Diversity, Distribution and Indigenous Uses of the *Hypericum* Species in Indian Himalayan Region

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Abstract

The genus *Hypericum* is known worldwide for its traditional and modern uses. Therefore, an attempt has been made to assess the diversity, distribution and indigenous uses of the species of this genus in the Indian Himalayan Region (IHR). A total of 27 species of *Hypericum* were recorded from the IHR, of these 17 were economically important. Thirteen species were native to the Himalayan region, 3 were endemic and 6 were near endemic species. Amongst the species, *Hypericum perforatum* was the most valued species used for fuel, fodder, dying and medicine, and for the extraction of hypericin. Due to over exploitation of this species for the pharmaceutical industries, the natural populations of this species are depleting fast and this species have been placed under vulnerable category of the IUCN. Similarly, due to multiple utility of the *H. choisanum*, *H. oblongifolium* and *H. sampsonii*, these species are also facing high pressures. It is expected that like *H. perforatum*, other species of *Hypericum* may have high concentration of hypericin. Therefore, chemical extraction of these species has been suggested for the identification of potential of these species. The population assessment using standard ecological methods and development of propagation protocol have been suggested.

Key words: *Hypericum, medicinal plant, diversity, distribution, indigenous uses, Indian Himalayan Region*

Introduction

The Indian Himalayan Region (IHR) is very well known for its representative, natural, unique and socio-economically important Biodiversity. The occurrence of 21 forest types (Schweinfurth, 1957; Champion and Seth, 1968; Singh and Singh, 1992), 18,440 species of plants (Singh and Hajra, 1997); 816 tree species; 1748 species of medicinal plants (Samant et al., 1998); 675 species of wild edibles (Samant and Dhar, 1997); 279 species of fodder (Samant, 1998); 155 species of sacred plants (Samant and Pant, 2003) and 118 species of essential oil yielding medicinal plants (Samant and Palni, 2000) throughout the IHR is in itself prove the above fact. This rich diversity of the plant resources is used by the inhabitants of the IHR for medicine, wild edible, fuel, fodder, timber, making agricultural tools, religious and various other purposes. Among the various uses of the plant resources, medicinal use is prominent throughout the IHR. The wild medicinal plants are one of the sources of income generation due to their various traditional and modern therapeutic uses (Samant et al., 1998). It has been realized that medicinal plants of this region offer an advantage in having much greater possibilities of providing novel biomolecules in view of the environmental stress they are subjected (Dhawan, 1997). The unique diversity of medicinal plants in the region is manifested by the presence of a number of native (31 %), endemic (15.5 %) and threatened elements (Samant et al., 1998).

Like other families of the Angiosperms, the family Hypericaceae is very well known for its economic value. The genus *Hypericum* is known worldwide for its traditional and modern uses. Of the total 400 species of this genus, distributed chiefly in the temperate regions of the world, about 25 species occur in India (Gaur, 1999). Most of the species are used by the inhabitants in one way or the other. Amongst the species, *Hypericum perforatum* is a potential plant for curing many diseases like cancer, tumour, AIDS, etc. and is very popular today in different countries of the world especially as an antidepressant (Ernst, 1995). The review of literature indicates that besides *H. perforatum*, other species of the genus are also economically important, used as edible, medicinal, fodder, fuel, dye, etc. In spite of such high economic value, there is hardly any document available, which

contains comprehensive information on the diversity, distribution, habitat preference, nativity, endemism, status and indigenous uses of the species of genus *Hypericum* in the IHR. In view of the economic importance of the genus for the inhabitants of the region, the study was undertaken to: (i) study the diversity, distribution pattern and indigenous uses of the species of *Hypericum* in the IHR; (ii) assess and analyse species for their habitat preference, nativity, endemism and status.

