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A Versatile Flower Barleria: Species, Importance and Landscape Uses

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Abstract

Barleria is an attractive small evergreen shrub, 60 to 150 cm in height, being loaded with bell shaped beautiful flowers in the rainy season and tolerates regular pruning. Barleria belongs to the family Acanthaceae and it is reported that it has about 230 species. The plant blooms almost throughout the year. Though the flower is not having aroma it is very popular because of its attractive range of beautiful colours. This plant is named after the French botanist, J. Barleria during 17th century. Its vernacular names in Hindi are jhate, and in Kannada it is called spatika, mullu jaji or gorate and in Telugu it is called as 'Decembarala poolu'. It is native to India and Africa and is grown in many tropical and subtropical countries as a wild plant, out of which the majority are developed in Africa. But in India it is grown on commercial scale and there are 21 species spread over the hills of Bengal, the Deccan Plateau, Tamil Nadu, Karnataka, Maharashtra, Madhya Pradesh and the north-eastern Himalayan region. Flowers of Barleria are used for making garlands, ceremonial offerings and hair decorations by ladies. Plants are used in mixed borders; ornamental hedges and it is also used for fencing due to the presence of spines. The economic importance of Barleria, their species and botanical description and cultivation for loose flower production played a key role for commercial production by growers.

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Introduction

Barleria is an attractive small evergreen shrub, 60 to 150 cm in height, being loaded with bell shaped beautiful flowers in the rainy season. The plant blooms almost throughout the year. Though the flower is not having aroma, it is very popular because of its attractive range of beautiful colours.

The genus name Barleria was derived from a French botanist and Dominican monk, Jacques Barrelier (Froneman & Roux, 2007). The plant produces numerous compact bushy flowering shoots from the ground level with ovate to lanceolate and hairy leaves which are borne in opposite pairs being loaded with beautiful bell shaped flowers in axillary or terminal racemes for several months in a year in mild tropical climate. But in North India, it flowers in the early cold months for few weeks.

The twigs are four sided and leaves decussately placed. The limb of flower is five lobed and spread out, one of the lobes being almost spherical and other four obliquely oval. The plants bloom almost throughout the year under South-Indian conditions and peak season of flowering is

December. Though the flowers are not having any fragrance or aroma, it is very popular because of attractive range of beautiful colours. Its flowers are mostly dominated by violet colour including numerous shades and hues of blue, pink, purple, mauve, lilac and white. Flowers are borne on spiny, hairy calyx, which are persistent even after the flowering is over. The seed capsules are found hidden among the dried calyx with 2-4 black coloured seeds, which are hairy and compressed. It has been found globally in gardens and forests of Africa, Pacific region, tropical as well as temperate Asia.

The genus Barleria has approximately 300 species of shrubs and herbs that are distributed in the subtropical and tropical regions of the world (Kumari *et al.,* 2017). It is extensively distributed throughout tropical Asian regions including Indian subcontinent (Bangladesh, Bhutan, India, Nepal and Pakistan) and Indo-china region (Cambodia, Laos, Myanmar, Thailand and Vietnam). But in India it is grown on commercial scale and there are 21 species spread over the hills of Bengal, the Deccan Plateau, Tamil Nadu, Karnataka, Maharashtra, Madhya Pradesh and the north-eastern Himalayan region. Flowers of Barleria are used for making garlands, ceremonial offerings and hair decorations by ladies. Plants are used in mixed borders; ornamental hedges and it is also used for fencing due to the presence of spines. Among the various species *viz*., *Barleria cristata, Barleria buxiflora, Barleria cuspidata, Barleria tomentosa, Barleria grandiflora* and *Barleria montana*, etc. were dispersed in tropical and sub-tropical regions of the world, mostly in Africa (Jayanthi and Bhattacharjee, 2006). The major concentrations of diversity and endemism are in Tanzania, Angola, Madagascar and India (Darbyshire *et al.,* 2019a). It is one of the largest genera in the Acanthaceae family, with 300 species from the world (Balkwill and Balkwill, 1998; Mabberley, 2008) and India is endowed with 28 taxa (Shendage and Yadav, 2010). The species reports a high degree of endemism in its occurrence in India, out of the above reported species, 13 are mainly confined to peninsular India (Shendage, 2008). The genus Barleria can be recognised based on the presence of a calyx with two outer segments large and two inner ones smaller, globose honey-comb pollen and epidermal cells with double cystoliths (Balkwill and Balkwill, 1998).

