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Full Length Research Paper

Population census of critically endangered *Dactylorhiza hatagirea* (D. Don) Soo in Suru valley, (cold desert region, Jammu and Kashmir, India)

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***Dactylorhiza hatagirea* (D. Don), Soo (Panja, Salam-panja or Hath-panja) is a critically endangered native and high value medicinal plant of the Himalayan Region. The several medicinal properties of the roots of this species have increased its risk of extinction due to pressures for utilization. It is also subjected to browse by cattle's. The species also does not regenerate well in nature which is another risk factor. Therefore, an attempt has been made to investigate the population ecology of the species as a foundation for its conservation. Forty eight sites in the Suru valley, a part of the cold desert region were surveyed but only in sixteen sites was the target species present. The abundance of the species, impacts of over exploitation and its current status indicated that it may soon be extirpated from the Suru valley. So a plan for conserving the remaining number of the species is presented. It could provide a template for conservation in other locations where the species is at risk.**

Key words: Angulakpa, cold desert, population ecology, hath-panja, wanglak.

INTRODUCTION

Dactylorhiza hatagirea (D.Don), Soo (Panja, Salam-panja or Hath-panja), locally known as 'wanglak' or 'angulagpa' in various parts of Ladakh, is a critically endangered species (CAMP status), and rare (IUCN status) (Kala, 2000; Samant et al., 2001). It is a native and near endemic to Indian Himalayan region (Samant et al., 1998; Badola and Aitken, 2003; Ved et al., 2003). It extends to Pakistan, Afghanistan, Nepal, Tibet and Bhutan. In India, it is reported from Jammu and Kashmir (Dhar and Kachroo, 1983), Uttarakhand (Hajra and Balodi, 1995) and Himachal Pradesh (Aswal and Mehrotra, 1994). Generally, it is widely and narrowly distributed between 2996 and 4120 m amsl in open, grassy slopes and alpine meadows. However, the population of the species is small due to high anthropogenic pressures (photoplate A and B).

Since the time immemorial, the species is used in various Indian systems of Medicine that is, Ayurveda, Siddha, Unani, and also used in some traditional medicinal systems that is, Amchi medicinal system. It is widely used to cure dysentery, diarrhoea, chronic fever, cough, stomachache, wounds, cuts, burns, fractures, and general weakness particularly in debilitated women after delivery and to increase regenerative fluids. Tubers of *D. hatagirea* are rich in starch, mucilage, sugar, phosphate, chloride and glucoside-loroglossin (CSIR, 1996). In Ladakh, it is locally called 'Wanglak' or 'angulakpa' due to its palmately lobed tubers that stimulate a hand with fingers open, and yields 'salap', which is used as farinaceous food, expectorant, aphrodisiac and used as nervine tonic. Local inhabitants collect the roots, dry it and then take with milk to increase vigourness. Due to its high medicinal and edible value, the species has great demand in national and international market (Badola and Pal, 2002; Olsen and Helles, 1997). Further, extraction of