Material and Methods

Survey, sampling and identification of the species

An extensive survey of literature was carried out for the compilation of a list of economically important species of *Hypericum* genus in IHR. Also, surveys for exploration of the species of *Hypericum* were conducted in the Trans, Northwest and west Himalaya. Information on distribution, altitude range, life forms, habitat (s), nativity, status and indigenous uses was gathered from primary and secondary sources (Samant et al., 1998; Gaur, 1999; Anonymous, 1997, Srivastava, 1998; Naithani, 1990; Xi-wen and Robson, 2005).

Identification of nativity and endemism of the species

Nativity of the species has been identified following Samant et al. (1998) and Anonymous (1883-1970) and endemism based on the distribution range of the species (Dhar and Samant, 1993; Samant et al., 1998). The species restricted to IHR have been considered as endemic whereas those with extended distribution to neighboring countries/states have been considered as near endemic.

Results and Discussion

Diversity, distribution and habitat preference

A total of 27 species of *Hypericum* representing herbs (11 spp.) and shrubs (16 spp.) were recorded from the IHR. These species were distributed between 100-4400m and within 13 habitats i.e., forest, riverine, shady moist, open grass land, exposed areas, rocks, shrubberies, roadside/way side, agricultural fields, fallow lands, swampy places, grassy slopes and thickets (Table 1). The maximum species (18 spp.) were distributed in the forests followed by open grass land (13 spp.) and riverine (11 spp.) habitats. Nine species were restricted to one or two habitats only.

Native and endemic species

Of the total species, 13 species were native to the Himalayan region and remaining 14 species were non-natives (Table 1). Three species namely *Hypericum assamicum*, *H. gaitti* and *H. gracilipes* were endemic and 6 species, viz., *H. cordifolium*, *H. dyeri, H. oblongifolium*, *H. podocarpoides*, *H. tenuicaule* and *H. williamsii* extended their distribution to the Himalayan region of Pakistan, Afghanistan, Bhutan and Nepal, hence have been identified as near endemic. The information on occurrence, altitudinal range, life forms, habitats, nativity and endemism helps in identifying the distribution pattern of diversity, habitat preference and conservation values of the species. However, the high species diversity in the forest habitat indicates high preference by the species of *Hypericum*. Similarly, the high species diversity in between 1000-3000m identifies this zone as a potential zone. The high diversity of the species may be due to diversity in soil, climate and geography giving rise to many micro and macro habitats (Samant, 1999).

Indigenous uses

The species of *Hypericum* are well known worldwide for their economic values (Table 1). Among the various parts, viz., leaves, stem, flowers, seeds, aerial parts, roots, etc. are used for curing diseases, leaf part is most usable. Four species, viz., *H. choisanum*, *H. oblongifolium*, *H. perforatum* and *H. sampsonii* were recorded as multipurpose species, used as medicine, edible, fodder, fuel and dye. Amongst species, *H. perforatum* has high potential and its whole plant is used for curing various diseases. Such as anti-depressant (Ernst, 1995), anti-cancer (Lavie et al., 1995), anti-tumor (Diwu, 1995) and anti-viral (Lavie et al., 1989). Due to its anti-viral property, this species have a potential for the treatment of Acquired Immuno Deficiency Syndrome (AIDS) as a hepatoprotectant (Schinazi et al., 1990). It is also the main source of hypericin (0.05-0.3 % w/w on dry weight basis) (Anonymous, 1997). There is a need to investigate the chemical composition of other species of the

Hypericum, so that more sources of the hypericin could be explored.

Status

Of the total species, 6 species namely *Hypericum chinense*, *H. choisianum*, *H. cordifolium*, *H. monanthemum*, *H. podocarpoides* and *H. trigonum* were identified as rare and three species, viz., *H. humifusum*, *H. japonicum* and *H. perforatum* were identified as vulnerable species due to heavy pressure on these species. Therefore, population assessment using standard ecological methods is suggested.

