

Threat status of *Ajuga bracteosa* Wall ex Benth. an important medicinal plant of Kashmir Himalaya

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Abstract: *Ajuga bracteosa* Wall ex Benth. is an important medicinal plant of Kashmir Himalaya. Traditionally the species is used to treat various diseases in Kashmir valley. During the present study the threat status of the species have been evaluated in accordance with IUCN Regional Guidelines 2003 version 3.0 following IUCN categories and Criteria 2010 version 8.1. The present investigation revealed that the total number of sub-populations in Kashmir valley is 42 and the mature individuals are 30850. The calculated Extent of Occurrence and Area of Occupancy of the species turned out to be 583km² and 336km² respectively. The data revealed that the plant species is Least Concern in Kashmir valley. Although the species is subjected to various threat factors like construction of roads and buildings, landslides, exploitation for local use etc. but the overall impact of these threats is very low.

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Key words: traditional, IUCN, regional guidelines, sub-population, Extent of Occurrence, Area of Occupancy, Least Concern

Introduction

Wild plants are rapidly disappearing due to tremendous increase in human population, urbanization, habitat fragmentation and the increased dependency of the poor on the limited natural resources (Woodruff, 2001). As a result of these anthropogenic activities, the rate of plant extinction has reached to one species per day. This rate is considered to be 1000-10000 times faster than could naturally occur (Hilton-Taylor, 2000) and if the trend remains constant - 60,000 to 100,000 plant species would disappear during the next 50 years (Pujol *et al.*, 2006). It is expected that as many as half of the world's plant species would be threatened by extinction if assessment is made according to the IUCN categories and criteria (Pitman & Jørgensen, 2002). The total number of identified vascular plant species is estimated to be between 310,000 (Prance *et al.*, 2000) and 420,000 (Bramwell, 2002). The 2010 Red List (IUCN, 2010) contains \geq 12,000 plant taxa but \leq 1,000 are properly documented (\leq 8.3% of global plant diversity). The process of conservation assessments clearly needs to be accelerated. The emerging magnitude of the contemporary extinction crises has inspired a massive effort to evaluate and monitor the risk of extinction faced by the species worldwide (Burton, 2003). Growing awareness about the possible extinction of certain taxa is largely attributed to the development of the World Conservation Union's (IUCN) Red List and/ or Red Data Books (RDB) concept, which allow conservation scientists to establish the nature and extent of such declines, introduce conservation actions, research and

the monitoring of such taxa and has proven to be helpful by drawing public focus towards these taxa, as well as their declining habitats (Magin *et al.*, 1994). The IUCN categories and criteria were originally developed to evaluate the threat status of the species at global level. However, need was felt to develop the guidelines which would be applied at either regional or national level. Accordingly Guidelines for Application of IUCN Red List Criteria at Regional Levels (2003) version 3.0. were developed. The IUCN Regional Red Lists would provide a more objective evaluation of the threats which a taxon is facing either at national or regional scale (Gardenfors, 2001) and also the national or regional threat lists can be helpful in the determination of different threat levels and the inclusion of these threat levels into the National Conservation Planning. Henceforth, setting priorities is a key process for conservation purposes throughout the world (Master, 1999; Mace, 1995).

To determine the threat status of a taxon, it is necessary to monitor the population size in the form of number of mature individuals, geographical range in terms of the Extent of Occurrence (EOO), and Area of Occupancy (AOO) and the nature and extent of threats faced by the taxon and the decline and fluctuations in the number of mature individuals (IUCN, 2010).

Ajuga bracteosa is an important medicinal plant species growing in Kashmir valley. Traditionally the plant species is used to cure fever, skin infection, jaundice, and also as a lice killer. Keeping in view the immense medicinal importance of the species, it was thought worthwhile to evaluate the threat status of the species in accordance with IUCN regional guidelines.

The information regarding the threat status will work as a bed rock for long term and sustainable use of the plant species.