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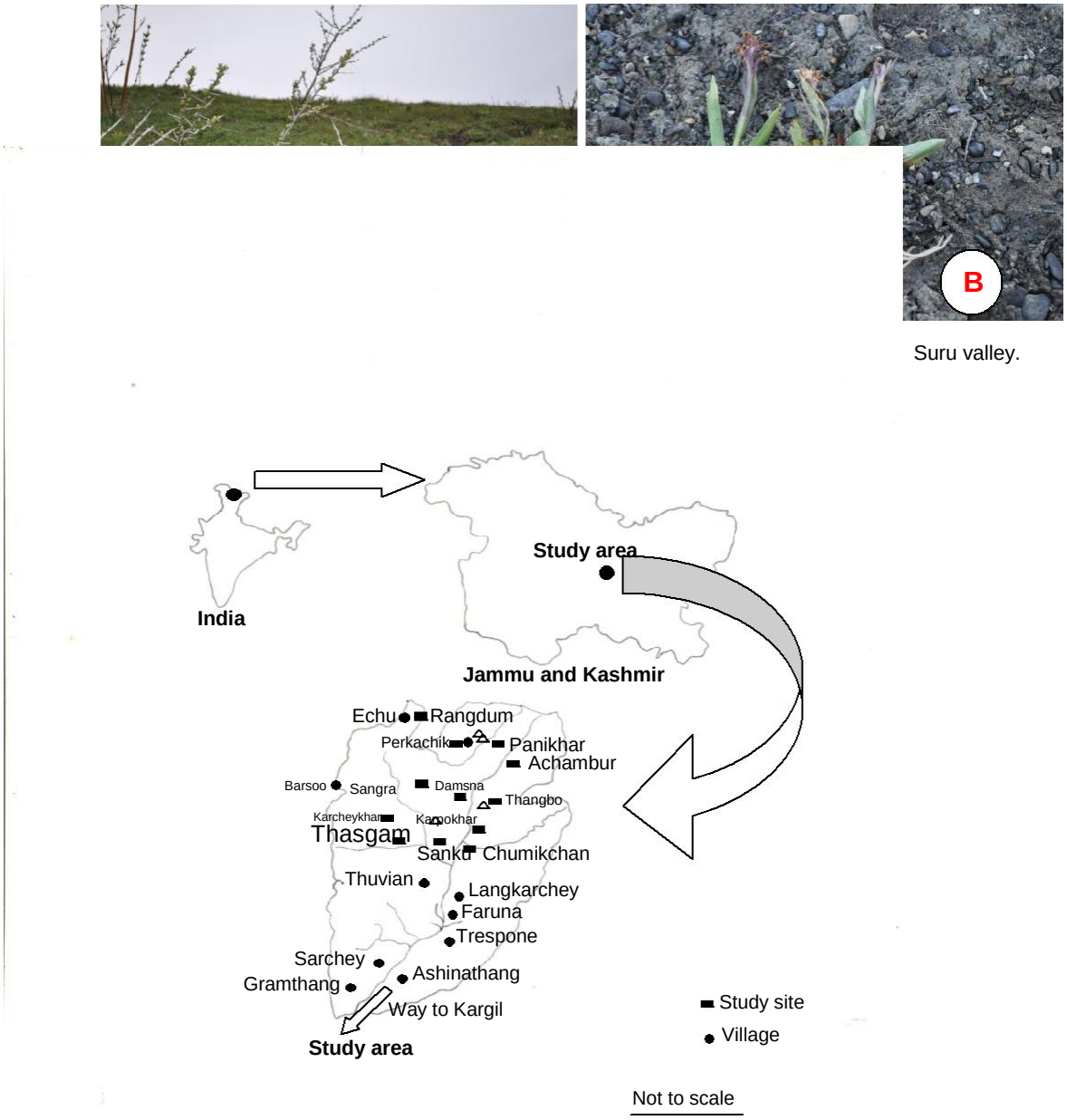

Suru valley.

Figure 1. Suru valley, a part of cold desert region of India .

raw material from its wild population is the only source for meeting the market demand. According to a report, the annul demand of the species is approximately 5000 tons (Kala, 2004). This leads over-exploitation of the species from wild. The main objective of this research was to assess the population status of *D. hatagirea* in Suru valley and to identify factors responsible for its depletion.

METHODS

This study was conducted during April to October, 2010 in the Suru valley cold desert region located in Kargil district of Ladakh province of Jammu and Kashmir (Figure 1).

The altitude ranges between 2100 to 4200 m amsl and the area supports diverse habitats, species and communities of the sub-alpine and alpine zones. Local inhabitants are totally dependent on the locally available bio-resources to meet out their domestic needs.