Conclusions

1. The present study provides comprehensive information on the diversity, distribution, indigenous uses, nativity, endemism and status of the *Hypericum* species of the Indian Himalayan Region.
2. Though, economic importance of some of the species is known but there is need to investigate these species for their chemical properties, so that the sources of the hypericin could be increased.
3. Among the species, *H. perforatum* is most valued species uses for fuel, fodder, dying and medicine. Considering high industrial demand of its raw material and vulnerability, it should be prioritized for conservation throughout the IHR. Further, the study also revealed that *H. choisanum*, *H. oblongifolium* and *H. sampsonii* are other multipurpose species of this genus and therefore, these species may also require priority attention for conservation.
4. Population assessment of the rare and threatened species using standard ecological methods have been suggested for the identification of the existing stock of these species in the natural habitats.
5. Mass multiplication through conventional and *in-vitro* methods of rare, threatened and multipurpose species is suggested.

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Table 1: Diversity, distribution, habitat preference, status and indigenous uses of the species of *Hypericum* in Indian Himalayan Region

S. No.	Taxa	LN	Altitudinal range (m)	LF	Habitat (s)	Nativity	Status	Indigenous Uses
1.	**Hypericum assamicum* Biswas	-	Upto 1200	H	2,4,8,9,10	Reg Himal	Co	-
2.	*H. bellum* H. L. Li	-	1900-3200	Sh	1,12,13	China, Burma	Occ	Used as Febrifuge and vermifuge. Also used in the treatment of hepatitis, colds, dysentery and dermatitis.
3.	*H. chinense* Linn.	-	1500-2800	Sh	9	China	Rare	It is astringent and alterative and is used in diarrhoea and vomiting. Leaves paste applied to dog bites and bee stings.
4.	*H. Choisianum* Wall. ex N. Robs.	Phulya, Basanti	>2000	Sh	1,2,3	Reg Himal	Rare	Fodder; the plant have antiviral property and traditionally used in the treatment for anxiety and inflammation; leaf powder used in tertiary fever.
5.	***H. cordifolium* Choisy	-	1200-2000	Sh	1,4,8	Reg Himal	Rare	Used in fever
6.	***H. dyeri* Rehder	-	1500-3000	Sh	1,3,6	Reg Himal	Unco	Medicinal
7.	*H. elodeoides* Choisy	Basanti	1300-3000	H	1,4, 8,9	Ind Or	Co	Medicinal
8.	**H. gaitii* Haines	-	Upto 1000	Sh.	1,2	Ind Or	Co	-