In India, the genus is represented by 30 species (Patil *et al.,* 2020). Extensive literature survey showed that it is medicinally important genus and locally called as Vajradanti (Banerjee *et al.,* 2012). The plant is widely used in the treatment of human diseases like anemia, toothache, cough, fever, asthma, bronchitis, diabetes, insect bites and inflammations (Banerjee *et al.,* 2012; Sudheer and Praveen, 2021). Aerial parts and leaves are known to be a vital source of iridoids (Amoo *et al.,* 2011; Sudheer and Praveen, 2021). The leaves of the plant are known for flavonoids, saponins, sterols, tannins, and terpenoids. Similarly, flowers contain flavonoids and neohesperidoside. In the same way, aerial part contains balarenone, terpenoid, barlerinoside, saponins, flavonoids, phenolics, tannins, steroids, carbohydrates, phytosterols, acetyl-barlerin, β-sitosterol, iridoids and lupulinoside (Ata *et al.,* 2009) and contains numerous medicinal properties (Sudheer and Praveen, 2021).

Important Species, Landscape and Other Uses

Barleria cristata is a commonly cultivated ornamental plant, recently gaining popularity in South China, South East Asia, subtropical and tropical regions of India. This plant is distributed throughout India as hedges around fields and gardens (Chowdhury *et al.,* 2014). It is commonly known as the Philippine violet. It belongs to the subgenus Barleria (Darbyshire *et al.,* 2019b). It is native to South Asia and India; it is found throughout the country (Shendage and Yadav, 2010). It is cultivated as an ornamental plant for its showy flowers. As the plant is in the horticultural trade, many forms, particularly those varying in corolla colour (such as white, pink, striped and blue), are available. Additionally, the species enjoys varied habitats across the country, and hence, variations may be on account of its response to the existing environmental conditions. It has great importance in different ethnomedical systems for the treatment of a variety of diseases, especially lung disorders and inflammatory conditions. So far, 22 compounds have been reported from the species that fall mainly under the category of flavones and flavonoids, phenolics and phenolic glycosides (Lekhak *et al.,* 2022).

Barleria cristata L. 'Alba' is generally propagated by seeds and terminal cuttings. Being a hardy and xerophytic plant, it can be grown in all environmental and soil conditions. However, tropical and subtropical climate with maximum sunlight conditions, well-drained soil with pH of 6-7 is most suitable for its proper growth and flowering. It requires light around 2000 foot candles (21527.82 lux) but can flower fairly well in semi-shady conditions. In India, *Barleria cristata* L. 'Alba' is commonly grown in the garden as a hedge plant because this shrub tolerates regular pruning. It can also be utilized for making shrubbery borders. These plants are commercially grown for loose flower production in

South India (Bhattacharjee & De, 2003) and used for making garlands, adorning the hair of women, for religious and ceremonial offerings. Its capsules can be utilized in making various products e.g. greeting cards, wall pictures, dry flower arrangements and other gift items. This plant also bear medicinal properties; like leaves are chewed for relief in toothache, roots and leaves are applied to reduce swellings and the decoction of leaves and roots are given in anaemia as well as therapeutic in rheumatism. Also, its seeds are supposed to be an antidote for snake bite and its infusion is given in cough (Pullaiah, 2006).

Barleria terminalis Nees is the endemic plant of the Western Ghats of India (Tripp *et al.,* 2013; Patil *et al.,* 2019). Seven species, viz. *Barleria hochstetteri*, *B. montana*, *B. nitida*, *B. pilosa*, *B.prattensis*, *B. stocksii* and *B. vestita* are yet to be investigated karyologically, owing to their restricted distribution. Of these, four species are endemic. Among seven species, *Barleria hochstetteri* is very rare and it has not been collected in India for a long time (Shendage and Yadav, 2010). It is distributed in North West India (Gujarat and Rajasthan). *Barleria sepalosa* has been recently collected by Gosavi *et al.,* (2013). *Barleria stocksii* is now known from Andhra Pradesh and Gadag district in Karnataka (Sankar *et al.,* 2005; Kambhar *et al.,* 2014). *Barleria vestita* is found in India as well as in Sri Lanka. In India the species is only known from the collections of Lawson and Beddome housed at the Madras Herbarium (MH), Coimbatore (Shendage and Yadav, 2010).

Barleria albostellata, an evergreen shrub, thrives in semi-shade to full-sun woodland areas of South Africa and under suitable conditions, grows up to 1.5 m in height. However, in colder regions, they can become deciduous to semi-deciduous (Froneman & Roux, 2007). In South Africa, It is generally known as 'grey barleria' or in Afrikaans the 'Bosviooltjie'. and is widely distributed from Limpopo, Gauteng, and Mpumalanga to KwaZulu-Natal (Froneman & Roux, 2007). This shrub flourishes from September to May, with beautiful white flowers appearing sporadically. Flowers appear from a dense compound inflorescence and are surrounded by four leafy-bracts (Balkwill and Balkwill, 1997). The blooming flowers are white in color and have a tinge of purple on the bracts. In contrast to the flowers, the leaves are grey-green and have an abundance of velvety hairs. This plant develops fairly quickly and reaches maturity in about three years (Froneman & Roux, 2007).

