



## The genus *Lobelia* L. (Lobeliaceae) in Sikkim

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### Abstract

In Sikkim, *Lobelia* L. (Lobeliaceae) is previously reported with 4 to 12 species. The present communication confirmed occurrence of 14 species of the genus in this state. All species are enumerated in details along with synonyms, phenology and distribution. Besides, the identification key to Sikkimese species of *Lobelia* is also provided.

**Keywords:** Biodiversity, Himalaya, *Lobelia*, India, phenology.

### Introduction

Sikkim, the second smallest state of India is well-known for its rich diversity of flora and fauna. It occupies nearly 7096 km<sup>2</sup> area that is about 0.2% geographical cover of the country (Rawat & Tambe, 2011). This tiny state is bounded by Tibet in the north, Darjeeling in the south, Nepal in the west and Bhutan in the south-east. Mount Khangchendzonga, the third highest peak of the world is stretched along the border of Sikkim and is immense influential in physiographical formation of the state (Mukhopadhyay, 1998). Climatic peculiarities like enormous rainfall (annual average 500 cm), variable temperature (hot tropical to cold arctic), etc., and highly varying altitudinal range (270 m to 8598 m amsl) favour a huge number of plants to grow within this small state. The floral wealth of Sikkim also endeavours with admixture of plants from South East Asia, Deccan Peninsula, Bhutan, China, Japan, Tibet, and even from Europe (Gierson and Long, 1983; Maity et al., 2018). Recent documents on plant diversity of Sikkim suggests this tiny state presently shelters more than 6000 taxa of flowering plants (Maity et al., 2018; Gogoi et al., 2021; Maity & Maiti, 2022).

The genus *Lobelia* L. was established by Linnaeus (1753) with 25 species in his legendary book '*Species Plantarum*'. The genus *Lobelia* is taxonomically complex, since some of its species and infraspecific taxa are very similar in morphology and differs only in minor characteristics like flower colour, nature of indumentum, etc. Besides, several intermediates and variable forms can also be found both in fields and herbarium specimens (Singh & Diwakar, 2010). Detail study of *Lobelia* is therefore of immense importance in floristic as well as in taxonomic point of views.

Presently there are more than 400 species of *Lobelia* recorded all over the world mostly distributed in tropical and subtropical regions with a few species extending its distribution to temperate regions (Mabberly, 2017). In India, the genus is represented by 11 species (plus 4 cultivated species) that are found distributed in various regions of the country starting from southern parts of India to temperate regions of Indian Himalaya.

Until now 4 to 12 species of the genus are reported in Sikkim by previous workers (Singh & Diwakar, 2010; Singh et al., 2019; Tiwari, 2020; Gogoi et al.,

2021). However, the present work confirmed the occurrence of 14 species in this Himalayan state.

This communication is an attempt to enumerate all the species of *Lobelia* occur within the present political boundary of Sikkim. All 14 species are provided here along with first publication details, all the synonyms, flowering-fruiting periods, and distribution within India and around the globe. An artificial key is also provided for easy identification of each species.

## Materials And Methods

The present study is an outcome of extensive field survey and detail literature search. Alongside, specimens deposited in different national herbaria (CAL, BSHC, CUH) and international (digital) herbaria (K, E, PE, G, GH, BM) have also been consulted. Furthermore, all relevant literatures are also critically scrutinized and important information is incorporated.

## Results

### Enumeration of *Lobelia* in Sikkim (arranged alphabetically)

#### 1. *Lobelia alsinoides* Lam., Encycl. 3: 588. 1792.

*Dortmanna alsinodes* (Lam.) Kuntze; *Rapuntium alsinoides* (Lam.) C.Presl

**Flowering & Fruiting:** September-December

**Distribution:** INDIA (Goa, Gujarat, Karnataka, Kerala, Madhya Pradesh, Maharashtra, Sikkim, West Bengal); BANGLADESH, BHUTAN, CHINA, LAOS, MALAYSIA, MYANMAR, NEPAL, NEW GUINEA, SRI LANKA, THAILAND, VIETNAM.

#### 2. *Lobelia chinensis* Lour., Fl. Cochinch. 514. 1790.

*Dortmanna campanuloides* (Thunb.) Kuntze; *D. chinensis* (Lour.) Kuntze; *D. radicans* (Thunb.) Kuntze; *Isolobus caespitosus* (Blume) Hassk.; *I. campanuloides* (Thunb.) A.DC.; *I. kerii* A.DC.; *I. radicans* (Thunb.) A.DC.; *I. roxburghianus* A.DC.; *Lobelia caespitosa* Blume; *L. campanuloides* Thunb.; *L. chinensis* var. *tetrapetala* Y.N.Lee; *L. chinensis* f. *tetrapetala* (Y.N.Lee) M.Kim; *L. japonica* F.Dietr.; *L. kerii* (A.DC.) Heynh.; *L. radicans* Thunb.; *L. roxburghiana* (A.DC.) Heynh.; *Pratia radicans* G.Don; *P. thunbergii* G.Don; *Rapuntium caespitosum* (Blume) C.Presl; *R. campanuloides* (Thunb.) C.Presl; *R. chinense* (Lour.) C.Presl; *R. radicans* (Thunb.) C.Presl.

