

# CAMP REPORT

*Edited by DK Ved IFS and Vinay Tandon IFS*



*For High Altitude Medicinal Plants of  
Jammu - Kashmir & Himachal Pradesh*

## **Conservation Assessment & Management Plan Workshop**

**Kullu, Himachal Pradesh, 16 - 18 April 1998**

*organised by Foundation for Revitalization of Local Health Traditions, Bangalore, India  
Funded by The Royal Netherlands Embassy, New Delhi, DFID, UK  
supported by Medicinal Plants Specialist Group, SSC-IUCN*



### Acknowledgements

We are most grateful to the Royal Netherlands Embassy, New Delhi and the Department for International Development of the UK, New Delhi for financial support that enabled organisation of the Kullu CAMP workshop.

The Medicinal Plants Specialist Group (MPSG) of the Species Survival Commission of the IUCN has been consistently supporting CAMP workshops held and organised by FRLHT. This time is no exception and we thank them for their support.

Thanks are due to the Conservator of Forests of Kullu and his staff, notably Mr R N Vidyarthi for helping with arrangements for the workshop. The support of the Principal Chief Conservator of Forests, Himachal Pradesh for facilitating participation by several forest officers and personally presiding over the concluding part of the workshop are gratefully and duly acknowledged.

Finalising a list of candidate species for assessment entailed substantial research effort and later compilation of the taxon data sheets. For this we owe thanks to Ms T.S. Suma of FRLHT.

Much preparatory work, including making of a comprehensive "Briefing Book" for the CAMP workshop was carried out. For this work and giving the final shape to this REPORT including designing the cover pages, we are most thankful to Ms Meera Iyer of FRLHT.

*Vinay Tandon and D K Ved*

## Dedicated to the memory of Dr B S Aswal

(25 Dec 1948 - 21 Mar 1998)

On a cold January morning in 1997, we first met Dr B S Aswal at Kukrail near Lucknow. Little did we realise that this first meeting with him was to be our last.

Dr Aswal was born in Tehri (Gharwal) in Uttar Pradesh. After his early education there, Dr Aswal completed his Masters in Botany from Dehradun in the early seventies. He joined the Botanical Survey of India, Dehradun where he worked for some years. In May 1976, Dr Aswal joined the Central Drug Research Institute (CDRI), in Lucknow and was head of the Botany Division.

During his 20 years with the CDRI, Dr Aswal was involved with the survey and collection of plants for the isolation of bio-active constituents for new or better drugs. This work helped him acquire vast experience on Himalayan flora besides contributing greatly to the development of an internationally recognised herbarium and advanced centre for taxonomic research at the CDRI. In 1984, Dr Aswal submitted for a doctoral degree his work on the "Flora of Lahaul – Spiti" to the Lucknow University. For this he was awarded the degree of Doctor of Philosophy. Later, this work was published under the same title in 1994 along with Dr R N Mehrotra. In addition, Dr Aswal's contribution to the field of botany includes publication of about 60 research papers on several Himalayan species. His other achievements include new records, finding several new species and rare ones. He was one of the inventors in two international patents filed on *Picrorhiza kurrooa*. During his eventful career, Dr Aswal was an active member of several professional societies and technical committees.

Dr B S Aswal had confirmed participation in the Kullu CAMP. Sadly, the cruel hands of death took him away most unexpectedly. All the participants at the CAMP workshop were unanimous in their agreement that this CAMP REPORT should be dedicated to the memory of Dr Aswal. Personally for us the memory of Dr Aswal comes back as that of a gentle and genial personality, ever willing to share his knowledge and experience with those he came in contact with. This CAMP report has drawn much from his work especially on the flora of Lahaul & Spiti and we would have benefited much more with his participation.

But that was not to be.

*D K Ved, Vinay Tandon and Dr Ved Prakash*

Handwritten notes and diagrams along the right margin, including a vertical line with tick marks and some illegible text.

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3 March 1998

**4th FRLHT CAMP workshop on Medicinal Plants**

Dear Dr. Darshan, Dear Dr. Tandon,

Thank you very much for your fax of February 12 in which you advise us on the forthcoming 4th CAMP workshop organized by FRLHT at Kulla, 16 - 18 April 1998.

On behalf of the Medicinal Plants Conservation Group, Dr Tony Cunningham and myself want to congratulate FRLHT for this new milestone in the series of workshops organized by FRLHT. We regard the CAMP process as one of the most valuable presently undertaken to assess the threat that medicinal plant taxa are undergoing. This links very well to the objective of the MPSG to identify major threatened medicinal plant taxa world wide with a common methodology. It is a pleasure to see that you are now "exploring" this approach also to Northern India. This fits very well to the earlier CAMP workshop on medicinal plants organized by CBSG India at Lucknow in January 1997.

We want to express the MPSG's formal support to your initiative and the forthcoming workshop. Please feel free to include the MPSG and its logo in the workshop documents as formally supporting this initiative.

Yours sincerely,

-----Sd-----

Dr. Uwe Schippmann



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Distribution Maps of six Threatened Taxa -

## *Executive Summary*

1. A CAMP workshop for medicinal plant species occurring predominantly over 3000 metres in the North Western Himalayas of India was held at Kullu, in Himachal Pradesh, from 16<sup>th</sup> to 18<sup>th</sup> April 1998. The NW Himalayas in India comprises the states of Jammu & Kashmir, Himachal Pradesh and the two districts of Tehri-Gharwal & Kumaon in western Uttar Pradesh. For purposes of this workshop, the separate assessments made are applicable to the states of JMK & HP.
2. The CAMP workshop was organised and facilitated by the Foundation for Revitalisation of Local Health Traditions (FRLHT), Bangalore. It was financially supported by the Royal Netherlands Embassy, New Delhi & Department for International Development (DFID)-UK, New Delhi. The workshop was supported by the Medicinal Plants Specialist Group (MPSG) of the IUCN. The closing session of the workshop was presided by Mr G C Chaudhary, IFS, Principal Chief Conservator of Forests, Himachal Pradesh.
3. There were 32 participants in the workshop comprising field botanists, Forest Department officials, university & wildlife researchers and representatives from state and central research organisations and NGOs from both JMK & Himachal Pradesh.
4. For the Kullu CAMP workshop, a list of 73 high altitude Himalayan medicinal plant species was prepared with inputs from FRLHT, some invitees and participants.
5. At the beginning of the workshop 51 species out of this list of 73 were short-listed for assessment by the participants in a plenary session.
6. For 2 days of the CAMP workshop, a total of 42 taxa out of the 51 short-listed were assessed.
7. The assessment for each of these 42 taxa was made separately for the states of Jammu & Kashmir and Himachal Pradesh.
8. The state-wise threat categorisation is shown at Table I. It can be seen that the threat categories vary between the two states for several of the taxa assessed.

Table I

Number of Species	Altitude Zone	Altitude Range
6	Temperate	1800 – 3500 meters
14	Sub alpine	3500 – 4000 meters
21	Alpine	4000 – 5500 meters
1 ( Data deficient )		
42 ( Total species assessed )		



10. A state-wise summary of the threat categories assigned is given below:

*Jammu & Kashmir:* Critically Endangered (CR) = 6; Endangered (EN) = 11; Vulnerable (VU) = 18; Lower Risk-Near Threatened (LR-NT) = 2; Lower Risk-Least Concern (LR-LC) = 1; Data Deficient (DD) = 1; Not Evaluated (NE) = 2; **Total = 42**

*Himachal Pradesh:* Critically Endangered (CR) = 2; Endangered (EN) = 11; Vulnerable (VU) = 21; Lower Risk-Near Threatened (LR-NT) = 2; Lower Risk-Least Concern (LR-LC) = 2; Data Deficient (DD) = 1; Not Evaluated (NE) = 3; **Total = 42**

11. From the threat status assessment carried out, it can be seen that out of 42 species as many as 35 (over 83%) for JMK and 34 (81%) for HP are listed in the threatened categories i.e. Critically Endangered, Endangered or Vulnerable. These figures besides being quite alarming highlight the urgent need for immediate conservation action.
12. Of the 42 taxa assessed, 21 have been earlier assessed at the Lucknow CAMP workshop in end January 1997.
13. In the Lucknow workshop 19 out of the 21 species (common to both workshops) were assessed for the Northwest Himalayas while 2 were assessed for the Northeast Himalayas.
14. The comparative positions of these two assessments can be seen at table II. It is interesting to note that only in the case of four species there is agreement in the threat categories assigned in the two workshops. A more detailed analysis of this comparison is given along with table II.
15. The major recommendations made by participants for remedial conservation action include surveys, habitat

management and cultivation programmes.

16. Between the two states there is only one species i.e. *Ferula narthex* which is reportedly endemic to the Gilgit area of Pakistan occupied Kashmir. No record of this species have been made in the last 50 years or so. The species has been assessed Data Deficient (DD) for JMK. Potentially, this was the only species that could have been assigned a global threat status.
17. For some of the species assessed during the workshop, propagation trials either have been conducted earlier or are currently ongoing. Notable among these institutions is Dr Y S Parmar University of Horticulture & Forestry, Solan, HP, at their field station in Tabo in Spiti and at Rallha near Manali in Kullu district. The CSIR complex at Palampur in Kangra district HP is also carrying out cultivation trials on some of the species assessed. The other institutions connected with similar research are the Himalayan Forestry Research Institute, Simla a unit of ICFRE Dehradun and the Field Research Laboratory of the Ministry of Defence, GoI, in Leh, Ladakh.
18. In terms of botanical surveys conducted in the two states, particularly the regions of Ladakh & Lahaul Spiti, the major works include the flora of Lahaul & Spiti by Dr B S Aswal, CDRI, Lucknow; Survey of medicinal flora of Spiti by Dr N S Chauhan of UHF, Solan; Dr Chourasia of FRL, Leh and the Mandi unit of the Central Council for Research in Ayurveda, New Delhi. Both the UHF, Solan & CCRAS, Mandi maintain their own herbaria of the medicinal plants of Himachal Pradesh. The research team of the Wildlife Institute of India, Dehradun has conducted detailed botanical surveys within the Great Himalayan National Park in Kullu district of HP. A more detailed bibliography is given at the end of this report.

## The 42 medicinal species assessed at the Kullu CAMP - CATEGORISED

## Jammu &amp; Kashmir

## CRITICALLY ENDANGERED-CR

- 1 *Aconitum chasmanthum*
- 2 *Arnebia benthamii*
- 3 *Dactylorhiza hatagirea*
- 4 *Fritillaria roylei*
- 5 *Gentiana kurroo*
- 6 *Saussurea costus*

## ENDANGERED-EN

- 1 *Aconitum dienorrhizum*
- 2 *Aconitum heterophyllum*
- 3 *Angelica glauca*
- 4 *Arnebia euchroma*
- 5 *Artemisia maritima*
- 6 *Betula utilis*
- 7 *Ephedra gerardiana*
- 8 *Jurinea dolomiaea*
- 9 *Meconopsis aculeata*
- 10 *Picrorhiza kurrooa*
- 11 *Podophyllum hexandrum*

## VULNERABLE-VU

- 1 *Aconitum violaceum*
- 2 *Allium stracheyi*
- 3 *Bergenia stracheyi*
- 4 *Ferula jaeschkeana*
- 5 *Heracleum lanatum*
- 6 *Malaxis muscifera*
- 7 *Physochlaena prealta*
- 8 *Polygonatum multiflorum*
- 9 *Polygonatum verticillatum*
- 10 *Rheum australe*
- 11 *Rheum moorcroftianum*
- 12 *Rheum spiciforme*
- 13 *Rheum webbianum*
- 14 *Rhododendron anthopogon*
- 15 *Rhododendron campanulatum*
- 16 *Rhododendron lepidotum*
- 17 *Saussurea gossypiphora*
- 18 *Saussurea obvallata*

## LOWER RISK-NEAR THREATENED-LR-NT

- 1 *Hippophea rhamnoides*
- 2 *Hyoscyamus niger*

## LOWER RISK-LEAST CONCERN-LR-LC

- 1 *Selinum tenuifolium*
- 2 *Selinum vaginatum*

## DATA DEFICIENT-DD

- 1 *Ferula narthex*

## NOT EVALUATED-NE

- 1 *Inula racemosa*
- 2 *Nardostachys grandiflora*

## Himachal Pradesh

## CRITICALLY ENDANGERED- CR

- 1 *Arnebia benthamii*
- 2 *Dactylorhiza hatagirea*

## ENDANGERED-EN

- 1 *Aconitum dienorrhizum*
- 2 *Aconitum heterophyllum*
- 3 *Angelica glauca*
- 4 *Arnebia euchroma*
- 5 *Betula utilis*
- 6 *Gentiana kurroo*
- 7 *Fritillaria roylei*
- 8 *Nardostachys grandiflora*
- 9 *Picrorhiza kurrooa*
- 10 *Podophyllum hexandrum*
- 11 *Saussurea gossypiphora*

## VULNERABLE-VU

- 1 *Aconitum violaceum*
- 2 *Allium stracheyi*
- 3 *Artemisia maritima*
- 4 *Bergenia stracheyi*
- 5 *Ephedra gerardiana*
- 6 *Ferula jaeschkeana*
- 7 *Heracleum lanatum*
- 8 *Jurinea dolomiaea*
- 9 *Malaxis muscifera*
- 10 *Meconopsis aculeata*
- 11 *Physochlaena prealta*
- 12 *Polygonatum multiflorum*
- 13 *Polygonatum verticillatum*
- 14 *Rheum australe*
- 15 *Rheum moorcroftianum*
- 16 *Rheum spiciforme*
- 17 *Rheum webbianum*
- 18 *Rhododendron anthopogon*
- 19 *Rhododendron campanulatum*
- 20 *Rhododendron lepidotum*
- 21 *Saussurea obvallata*

## LOWER RISK-NEAR THREATENED-LR-NT

- 1 *Hippophea rhamnoides*
- 2 *Hyoscyamus niger*

## LOWER RISK-LEAST CONCERN-LR-LC

- 1 *Selinum tenuifolium*
- 2 *Selinum vaginatum*

## DATA DEFICIENT-DD

- 1 *Aconitum chasmanthum*

## NOT EVALUATED-NE

- 1 *Inula racemosa*
- 2 *Saussurea costus*
- 3 *Ferula narthex*

## Analysis of Results

Table II

Comparison of Threat Categories assigned at Lucknow and Kullu CAMPs

Sl.No	BOTANICAL NAME	Lucknow (CAMP)	JMK (Kullu)	HP (Kullu)	REMARKS
1	<i>Aconitum dienorrhizum</i>	CR/NW (PR+RD)	EN	EN	
2	<i>Aconitum heterophyllum</i>	CR/NW (Res. Dist.??)	EN	EN	
3	<i>Aconitum violaceum</i>	CR/NW (PR+RD)	VU	VU	
4	<i>Angelica glauca</i>	CR/NW (PR)	EN	EN	
5	<i>Arnebia benthamii</i>	CR/NW (PR)	CR	CR	Same assessment
6	<i>Dactylorhiza hatagirea</i>	CR/NW (PR)	CR	CR	Do
7	<i>Fritillaria roylei</i>	CR/NW (PR)	CR	EN	
8	<i>Gentiana kurroo</i>	CR/NW (PR)	CR	EN	
9	<i>Heracleum lanatum</i>	EN/NW (PR)	VU	VU	
10	<i>Inula racemosa</i>	CR/NW (PR)	NE	NE	
11	<i>Jurinea dolomiaea</i>	LR-NT/NW	EN	VU	
12	<i>Meconopsis aculeata</i>	CR/NW (PR+RD)	EN	VU	
13	<i>Nardostachys grandiflora</i>	CR-NW (PR)	NE	EN	Not yet recorded in JMK
14	<i>Pictorhiza kurrooa</i>	EN/NW	EN	EN	Same assessment
15	<i>Podophyllum hexandrum</i>	CR/NW - NE	EN	EN	
16	<i>Polygonatum verticillatum</i>	ER - NW	VU	VU	
17	<i>Rheum australe</i>	VU/NW	VU	VU	Do
18	<i>Rhododendron anthopogon</i>	VU/NE	VU	VU	
19	<i>Saussurea gossypiphora</i>	EN/NW	VU	EN	
20	<i>Saussurea costus</i>	CR/NW (RD)	CR	NE	Not wild from HP
21	<i>Sausurrea obvallata</i>	EN - NW	VU	VU	

The criteria for assigning threat categories for both JMK & HP in the table above is population reduction. It can be seen that this is also the principal criterion for threat categorisation in the Lucknow CAMP. However, despite this common criterion the threat categories assigned in the two CAMPs are very different. Out of the 21 common species assessed, only four have been assigned the same threat category in both the CAMPs. It is also observed that since the extent of occurrence has been recorded as more than 20000 sq.km. for the above species, the criterion of restricted distribution in terms of extent of occurrence would not be applicable for assigning threat categories to these species. As has been highlighted earlier, the need to assess planet taxa over internationally accepted geo-political units ( in this case, these two states) comes out forcefully with the different threat

categories assessed for the same species in the two states. Of course this has been preceded by a rigorous pre- CAMP exercise resulting in compilation of existing data from either published literature or the participants themselves. One species each have not yet been recorded/ reported from JMK & HP. It is interesting to note that *Inula racemosa* which has been categorised as Critically Endangered in the previous CAMP has not been recorded from the wild either in JMK or HP, and hence could not be evaluated. It may also be mentioned that in the previous CAMPs the exact areas comprising the North West Himalaya has not been spelt out. The Indian North West Himalaya comprises the states of JMK & HP and the districts of Tehri-Gharwal & Kumaon in UP. In the Kullu CAMP assessments apply to only JMK & HP.

**Altitudinal range of taxa assessed:  
Altitude zone wise occurrence of the 42 assessed species wise is tabulated below:**

Number of Species	Vegetation Zone	Altitude Range in metres
6	Temperate	1800 - 3500
14	Sub alpine	3500 - 4000
21	Alpine	4000 - 5500
1 (Data deficient)		

**Habit of taxa assessed:**

Perennial herbs = 35  
 Shrub/ small shrub = 6  
 Tree = 1  
 Total species assessed = 42

The occurrence of species is not only governed by the altitude but also by various other parameters like aspect, slope, moisture availability and micro-habitat.

**Diversity of habitats recorded:**

The alpine and sub-alpine meadows of the temperate Himalaya are grasslands either as clearings in forests or on mountain peaks above the tree line. For 4 to 6 months in a year these alpine areas are under snow, depending upon their altitude and aspect. At the heels of the snow melt, all variety of herbaceous flora manifests itself. Species come up together or in quick succession according to their life cycle, and by autumn they have completed the cycle of flowering and seeding and are gone. The perennials persist, but mainly in the form of underground parts.

In the Himalaya, habitat varies greatly with altitude and aspect. The altitude at which many species are found is much less on the northern aspects than on south facing slopes. The more luxuriant alpine meadows generally face north or east or north-east. And in these because of better moisture availability, species richness is likely to be more. In this sense, therefore, a straightforward altitudinal zonation can be misleading, since aspect plays a crucial

role in the occurrence of taxa within their altitudinal range. Aspect thus makes the vegetation zones like temperate, sub-alpine and alpine for a given altitude zone overlap.

The habitat diversity recorded for the 42 assessed species, shows that habitat specificity is conditioned more by moisture availability which in turn can easily be linked to aspect although in the present exercise information on aspects is wanting. There are species like *Aconitum heterophyllum* which occur within forested habitats as well as treeless alpine meadows. Others, like *Arnebia euchroma* and *Artemisia maritima* begin to show their presence in the inner Himalayas which receive lesser rainfall. Altitudinally, however, all these 3 species show the nearly the same range. There are species like *Inula racemosa* and *Physochleana praealta* that have been recorded only along cultivations or around village wastelands although their altitudinal range is quite different. Within the alpine and sub-alpine landscape species seem to vary in preference between dry slopes, moist slopes, rocky patches and humus-rich rocky patches. In the cold desert regions of Spiti and Ladakh, species like *Hippophae rhamnoides* and *Saussurea obvallata* occur only along glacial streams or on moist slopes.

In the Trans-Himalaya, however, at the same altitude the landscape is quite different. The perennial herbaceous species grow here virtually without water. The adaptation of plant species to survive

throughout the growing season on the previous snow melt is remarkable. Where there is relatively more moisture, herbaceous annuals and large shrubs like *Hippophae rhamnoides* display more luxuriant growth. But everywhere, unlike in the temperate zone, alpine pastures of the middle/ inner Himalayas have no 'grasslands' and the general feeling of the land being totally barren permeates. That is why the Trans-Himalaya is called a cold desert.

### Trade Levels

The assessment of the 42 species during the Kullu Camp records that all the species are traded. The level of trade ranges between local to regional to national and global. Figures with respect to the volume of trade as recorded for Himachal and Kullu Forest Circle over some years are

shown in Tables I & II.

In the Table XX it is seen that of the 42 species assessed during the Kullu Camp, 30 are traded at the "National" level. Of these 30 species, 14 are also traded at the "global" level. In addition 2 species are shown as only traded at "global" level. 25 species are reportedly traded at "local" level also and of these 7 are only traded at "local" level. "Regional" level trade has been recorded for 5 out of the 42 species assessed.

It needs to be mentioned that figures for quantities traded even for export are patchy. Very often the local / trade names are used and their correlation with their correct botanical identity is lacking. Reliable traded figures for "national, regional or local" levels are simply quite impossible to come by.

### Kullu Forest Circle records

Table I

Medicinal plants (species Red Listed in Kullu CAMP) exported in quintals from Kullu Forest Circle Range wise-5 year data; Quantities in '00 kgs.

Sl. No.	Species	Kullu 1989-93	Pallikull 1989-92	Nagar 1990-95	Kasol 1990-94	Hucla 1990-95	Tirthan 1987-92	Banjr 1990-92	Total 1989-95
1.	<i>Angelica glauca</i>	87	-	1	27	65	-	-	171
2.	<i>Betula utilis</i>	237	-	2	-	-	-	-	239
3.	<i>Dactylorhiza hatagirea</i>	64	-	-	2	6	-	-	72
4.	<i>Gentiana kurroo</i>	185	8	-	269	91	49	5	607
5.	<i>Jurinea dolomiaea</i>	216	-	-	273	275	365	-	1129
6.	<i>Podophyllum emodi</i>	75	-	-	102	-	-	-	177
7.	<i>Polygonatum verticillatum</i>	8	-	1	20	10	-	-	39
8.	<i>Rhododendron campanulatum</i>	43	-	-	-	-	-	-	43
9.	<i>Selinum vaginatum</i>	58	11	200	14	10	-	-	293

### Kullu CAMP Herbs EXPORTED FROM HP (in '00 kgs.) \* Table II

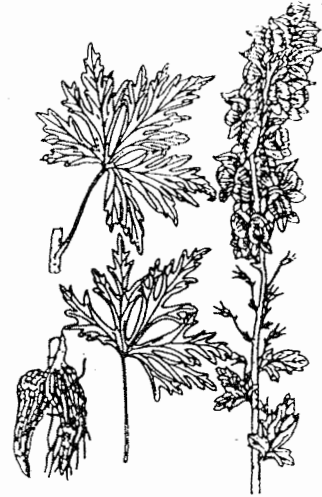
Sl. No	Botanical Name	Trade Name	1988-89	1989-90	1991-92
1	<i>Aconitum violaceum</i>	Kauri patis	190	1	3
2	<i>Saussurea lappa</i>	Kuth	3	648	668
3	<i>Jurinea macrocephala</i>	Dhoop	5845	4064	4940
4	<i>Picrorhiza kurrooa</i>	Karu	1468	200	2899
	<b>TOTAL</b>		<b>7506</b>	<b>4913</b>	<b>8510</b>

## Recommendations for research mgmt.

1. The most significant recommendation for 38 of the 42 species concerns habitat management. This includes "management actions primarily intended to protect and/or enhance the species' habitat". This is perhaps a reflection of a more general threat perception that unless the habitats are saved, the individual species has no chance. Further, given the vast distribution ranges of most species assessed, the variation in habitat becomes very important. It is this variation in habitat that a species adapts to that lies at heart of what is termed infra-specific genetic variability. While a species may manifest phenotypic variations, it is their occurrence across a variety of habitats and as disjunct populations that is likely to yield rich genetic variability within a species. In the long run it is species with the broadest genetic variation that are most likely to survive through successful adaptation to change.
2. The other two major recommendations are closely linked. For 28 species field surveys to search and find the species are advocated while for 24 species monitoring to determine population information is recommended. At one level both these recommendations reflect the lack of reliable field data about these species. In fact there appear to be no current field studies addressing the need to systematically sample presence and population levels of a species across its distribution. **It is important to mention here that should such an exercise be contemplated, it is only feasible and most likely to be carried out within a geo-political unit like a state. This is one of reasons why this CAMP workshop assessed the 42 species state-wise.**
3. The other recommendations include life history studies for 11 species. As many Ph.D if taken up! For 4 species "limiting factor research" has been recommended. This entails research management activities on known or suspected limiting factors.



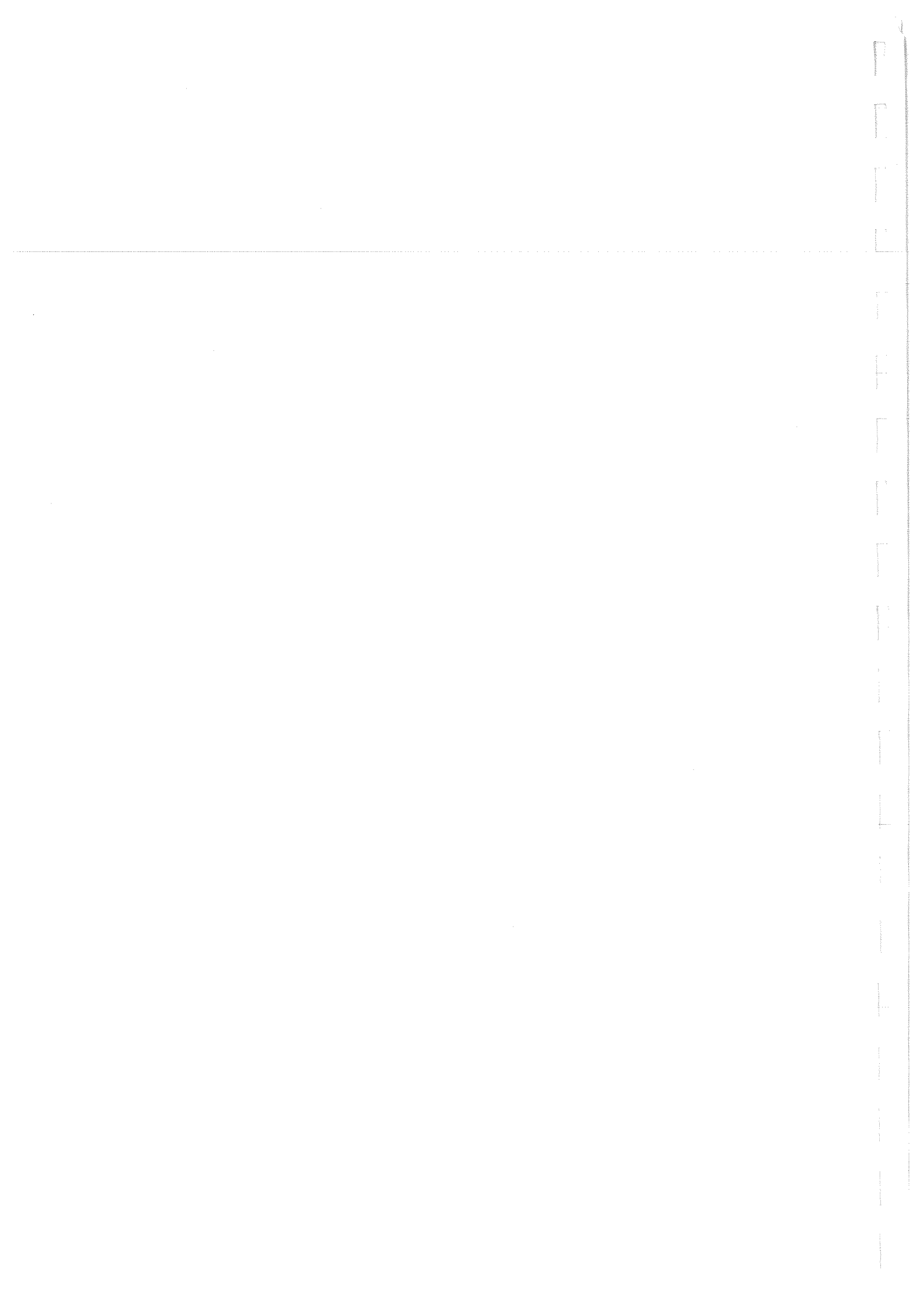
*Betula utilis* D. Don



*Aconitum deinorrhizum* Stapf.

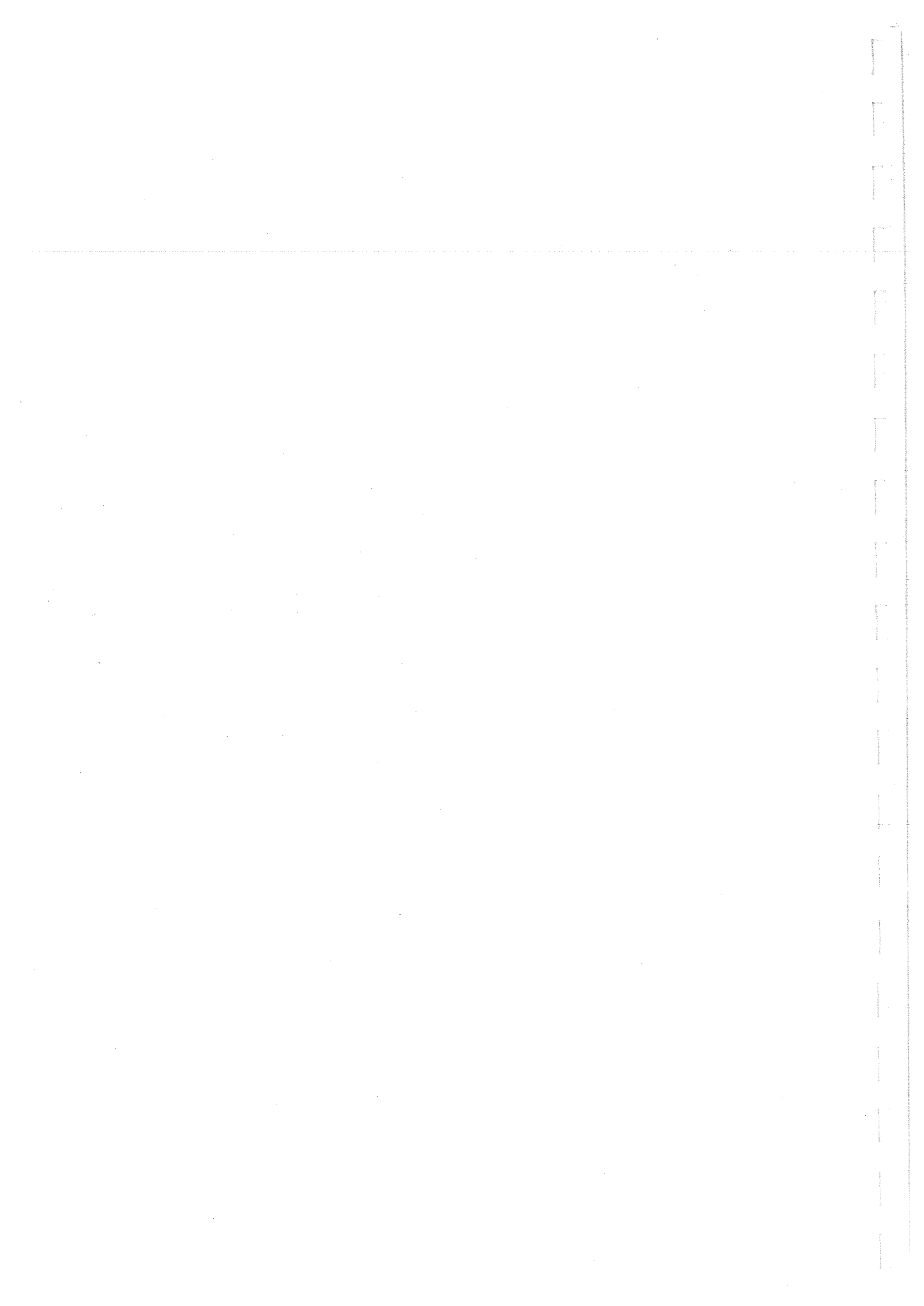


*Picrorhiza kurrooa* Benth.