Barleria albostellata contains medicinal properties (Amoo *et al.,* 2009). It was found that several extracts from this plant exhibited excellent anti-inflammatory properties and a broad-spectrum of antibacterial activity. This plant has a relatively high flavonoid content, with an added effect from tannin and iridoid compounds (Amoo *et al.,* 2011). Although *Barleria albostellata* has no recorded practice in traditional medicine, many species of Barleria have been used in traditional medicine and were confirmed to contain various compounds possessing biological effects such as analgesic, anti-inflammatory, antileukemic, antihyperglycemic, antitumor, anti-amoebic, antibiotic and virucidal activities (Suba *et al.,* 2005). Members of this genus originated from the far east of Japan, through southern Asia, Arabia, India, Africa, Madagascar to as far west of Central America and Mexico.

The short type of plants viz., *Barleria mysorensis*: It produces blue flowers. *Barleria tomentosa*: It is a South Indian species, the flowers are rose coloured. *Barleria acanthaides*: They grow to the height of 30-45 cm. The flowers are ash colour. *Barleria flava:* It is thornless species. It is 90 cm tall. Bears yellow flowers. It was originated in Arabia. *Barleria strigosa:* It bears large blue flowers, thornless, Indian species. *Barleria noctiflora*: It opens only after sunset. The leaves are oblong, acute. Spines are with leafy margins and the flowers are dull white having a very long corolla tube. It is night flowering type. *Barleria montana* and *Barleria grandiflora* are herbaceous type. Plants are soft and succulent, flowers are white, rose or ash-coloured. *Barleria repens*: Its flowers are an attractive pink colour. It is climbing type flower plant.

Barleria lupulina Lindl.: It is an erect, strongly branched shrub from Madagascar, 1 to 2 metres high, with dark purplish-brown branches. This is a very decorative shrub excellent for hedges, for forming groups or planting in beds. The leaves are shining dark green, entire-margined, linear-lanceolate, 8 to 10 cm long, 2 cm broad, with red margins and middle vein. The plant is spiny. These are propagated by seeds or cuttings. Plants produce attractive flowers; they require the same cultural conditions as other species. The flowers are golden-yellow, with round bracts, dark brown or green at the base, all united into spicate, with 10 cm-long inflorescences. *Barleria macconoii*: This species bears attractive blue flowers and grows to a height of up to 1 metre. These two species are useful for indoor purpose.

Another plant suitable for hedge making is *Barleria gibsonii*. This is a glabrous, branching shrub with pale bluish-purple flowers. It was originated in India. This is a glabrous, branching shrub with pale bluish-purple flowers. *Barleria prionitis*: This shrub is a very thorny, many branched plant from South Africa, 45 cm to 2 metres tall, with green twigs, in the axils there are one or numerous little prickles. The leaves are narrow and rather long.

The flowers are sessile, yellow, strongly resembling those of *Barleria lupulina*, but somewhat larger. It is a decorative plant, which, like the previous species, is suitable both for hedges and planting in beds. These are grown below 800 metres altitude and propagated by seeds and cuttings. It is a distinct species, worth growing in the garden. They prefer full sunlight and well drained soil. It is a hardy species, suitable for growing in arid regions. It is also important for its medicinal value (Patil *et al.,* 2019).

Some species are low-growing types that can be used as dwarf shrubs in the garden; white flowers; *Barleria coerulea, Barleria involucrata, Barleria nitida* and *Barleria stringosa* are upright shrubby plants bearing blue flowers. A large shrub in Barleria is *Barleria courtallica* with blue, yellow or white flowers. *Barleria lichtensteiniana* is a shrub with slender branches; flowers are brownish in ovoid, axillary spikes.

Barleria grandiflora Dalz

Shrubby with terete branches, nodes having small hairs; leaves elliptic-lanceolate, acuminate, glabrous with base tapering acutely. Flowers axillary, solitary, linear-ligulate. Corolla white, pubescent outside with the tube enlarging towards the top becoming narrowly infundibuliform. Capsules shorter than the calyx. Flowering season is October-February. Flowers open between 12 noon-3 pm and remain open for the next two days.

Barleria pilosa F.Heyne ex Nees

It is a shrub. December-January is the heavy flowering season. Well distributed in Kerala.

Conclusion

Barleria not only as a loose flower crop but can also be useful in various houses for beautification and aesthetic values, having lot of demand in domestic and international market for multiple uses. Along with medicinal uses, this plant is suitable for landscape uses in many ways.

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