

## **Dwinding of an endangered orchid *Dactylorhiza hatagirea* (D.Don) Soo: A case study from Tungnath Alpine meadows of Garhwal Himalaya, India**

Dinesh Giri\*, Dhani Arya\*\*, Sushma Tamta\* and Lalit M. Tewari

\* Department of Botany, D.S.B. Campus, Kumaun University, Nainital, Uttarakhand (India)

\*\* Department of Botany, HNB Garhwal University, Shrinagar-Garhwal, Uttarakhand (India)

<b>Name of Author</b>	<b>E-mail address</b>
Dinesh Giri	: <a href="mailto:giri_gld@rediffmail.com">giri_gld@rediffmail.com</a>
Dhani Arya	: <a href="mailto:dhaniarya@gmail.com">dhaniarya@gmail.com</a>
Sushma Tamta	: <a href="mailto:sushma_tamta@yahoo.com">sushma_tamta@yahoo.com</a>
Lalit M. Tewari	: <a href="mailto:l_tewari@rediffmail.com">l_tewari@rediffmail.com</a>

**ABSTRACT:** The Central Himalayan region has been rich in biological wealth and would become an uplift resource of socio-economic status of the Himalayan people. Presence of a varied number of medicinal plants indicates its significance. Due to various levels of disturbances, destruction of number of economically important plants in these alpine meadows is continued like declining of *Dactylorhiza hatagirea* (D.Don) Soo, in its natural population. Out of six study sites, only two sites showed its presence, which indicates its declining health from natural population. [Nature and Science. 2008;6(3):6-9]. ISSN: 1545-0740.

**Key words:** Alpine meadows, study sites, natural population, density, orchid, grazing pressure

### **INTRODUCTION**

The alpine region forms the uppermost catchments of the Himalayan Rivers which supports million of people in the lower hills as well as in plain of north India. Therefore health of the alpine ecosystem has direct bearing on the life-support system, environmental stability, biodiversity and human welfare in the region (Rawat, 2005). The various changes in the Himalayan forests are appearing in their structure, density and composition due to global warming, uncontrolled lopping and felling of trees for fuel wood, fodder and grazing (Gaur 1982, Bargali et al. 1998; Kumar et al. 2004). Changes in climate, exploitation of several plants for medicine and grazing pressure in alpine region of Garhwal Himalaya have led to drastic changes in vegetation composition and population of species during last few decades (Nautiyal et al. 2004). *Dactylorhiza hatagirea* (D. Don) Soo (Family Orchidaceae), a high value medicinal orchid, is reported to occur in temperate to alpine regions (2500-5000 m) in India, Pakistan and Nepal (Bhatt et al. 2005). *Dactylorhiza hatagirea* (D. Don) Soo, earlier known *Orchis latifolia* Hook (Vij et al. 1992). It is a terrestrial orchid and commonly it is known as Salampanja and Hatajari in Garhwal Himalaya. The tubers of this species, commonly sold as 'Salampanja' are known to yield a high quality 'Salep' which is extensively used in local medicine as nervine tonic for its astringent and aphrodisiac properties (Vij et al 1992). It has been categorized as critically endangered (Kala, 2000), rare (Samant et al 2001) and listed under appendix II of CITES (Uniyal et al 2002). This study aims to assess the quantum of availability of a therapeutically important orchid *D. hatagirea* (D.Don) Soo, in its natural habitats.

### **MATERIAL AND METHODS**

Tungnath (30° 30' N - 79° 15' E and elevation 3300- 4200 m ) represent an alpine zone of the Garhwal Himalaya (Sundriyal, 1994). In this region our study area covers an elevation range of 3500 to 4000 m. The rocks around Tungnath alpine meadows are mainly mylonitized gneisses, augengneisses, schist, granite and highly folded having a north west – south west trend (Valdia 1980). The heavy snowfall, frost, drought, low

oxygen and carbon dioxide are the common features of an alpine environment (Billings 1973). The present study deals with a quantitative analysis of herb species in different sites of Tungnath Alpine meadows to assess the quantum of availability of *D. hatagirea* in its natural habitats (Table: 1). Phytosociological data for herbs were quantitatively analyzed in six study sites on northern-west aspect by placing random sampling 40, 1x1 m quadrat. Quadrats data were analyzed for density, frequency and abundance (Muller-Dombois and Ellenberg, 1974).