Material and Methods

During the present investigation extensive field studies were conducted during year 2011 and 2012 in the Kashmir valley. Field surveys were carried out in the localities from where the taxon had previously been collected and localities that had not previously been surveyed but that lie within the altitudinal range and habitat typical of *Ajuga bracteosa*. When a population of the species was located 1–2 days were spent in the location to determine the extent of the population by walking within an area of at least 2 km² in each locality. The number of mature individuals was counted (Ali and Qaiser, 2010). Only those individuals were counted as mature which bear flowers or fruits. Decline in the number of mature individuals (if occurs) were also recorded by comparing the number of individuals plants present during the 1st year to the individuals of the 2nd year. Comprehensive field notes on habit, habitat, life form and altitudinal range of the species were recorded. Any anthropogenic threats (grazing, expansion of agriculture, road building, landslides, over exploitation for local use, effect of tourism and deforestation) were recorded. Plant specimens collected were deposited at Kashmir University Herbarium (KASH). The Extent of Occurrence (the area contained within the shortest continuous imaginary boundary that can be drawn to encompass all the known sites of occurrence of a taxon, excluding cases of vagrancy) of the species were calculated by α - hull method (IUCN, 2010). Area of occurrence (the area within the extent of occurrence that is occupied by a taxon) was calculated by over laying a grid of 2 x 2 km squares on the distribution map and summing the area of the squares in which the species was located (IUCN, 2010). The data gathered were evaluated in light of IUCN Red List Categories and Criteria 2010 version 8.1 following Guidelines for Application of IUCN Red List Criteria at Regional Levels 2003 version 3.0.

Results and Discussion

Local distribution

The present study revealed that *Ajuga bracteosa* occurs at forty two different locations (Reshiwari, Langate, Kupwara, Charari-sharief, Yousmarg, Nilnag, Badipora, Budgam, Chadoora, Doodhpathri, Khanshab, Salamabad, Baramullah, Drang, Ferozpora, Gulmarg, Tangmarg, Watlab, Bandipora, Mansbal, Chakisangri, Dachigam, Khrew, Awantipora, Aharbal, Dubjan, Shopian, Sonamarg, Ganderbal, Narayannag, Kangan, Daksum, Kokernag, Pahalgam, Betab valley, Mati Gawran, Chanderwari, Aru, Kokernag, Achabal,

Pandobal, Gulabghagh and Jawahir Tunnel) in Kashmir valley. The species grows in sloppy and landslide prone areas with low moisture content in temperate to sub-alpine zones at an altitudinal gradient of 1620-2900m asl.

Taxonomic description

Perennial herb upto 15-40cm long, stoloniferous; stems branched from base, gray villous or lanate-villous especially on young parts; basal petioles 1-1.5cm; basal leaf blade spatulate to oblanceolate, 2-4 × 0.7-1.2cm; stem blades sessile or subsessile, obovate to subcircular, 1-1.5 × 0.6-1cm, pilose or strigose, base cuneate-decurrent, margin inconspicuously to irregularly undulate-crenate, ciliate, apex obtuse to subrounded; basal verticillasters widely spaced, apical verticillasters in dense spikes; basal floral leaves densely lanate-villous, incised, ciliate; calyx campanulate, 4.5-6mm, villous especially on teeth; teeth subulate-triangular, regular, 1/2 or more as long as calyx, apically acute, margin villous-ciliate; corolla purple or purplish with dark purple spots, tubular, slightly exserted, puberulent, yellowish glandular, villous annulate inside; upper lip straight, apex emarginate; middle lobe of lower lip obcordate, lateral lobes oblong; nutlets oblong to oblong-obovoid, adaxially swollen at middle, areole to 2/3 or more as long as adaxial side of nutlet (Fig.1).

Common name: Jan-e-adam



Fig.1: Habit and habitat of *A. bracteosa*

Assessment of threat status

In order to evaluate the threat status of the species in accordance with the IUCN guidelines, the population size, Extent of Occurrence (EOO) (Fig.2) and Area of Occupancy (AOO) (Fig.3) and the different types of threats to the species were recorded. The most common operative threats are landslides and overexploitation for local use (Table 1).

