will have to be implemented targeting the local rural people as major stakeholders.

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