# **Taxon Data Sheets**





## Taxon Data Sheet

Species & synonyms	<i>Aconitum deinorrhizum</i> Stapf
Vernacular Name	-
Family	RANUNCULACEAE
Taxonomic status	Species
Habit	Perennial herb with paired, tuberous roots
Habitat	Sub-alpine in partial shade rocky strips.
Original global distribution	Himalaya of JMK, HP, NEP, Bhutan
Current regional distribution	Restricted to micro-habitats (JMK, HP)
- Elevation (m)	2800-4500
- Range (km <sup>2</sup> )	< 5000 and severely fragmented
- Area occupied (km <sup>2</sup> )	Not assessed
- No. of locations	5 in JMK, 2 in HP (Kinnaur & Rampur, Bushahr)
Population trends	
- % Decline	> 50 (JMK, HP)
- Time/ rate (years or generations)	10 years
- No. of mature individuals	Not assessed
Global population	Not assessed
Regional population	Not assessed
Data quality	Informal field sightings (3), indirect information (4) General field studies (2)
Recent field studies	1995-96 in HP (Lucknow CAMP 1997)
Threats	Over exploitation (Ov), loss of habitat (L), Human interference (I)
Trade	The market samples of MEETHATELIA/ BACHNAG consist of More than one Aconite- <i>Aconitum deinorrhizum</i> Stapf., <i>A. chasmanthum</i> Stapf., <i>A. falconeri</i> Stapf., <i>A. ferox</i> Wall. <i>A. violaceum</i> Jacob and <i>A. balfouri</i> Stapf. (Illustrated Manual of Herbal Drugs Used In Ayurveda, 1996, by Y.K.Sarin)
Other comments	Sustainable collection. It is recorded as Vulnerable in Red Data Book of Indian Plants, Vol. 1, 1990
Status	
- IUCN	EN- JMK, HP
- Criteria based on	PR, EO
- CITES	Not currently listed but proposed for Appendix II (- CITES Guide To Plants In Trade, 1994)
- IWPA (1972; 91)	No
- National legislation	Negative List of Exports, 1994 (All aconites); Public Notice No. 47 (PN) / 92- 97
Recommendations	
Research management	Life history studies (Lh), Micro-habitat analysis, survey (S), Monitoring (M), habitat management (Hm), In situ conservation supplemented by cultivation .
- P.H.V.A	No
Cultivation prog. recommendations	
- Cultivation	Ex situ conservation and in situ conservation supplemented Cultivation ( level 1) and ( level 2 )
- Level of difficulty	Very difficult ( level 3)
Existing cultivation	
- No. of facilities	Not known
Sources	Not known
Compilers	Y.K. Sarin , O.P. Sharma, Jen Van der Waals, Nima Manjrekar, Amchi Tsering Phuntsog
Reviewers	N.S. Chauhan, H.K. Badola, C.P.Kala, Sanjay K. Singh, S.K. Guleria, R.K. Gupta, D.K. Ved, V. Tandon, M. C. Nautiyal, P.B. Singh, Brijljal, T.R. Vinod, S.D. Sharma, Sanjeeva Pandey, B.C. Thakur, B.S. Rana.

## Taxon Data Sheet

Species & synonyms	<i>Allium stracheyi</i> Baker
Vernacular Name	JAMBO ( Garhwal ), FARAN (Kullu)
Family	LILIACEAE
Taxonomic status	Species
Habit	Perennial bulbous herb
Habitat	Sub-alpine / alpine meadows, dry slopes, open sandy situations, Open plateau, forest shades and pastures in temperate areas.
Original global distribution	Himalaya in PAK, JMK, HP, UP
Current regional distribution	JMK, HP, UP
- Elevation (m)	2600-3000
- Range (km <sup>2</sup> )	> 20,000
- Area occupied (km <sup>2</sup> )	> 2000
- No. of locations	Many [ 12 in JMK 3 in HP]
Population trends	
- % Decline	> 20 (JMK, HP)
- Time/ rate (years or generations)	10 years
- No. of mature individuals	Not assessed
Global population	Not assessed
Regional population	Not assessed
Data quality	General field studies (2), informal field sightings (3)
Recent field studies	Nima Manjrekar, WII, Dehra Dun, 1997 (Pin Valley, Spiti,HP), S. K. Singh (Great Himalayan National Park, Kullu)
Threats	Harvest for food (Hf), harvest for medicine (Hm), Over exploitation (Ov)
Trade	Local trade in pseudobulbs, local consumption of leaves as vegetables.
Other comments	Intensive search for this species in this region and adequate protection of natural habitats and introduction into cultivation in W. Himalayan areas. In Red Data Book. Volume-3, BSI, 1990, this plant is recorded as Vulnerable.
Status	
- IUCN	VU- JMK, HP
- Criteria based on	PR
- CITES	No
- IWPA (1972; 91)	No
- National legislation	No
Recommendations	
- Research management	Survey (S), life history studies (Lh), habitat management (Hm), Monitoring (M), Insitu and ex-situ conservation followed by cultivation
- P.H.V.A	Yes
Cultivation prog. recommendations	
- Cultivation	Level 2
- Level of difficulty	Least difficult ( level 1)
Existing cultivation	
- No. of facilities	Experimental cultivation HAPPRC, Tunganath ( UP)
Sources	M. P. Nayar and A.R. K. Sastry, Red Data Book of Indian Plants, Vol. 3, 1990, published by BSI, Calcutta.
Compilers	Y.K. Sarin, M.V. Vishwanathan, O.P. Sharma, Jen Van der Waals, Nima Manjrekar, Amchi Tsering Phuntsog.
Reviewers	N.S. Chauhan, H.K. Badola, C.P.Kala, Sanjay K. Singh, S.K. Guleria, R.K. Gupta, S.D. Sharma, M.C. Nautiyal, P.B. Singh, Brijlal. T.R. Vinod, Sanjeeva Pandey, B.C. Thakur, B.S. Rana, D.K. Ved. V. Tandon

## Taxon Data Sheet

<b>Species &amp; synonyms</b>	<i>Aconitum heterophyllum</i> Wall. Ex Royle
<b>Vernacular Name</b>	ATIS / PATISH ( Kullu)
<b>Family</b>	RANUNCULACEAE
<b>Taxonomic status</b>	Species
<b>Habit</b>	Perennial (subterranean ) herb
<b>Habitat</b>	Alpine to sub-alpine open slopes, common on grassy meadows, Upper oak – coniferous forests, forest margins around sub-alpine scrubs.
<b>Original global distribution</b>	Himalaya of PAK, JMK, HP, UP, NEP, SK
<b>Current regional distribution</b>	JMK, HP, UP
- Elevation (m)	2600-4500
- Range (km <sup>2</sup> )	> 20,000
- Area occupied (km <sup>2</sup> )	> 2000
- No. of locations	18 (JMK), 20 (HP) fragmented
<b>Population trends</b>	
- % Decline	>50 (JMK, HP)
- Time/ rate (years or generations)	10 years
<b>Number of mature individuals</b>	Not assessed
<b>Global population</b>	Not assessed
<b>Regional population</b>	Not assessed
<b>Data quality</b>	General field study (2), informal field sightings (3), Indirect information (4)
<b>Recent field studies</b>	S. K. Kapur, RRL, Jammu –1997, Chauhan N.S. 1984-1997, Chamba, Kinnaur, Kullu; Singh S. K. (GHNP, Kullu), Badola (Kullu)
<b>Threats</b>	Loss of habitat (L), over exploitation (Ov), Trade of plant parts ( Tp)
<b>Trade</b>	Local to National, roots used in modern, ayurvedic, Unani and Tibetan medicine. Roots traded as ATEES (KAURIPATIS). Extensively used in traditional medicine industry.
<b>Other comments</b>	Sustainable collection recommended.
<b>Status</b>	
- IUCN	EN-JMK, HP
- Criteria based on	PR
- CITES	No
- IWPA (1972; 91)	No
- National legislation	First Negative List of Exports, 1994 (All aconites); Public Notice No. 47 (PN) / 92- 97
<b>Recommendation</b>	
- Research management	Species management, life history studies (Lh), Habitat management (Hm), monitoring (M), survey (S) In-situ and ex-situ conservation required and captive cultivation
- P.H.V.A	Yes
<b>Cultivation prog. recommendations</b>	
- Cultivation	Level 1, level 2
- Level of difficulty	Very difficult ( level 3)
<b>Existing cultivation</b>	
- No. of facilities	High Altitude Plant Physiology Research Centre, Srinagar. Garhwal-1000 plants in cultivation in 2 areas (Lucknow CAMP 1997) Being raised in nurseries and planted out in one of the forest areas In Sikkim (V. Tandon, 11/97)
<b>Sources</b>	Not known
<b>Compilers</b>	Y.K. Sarin , O.P. Sharma, Jen Van der Waals, Nima Manjrekar , Amchi Tsering Phuntsog.
<b>Reviewers</b>	N.S. Chauhan, H.K. Badola, C.P.Kala, Sanjay K. Singh, S.K. Guleria, R.K. Gupta, M.C. Nautiyal, P.B. Singh, Brijlal T.R. Vinod, Sanjeeva Pandey, B.C. Thakur, B.S. Rana, S.D. Sharma, D.K. Ved. V. Tandon

## Taxon Data Sheet

Species & synonyms	<i>Aconitum violaceum</i> Jacq. ex Stapf. (= <i>A. napellus</i> var. <i>multifolium</i> (Royle) Hook.)
Vernacular Name	PATISH, DUDATEES (Garhwal); MITHAPATISH (Kullu)
Family	RANUNCULACEAE
Taxonomic status	Species
Habit	Perennial herb
Habitat	Temperate, open lands in alpine meadows and slopes.
Original global distribution	Himalaya of PAK, JMK, HP, UP, NEP
Current regional distribution	JMK, HP, UP ( In the Valley of flowers and Nanda Devi Biosphere Reserve)
- Elevation	3600- 4800 m
- Range (km <sup>2</sup> )	5001 – 20000
- Area occupied (km <sup>2</sup> )	Not assessed
- No. of locations	3 in JMK and 8 in HP
Population trends	
- % Decline	> 50 (JMK, HP)
- Time/ rate (years or generations)	10 years
Number of mature individuals	Not assessed
Global population	Not assessed
Regional population	Not assessed
Data quality	General field study (2), informal field sightings (3)
Recent field studies	Nima Manjrekar, WII, Dehradun, 97 (Pin valley, Spiti, HP) Chauhan N.S. ,1997, (Spiti), S.K. Singh (GHNP), C.P. Kala, 1997 (GHNP)
Threats	Loss of habitat (L), over exploitation (Ov), human interference (I)
Trade	The North Indian market samples of MEETHATELIA/ BACHNAG Consist of more than one Aconite- <i>Aconitum deinorrhizum</i> Stapf. , <i>A. chasmanthum</i> Stapf. , <i>A. falconeri</i> Stapf. , <i>A. ferox</i> Wall. <i>A. violaceum</i> Jacq.ex.Stapf., <i>A. balfourii</i> Stapf. (Y.K. Sarin, 1996, Illustrated Manual of Herbal Drugs used in Ayurveda, CSIR and ICMR, 1996, New Delhi ) The predominant material in the market samples of North India is <i>A. violaceum</i> Jacq.ex Stapf.
Other comments	Regulated collections and sustainable exploitation recommended. The species is more common in the camping sites of sheep and goats. (Sanjay K. Singh)
Status	
- IUCN	VU- JMK, HP
- Criteria based on	PR, EO
- CITES	No
- IWPA (1972; 91)	No
- National legislation	First Negative List of Exports, 1994 (all aconites); Public Notice No. 47 (PN) / 92- 97
Recommendation	
- Research management	Habitat management (Hm), survey (S), monitoring (M) In- situ and ex-situ conservation followed by cultivation
- P.H.V.A	Yes
Cultivation prog. recommendations	
- Cultivation	Level 2
- Level of difficulty	Moderate difficulty ( level 2)
Existing cultivation	
- No. of facilities	Not known
Sources	Not known
Compilers	Y.K. Sarin , M.V. Vishwanathan, O.P. Sharma. Nima Manjrekar, Amchi Tsering Phuntsog.
Reviewers	N.S. Chauhan, H.K. Badola, C.P.Kala, Sanjay K. Singh, S.K. Guleria, R.K. Gupta, S.D. Sharma, M.C. Nautiyal, P.B. Singh, Brijljal, T.R. Vinod, Sanjeev, Pandey, B.C. Thakur, B.S. Rana, D. K. Ved, V. Tandon

## Taxon Data Sheet

Species ( & Synonyms)	<i>Aconitum chasmanthum</i> Stapf ex Holmes
Vernacular Name	MOHARA (Kullu)
Family	RANUNCULACEAE
Taxonomic status	Species
Habit	Perennial herb
Habitat	Alpine meadows
Original global distribution	Himalaya in PAK, JMK, HP
Current regional distribution	JMK, HP
- Elevation (m)	3500 – 4000
- Range (km <sup>2</sup> )	<20000
- Area occupied (km <sup>2</sup> )	<100
- No. of locations	Sona Marg, Baltal area ( JMK) Great Himalayan National Park, Kullu (HP)
<b>Population trends</b>	
- % Decline	> 80 (JMK, HP)
- Time/ rate (Years or generations)	10 years
- No. of mature individuals	Not assessed
Global population	Not assessed
Regional population	Not assessed
Data quality	General field studies (2), informal field sightings (3)
Recent field studies	Sanjay K. Singh, Great Himalayan National Park, Kullu, 1997
Threats	Over exploitation (Ov), loss of habitat (L)
Trade	The North Indian market samples of MEETHATELIA/ BACHNAG consist of more than one Aconite- <i>Aconitum deinorrhizum</i> Stapf. , <i>A. chasmanthum</i> Stapf. , <i>A. falconeri</i> Stapf. , <i>A. ferox</i> Wall. <i>A. violaceum</i> Jacq.ex.Stapf. , <i>A. balfourii</i> Stapf. The proportion of <i>A. chasmanthum</i> in the commercial samples is very small. (Illustrated Manual of Herbal Drugs Used in Ayurveda, 1996, by Y.K.Sarin)
Other comments	-
<b>Status</b>	
- IUCN	CR - JMK , DD- HP
- Criteria based on	PR, EO
- CITES	No
- IWPA (1972; 91)	No
- National legislation	Negative List of Exports, 1994 (All Aconites) Public Notice No. 47 (PN) / 92- 97
<b>Recommendations</b>	
- Research management	Survey (S), habitat management (Hm)
- P.H.V.A	No
<b>Cultivation prog. recommendations</b>	
- Cultivation	Not known
- Level of difficulty	Not assessed
<b>Existing cultivation</b>	
- No. of facilities	Not known
<b>Sources</b>	Illustrated Manual of Herbal Drugs used in Ayurveda, 1996, By Y. K. Sarin
<b>Compilers</b>	Y.K. Sarin , O.P. Sharma, Jen Van der Waals, Nima Manjrekar, Amchi Tsering Phuntsog, L. Pordie
<b>Reviewers</b>	N.S. Chauhan, H.K. Badola, C.P.Kala, D.K. Ved, Sanjay K. Singh, S.K. Guleria, R.K. Gupta, S.D. Sharma, V.Tandon, . M.C. Nautiyal, P.B. Singh, Brijlal, T.R. Vinod, Sanjeeva Pandey, B.C. Thakur, B.S. Rana

## Taxon Data Sheet

Species ( & Synonyms)	<i>Angelica glauca</i> Edgew.
Vernacular Name	CHORU(Garhwal and Kullu)
Family	APIACEAE
Taxonomic status	Species
Habit	Perennial herb
Habitat	Moist rocky situations near water springs/ forest shades.
Original global distribution	Himalaya in JMK, HP, UP
Current regional distribution	JMK, HP, UP
- Elevation (m)	2400 – 3600
- Range (km <sup>2</sup> )	> 20,000
- Area occupied (km <sup>2</sup> )	>2000
- No. of locations	5 in JMK , 4 in HP
Population trends	
- % Decline	> 50 (JMK, HP)
- Time/ rate (years or generations)	10 years
Number of mature individuals	Not assessed
Global population	Not assessed
Regional population	Not assessed
Data quality	General field studies (2), informal field sightings (3), Indirect information (4)
Recent field studies	Y.K. Sarin and P.B. Singh (H.P), 1990- 98 Chauhan N. S, 1992; S. K. Singh Great Himalayan National Park, Kullu
Threats	Harvest for market (Hm)
Trade	Local, national, global, rhizomes are traded as CHORA.
Other comments	Root have essential oils. Used in Ayurvedic medicines, beverages
Status	
- IUCN	EN-JMK, HP
- Criteria based on	PR
- CITES	No
- IWPA (1972; 91)	No
- National legislation	No
Recommendations	
- Research management	Survey (S), habitat management (Hm), Life history studies (Lh), monitoring (M) In-situ conservation
- P.H.V.A	Yes
Cultivation prog. recommendations	
- Cultivation	Level 2
- Level of difficulty	Moderately difficult ( level 2)
Existing cultivation	
- No. of facilities	RAHLLA (Manali) , Dept. of Agriculture Trial cultivation in herbal garden by University of Horticulture & Forestry, Solan. Experimental cultivation HAPPRC, Alpine Garden, Tunganath( UP)
Sources	N.S.Chauhan, Report (unpublished) 1997.
Compilers	Y.K. Sarin, O.P. Sharma, Jen Van der Waals, Nima Manjrekar, L. Pordie, Amchi Tsering Phuntsog.
Reviewers	N.S. Chauhan, H.K. Badola, C.P.Kala, D.K. Ved, Sanjay K. Singh, S.K. Guleria, R.K. Gupta, S.D. Sharma, V.Tandon, . M.C. Nautiyal, P.B. Singh, Brijlal, T.R. Vinod, Sanjeeva Pandey, B.C. Thakur, B.S. Rana

## Taxon Data Sheet

Species & synonyms	<i>Arnebia benthamii</i> (Wall. ex G.Don) Johns ( = <i>Macrotomia benthamii</i> (Wall) A. Don )
Vernacular Name	BALCHHADI (Kullu), RATANJOT / KHAMET (Lahul and Spiti)
Family	BORAGINACEAE
Taxonomic status	Species
Habit	Perennial herb
Habitat	Dry sub-alpine and alpine scrub and sub alpine fir-birch forest.
Original global distribution	Himalaya in AFG, PAK, JMK, HP, UP, NEP
Current regional distribution	JMK, HP, UP
- Elevation (m)	2800- 4500
- Range (km <sup>2</sup> )	>20,001
- Area occupied (km <sup>2</sup> )	Not assessed
- No. of locations	3 in JMK, 5 in HP
Population trends	
- % Decline	>80 (JMK, HP)
- Time/ rate (years or generations)	10 years
- No. of mature individuals	Not assessed
Global population	Not assessed
Regional population	Not assessed
Data quality	General field studies (2), informal field sightings (3), Indirect information (4)
Recent field studies	<i>Medicinal plants of Kashmir and Ladakh, 1997</i> by M.K.Kaul, GHNP, Kullu, C. P. Kala , GHNP, 1997 & (Valley of Flowers National Park )
Threats	Harvest for medicine (Hm), Over exploitation (Ov) Loss of habitat (L), human interference (I)
Trade	National, global, well traded in low volume. Roots, Leaves and seeds are traded as GAUZABAN/RATANJOT.
Other comments	Roots yields red dye. It has antibiotic and antiseptic, properties.
Status	
- IUCN	CR- JMK, HP
- Criteria based on	PR
- CITES	No
- IWPA (1972; 91)	No
- National legislation	No
Recommendations	
- Research management	In situ and ex-situ conservation and habitat management (Hm), Life history studies(Lh), autecological study, Survey (S) & Monitoring (M)
- P.H.V.A	Yes
Cultivation prog. recommendations	
- Cultivation	Level 2
- Level of difficulty	Very difficult ( level 3)
- No. of facilities	Not known
Sources	M.K.Kaul, 1997, Medicinal Plants of Kashmir and Ladakh
Compilers	Y.K. Sarin , M.V. Vishwanathan, O.P. Sharma, Jen Van der Waals, Nima Manjrekar
Reviewers	N.S. Chauhan, H.K. Badola, C.P.Kala, Sanjay K. Singh, S.K. Guleria, R.K. Gupta, S.D. Sharma, M.C. Nautiyal, P.B. Singh, Brijlal T.R. Vinod, D.K.Ved, V.Tandon, Sanjeeva Pandey, B.C. Thakur. B.S. Rana



## Taxon Data Sheet

Species & synonyms	<i>Arnebia euchroma</i> (Royle) John. (= <i>Macrotomia perennis</i> (Schrenk Boiss.)
Vernacular Name	KHAMED/ RATANJOT (Lahul and Spiti)
Family	BORAGINACEAE
Taxonomic status	Species
Habit	Perennial herb
Habitat	Alpine, dry sandy rocky slopes. Dry alpine scrub
Original global distribution	Himalaya in AFG, JMK, HP, UP, NEP, China, Temperate Asia (Central Asia), West Asia, Iran
Current regional distribution	JMK, HP, UP
- Elevation (m)	3000 - 4800
- Range (km <sup>2</sup> )	> 20000
- Area occupied (km <sup>2</sup> )	>2000
- No. of locations	3 in JMK and 10 in HP
Population trends	
- % Decline	>50 (JMK, HP)
- Time/ rate (years or generations)	10 years
Number of mature individuals	Not assessed
Global population	Not assessed
Regional population	Not assessed
Data quality	General field studies (2), informal field sightings (3), Indirect information (4)
Recent field studies	Cold desert plants by O.P. Chaurasia, 1996. Chauhan N.S. 1994,1997 (Lahul –Spiti, Kinnaur), Nima Manjrekar 1997 (Pin valley, Spiti, HP) B.S. Rana 1992-96 (Lahual Spiti)
Threats	Harvest for medicine (Hm), over exploitation (Ov), Human interference (I), loss of habitat (L)
Trade	Local, national, GAOZABAN of Ladakh / RATANJOT, Roots are traded. It is used as substitute for <i>A. benthamii</i> (Wall. ex G.Don)Johns.
Other comments	Mainly a high altitude plant. It differs from <i>A. benthamii</i> in having rounded clusters of pale pink- purple flowers which turn Blackish- purple. Roots produce red dye.
Status	
- IUCN	EN- JMK, HP
- Criteria based on	PR
- CITES	No
- IWPA (1972; 91)	No
- National legislation	No
Recommendations	
- Research management	Habitat management (Hm), monitoring (M), survey (S), in-situ conservation
- P.H.V.A	Yes
Cultivation prog. recommendations	
- Cultivation	Level 2
- Level of difficulty	Very difficult ( level 3)
Existing cultivation	
- No. of facilities	Not known
Sources	B. S. Rana Long Term Vegetation Monitoring Project In Pin Valley National Park, Spiti, 1993-96
Compilers	Y.K. Sarin , M.V. Vishwanathan, O.P. Sharma, Jen Van der Waals, Nima Manjrekar
Reviewers	N.S. Chauhan, H.K. Badola, C.P.Kala, D.K.Ved, Sanjay K. Singh, S.K. Guleria, R.K. Gupta, V. Tandon, S.D. Sharma, M.C. Nautiyal, P.B. Singh, Brijlal, T.R.Vinod, Sanjeeva Pandey, B.C. Thakur, B.S. Rana

## Taxon Data Sheet

Species ( & Synonyms)	<i>Artemisia maritima</i> L. (= <i>A. brevifolia</i> Wall. ex. DC.)
Vernacular Name	JHOA, SESKI (Kullu)
Family	ASTERACEAE
Taxonomic status	Species
Habit	Perennial undershrub
Habitat	Dry open slopes
Original global distribution	Himalaya of JMK, HP, UP, NEP, China, Temperate Asia and Europe
Current regional distribution	JMK, HP
- Elevation (m)	2600-4500
- Range (km <sup>2</sup> )	> 20,000
- Area occupied (km <sup>2</sup> )	Not assessed
- No. of locations	8 in JMK and 20 in HP
Population trends	
- % Decline	> 50 in JMK and > 20 in HP
- Time/ rate (years or generations)	10 years
- No. of mature individuals	Not assessed
Global population	Not assessed
Regional population	Not assessed
Data quality	General field studies (2), informal field study (3), Indirect information sightings (4)
Recent field studies	S. K. Singh (Great Himalayan National Park, Kullu), Nima Manjrekar 1997 (WII)- Pin Valley, Spiti, HP
Threats	Harvest for medicine (Hm), over exploitation (Ov) Human interference (I), loss of habitat (L)
Trade	National and global – aerial parts; exported. Traded as SESKI
Other comments	Aerial parts contains Santonin, essential oil. Baramulla factory uses two varieties. <b>Red Stem</b> – rich in Santonin, <b>Woolly Stem</b> has less Santonin ( Y.K. Sarin)
Status	
- IUCN	EN- JMK ,VU- HP
- Criteria based on	PR
- CITES	No
- IWPA (1972; 91)	No
- National legislation	Negative List of Exports, 1994; Public Notice No. 47 (PN) / 92- 97 (All Species of <i>Artemisia</i> )
Recommendations	
- Research management	Monitoring (M), survey (S), habitat management (Hm), Scientific harvesting and management
- P.H.V.A	Yes
Cultivation prog. recommendations	
- Cultivation	Level 2
- Level of difficulty	Moderate difficulty ( level 2)
Existing cultivation	
- No. of facilities	Not known
Sources	Y.K. Sarin, N.S.Chauhan, Y. S. Parmar University of Horticulture and Forestry, Solan (1997), report unpublished.
Compilers	Y.K. Sarin , M.V. Vishwanathan, O.P. Sharma, Jen Van der Waals, Nima Manjrekar, Amchi Tsering Phuntsog.
Reviewers	N.S. Chauhan, H.K. Badola, C.P.Kala, Sanjay K. Singh, S.K. Guleria, R.K. Gupta, S.D. Sharma, . M.C. Nautiyal, P.B. Singh, Brijlal T.R. Vinod, Sanjeeva Pandey, B.C. Thakur, B.S. Rana, D.K.Ved, V. Tandon

## Taxon Data Sheet

Species ( & Synonyms)	<i>Bergenia stracheyi</i> (Hook.f. & Tho) Engl.
Vernacular Name	GATIKPA/ PASHANBHED (Lahul and Spiti)
Family	SAXIFRAGACEAE
Taxonomic status	Species
Habit	Perennial stoloniferous rhizomatic herb with woody Root stock
Habitat	Common on moist rocky alpine slopes/ sub-alpine slopes
Original global distribution	Himalaya in AFG, JMK, HP, UP, and Temperate Asia & Central Asia
Current regional distribution	JMK, HP, UP
- Elevation (m)	2500 – 4500
- Range (km <sup>2</sup> )	> 20,001
- Area occupied (km <sup>2</sup> )	> 2000
- No. of locations	15 in JMK , 12 in HP
Population trends	
- % Decline	> 20 (JMK, HP)
- Time/ rate (years or generations)	10 years
Number of mature individuals	Not assessed
Global population	Not assessed
Regional population	Declining
Data quality	General field study (2), informal field sightings (3)
Recent field studies	Chauhan N.S., 1989, 1994, 1997 (Lahul-Spiti, Kullu, Kinnaur) Nima Manjrekar (WII) –Pin Valley , Spiti, HP, 1997 C.P. Kala and S. K. Singh, 1997 (GHNP, Kullu ) B.S. Rana 1992-96 (Lahual Spiti), H.P. , Located at Gechang, Kinlung Nala, Mudh, Sagram; Altitude (4000-4200m), August , September, during 1992-96
Threats	Harvest for medicine (Hm), human interference (I), Loss of habitat (L), over exploitation (Ov)
Trade	Local to National – rhizomes. Mixed with <i>Bergenia ligulata</i> (Wall.) Engl. Used in Ayurvedic medicines.
Other comments	-
Status	
- IUCN	VU- JMK, HP
- Criteria based on	PR
- CITES	No
- IWPA (1972; 91)	No
- National legislation	No
Recommendations	
- Research management	Survey (S), Scientific harvesting and habitat management (Hm), Monitoring (M)
- P.H.V.A	Yes
Cultivation prog. recommendations	
- Cultivation	Level 2
- Level of difficulty	Least difficulty ( level 1)
Existing cultivation	
- No. of facilities	Chashmashahi garden, Srinagar, Kashmir. ( Y.K. Sarin)
Sources	B. S. Rana Long Term Vegetation Monitoring Project In Pin Valley National Park, Spiti, 1993-96
Compilers	Y.K. Sarin , M.V. Vishwanathan, O.P. Sharma, Jen Van der Waals, Nima Manjrekar, Amchi Tsering Phuntsog.
Reviewers	N.S. Chauhan, H.K. Badola, C.P.Kala, Sanjay K. Singh, S.K.Guleria, R.K. Gupta, S.D. Sharma, M.C. Nautiyal, P.B. Singh, Brijljal, T.R. Vinod. Sanjeeva Pandey, B.C.Thakur,B.S. Rana, V.Tandon, D.K. Ved

## Taxon Data Sheet

<b>Species ( &amp; Synonyms)</b>	<i>Dactylorhiza hatagirea</i> (D.Don.) Soo (= <i>Orchis latifolia</i> auct. non.Linn)
<b>Vernacular Name</b>	HATH PANJA/ SALAM PANJA, HATHAJARI (Kullu)
<b>Family</b>	ORCHIDACEAE
<b>Taxonomic status</b>	Species
<b>Habit</b>	Perennial herb
<b>Habitat</b>	Shrubberies, open slopes, well watered high altitude valleys, Alpine meadows
<b>Original global distribution</b>	Himalaya in PAK, JMK, HP, UP, NEP, China, and Europe (= <i>Orchis latifolia</i> auct. non. Linn), N.Africa, Atlantic, Temperate Asia
<b>Current regional distribution</b>	JMK, HP, UP
- Elevation (m)	2800 – 4000
- Range (km <sup>2</sup> )	5001 to 20,000
- Area occupied (km <sup>2</sup> )	>2000
- No. of locations	4 in JMK, 3 in HP
<b>Population trends</b>	
- % Decline	> 80 (JMK , HP)
- Time/ rate (years or generations)	10 years
- No. of mature individuals	Not assessed
<b>Global population</b>	Not assessed
<b>Regional population</b>	Not assessed
<b>Data quality</b>	General field study (2), informal field sightings (3), Indirect information (4)
<b>Recent field studies</b>	Nima Manjrekar, Pin Valley 1997, B.K. Kapahi, T.N. Srivastava, RRL, Jammu Chauhan N.S., 1992, 1994, 1997; S. K. Singh, 1997 (GHNP), C. P. Kala (97-98) GHNP. B. S. Rana, Lahul Spiti. Location –Shego, Rangrik, Godhal. Altitude 3800-4000m, August 1994, September 1995
<b>Threats</b>	Harvest for medicine (Hm), loss of habitat due to Fragmentation (Lf), over exploitation (Ov)
<b>Trade</b>	National and Global, rhizomes traded as SALAM PUNJA, Imported.
<b>Other comments</b>	Tissue culture studies under progress at CSIR Palampur & Research station at Bhowali. Ban on wild collection recommended Urgently (Lucknow CAMP, 1997) Tuberous roots are used as tonic, aphrodisiac, salip
<b>Status</b>	
- IUCN	CR- JMK, HP
- Criteria based on	PR
- CITES	No
- IWPA (1972; 91)	No
- National legislation	First Negative List of Exports, 1994; PN 47/92-98 Collection regulated by HP State Forest Department
<b>Recommendation</b>	
- Research management	Monitoring (M), in situ and ex situ conservation needed
- P.H.V.A	Yes
<b>Cultivation prog. recommendations</b>	
- Cultivation	Level 2
- Level of difficulty	Very difficulty ( level 3)
<b>Existing cultivation</b>	
- No. of facilities	Harki Doon valley, Garhwal under trial since 1990. Cultivation trial of <i>Dactylorhiza</i> at RHRSS, Tabo, Spiti, Himachal Pradesh, by NS Chauhan 1997; Grown in nursery & planted in forest plantations in Sikkim (V.Tandon 11/97) Experiment on cultivation is being carried out in the buffer zone of Valley of Flowers National Park by ICIMOD (CPKala98)
<b>Sources</b>	C. P. Kala, 1998. Ethnobotanical Survey & propagation of rare Medicinal herbs in the buffer zone of valley of Flowers National Park. Report submitted to ICIMOD, Nepal. 35p.p B. S.Rana Long Term Vegetation Monitoring Project In Pin Valley National Park, Spiti, 93-96
<b>Compilers</b>	Y.K. Sarin, M. V. Vishwanathan, O. P. Sharma, Jen Van der Waal, Nima Manjrekar, Amchi Tsering Phuntsog.
<b>Reviewers</b>	N.S. Chauhan, H.K. Badola, C.P. Kala, Sanjay K. Singh, MC. Nautiyal, P.B. Singh, Brijlal, T.R. Vinod, Sanjeeva Pandey, B.C. Thakur, B.S. Rana, V. Tandon, D.K. Ved, S.K. Guleria, R.K. Gupta, S.D. Sharma

