



## DISTRIBUTION, TAXONOMY AND MEDICINAL IMPORTANCE OF AJUGA BRACTEOSA AND AJUGA PARVIFLORA : A COMPARATIVE STUDY

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### ABSTRACT:

The Kashmir Himalaya forms a part of the Great Himalayan Range located on the north- west of India, the state of Jammu and Kashmir lies between 32°17' to 36°26' N latitude and 73°26' to 80°30' E longitude. Kashmir Himalaya is rich in diversity of medicinal plants. The medicinal plants are used for the treatment of different diseases. However due to the anthropogenic pressure the diversity of medicinal plants is decreased. The genus *Ajuga* L. is distributed in subtropical and temperate regions from Kashmir to Bhutan, Pakistan, Afghanistan, China, Malaysia, Western Himalayas, plains of Punjab and Upper Gangetic plains of India. It has worldwide distribution growing under wide variety of soil and climate, but more abundant in Mediterranean regions and in the hills. The present review of literature gives an overview of literature regarding the distribution, taxonomic description and medicinal importance of: *Ajuga bracteosa* Wall. ex Benth. and *Ajuga parviflora* Benth.

**Key words:** - *Ajuga*, taxonomy, morphology, ethnomedicinal importance

### INTRODUCTION:

Lamiaceae is the seventh largest family of the order Lamiales with cosmopolitan distribution (Heywood et al., 2007; Yuan et al., 2010). It comprising around 236 genera (Harley et al., 2004) and 6900 (Heywood et al., 2007) to 7200 species (Harley et al., 2004) worldwide. Coll and Tandon (2008) reported that the family comprises of about 220 genera and almost 4000 species. The large number of plants in this family reflects the intensification of taxonomic and ethno-botanical research in this area (Merritt and Ley, 1992). Most plants of Lamiaceae are native to Europe, Asia, and Africa, but also growing in Australia and North America (Flora of China, 1994; Coll and Tandon, 2008). About 60 genera with 980 species occur in Sub-Saharan African region (Klopper et al., 2006).

### Geographic Distribution

The genus *Ajuga* L. is distributed in subtropical and temperate regions from Kashmir to Bhutan, Pakistan, Afghanistan, China, Malaysia, Western Himalayas, plains of Punjab and Upper Gangetic plains of India (Khare, 2007) at an altitude of 1300m. In India, it abounds in Western Himalaya at an altitude of 1300m (Chandel and Bagai, 2010). It is found along roadsides, open slopes, and rock crevices up to 1500m above mean sea level (Upadhyay et al., 2011). Most of the plants belonging to genus *Ajuga* are native to Europe, Asia, and Africa, but also growing in Australia and North America (Flora of China, 1994). It has worldwide distribution growing under wide variety of soil and climate, but more abundant in Mediterranean regions and in the hills.

The genus *Ajuga* L. consists of about 40-50 species mostly distributed in the north

temperate zone of the World (Ali and Nasir, 1990) from Europe to Asia and Australia (Keng, 1969). The genus consists of about 301 species (Upadhyay et al., 2011). It is mostly distributed in the north temperate zone of the old world. It also occurs in South Africa and Australia. In flora of Turkey, the genus *Ajuga* is represented by 14 species and 27 sub-specific taxa ( Baytop, 1999).

In Kashmir Himalaya only three species of genus *Ajuga* have been reported which include *Ajuga bracteosa* Wall. ex Benth., *Ajuga parviflora* Benth. and *Ajuga remota* Wall. ex Benth ( Stewart, 1972). *A. bracteosa* is distributed in sub-tropical and temperate regions from Kashmir to Bhutan, Pakistan, Afghanistan, China and Malaysia. In Pakistan it is found in northern hilly areas, where it is called as Kori booti (meaning, bitter herb) owing to its bitter taste (Pal et al., 2011). It is found on grassy slopes of Afghanistan, India, Myanmar and Nepal (e-flora of China). In India, *A. bracteosa* has been reported from Maharashtra, Tamil Nadu, Kerala, Karnataka, West Bengal (Bandyopadhyaya et al., 2003) and Himachal Pradesh (Sharma and Mishra, 2009).

*A. parviflora* Benth has been found to grow in the temperate Kumaon region of the Indian Himalaya at 1200 m to 1800 m elevations (Beauchamp et al., 1996). Nawaz et al., (2000) have reported *A. parviflora* in the hilly regions of northern Pakistan. It is an annual or short lived perennial herb that grows in temperate region, widely distributed in east Afghanistan, Himalaya, Kashmir and Pakistan; it flowers between March and October (Rahman et al., 2013). It is a small herb, which grows wild in the temperate regions of Himalaya (Joshi et al., 2014).

#### **Taxonomy and Morphology**

The term Labiatae was coined by De Jussieu in 1789, which originates from the Latin word Labium (lip), referring to the bilipped corolla, a

salient feature of the family. Lindley proposed the name “Lamiaceae” after the genus *Lamium*. The International Code of Botanical Nomenclature (ICBN) in 1935 also approved the name Lamiaceae as an alternative name to Labiatae. The family has traditionally been considered closely related to Verbenaceae and in the last revision of the family published in 2004 in which 236 genera were described and provided with keys (Harley et al., 2004).

Lamiaceae has been divided into seven subfamilies with ten genera not placed in any of the subfamilies. The unplaced genera included: *Tectona*, *Callicarpa*, *Hymenopyramis*, *Petraeovitex*, *Peronema*, *Garrettia*, *Cymaria*, *Acrymia*, *Holocheila*, and *Ombrocharis*. The subfamilies are *Symphorematoideae*, *Viticoideae*, *Ajugoideae*, *Prostantheroideae*, *Nepetoideae*, *Scutellarioideae*, and *Lamioideae*. The subfamily *Viticoideae* is probably not monophyletic and *Prostantheroideae* and *Nepetoideae* are divided into tribes (Harley et al., 2004; Gemma et al., 2009).

