SWERTIA SPP: A SOURCE OF BITTER COMPOUNES FOR MEDICINAL USE

BHUPENDER DUTT, L.J SRIVASTAVA AND J.M SINGH

Department of forest products, Dr Y.S Parmar University of Horticulture and forestry
Nauni, Solan- 173 230, Himachal Pradesh

Received: 5 June, 1995
Accepted: 17 July, 1995

ABSTRACT: Swertia is an important genus used in Indian medicine. A comprehensive review on this genus is presented in this article.

Introduction:

Genus Swertia Linn belongs to the family gentianaceae. There are 90 species of this genus are cosmopolitan in distribution (Kirtikar and Basu, 1975). Swertia is a large genus of herbs distributed in the mountainous regions of tropical Asia Europe, America and Africa. Like most other member of the gentian family, this is an alpine plant. Its original home is the area around Himalayas.

In India about 40 species of the genus have been recorded. Out of these species Swertia chirayita is important for its medicinal uses. Several other species of swertia are used as substitutes and adulterant of S chirayita the most important among these being S. angustifolia (Anonymous, 1976).

Distribution of common and important species of Swertia:

Swertia chirayita Karst commonly known as chirata is distributed in temperate Himalayas at altitudes of 1200-3000m from Kashmir to Bhutan, and in Khasi hills in Meghalaya at 1200- 1500m Flowering and fruiting occur from July to October.

S.angustifolia Ham Commonly known as Kiretta is distributed in sub-tropical Himalayas from Kashmir to kumaon, sikkim, Khasia hills, Assam cooch Bihar sough west and south china at altitude ranging form 500to 2000m Flowering and fruiting take place in September-October. S. alata Royle. Commonly known as chiretta or Hatmul is a winged species and is distributed in temperate Himalayas from 1200 to 2000m. it resembles. S chirayita in external appearance. Flowering and fruiting takes place in September – October.

S. alterifolia Royle. It is distributed in the western Himalayas Kumaon and Gharwal with altitudes ranging from 3500 to 4000m. Flowering and fruiting takes place in August to September.

S.cordata Wall. It is widely distributed in temperate Himalayas and western Tibet from 200 to 3500m in Kashmir and Bhutan. Flowering and fruiting take place from August to September.

S.dicussata Nimo ex charch is distributed in western Deccan peninsula from 1000 to 2000m, from konkan to travencore more common.
S. japonica. it is distributed in Japan. 
S. paniculate wall it is distributed in Temperate Himalayas up toe Bhutan with altitudes ranging from 1200-2500. Flowering and fruiting take place in July-September.

S. purpursence wall it is widely distributed in North west Himalayas from 2000-400 from Kashmir to Kumaon. Flowering and fruiting take place in August – October.

S. petiolata. It is distributed in western Himalayas from 3000-4000m Flowering and fruiting occur from July- September.

S. speciosa. It is distributed in western Himalayas up to 3500m Flowering and fruiting take place in August – October.

Identification of some important species of Swertia:

Identification of some important species of Swertia given by Blatter (1984) is as follows:

A) Calyx and corolla 5 lobed
I Two glands on each corolla lobe stem hollow
   a) Seeds not winged flowers lurid grey or white with blue green veins….. Swertia petiolata

b) Glands on corolla lobes fringed flowers lurid grey ........... Swertia speciosa

2) Stem not hollow ..... Swertia teteragona

II. One gland on each corolla lobe
   1. Corolla purple or dark red ....... Swertia purpurescence
   2. Corolla yellow white ..... Swertia cordata
   3. Corolla white in upper half with 2 purple blotches at the base ..... Swertia paniculata

B. Calyx and corolla -4-lobed

1. Corolla white or pale blue darker dotted .... Swertia angustifolia
2. Corolla green yellow variously tinged .... Swertia alata one gland on each lob of corolla .... Swertia chirayita

Active Principles:

Swertia species are known for bitter principles. Among swertia species, S. chirayita is most valuable and is used in medicines on large scale particularly in India and Nepal for its bitter principles. The active constituents of swertia spp. Are tabulated as follows:

| Name of the Species | Active constituents | Source |
|---------------------|---------------------|--------|
| Swertia chirayita   | Ophelic acid, Chiratin, Amarogentin, Gentiocrucine, Enicoflavin, Palmitic acid, Sswerchirine, Gentianine, Oleic acid, Stearic acid and phytosterol | Shah et. al (1970) and Sharma, P.V (1982) |
| S. dicussata        | Dicusatin, swertinin | Chopra and Handa (1961) |
S. paniculata | Triterpene, Hedragenin, 4-Xanthone glucosides, Urolic acid B-81 sitosterol, B-amyrin, Swertisin, Isoswertisin. | Parkash et al (1982) Khetwal and Verma (1990)

S. petiolata | Amaroswerine, swertia lactone, swertia lactone Tri and tetra oxygenated xanthones. | Kubota, et al. (1983) and Bhan, et al., (1988)

S. alata | Swertisin, Sertiamarin and Beldifolin | Khan et al. (1979)

S. angustifolia | Tetroxygenated and penta oxygenated Xanthones, O-glucosides. | Ghosal (1978)

S. macroperma | Swertia bisxanth – I Norswertianolin. | Hui (1969)

S. perenin | Gentiopicrin | Nadkarni (1976)

S. Japonica | Swertiamarin, Amarogentin, Amaroswerin, Swertisin, Swertia Japonin, Homoorientinin, Oleanolic acid | Kubota et. al (1983)