## RESULTS

A total of 24 herbs species were encountered across the study sites. Out of six study sites, only two sites showed presence of *D. hatagirea*. Observable grazing pressure was recorded at all study sites. The maximum density was of *Phleum alpinum* L. (141.52-201.28 ind/m<sup>2</sup>) followed by *Gaultheria trichophylla* Royle, (14.2-75.0 ind/m<sup>2</sup>), *Danthonia cachaemyriana* Jaub. and Spach, (8.32-40.32 ind/m<sup>2</sup>), *Plantago depressa* Willd. (15.0-58.4 ind/m<sup>2</sup>) and *Ainsliea aptera* DC (2.80-32.2 ind/m<sup>2</sup>) and dominant herbs in all study sites. The target species i.e. *D. hatagirea* showed minimum density (0.70-1.8 ind/m<sup>2</sup>) in all study sites (Table: 2).

**Table: 1 Site description indicating altitudinal range, aspect and dominant herb species**

Study sites	Altitudinal range (m)*	Aspect	Dominant herb species
1	3500-3600	NW*	<i>Phleum alpinum</i> , <i>Gaultheria trichophylla</i> , <i>Plantago depressa</i>
2	3600-3690	NW	<i>Phleum alpinum</i> , <i>Ainsliea aptera</i> , <i>Gaultheria trichophylla</i>
3	3940-4000	NW	<i>Phleum alpinum</i> , <i>Potentilla peduncularis</i> , <i>Danthonia cachaemyriana</i>
4	3600-3650	NW	<i>Phleum alpinum</i> , <i>Plantago depressa</i> <i>Geum elatum</i>
5	3700-3800	NW	<i>Phleum alpinum</i> , <i>Plantago depressa</i> , <i>Geum elatum</i>
6	3550-3600	NW	<i>Phleum alpinum</i> , <i>Gaultheria trichophylla</i> , <i>Danthonia cachaemyriana</i>

\* m = meter, NW\* = north-west

**Table: 2 Density of *D. hatagirea* and dominant herbs in different study sites**

Sites	Density of <i>D. hatagirea</i> ( ind/ m2)*	Density of Dominant herb's (ind/m2)*
1	-	<i>Phleum alpinum</i> (160.12), <i>Gaultheria trichophylla</i> (75.00), <i>Plantago depressa</i> ( 30.32), <i>Danthonia cacchymyriana</i> ( 26.72)
2	-	<i>Phleum alpinum</i> ( 201.28), <i>Ainsliea aptera</i> ( 32.20), <i>Gaultheria trichophylla</i> ( 23.60), <i>Danthonia cacchymyriana</i> ( 10.60)
3	1.8	<i>Phleum alpinum</i> (141.52), <i>Potentilla peduncularis</i> (41.92), <i>Tanacetum longifolium</i> ( 32.72), <i>Danthonia cacchymyriana</i> ( 34.32)
4	-	<i>Phleum alpinum</i> (190.52), <i>Plantago depressa</i> (36.12), <i>Tanacetum longifolium</i> ( 16.80), <i>Geum elatum</i> (17.60)
5	0.7	<i>Phleum alpinum</i> (174.32), <i>Plantago depressa</i> (58.40), <i>Geum elatum</i> (17.72)
6	-	<i>Phleum alpinum</i> (196.72), <i>Plantago depressa</i> (15.0), <i>Gaultheria trichophylla</i> (20.40), <i>Danthonia cacchymyriana</i> ( 40.32)

\* (ind/m2) = individual per meter square

## DISCUSSION

On the basis of field visit, past records and observable grazing pressure, our study sites are fallen within the category of unprotected area. The density of *D. hatagirea* ranged from 0.70- 1.8 ind/m2 in these sites which was comparatively less from the reported density of *D. hatagirea* (*Orchis latifolia*) i.e. 2.66 ind/m2 in grazed sites and 3.2 ind/m2 in ungrazed sites at Tungnath (Nautiyal et al. 2004). Bhatt et al (2005) also reported 2.02-2.19 ind/m2 density in protected area and 1.13-1.64 ind/m2 in unprotected area in west Himalaya for *D. hatagirea*. These data shows that there is decrease in number of plants of this species with time. Tungnath is one of the famous religious shrines of Hindus where large herds of sheep, goat and buffalo reach every year during May-October for summer grazing (Nautiyal et al. 2004). Therefore the low density in unprotected areas may be due to heavy grazing pressure.