Conservation status

The total number of sub-populations is 42 and the mature individuals of the species in the Kashmir valley are 30850. The data obtained revealed that the values are higher than the threshold values of IUCN for any of the threat category. The extent of Occurrence and Area of Occupancy of the species are 583km² and 336km² respectively, though the values of AOO and EOO fall within the threshold of IUCN threat category. However, the species is performing well and during the course of study an increase of 1666 mature individuals were recorded. Therefore, *Ajuga bracteosa* does not qualify for any of threat

category and hence is placed under the **Least Concern (LC)** category according to IUCN categories and criteria 2010. The species is performing well in this part of the world, however, the natural habitats of the species have been altered or destroyed by unplanned construction of buildings, roads, bridges etc. in the name of development which may restrict the distributional range of the species in future and also the 2nd major threat to the species is landslides which also get enhanced by the unplanned constructions. If these threatening factors continue to prevail, the species may become threatened.

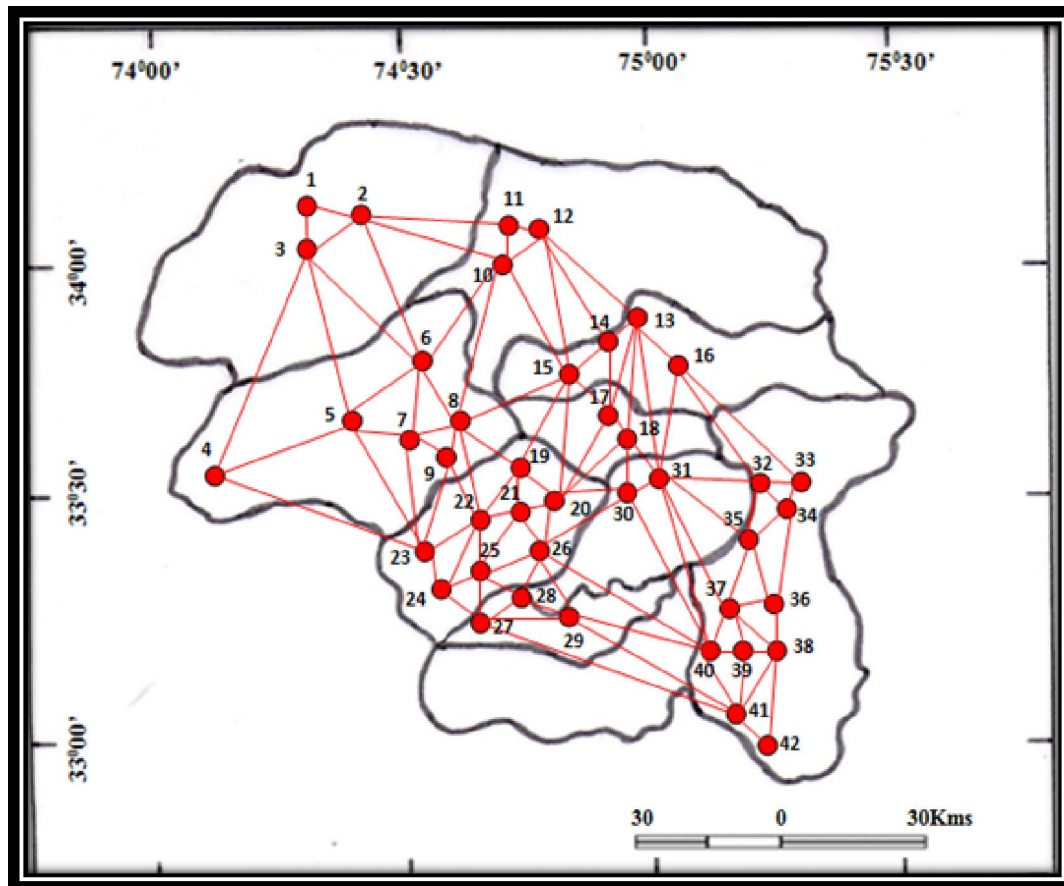