Chiretta or chirata belongs to amaroidal class of drugs which are difficult to standardize and therefore the physiological evaluation of the drug through bitter values has been recommended for inclusion of the pharmacopoeia of India the bitter value of chiretta has been determined by using the method of Wasicky with brucine as the standard, and it is found to be 455 which in 2/3 of the value of gentian (Shah et al 1979). Bitter value for some of the bitter principle as given by wanger and vasirian (1974) is tabulated as follows.

| Bitter Principle | Bitter value | Average content in root (%) |
|------------------|--------------|-----------------------------|
| Amarogentin      | 58,000,000   | 0.05 – 0.3                  |
| Amaroswerin      | 58,000,000   | 0.03 – 0.1                  |
| Gentiopicriside  | 12,000       | 2.0 – 4.0                   |
| Amaropanin       | 20,000,000   | 0.05 – 0.2                  |
| Genntiobose      | 124          | 5.0 – 8.0                   |

**Uses of Swertia Species in Medicines:**

Whole plant collected in flowering stage and dried, constitutes an drug. Swertia chirayita is the most commercial species used in medicines. Chirata is much prized in India as a tonic and bitter without aroma or astringency. It was introduced in to medical practice in England 1839. it is official in Indian pharmacopoeia and was formerly also official in british and American Pharmacopoeias. It possesses the properties of bitter tonic but, unlike most other bitter, it does not constipate bowls, Instead it tends to produce regular action and causes a free discharge of bile, In Indian system of
medicines chirata is prescribed in a variety of forms and combination in chronic fevers and anaemia. It enjoys as special reputation in western India as a remedy for bronchial asthma and liver disorders. If taken with sandal wood paste, it is used to stop internal hemorrhage of the stomach. It is credited with tonic, febrifugal, laxative, stomachic, anthelmintic and antidiarrhoeal properties in Indian medical systems (Kirtikar and Basu, 1975).

Chirata possesses all properties of gentians and can effectively replace it. It is prescribed in dyspepsia, debility convalescence and generally in cases in which corroborate measures are indicated. It may be given as powder infusion, tincture, or a fluid extract. It is also applied to impart flavour to cattle feeds.

According to the pharmacopoeia of India, the drug should not contain less than 1.3% of bitter principles, It is usually administrated as concentrated infusion or as tincture. The pharmacopoeia of India also includes a concern-treated compound chirata infusion, prepared from chirata, dried peals of orange and lemon, and alcohol (25%) by maceration and its dose is 2-4ml (Chopra and Handa, 1961).

Several other species of genus Swertia occurring in hilly regions of Indian are used in similar manner as the chirata, they are used either as substitutes or adulterants S angustifolia, S. pulchella and S. corymbosa are used in indigenous systems of medicine in southern India, Most common species which are used as substitutes or adulterants includes S alata, S bimaculata, S. purpuresence, S decussate, S corymbosa and S paniculata Important preparations of chirata include sudarshan churna, panchabhadra kwath survaj warhar lauha chandraprabha vati Liv – 52 etc.

**Conclusions:**

It is evident that chriata has got many uses and is used in different medical treatments. But due to its over exploitation the species has become threatened. The annual demand of chirata is very high and the requirement is met through import a to some extent. Our country is importing about 1.225 toinnes of chirata having its value worth0.038 million rupees besides its own indigenous resources (Gauniyal et al. 1991) Due to its manifold uses, expansion of cultivation of this plant is recommended. Cultivation practices need to be standardized. Higher mountainous regions in Himalayas in the states of Kashmir, Himachal Pradesh, Punjab Utter Pradesh and up to Assam are recommended as suitable areas for cultivation of swertia chirayita which is the main commercial species (Jain, 1968).

**REFERENCES**

Anonymous (1976). The wealth of India Vol X: Sp-w (Raw material) CSIR, Publications Co., New Delhi.

Bhan, S; Kumar, R; Kalla A.K and Dhar K.L (1988). Phytochemistry 27 (2): 539-542.

Blatter, E. (1984).Beautiful flowers of Kashmir. International Book distributors, dehradum, India.
Chopra, R.N Chopra I.C and Handa, K.L (1961) Indigenous drugs of India. Dhur and sons Pvt Ltd., Calcutta.

Gauniyal A.K; Singh A.K and virmani, P (1991). Yojna, 35(13): 14-17.

Ghoshal, S; Sharma P.V and Jaiswal, D.K (1978). 1978). J of Pharmaceutical sciences, 67(1): 55-60.

Hui-Min (1989). Phytochemistry. 28(12): 3569-3571.

Khan, T.A: Haqqani, M.H. and Nisar, N.M (1979). Planta Medica, 37(2): 180-181.

Khetwal, K.S and Verma D.L (1990). Indian J of Pharmaceutical sciences, 46(1): 22-26.

Kirtikar, K.R and Basu B.D (1975). Indian Medicinal Plants Vol III, New Cannought Place, Dehradun.

Kubota, M; Hattori, M. and Namba, T. (1983) Soyakugaku Zasshi, 37(3): 229-236.

Nadkarni. K.M (1976). Indian material Medica (Ed) Vol II Popular prakashan, Bombay.

Parkash, A Busumatary, P.C Ghoshal, S. and Handa, S.S (1982). Planta Medica, 45(1) : 61-62.

Shah, S.S; Quadry, J.S and Mody, K.D (1970). Indian J of Pharmaceutical Sciences, 32:15-16.

Sharma, P.V (1982) Indian J of Pharmaceutical sciences, 44(2) :36.

Wanger, H and Vasirian, K (1974). Zurchromatographie der Enzianbitt erstofee. Bent Apoth. 2(114): 1245-48.