## Taxon Data Sheet

Species ( & Synonyms)	<i>Ephedra gerardiana</i> Wall ex Stapf. ( <i>E. vulgaris</i> auct non Rich.)
Vernacular Name	SUTCHUR/ SOMALATA (Kullu)
Family	EPHEDRACEAE
Taxonomic status	Species
Habit	Perennial under-shrub
Habitat	Dry riverine, dry temperate and alpine sandy / rocky slopes
Original global distribution	Himalaya in AFG, JMK, HP, UP, NEP, Bhutan, Tibet
Current regional distribution	JMK, HP
- Elevation (m)	3000 – 4800
- Range (km <sup>2</sup> )	5001 to 20,000
- Area occupied (km <sup>2</sup> )	Not assessed
- No. of locations	3 in JMK , many in HP
Population trends	
- % Decline	>50 in JMK, > 20 in HP
- Time/ rate (years or generations)	10 years
Number of mature individuals	Not assessed
Global Population	Not assessed
Regional Population	Declining
Data quality	General field studies (2), informal field sightings ( 3), Indirect information (4)
Recent field studies	Cold desert plants, Volume I, O. P. Chaurasia, FRL, Leh Chauhan N.S, 1992 (Lahul –Spiti and Kinnaur), Nima Manjrekar 2997 (WII)- Pin Valley, Spiti, HP, B. S. Rana 1993-96, Lahul spiti, Vegetation Monitoring Project , Pin Valley National Park , Spiti
Threats	Harvest (H), harvest for market (Hm),over exploitation (Ov), Trade of plant/ plant parts (Tp)
Trade	National / Global, twigs and roots traded as SOMA / SOMALATA. <i>E. intermedia</i> Schrenk et Mey. is an adulterant
Other comments	In Rampur Forest Circle of HP it extraction for trade. Is allowed in area on rotational basis with a 3-4 year. Cycle. (V. Tandon 4/98) In Pooh Division of Kinnaur district , HP, five years cultivation Practice based on felling and collection cycle is undertaken. (B. S. Rana, 1998) Scientific harvesting and sustainable harvesting needed. Twigs have Ephedrine. Used for cough syrups
Status	
- IUCN	EN- JMK; VU- HP
- Criteria based on	PR
- CITES	No
- IWPA (1972; 91)	No
- National legislation	Negative List of Exports, 1994; Public Notice No. 47 (PN) / 92- 97
Recommendations	
- Research management	Monitoring (M), Habitat management (Hm), in-situ Conservation and sustainable harvesting
- P.H.V.A	Yes
Cultivation prog. recommendations	
- Cultivation	Level 2
- Level of difficulty	Moderately difficult ( level 2)
Existing cultivation	
- No. of facilities	Studies on the growth and yield potential of <i>E. gerardiana</i> in Tabo, Spiti Valley by N. S. Chauhan, Y. S. Parmar, University of Horticulture and Forestry, Nauni, Solan, HP
Sources	B. S. Rana Long Term Vegetation Monitoring Project In Pin Valley National Park, Spiti, 1993-96
Compilers	Y.K. Sarin , M. V. Vishwanathan, O. P. Sharma, Jen Van der Waals, Nima Manjrekar , Amchi Tsering Phuntsog.
Reviewers	N.S. Chauhan, H.K.Badola, C.P.Kala, D. K.Ved, Sanjay K.Singh, S.K. Guleria,R.K.Gupta,V.Tandon, S.D. Sharma, M.C.Nautiyal, P.B.Singh, Brijlal, T.R. Vinod, Sanjeeva Pandey, B.C. Thakur, B.S. Rana

## Taxon Data Sheet

<b>Species ( &amp; Synonyms)</b>	<i>Ferula jaeschkeana</i> Vatke
<b>Vernacular Name</b>	-
<b>Family</b>	APIACEAE
<b>Taxonomic status</b>	Species
<b>Habit</b>	Perennial herb
<b>Habitat</b>	Sub- alpine cultivated tracts Temperate desert to cold desert areas, dry alpine slopes
<b>Original global distribution</b>	Himalaya in AFG, TKM, PAK, JMK, HP, and Temperate Asia, Iran
<b>Current regional distribution</b>	JMK, HP
- Elevation (m)	2800-3800
- Range (km <sup>2</sup> )	5001 to 20000
- Area occupied (km <sup>2</sup> )	Not assessed
- No. of locations	4 in JMK, 7 in HP
<b>Population trends</b>	
- % Decline	> 20 (JMK, HP)
- Time/ rate (years or generations)	10 years
<b>Number of mature individuals</b>	Not assessed
<b>Global population</b>	Not assessed
<b>Regional population</b>	General decline
<b>Data quality</b>	General field studies (2), informal field sightings (3), Indirect information (4)
<b>Recent field studies</b>	<i>Ferula jaeschkeana</i> in India, Perfumery, Essential oil Records in 1991 by B.K. Kapahi & Y.K. Sarin, RRL, Jammu. Chauhan N.S(Lahul –Spiti, Kinnaur), S. K. Singh, GHNP. Nima Manjrekar 2997 (WII)- Pin Valley, Spiti, HP. B. S. Rana Lahul Spiti 1993-96, Pin Valley. Location-Kee, Gete Altitude 4000-4200m, 1993, August.
<b>Threats</b>	Harvest (H), loss of habitat (L), Harvest for market (Hm), Human interference (I), Over exploitation (Ov)
<b>Trade</b>	Global, roots (KAINDAL). Steam distillation for oil Extraction. Exported
<b>Other comments</b>	Uprooting from agricultural fields by farmers should be minimised & such wildings should be rehabilitated elsewhere by appropriate agency.
<b>Status</b>	
- IUCN	VU- JMK, HP
- Criteria based on	PR
- CITES	No
- IWPA (1972; 91)	No
- National legislation	No
<b>Recommendations</b>	
- Research management	Survey (S), monitoring (M), habitat management (Hm) Supported by captive cultivation
- P.H.V.A	Yes
<b>Cultivation prog. recommendations</b>	
- Cultivation	Level 1 & level 2
- Level of difficulty	Moderately difficult ( level 2)
<b>Existing cultivation</b>	
- No. of facilities	Not known
<b>Sources</b>	Not known
<b>Compilers</b>	Y.K. Sarin , M.V. Vishwanathan, O.P. Sharma, Jen Van der Waals, Nima Manjrekar , Amchi Tsering Phuntsog.
<b>Reviewers</b>	N.S. Chauhan, H.K. Badola, C.P.Kala, Sanjay K. Singh, S.K. Guleria, R.K. Gupta, S.D. Sharma, M.C. Nautiyal, P.B. Singh, Brijlal, T.R. Vinod, Sanjeeva Pandey, B.C. Thakur, B.S. Rana, D. K. Ved, V. Tandon

## Taxon Data Sheet

Species ( & Synonyms)	<i>Ferula narthex</i> Boiss.
Vernacular Name	-
Family	APIACEAE
Taxonomic status	Species
Habit	Perennial herb
Habitat	Sub-alpine slopes
Original global distribution	Endemic to Gilgit in JMK
Current regional distribution	
- Elevation (m)	Above 3000
- Range (km <sup>2</sup> )	< 100
- Area occupied (km <sup>2</sup> )	Not assessed
- No. of locations	Not assessed
Population trends	
- % Decline	Not known
- Time/ rate (years or generations)	Not known
- No. of mature individuals	Not assessed
Global population	Not assessed
Regional population	Not assessed
Data quality	General field studies (2), informal field sightings (3), Indirect information (4)
Recent field studies	Not known
Threats	Over exploitation (Ov), loss of habitat (L)
Trade	National , global
Other comments	Non availability of "LADAKHIHING ", obtained from this plant Suggests that the plant may be almost extinct. No fresh collection made during last 50 years.
Status	
- IUCN	DD- JMK, NE- HP
- Criteria based on	-
- CITES	No
- IWPA (1972; 91)	No
- National legislation	No
Recommendations	
- Research management	Survey (S)
- P.H.V.A	-
Cultivation prog. recommendations	
- Cultivation	Pending (P)
- Level of difficulty	-
Existing cultivation	
- No. of facilities	Not known
Sources	Personal communications, Y. K. Sarin, RRL Jammu
Compilers	Y.K. Sarin , M.V. Vishwanathan, O.P. Sharma, Jen Van der Waals, Nima Manjrekar, Amchi Tsering Phuntsog.
Reviewers	N.S. Chauhan, H.K. Badola, C.P.Kala, D.K. Ved, Sanjay K. Singh, S.K. Guleria, R.K. Gupta, S.D. Sharma, V.Tandon, . M.C. Nautiyal, P.B. Singh, Brijlal, T.R. Vinod, Sanjeeva Pandey, B.C. Thakur, B.S. Rana

## Taxon Data Sheet

<b>Species ( &amp; Synonyms)</b>	<i>Fritillaria roylei</i> Hook.
<b>Vernacular Name</b>	SALAM MISHARI ( Kullu )
<b>Family</b>	LILIACEAE
<b>Taxonomic status</b>	Species
<b>Habit</b>	Perennial bulbous herb
<b>Habitat</b>	Sub-alpine - alpine meadows
<b>Original global distribution</b>	Himalaya in PAK, JMK, HP, UP, Tibet
<b>Current regional distribution</b>	JMK, HP, UP
- Elevation (m)	2800- 4000
- Range (km <sup>2</sup> )	5001 to 20000
- Area occupied (km <sup>2</sup> )	Not assessed
- No. of locations	2 in JMK, 10 in HP
<b>Population trends</b>	
- % Decline	> 80 (JMK) > 50 (HP)
- Time/ rate (years or generations)	10 years
- No. of mature individuals	Not assessed
<b>Global population</b>	Not assessed
<b>Regional population</b>	Declining
<b>Data quality</b>	General field studies (2), informal field studies (3), Indirect information (4)
<b>Recent field studies</b>	University of Horticulture and Forestry, Solan (HP) & GHNP, Kullu, S. K. Singh, 1998
<b>Threats</b>	Loss of habitat (L), over exploitation (Ov) Human interference (I), loss of habitat due to fragmentation(Lf)
<b>Trade</b>	Local and regional. Bulbs traded as KSHEERA KAKOLI, LAHSONIA SALAP.
<b>Other comments</b>	Recognised as one of the controverwial "Ashtavarga" Group of Ayurvedic drugs used in the well known formulation of Chyavanprash
<b>Status</b>	
- IUCN	CR- JMK, EN- HP
- Criteria based on	PR, EO
- CITES	No
- IWPA (1972; 91)	No
- National legialation	No
<b>Recommendations</b>	
- Research management	Survey (S), habitat management (Hm), monitoring (M) & In-situ conservation
- P.H.V.A	Yes
<b>Cultivation prog. recommendations</b>	
- Cultivation	Level 2
- Level of difficulty	Moderately difficult ( level 2)
<b>Existing cultivation</b>	
- No. of facilities	Not known
<b>Sources</b>	Not known
<b>Compilers</b>	Y.K. Sarin , M.V. Vishwanathan, O.P. Sharma, Jen Van der Waals, Nima Manjrekar , Amchi Tsering Phuntsog.
<b>Reviewers</b>	N.S. Chauhan, H.K. Badola, C.P.Kala, Sanjay K. Singh, S.K. Guleria, R.K. Gupta, S.D. Sharma, . M.C. Nautiyal, P.B. Singh, Brijlal, T.R. Vinod, Sanjeeva Pandey, B.C. Thakur, B.S. Rana, D. K. Ved, V. Tandon



## Taxon Data Sheet

Species ( & Synonyms)	<i>Gentiana kurroo</i> Royle.
Vernacular Name	KARU/ TIKTA (Spiti)
Family	GENTIANACEAE
Taxonomic status	Species
Habit	Perennial herb
Habitat	Grassy meadows, rocky slopes, sub temperate to sub-alpine regions
Original global distribution	Himalaya in PAK, JMK, HP, UP, NEP
Current regional distribution	JMK, HP, UP
- Elevation (m)	1800-4200 in HP, 1500-3200 in JMK
- Range (km <sup>2</sup> )	>20,000
- Area occupied (km <sup>2</sup> )	>2000
- No. of locations	15 in JMK, 13 in HP
Population trends	
- % Decline	> 50 (HP) and > 80 (JMK)
- Time/ rate (years or generations)	10 years
- No. of mature individuals	Not assessed
Global population	Not assessed
Regional population	Continuing rapid decline in population
Data quality	General field studies (2), informal field sightings (3), Indirect information (4)
Recent field studies	Singh P.B., HP, 1986-96, Kaul M.K., JMK, 1980-83, University of Horticulture and Forestry, Nauni, Solan, Chauhan N. S. 1992, Kinnaur
Threats	Loss of habitat due to fragmentation (Lf), Over exploitation (Ov), catastrophic events (S), fire (Sf)
Trade	National, global , roots/ rhizome or entire plant used;Trade name is KARU.
Other comments	Roots have bitter principles which is used in Liver protective drugs
Status	
- IUCN	CR-JMK, EN-HP
- Criteria based on	PR
- CITES	Not currently listed but proposed for Appendix II ( CITES –Guide To Plants In Trade, 1994)
- IWPA (1972; 91)	-
- National legislation	Negative List of Exports, 1994; Public Notice No. 47 (PN) / 92- 97
Recommendations	
- Research management	Survey (S), habitat management (Hm), life history studies (Lh), Monitoring (M) , ex situ and in situ conservation followed by Cultivation.
- P.H.V.A	Yes
Cultivation prog. recommendations	
- Cultivation	Level 2
- Level of difficulty	Moderately difficult ( level 2)
Existing cultivation	
- No. of facilities	Not known
Sources	Gentianaceae of N.W. Himalaya by Sunita Garg 1980, BSI, Dehradun
Compilers	Y.K. Sarin , M.V. Vishwanathan, O.P. Sharma, Jen Van der Waals, Nima Manjrekar, Amchi Tsering Phuntsog.
Reviewers	N.S.Chauhan, H.K.Badola,C.P.Kala,Sanjay K.Singh, S.K.Guleria, R.K.Gupta, S.D. Sharma, M.C. Nautiyal,P.B. Singh, Brijlal,T.R.Vinod, Sanjeeva Pandey, B.C. Thakur, B.S. Rana, D.K.Ved, V. Tandon

## Taxon Data Sheet

<b>Species ( &amp; Synonyms)</b>	<i>Selinum tenuifolium</i> Wall. ex DC. (= <i>S. candolleii</i> DC)
<b>Vernacular Name</b>	BHAIE ( Kullu )
<b>Family</b>	APIACEAE
<b>Taxonomic status</b>	Species
<b>Habit</b>	Perennial herb
<b>Habitat</b>	Alpine meadows, open slopes, shady slopes, temperate forests, nalas
<b>Original global distribution</b>	Himalaya in JMK, HP, UP, Burma
<b>Current regional distribution</b>	JMK, HP, UP
- Elevation (m)	2700 – 4000
- Range (km <sup>2</sup> )	> 20,000
- Area occupied (km <sup>2</sup> )	> 2000
- No. of locations	Many
<b>Population Trends</b>	
- % Decline	< 10 (JMK, HP)
- Time/ rate (years or generations)	10 years
- No. of mature individuals	Many
<b>Global population</b>	Not assessed
<b>Regional population</b>	Declining
<b>Data quality</b>	General field studies (2)
<b>Recent field studies</b>	P.B. Singh (90-98), B.S. Rana (90-98) HP, locations Khaminger, Pin valley National Park, altitude 4100m during August 1993. Brijlal (93-98), S. k. Singh, 1995- 98. Nima Manjrekar (WII) 1997- Pin valley, Spiti, HP
<b>Threats</b>	Loss of habitat (L)
<b>Trade</b>	Local –roots. All <i>Selinum</i> species roots are traded as BHUTAKESHI. Global-roots being exported to Japan
<b>Other comments</b>	-
<b>Status</b>	
- IUCN	LR-LC- JMK, HP
- Criteria based on	PR
- CITES	No
- IWPA (1972; 91)	No
- National legislation	No
<b>Recommendations</b>	
- Research management	Habitat management (Hm)
- P.H.V.A	No
<b>Cultivation prog. recommendations</b>	
- Cultivation	Level 3
- Level of difficulty	Least difficult (level 1)
<b>Existing cultivation</b>	
- No. of facilities	Not known
<b>Sources</b>	Singh P.B & D.S. Aswal 1992, Medicinal Plants of Himachal Pradesh used in Indian Pharmaceutical , BMEBR 13 172 –200
<b>Compilers</b>	M.C. Nautiyal, P.B. Singh, Brijlal, T.R. Vinod, Sanjeeva Pandey, B.C. Thakur, B.S. Rana
<b>Reviewers</b>	Y.K. Sarin , O.P. Sharma, Jen Van der Waals, Nima Manjrekar , Amchi Tsering Phuntsog, N.S. Chauhan, H.K. Badola, C.P.Kala, Sanjay K. Singh, S.K. Guleria, R.K. Gupta, S.D. Sharma, D. K. Ved, V. Tandon

**Note#** Followed the Flora of Lahul-Spiti, B.S. Aswal and Mehrotra, which gives *S. conifolium* (Wall. ex DC) Benth. & Hook. as the accepted name and the 2 other names as mentioned are synonymy

## Taxon Data Sheet

<b>Species ( &amp; Synonyms)</b>	<i>Selinum vaginatum</i> (Edgew) C.B. Clarke
<b>Vernacular Name</b>	BHOOTKESHI (Ladakh), BUTKESERI ( Kullu )
<b>Family</b>	APIACEAE
<b>Taxonomic status</b>	Species
<b>Habit</b>	Perennial herb
<b>Habitat</b>	Open sunny slopes, moist shady ravines and undulating alpine pastures
<b>Original global distribution</b>	Himalaya in JMK, HP, UP
<b>Current regional distribution</b>	JMK, HP, UP
- Elevation (m)	2800 – 4000
- Range (km <sup>2</sup> )	> 20000
- Area occupied (km <sup>2</sup> )	> 2000
- No. of locations	JMK (20), HP (15)
<b>Population trends</b>	
- % Decline	< 20 (JMK, HP)
- Time/ rate (years or generations)	10 years
- No. of mature individuals	Not assessed
<b>Global population</b>	Not assessed
<b>Regional population</b>	Declining
<b>Data quality</b>	General field studied (2)
<b>Recent field studies</b>	P.B. Singh HP, (1990-98), S. K. Singh, GHNP, Kullu. Chauhan N.S.1988-1997 (Chamba, Kullu, Kinnaur)
<b>Threats</b>	Los of habitat (L), trade of plant/plant parts (Tp)
<b>Trade</b>	Local, National (Roots) -All <i>Selinum</i> species are traded as BHUTAKESHI.
<b>Other comments</b>	Roots used for incense, beverages etc.
<b>Status</b>	
- IUCN	LR – LC – JMK, HP
- Criteria based on	PR, EO
- CITES	No
- IWPA (1972; 91)	No
- National legislation	No
<b>Recommendations</b>	
- Research management	Habitat management (Hm), ex situ conservation & cultivation .
- P.H.V.A	No
<b>Cultivation prog. recommendations</b>	
- Cultivation	Level 2, level 3
- Level of difficulty	Least difficult (level 1)
<b>Existing cultivation</b>	
- No. of facilities	Experimental cultivation at HAPPRC, Tunganath (UP) Only cultivated for demonstration in herbal garden of University of Horticulture and Forestry, Solan, (N.S.Chauhan)
<b>Sources</b>	-
<b>Compilers</b>	M.C. Nautiyal, P.B. Singh, Brijlal, M.V. Vishwanathan, T.R.Vinod, Sanjeeva Pandey, B.C. Thakur, B.S. Rana
<b>Reviewers</b>	Y.K. Sarin , O.P. Sharma, Jen Van der Waals, Nima Manjrekar , Amchi Tsering Phuntsog, N.S. Chauhan, H.K. Badola, C.P.Kala, Sanjay K. Singh, S.K. Guleria, R.K. Gupta, S.D. Sharma, D. K. Ved, V. Tandon

## Taxon Data Sheet

Species & synonyms	<i>Rheum australe</i> D. Don (= <i>Rheum emodi</i> Wall. Ex Meissn.) DOLU
Vernacular Name	(Garhwal), REWARCHINI/ CHUCHHI (Kullu) TUKSHU (Lahul & Spiti)
Family	POLYGONACEAE
Taxonomic status	Species
Habit	Perrenial herb
Habitat	Steep dry slopes, alpine alluvial slopes and temperate pastures/ moriane & rocky slopes.
Original global distribution	Himalaya in JMK, HP, UP, NEP, SK
Current regional distribution	JMK, HP, UP
- Elevation (m)	3000 to 4500 m
- Range (km <sup>2</sup> )	> 20000
- Area occupied (km <sup>2</sup> )	> 2000
- No. of locations	17 in HP, many in JMK
Population trends	
- % Decline	> 20 (JMK, HP)
- Time/rate (years or generations)	10 years
- No. of mature individuals	Not assessed
Global population	Not assessed
Regional population	Declining
Data quality	General field study (2), field collections/ surveys
Recent field studies	P.B. Singh (HP), 1989-98, Brijlal, 1993-98, Rana, B.S (HP), Pin Valley National Park, 1992-96 Chauhan N.S. (1971-1997) C. P. Kala (GHNP) 1997
Threats	Trade for plant /plant parts (Tp), loss of habitat (L), Human interference (I)
Trade	National, global, roots are traded as REVANDCHINI / CHUCHHI
Other comments	Roots have Anthraquinone derivatives. Used in Unani, Ayurvedic medicine
Status	
- IUCN	VU-JMK, HP
- Criteria based on	PR, EO
- CITES	-
- IWPA (1972; 91)	-
- National legislation	Negative List of Exports, 1994; Public Notice No. 47 (PN) / 92- 97
Recommendations	
- Research management	Habitat Management (Hm), regulated trade, conservation, Captive cultivation, survey (S), monitoring (M)
- P.H.V.A	Yes
Cultivation prog. recommendations	
- Cultivation	Level 2
- Level of difficulty	Moderate difficulty ( level 2)
Existing cultivation	
- No. of facilities	Experimental cultivation at HAPPRC, Garhwal, UP. Experimental cultivation in the buffer zone of Valley of Flowers National Park, ICIMOD, Nepal. (C. P. Kala)
Sources	Published research papers on multiplication and cultivation Preliminary information available with University of Horticulture and Forestry, Solan. Chauhan N.S. 1997, Final report, DDP, Spiti. Literature to be furnished by M.V. Vishwanathan, New Delhi. C.P. Kala, 1998. Ethanobotanical Survey and propagation of rare medicinal herbs in the buffer zone of Valley of Flowers National Park. Report Submitted to ICIMOD, Nepal. 35p.p B. S. Rana Long Term Vegetation Monitoring Project In Pin Valley National Park, Spiti, 1993-96
Compilers	M.C. Nautiyal, P.B. Singh, Brijlal, M.V. Vishwanathan, T.R. Vinod, Sanjeeva Pandey, B.C. Thakur, B.S. Rana
Reviewers	Y.K. Sarin, O.P. Sharma, Jen Van der Waals, Nima Manjrekar, Amchi Tsering Phuntsog, N.S. Chauhan, H.K. Badola, C.P. Kala, Sanjay K. Singh, S.K. Guleria, R.K. Gupta, S.D. Sharma, D. K. Ved, V. Tandon

## Taxon Data Sheet

Species ( & Synonyms)	<i>Saussurea costus</i> (Falc.) Lipsch (= <i>Saussurea lappa</i> (Decne.) Sch.-Bip.)
Vernacular Name	KUTH/ KAT (Garhwal)
Family	ASTERACEAE
Taxonomic status	Species
Habit	Perennial herb
Habitat	Moist slidy slopes, low rainfall area, dry temperate area
Original global distribution	Himalaya in PAK, JMK, HP, UP
Current regional distribution	JMK, HP, UP
- Elevation (m)	2400 - 3500
- Range (km <sup>2</sup> )	5001 to 20000
- Area occupied (km <sup>2</sup> )	<1000
- No. of locations	Udhampur district in JMK Cultivated in HP (Many)
Population trends	
- % Decline	> 80 (JMK)
- Time/ rate (years or generations)	10 years
- No. of mature individuals	Not assessed
Global population	Not assessed
Regional population	Declining rapidly in restricted and severely fragmented areas
Data quality	General field study (2) for cultivation
Recent field studies	B.S. Rana, 1988-95, Lahul (HP), B.C. Thakur, Brijlal (HP)
Threats	Trade for plant parts (Tp), loss of habitat (L)
Trade	National, Global – Root is traded as KUTH. Roots of <i>Inula royleana</i> DC. <i>Inula racemosa</i> Hook. f. and <i>Carduus nutans</i> L. are found as adulterants in the market sample ( Y.K.Sarin) Roots have essential oil
Other comments	Harvested for medicine; only cultivated in HP (Lahul) Conservation and cultivation on large scale required Along with market support. It is recorded as Endangered In Red Data Book of Indian Plants, Vol. 2, 1990. Wild occurrence in HP is questionable.
Status	
- IUCN	CR-JMK, NE-HP
- Criteria based on	PR, EO
- CITES	Appendix I
- IWPA (1972: 91)	No
- National legislation	First Negative List of Exports, 1994, Public Notice No.47 (PN) / 92- 97
Recommendations	
- Research management	Habitat management (Hm), regulated trade Survey (S), monitoring (M)
- P.H.V.A	Yes
Cultivation prog. recommendations	
- Cultivation	Level 2
- Level of difficulty	Less difficult ( level 1)
Existing cultivation	
- No. of facilities	Cultivation for commercial purpose (JMK, HP), Cultivation in Kashmir and Lahul Herbal demonstration farm in Barsu, Uttar Kashi, UP, Himachal Pradesh (Lucknow CAMP 1997)
Sources	University of Horticulture and Forestry, Solan, Annual Report, 1990-1994
Compilers	M.C. Nautiyal, P.B. Singh, Brijlal, T.R. Vinod, Sanjeeva Pandey, B.C. Thakur, B.S. Rana
Reviewers	Y.K. Sarin, O.P. Sharma, Jen Van der Waals, Nima Manjrekar, Amchi Tsering Phuntsog, N.S. Chauhan, H.K. Badola, C.P. Kala, Sanjay K. Singh, S.K. Guleria, R.K. Gupta, S.D. Sharma, D. K. Ved, V. Tandon

## Taxon Data Sheet

<b>Species &amp; synonyms</b>	<i>Malaxis muscifera</i> (Lindley) Kuntze. (= <i>Microstylis muscifera</i> (Lindl.) Ridl.)
<b>Vernacular Name</b>	-
<b>Family</b>	ORCHIDACEAE
<b>Taxonomic status</b>	Species
<b>Habit</b>	Annual Herb
<b>Habitat</b>	Alpine and sub-alpine on meadows
<b>Original global distribution</b>	Himalaya in AFG, JMK, HP, UP, SK, BHU, China
<b>Current regional distribution</b>	JMK, HP, UP
- Elevation (m)	2800- 4400
- Range (km <sup>2</sup> )	> 20000
- Area occupied (km <sup>2</sup> )	>2000
- No. of locations	Many/ fragmented
<b>Population trends</b>	
- % Decline	> 20 (JMK, HP)
- Time/ rate (years or generations)	10 years
- No. of mature individuals	Not assessed
<b>Global population</b>	Not assessed
<b>Regional population</b>	Declining
<b>Data quality</b>	General field study (2)
<b>Recent field studies</b>	P.B. Singh (HP), Chauhan N.S. 1992
<b>Threats</b>	Habitat loss (L), loss of habitat due to exotic animals (La), Trade of plant /plant parts (Tp), harvest for medicine (Hm)
<b>Trade</b>	Regional/ National –bulbs.
<b>Other comments</b>	Recognised as a source of Ayurvedic drug “ RSHABHA belonging to The well known “ ASHTAVARGA” group used in the preparation of many Ayurvedic formulation including Chyavanprash
<b>Status</b>	
- IUCN	VU- JMK, HP
- Criteria based on	PR
- CITES	No
- IWPA (1972; 91)	No
- National legislation	No
<b>Recommendations</b>	
- Research management	Habitat management (Hm), life history studies (Lh), Survey (S), monitoring (M)
- P.H.V.A	Yes
<b>Cultivation prog. recommendations</b>	
- Cultivation	Level 1
- Level of difficulty	Very difficult ( level 3)
<b>Existing cultivation</b>	
- No. of facilities	Not known
<b>Sources</b>	Singh P. B. and B. S. Aswal 1992, Medicinal plants of HP Used in Indian Pharmaceutical Industry 13 172-208 p
<b>Compilers</b>	M.C. Nautiyal, P.B. Singh, Brijlal T.R. Vinod, Sanjeeva Pandey, B.C. Thakur, B.S. Rana
<b>Reviewers</b>	Y.K. Sarin , O.P. Sharma, Jen Van der Waals, Nima Manjrekar , Amchi Tsering Phuntsog, N.S. Chauhan, H.K. Badola, C.P.Kala, Sanjay K. Singh, S.K. Guleria, R.K. Gupta, S.D. Sharma, D. K. Ved, V. Tandon

## Taxon Data Sheet

<b>Species (&amp; synonyms)</b>	<i>Saussurea obvallata</i> (DC.) Edgew
<b>Vernacular Name</b>	BRAHMAKAMAL (Garhwal)/ PANGCHI (Lahul and Spiti, Tibet)
<b>Family</b>	ASTERACEAE
<b>Taxonomic status</b>	Species
<b>Habit</b>	Perennial herb
<b>Habitat</b>	Humus rich, glaciated morianes, alpine rocky slopes
<b>Original global distribution</b>	Himalaya in PAK, JMK, HP, UP, NEP, SK, Bhutan, AP, Burma, Tibet
<b>Current regional distribution</b>	JMK, HP, UP
- Elevation (m)	3600 –5500
- Range (km <sup>2</sup> )	> 20000
- Area occupied (km <sup>2</sup> )	> 2000
- No. of locations	10 in HP, 1 in JMK
<b>Population Trends</b>	
- % Decline	> 20 (JMK, HP)
- Time/ rate (years or generations)	10 years
- No. of mature individuals	Not assessed
<b>Global population</b>	Not assessed
<b>Regional population</b>	Declining and occurrences is restricted.
<b>Data quality</b>	General field studies (2), informal field sightings (3)
<b>Recent field studies</b>	Sanjeeva Pandey ,GHNP (1995-98), Chauhan N.S. 1992, 1994, 1997, Cold Desert Plants by O.P. Chaurasia, 1997 C.P. Kala (1993- 1997), UP Hills and GHNP
<b>Threats</b>	Human interference (I), over exploitation (Ov), loss of habitat ( L)
<b>Trade</b>	Local, flowers and roots.
<b>Other comments</b>	Exploitation for religious purpose. Locals exploit this plant for their festival offerings at shrines (Badrinath, Kedarnath, Gangotri). Inflorescence attractive and plucked by tourists. 1g of powder is prescribed to cure insanity by the locals. (Lucknow CAMP 1997)
<b>Status</b>	
- IUCN	VU-JMK, HP
- Criteria based on	PR
- CITES	No
- IWPA (1972; 91)	No
- National legislation	No
<b>Recommendations</b>	
- Research management	Survey (S), monitoring (M), habitat management (Hm)
- P.H.V.A	Yes
<b>Cultivation Prog. recommendations</b>	
- Cultivation	Level 1
- Level of difficulty	Very difficult (3)
<b>Existing Cultivation</b>	
- No. of facilities	Experimental cultivation at HAPPRC, Tunganath (UP)
<b>Sources</b>	Not known
<b>Compilers</b>	M.C. Nautiyal, P.B. Singh, Brijlal, T.R. Vinod, Sanjeeva Pandey, B.C. Thakur, B.S. Rana
<b>Reviewers</b>	Y.K. Sarin, O.P. Sharma, Jen Van der Waals, Nima Manjrekar, Amchi Tsering Phuntsog, N.S. Chauhan, H.K. Badola, C.P.Kala, Sanjay K. Singh, S.K. Guleria, R.K. Gupta, S.D. Sharma, V. Tandon, D. K. Ved

## Taxon Data Sheet

<b>Species and synonyms</b>	<i>Hippophae rhamnoides</i> L.
<b>Vernacular Name</b>	AMOES (Garhwal), CHHARMA/ SARMA (Lahul and Spiti, Tibet)
<b>Family</b>	ELAEAGNACEAE
<b>Taxonomic status</b>	Species
<b>Habit</b>	Shrub / small tree
<b>Habitat</b>	Common on borders of glacial streams, inner drier region, Moist slopes, areas in river bed and fresh alluvial soil
<b>Original global distribution</b>	Himalaya in AFG, JMK, HP, UP, NEP, China and Temperate Asia
<b>Current regional distribution</b>	JMK, HP, UP
- Elevation (m)	3300 - 4500
- Range (km <sup>2</sup> )	> 20000
- Area occupied (km <sup>2</sup> )	Not assessed
- No. of locations	Many
<b>Population Trends</b>	
- % Decline	< 20 (JMK, HP)
- Time/ rate (years or generations)	10 years
- No. of mature individuals	Many
<b>Global population</b>	Not assessed
<b>Regional population</b>	Declining
<b>Data quality</b>	General field studies (2)
<b>Recent field studies</b>	C. P. Kala, 1997, GHNP, Nautiyal, P.B. Singh, Brijlal, B. S. Rana , Lahul Spiti, 1990-97, Souvenir 1995, Ladarcha .Location Entire Lahul Spiti 1990-96, altitude 3600- 4500m (1990-96) B.C. Thakur (Spiti), M. V. Viswanathan(1994-98); Nima Manjrekar (WII) 1997- Pin Valley, Spiti, HP
<b>Threats</b>	Loss of habitat (L), over exploitation (Ov)
<b>Trade</b>	Locally fruit is used-UP. Used as fuel wood. ISTARBU in folk Medicine. Local in JMK (Ladakh), and HP (Lahul)
<b>Other comments</b>	-
<b>Status</b>	
- IUCN	LR - NT- JMK, HP
- Criteria based on	PR
- CITES	No
- IWPA (1972; 91)	No
- National legislation	No
<b>Recommendations</b>	
- Research management	Habitat management (Hm), life history studies (Lh)
- P.H.V.A	Yes
<b>Cultivation prog. recommendations</b>	
- Cultivation	Cultivation programme (1)
- Level of difficulty	Least difficulty (1)
<b>Existing cultivation</b>	
- No. of facilities	Cold Desert Plants of Ladakh by O.P. Chaurasia, 1996, FRL, Leh. Cultivated in Spiti division, Lahul division and Pooh division of H.P. By seeds, cutting and root suckers
<b>Sources</b>	From literature, HPSCSTE, SBT Task Force Report
<b>Compilers</b>	M.C. Nautiyal, P.B. Singh, Brijlal, T.R. Vinod, Mr .Sanjeeva Pandey, B.C. Thakur, B. S. Rana Ladarcha Souvenir-1995-SBT-An Old Wine In New Bottle by B.S. Rana
<b>Reviewers</b>	Y.K. Sarin , O.P. Sharma, Jen Van der Waals, Nima Manjrekar , Amchi Tsering Phuntsog, N.S. Chauhan, H.K. Badola, C.P.Kala, Sanjay K. Singh, S.K. Guleria, R.K. Gupta, S.D. Sharma, D. K. Ved, V. Tandon