The generic name *Ajuga* derives from the Greek meaning without a yoke in reference to a yoke–yellow to the lower lip of the corolla (Fernald, 1950). The plants belonging to this genus are evergreen, clump-forming rhizomatous annual or perennial herbaceous flowering species. It can be distinguished from other genera of Lamiaceae by the combination of reticulately sculptured mericarps, which separate late in development producing a prominent areole at the point of attachment, and a persistent corolla base, which often leaves a sheath around the mature mericarps (Harley et al., 2004). According to Isriaili and Lyossi (2009) the *Ajuga* plants grow upto 5-50cm tall, with opposite leaves. The flowers are two lipped and tubular, mostly blue, purple or yellow in colour.

*Ajuga bracteosa* is perennial, erect or ascending hairy herb, often prostrate with

oblanceolate or sub-spathulate leaves. Stems are branched from base, 10–30 cm tall, gray villous or lanate-villous especially on young parts. Basal petioles 1–1.5 cm; basal leaf blade spatulate to oblanceolate, stem blades sessile or subsessile, obovate to subcircular, 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, 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 exerted, 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 (flora of china). Flowers are white or purplish-violet tinged from lower surface in distant, axillary whorls in spike .It usually flowers between March to December (Pal et al., 2011). *Ajuga parviflora* is an annual or short lived perennial herb (Nawaz et al., 1999). It is an annual or short-lived perennial herb with stems spreading or ascending, 10-25 cm, usually unbranched, with a sparse to dense glandular indumentum of long villous multicellular hairs. Leaves may be rosette-forming, variable in size, up to 45 x 25 mm, obovate-spathulate to elliptic, entire to crenate, narrowed into petiole, entire to irregularly crenate, with multicellular glandular hairs, thin-textured; petiole on basal leaves up to 20 mm; cauline leaves smaller than basal and decreasing up the stem. Inflorescence unbranched of up to 18 distant or approximating 8-12-flowered verticillasters. It usually flowers between March-June. A.

*parviflora* is unusually densely villous in comparison with other species (www eflora of china).

### RESULT AND DISCUSSION:

Medicinal plants have been used for centuries in traditional health care systems and thus contribute significantly to human health. With the recent advancements in plant sciences, there has been a tremendous increase in the use of plant based health products in developing as well as developed countries. However India is not able to keep pace with other nations having equally rich biodiversity and traditional knowledge systems. This is evident by a planning commission report, which has projected that India has less than 2% global herbal market, whereas China with similar biodiversity and ecological conditions has 25 % share. The cause for this has been identified as the lack of scientific data on Indian herbs (Tripathi et al., 2009). Hence, India needs to augment its research in herbal medicine by encouraging the scientific force at both research and educational institutions. Due to the immense medicinal importance, *Ajuga bracteosa* and *Ajuga parviflora* are extracted by the locals for various ethnomedicinal uses which leads to decline of *Ajuga bracteosa* hence the species became critically endangered (Ahmad et al., 2012). The present review is an attempt to highlight the importance of two medicinal plants growing in Kashmir Himalaya. It is very common among the people who live in upper reaches of Kashmir Himalaya to use herbs for curing of various diseases (Dutt et al., 2015).

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**Table 2.1: Different species of *Ajuga* from China (Linnaeus, 1753)**

S. No.	Name of the species
1.	<i>Ajuga lobata</i>
2.	<i>Ajuga pygmaea</i>
3.	<i>Ajuga sciaphila</i>
4.	<i>Ajuga nubigena</i>
5.	<i>Ajuga lupulina</i>
6.	<i>Ajuga ovalifolia</i>
7.	<i>Ajuga ciliate</i>
8.	<i>Ajuga multiflora</i>
9.	<i>Ajuga campylanthoides</i>
10.	<i>Ajuga campylantha</i>
11.	<i>Ajuga forrestii</i>
12.	<i>Ajuga bracteosa</i>
13.	<i>Ajuga pantantha</i>
14.	<i>Ajuga decumbens</i>
15.	<i>Ajuga nipponensis</i>
16.	<i>Ajuga dictyocarpa</i>
17.	<i>Ajuga macrosperma</i>
18.	

<i>Ajuga linearifolia</i>
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**Table 2.2:** Traditional methods of applications of *A. bracteosa* ( Hussain et al., 2016).

Disease	Methods of applications
Headache	Paste of the leaves is applied to cure headache.
Abdominal pain	Powder of the whole plant is given to treat abdominal pain.
Indigestion	Powder of whole plant is also used to treat indigestion.
Astringent	Whole plant is used as astringent.
Tonic	Whole plant is also used as tonic.
Internal colic	Whole plant is used to treat internal colic.
Pimples	Barks juice is used to treat pimples.
Jaundice	Leaves extracts are used to treat jaundice.
Hypertension	Whole plant is used to treat hypertension.
Sore throat	Whole plant is used to sore throat.
Cold	Decoction of root is taken.
Leprosy	Root powder is ingested.
Blood purification	Leaves extract is used for blood purification.
Diabetes	Decoction of leaves is used to treat the diabetes.
Fever	Decoction of leaves is used to treat the fever.
Swollen wounds	Plant extract is used is used to cure swollen wounds.
Bites of insects	Plant extract is used is used to cure bites of insects.
Eye trouble	Plant extract is used is used to cure eye trouble.
Bladder disease	Plant extract is used is used to treat bladder disease.