According to local people the Himalayan Monal, *Lophophorus impejanus* also known as the Impeyan Monal or Impeyan Pheasant, destroy its underground part i.e. tubers for food. It was also observed by the first two authors during their field visit. This and other levels of disturbances like grazing pressure because of its palatable nature, over exploitation due to its high medicinal value, and unawareness of the proper procedure of collection and propagation etc. are the major factors for declining of this species from its natural habitats. Chhetri et al. (2005), also reported that, the Sandakphu area in the Singalila range is a natural habitat of precious medicinal plants like *Aconitum*, *Picrorhiza*, *Nardostachys*, *Dactylorhiza*, etc., which are being destroyed by grazing.

Therefore it is a need to promote cultivation, propagation and conservation of this species. Using *in-situ* as well as *ex-situ* conservation efforts we can propagate and conserve this species and would become an ecologically as well as economically important plants of High Altitudes.

## ACKNOWLEDGEMENT

The financial support received from UCOST Dehradun is gratefully acknowledged.

## Correspondence to

Dinesh Giri  
Research fellow  
Department of Botany  
D.S.B.Campus  
Kumaun University, Nainital (Uttarakhand), India  
Tel: 09411197618  
E-mail: giri\_gld@rediffmail.com

Alternate E-mail: giri.online@yahoo.com

giri.online@rediffmail.com

## REFERENCES

1. Bhatt A, Joshi SK, Garola S. *Dactylorhiza hatagirea* (D. Don) Soo- a west Himalayan Orchid in peril, *curr.sci.* 2005; 89,610-612.
2. Bargali K, Usman, Joshi M. Effect of forest covers on certain site and soil characteristics in Kumaun Himalayas. *Indian Journal of Forestry*, 1998; 21 (3): 224-227.
3. Billings WD. Arctic and Alpine vegetation: Similarities, differences and susceptibility to disturbances. *Bio- Science* 1973; 23: 697-704.
4. Chhetri DR, Basnet Chiu D, Kalikotary PF, Chhetri GS, Parajuli S. Current status of ethno medicinal plants in the Darjeeling Himalaya. *Curr.Sci.* 2005; 89:264-268
5. Gaur RD. Dynamics of vegetation of Garhwal Himalayas. *The Vegetational Wealth of the Himalayas* (ed. G.S. Paliwal), 1982: 12-25.
6. Kala CP. *Biol. Conserve.* 2000; 93, 371-379.
7. Kumar M, Sharma CM, Rajwar GS. A study on the community structure and diversity of a sub-tropical forest of Garhwal Himalayas. *Indian Forester* 2004; 130 (2): 207- 214
8. Muller-Dombois D, Ellenberg H. *Aims and Methods of Vegetation Ecology*, John Wiley, USA 1974
9. Nautiyal MC, Nautiyal BP, Prakash V. Effect of Grazing and Climatic Changes on Alpine Vegetation of Tungnath, Garhwal Himalaya, India. *The Environmentalist*, 2004; 24, 125-134
10. Rawat GS. Alpine meadows of Uttarakhand: Ecology, Landuse and Status of Medicinal & Aromatic Plants. Bishen Singh Mahendra Pal Singh, Publication, Dehradun, India: 2005
11. Samant SS, Dhar U, Rawal RS. In *Himalayan Medicinal plants- potential and Prospects* (eds Samant S, S, Dhar U and Palni, L.M.S.) Gyanodaya Prakashan Nainital. 2001:166- 184.
12. Sundriyal RC. Vegetation Dynamics and Animal behaviour in an Alpine pasture of the Garhwal Himalaya: In Pangety, YPS. & Rawal, RS. (ed). *High altitude of the Himalaya (Bibliography, Ecology & Conservation)* gyanodaya Prakashan, Nainital, India:1994.
13. Unial SK, Awasthi A, Rawat GS. *Curr. Sci.*, 2002; 82, 1246-1252.
14. Valdiya KS. Stratigraphic Scheme of the sedimentary units of the Kumaun lesser Himalaya. In Valdiya K.S. & Bhatia, S.B. (ed). *Stratigraphy and correlation of the lesser Himalayan formation.* Hindustan Publication Corporation, Delhi. 1980: 7- 48.
15. Vij SP, Srivastav RC, Mainra AK. On the occurrence of *Dactylorhiza hatagirea* (D. Don) Soo in Sikkim, *Orhid News*, 1992; 8-9, 14-15.

6/21/2008