## Taxon Data Sheet

Species ( & Synonyms)	<i>Betula utilis</i> D.Don
Vernacular Name	BHOJPATRA (Kullu, Garhwal )
Family	BETULACEAE
Taxonomic status	Species
Habit	Tree
Habitat	Temperate alpine slopes and sub-alpine slopes
Original global distribution	Himalaya in AFG, PAK, JMK, HP, UP, NEP, SK, Bhutan, Tibet
Current regional distribution	JMK, HP, UP
- Elevation (m)	2800 - 3500 ( 3800m in the Valley of flowers , UP Hills)
- Range (km <sup>2</sup> )	> 20000
- Area occupied (km <sup>2</sup> )	> 2000
- No. of locations	10 in JMK, 10 in HP
Population trends	
- % Decline	>50 (JMK, HP)
- Time/ rate (years or generations)	3 generations(90 years)
Number of mature individuals	Not assessed
Global population	Not assessed
Regional population	Declining
Data quality	General field studies (2)
Recent field studies	P.B. Singh (1990-98), S. Pandey, B. S. Rana, Lahul Spiti, 1988-96, Cover Photo Indian Forester, March Issue 1996. C. Thakur, Brijlal (HP). Chauhan N.S.1971-1997. S. K. Singh, 1998, (GHNP, Kullu) and C. P. Kala, 1997 (GHNP, Kullu )
Threats	Climate (C), loss of habitat (L), over exploitation (Ov), fire (SF), Human interference (I) cut for fuel wood.
Trade	Local , National- bark (paper) , BHOJPATRA is traded
Other comments	Ex-situ conservation and habitat management. Used as fuel wood, Agriculture Implements, young shoots used as broom.
Status	
- IUCN	EN – JMK, HP
- Criteria based on	PR
- CITES	No
- IWPA (1972; 91)	No
- National legislation	No
Recommendations	
- Research management	Habitat management (Hm), life history studies (Lh), Survey (S)
- P.H.V.A	Yes
Cultivation prog. recommendations	
- Cultivation	Level I
- Level of difficulty	Moderate difficulty ( level 2)
Existing cultivation	
- No. of facilities	Not known
Sources	-
Compilers	M.C. Nautiyal, P.B. Singh, Brijlal, B. S. Rana T.R. Vinod, Sanjeeva Pandey, B. C. Thakur
Reviewers	Y.K. Sarin , O.P. Sharma, Jen Van der Waals, Nima Manjrekar , Amchi Tsering Phuntsog, N.S. Chauhan, H.K. Badola, C.P.Kala, Sanjay K. Singh, S.K. Guleria, R.K. Gupta, S.D. Sharma, D. K. Ved, V. Tandon

## Taxon Data Sheet

<b>Species ( &amp; Synonyms)</b>	<i>Polygonatum verticillatum</i> (L.) ALL. (= <i>Convallaria verticillata</i> L.)
<b>Vernacular Name</b>	SALAM MISRI (Kullu)
<b>Family</b>	LILIACEAE
<b>Taxonomic status</b>	Species
<b>Habit</b>	Perennial herb
<b>Habitat</b>	Moist grassy places , in forest shades, sub-alpine slopes
<b>Original global distribution</b>	Himalaya in AFG, PAK, JMK, HP, UP, SK, BHU, Temperate Asia, Tibet
<b>Current regional distribution</b>	JMK, HP, UP
- Elevation (m)	2000-3600
- Range (km <sup>2</sup> )	> 20000
- Area occupied (km <sup>2</sup> )	Not assessed
- No. of locations	3 in JMK , 18 in HP
<b>Population trends</b>	
- % Decline	> 20 (JMK, HP)
- Time/ rate (years or generations)	10 years
<b>Number of mature individuals</b>	Not assessed
<b>Global population</b>	Not assessed
<b>Regional population</b>	Rapid continuing decline
<b>Data quality</b>	General field studies (2)
<b>Recent field studies</b>	P.B. Singh (1990-98), M.C. Nautiyal (HP) Chauhan N.S. 1992; Singh S. K. , GHNP, Kullu, 1997
<b>Threats</b>	Loss of habitat (L), over exploitation (Ov)
<b>Trade</b>	Local, national, roots/rhizome, important component of ASTHAVARGA which is used in the preparation of Chavanprash
<b>Other comments</b>	-
<b>Status</b>	
- IUCN	VU- JMK, HP
- Criteria based on	PR
- CITES	No
- IWPA (1972; 91)	No
- National legislation	No
<b>Recommendations</b>	
- Research management	Cultivation with ex situ conservation , Habitat management(Hm), Life history studies(Lh)
- P.H.V.A	Yes
<b>Cultivation prog. recommendations</b>	
- Cultivation	Level 2
- Level of difficulty	Very difficulty (level 3)
<b>Existing cultivation</b>	
- No. of facilities	Not Known
<b>Sources</b>	Not known
<b>Compilers</b>	M.C. Nautiyal, P.B. Singh, Brijlal, T.R. Vinod, Sanjeeva Pandey, B.C. Thakur, B.S. Rana
<b>Reviewers</b>	Y.K. Sarin , O.P. Sharma, Jen Van der Waals, Nima Manjrekar , Amchi Tsering Phuntsog, N.S. Chauhan, H.K. Badola, C.P.Kala, Sanjay K. Singh, S.K. Guleria, R.K. Gupta, S.D. Sharma, V. Tandon, D. K. Ved

## Taxon Data Sheet

<b>Species (&amp; synonyms)</b>	<i>Polygonatum multiflorum</i> (L.) ALL.(= <i>Convallaria multiflora</i> L.)
<b>Vernacular Name</b>	SALAM MISHRI (Kullu)
<b>Family</b>	LILIACEAE
<b>Taxonomic status</b>	Species
<b>Habit</b>	Perennial herb
<b>Habitat</b>	Open grassy slopes,, forests shade/pastures
<b>Original global distribution</b>	Himalaya in PAK , JMK, HP, UP, Temperate Asia, Japan, Europe
<b>Current regional distribution</b>	JMK, HP, UP
- Elevation (m)	2800 – 4000
- Range (km <sup>2</sup> )	> 20000
- Area occupied (km <sup>2</sup> )	Not assessed
- No. of locations	Many in JMK and HP
<b>Population trends</b>	
- % Decline	> 20 (JMK, HP)
- Time/ rate (years or generations)	10 years
- No. of mature individuals	Many
<b>Global population</b>	Not assessed
<b>Regional population</b>	Not assessed
<b>Data quality</b>	General field studies (2)
<b>Recent field studies</b>	P.B. Singh (HP) 1990- 98
<b>Threats</b>	Loss of habitat (L), over exploitation (Ov), human interference (I)
<b>Trade</b>	Local, national ; Rhizome used in folk medicine (SKJ)
<b>Other comments</b>	Rhizomes used in indigenous medicine
<b>Status</b>	
- IUCN	VU –JMK, HP
- Criteria based on	PR
- CITES	No
- IWPA (1972; 91)	No
- National legislation	No
<b>Recommendations</b>	
- Research management	Habitat management (Hm), limiting factor research (Lr) Monitoring (M), survey (S)
- P.H.V.A	Yes
<b>Cultivation prog. recommendations</b>	
- Cultivation	Level 1
- Level of difficulty	Very difficult ( Level 3)
<b>Existing cultivation</b>	
- No. of facilities	Not known
<b>Sources</b>	Not known
<b>Compilers</b>	M.C. Nautiyal, P.B. Singh, Brijlal, T.R. Vinod, Sanjeeva Pandey, B.C. Thakur, B.S. Rana
<b>Reviewers</b>	Y.K. Sarin , O.P. Sharma, Jen Van der Waals, Nima Manjrekar , Amchi Tsering Phuntsog, N.S. Chauhan, H.K. Badola, C.P.Kala, Sanjay K. Singh, S.K. Guleria, R.K. Gupta, S.D. Sharma, D.K. Ved, V. Tandon

## Taxon Data Sheet

<b>Species ( &amp; Synonyms)</b>	<i>Rheum spiciforme</i> Royle
<b>Vernacular Name</b>	-
<b>Family</b>	POLYGONACEAE
<b>Taxonomic status</b>	Species
<b>Habit</b>	Perennial herb
<b>Habitat</b>	Alpine and sub-alpine slopes
<b>Original global distribution</b>	Himalaya in AFG, JMK, HP, UP, BHU, Tibet
<b>Current regional distribution</b>	JMK, HP, UP
- <b>Elevation (m)</b>	3000- 4800
- <b>Range (km<sup>2</sup>)</b>	> 20000
- <b>Area occupied (km<sup>2</sup>)</b>	Not assessed
- <b>No. of locations</b>	JMK (2), HP(3)
<b>Population trends</b>	
- <b>% Decline</b>	> 20 (JMK, HP)
- <b>Time/ rate (years or generations)</b>	10 years
- <b>No. of mature individuals</b>	Not assessed
<b>Global population</b>	Not assessed
<b>Regional population</b>	Declining
<b>Data quality</b>	General field studies (2)
<b>Recent field studies</b>	P.B. Singh (90-98), Brijlal (94-98), HP
<b>Threats</b>	Loss of habitat (L), harvest for food (Hf) and human interference (I)
<b>Trade</b>	Local, National, roots traded as REVAND-CHINI , Locally leaves are used.
<b>Other comments</b>	Needs attention because collected from wild.
<b>Status</b>	
- <b>IUCN</b>	VU- JMK , HP
- <b>Criteria based on</b>	PR
- <b>CITES</b>	No
- <b>IWPA (1972; 91)</b>	No
- <b>National legislation</b>	No
<b>Recommendations</b>	
- <b>Research management</b>	Habitat management (Hm), monitoring (M), Limiting factor research (Lr), Life history studies ( Lh)
- <b>P.H.V.A</b>	Yes
<b>Cultivation prog. recommendations</b>	
- <b>Cultivation</b>	Level 1
- <b>Level of difficulty</b>	Moderately difficult ( level 2)
<b>Existing cultivation</b>	
- <b>No. of facilities</b>	Not known
<b>Sources</b>	-
<b>Compilers</b>	M.C. Nautiyal, P.B. Singh, Brijlal, B.S. Rana T.R. Vinod, Sanjeeva Pandey, B.C. Thakur
<b>Reviewers</b>	Y.K. Sarin , O.P. Sharma, Jen Van der Waals, Nima Manjrekar , Amchi Tsering Phuntsog, N.S. Chauhan, H.K. Badola, C.P.Kala, Sanjay K. Singh, S.K. Guleria, R.K. Gupta, S.D. Sharma, D.K. Ved, V. Tandon

## Taxon Data Sheet

Species ( & Synonyms)	<i>Rheum webbianum</i> Royle
Vernacular Name	DOLU (Kullu)
Family	POLYGONACEAE
Taxonomic status	Species
Habit	Perennial herb
Habitat	Humus rich rocky slopes (moist), sub-alpine, alpine zone
Original global distribution	Himalaya in PAK, JMK, HP, UP, NEP
Current regional distribution	JMK, HP, UP
- Elevation (m)	2500 – 4300
- Range (km <sup>2</sup> )	> 20000
- Area occupied (km <sup>2</sup> )	Not assessed
- No. of locations	JMK(3) and HP(5)
Population trends	
- % Decline	> 20 (JMK, HP)
- Time/ rate (years or generations)	10 years
- No. of mature individuals	Not assessed
Global population	Not assessed
Regional population	Declining
Data quality	General field studies (2)
Recent field studies	B.S. Rana (Pin Valley NP, 1992-95) location- Gete, Chhit 1993-94, altitude-4200-4500m, Brijlal-Lahul and Spiti, HP P. B. Singh Lahul and Spiti, Mandi, B. C. Thakur, (1990-98) Lahul-Spiti, HP. Nima Manjrekar 1997 (WII) – Pin Valley, Spiti, HP
Threats	Loss of habitat (L), harvest for food (Hf), human interference (I)
Trade	Local /global (roots), REVANDCHINI is the trade name.
Other comments	-
Status	
- IUCN	VU- JMK, HP
- Criteria based on	PR
- CITES	No
- IWPA (1972; 91)	No
- National legislation	No
Recommendations	
- Research management	Habitat management (Hm), survey (S)
- P.H.V.A	Yes
Cultivation prog. recommendations	
- Cultivation	Level 1
- Level of difficulty	Moderate difficulty (Level 2)
Existing cultivation	
- No. of facilities	Not known
Sources	B. S. Rana Long Term Vegetation Monitoring Project In Pin Valley National Park, Spiti, 1993-96
Compilers	M.C. Nautiyal, P.B. Singh, Brijlal, T.R. Vinod, Sanjeeva Pandey, B.C. Thakur, B.S. Rana
Reviewers	Y.K. Sarin, O.P. Sharma, Jen Van der Waals, Nima Manjrekar, Amchi Tsering Phuntsog, N.S. Chauhan, H.K. Badola, C. P. Kala, Sanjay K. Singh, S.K. Guleria, R.K. Gupta, S.D. Sharma, D. K. Ved, V. Tandon

## Taxon Data Sheet

<b>Species &amp; synonyms</b>	<i>Rheum moorcroftianum</i> Royle
<b>Vernacular Name</b>	DOLYA (Garhwal)
<b>Family</b>	POLYGONACEAE
<b>Taxonomic status</b>	Species
<b>Habit</b>	Perennial Herb
<b>Habitat</b>	Humus rich rocky slopes
<b>Original global distribution</b>	Himalaya in JMK, HP, UP, NEP
<b>Current regional distribution</b>	JMK, HP, UP
- Elevation (m)	3500 – 4800
- Range (km <sup>2</sup> )	> 20000
- Area occupied (km <sup>2</sup> )	> 2000
- No. of locations	2 in JMK, 4 in HP
<b>Population trends</b>	
- % Decline	>20 (JMK, HP)
- Time/ rate (years or generations)	10 years
- No. of mature individuals	Many
<b>Global population</b>	Not assessed
<b>Regional population</b>	Not assessed
<b>Data quality</b>	General field studies (2)
<b>Recent field studies</b>	P.B.Singh (90-98) B.S. Rana (1990-98) HP. Locations Kibber , Chhit, Gechang. Altitude 4200-4500m August 93 and August 94 , Brijlal (1993-98), Lahul –Spiti Chauhan N.S., 1989, 1992, 1994, 1997, HP Nima Manjrekar 1997 (WII)- Pin Valley, Spiti, HP
<b>Threats</b>	Loss of habitat (L) , harvest for food (Hf), human interference (I)
<b>Trade</b>	Local / National. Roots traded as REVAND-CHINI.
<b>Other comments</b>	-
<b>Status</b>	
- IUCN	VU-JMK , HP
- Criteria based on	PR
- CITES	No
- IWPA (1972; 91)	No
- National legislation	No
<b>Recommendations</b>	
- Research management	Habitat management (Hm), monitoring (M), survey (S)
- P.H.V.A	Yes
<b>Cultivation prog. recommendations</b>	
- Cultivation	Level 1
- Level of difficulty	Moderately difficult ( level 2)
<b>Existing cultivation</b>	
- No. of facilities	Experimental cultivation at HAPPRC, Tunganath (UP)
<b>Sources</b>	B. S. Rana Long Term Vegetation Monitoring Project In Pin Valley National Park, Spiti, 1993-96
<b>Compilers</b>	M.C. Nautiyal, P.B. Singh, Brijlal, T.R. Vinod, Sanjeeva Pandey, B. C. Thakur, B. S. Rana
<b>Reviewers</b>	Y.K. Sarin , O.P. Sharma, Jen Van der Waals, Nima Manjrekar , Amchi Tsering Phuntsog, N.S. Chauhan, H.K. Badola, C.P.Kala, Sanjay K. Singh, S.K. Guleria, R.K. Gupta, S.D. Sharma, D. K. Ved, V. Tandon

## Taxon Data Sheet

<b>Species ( &amp; Synonyms)</b>	<i>Heracleum lanatum</i> Michx. (= <i>Heracleum candicans</i> Wall. ex DC)
<b>Vernacular Name</b>	PATISHAN ROOLI (Kullu), PADARA/ PATRALA (Lahul and Spiti)
<b>Family</b>	APIACEAE
<b>Taxonomic status</b>	Species
<b>Habit</b>	Perennial herb
<b>Habitat</b>	Temperate forest openings and alpine meadows
<b>Original global distribution</b>	Himalaya in AFG, PAK, JMK, HP, UP, AP, China
<b>Current regional distribution</b>	JMK, HP
- Elevation (m)	2500 – 4500
- Range (km <sup>2</sup> )	>20000
- Area occupied (km <sup>2</sup> )	>2000
- No. of locations	JMK(10), HP(18)
<b>Population trends</b>	
- % Decline	> 20 (JMK, HP)
- Time/ rate (years or generations)	10 years
- No. of mature individuals	Not assessed
<b>Global population</b>	Not assessed
<b>Regional population</b>	Declining
<b>Data quality</b>	General field studies (2)
<b>Recent field studies</b>	N. S. Chauhan, 1992; S. K. Singh, GHNP, Kullu, 1998
<b>Threats</b>	Human interference (I), loss of habitat due to fragmentation (Lf), Harvest (H)
<b>Trade</b>	National, roots are traded. It contains Xanthotoxin. Traded as PATISHAN ROOLI in North Indian markets.
<b>Other comments</b>	Both in situ and ex situ efforts are needed.
<b>Status</b>	
- IUCN	VU-JMK, HP
- Criteria based on	PR
- CITES	No
- IWPA (1972; 91)	No
- National legislation	No
<b>Recommendations</b>	
- Research management	Monitoring (M), habitat management (Hm), limiting factor Research (Lr), others- cultivation (O)
- P.H.V.A	Yes
<b>Cultivation prog. recommendations</b>	
- Cultivation	Level 2
- Level of difficulty	Least difficult (level 1)
<b>Existing cultivation</b>	
- No. of facilities	Agrotechnology developed , Jammu, RRL (Lucknow CAMP 1997) Y.S. Parmar , UHF, Solan M.K.Kaul, RRL, Jammu and Kashmir- Cultivation trials in Kashmir
<b>Sources</b>	Chauhan N.S., 1992, Commercial Medicinal and Aromatic Plants of HP, HPST, Simla; 171002; Chauhan N.S., 1997, Botanical Survey, Chemical Screening Cultivation of Medicinal Plants of Lahul and Spiti Final Project Report, submitted to Govt. of Himachal Pradesh
<b>Compilers</b>	N.S. Chauhan, H.K. Badola, C.P.Kala, Sanjay K. Singh, S.K. Guleria, R.K. Gupta, S.D. Sharma
<b>Reviewers</b>	Y.K. Sarin , O.P. Sharma, Jen Van der Waals, Nima Manjrekar , Amchi Tsering Phuntsog, M.C. Nautiyal, P.B. Singh, Brijlal, T.R. Vinod, Sanjeeva Pandey, B.C. Thakur, B.S. Rana, D. K. Vaid, V. Tandon

## Taxon Data Sheet

<b>Species ( &amp; Synonyms)</b>	<i>Meconopsis aculeata</i> Royle
<b>Vernacular Name</b>	TSHER- SNGON (Tibetan)
<b>Family</b>	PAPAVERACEAE
<b>Taxonomic status</b>	Species
<b>Habit</b>	Perennial herb
<b>Habitat</b>	Sub-alpine to alpine zone, pasture, rock- crevices.
<b>Original global distribution</b>	Himalaya in AFG, PAK, JMK, HP, UP
<b>Current regional distribution</b>	JMK, HP, UP
- Elevation (m)	3000 –4700
- Range (km <sup>2</sup> )	>20000
- Area occupied (km <sup>2</sup> )	>2000
- No. of locations	JMK (4), HP (15)
<b>Population trends</b>	
- % Decline	> 20 in HP, > 50 in JMK
- Time/ rate (years or generations)	10 years
- No. of mature individuals	Not assessed
<b>Global population</b>	Not assessed
<b>Regional population</b>	Rapid continuing decline in restricted and fragmented distribution
<b>Data quality</b>	General field study (2)
<b>Recent field studies</b>	N.S. Chauhan, 1992, HP (Kullu, Lahul - Spiti), Kinnaur, Chamba S. K. Singh, 1997, Great Himalayan National Park. Nima Manjrekar 1997 (WII)- Pin Valley, Spiti, HP
<b>Threats</b>	Loss of habitat (L), loss of habitat due to fragmentation (Lf) Harvest for food (Hm), human interference (I) In-situ conservation, scientific harvesting and management
<b>Trade</b>	Roots is used in Tibetan and folk medicine
<b>Other comments</b>	Highly scattered low density population
<b>Status</b>	
- IUCN	EN – JMK, VU- HP
- Criteria based on	PR
- CITES	No
- IWPA (1972; 91)	No
- National legislation	No
<b>Recommendations</b>	
- Research management	Habitat management (Hm)
- P.H.V.A	Yes
<b>Cultivation prog. recommendations</b>	
- Cultivation	Level 2
- Level of difficulty	Moderate difficult ( level 2)
<b>Existing cultivation</b>	
- No. of facilities	Experimental cultivation being carried out by Purohit in Srinagar University, Garhwal, UP
<b>Sources</b>	Survey report (unpublished) by N.S. Chauhan, Chamba; Singh S.K and Rawat G. S 1998. Long Term Monitoring Vegetation in GHNP
<b>Compilers</b>	N. S. Chauhan, H.K. Badola, C. P.Kala, Sanjay K. Singh, S.K. Guleria, R.K. Gupta, S.D. Sharma
<b>Reviewers</b>	Y.K. Sarin , O.P. Sharma, Jen Van der Waals, Nima Manjrekar , Amchi Tsering Phuntsog, M.C.Nautiyal, P.B. Singh, Brijlal T.R.Vinod, Sanjeeva Pandey, B.C. Thakur, B.S. Rana, D. K. Ved, V. Tandon



## Taxon Data Sheet

Species ( & Synonyms)	<i>Jurinea dolomiaea</i> Boiss. (= <i>Jurinea macrocephala</i> (Royle) Cl.)
Vernacular Name	DHOOP (Lahul and Spiti)
Family	ASTERACEAE
Taxonomic status	Species
Habit	Perennial herb
Habitat	Alpine pastures and meadows, open slopes, grassy slopes. Rocky situations (dry to semi dry) occurs as lithophyte
Original global distribution	Himalaya in PAK, JMK, HP, UP, NEP, China
Current regional distribution	JMK, HP, UP
- Elevation (m)	2100 – 4600
- Range (km <sup>2</sup> )	>20000
- Area occupied (km <sup>2</sup> )	>2000
- No. of locations	JMK (8), HP (11)
Population trends	
- % Decline	> 50 in JMK, > 20 in HP
- Time/ rate (years or generations)	10 years
- No. of mature individuals	Not assessed
Global population	Not assessed
Regional population	Not assessed
Data quality	General field studies (2), informal field sightings (3), Indirect information (4)
Recent field studies	S. K. Singh (GHNP) 1997-98, N. S. Chauhan (HP) 1985-97, Badola H.K (Kullu), 1994-97; C. P. Kala, (GHNP, Kullu ) 1997- 1998
Threats	Over exploitation (Ov), trade for plant/ plant parts (Tp)
Trade	Regional, national –roots-DHOOP. Products Agarbhathi and Dhup
Other comments	Scientific harvesting, habitat management, in situ conservation.
Status	
- IUCN	EN- JMK ;VU- HP
- Criteria based on	PR
- CITES	No
- IWPA (1972; 91)	No
National I Legislation	No
Recommendations	
- Research management	Survey (S), habitat management (Hm), monitoring (M), In-situ conservation, scientific harvesting and management
- P.H.V.A	Yes
Cultivation prog. recommendations	
- Cultivation	Level 2
- Level of difficulty	Moderate difficulty (level 2)
Existing cultivation	
- No. of facilities	Not known. Trial cultivation in Kashmir (JMK) and Spiti (HP)
Sources	Chauhan N.S, 1992 Commercial Medicinal and Aromatic plants of Himachal Pradesh Y.S.Parmar University of Horticulture and Forestry, H.P. Singh S.K. and Rawat G.S , 1998-Long term Monitoring of Vegetation in GHNP, report submitted to Wildlife Institute of India, Dehradun.
Compilers	N.S. Chauhan, H.K. Badola, C.P.Kala, Sanjay K. Singh, S.K. Guleria, R.K. Gupta, S.D. Sharma
Reviewers	Y.K. Sarin , O.P. Sharma, Jen Van der Waals, Nima Manjrekar , Amchi Tsering Phuntsog, M.C. Nautiyal, P.B. Singh, Brijlal, T.R. Vinod, Sanjeeva Pandey, B.C. Thakur, B.S. Rana, V. Tandon, D.K.Ved

## Taxon Data Sheet

Species (& synonyms)	<i>Nardostachys grandiflora</i> DC. (= <i>N. jatamansi</i> DC)
Vernacular Name	MASI, JATAMANSI (Garhwal), NAHANI/ BALCHAD/ NAHARU/
Family	VALERIANACEAE
Taxonomic status	Species
Habit	Herb
Habitat	Rocks, ledges, open slopes, alpine., sub-alpine
Original global distribution	Himalaya in HP, UP, NEP, SK, Bhutan, AP, China
Current regional distribution	HP, UP, not in JMK, recorded from Great Himalayan National Park By S. K. Singh (1997) (Note: herbarium specimen and photograph are Available) the species will shortly be published as new record for HP- S. K. Singh
- Elevation (m)	3000 – 4800
- Range (km <sup>2</sup> )	> 20000
- Area occupied (km <sup>2</sup> )	>2000
- No. of locations	HP (8)
Population trends	
- % Decline	>50 (HP)
- Time/ rate (Years or generations)	10
- No. of mature individuals	Not assessed
Global population	Not assessed
Regional population	Rapid continuing decline
Data quality	General field studies (2)
Recent field studies	N.S. Chauhan, Kinnaur and Kullu (1984-90), H.K. Badola (Parvati Valley), C.P.Kala (GHNP) 1997, Sanjay K. Singh, GHNP
Threats	Over exploitation (Ov), loss of habitat due to fragmentation (Lf), Trade of plant /plant parts (Tp)
Trade	National, Global- roots, essential oil, drugs. Traded as JATAMANSI, NAHANI/ BALCHAND. <i>Selinum vaginatum</i> (Edgew.) C.B. Cl. & <i>S. tenuifolium</i> Wall. ex DC. are traded as a cheap substitute for the genuine drug.
Other comments	Singh S.K. and Rawat G. S. 1998 have recorded from HP( Nima) Not recorded from HP in published literature. In Red Data Book of Indian Plants, Vol. 2, 1990, recorded as Vulnerable.
Status	
- IUCN	EN- HP, NE- JMK
- Criteria based on	PR
- CITES	Not currently listed but proposed for Appendix II (- CITES-Guide To Plants In Trade, 1994)
- IWPA (1972; 91)	No
- National legislation	Negative List of Exports, 1994; Public Notice No. 47 (PN) / 92- 97
Recommendations	
- Research management	Habitat management (Hm), survey ( S)
- P.H.V.A	Yes
Cultivation prog. recommendations	
- Cultivation	Level 2
- Level of difficulty	Moderate difficulty (Level 2)
Existing cultivation	
- No. of facilities	Experimental cultivation at HAPPRC, Tunganath (UP)
Sources	-
Compilers	N.S. Chauhan, H.K. Badola, C.P.Kala, Sanjay K. Singh, S.K. Guleria, R.K. Gupta, S.D. Sharma
Reviewers	Y.K. Sarin, O.P. Sharma, Jen Van der Waals, Nima Manjrekar, Amchi Tsering Phuntsog, M.C.Nautiyal, P.B.Singh, Brijlal T.R.Vinod, Sanjeeva Pandey, B.C. Thakur, B.S. Rana, D.K.Ved, V. Tandon

## Taxon Data Sheet

Species (& synonyms)	<i>Physochlaena praealta</i> (Walp.) Miers. (= <i>Hyoscyamus praealta</i> Walp.)
Vernacular Name	-
Family	SOLANACEAE
Taxonomic status	Species
Habit	Perennial herb
Habitat	Cold desert areas, village waste lands
Original global distribution	Himalaya in PAK, JMK, HP, UP, NEP, Tibet and Temperate Asia
Current regional distribution	JMK, HP
- Elevation (m)	2700 – 4300
- Range (km <sup>2</sup> )	>20000
- Area occupied (km <sup>2</sup> )	>2000
- No. of locations	2 in JMK, 2 in HP
Population trends	
- % Decline	> 20 (JMK, HP)
- Time/ rate (years or generations )	10 years
- No. of mature individuals	Not assessed
Global population	Not assessed
Regional population	Not assessed
Data quality	General field studies (2)
Recent field studies	N.S. Chauhan (1992, 1997) Nima Manjrekar 1997 (WII)- Pin Valley, Spiti, HP
Threats	Loss of habitat (L), Over exploitation (Ov)
Trade	Local (Leaves/herb) BAJARBANG. Langtang is used in Tibetan medicine. Plant has Atropine and Hyoscyamine.
Other comments	In situ conservation followed by intensive cultivation is needed
Status	
- IUCN	VU- JMK, HP
- Criteria based on	PR
- CITES	-
- IWPA (1972; 91)	-
- National legislation	Negative List of Exports, 1994; Public Notice No. 47 (PN) / 92- 97
Recommendations	
- Research management	Habitat management (Hm), survey (S)
- P.H.V.A	Yes
Cultivation prog. recommendations	
- Cultivation	Level 2
- Level of difficulty	Moderate difficult ( level 2)
Existing cultivation	
- No. of facilities	Cold desert plants of Ladakh by O.P. chaurasia 1997
Sources	N.S. Chauhan, 1992, Commercial Medicinal and Aromatic plants of Himachal Pradesh HPSTE Govt of Himachal Pradesh, Shimla-171001 N.S. Chauhan, 1997, Botanical survey, Chemical screening & cultivation of Medicinal and Aromatic Plants of Spiti, DDP, Dept. of Rural Development Govt. of Himachal Pradesh, Final Report.
Compilers	N.S. Chauhan, H.K. Badola, C.P.Kala, Sanjay K. Singh, S.K. Guleria, R.K. Gupta, S.D. Sharma
Reviewers	Y.K. Sarin , O.P. Sharma, Jen Van der Waals, Nima Manjrekar, Amchi Tsering Phuntsog, M.C. Nautiyal, P.B. Singh, Brijlal T.R. Vinod, Sanjeeva Pandey, B.C. Thakur, B.S. Rana, V. Tandon, D. K. Ved

## Taxon Data Sheet

Species (& synonyms)	<i>Picrorhiza kurrooa</i> Royle ex Benth.
Vernacular Name	KUTKI, KARHWI (Garhwal), KARU (Kullu)
Family	SCROPHULARIACEAE
Taxonomic status	Species
Habit	A rhizomatous perennial herb
Habitat	Sub-alpine and alpine rocky boulders/slopes, drainage area
Original global distribution	Himalaya of PAK, JMK, HP, UP, NEP, SK, temperate Asia
Current regional distribution	JMK, HP, UP
- Elevation (m)	3000 – 4300
- Range (km <sup>2</sup> )	> 20000
- Area occupied (km <sup>2</sup> )	> 1500
- No. of locations	JMK (11), HP (12)
Population trends	
- % Decline	> 50 (JMK, HP)
- Time/ rate (years or generations)	10 years
- No. of mature individuals	Not assessed
Global population	Not assessed
Regional population	Not assessed
Data quality	General field studies (2), informal field sightings (3) Indirect information (4)
Recent field studies	N.S. Chauhan (Chamba, Kinnaur, Kullu, 1992), S.K. Singh and C. P. Kala (GHNP) 1997
Threats	Over exploitation (Ov), loss of habitat (L)
Trade	Local, National and Global. Rhizomes have picrotoxin and are traded as KUTKI/ KARU. Roots of <i>Lagotis glauca</i> Gaertn. (Selaginellaceae) are found as an adulterant in market samples. (Y.K. Sarin). Used in Indian system of medicine as liver drug.
Other comments	Vulnerable as recorded in Red Data Book of Indian Plants, Vol. 1., 1990, BSI
Status	
- IUCN	EN- JMK, HP
- Criteria based on	PR
- CITES	Appendix II
- IWPA (1972; 91)	No
- National legislation	No
Recommendations	
- Research management	Habitat management (Hm), limiting factor management (Lm), Survey (S)
- P.H.V.A	Yes
Cultivation prog. recommendations	
- Cultivation	Level 2
- Level of difficulty	Least difficult ( level 1)
Existing cultivation	
- No. of facilities	Experimental cultivation at HAPPRC, Tunganath (UP) Medicinal Plants of Kashmir and Ladakh by M.K.Kaul, 1997. Cultivation trails in Sannasar-Kud area of JMK. Assessment of <i>Picrorhiza kurrooa</i> in India by B.K. Kapahi and Y. K. Sarin, RRL, Jammu, 1994-95
Sources	N.S. Chauhan, 1992, Commercial habitat & Aromatic plants of HP S.K. Singh and Rawat G.S. 1998, Long term Monitoring of Vegetation in Great Himalayan National Park, Kullu
Compilers	N.S. Chauhan, H.K. Badola, C.P.Kala, Sanjay K. Singh, S.K. Guleria, R.K. Gupta, S.D. Sharma
Reviewers	Y.K. Sarin, O.P. Sharma, Jen Van der Waals, Nima Manjrekar, Amchi Tsering Phuntsog, M.C. Nautiyal, P.B. Singh, Brijlal, T.R. Vinod, Sanjeeva Pandey, B.C. Thakur, B.S. Rana, D. K. Ved, V. Tandon