Fig. 2: Map showing EOO of *Ajuga bracteosa* in Kashmir valley

1. Handwara; 2. Reshiwari; 3. Langate; 4. Salamabad; 5. Gulmarg; 6. Baramullah; 7. Ferozpora; 8. Drang; 9. Tangmarg; 10. Sopore; 11. Watlab; 12. Bandipora; 13. Naranag; 14. Kangan; 15. Ganderbal; 16. Sonamarg; 17. Dachigam; 18. Chacksangri; 19. Budgam; 20. Chadoora; 21. Badipora; 22. Khanshab; 23. Doodhpathri; 24. Yousmarg; 25. Nilnag; 26. Charisharief; 27. Dubjan; 28. Shopian; 29. Aharbal; 30. Awantipora; 31. Khrew; 32. Aru; 33. Chandanwari; 34. Betab valley; 35. Pahalgam; 36. Matigawran; 37. Achabal; 38. Daksum; 39. Pandobal; 40. Kokernag; 41. Gullab Bagh; 42. Jawahar Tunnel

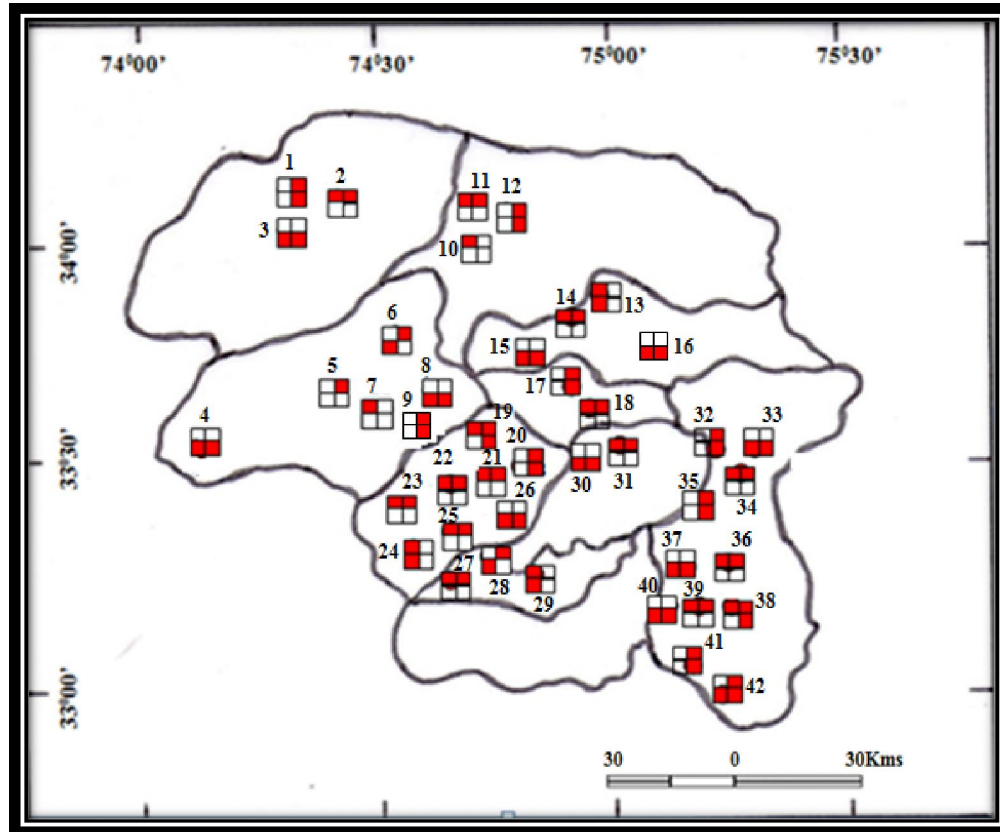


Fig. 3: Map showing AOO of *Ajuga bracteosa* in Kashmir valley

1. Handwara; 2. Reshiwari; 3. Langate; 4. Salamabad; 5. Gulmarg; 6. Baramullah; 7. Ferozpora; 8. Drang; 9. Tangmarg; 10. Sopore; 11. Watlab; 12. Bandipora; 13. Naranag; 14. Kangan; 15. Ganderbal; 16. Sonamarg; 17. Dachigam; 18. Chacksangri; 19. Budgam; 20. Chadoora; 21. Badipora; 22. Khanshab; 23. Doodhpathri; 24. Yousmarg; 25. Nilnag; 26. Chariresharief; 27. Dubjan; 28. Shopian; 29. Aharbal; 30. Awantipora; 31. Khrew; 32. Aru; 33. Chandanwari; 34. Betab valley; 35. Pahalgam; 36. Matigawran; 37. Achabal; 38. Daksum; 39. Pandobal; 40. Kokernag; 41. Gullab Bagh; 42. Jawahar Tunnel