Identification and selection of sites and habitats

The sites representing *D. hatagirea* were selected along transacts between 2911 to 3990 m amsl. A total of 11 transects namely Sanku (2911 to 3525 m); Chumikchan (3309 to 3525 m); Karcheykhar and Karpokhar (3270 to 3887 m); Thangbo (2742 to 3598 m); Sangra (3057 to 3228 m); Damsna (3165 to 3990 m); Achambur (3193 to 3447 m); Panikhar (3390 to 3963 m); Parkachik

Table 1. Site characteristic and densities of *D*. *hatagirea* and its major associates in Suru valley, J and K.

S/N	Altitude (m)	Aspect	Habitat (s)	Coordinates	*D. hatagirea* (Ind m2)	Densities of associate species (Ind m2)
1	3951	NE	Meadows	N 34°16.486' E 075°57.927'	1.90	*Polygonum* sp. (3.3), *S.chrysanthemoides* (2.85), *M. longifolia* (2.5)
2	3990	NE	Riverine	N 34°15.991' E 075°58.053'	2.20	*S. chrysanthemoides* (4.4), *Equisetum* sp. (17.2), *R. hirtellus* (2.45)
3	3088	NE	Meadows	N 34°16.161' E 075°58.478'	1.60	*Equisetum* sp. (16.2), *P. haxandrum* (1.95), *Polygonum* sp. (2.2)
4	3109	NE	Meadows	N 34°16.681' E 075°58.840'	1.40	*Geranium* sp. (2.45), *Polygonum* sp. (2.1), *Equisetum* sp. (6.85), *S. chrysanthemoides* (3.1)
5	2998	NE	Meadows	N 34°15.692' E 075°57.187'	1.10	*Polygonum* sp. (3.1), *Equisetum* sp. (10.85), *S.chrysanthemoides* (5.75)
6	3416	NE	Meadows	N 34°16.467' E 075°56.192'	8.00	*S. chrysanthemoides* (4.95), *Gentiana* sp. (3.25), *M. lupilina* (3.7)
7	3443	NE	Meadows	N 34°16.834' E 075°56.504'	0.44	*M. lupilina* (5.6), *Trifolium* sp. (3.5), *Gentiana* sp. (2.4)
8	3525	NE	Meadows	N 34°16.623' E 075°56.754'	0.85	*M. lupilina* (2.5), *Trifolium* sp. (1.05), *S. chrysanthemoides* (1.55)
9	3034	NE	Meadows	N 34°17.011' E 075°57.227'	3.00	*Equisetum* sp. (4.55), *Oxytropis lapponica* (1.75), *M. lupalina* (4.2), *Polygonum* sp. (2.85)
10	2996	NE	Meadows	N 34°17.168' E 075°57.541'	2.45	*S. chrysanthemoides* (2.6), *Geranium* sp. (2.45), *Equisetum* sp. (5.5), *Polygonum* sp. (4.35)
11	2974	NE	Meadows	N 34°17.353' E 075°57.729'	1.75	*Polygonum* sp. (3.9), *Senecio chrysanthemoides* (2.7), *Geranium* sp. (1.3)
12	2961	NE	Meadows	N 34°17.381' E 075°57.984'	1.30	*Equisetum* sp. (3.45), *Oxytropis lapponica* (1.15), *Polygonum* spp. (3.1)
13	2948	NE	Meadows	N 34°17.378' E 075°57.998'	6.10	*S.chrysanthemoides* (3.7), *Polygonum* spp. (2.25)
14	3018	NE	Meadows	N 34°16.958' E 075°57.821'	3.65	*Polygonum* sp. (2.95), *M. lupalina* (2.75), *Equisetum* sp. (2.95)
15	3044	NE	Meadows	N 34°16.727' E 075°57.818'	3.40	*Geranium* sp. (1.5), *Polygonum* sp. (2.75), *M. lupalina* (4.5)
16	2911	NE	Meadows	N 34°17.239' E 075°58.181'	3.50	*Equisetum* sp. (3.95), *Polygonum* sp. (2.6), *S. chrysanthemoides* (2.75)

(3579 to 3845 m); Thasgam (3058 to 3990 m); and Rangdum (3134 to 3990 m) selected to collect the information. Observations on altitude, coordinates, aspect, slope and habitats were taken. Sites having high percentage of moisture were considered as moist habitat.