## Taxon Data Sheet

Species (& synonyms)	<i>Podophyllum hexandrum</i> Royle (= <i>P. emodi</i> Royle)
Vernacular Name	BANKAKRI (Garhwal), GALAKADA (Kullu), SHATHJALARI (Lahul and Spiti)
Family	BERBERIDACEAE
Taxonomic status	Species
Habit	Herb with perennial rootstock
Habitat	Temperate forest shades and sub-alpine areas.
Original global distribution	Himalaya in AFG, JMK, HP, UP, SK, Bhutan, AP, NEP, China, Temperate Asia
Current regional distribution	JMK, HP, UP
- Elevation (m)	2600 - 4500
- Range (km <sup>2</sup> )	10000
- Area occupied (km <sup>2</sup> )	1000
- No. of locations	JMK (10), HP (7)
Population trends	
- % Decline	> 50 (JMK, HP)
- Time/ rate (years or generations)	10 years
- No. of mature individuals	Not assessed
Global population	Not assessed
Regional population	Rapid continuing decline
Data quality	General field studies (2), informal field sightings (3)
Recent field studies	N.S. Chauhan (Lahul -Spiti), H.K. Badola, 1997, Parvati Valley (Kullu), C.P.Kala (GHNP), Sanjay K. Singh (GHNP) Threatened Plants of India by S.K.Jain and A.R.K.Shastry, BSI, Calcutta
Threats	Loss of habitat (L), over exploitation (Ov)
Trade	National and global. Root Stock contains Podophyllotoxin . BANKAKRI is the trade name.
Other comments	Ex situ and in situ conservation as well as habitat management and autecological study.
Status	
- IUCN	EN- JMK, HP
- Criteria based on	PR
- CITES	Appendix II
- IWPA (1972; 91)	No
- National legislation	Negative List of Exports, 1994; Public Notice No. 47 (PN) / 92- 97
Recommendations	
- Research management	Habitat management (Hm), survey ( S), monitoring ( M)
- P.H.V.A	Yes
Cultivation prog. recommendations	
- Cultivation	Level 2
- Level of difficulty	Moderate difficulty ( level 2)
Existing cultivation	
- No. of facilities	Experimental cultivation at HAPPRC, Tunganath(UP) and Buffer zone of Valley of Flowers by ICIMOD, Nepal.( C. P. Kala)
Sources	N.S. Chauhan , 1994 , Herbal wealth of Lahul and Spiti, Souvenir, Tribal fair, Keylong Singh & Rawat G.S. , 1998, Long Term Monitoring of Vegetation of GHNP, Kullu C. P. Kala, 1998. Ethnobotanical Survey and propagation of rare medicinal herbs in the buffer zone of valley of Flowers National Park. Report submitted to ICIMOD, Nepal. 35p.p
Compilers	N.S. Chauhan, H.K. Badola, C.P.Kala, Sanjay K. Singh, S.K. Guleria, R.K. Gupta, S.D. Sharma
Reviewers	Y.K. Sarin , O.P. Sharma, Jen Van der Waals, Nima Manjrekar , Amchi Tsering Phuntsog, M.C. Nautiyal, P.B. Singh, Brijlal T.R. Vinod, Sanjeeva Pandey, B.C. Thakur, B.S. Rana, D.K. Ved, V. Tandon

## Taxon Data Sheet

Species & synonyms	<i>Rhododendron campanulatum</i> D.Don.
Vernacular Name	SIMRU (Garhwal), KASHMIRI PATTA (Kullu )
Family	ERICACEAE
Taxonomic status	Species
Habit	A rambling shrub
Habitat	Sub-alpine and alpine pastures, gorges and depressions.
Original global distribution	Himalaya in JMK, HP, UP, BHU, AP, Tibet
Current regional distribution	JMK, HP, UP
- Elevation (m)	2800 - 4400
- Range (km <sup>2</sup> )	> 20000
- Area occupied (km <sup>2</sup> )	> 2000
- No. of locations	17 in HP and many in JMK
Population trends	
- % Decline	> 20 (JMK, HP)
- Time/ rate (years or generations)	10 years
- No. of mature individuals	Not assessed
Global population	Not assessed
Regional population	Not assessed
Data quality	General field studies (2), informal field sightings (3)
Recent field studies	Chauhan N. S (Chamba, Kullu, Lahul, Kinnaur), H. K. Badola (Kullu), Sanjay K. Singh (GHNP)
Threats	Human interference (I), loss of habitat (L), over exploitation (Ov), loss of habitat due to fragmentation (Lf)
Trade	National, leaves (KASHMIRI PATTA)
Other comments	In-situ conservation essential, habitat management and monitoring
Status	
- IUCN	VU -JMK, HP
- Criteria based on	PR
- CITES	No
- IWPA (1972; 91)	No
- National legislation	Negative List of Exports, 1994; Public Notice No. 47 (PN) / 92- 97
Recommendations	
- Research management	Habitat management (Hm), survey (S), scientific harvesting , Limiting factor management (Lm)
- P.H.V.A	Yes
Cultivation prog. recommendations	
- Cultivation	Level 2
- Level of difficulty	Least difficulty ( level 1)
Existing cultivation	
- No. of facilities	Experimental cultivation at HAPPRC, Tunganath (UP)
Sources	Not known
Compilers	N.S. Chauhan, H.K. Badola, C.P.Kala, Sanjay K. Singh, Nagesh Kumar, S.K. Guleria, R.K. Gupta, S.D. Sharma
Reviewers	Y.K. Sarin, O.P. Sharma, Jen Van der Waals, Nima Manjrekar, Amchi Tsering Phuntsog, M.C. Nautiyal, P.B. Singh, Brijlal T.R. Vinod, Sanjeeva Pandey, B.C. Thakur, B.S. Rana, D. K. Ved, V. Tandon

## Taxon Data Sheet

Species ( & synonyms)	<i>Rhododendron anthopogon</i> D.Don
Vernacular Name	TALSHI (Kullu)
Family	ERICACEAE
Taxonomic status	Species
Habit	Small shrub (scrub)
Habitat	Sub-alpine and alpine shrubberies.
Original global distribution	Himalaya of PAK, JMK, HP, UP, NEP, AP, SK, Bhutan, Tibet and Tempeate Asia
Current regional distribution	JMK, HP, UP
- Elevation (m)	3000-5200
- Range (km <sup>2</sup> )	>20000
- Area occupied (km <sup>2</sup> )	>2000
- No. of locations	HP (10)
Population trends	
- % Decline	> 20 (JMK, HP)
- Time/ rate (years or generations)	3 generations (60 years approximately).
- No. of mature individuals	Not assessed
Global population	Not assessed
Regional population	Not assessed
Data quality	General field studies (2), informal field sightings (3)
Recent field studies	N.S. Chauhan (Chamba, Kinnaur, Kullu), S. K. Singh, 1998 (GHNP), C.P. Kala (GHNP), 1997
Threats	Human interference (I), over exploitation (Ov), loss of habitat (L)
Trade	Local and regional –Leaves. Leaves as TAALISPATRA. Distribution wide spread with low density.
Other comments	In situ conservation and habitat management needed.
Status	
- IUCN	VU-JMK, HP
- Criteria based on	PR
- CITES	No
- IWPA (1972; 91)	No
- National legislation	Negative List of Exports, 1994; Public Notice No. 47 (PN) / 92- 97
Recommendations	
- Research management	Habitat management (Hm), regulated extraction for sustainability and survey ( S)
- P.H.V.A	Yes
Cultivation prog. recommendations	
- Cultivation	Not known
- Level of difficulty	Not known
Existing cultivation	
- No. of facilities	Not known
Sources	N.S. Chauhan, 1994 , Herbal wealth of Lahul and Spiti, Sovenior, Tribal Fair, Keylong
Compilers	N.S. Chauhan, H.K. Badola, C.P.Kala, Sanjay K. Singh, Nagesh Kumar, S.K. Guleria, R.K. Gupta, S.D. Sharma
Reviewers	Y.K. Sarin , O.P. Sharma, Jen Van der Waals, Nima Manjrekar , Amchi Tsering Phuntsog, M.C. Nautiyal, P.B. Singh, Brijlal, T.R. Vinod, Sanjeeva Pandey, B.C. Thakur, B.S. Rana, D. K. Ved, V. Tandon

## Taxon Data Sheet

<b>Species (&amp; synonyms)</b>	<i>Rhododendron lepidotum</i> Wall ex D. Don
<b>Vernacular Name</b>	TALSHI (Kullu)
<b>Family</b>	ERICACEAE
<b>Taxonomic status</b>	Species
<b>Habit</b>	Shrublet, a small scrubby shrub
<b>Habitat</b>	Alpine and sub-alpine slopes often in temperate pastures
<b>Original global distribution</b>	Himalaya in PAK, JMK, HP, UP, BHU, AP, China
<b>Current regional distribution</b>	JMK, HP, UP
- Elevation (m)	2400 - 4500
- Range (km <sup>2</sup> )	> 20000
- Area occupied (km <sup>2</sup> )	> 2000
- No. of locations	6 in JMK and 16 in HP
<b>Population trends</b>	
- % Decline	> 20 (JMK, HP)
- Time/ rate (years or generations)	10 years
- No. of mature individuals	Not assessed
<b>Global population</b>	Not assessed
<b>Regional population</b>	Not assessed
<b>Data quality</b>	General field studies (2), informal field study (3)
<b>Recent field studies</b>	N.S. Chauhan (Chamba, Kullu, Kinnaur), M.K. Badola (Kullu), Sanjay K. Singh (GNHP)
<b>Threats</b>	Loss of habitat (L), over exploitation (Ov), human interference (I), Loss of habitat due to fragmentation (Lf)
<b>Trade</b>	Local and regional , leaves.
<b>Other comments</b>	-
<b>Status</b>	
- IUCN	VU-JMK, HP
- Criteria based on	PR
- CITES	No
- IWPA (1972; 91)	No
- National legislation	Negative List of Exports, 1994; Public Notice No. 47 (PN) / 92- 97
<b>Recommendations</b>	
- Research management	Habitat management (Hm), survey (S), monitoring (M)
- P.H.V.A	Yes
<b>Cultivation prog. recommendations</b>	
- Cultivation	Not assessed
- Level of difficulty	Not assessed
<b>Existing cultivation</b>	
- No. of facilities	Not known
<b>Sources</b>	Not known
<b>Compilers</b>	N.S. Chauhan, H.K. Badola, C.P.Kala, Sanjay K. Singh, Nagesh Kumar, S.K. Guleria, R.K. Gupta, S.D. Sharma
<b>Reviewers</b>	Y.K. Sarin , O.P. Sharma, Jen Van der Waals, Nima Manjrekar , Amchi Tsering Phuntsog, . M.C. Nautiyal, P.B. Singh, Brijlal, . M.C. Nautiyal, P.B. Singh, Brijlal T.R. Vinod, Sanjeeva Pandey, B.C. Thakur, B.S. Rana D.K. Ved, V. Tandon



## Taxon Data Sheet

Species (& synonyms)	<i>Saussurea gossypiphora</i> D.Don
Vernacular Name	GHOOGHI (Kullu)
Family	ASTERACEAE
Taxonomic status	Species
Habit	A woolly perennial herb
Habitat	Alpine glaciated sites.
Original global distribution	Himalaya in JMK, HP, UP, NEP, SK, Bhutan, Tibet and China
Current regional distribution	JMK, HP, UP, SK
- Elevation (m)	3800 - 5600
- Range (km <sup>2</sup> )	Data deficient
- Area occupied (km <sup>2</sup> )	5000- 2000 km
- No. of locations	JMK (2), HP(10)
Population trends	
- % Decline	>50 in HP, > 20 in JMK
- Time/ rate (years or generations)	10 years
- No. of mature individuals	Not assessed
Global population	Not assessed
Regional population	Not assessed
Data quality	General field studies (2)
Recent field studies	Chauhan N.S. (Chamba, Kinnaur, Lahul-Spiti); Singh S.K. (GHNP, Kullu)
Threats	Over exploitation (Ov), loss of habitat (L), human interference (I)
Trade	Whole plant used locally.
Other comments	Attractive appearance. Collected by tourists.
Status	
- IUCN	EN-HP, VU-JMK
- Criteria based on	PR
- CITES	No
- IWPA (1972; 91)	No
- National legislation	No
Recommendations	
- Research management	In-situ conservation through habitat management (Hm), Survey (S), monitoring (M)
- P.H.V.A	Yes
Cultivation prog. recommendations	
- Cultivation	Not known
- Level of difficulty	Not known
Existing cultivation	
- No. of facilities	Not known
Sources	-
Compilers	N.S. Chauhan, H.K. Badola, C.P.Kala, Sanjay K. Singh, Nagesh Kumar, S.K. Guleria, R.K. Gupta, S.D. Sharma
Reviewers	Y.K. Sarin, O.P. Sharma, Jen Van der Waals, Nima Manjrekar, Amchi Tsering Phuntsog, M.C. Nautiyal, P.B. Singh, Brijlal, T.R. Vinod, Sanjeeva Pandey, B.C. Thakur, B.S. Rana, D. K. Ved, V. Tandon

## Taxon Data Sheet

Species (& synonyms)	<i>Inula racemosa</i> Hook. F.
Vernacular Name	MANU/ POSHKAR MOOL (Kullu)
Family	ASTERACEAE
Taxonomic status	Species
Habit	Perennial tall herb
Habitat	Dry temperate zone along cultivated field
Original global distribution	Himalaya in AFG, JMK, HP, UP, NEP
Current regional distribution	JMK, HP, UP
- Elevation (m)	2800 – 3200
- Range (km <sup>2</sup> )	Not assessed
- Area occupied (km <sup>2</sup> )	Not assessed
- No. of locations	3 in Lahul & Spiti Not found in wild, occasionally met as an escape. Jispa. Aswal, 11020, Flora of Lahul –Spiti, Aswal and Mehrotra.
<b>Population trends</b>	
- % Decline	Not assessed
- Time/ rate (years or generations)	Not assessed
- No. of mature individuals	Not assessed
Global population	Not assessed
Regional population	Declining
Data quality	General field studies (2)
Recent field studies	N.S. Chauhan, 1994-97 B. S. Rana, 1992-96
Threats	Loss of habitat (L), trade of plant parts (Tp)
Trade	National, Global, rhizomes are traded as PUSHKAR MOOL/ MANU. Samples from Kashmir are usually adulterated with <i>Inula royleana</i> DC.
<b>Other comments</b>	Needs intensive cultivation. Information regarding planting material Can be obtained from CDRI and RRC, and from CCRAS in Mandi (Lucknow CAMP 1997) . In Red Data Book of Indian Plants, Vol. 2 , BSI, 1990, this plant is recorded Vulnerable. It is used as a substitute of <i>Saussurea costus</i> (Falc.) Lipsch. , (Red Data Book, 1990)
<b>Status</b>	No status can be proposed as the plant is known Under cultivation only in JMK and HP. In HP only in Lahul sub-division of Lahul Spiti district that too in very small quantity. Scattered wildings can be seen around the agriculture fields in Lahul.
- IUCN	NE-JMK, HP
- Criteria based on	-
- CITES	No
- IWPA (1972; 91)	No
- National legislation	No
<b>Recommendations</b>	
- Research management	Habitat management (Hm), limiting factor research (Lr)
- P.H.V.A	No
<b>Cultivation prog. recommendations</b>	
- Cultivation	Level 2, intensive cultivation needed.
- Level of difficulty	Moderate difficulty ( level 2)
<b>Existing cultivation</b>	
- No. of facilities	Experimental and commercial cultivation in HP Cultivated in Lahul Valley and Kashmir Valley
<b>Sources</b>	Chauhan N.S, 1994, Herbal Wealth of Lahul & Spiti, Souvenir, Tribal fair (Aug), Keylong Medicinal plants of Kashmir and Ladakh by M. K. Kaul, 1997
<b>Compilers</b>	N.S. Chauhan, H.K. Badola, C.P.Kala, Sanjay K. Singh, S.K. Guleria, R.K. Gupta, S.D. Sharma
<b>Reviewers</b>	Y.K. Sarin , O.P. Sharma, Jen Van der Waals, Nima Manjrekar, Amchi Tsering Phuntsog, . M.C. Nautiyal, P.B. Singh, Brijlal, T.R. Vinod, Sanjeeva Pandey, B.C. Thakur, B.S. Rana, D. K. Ved, V. Tandon

## Taxon Data Sheet

Species (& synonyms)	<i>Hyoscyamus niger</i> L.
Vernacular Name	KURASANIAJWAIN (Kullu)
Family	SOLANACEAE
Taxonomic status	Species
Habit	Annual Herb
Habitat	Western Himalaya, sandy places, waste land, open sunny slopes In alpine pastures. It is found around village habitations in wastelands, cold desert region of Lahul Spiti and Ladakh.
Original global distribution	Himalaya in AFG, PAK, JMK, HP, UP and Temperate Asia, W.Asia and Europe, GRB, N. Africa, N. America
Current regional distribution	JMK, HP
- Elevation (m)	2700-4200
- Range (km <sup>2</sup> )	> 20000
- Area occupied (km <sup>2</sup> )	>2000
- No. of locations	Many in HP and many in JMK
Population trends	
- % Decline	< 20 (JMK, HP)
- Time/ rate (years or generations)	10 years
- No. of mature individuals	Many
Global population	Not assessed
Regional population	Slightly declining
Data quality	General field studies (2), informal field sightings (3).
Recent field studies	B. S. Rana, Lahul (HP), Brijlal (HP), Chauhan N. S. 1994, 1997 Nima Manjrekar 1997 (WII)- Pin Valley, Spiti, HP
Threats	Loss of habitat (L), habitat management (Hm)
Trade	National and global, seeds are traded (KHURSANI AJWAIN). Aerial twigs and seeds are used in traditional medicine system. Leaves and seeds are traded.
Other comments	Needs intensive cultivation. Hyoscyamine present seeds and twigs. Used in ayurvedic medicine
Status	
- IUCN	LR- NT- JMK, HP
- CITES	No
- IWPA (1972; 91)	No
- National legislation	Negative List of Exports, 1994; Public Notice No. 47 (PN) / 92- 97
Recommendations	
- Research management	In-situ conservation and captive cultivation
- P.H.V.A	Yes
Cultivation prog. recommendations	
- Cultivation	Level 2
- Level of difficulty	Least difficult ( Level 1)
Existing cultivation	
- No. of facilities	CIMAP, Lucknow, Kashmir, Farukhabad (UP), Spiti (HP)
Sources	B.G. Rana and Brijlal (HP), University of Horticulture and Forestry of Nauni, Solan. Chauhan N.S. (1994), Herbal Wealth of Lahul and Spiti Souvenir, Tribal Fair, Keylong Chauhan N.S. 1997. Botanical survey Chemical Screening and Cultivation of Medicinal and Aromatic Plants, DDP, Govt. of Himachal Pradesh.
Compilers	M.C. Nautiyal, P.B. Singh, Brijlal, T.R. Vinod, Sanjeeva Pandey, B. C. Thakur, B. S. Rana, M.V. Vishwanathan
Reviewers	Y.K. Sarin, O.P. Sharma, Jen Van der Waals, Nima Manjrekar, Amchi Tsering Phuntsog, N.S. Chauhan, H.K. Badola, C.P.Kala, Sanjay K. Singh, S.K. Guleria, R.K. Gupta, S.D. Sharma, D. K. Ved, V. Tandon

Summary Data Table –North Western Himalayan Medicinal Plant Species- Kullu Camp

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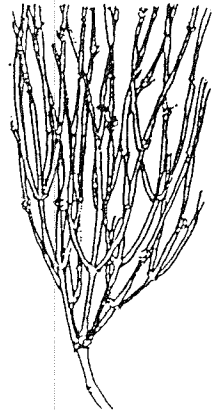
No.	Species & Family	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1.	<i>Aconitum chasmanthum</i> Ranunculaceae	Alpine meadows	H	D	A	One in JMK	>80 JMK	2, 3	10	-	Ov, L	CR- JMK DD- HP	PR, EO	S	No	-	-
2.	<i>Aconitum deinorrhizum</i> Ranunculaceae	Sub alpine. grows in partial shade	H	B	-	JMK (5) HP (2)	>50 JMK HP	2, 3, 4	10	-	Ov, L, I	EN- JMK, HP	PR, EO	Lh, S, M, Hm	No	1, 2	3
3.	<i>Aconitum heterophyllum</i> Ranunculaceae	Alpine to sub-alpine slopes. Meadows, scrub forests, oak & conifer forests	H	D	D	JMK (18), HP (20)	>50 JMK HP	2, 3, 4	10	-	Ov, L, Tp	EN-JMK, HP	PR	Lh, Hm, M, S	Yes	1, 2	3
4.	<i>Aconitum violaceum</i> (= <i>A. napellus</i> var. <i>multifolium</i> ) Ranunculaceae	Grasslands in alpine meadows and slopes	H	C	-	JMK (3) HP (8)	>20 JMK HP	2, 3	10	-	Ov, L, I	VU- JMK, HP	PR, EO	Hm, S, M	Yes	2	2
5.	<i>Allium stracheyi</i> Liliaceae	Sub alpine and alpine meadows, dry slopes, forest shades, open plateaus	H	D	D	JMK (12) HP (3)	> 20 JMK HP	2, 3	10	-	Hf, Hm, Ov	VU- JMK, HP	PR	S, Lh, Hm, M	Yes	2	1
6.	<i>Angelica glauca</i> Apiaceae	Moist rocky places near water springs, forest shades	H	D	D	JMK (5) HP (4)	>50 JMK, HP	2, 3, 4	10	-	Hm	EN- JMK, HP	PR	S, Hm, Lh, M	Yes	2	2
7.	<i>Arnebia benthamii</i> (= <i>Macrotomia benthamii</i> ) Boraginaceae	Alpine dry sandy rocky slopes in cold deserts	H	D	D	JMK (3) HP (10)	>80 JMK HP	2, 3, 4	10	-	Hm, Ov, I, L	CR- JMK, HP	PR	Hm, Lh	Yes	2	3
8.	<i>Arnebia euchroma</i> Boraginaceae	Alpine dry sandy rocky bslopes in cold deserts	H	D	D	JMK (3) HP(10)	>50 JMK HP	2, 3, 4	10	-	Hm, Ov, I, L	EN- JMK, HP	PR	Hm, M, S	Yes	2	3
9.	<i>Artemisia maritima</i> (= <i>A. brevifolia</i> ) Asteraceae	Dry open slopes in cold desert areas	H	D	D	JMK(8) HP (20)	>50 in JMK >20 in HP	2,3, 4	10	-	Hm, Ov, I, L	EN- JMK VU- HP	PR	M, S, Hm	Yes	2	2
10.	<i>Bergenia stracheyi</i> Saxifragaceae	Alpine and sub-alpine moist rocky slopes	H	D	D	JMK (15) HP (12)	>20 JMK, HP	2, 3	10	-	Hm, I, L, Ov	VU- JMK, HP	PR	Hm, M, S	Yes	2	1
11.	<i>Betula utilis</i> Betulaceae	Temperate Alpine slopes	T	D	D	JMK (10), HP (10)	>50 JMK, HP	2	90	-	C, I, Ov, Sf, I	EN- JMK, HP	PR	Hm, Lh, S	Yes	1	2
12.	<i>Dactylorhiza hatagirea</i> (= <i>Orchis latifolia</i> ) Orchidaceae	Alpine meadows, open slopes, shrubberies, well watered high altitude valleys	H	D	D	JMK (4) HP (3)	>80 JMK, HP	2, 3, 4	10	-	Hm, Lf, Ov	CR- JMK, HP	PR	M	Yes	2	3
13.	<i>Ephedra Gerardiana</i> (= <i>E. vulgaris</i> ) Ephedraceae	Dry temperate and alpine sandy /rocky slopes	US	D	D	JMK (3) HP (many)	>50 in JMK > 20 in HP	2, 3, 4	10	-	H, Hm, Ov, Tp	EN- JMK, VU- HP	PR	M, Hm	Yes	2	2
14.	<i>Ferula Jaeschkeana</i> Apiaceae	Sub alpine cultivated tracts, temperate desert to cold desert	H	D	D	JMK (4) HP (7)	>20 JMK, HP	2, 3, 4	10	-	Hm, I, Ov, L, H	VU- JMK, HP	PR	S, M, Hm	Yes	1, 2	2
15.	<i>Ferula narthex</i> Apiaceae	Sub alpine slopes Endemic to Gilgit in JMK	H	A	-	-	-	2, 3, 4	-	-	Ov, L	DD- JMK, NE- HP	-	S	No	P	-
16.	<i>Fritillaria roylei</i> Liliaceae	Sub alpine to alpine meadows	H	D	D	JMK (2) HP(10)	>80 in JMK > 50 in HP	2, 3, 4	10	-	L, Ov, I, Lf	CR- JMK, EN- HP	PR	S, Hm, M	Yes	2	2
17.	<i>Gentiana kurroo</i> Gentianaceae	Grassy meadows, rocky slopes. sub temperate to sub- alpine regions	H	D	D	JMK (15) HP (13)	>80 in JMK >50 in HP	2, 3, 4	10	-	Lf, Ov, S, Sf	CR- JMK EN- HP	PR	S, Hm, Lh, M	Yes	2	2

1=Location/ Habitat; 2=Habit; 3=Range; 4=Areas; 5=No. Of location; 6= %Decline; 7=Data Duality; 8=Yr./Generations; 9=Popln./No; 10=Threat Category; 11=IUCN; 12=Criteria Used; 13= Research Mgmt. Recommendations; 14= P.H.V.A.; 15= Cultivation Recommendation; 16= Level of Difficulty

No.	Species & Family	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
18.	<i>Heracleum lanatum</i> (=H. <i>Candicans</i> ), Apiaceae	Temperate forest openings and alpine meadows	H	D	D	JMK (10) HP (18)	>20 JMK, HP	2	10	-	I, Lf, H	VU-JMK, HP	PR, EO	M, Hm, LR, O	Yes	2	1
19.	<i>Hippophae rhamnoides</i> Elaeagnaceae	Borders of glacial streams, moist slopes, fresh alluvial soil	S	D	D	Many in JMK, HP	<20 JMK, HP	2	10	-	L, Ov	LR- NT- JMK, HP	PR	Hm, Lh	Yes	1	1
20.	<i>Hyoscyamus niger</i> Solanaceae	Waste lands in the cold deserts of Lahual Spiti and Ladakh	H	D	D	Many in JMK, HP	<20 JMK HP	2, 3	10	-	L, Hm	LR- NT- JMK, HP	PR	-	Yes	2	1
21.	<i>Inula racemosa</i> (I. <i>Helenium</i> ), Asteraceae	Dry temperate zone along cultivated fields	H	-	-	3 in Lahual and Spiti	-	2	-	-	L, Tp	NE- JMK, HP	-	Hm, Lr	No	2	2
22.	<i>Jurinea dolomiaea</i> (=Jurinea <i>macrocephala</i> ) Asteraceae	Alpine pastures, rocky situations (dry and semi dry) occurs as lithophyte	H	D	D	JMK (8), HP (11)	>50 in JMK, > 20 in HP	2, 3, 4	10	-	Ov, Tp	EN- JMK, VU- HP	PR	S, Hm, M	Yes	2	2
23.	<i>Malaxis muscifera</i> (= <i>Microstylis muscifera</i> ), Orchidaceae	Alpine or sub alpine meadows	H	D	D	Many and fragmen- ted	>20 JMK HP	2	10	-	L, La, Tp, Hm	VU- JMK, HP	PR	Hm, Lh, S, M	Yes	1	3
24.	<i>Meconopsis aculeata</i> Papaveraceae	Sub alpine to alpine zone, pasture, rock crevices	H	D	D	JMK (4) HP (15)	> 20 in HP > 50 in JMK	2	10	-	L, Lf, Hm, I	EN- JMK, VU- HP	PR	Hm	Yes	2	2
25.	<i>Nardostachys grandiflora</i> (= <i>N. jatamansi</i> ) Valerianaceae	Rocks, ledges, open slopes, alpine and sub alpine	H	C	C	HP (8) Not seen in JMK	> 50 in HP	2	10	-	Ov, Lf, Tp	EN- HP NE-JMK	PR, EO	Hm, S	Yes	2	2
26.	<i>Physochaena praealta</i> (=Hyoscyamus <i>praealta</i> ), Solanaceae	Cold desert areas, village waste lands	H	C	C	JMK (2) HP (2)	>20 JMK HP	2	10	-	L, Ov	VU- JMK, HP	PR	Hm, S	Yes	2	2
27.	<i>Picrorhiza kurroo</i> Scrophulariaceae	Sub alpine and alpine rocky boulders/ slopes	H	D	D	JMK (11) HP (12)	> 50 JMK, HP	2, 3, 4	10	-	L, Ov	EN- JMK, HP	PR	Hm, Lm, S	Yes	2	1
28.	<i>Podophyllum hexandrum</i> (= <i>P. emodi</i> ) Berberidaceae	Temperate forest shades and sub alpine areas	H	D	D	JMK (10) HP (7)	>50 JMK HP	2, 3	10	-	L, Ov	EN- JMK, HP	PR	Hm, S, M	Yes	2	2
29.	<i>Polygonatum</i> <i>Multiflorum</i> (=C. <i>Multiflora</i> ), Liliaceae	Open grassy slopes, in forest shades and pastures	H	D	D	Many in JMK & HP	>20 JMK, HP	2	10	-	L, Ov, I	VU- JMK, HP	PR, EO	Hm, Lr, M, S	Yes	1	3
30.	<i>Polygonatum verticillatum</i> (= <i>Convallaria verticillata</i> ) Liliaceae	Moist grassy places, in forest shades, sub alpine slopes	H	D	D	JMK (3) HP (18)	>20 JMK HP	2	10	-	L, Ov	VU- JMK, HP	PR	Hm, Lh	Yes	2	3
31.	<i>Rheum australe</i> (= <i>R. emodi</i> ) Polygonaceae	Alpine alluvial slopes, temperate pastures / morianes and dry steep slopes	H	D	D	Many in JMK HP (17)	>20 JMK HP	2	10	-	Tp, I., I	VU- JMK, HP	PR, EO	Hm, S, M,	Yes	2	2
32.	<i>Rheum moorcroftianum</i> Polygonaceae	Humus rich rocky slopes	H	D	D	JMK (2) HP (4)	>20 JMK HP	2	10	-	L, I, Hf	VU- JMK, HP	PR	Hm, M, S	Yes	1	2
33.	<i>Rheum spiciforme</i> Polygonaceae	Alpine and sub- alpine slopes	H	D	D	JMK (2) HP (3)	>20 JMK HP	2	10	-	L, Hf, I	VU- JMK, HP	PR	Hm, M, Lh, Lr	Yes	1	2
34.	<i>Rheum webbianum</i> Polygonaceae	Humus rich rocky slopes (moist), sub alpine & alpine zone	H	D	D	JMK (3) HP (5)	>20 JMK HP	2	10	-	L, Hf, I	VU- JMK, HP	PR	Hm, S	Yes	1	2
35.	<i>Rhododendron anthopogon</i> Ericaceae	Sub alpine and alpine shrubberies	S	D	D	Many in JMK HP (10)	>20 JMK, HP	2, 3	60	-	I, Ov, L	VU- JMK, HP	PR	Hm, S	Yes	-	-

1=Location/ Habitat; 2=Habit; 3=Range; 4=Areas; 5=No. Of location; 6= %Decline; 7=Data Duality; 8=Yr./Generations; 9=Popln./No; 10=Threat Category; 11=IUCN; 12=Criteria Used; 13= Research Mgmt. Recommendations; 14= P.H.V.A.; 15= Cultivation Recommendation; 16= Level of Difficulty

No.	Species & Family	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
36.	<i>Rhododendron campanulatum</i> , Ericaceae	Sub alpine and alpine pastures, gorges and depressions	S	D	D	Many in JMK, HP (17)	>20 JMK HP	2, 3	10	-	I, Ov, L, Lf	VU- JMK, HP	PR	Hm, S, Lm	Yes	2	1
37.	<i>Rhododendron lepidotum</i> Ericaceae	Alpine and sub alpine slopes, often in temperate pastures	S	D	D	JMK (6) HP (16)	>20 JMK HP	2, 3	10	-	L, Ov, I, Lf	VU- JMK, HP	PR	Hm, S, M	Yes	-	-
38.	<i>Saussurea gossypiflora</i> Asteraceae	Alpine glaciated sites	H	D	D	JMK (2) HP (10)	> 20 in JMK > 50 in HP	2	10	-	Ov, L, I	VU- JMK EN- HP	PR	Hm, S, M	Yes	-	-
39.	<i>Saussurea costus</i> (= <i>S. lappa</i> ) Asteraceae	Moist shldy slopes and low rainfall area	H	C	B	JMK (1) HP (Many cultivated)	>80 JMK	2	10	-	Tp, L	CR- JMK NE- HP	PR, EO	Hm, S, M	Yes	2	1
40.	<i>Saussurea obvallata</i> Asteraceae	Humus rich glaciated moraine, alpine rocky slopes	H	D	D	JMK (1) Hp (10)	>20 JMK HP	2, 3	10	-	Ov, L, I	VU- JMK, HP	PR	Hm, S, M	Yes	1	3
41.	<i>Selinum tenuifolium</i> (= <i>S. candoleii</i> ) Apiaceae	Alpine Meadows, open slopes, shady slopes, temperate forests, nalas	H	D	D	Many in JMK, HP	<10 JMK HP	2	10	-	L	LR- LC- JMK, HP	PR	Hm	No	3	1
42.	<i>Selinum vaginatum</i> Apiaceae	Open sunny slopes, moist shady ravines and undulating alpine pasture	H	D	D	JMK (20) HP (15)	< 20 JMK HP	2	10	-	L, Tp	LR- LC- JMK, HP	PR	Hm	No	2, 3	1



*Ephedra gerardiana* Wall. ex Stapf.