9.	**H. gracilipes* Stapf *ex* Fischer	-	1500-2500	Sh	1,2	Ind Or	Occ	-
10.	*H. himalaicum* N. Robs.	-	2500-3300	H	1,4,5,6,12	Reg Himal	Co	-
11.	*H. humifusum* Linn.	Trailing St. John's Wort	1800-2800	H	1,5	Europe As Bor	Threat	Flowers' infusion in olive oil or alcohol is used as vulnerary, chiefly for old sores and eczema.
12.	*H. japonicum* Thunb. ex Murray	Pikarichar	1000-3000	H	1,5,6	As Temp Or Austr	Threat	Plant is considered astringent, alternative and vulnerary. It is also used in asthma, dysentery, acute hepatitis, pain in the liver region, appendicitis and as styptic. In china, it is used as a vulnerary in treating scrofula, contusions, abscesses, wounds, fungoid skin diseases and leech bites; also has antitumour activity.
13.	*H. lalandii* Choisy	-	>1200	H	4, 11	Ind Afr Trop	Occ	Medicinal and Aromatic
14.	*H. latisepalum* N. Robs.	-	2500-2900	Sh	1, 12,13	China, Burma	Occ	-
15.	*H. monanthemum* Hk. f. & Th.	Tenikmolitong	3500-4400	Sh	1,4,8	Reg Himal	Rare	Whole plant is used in eye diseases.
16.	*H. mysorense* Wt. & Arn.	-	1000-2000	Sh	7	Ind Or	Occ	The plant has antiviral and antitumour properties and traditionally used in anxiety and inflammation. Extraction of aerial parts as antifungal and antispasm.
17.	***H. oblongifolium* Choisy	Chitroi, Chaya H. Basant	1000-3000	Sh	2,3,4,6	Reg Himal	Co	Fodder; roots yield yellow dye; decoction of leaves and stem given to facilitate delivery. Crushed flowers used on wounds and boils.
18.	*H. perforatum* Linn.	Choli-phulya H., Basant, Kalamath weed, balsana, dendhu	1000-3000	H	3,4,7,9,10	Reg Himal	Threat	Fuel; fodder; leaves' paste applied on cuts to check bleeding. Leaves' infusion is given in malarial fever. It has astringent, expectorant and diuretic properties and used in pulmonary and urinal troubles, diarrhoea and in the therapy of depressional state. It is also used as anthelminitic and emmenagogure. An oil is known as St. John's Wort Oil (Oleum Hyperici) is prepared by infusing the fresh flower in olive oil and used externally for the treatments of burns, wounds, sores, ulcers, swellings and sometimes against rheumatism, lumbago and intestinal worms. It contains hypericin (0.05-0.3 % w/w on dry weight basis) which has antidepressant and antiviral properties. It is suggested for having a potential in treatment of Acquired Immuno Deficiency Syndrome (AIDS). It is also reported to possess anti-tumor and anti-cancer properties. An infusion of the plant, taken as a tea, has been helpful in treating night-time incontinence in children. Also useful as a dye.
19.	*H. petiolulatum* Hk. f. & Th. ex Dyer	-	1200-3100	H	1,2,4,8, 12,13,	Reg Himal	Co	-
20.	***H. podocarpoides* Rob.	-	2000-2900	Sh	1,6,	Ind Or	Rare	Used as a wound healing agent, prepared ointments from dried extracts of the leaves and stems.
21.	*H. reptans* Hk. f. & Th. ex Dyer	-	2700-3000	Sh	1,2,6,12	Reg Himal	Co	-
22.	*H. sampsonii* Hance	-	100-1700	H	2,4,8,9,10,12	China	Occ	Young leaves and plant tops are edible. It is anodyne, anticoagulant, depurative, emmenagogue, haemolytic and vermifuge. It is used as a vulnerary in treating scrofula and contusions.
23.	***H. tenuicaule* Hk. f. & Th. ex Dyer	-	2100-3200	Sh	1,4, 12	Reg Himal	Occ	-
24.	*H. trigonum* Handel-	-	2900-3600	H	3,4	China	Rare	-

	Mazzetti							
25.	*H. uralum* Buch. Ham. ex D.Don	Bhyoul H., Tumbhul, Urilo, Tumbomri, La-syn-rit	1000-3000	Sh	1,2,3,7, 8	Reg Himal China Japan	Co	Seed powder against food poisioning and as an abortifacient and as aromatic stimulant. Seeds are also used both externally and internally for dog bites and bee stings. An ointment prepared from the menthol extract of the leaves was found to exhibit beneficial effects on various wound healing parameters in rat excisional and incisional wound models.
26.	*H. wightianum* Wall. ex Wt. & Arn.	-	1800-3000	H	2,3,4,8	Ind Or	Unco	Medicinal
27.	***H. williamsii* Robs.**	-	1800-2800	Sh	1,2	Reg Himal	Occ	-

Abbreviations used: LN=Local Names; LF=Life form; H=Herb; Sh=Shrub; *=Endemic; **=Near Endemic; 1=Forest; 2=Riverine; 3=Shady Moist; 4= Open grass land; 5=Exposed; 6= rocks; 7=Shrubberies; 8= Roadside/way side; 9= Agricultural fields; 10=Fallow lands; 11=Swampy places; 12=grassy slopes; 13= thickets; Reg Himal = Himalayan Region; Ind= India; Or = Oriental; As= Asia; Trop= Tropical; Austr = Australia; Afr = Africa; Temp= Temperate; Bor = Boreal; Co=Common; Unco=Uncommon and Occ= Occasional