Survey, sampling, identification and analysis of data

The field surveys and samplings were conducted during April to October, 2010 within the selected sites in the Suru valley. In each site, a plot of 50 × 50 m was laid and randomly, 20 quadrat of 1 × 1 m in each plot were laid for herbs.

For the size, number of quadrats and collection of data standard ecological methods (Curtis and Intosh, 1950; Smith, 1957; Misra, 1968; Kersaw, 1973; Dombois and Ellenberge, 1974; Dhar et al., 1997; Joshi and Samant, 2004; Samant and Joshi, 2005) were followed.

To identify the factors responsible for depletion of population, field observations were made and old knowledgeable persons were interviewed with the help of semi-structured open ended questionnaire to know the current status, utilization pattern including traditional/indigenous practices.

RESULTS

Forty eight sites were sampled. Out of which *D*. *hatagirea* was found only in sixteen sites. The physical and vegetation characteristics of the sixteen sites were represented in Table 1. Almost in all reported sites, *Dactylorhiza* showed least density except in two sites (8.00 and 6.1 ind/m^2; whereas among other associates, the maximum density was of *Equisetum* sp. (3.45 to 17.2 ind/m^2) followed by *Polygonum* sp. (2.6 to 4.35 ind/m^2), *Senecio chrysanthemoides* (2.05 to 5.75 ind/m^2), *Medicago lupalina* (1.75 to 5.6 ind/m^2), *Ranunculus hirtellus* (1.5 to 4.55 ind/m^2) and *Podophyllum hexandrum* (1.95 to 3.65 ind/m^2). While other species showed comparatively less densities. Further, anthropogenic and grazing pressures were also recorded from all the sites.

In the questionnaire survey of the study area, we collected the information from only 75 and 25% male and female, respectively. Out of total informants, only 41.6 and 31% males and females, respectively were well versed with the use of the species and they also know potential sites of the target species where they used to visit in the past. But according to the respondents, it was clears that the target species facing grave threat due to the over exploitation and illegal collection made by the local inhabitants and also the outsiders.

DISCUSSION

Out of 48 sites, the target species that is, *D.*

hatagirea was present only in 16 sites having a very low density except in two sites that is 8 and 6.1 ind/m^2 (Table 1). The density values are more or less similar to the study conducted in Tungnath area that is, 1.8 and 0.7 ind/m^2 of Garhwal Himalaya (Giri et al., 2008). A very few studies have been conducted in the other parts of Himalaya that is, Uttarakhand (Nautiyal and Nautiyal, 2004; Bhatt et al., 2005) but this part of Suru valley, Kargil District, a proposed part of CDBR, is untouched or unexplored and the information presented in the paper is the first hand information of this area.

According to the local inhabitants, Amchies (local herbalists) used to visit potential sites almost thrice every year for collection of medicinal plants. But from the past few years, they visit either alone or along with the researchers for the collection of high value medicinal plants for use and research purposes. Further, some local inhabitants collect this high value medicinal plant for illegal trading. The local inhabitants could collect Rs.100 to 200 per kg of dried roots of *D. hatagirea.* For 1 kg of dried roots, 90 to 100 mature plants were exploited. As a result, so many areas were seen there, though *D. hatagirea* was, one time, present in abundance, but now a few individuals of the species were seen. This indicates that if the casual factors continue to operate, this species may become extinct within a few years.

During the survey, it was also observed that local inhabitants carry their livestock in the higher regions of the valley for grazing. This is another level of disturbance because due to the grazing and trampling the underground part of the *D. hatagirea* get exposed or removed. These levels of disturbances like grazing pressure, over exploitation and unawareness of proper procedure of collection and propagation, etc. are the other major factors for declining of species from its natural habitats.

Therefore, it needs further research to overcome with these problems and also needs to promote cultivation, propagation, awareness and conservation of this species though people participation and of course through various conservation methods like, *in-situ* and *ex-situ*.

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