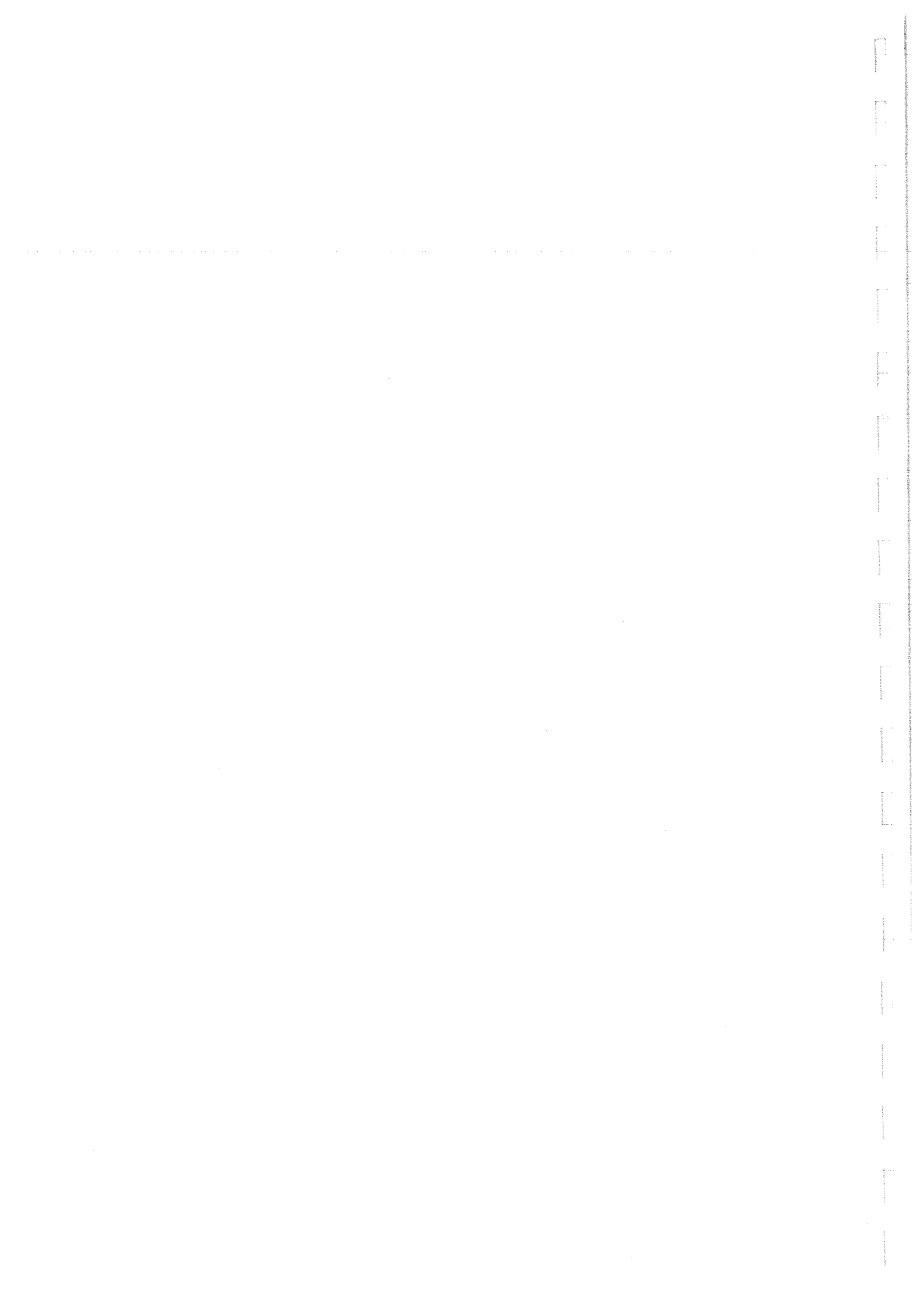


*Gentiana kurroo* Royle



*Nardostachys grandiflora* DC.

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# Annexures





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# Conservation Assessment & Management Plan (CAMP) workshops

## Introduction

Reduction and fragmentation of wildlife populations and habitats are occurring at a rapid and accelerating rate. This results in small and isolated populations of many taxa which are at a risk of extinction. For such taxa with small populations more intensive management becomes necessary for their survival and recovery. To an increasing extent this intensive management will include, but not be limited to,

- habitat management and restoration
- intensified information gathering and
- possibly captive breeding.

The problems for wildlife are so enormous that it is vital to apply the limited resources available for intensive management as efficiently and effectively as possible.

Conservation Assessment and Management Plans are being developed to respond to this need.

## CAMP workshops

CAMP workshops are intended to provide strategic guidance for application of intensive management and information collection techniques to threatened taxa. They provide a rational and comprehensive means of assessing priorities for intensive management within the context of the broader conservation needs of threatened taxa.

The CAMP process assembles a broad spectrum of expertise on wild and captive management of the taxa under review. It brings together 10-40 experts like wildlife managers, specialist group members, ecologists, taxonomists, field biologists, scientists from the academic community and/ or the private sector, persons related to industries, cultivators (in case of plant species) to evaluate the threat status of all taxa in a broad group. This can be done for a country, or geographic region to set conservation action and information-gathering priorities. It also provides an opportunity to test

the applicability of the new IUCN Red List categories.

## The new IUCN Red List categories

The threat categories used in Red Data books and Red Lists had been in place, with some modification, for almost 30 years (Mace et al., 1994). The Mace - Lande criteria (Mace & Lande 1991) were one developmental step towards making those categories more explicit and were tested extensively in early CAMPs. These criteria, subsequently, have been revised and formulated into the new IUCN Red List categories which are also being tested in the CAMP processes.

The new IUCN (International Union for Conservation of Nature & Natural Resources) Red List categories provide a system that facilitates comparisons across widely different taxa and is based both on population and distribution criteria. These criteria can be applied to any taxonomic unit at or below the species level, with sufficient range among different criteria. This enables the appropriate listing of taxa from the complete spectrum of taxa, with the exception of micro-organisms (Mace et al., 1994).

## The CAMP Process

The CAMP process itself is intensive and interactive. It is unique in its ability to facilitate objective and systematic prioritisation of research and management actions needed for species conservation, both *in situ* and *ex situ*. Participants develop the assessments of risks and formulate recommendations for action using a Taxon Data Sheet that allows recording of detailed information about each taxon under review including data on the status of populations and habitat in the wild as well as recommendations for intensive conservation action. The Taxon Data Sheet is augmented by a spreadsheet that summarizes data recorded on the Taxon Data Sheet and provides for rapid review or comparison of taxa.

During a CAMP process, the wild and captive status for each taxon under consideration are reviewed, on a taxon-by-taxon basis. For each taxon, there is an attempt to estimate the total population. It is often very difficult, even agonizing, to be numerate because so little *quantitative* data on population sizes and distribution exists. However, it is frequently possible to provide order-of-magnitude estimates, like whether the total population is greater or less than the numerical thresholds for the population data used in determining categories of threat. CAMP spreadsheets include a "data quality" column so that "guesstimates" can be distinguished from population estimates based on systematic documentation. The CAMP process attempts to be as quantitative or numerate as possible for two major reasons:

- Action plans ultimately must establish numerical objectives for population sizes and distribution if they are to be viable.
- Numbers provide for more objectivity, less ambiguity, more comparability, better communication and hence cooperation.

Information about population fragmentation and trends, distribution, as well as habitat changes and environmental stochasticity are also considered.

The CAMP process might also utilize information compiled by experts on the taxa, from published and unpublished sources. CAMPs have been endorsed by the Species Survival Commission (SSC) and by Bird Life International as the logical first step towards development of Taxon level Action Plans where they do not yet exist.

For each taxon reviewed, three kinds of assessment recommendations are made:

- 1 Assigning the taxon to New IUCN Red List Category of Threat
- 2 Making recommendations for research and management activities to

contribute to the taxon's conservation. These recommendations aim to more fully integrate recommended research and management actions and known threats. Research management can be defined as an interactive management program including a strong feedback loop between management activities, evaluation of their effectiveness, and the response of the species/ taxon.

- 3 Making recommendations for captive programs if they can contribute to the conservation of the taxon. These can form the foundation for development of captive action recommendations and collection plans.

The CAMP process generally uses a conservative taxonomic approach. In most cases, initial risk assessment and management recommendations are made in terms of the maximal distinction among possible "subspecies" until taxonomic relationships are better elucidated. Splitting rather than lumping maximizes preservation of options. Taxa can always be merged ("lumped") later if further information invalidates the distinctions or if biological or logistic realities of sustaining viable populations precludes maintaining taxa as separate units for conservation.



*Saussurea costus* (Falc.) Lipsch.

## The CAMP Process

There are several ground rules made explicit at the beginning of a CAMP process. In India, we read these and request a show of hands in agreement before starting the workshop process.

### Ground Rules for Group Interaction

- \* Every idea or plan or belief about the Taxon or Region can be examined and discussed.
- \* Everyone participates in discussions and no one dominates.
- \* Set aside all special agendas except conserving the Taxa under assessment.
- \* Assume good intent of all participants. Treat other participants with respect.
- \* Stick to the schedule.. begin and end promptly.
- \* The primary work will be conducted in sub-groups.
- \* Facilitators of plenary sessions or working groups can call 'time out' when discussions reach an impasse or stray too far off the topic at hand.
- \* Agreements or recommendations are reached by consensus.
- \* Plan to complete and review a draft report by the end of the meeting.
- \* Flexibility is the key. We adjust our process and schedule as needed to achieve goals.

### Working Group Tasks: the CAMP Spreadsheet and Taxon Data Sheets

In each CAMP process working group, two people are key:

- 1 the facilitator; and
- 2 the Taxon Data Sheet recorder.

Working group facilitators are designated by the CAMP facilitators and organizers. It also is essential that in each working group one person keep master Taxon Data Sheets for each taxon. S/he may enter them into a computer as they are discussed. **Taxon Data Sheet information should be checked as each is completed to be sure that all data have been recorded.**

Each participant is given a spreadsheet at the beginning of the process. An important step for each working group is to examine the taxonomic correctness, working group participants begin to systematically work through the taxa making assessments and making recommendations on the Taxon Data Sheets. A Taxon Data Sheet category explanation sheet, such as the one that follows, is

provided to explain the various data categories. Sample Taxon Data Sheets, sample Spreadsheets and blank Taxon Data Sheets are included in the Appendices of this Manual.

The CAMP Workshop for Medicinal Plants made several additions and alterations in the Spreadsheet and in the Taxon Data Sheet. The Indian version of these sheets has been used in this Manual.

## Conservation Assessment and Management Plan (CAMP) Process

### Taxon Data Sheet Categories

The Conservation Assessment and Management Plan (CAMP) taxon data sheet is a working document that provides information that can be used to assess the degree of threat and recommend conservation action. The first part of the sheet summarises information on the status of the wild and captive populations of each taxon. It contains taxonomic, distributional, and demographic information useful in determining which taxa are under greatest threat of extinction. This information can be used to identify priorities for intensive management action for taxa.

This Sample Taxon Data Sheet model is based on birds, but is similar to those for other taxa.

#### Scientific name:

Scientific names of extant taxa: genus and species (or subspecies where appropriate)

#### Tentative IUCN:

Tentative Status according to the New IUCN Red List criteria (additional materials will be provided at the CAMP)

EX = Extinct  
EW = Extinct in the wild  
CR = Critically Endangered  
EN = Endangered  
VU = Vulnerable  
LR = Lower Risk  
nt = Near threatened  
cd = Conservation Dependent  
lc = Least Concern  
DD = Data Deficient  
NE = Not Ev

#### Criteria based on:

Indicate which of the New IUCN Red List criteria were used to assign a category to threat:

PR = Population reduction  
(A1a or A2b, etc See IUCN Red List document later in this Manual)

EO = Extent of occurrence (B1, or B2a, B3a, B3c, etc.)  
PE = Population estimates (C1, or C2a, etc.)  
NM = Number of mature individuals (D)  
PX = Probability of extinction (D)

**CITES:** List CITES Appendix on which the species is listed, if appropriate. Indian Wildlife (Protection) Act, 1972; Amendments Act, 1991.

**Other:** List whether the species has been assigned threatened status in other venues, e.g. nationally or in other conservation assessments.

**Taxonomic status:** This indicates the taxonomic status of the extant taxa. Taxonomic uncertainties may be discussed in this section. Subspecies not considered separately should be listed here along with their distribution.

**Historical distribution:** List the historical distribution of the species

**Current distribution: (incl. breeding & wintering, if any)**

List the geographical extent, including breeding and wintering locations of the species.

**Concentrated migration regions:**

List the regions in which migration is concentrated, especially those in which the birds may face some degree of threat.

**Extent of occurrence:**

List the actual size of the area in which the species occurs, if possible. Also list the area contained within the shortest continuous imaginary boundary which can be drawn to encompass all the known, inferred, or projected sites of present occurrence of a taxon, excluding cases of vagrancy (Figure 1). This measure does not take account of discontinuities or disjunctions in the spatial distributions of taxa. Extent of occurrence can often be measured by a minimum convex polygon (the smallest polygon in which no internal angle exceeds 180 degrees and which contains all the sites of occurrence).

A: <100 km<sup>2</sup>  
B: 101 km<sup>2</sup> - 5,000 km<sup>2</sup>  
C: 5,001 km<sup>2</sup> - 20,000 km<sup>2</sup>  
D: >20,001 km<sup>2</sup>

**Area of Occupancy:**

List the area within the 'extent of occurrence' which is actually occupied by a taxon, excluding cases of vagrancy. The measure reflects the fact that a taxon will not usually occur throughout the area of its extent of occurrence, which may, for example, contain unsuitable habitats. The area of occupancy is the smallest area essential at any stage to the survival of a taxon (e.g., colonial nesting sites, feeding sites for migratory taxa). The size of the area of occupancy will be a function of the scale at which it is measured, and should be at a scale appropriate to relevant biological aspects of the taxon. The criteria include values in km<sup>2</sup>, and thus to avoid errors in classification the area of occupancy should be measured on grid squares or equivalents which are sufficiently small (see Figure 1).

A: <10 km<sup>2</sup>  
B: 11 km<sup>2</sup> - 500 km<sup>2</sup>  
C: 501 km<sup>2</sup> - 2,000 km<sup>2</sup>  
D: >2,001 km<sup>2</sup>

**# Locations :**

Note the number of locations. If it is fragmented, indicate "F" after the number of locations.

**Population trends - % change in years or in generations:**

If possible, list the trend of the population (stable, declining, or increasing). If possible, list the percent of change over a particular time frame (e.g., 10 or 20 years) or number of generations. Specify the number of years or generations over which the decline has occurred, e.g., 10% / 2g or 20% / 20yrs.

**Generation time:**

Indicate the number of years in a generation. A generation is defined as the average age of parents in the population.

**World Population:**

List the estimated numbers of pairs in the wild. If specific numbers are unavailable, estimate the general range of the population size.

**Regional Populations:**

List the estimated number of pairs in any particular region for which there are data, followed by the location.

**Data Quality:**

List the actual age of the data used to provide the 'population estimate'. Also list

the type of data from which the estimates are provided.

- 1 = Reliable census or population monitoring
- 2 = General field study
- 3 = Informal field sightings
- 4 = Indirect information (trade numbers, habitat availability)

Any combination of above different data quality in parts of range.

#### Recent field studies:

List any current or recent field studies, the name of the researcher and the location of the study.

#### Threats :

List immediate or predicted events that are or may cause significant population declines. These may include:

- A = Aircraft
- C = Climate
- D = Disease
- Dp= Decline in prey species
- Dr= Drowning
- E = Edaphic factors (change due to fertilisers, pesticides, fire, etc.
- F = Fishing
- G = Genetic problems
- H = Hunting/ Harvest
- Hf= Hunting or Harvest for food
- Hm= Hunting or Harvest for medicine
- Ht= Hunting for trophies or Harvest for timber
- Hyb= Hybridization
- I = Human interference, persecution, or disturbance
- Ic= Interspecific competition
- Ice= Interspecific competition with domestic livestock
- L = Loss of habitat
- La= Loss of habitat because of exotic animals
- Lf= Loss of habitat because of fragmentation
- Lp= Loss of habitat because of exotic plants
- M = Maine perturbations, including El Nino and other shifts
- N = Nutritional disorders or problems
- Ov= Over-exploitation
- P = Predation
- Pe= Predation of exotics
- Ps= Pesticides
- Pl= Powerlines

- Po= Poisoning
- Pu= Pollution
- S = Catastrophic events
- Sd: drought
- Sf: fire
- Sh: hurricane
- St: tsunami
- Sv: Volcano
- T = Trade for the live animal market or medicine
- Tp= Trade for parts, including skins, bone, bark, fruits, etc.
- W = War

**Trade :** Was the species present in Trade according to CITES records? If so, list year(s), or list trade practices and parts in domestic or commercial market or by locals.

**Comments :**Note any additional information that is important with respect to the conservation of the species.

#### Recommendations

##### Research management:

It should be noted that there is (or should be) a clear relationship between threats and subsequent outlined research management actions. The "Research Management" column provides an integrated view of actions to be taken, based on the listed threats. Research management can be defined as a management program which includes a strong feedback between management activities and an evaluation of the efficacy of the management, as well as response of the species to that activity. The categories within the column are as follows:

- T - Taxonomic and morphological genetic studies
- Tl- Translocations
- S - Survey-search and find
- M - Monitoring - to determine population information
- H - Husbandry research
- Hm- Habitat management-management actions primarily intended to protect and/ or enhance the species' habitat (e.g., forest management)
- Lm= Limiting factor management-"research management" activities on known or suspected limiting factors. Management projects have a research component that provide scientifically defensible results.
- Lr= Limiting factor research-research projects aimed at determining limiting factors. Results from this

work may provide management recommendations and future research needs.

- Lh= Life history studies  
O = Other (record in detail on taxon data sheet)

**PHVA:** Is a Population and Habitat Viability Assessment process recommended to develop an intensive management/ recovery plan for the species? Yes, No or Pending further data from surveys or other research.

NOTE\*\* A detailed model of a species' biology is not always needed to make sound management decisions.

### CULTIVATION OR CAPTIVE PROGRAM RECOMMENDATIONS:

- 1 = Level 1 - A captive or cultivation population is recommended as a component of a conservation program. This program has a tentative goal of developing and managing a population sufficient to preserve 90% of the genetic diversity of a population for 100 years (90%/ 100). The program should be further defined with a species management plan encompassing the wild and captive/ cultivation populations and implemented immediately with available stock in captivity/ cultivation. If the current stock is insufficient to meet program goals, a species management encompassing the wild and captive/ cultivation populations and implemented immediately with available stock in captivity/cultivation. If the current stock is insufficient to meet program goals, a species management plan should be developed to specify the need for additional founder stock. If no stock is present in captivity/ cultivation then the program should be developed collaboratively with appropriate wildlife agencies and specialist institutions.
- 2 = Level 2 - Similar to the above except a species/ subspecies management plan would include periodic reinforcement of captive/ cultivated population with new genetic material from the wild. The levels and amount of genetic exchange needed should be defined in terms of the program goals, a population model, and species management plan. It is anticipated that periodic supplementation with new genetic material will allow management of a smaller captive/ cultivated population. The time period for implementation of a Level 2 program will

depend on recommendations made at the CAMP.

- 3 = Level 3 - A captive or cultivation programme is not currently recommended as a demographic or genetic contribution to the conservation of the species/ subspecies but is recommended for education, research, or husbandry.

N = No - A captive or cultivation programme is not currently recommended as a demographic or genetic contribution to the conservation of the species/ subspecies. Taxa already held in captivity or cultivation may be included in this category. In this case species/ subspecies should be evaluated either for management toward a decrease in numbers or for complete elimination from captive or cultivation programs as part of a strategy to accommodate as many species/ subspecies as possible of higher conservation priority as identified in the CAMP or in SSC Action Plans.

P = Pending - A decision on a captive or cultivation programme will depend upon further data either from a PHVA, a survey, or existing identified sources to be queried.

#### Level of difficulty:

What is the level of difficulty in maintaining the species in captive or cultivation conditions

- 1 = Least difficult - Techniques are in place for capture or collection maintenance, and propagation of similar taxa in captivity or cultivation which ostensibly could be applied to the taxon.
- 2 = Moderate difficulty - Techniques are only partially in place for capture or collection maintenance and propagation of similar taxa in captivity or cultivation, any many techniques still need refinement.
- 3 = Very difficult - Techniques are not in place for capture or collection, maintenance, and propagation of similar taxa in captivity or cultivation and techniques still need to be developed.

#### Existing Captive/ Cultivation Population:

Number of individuals in captivity or cultivation according to the International Species Information System, Central Zoo Authority of India, or similar botanical



listing. Please add other information, when available, as the numbers listed consist of only a portion of the captive or cultivated population.

**Sources :**

List sources used for information for the above data. (Author's name, year, title of article or book, journal, issue, and page numbers).

**Compilers:**

List the names of the people who contributed information for this taxon data sheet.

**Assigning New IUCN Red List Categories:**

Each taxa reviewed during the CAMP process is assigned a New IUCN Red List Category of Threat. The process of assigning a taxon to a category of threat relies heavily on the data concerning threats, population numbers, trends, and distribution. CAMP participants should read the paper by Mace and Stuart (1994) in Section 4 of this Manual before beginning this process. The steps in making these evaluations is illustrated in Figure 1. For taxa suspected to be threatened (Critical, Endangered, or Vulnerable), criteria listed Table 1 are used to make the assignment to a threat category. The criteria used to make the assessment (e.g., A1a, B1, D, etc.) should be recorded on the Taxon Data Sheet under "Criteria based on".

**IUCN:** Status according to New IUCN Red List criteria:

**EXTINCT (EX)**

A taxon is **Extinct** when there is no reasonable doubt that its last individual has died.

**EXTINCT IN THE WILD (EW)**

A taxon is **Extinct in the Wild** when it is known only to survive in cultivation, in captivity, or as a naturalized population (or population) well outside the past range.

**CRITICALLY ENDANGERED (CR)**

A taxon is **Critically Endangered** when it is facing an extremely high risk of extinction in the wild in the immediate future as defined by the criteria listed in Table 1.

**ENDANGERED (EN)**

A taxon is **Endangered** when it is not Critical but is facing a very high risk of extinction in the wild in the near future, as defined in the criteria listed in Table 1.

**VULNERABLE**

A taxon is **Vulnerable** when it is not Critical or Endangered but is facing a high risk of extinction in the wild in the medium term future, as defined by the criteria listed in Table 1.

**LOWER RISK (LR)**

A taxon is **Lower Risk** when it has been evaluated and does not qualify for any of the categories - Critical, Endangered, Vulnerable or Data Deficient.

**Conservation Dependent (cd)**

Taxa which do not currently qualify under any of the categories above may be classified as

**Conservation Dependent.**

To be considered

**Conservation Dependent,**

A taxon must be the focus of a continuing taxon-specific or habitat-specific conservation program which directly affects the taxon in question. The cessation of this program would result in the taxon qualifying for one of the threatened categories above.

**Near Threatened (nt)**

A taxon is **Near Threatened** when it is not Critical, Endangered, Vulnerable and is not able to be termed Lower Risk, but is facing a risk of being threatened.

**Least concern (lc)**

A taxon is **Least concern** when it is not **Threatened, Conservation Dependent or Near Threatened.**

**DATA DEFICIENT (DD)**

A taxon is **Data Deficient** when there is inadequate information to make a direct, or indirect, assessment of its risk of extinction based on its distribution and/ or population status.

**NOT EVALUATED (NE)**

A taxon is **Not Evaluated** when it has not yet been assessed against the criteria.

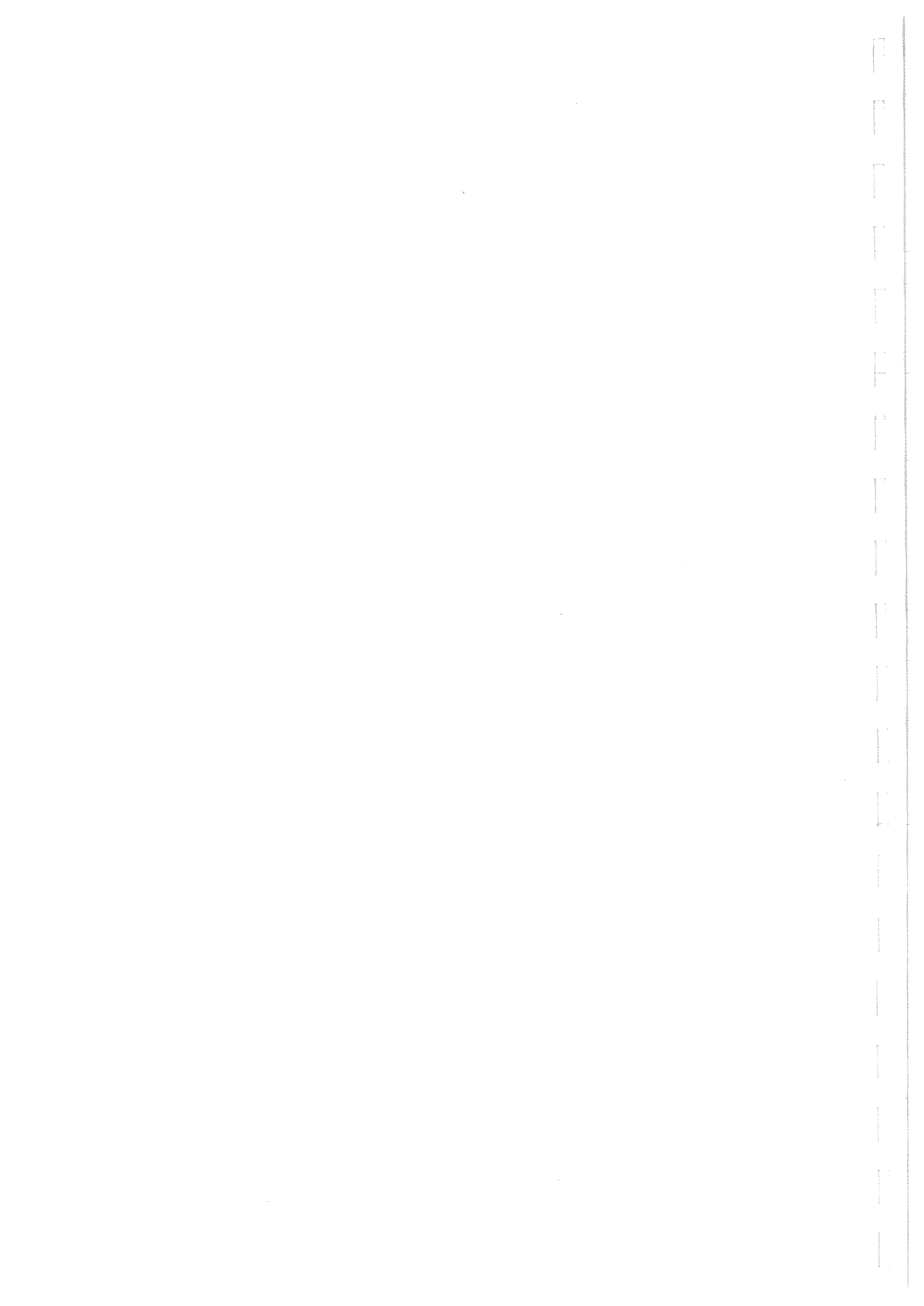
**IUCN RED LIST CATEGORIES**

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**PREPARED BY THE  
IUCN SPECIES SURVIVAL COMMISSION**

**AS APPROVED BY THE  
40TH MEETING OF THE IUCN COUNCIL  
GLAND, SWITZERLAND**

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# IUCN RED LIST CATEGORIES

## I. INTRODUCTION

1. The threatened species categories now used in Red Data Books and Red Lists have been in place, with some modification, for almost 30 years. Since their introduction these categories have become widely recognised internationally, and they are now used in a whole range of publications and listings, produced by IUCN as well as by numerous governmental and non-governmental organisations. The Red Data Book categories provide an easily and widely understood method for highlighting those species under higher extinction risk, so as to focus attention on conservation measures designed to protect them.

2. The need to revise the categories has been recognised for some time. In 1984, the SSC held a symposium, 'The Road to Extinction' (Fitter & Fitter 1987), which examined the issues in some detail, and at which a number of options were considered for the revised system. However, no single proposal resulted. The current phase of development began in 1989 with a request from the SSC Steering Committee to develop a new approach that would provide the conservation community with useful information for action planning.

In revision has several specific aims:

- to provide a system that can be applied consistently by different people;
- to improve the objectivity by providing those using the criteria with clear guidance on how to evaluate different factors which affect risk of extinction;
- to provide a system which will facilitate comparisons across widely different taxa;
- to give people using threatened species lists a better understanding of how individual species were classified.

3. The proposals presented in this document result from a continuing process of drafting, consultation and validation. It was clear that the production of a large number of draft proposals led to some confusion, especially as each draft has been used for classifying some set of species for conservation purposes. To clarify matters, and to open the way for modifications as and when they became necessary, a system for version numbering was applied as follows:

Version 1.0: Mace & Lande(1991)

The first paper discussing a new basis for the categories, and presenting numerical criteria especially relevant for large vertebrates.

Version 2.0: Mace et al.(1992)

A major revision of Version 1.0, including numerical criteria appropriate to all organisms and introducing the non-threatened.

Version 2.1:IUCN (1993)

Following an extensive consultation process within SSC, a number of changes were made to the details of the criteria, and fuller explanation of basic principles was included. A more explicit structure clarified the significance of the non-threatened categories.

Version 2.2 Mace & Stuart(1994)

Following further comments received and additional validation exercises, some minor changes to the criteria were made. In addition, the Susceptible category present in Versions 2.0 and 2.1 was subsumed into the Vulnerable category. A precautionary application of the system was emphasised.

Final Version

This final document, which incorporates changes as a result of comments from IUCN members, was adopted by the IUCN Council in December 1994.

All future taxon lists including categorisations should be based on this version, and not the previous ones.

4. In the rest of this document the proposed system is outlined in several sections. The Preamble presents some basic information about the context and structure of the proposal, and the procedures that are to be followed in applying the definitions to species. This is followed by a section giving definitions of terms used. Finally the definitions are presented, followed by the quantitative criteria used for classification within the threatened categories. It is important for the effective functioning of the new system that all sections are read and understood, and the guidelines followed.

## REFERENCES

- Fitter, R., and M. Fitter, ed.(1987) *The Road to Extinction*. Gland, Switzerland:IUCN.
- IUCN.(1993) Draft IUCN Red List Categories. Gland, Switzerland:IUCN.
- Mace, G.M., et al(1992) "The development of new criteria for listing species on the IUCN Red List." *Species* 19:16-22.
- Mace, G.M., and R.Lande.(1991) "Assessing extinction threats: towards a reevaluation of IUCN threatened species categories." *Conserv. Biol.* 5.2: 148-157.
- Mace, G.M.& S.N.Stuart.(1994) "Draft IUCN Red List Categories, Version 2.2". *Species* 21-22:13-24.

## II. PREAMBLE

The following points present important information on the use and interpretation of the categories(=Critically Endangered, Endangered, etc.), criteria(=A to E), and sub-criteria(= a,b etc., i,ii etc.):

### 1. Taxonomic level and scope of the categorisation process

The criteria can be applied to any taxonomic unit at or below the species level. The term 'taxon' in the following notes, definitions and criteria is used for convenience, and may represent species or lower taxonomic levels, including forms that are not yet formally described. There is a sufficient range among the different criteria to enable the appropriate listing of taxa from the complete taxonomic spectrum, with the

exception of micro-organisms. The criteria may also be applied within any specified geographical or political area although in such cases special notice should be taken of point 11 below. In presenting the results of applying the criteria, the taxonomic unit and area under consideration should be made explicit. The categorisation process should only be applied to wild populations inside their natural range, and to populations resulting from benign introductions(defined in the draft IUCN Guidelines for Re-introductions as "...an attempt to establish a species, for the purposes of conservation, outside its recorded distribution, but within an appropriate habitat and eco-geographical area").