Table 1: Sub-populations, population size, Area of Occupancy and the threats of the *Ajuga bracteosa* recorded at different locations

S. No	Sub-populations	Population size		AOO (km ²)	Threats
		2011	2012		
1.	Handwara	422	459	4,4	Landslides
2.	Reshiwari	800	850	4,4	Landslides, Exploitation for local use
3.	Langate	650	630	4,4	Landslides, Exploitation for local use
4.	Salamabad	800	900	4,4	No apparent threat
5.	Gulmarg	175	150	4	Construction of roads, Landslides
6.	Baramullah	1050	1100	4,4	Construction of roads
7.	Ferozpora	200	230	4	Construction of roads, Landslides
8.	Drang	515	495	4,4	Construction of roads, Landslides, Exploitation for local use
9.	Tangmarg	775	750	4,4	Construction of roads, Landslides
10.	Sopore	235	250	4	No apparent threat
11.	Watlab	789	810	4,4	No apparent threat
12.	Bandipora	1500	1698	4,4	No apparent threat
13.	Naranag	990	1050	4,4	Construction of roads, Landslides, Exploitation for local use
14.	Kangan	1290	1370	4,4	Construction of roads, Landslides, Exploitation for local use

S. No	Sub-populations	Population size		AOO (km ²)	Threats
		2011	2012		
15.	Ganderbal	550	575	4,4	Landslides, Exploitation for local use
16.	Sonamarg	1039	1005	4,4	Construction of roads, Landslides
17.	Dachigam	740	770	4,4	Construction of roads, Landslides
18.	Checksangri	1235	1265	4,4	Landslides
19.	Budgam	632	625	4,4,4	Construction of roads, Landslides, Exploitation for local use
20.	Chadoora	600	644	4,4	Landslides, Exploitation for local use
21.	Badipora	245	233	4,4	Landslides, Exploitation for local use
22.	Khanshab	853	880	4,4	Construction of roads, Landslides
23.	Doodhpathri	500	550	4,4	Construction of roads
24.	Yousmarg	200	210	4,4	Construction of roads, Exploitation for local use
25.	Nilnag	230	250	4,4	Construction of roads, Landslides, Exploitation for local use
26.	Chararisharief	444	432	4,4	Landslides
27.	Dubjan	822	750	4,4	Construction of roads, Exploitation for local use
28.	Shopian	710	722	4,4	Landslides, Exploitation for local use
29.	Aharbal	1250	1222	4,4	Construction of roads, Landslides
30.	Awantipora	234	269	4,4	Landslides
31.	Khrew	1400	1260	4,4	Construction of roads, Landslides, Mining, Cement dust
32.	Aru	1076	1998	4,4	Construction of roads, Landslides, Exploitation for local use
33.	Chanderwari	650	630	4,4	Construction of roads, Landslides, Tourism
34.	Betab valley	900	850	4,4	Construction of roads, Landslides
35.	Pahalgam	630	650	4,4	Construction of roads, Landslides, Exploitation for local use
36.	Matigawran	454	514	4,4	Landslides, Exploitation for local use
37.	Achabal	330	310	4,4	Construction of roads, Landslides
38.	Daksum	632	650	4,4,4	Construction of roads, Landslides
39.	Pandobal	700	760	4,4	Landslides, Exploitation for local use
40.	Kokernag	345	369	4,4	Construction of roads, Landslides
41.	Gulabgah	650	700	4,4	No apparent threat
42.	Jawahir Tunnel	942	1022	4,4,4	Construction of roads, Landslides
Total		29,184	30,850	336	

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