### 2. Nature of the categories

All taxa listed as Critically Endangered qualify for Vulnerable and Endangered, and all listed as Endangered qualify for Vulnerable. Together these categories are described as 'threatened'. The threatened species categories form a part of the overall scheme. It will be possible to place all taxa into one of the categories (see Figure 1).

### 3. Role of the different criteria

For listing as Critically Endangered, Endangered or Vulnerable there is a range of quantitative criteria; meeting any one of these criteria qualifies a taxon for listing at that level of threat. Each species should be evaluated against all the criteria. The different criteria(A-E) are derived from a wide review aimed at detecting risk factors across the broad range of organisms and the diverse life histories they exhibit. Even though some criteria will be inappropriate for certain taxa(some taxa will never qualify under these however close to extinction they come), there should be criteria appropriate for assessing threat levels

for any taxon(other than micro-organisms). The relevant factor is whether any one criteria is met, not whether all are appropriate or all are met. Because it will never be clear which criteria are appropriate for a particular species in advance, each species should

be evaluated against all the criteria, and any criterion met should be listed.

#### **4. Derivation of quantitative criteria**

The quantitative values presented in the various criteria associated with threatened categories were developed through wide consultation and they are set at what are generally judged to be appropriate levels, even if no formal justification for these values exists. The levels for different criteria within categories were set independently but against a common standard. Some broad consistency between them was sought. However, a given taxon should not be expected to meet all criteria (A-E) in a category; meeting any one criterion is sufficient for listing.

#### **5. Implications of listing**

Listing in the categories of Not Evaluated and Data Deficient indicates that no assessment of extinction risk has been, though for different reasons. Until such time as an assessment is made, species listed in these categories should not be treated as if they were non-threatened, and it may be appropriate (especially for Data Deficient forms) to give them the same degree of protection as threatened taxa, at least until their status can be evaluated.

Extinction is assumed here to be a chance process. Thus, a listing in a higher extinction risk category implies a higher expectation of extinction, and over the time-frames specified more taxa listed in a higher category are expected to go extinct than in a lower one (without effective conservation action). However, the persistence of some taxa in high risk categories does not necessarily mean their initial assessment was inaccurate.

#### **6. Data quality and the importance of inference and projection**

The criteria are clearly quantitative in nature. However, the absence of high quality data should not deter attempts at applying the criteria, as methods involving estimation, inference and projection are empha-

sised to be acceptable throughout. Inference and projection may be based on extrapolation of current or potential threats into the future (including their rate of change), or of factors related to population abundance or distribution (including dependence on other taxa), so long as these can reasonably be supported. Suspected or inferred patterns in either the recent past, present or near future can be based on any of a series of related factors, and these factors should be specified.

Taxa at risk from threats posed by future events of low probability but with severe consequences (catastrophes) should be identified by the criteria (e.g. small distributions, few locations). Some threats need to be identified particularly early, and appropriate actions taken, because their effects are irreversible, or nearly so (pathogens, invasive organisms, hybridization).

#### **7. Uncertainty**

The criteria should be applied on the basis of the available evidence on taxon numbers, trend and distribution, making due allowance for statistical and other uncertainties. Given that data are rarely available for the whole range or population of a taxon, it may often be appropriate to use the information that is available to make intelligent inferences about the overall status of the taxon in question. In cases where a wide variation in estimates is found, it is legitimate to apply the precautionary principle and use the estimate (providing it is credible) that leads to listing in the category of highest risk.

Where data are insufficient to assign a category (including Lower Risk), the category of 'Data Deficient' may be assigned. However, it is important to recognise that this category indicates that data are inadequate to determine the degree of threat faced by a taxon, not necessarily that the taxon is poorly known. In cases where there are evident threats to a taxon through, for example, deterioration of its only known habitat, it is important to attempt threatened listing, even though there may be little direct information on the biological status of the taxon itself. The category 'Data Deficient' is not a

threatened category, although it indicates a need to obtain more information on a taxon to determine the appropriate listing.

#### **8. Conservation actions in the listing process**

The criteria for the threatened categories are to be applied to a taxon whatever the level of conservation action affecting it. In cases where it is only conservation action that prevents the taxon from meeting the threatened criteria, the designation of 'Conservation Dependent' is appropriate. It is important to emphasise here that a taxon require conservation action even if it is not listed as threatened.

#### **9. Documentation**

All taxon lists including categorisation resulting from these criteria should state the criteria and sub-criteria that were met. No listing can be accepted as valid unless at least one criterion is given. If more than one criterion or sub-criterion was met, then each should be listed. However, failure to mention a criterion should not necessarily imply that it was not met. Therefore, if a re-evaluation indicates that the documented criterion is no longer met, this should not result in automatic down-listing. Instead, the taxon should be re-evaluated with respect to all criteria to indicate its status. The factors responsible for triggering the criteria, especially where inference and projection are used, should at least be logged by the evaluator, even if they cannot be included in published lists.

#### **10. Threats and priorities**

The category of threat is not necessarily sufficient to determine priorities for conservation action. The category of threat simply provides an assessment of the likelihood of extinction under current circumstances, whereas a system for assessing priorities for action will include numerous other factors concerning conservation action such as costs, logistics, chances of success, and even perhaps the taxonomic distinctiveness of the subject.

#### **11. Use at regional level**

The criteria are most appropriately applied to whole taxa at a global scale, rather than to those units defined by regional or national boundaries. Regionally or nationally based threat categories, which are aimed at including taxa that are threatened at regional or national levels (but not necessarily throughout their global ranges), are best used with two key pieces of information: the global status category for the taxon, and the proportion of the global population or range that occurs within the region or nation. However, if applied at regional or national level it must be recognised that a global category of threat may not be the same as a regional or national category for a particular taxon. For example, taxa classified as Vulnerable on the basis of their global declines in numbers or range might be Lower Risk within a particular region where their populations are stable. Conversely, taxa classified as Lower Risk globally might be Critically Endangered within a particular region where numbers are very small or declining, perhaps only because they are at the margins of their global range. IUCN is still in the process of developing guidelines for the use of national red list categories.

#### **12. Re-evaluation**

Evaluation of taxa against the criteria should be carried out at appropriate intervals. This is especially important for taxa listed under Near Threatened, or Conservation Dependent, and for threatened species whose status is known or suspected to be deteriorating.

#### **13. Transfer between categories**

There are rules to govern the movement of taxa between categories. These are as follows: (A) A taxon may be moved from a category of higher threat to a category of lower threat if none of the criteria of the higher category has been met for 5 years or more. (B) If the original classification is

found to have been erroneous, the taxon may be transferred to the appropriate category or removed from the threatened categories altogether, without delay (but see Section 9). (C) Transfer from categories of lower to higher risk should be made without delay.

#### 14 Problems of scale

Classification based on the sizes of geographic ranges or the patterns of habitat occupancy is complicated by problems of spatial scale. The finer the scale at which the distributions or habitats of taxa are mapped, the smaller will be the area that they are found to occupy. Mapping at finer scales reveals more areas in which the taxon is unrecorded. It is impossible to provide any strict but general rules for mapping taxa or habitats; the most appropriate scale will depend on the taxa in question, and the origin and comprehensiveness of the distributional data. However, the thresholds for some criteria (e.g. Critically Endangered) necessitate mapping at a fine scale.

### III. Definitions

#### 1. Population

Population is defined as the total number of individuals of the taxon. For functional reasons, primarily owing to differences between life-forms, population numbers are expressed as numbers of mature individuals only. In the case of taxa obligately dependent on other taxa for all or part of their life cycles, biologically appropriate values for the host taxon should be used.

#### 2. Subpopulations

Subpopulations are defined as geographically or otherwise distinct groups in the population between which there is little exchange (typically one successful migrant individual or gamete per year or less).

#### 3. Mature individuals

The number of mature individuals is defined as the number of individuals known, estimated or inferred to be capable of re-

production. When estimating this quantity the following points should be borne in mind:

- Where the population is characterised by natural fluctuations the minimum number should be used.
- This measure is intended to count individuals capable of reproduction and should therefore exclude individuals that are environmentally, behaviourally or otherwise reproductively suppressed in the wild.
- In the case of populations with biased adult or breeding sex ratios it is appropriate to use lower estimates for the number of mature individuals which take this into account (e.g. the estimated effective population size).
- Reproducing units within a clone should be counted as individuals, except where such units are unable to survive alone (e.g. corals).
- In the case of taxa that naturally lose all or a subset of mature individuals at some point in their life cycle, the estimate should be made at the appropriate time, when mature individuals are available for breeding.

#### 4. Generation

Generation may be measured as the average age of parents in the population. This is greater than the age at first breeding, except in taxa where individuals breed only once.

#### 5. Continuing decline

A continuing decline is a recent, current or projected future decline whose causes are not known or not adequately controlled and so is liable to continue unless remedial measures are taken. Natural fluctuations will not normally count as a continuing decline, but an observed decline should not be considered to be part of a natural fluctuation unless there is evidence for this.



## 6. Reduction

A reduction (criterion A) is a decline in the number of mature individuals of at least the amount (%) stated over the time period (years) specified, although the decline need not still be continuing. A reduction should not be interpreted as part of a natural fluctuation unless there is good evidence for this. Downward trends that are part of natural fluctuations will not normally count as a reduction

## 7. Extreme fluctuations

Extreme fluctuations occur in a number of taxa where population size or distribution areas varies widely, rapidly and frequently, typically with a variation greater than one order of magnitude (i.e., a tenfold increase or decrease).

## 8. Severely fragmented

Severely fragmented refers to the situation where increased extinction risks to the taxon result from the fact that most individuals within a taxon are found in small and relatively isolated subpopulations. These small subpopulations may go extinct, with a reduced probability of recolonisation

## 9. Extent of occurrence

Extent of occurrence is defined as the area contained within the shortest continuous imaginary boundary which can be drawn to encompass all the known, inferred or projected sites of present occurrence of a taxon, excluding cases of vagrancy. This measure may exclude discontinuities or disjunctions within the overall distributions of taxa (e.g., large areas of obviously unsuitable habitat) (but see 'area of occupancy'). Extent of occurrence can often be measured by a minimum convex polygon (the smallest polygon in which no internal angle exceeds 180 degrees and which contains all the sites of occurrence).

## 10. Area of occupancy

Area of occupancy is defined as the area within its 'extent of occurrence' (see definition) which is occupied by a taxon, exclud-

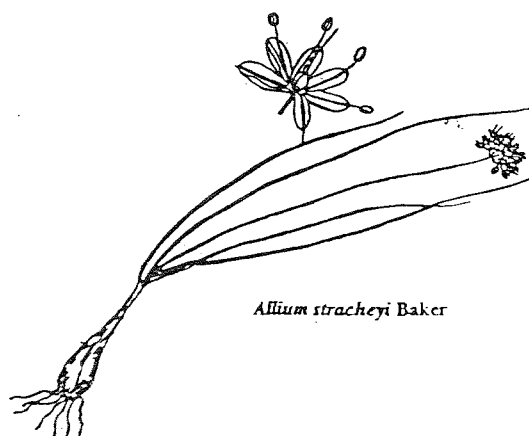
ing cases of vagrancy. The measure reflects the fact that a taxon will not usually occur throughout the area of its extent of occurrence, which may, for example, contain unsuitable habitats. The area of occupancy is the smallest area essential at any stage to the survival of existing populations of a taxon (e.g., colonial nesting sites, feeding sites for migratory taxa). The size of the area of occupancy will be a function of the scale at which it is measured, and should be at a scale appropriate to relevant biological aspects of the taxon. The criteria include values in km<sup>2</sup>, thus to avoid errors in classification, the area of occupancy should be measured on grid squares (or equivalents) which are sufficiently small (see Figure at Pg. 66).

## 11. Location

Location defines a geographically or ecologically distinct area in which a single event (e.g. pollution) will soon affect all individuals of the taxon present. A location usually, but not always, contains all or part of a subpopulation of the taxon, and is typically a small proportion of the taxon's total distribution.

## 12. Quantitative analysis

A quantitative analysis is defined here as the technique of population viability analysis (PVA) or any other quantitative form of analysis, which estimates the extinction probability of a taxon or population based on the known life history and specified management or non-management options. In presenting the results of quantitative analyses the structural equations and the data should be explicit.



*Allium stracheyi* Baker

*Pitching in*



the KULLU CAMP

*by Vinay Tandon*

At one time it was considered the "end of the habitable world", *a la* Penelope Chetwode. That was not very long ago. With Independence in 1947, change began to trickle in. Spurred by the Chinese aggression in 1962, this trickle of change began to swell and sweep the valley. Soon it turned into a deluge. In its wake followed planned development ....schools, health centres, offices, cash crops,....communications. Roads snaked up hitherto forbidden valleys and streaked through primeval forests. Population boomed. Change, like a muddied river in spate, continues unabated. Kullu has transformed. The beautiful "Valley of the Gods" is now on the tourist map. Travellers & tourists have brought a trail of money, business, "progress" and "development".... Kullu has connected with mainstream India & the world. But like for everything else in life, a price had to be paid.

Perhaps from the time the Great Himalaya started lifting itself into the sky, to keep its sides from dissolving down with the streams and rivers and into the ocean, it clothed itself with forests. The forests in turn flourished, harbouring a unique and enormous diversity of life; moderating climatic extremes, regulating moisture regimes and making the Great Plains of the Indian sub-continent habitable. When historical necessity pushed people deeper and deeper into the Himalayas, it was these forests and all that lived in them that made habitation possible here. Man however has betrayed the sanctity of the symbiotic relationship between him and the life-giving forests. Ever since, regrettably, and with accelerating rapidity, as Man has 'developed' the forests have disappeared.

So have many of the species these forests once harboured. Being numerous and common and often ordinary, plant species have been most susceptible to quiet, imperceptible extinction. In the absence of thorough inventorisation, and the

pathetic lack of urgency in doing it, our best checklists will fall far short of what they could have been. And so, before conservation mandarins actually key in "apologies" into their databases (in the name of inventories), we thought we'd hold a little, big CAMP at KULLU!

It was fun and funded. Thanks to the Royal Netherlands, Embassy in New Delhi and the DFID, UK. Of the 40 odd invitees, 32 could attend. It was hard work too. Three days of uninterrupted botanical discussions and doodling. Spring was in the air. Even as apple blossoms metamorphosed from youth into applehood, a bumper crop was being predicted this year. Our motley group enthusiastically selected 51 out of the 73 medicinal plant species proposed for assessment during the workshop. The final tally of species actually assessed came to 42. Nine species, it seems had been so completely forgotten that our collective botanical genius was unable to figure out why we had selected them in the first place! (For results of this CAMP workshop, please see Table V).

### **The Conservation Assessment & Management Plan (CAMP) Workshop**

This was the fourth CAMP organised and conducted at the behest of FRLHT, the Foundation for Revitalisation of Local Health Traditions, Bangalore. It was the first CAMP fully conducted and facilitated by FRLHT. Some other "firsts" of this CAMP include its being the only attempt so far to assign threat status to medicinal plant species of the higher and trans Himalayas in the north west of the country. The species selected generally occur above 3000 metres altitude in the NW Himalayas. The earlier three CAMP workshops organised by FRLHT were for southern India. While assessment of threat status through the CAMP process is being increasingly applied at regional levels as against

GLOBAL assessments done earlier, the Kullu CAMP focussed its attention to state wise assessment for the Indian North West Himalaya. In this case, the status of the selected taxa was assessed separately for the states of Jammu & Kashmir (JMK) and Himachal Pradesh (HP). As a result in some cases different threat status has been arrived at for the same species in the two states.

The significance of this development lies in fine tuning threat assessments to smaller, political units (like states or provinces of a country) because that is the level at which resultant conservation action is most likely to take place and become institutionally funded. Particularly so in the case of plant taxa where because of their wide distribution ranges, consensus on a single and universally applicable threat category would be very difficult to arrive at. Global threat status is much easier to assign when the taxa are endemic or more so in the case of narrow endemic species.

It is hoped that over time and as governments and conservation bodies get to assess plant taxa for threat status in their respective regions, a larger picture will emerge of the situation in the taxon's distribution range, like pieces of a jigsaw puzzle falling into place.

### High Zones In the North Western Himalaya:

Bio-geographically, the NW Himalaya comprises the states of Jammu & Kashmir, Himachal Pradesh and the districts of Tehri-Gharwal and Kumaon in Uttar Pradesh. Because of their higher latitude (between 35 and 28 degrees North), climatic syncopation along the altitude

gradient occurs at lower heights than in the Eastern Himalaya. For instance, the tree line in the NWH is upto 3600 metres as compared to 4570 metres in the east. This along with lower rainfall and colder conditions has an important bearing on the vegetation complexes found in the NW region. For purposes of this CAMP workshop the assessments are applicable to J&K and HP.

It has been estimated that an area of 28,600 sq. kms. Out of a total area of 1,20,827 sq. kms in Ladakh (i.e. Leh and Kargil civil districts) ranges between 3000 and 4500 metres. Similarly, for 4 districts of Himachal Pradesh (i.e. Lahaul & Spiti, Kinnaur, Chamba and Kullu), the area estimated to cover this altitudinal range comes to 9300 sq. kms. Out of a total geographical area of 32,267 sq. kms. for these districts. It may be mentioned that there is in addition much area above 4500 metres altitude in both the states.

Precipitation in Lahaul-Spiti, parts of Kinnaur district and Ladakh is mainly in the form of snow during the cold and long winter. These make up the trans-himalayan cold desert in India. The vegetation is therefore largely tree-less with shrubs or undershrubs in the more protected niches, while perennial herbs and annual grasses pre-dominate the landscape.

For purposes of this workshop medicinal species predominantly found above 3000 metres have been considered. Some occur in the upper fringe of the temperate zone (1800 to 3600 m), while the majority of the medicinal species assessed are restricted to the sub-alpine (3500 – 4000 m) and the alpine zones (4000 – 5500 m).

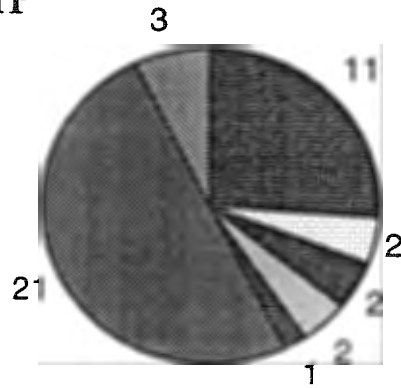
Table I

Number of Species	Altitude Zone	Altitude Range
6	Temperate	1800 – 3500 meters
14	Sub alpine	3500 – 4000 meters
21	Alpine	4000 – 5500 meters
1 ( Data deficient )		
42 ( Total species assessed )		

### Findings of the workshop:

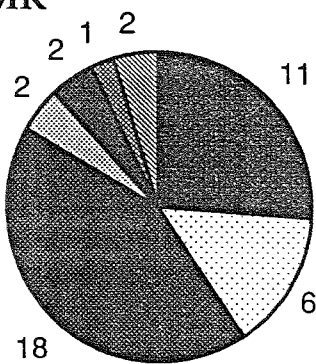
Of the 42 medicinal species assessed, separately for Jammu & Kashmir and Himachal Pradesh, the details of the threat categories assigned can be seen in Table V. A summary of the threat categories for each state are illustrated in the pie diagrams below:

HP



EN	11
CR	2
LR-NT	2
LR-LC	2
DD	1
VU	21
NE	3

JMK



EN	11
CR	6
VU	18
LR-NT	2
LR-LC	2
DD	1
NE	2

Table II

## Comparison of Threat Categories assigned at Lucknow and Kullu CAMPs

SLNo.	BOTANICAL NAME	Lucknow (CAMP)	JMK (Kullu)	HP (Kullu)	REMARKS
1	<i>Aconitum diennorrhizum</i>	CR/NW (PR+RD)	EN	EN	
2	<i>Aconitum heterophyllum</i>	CR/NW (Res. Dist.??)	EN	EN	
3	<i>Aconitum violaceum</i>	CR/NW (PR+RD)	VU	VU	
4	<i>Angelica glauca</i>	CR/NW (PR)	EN	EN	
5	<i>Arnebia benthamii</i>	CR/NW (PR)	CR	CR	Same assessment
6	<i>Dactylorhiza batagrica</i>	CR/NW (PR)	CR	CR	Do
7	<i>Fritillaria roylei</i>	CR/NW (PR)	CR	EN	
8	<i>Gentiana kurroo</i>	CR/NW (PR)	CR	EN	
9	<i>Heracleum lanatum</i>	EN/NW (PR)	VU	VU	
10	<i>Inula racemosa</i>	CR/NW (PR)	NE	NE	
11	<i>Jurinea dolomiaca</i>	LR-NT/NW	EN	VU	
12	<i>Meconopsis aculeata</i>	CR/NW (PR+RD)	EN	VU	
13	<i>Nardostachys grandiflora</i>	CR-NW (PR)	NE	EN	Not yet recorded in JMK
14	<i>Picrorhiza kurroa</i>	EN/NW	EN	EN	Same assessment
15	<i>Podophyllum hexandrum</i>	CR/NW - NE	EN	EN	
16	<i>Polygonatum verticillatum</i>	ER - NW	VU	VU	
17	<i>Rheum australe</i>	VU/NW	VU	VU	Do
18	<i>Rhododendron ambopogon</i>	VU/NE	VU	VU	
19	<i>Saussurea gossypiphora</i>	EN/NW	VU	EN	
20	<i>Saussurea castus</i>	CR/NW (RD)	CR	NE	Not wild from HP
21	<i>Saussurea obvallata</i>	EN - NW	VU	VU	

The criteria for assigning threat categories for both JMK & HP in the table above is population reduction. It can be seen that this is also the principal criterion for threat categorisation in the Lucknow CAMP. However, despite this common criterion the threat categories assigned in the two CAMPs are very different. Out of the 21 common species assessed, only four have been assigned the same threat category in both the CAMPs. It is also observed that since the extent of occurrence has been recorded as more than 20000 sq.km. for the above species, the criterion of restricted distribution in terms of extent of occurrence would not be applicable for assigning threat categories to these species. As has been highlighted earlier, the need to assess plant taxa over internationally accepted geo-political units ( in this case, these two states) comes out forcefully with the different threat categories

assessed for the same species in the two states. Of course this has been preceded by a rigorous pre- CAMP exercise resulting in compilation of existing data from either published literature or the participants themselves. One species each have not yet been recorded/ reported from JMK & HP. It is interesting to note that *Inula racemosa* which has been categorised as Critically Endangered in the previous CAMP has not been recorded from the wild either in JMK or HP, and hence could not be evaluated. It may also be mentioned that in the previous CAMPs the exact areas comprising the North West Himalaya has not been spelt out. The Indian North West Himalaya comprises the states of JMK & HP and the districts of Tehri-Gharwal & Kumaon in UP. In the Kullu CAMP assessments apply to only JMK & HP.

Some of the more emergent issues concerning the CAMP process and its application and the need for pre-CAMP exercises for better assessment during the process are discussed below:

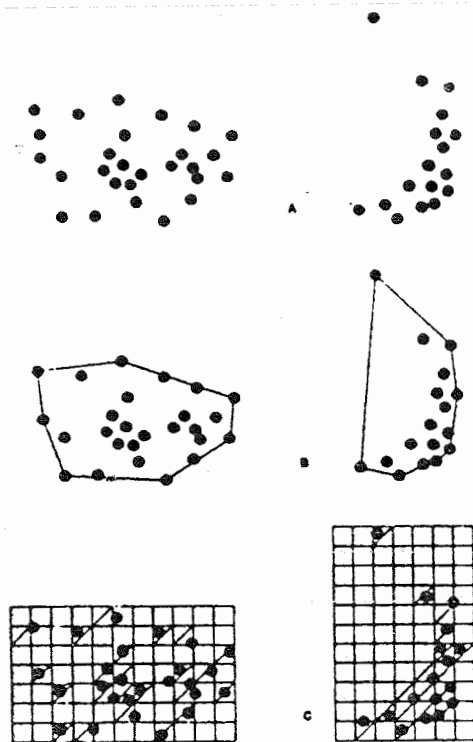
### *I Extent of Occurrence & Botanical Surveys*

An analysis of the 42 species assessed during the Kullu CAMP shows that the overwhelming criteria applied to assign threat categories is population reduction (PR). This is an assessment (often an informed guesstimate) of the rate of population decline expressed as a percentage over a ten year period or 3 generations whichever is longer. Only in the case of *Aconitum chamanthum* has the category been based on Extent of Occurrence.

While this population reduction is arrived at and often correlates with increased trade which in turn leads to over exploitation in the wild, it may be noted that more often than not trade figures at local, regional, national or global levels are woefully lacking. What is known is that a situation of extant "free riding" is prevalent in the field out of a fear that "if I don't collect, then somebody else will". The consequent decline in the quality of raw drugs now being collected is widely corroborated by traders. One trader in Kullu was able to show 3 different samples of Aconites, all three differently priced because of their quality, mostly determined by thickness and size of the dried roots. The Table II showing the decline in traded quantities in Kullu over the last 3 decades indicates that one of the factors for this reduction has been over exploitation of a species due to pressures of "free riding".

The question of extent of occurrence, however, remains elusive. Several views were expressed by the participants of the need to carry out botanical surveys according to a well designed sample within the distribution range of the species. On the other hand considering that the range of many of the species is over 20,000 sq. kms. even a small sampling could fall short on funds, time and expertise. The flowering and fruiting season

*Extent of Occurrence* is defined as the area contained within the shortest continuous imaginary boundary, which can be drawn to encompass all the known, Inferred or projected sites of present occurrence of a taxon, excluding cases of vagrancy.



Two examples of the distinction between extent of occurrence and area of occupancy.

- Is the spatial distribution of known, inferred or projected sites of occurrence.
- Shows one possible boundary to the extent of occurrence, which is the measured area within this boundary.
- Shows one measure of area of occupancy which can be measured by the sum of the occupied grid squares.

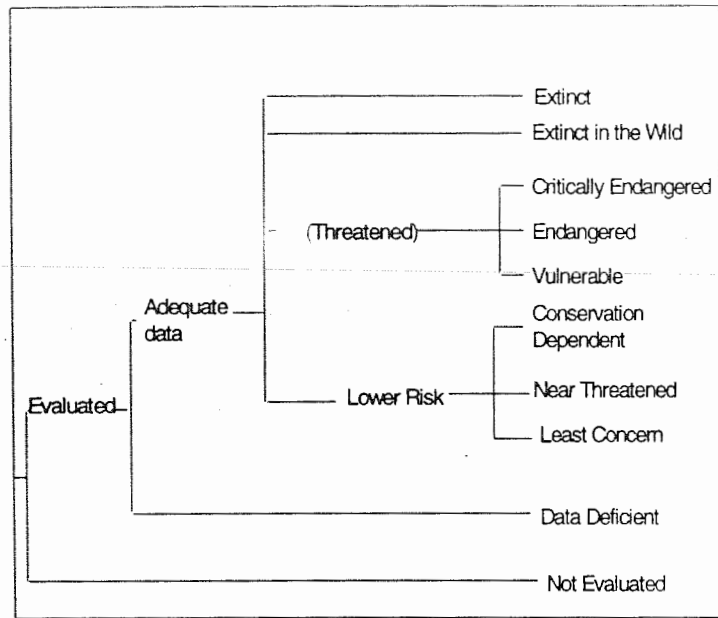
This measure may exclude discontinuities or disjunctions within the overall distributions of taxa (e.g. large areas of obviously unsuitable habitat). Extent of occurrence can often be measured by a minimum convex polygon (the smallest in which no internal angle exceeds 180 degrees and which contains all the sites of occurrence).

for species at that altitude being generally less than 2 months would make this task even more difficult. Not that all this in anyway minimises the importance of the task. What does emerge is that in the absence of any recent botanical surveys and those too according to a sampling design, the criteria that would remain perhaps as the only option for assigning threat categories would continue to be population reduction, real or apprehended.

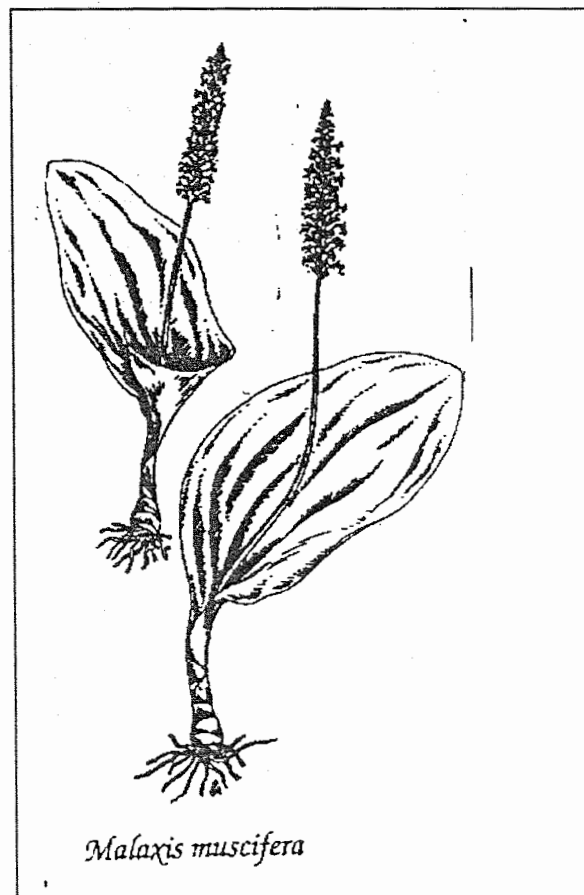
One option could be to start such surveys in Protected Areas of the states. The Protected Area (PA) network in the NW Himalayas is fairly spread out and representative of the major vegetation types. Some of these areas like the Hemis national park in Ladakh are very big. (C.>5000 KM<sup>2</sup>) Most of these national parks or wildlife sanctuaries also have within substantial variation in forest types and habitats. This provides an excellent format for carrying out botanical survey work. Since the PA network is largely centrally funded and can avail technical and man-power support form institutions like the Wildlife Institute of India, Dehradun and other local universities, steps could be initiated by the forest / wildlife department to undertake atleast representative botanical surveys across the PA network in the NW Himalaya.

## II "Rooted" TRADE .....

"Roots" are best sellers (even before Alex Haley!) or so it would seem for the vast majority of medicinal herbs in the NW Himalaya. It is the ROOT or RHIZOME or BULB that is the plant part most widespread in use and hence most traded as a raw drug. In the present case, of the 42 species assessed 32 are traded for their roots. This naturally leads to a practice of destructive collection or harvest. Where it is not the root, the whole plant is harvested and traded. This is equally destructive. Table II shows the plant part(s) which are used and hence normally traded as raw drugs.



IUCN RED LIST CATEGORIES



Threat Category	No of Species *	Plant part as raw drug
Critically Endangered	6	All as Roots/ rhizome/ bulbs
Endangered	15	All in roots; except <i>Artimesia maritima</i> for aerial parts; <i>Betula utilis</i> for bark; <i>Ephedra gerardiana</i> for twigs;
Vulnerable	22	All in roots, except <i>Physochliana praelta</i> in leaves; <i>Meconopsis aculeata</i> in fruit/ seeds; 3 species of <i>Rhododendron</i> for leaves;
Lower Risk – near threatened	2	<i>Hyoscyamus niger</i> for twigs and seeds; <i>Hippophae rhamnoides</i> for fruit;
Lower Risk – least concern	2	Roots for 2 species of <i>Selinum</i>
Data deficient	2	
Not Evaluated	2	

\* with overlap in the 2 states

#### ...and its DECLINE

Decline in wild collected medicinal plants over the last many decades has been taking place. For some of the species assessed during the Kullu CAMP, data was obtained from a Kullu medicinal plants trader who has been over 40 years in the business (See Table III). Shri Bahadur Singh Negi of VPO Kias, in Upper Kullu valley blames, besides declining availability, the variation in market rates, which in turn depend upon the quality of the raw drugs collected. Besides Kullu, Negi's area of operation for herb trade has extended to Lahaul & Spiti as well as Kinnaur districts and sometimes even Chamba.

Mr Negi was emphatic that the HP Government's Order (1994), greatly increasing the royalty rates of medicinal herbs exported

from the state has led to a lot of the trade having gone underground. A Local Forest Range Officer who said that in the current year no one has asked for a permit to export "gucchi" (*Morcella esculenta*) from his range later corroborated this. Morels are the most important source of cash income to local forest side people in the Kullu valley. Increased illegal collection and trade in medicinal herbs will make regulation of collection from the wild even more difficult for the forest department. Further with improved communications many local agents and middlemen now prefer to market the raw drugs directly in Delhi and Amritsar, thus leaving out the established merchants like himself. This could be good!



Table IV

### Estimation of volume of trade in Kullu valley over 3 decades ( B S Negi, 1998)

Quantities in '00 kilograms

Species	Plant part	Average annual trade		
		1970 - 79	1980 - 89	1990 - 98
<i>Aconitum heterophyllum</i>	Root	40	20	10
<i>Jurinea dolomiaea</i>	Root	250	200	175
<i>Picrorhiza kurrooa</i>	Root	800	400	200
<i>Podophyllum hexandrum</i>	Root	200	100	20
<i>Dactylorhiza hatagirea</i>	Rhizome	50	30	20
<i>Ephedra gerardiana</i>	Twigs	200	100	nil
<i>Selinum vaginatum</i>	Root	20	20	20
<i>Rhododendron Campanulatum</i>	Leaves	40	45	40

these need much strengthening.

### III The Issue of Sustainable Harvest?

When roots, rhizomes, bark or the whole plant is extracted it constitutes destructive harvest, just like we do in agriculture. In such cases the plant has to die. Over collection of flowers, fruit and seeds can adversely affect the species' regeneration in the wild. There could be other reasons for any particular species' decline in the wild. Research in species biology and conservation science related to specific ecosystems is still in its infancy. While possibilities of getting technological fixes for specific species related problems can be found (and ought to be), it must be appreciated that conservation action lies in implementation. And this implementation is not a onetime affair. To sustain the effort, institutional commitment and community stake and involvement have to be fostered. Thus to make technological and management solutions work over the long term, the underlying institutional mechanisms must first be there. And often

It is well known that "free riding" is extant in our common property resources (CPRs). Most reasons for this are well understood and copiously documented. But due to several reasons, many of that are essentially political, our institutional mechanisms even where they exist are unable to regulate leave alone control the use of CPRs. It is these sociological, political and economic issues at the local level that need to be addressed and understood first before any practices of sustainable harvest can be put in place.

The Joint Forest Management (JFM) models being developed all over the country does hold promise of adequately addressing these issues. Unfortunately, JFM is restricted to already degraded forests where NTFP collections may not be economic or feasible. The collection of medicinal plants and most NTFPs take place in good forests and extending the JFM model or its modified ver-

sions to these forests seems a pre-requisite before sustainable harvest of NTFP including medicinal plants can be institutionally managed.

In the case of the high altitude medicinal species of the NW Himalaya, we are looking at mostly treeless areas dominated where they are accessible, by sub-alpine and alpine meadows. Many of these meadows come under heavy grazing pressure (of local and migratory herds) during the summer season, a time when most species are either flowering, fruiting and the seeds are getting ripe. In such areas issues pertaining to sustainable harvest have another dimension and conventional JFM models even if they are practicable may not work. The 'rights' to grazing, just like in the case of medicinal herb collection, are legally admitted in various 'forest settlements' across the Himalayas.

The basic issues thus underlying sustainable harvest and management are complex. Often non destructive harvesting techniques are mixed up with sustainable harvest. Security of tenure to local communities over control of the CPR, local level and self-managed mechanisms for equitable sharing of resources and benefits and enforcing rules need to develop to ensure long-term conservation in the wild and sustainable use of NTFP in general and medicinal plants in particular.

#### ***IV The Cultivation versus Collection confusion :***

When it comes to the conservation of the threatened species, often by way of an immediate and standard response, cultivation of the species is recommended. Mass propagation through tissue culture is readily advocated. Research institutions talk of developing agro-technology. While a lot of this may be well intended, it is usually springs from an over simplified notion of the idea that if a species is "cultivated" it will automatically lead to conservation of its wild stock.

*( P.S. Thanks are due to Mr D K Ved for his suggestions and Ms Meera Iyer for editing and DTP work )*

This "belief" betrays inadequate understanding of issues that surround both cultivation and conservation of species in the wild. In the present case, where species found above 3000 metres are involved, "cultivation" as the term is generally understood, can be ruled out at those altitudes in the Himalayas. Any form of cultivation would be ecologically unsound and inevitably result in habitat degradation, presuming that it might make economic sense to do so up there.

The point to understand, however, is that even if large scale cultivation of a given threatened species can be made successful with huge technological, material and financial inputs (obviously for industrial use and by the big farmer), it would not result in conservation of that species in the wild. The main reason being that wild collection of medicinal herbs is a livelihood activity. For tribals and forest-side people it is often an important, sometimes the only source of cash income. Such stakeholders would continue to collect from the forests, herbs or NTFPs for whatever they are worth. Further because of fact that wild collected medicinal plants are cheaper due to the exploitative nature of the business, it suits the middlemen, the traders and the industrialist or exporter.

Knee-jerk reactions advocating cultivation further side track the real issue of improving *in situ* conservation and management of forest and alpine pastures. This is crucial particularly for threatened species where a stage of having viable, breeding populations would be an indication of the health of a species and its likelihood of staying there. Today, when 95% of the raw materials for medicinal trade or industry are wild collected, threatening many medicinal species with extinction, the paramount need, necessity and priority is to better manage our wild resources for sustained production. Other measures need to complement this concern, not detract from it.

## The 42 medicinal species assessed at the Kullu CAMP - CATEGORISED

## Jammu &amp; Kashmir

## CRITICALLY ENDANGERED-CR

- 1 *Aconitum chasmanthum*
- 2 *Arnebia benthamii*
- 3 *Dactylorhiza hatagirea*
- 4 *Fritillaria roylei*
- 5 *Gentiana kurroo*
- 6 *Saussurea costus*

## ENDANGERED-EN

- 1 *Aconitum dienorrhizum*
- 2 *Aconitum heterophyllum*
- 3 *Angelica glauca*
- 4 *Arnebia euchroma*
- 5 *Artemisia maritima*
- 6 *Betula utilis*
- 7 *Ephedra gerardiana*
- 8 *Jurinea dolomiaea*
- 9 *Meconopsis aculeata*
- 10 *Picrorhiza kurroo*
- 11 *Podophyllum hexandrum*

## VULNERABLE-VU

- 1 *Aconitum violaceum*
- 2 *Allium stracheyi*
- 3 *Bergenia stracheyi*
- 4 *Ferula joeschkeana*
- 5 *Heracleum lanatum*
- 6 *Malaxis muscifera*
- 7 *Physochlaena prealta*
- 8 *Polygonatum multiflorum*
- 9 *Polygonatum verticillatum*
- 10 *Rheum australe*
- 11 *Rheum moorcroftianum*
- 12 *Rheum spiciforme*
- 13 *Rheum webbianum*
- 14 *Rhododendron anthopogon*
- 15 *Rhododendron campanulatum*
- 16 *Rhododendron lepidotum*
- 17 *Saussurea gossypiphora*
- 18 *Saussurea obvallata*

## LOWER RISK-NEAR THREATENED-LR-NT

- 1 *Hippophae rhamnoides*
- 2 *Hyoscyamus niger*

## LOWER RISK-LEAST CONCERN-LR-LC

- 1 *Selinum tenuifolium*
- 2 *Selinum vaginatum*

## DATA DEFICIENT-DD

- 1 *Ferula narthex*

## NOT EVALUATED-NE

- 1 *Inula racemosa*
- 2 *Nardostachys grandiflora*

## Himachal Pradesh

## CRITICALLY ENDANGERED-CR

- 1 *Arnebia benthamii*
- 2 *Dactylorhiza hatagirea*

## ENDANGERED-EN

- 1 *Aconitum dienorrhizum*
- 2 *Aconitum heterophyllum*
- 3 *Angelica glauca*
- 4 *Arnebia euchroma*
- 5 *Betula utilis*
- 6 *Gentiana kurroo*
- 7 *Fritillaria roylei*
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- 20 *Rhododendron lepidotum*
- 21 *Saussurea obvallata*

## LOWER RISK-NEAR THREATENED-LR-NT

- 1 *Hippophae rhamnoides*
- 2 *Hyoscyamus niger*

## LOWER RISK-LEAST CONCERN-LR-LC

- 1 *Selinum tenuifolium*
- 2 *Selinum vaginatum*

## DATA DEFICIENT-DD

- 1 *Aconitum chasmanthum*

## NOT EVALUATED-NE

- 1 *Inula racemosa*
- 2 *Saussurea costus*
- 3 *Ferula narthex*

**Medicinal Plants categorised according to new IUCN Red List Criteria under the Biodiversity Conservation Prioritisation Project by a Conservation Assessment and Management Plan Workshop Process**  
 WWF, India, ZOO/CBSG, India, U.P. Forest Department  
 21-25 January 1997, Kukrail Park, Lucknow

**CRITICAL**

Aconitum balfourii - CR-NW  
 Aconitum deinorrhizum-CR-NW  
 Aconitum falconeri-CR-NW  
 Aconitum ferox-CR-NW  
 Aconitum heterophyllum-CR-NW  
 Aconitum violaceum-CR-NW  
 Acorus calamus-CR(?) -NE  
 Angelica glauca-CR-NW  
 Aquilaria malaccensis-CR-NE  
 Arnebia benthamii-CR-NE  
 Atropa acuminata-CR-NW  
 Berberis kashmirana-CR-NW  
 Berberis petiolaris-CR-NW  
 Butea monosperma varlutea CR-CEN  
 Craterostigma plantagineum CR-CEN  
 Craterostigma plantagineum CR-CEN  
 Dactylorhiza hatagirea-CR-NW  
 Delphinium denudatum-CR-NW  
 Dioscorea deltoidea-CR-NW  
 Fritillaria roylei-CR-NW  
 Gentiana kurroo-CR-NW  
 Hedychium coronarium-CR-CEN  
 Inula racemosa-CR-NW  
 Ilex khasiana-CR-NE  
 Luvunga scandens-CR-NE  
 Meconopsis aculeata-CR-NE  
 Nardostachys jatamansi-CR-NW  
 Nepenthes khasiana-CR-NE  
 Nepenthes khasiana-CR-NE  
 Panax pseudoginseng-CR-NE  
 Podophyllum hexandrum-CR-NE  
 Podophyllum hexandrum-CR-NW  
 Prazwalskia tangutica-CR-NE  
 Saussurea costus-CR-NW  
 Swertia chirayita-CR-NW  
 Taxus wallichiana-CR-NE  
 Valerinea jatamansi-CR-NE

**ENDANGERED**

Berberis aristata-EN-NW  
 Berberis chitria-EN-NW  
 Berberis lycium-EN-NW  
 Bunium persicum-EN-NW  
 Coptis teeta-EN-NE  
 Curculigo orchioidea-EN-CEN  
 Gastrochilus longiflora-EN-NE  
 Gloriosa superba-EN-CEN  
 Heracleum candicans-EN-NW  
 Hydnocarpus kurzii-EN-NW

Picrorhiza kurroa-EN-NE  
 Polygonatum verticillatum-EN-NW  
 Rauwolfia serpentina-EN-CEN  
 Rheum nobile-EN-NE  
 Saussurea gossypiphora-EN-NW  
 Saussurea obvallata-EN-NW  
 Swertia angustifolia-EN-CEN  
**VULNERABLE**

Bergenia ligulata-VU-NW  
 Clerodendrum colebrookiantum-VU  
 Clerodendrum serratum-VU-CEN  
 Cordia rothii-VU-CEN  
 Curcuma angustifolia-vu-cen  
 Gymnema sylvestre-VU-CEN  
 Hedychium spicatum-VU-NW  
 Ipomoea turpethum-VU-CEN  
 Lavatera cashmeriana-VU-NW  
 Paeonia emodi-VU(?) -NW  
 Rheum australe-VU-NW  
 Rhododendron anthopogon-VU-NE  
 Rhus semialata VU-NE  
 Thalictrum foliolosum VU-NW  
 Tylophora asthmatica-VU-CEN  
 Urginea indica-VU-CEN

**LOW RISK-NEAR THREATENED**

Baliospermum montanum LR-NT-CEN  
 Celastrus paniculata LR-NT-CEN  
 Cinnamomum tamala-LT/NT-NW  
 Jurinea dolomiaea-LR/NT-NW

**LOW RISK-LEAST CONCERN**

Evolvulus alsinoides-LR-LC-CEN

**Institutions and Organisations represented Medicinal Plants CAMP for Selected Plants of Northeast, Northwest and Central India, Lucknow, 1997**

(AY) Plants Research Division, CCRAS, Regional Res. Centre, Mandi  
 Botany Department, Calcutta University  
 Botanical Survey of India, Calcutta  
 Central Institute of Medicinal and Aromatic Plants, Lucknow  
 Centre for Minor Forest Products  
 Central Drug Research Institute, Lucknow  
 CCRAS, Govt. of India, Tarikhet  
 Conservation Breeding Specialist Group, India, Coimbatore  
 Environment and Forest Department, Aizawl, Mizoram  
 Forest Dept. of U.P., Lucknow, U.P.P  
 Foundation for Revitalisation of Local Health Traditions, Bangalore  
 Herbal Research and Development Institute, Gopeshwar  
 Indian Institute of Forest Management, Bhopal  
 IUCN Invasive spp. Specialist Group  
 National Bureau of Plant Genetic Resources, New Delhi  
 National Bureau of Fish Genetic Resources, Lucknow(observers)  
 Panchayat College, Dept. of Botany, Orissa  
 Regional Research Laboratory CSIR, Jammu  
 Salim Ali Centre for Ornithology and Natural History, Ch'e.  
 World Wild Fund for Nature, India, New Delhi  
 Wildlife Institute of India, Dehra Dun  
 Zoo Outreach Organisation, Coimbatore

## Trade/ Local Names Of Medicinal Plants

	BOTANICAL NAME/ (HABIT)	FAMILY	LOCAL NAME
1	<i>Abies spectabilis</i> (D.Don) Mirbal	Coniferae	Poe/ Talispatra
2	<i>Aconitum heterophyllum</i> Wall. ex Royle (H)	Ranunculaceae	Patish/ Atis
3	<i>Aconitum gammiei</i> Stap.(H)	Kanunculaceae	Patish
4	<i>Aconitum violaceum</i> Jacquem exstapf.(H)	Ranunculaceae	Mitha/Mithi patish
5	<i>Acorus calamus</i> Linn. (H)	Araceae	Bach, baj
6	<i>Adiantum lanulatum</i> Burn. (H)	Adiantaceae	Dusgtuui
7	<i>Ainsliaea aprta</i> D.C. (H)	Asteraceae	Sathjalari
8	<i>Angelica glauca</i> Edgew. (H)	Apiaceae	Chora
9	<i>Artemisia brevifolia</i> Wall. (LS)	Asteraceae	Seski
10	<i>Arnebia benthamii</i> (Wall.ex.G.Don) Johnston	Boraginaceae	Rattan jot
11	<i>Arnebia euchroma</i> (Royle) John	Boraginaceae	Rattan jot
12	<i>Atropa acuminata</i> Royle.(H)	Solanaceae	Jharka
13	<i>Bunium persicum</i> (Boiss) B.Fedtsch (H)	Apiaceae	Kala-zira
14	<i>Berberis aristata</i> D.C. (S)	Berberidaceae	Kasmal
15	<i>Berberis vulgaris</i> Linn. (S)	Berberidaceae	Kasmal
16	<i>Berberis lycium</i> Royle. (S)	Berberidaceae	Kirmora/ Kasmal
17	<i>Betula utilis</i> D.Don. (T)	Betulaceae	Bhojpatr
18	<i>Berginia ciliata</i> (Haw) Sternb.	Saxifragaceae	Pashanbhed/Sabla
19	<i>Cinnamomum tamala</i> Fr.Nees. (T)	Lauraceae	Tejpatta
20	<i>Centella asiatica</i> Linn. (H)	Apiaceae	Brahmi
21	<i>Dactylorhiza hatagirea</i> (D.Don)Soo. Soo (Terr.O)	Orchidaceae	Salam panja/ Hath panja
22	<i>Dioscorea deltoidea</i> ,Wall. (Cl.S)	Dioscoriaceae	Singlimingli
23	<i>Ephedra gerardiana</i> (L)	Gnetaceae	Sachur/ somlata
24	<i>Girardinia diversifolia</i> (Link) (H)	Urticaceae	Bichhubutti
25	<i>Hedychium acuminatum</i> Rose. (H)	Scitamineaceae	Kapoor kachri
26	<i>Heracleum candicans</i> Wall ex DC (H)	Apiaceae	Patishan rooli
27	<i>Hyoscyamus niger</i> Linn. (H)	Solanaceae	Kurasaniajwain
28	<i>Inula racemosa</i> Hook. (H)	Asteraceae	Manu/ Poshkar mool
29	<i>Jurinea dolomiaea</i> Biois (S)	Asteraceae	Dhoop
30	<i>Morchella esculenta</i> (Saprophyte)	Pezizales	Guchhi
31	<i>Nardostachys grandiflora</i> D.C. (H)	Valerianaceae	Nihanu/ Jatamansi/ Balchad
32	<i>Parmelia</i> spp.	Lichens	Mehandi
33	<i>Picrorhiza kurrooa</i> Benth. (H)	Scrophulariaceae	Karoo/Kutki/Kaur
34	<i>Pinus wallichiana</i> Jakson. (T)	Pinaceae	Kail cones
35	<i>Pistacia integririma</i> Stew. (T)	Anacardiaceae	Kakarsinghi
36	<i>Podophyllum hexandrum</i> Royle. (H)	Berberidaceae	Bankakri
37	<i>Polygonatum verticillatum</i> Aallioni (H); <i>P. amplexicaule</i> (H)	Liliaceae	Salam misri
38	<i>Potentilla nepalensis</i> Hook.(H)	Rosaceae	Dori ghas
39	<i>Rheum australe</i> D.Don (H)	Polygonaceae	Rewarchini/chuchhi
40	<i>Rhododendron campanulatum</i> D.Don. (S)	Ericaceae	Kashmiri patha
41	<i>Selinum vaginatum</i> Clarke. (H)	Apiaceae	Butkesri
42	<i>Salvia moorcroftiana</i> Wall. (H)	Lamiaceae	Tuth
43	<i>Swertia chirata</i> Ham. (H)	Gentianaceae	Chiratha
44	<i>Taxus baccata</i> Linn.(T)	Coniferae	Bimri-rakhal
45	<i>Thalictrum foliolosum</i> Linn. (H)	Ranunculaceae	Mamira
46	<i>Thalictrum alpinum</i> Linn	Ranunculaceae	Mamira
47	<i>Thymus sechyllum</i> Linn. (H)	Lamiaceae	Banjwain
48	<i>Tinospora cordifolia</i> Miers. (Cl.S)	Menispermaceae	Gloe, Galoi/Gulchhe
49	<i>Valeriana jatamansii</i> Jones	Valerianaceae	Muskhabala
50	<i>Valeriana hardwickii</i> R.S. (H)	Valerianaceae	Nihani
51	<i>Viola canescens</i> Wall. (H)	Violaceae	Banafsha
52	<i>Viola biflora</i> Linn (H)	Violaceae	Banafsha
53	<i>Viola pilosa</i> Blume (H)	Violaceae	Banafsha

Tree (T), Herb (H), Large Shrub (LS), Shrub (S), Terrestrial Orchid (Terr.O), Climbing Shrub (Cl.S), Liana (L)

## Select Bibliography:

### *Floristic Reports and Publications concerning Northwestern Himalaya*

1. Aitchison (1864). *Flora of Lahaul*.
2. Aitchison (1982) *A Catalogue of Plants of Punjab and Sindh*. Bishen Singh Mahendra Pal Singh, Dehradun
3. Aitchison (1989) *Flora of the Himalaya with special reference to Kumaon, Garhwal and part of Tibet*, Cosmic Publications, New Delhi.
4. Aswal B S and Mehrotra B N (1994) *Flora of Lahaul-Spiti*. Bishen Singh Mahendra Pal Singh, Dehradun
5. Bajaj Manjul (Feb. 1997) *Medicinal Plants and other Non Timber Forest Products in Himachal Pradesh*.
6. Banerjee S P, Pramanik B B (1983) *The Fascicles of India Fascicle 12* Violaceae, Botanical Survey of India, Calcutta.
7. Chaudhuri A B (1993) *Forest Plants of Eastern India*. Efficient Offset Printers, Delhi.
8. Chopra R N (1992) *Glossary of Indian Medicinal Plants*. Publication and Information Directorate Council of Scientific and Industrial Research, New Delhi.
9. Chowdhery H J and Wadhwa B M (1994). *Flora of Himachal Pradesh*. Vols. 1 to 3 Botanical Survey of India, Calcutta.
10. Collett H Reprint (1980) *Flora Simlensis*. Bisen Singh Mahendra Pal Singh, Dehradun.
11. Coventry B D Reprint (1984) *Wild Flowers of Kashmir*. Series 1 to 3. Bishen Singh Mahendra Pal Singh, Dehradun.
12. Dang R (1993) *Flowers of the Western Himalaya*. Indus, New Delhi.
13. Debrath H S and Nayar M P (1984) *The Fascicles of India Fascicle 17*. Papaveraceae and Hyperoaceae. Botanical Survey of India, Calcutta.
14. Dhar U and Kachroo P (1983) *Alpine Flora of Kashmir Himalaya*. Scientific Publishers, Jodpur.
15. Gupta B L (1927) *Forest Flora of the Chakrata. Dehradun and Saharanpur Forest Divisions*. U.P (Third Edition) Periodical Expert Book Agency, Delhi.
16. Gupta R K (1998) *The Living Himalaya* Vol. 2 Today and Tomorrows Printers and Publishers, New Delhi
17. Hajra P K and Verma D M (1996). *Flora of Sikkim*. Vol. 1 (Monocotyledons) Botanical Survey of India, Calcutta.
18. Hajra P K Verma D M and Giri G S (1996) *Materials for the Flora of Arunachal Pradesh*, Botanical Survey of India, Calcutta.
19. Hajra P K, Rao R R, Singh D K and Uniyal B P (1995) *Flora of India*. Vols. 12 & 13 Botanical Survey of India, Calcutta.
20. Hooker J D Reprint (1990) *Flora of British India*. Vol. 5 Bishen Singh Mahendra Pal Singh, Dehradun.
21. Hooker J D Reprint (1990) *Flora of British India*. Vols. 1 & 2 Bishen Singh Mahendra Pal Singh, Dehradun.
22. Hooker J D Reprint (1991) *Flora of British India*. Vols. 3 & 4 Bishen Singh Mahendra Pal Singh, Dehradun.
23. Hooker J D Reprint (1992) *Flora of British India*. Vols. 6 & 7 Bishen Singh Mahendra Pal Singh, Dehradun.
24. Jain S K (1991) *Dictionary of Indian Folk Medicine and Ethnobotany*, Deep Publications, New Delhi.
25. Jain S K and Rao R R (1983) *An Assessment of Threatened Plants of India*. Botanical Survey of India, Calcutta.
26. Jain S K and Robert A De Filippis. (1991) *Medicinal Plants of India*. Vols. 1 & 2 Reference Publications, Delhi.
27. Kachroo P, Sapru B L and Dhar U (1977) *Flora of Ladakh*. Bishen Singh Mahendra Pal Singh, Dehradun.
28. Kanjilal U N and Bor. (1997) *Flora of Assam*. Vols. 1 to 5 Omsons Publications, New Delhi.
29. Karnick C R (1994) *Pharmacopoeial Standards of Herbal Plants*. (First Edition) Sri Satguru Publications, Delhi.
30. Karthikeyan S, Jain S K Nayar M P and. Sanjappa M (1989). *Florae Indica Enumeration Monocotyledonae*. Botanical Survey of India, Calcutta.
31. Kaul M K (1997) *Medicinal Plants of Kashmir and Ladakh*. Indus Publishing Company, New Delhi

32. Kaul M K (1986) *Weed Flora of Kashmir Valley*. Scientific Publishers, Jodhpur.
33. Kirtikar K R and Basu B D (1993) *Indian Medicinal Plants*. Vol. 2 (Second Edition) Periodical Experts Book Agency, Delhi.
34. Maheshwari J K (1996) *Ethnobotany in South Asia*. Scientific Publishers, Jodhpur
35. Malla S B (1984) *Bulletin of the Department of Medicinal Plants No. 10* (First Edition) His Majesty's Government Press, Nepal.
36. Manadhar N P (1980) *Medicinal Plants of Nepal Himalaya*. Ratna Pustak Bhandar, Nepal
37. Manandhar N P (1989) *Useful Wild Plants of Nepal*. Franz Steiner Verlag Wiesbaden GMBH, Stuttgart.
38. Molur S and Walker S (June 1998). *CAMP Report on Selected Medicinal Plants of Norther, Northeastern and Central India*, Zoos' Print, Coimbatore.
39. Nair N C (1977) *Flora of Bashahar Himalayas*. International Bioscience Publishers, Hissar.
40. Navachoo I A and Kachroo P (1995) *Flora of Pulwama (Kashmir)*. Bishen Singh Mahendra Pal Singh, Dehradun.
41. Nayar M P (1996) *Hotspots of Endemic Plants of India. Nepal and Bhutan*. Tropical Botanical Garden and Research Institute, Calcutta.
42. Nayar M P and Sastry A R K (87,88,90) *Red Data Book of Indian Plants*. Vols.1, 2 & 3. Botanical Survey of India, Calcutta.
43. Nayar M P, Thothathri K and Sanjappa M *The Fascicles of India Fascicle 19 & 20*, Botanical Survey of India, Calcutta.
44. Pandey G (1992) *Medicinal Flowers (Puspayurveda) Medicinal Flowers of India and Adjacent Regions* (First Edition) Sri Satguru Publication, Delhi.
45. Parker R N Reprint (1984) *Forest Flora for the Punjab with Azara and Delhi* (II Edition). Bedi Printing Press offset unit, DehraDun.
46. Polunin O and Stainton A (1997) *Flowers of the Himalayas*. Oxford Press, Delhi.
47. Rai L K and Sharma E (1994) *Medicinal Plants of the Sikkim Himalaya-Status of Use and Potential*. GBPIHED. Bishen Singh Mahendra Pal Singh, Dehradun.
48. Rau M A (1975) *High Altitude Flowering Plants of West Himalaya*. Botanical Survey of India, Calcutta.
49. Rau M A (1978) *The fascicles of Flora of India. Fascicle 1* Botanical Survey of India, Calcutta.
50. Sarin Y K (1996) *Illustrated Manual of Herbal Drugs used in Ayurveda*. Council of Scientific and Industrial Research and Indian Council of Medical Research, New Delhi.
51. Sharma B D, Balakrishnan N P, Rao R R and Hazara P K (1993) *Flora of India*. Vols. 1 to 3 Botanical Survey of India, Calcutta.
52. Sharma B M and Jamwal P S (1998) *Flora of Upper Lidder valley of Kashmir Himalaya*. Vol. 1 Scientific Publishers, Jodhpur.
53. Sharma P V (1994) *Dravyaguna Vignana* Vol. 2 (Fourteenth Edition). Chowkhamba Bharati Academy, Varanasi
54. Singh G and Kachroo P (1994) *Flora of Srinagar*. Bishen Singh Mahendra Pal Singh, Dehradun.
55. Suwal P N (1993) *Medicinal Plants of Nepal* (Fourth Edition). Indu Chhapakhana Private Limited, Nepal
56. Tandon Vinay (May 1997). *Report on the Status of Collection, Conservation, Trade and Potential for Growth in Sustainable Use of major Medicinal Plants species found in the Great Himalayan National Park and its Environs in Kullu district of Himachal Pradesh*.
57. Thothathri K and Sen R (1985) *Selected Poisonous Plants from the tribal areas of India*, Botanical Survey of India, Calcutta.
58. Uniyal M R (1989) *Medicinal Flora of Garhwal Himalaya*. (First Edition) Shree Baidyanath Ayurved Bhavan Private Limited, Nagpur.
59. Warriar P K, Nambiar V P K and Ramamurthy C (93,94,95,96). *Indian Medicinal Plants* Vols. 1 to 5 Orient Longman, Madras
60. Watt George (1880) *Notes on the Vegetation & of Chumba State and British Lahaul; with descriptions of New Species*, Bengal Educational Service.

# Maps





# Recorded Distribution of three Critically Endangered Medicinal Plants in Jammu & Kashmir and Himachal Pradesh



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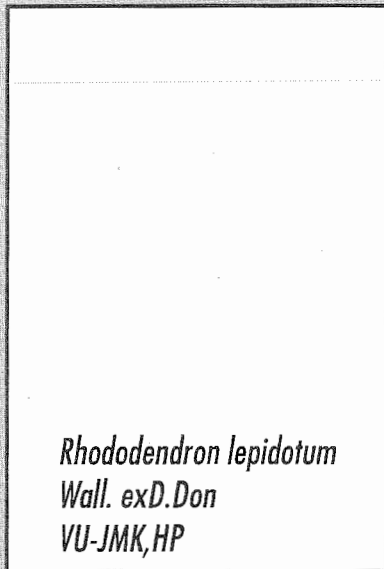
- *Aconitum chasmanthum* Stapf. ex Holmes
- ▲ *Arnebia benthamii* (Wall. ex G. Don) Johns.
- ★ *Fritillaria roylei* Hook.

Scale 1:4.5 Million

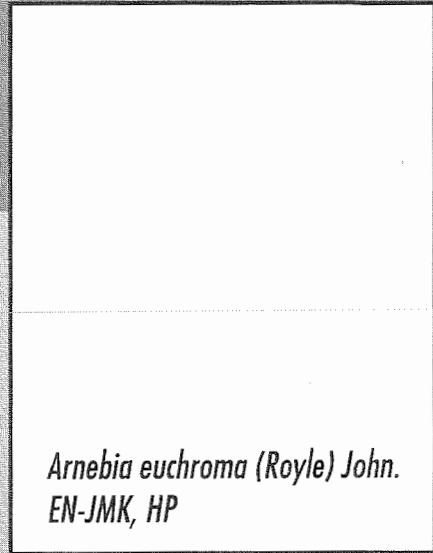


# CAMP REPORT

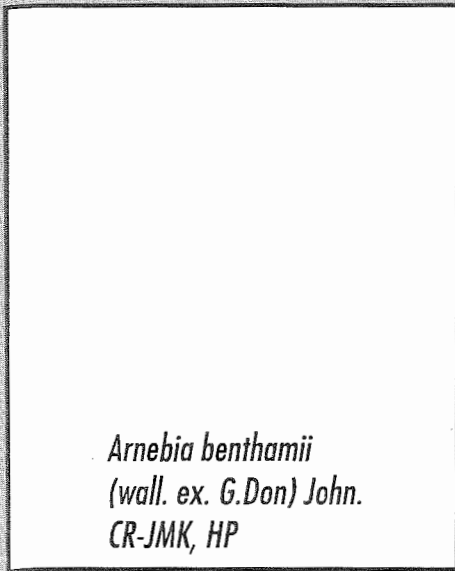
Edited by DK Ved IFS and Vinay Tandon IFS



*Rhododendron lepidotum*  
Wall. ex D. Don  
VU-JMK, HP



*Arnebia euchroma* (Royle) John.  
EN-JMK, HP



*Arnebia benthamii*  
(Wall. ex G. Don) John.  
CR-JMK, HP



*Fritillaria roylei* Hook.  
CR-JMK, EN-HP

*For High Altitude Medicinal Plants of  
Jammu - Kashmir & Himachal Pradesh*

## Conservation Assessment & Management Plan Workshop

**Kullu, Himachal Pradesh, 16 - 18 April 1998**

organised by Foundation for Revitalization of Local Health Traditions, Bangalore, India  
Funded by The Royal Netherlands Embassy, New Delhi, DFID, UK  
supported by Medicinal Plants Specialist Group, SSC-IUCN



## The 42 medicinal species assessed at the Kullu CAMP - CATEGORISED

### Jammu & Kashmir

#### CRITICALLY ENDANGERED-CR

- 1 *Aconitum chasmanthum*
- 2 *Arnebia benthamii*
- 3 *Dactylorhiza hatagirea*
- 4 *Fritillaria roylei*
- 5 *Gentiana kurroo*
- 6 *Saussurea costus*

#### ENDANGERED-EN

- 1 *Aconitum dienorrhizum*
- 2 *Aconitum heterophyllum*
- 3 *Angelica glauca*
- 4 *Arnebia euchroma*
- 5 *Artemisia maritima*
- 6 *Betula utilis*
- 7 *Ephedra gerardiana*
- 8 *Jurinea dolomiaea*
- 9 *Meconopsis aculeata*
- 10 *Picrorhiza kurroa*
- 11 *Podophyllum hexandrum*

#### VULNERABLE-VU

- 1 *Aconitum violaceum*
- 2 *Allium stracheyi*
- 3 *Bergenia stracheyi*
- 4 *Ferula jaeschkeana*
- 5 *Heracleum lanatum*
- 6 *Malaxis muscifera*
- 7 *Physochlaena prealta*
- 8 *Polygonatum multiflorum*
- 9 *Polygonatum verticillatum*
- 10 *Rheum australe*
- 11 *Rheum moorcroftianum*
- 12 *Rheum spiciforme*
- 13 *Rheum webbianum*
- 14 *Rhododendron anthopogon*
- 15 *Rhododendron campanulatum*
- 16 *Rhododendron lepidotum*
- 17 *Saussurea gossypiphora*
- 18 *Saussurea obvallata*

#### LOWER RISK-NEAR THREATENED-LR-NT

- 1 *Hippophea rhamnoides*
- 2 *Hyoscyamus niger*

#### LOWER RISK-LEAST CONCERN-LR-LC

- 1 *Selinum tenuifolium*
- 2 *Selinum vaginatum*

#### DATA DEFICIENT-DD

- 1 *Ferula narthex*

#### NOT EVALUATED-NE

- 1 *Inula racemosa*
- 2 *Nardostachys grandiflora*

### Himachal Pradesh

#### CRITICALLY ENDANGERED- CR

- 1 *Arnebia benthamii*
- 2 *Dactylorhiza hatagirea*

#### ENDANGERED-EN

- 1 *Aconitum dienorrhizum*
- 2 *Aconitum heterophyllum*
- 3 *Angelica glauca*
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