**Flowering & Fruiting:** May-October

**Distribution:** INDIA (Assam, Jharkhand, Maharashtra, Meghalaya Sikkim, West Bengal); BANGLADESH, CAMBODIA, CHINA, JAPAN, KOREA, LAOS, MALAYSIA, NEPAL, SRI LANKA, THAILAND, VIETNAM.

#### 3. *Lobelia davidii* Franch., Nouv. Arch. Mus. Hist. Nat., sér. 2, 6: 71. 1883.

*Lobelia davidii* var. *kwangsiensis* (E.Wimm.) Y.S.Lian; *L. davidii* var. *sichuanensis* Y.S.Lian; *L. dolichothyrsa* Diels; *L. kwangsiensis* E.Wimm.; *L. oligantha* C.Y.Wu; *L. sichuanensis* (Y.S.Lian) D.Y.Hong; *L. tibetica* W.L.Cheng

**Flowering & Fruiting:** August-October

**Distribution:** INDIA (Sikkim); BHUTAN, CHINA, MYANMAR, NEPAL.

4. *Lobelia erectiuscula* H.Hara, J. Jap. Bot. 40: 328. 1965.

*Dortmanna erecta* Kuntze; *Lobelia erecta* Hook.f. & Thomson

**Flowering & Fruiting:** July-September

**Distribution:** INDIA (Sikkim, West Bengal); CHINA, MYANMAR, NEPAL.

5. *Lobelia heyneana* Schult. in Roem. & Schult., Syst. Veg., ed. 15 bis 5: 50. 1819.

*Dortmanna trialata* (Buch.-Ham. ex D.Don) Kuntze; *Lobelia arenarioides* (C.Presl) A.DC.; *L. bialata* Merr.; *L. decurrens* Roth; *L. micrantha* Hook.; *L. subincisa* Wall. ex A.DC.; *L. subracemosa* Miq.; *L. trialata* Buch.-Ham. ex D.Don; *L. umbrosa* Hochst. ex Hemsl.; *Rapuntium arenarioides* C.Presl; *R. trialatum* (Buch.-Ham. ex D.Don) C.Presl

**Flowering & Fruiting:** August-December

**Distribution:** INDIA (Almost throughout India); BHUTAN, CHINA, INDONESIA, LAOS, MYANMAR, NEPAL, NEW GUINEA, PHILIPPINES, SRI LANKA, THAILAND, VIETNAM; AFRICA.

6. *Lobelia montana* Reinw. ex Blume, Bijdr. 14: 728. 1826.

*Lobelia brevisepala* (Y.S.Lian) Lammers; *L. reflexisepala* Lammers; *L. wardii* C.E.C.Fisch.; *Piddingtonia cyanocarpa* Hassk.; *P. montana* (Reinw. ex Blume) Miq.; *P. patens* Miq.; *Pratia brevisepala* Y.S.Lian; *P. montana* (Reinw. ex Blume) Hassk.; *P. reflexa* Y.S.Lian; *P. wardii* (C.E.C.Fisch.) E.Wimm.; *Speirema montanum* (Reinw. ex Blume) Hook.f. & Thomson

**Flowering & Fruiting:** July-April

**Distribution:** INDIA (Arunachal Pradesh, Himachal Pradesh, Jammu & Kashmir, Nagaland, Sikkim, Uttarakhand, West Bengal); BHUTAN, INDIA, INDONESIA, MALAYSIA, MYANMAR, NEPAL, VIETNAM.

7. *Lobelia nicotianifolia* Roth in Roem. & Schult., Syst. Veg., ed. 15 bis 5: 47. 1819.

*Dortmanna colorata* (Wall.) Kuntze; *D. mishmica* (C.B.Clarke) Kuntze; *D. nicotianifolia* (Roth) Kuntze; *Lobelia beddomeana* E.Wimm.; *L. colorata* Wall.; *L. colorata* subsp. *guizhouensis* T.J.Zhang & D.Y.Hong; *L. courtallensis* K.K.N.Nair; *L. doniana* Skottsb.; *L. leucanthera* Kerr; *L. mishmica* C.B.Clarke; *L. palustris* Kerr; *L. stimuleus* Buch.-Ham. ex D.Don; *L. trichandra* Wight; *Rapuntium coloratum* (Wall.) C.Presl; *R. nicotianifolium* (Roth) C.Presl

**Flowering & Fruiting:** October-March

**Distribution:** INDIA (Throughout India); BANGLADESH, BHUTAN, CHINA, INDONESIA, LAOS, MALAYSIA, MYANMER, NEPAL, SRI LANKA, VIETNAM.

8. *Lobelia nubigena* J.Anthony, Notes Roy. Bot. Gard. Edinburgh 19: 175. 1936.

**Flowering & Fruiting:** July-August

**Distribution:** INDIA (Sikkim); BHUTAN.

**9. Lobelia nummularia** Lam., Encycl. 3: 589. 1792.

*Lobelia angulata* var. *papuana* (S.Moore) Gilli; *L. arfakensis* Gibbs; *L. begoniifolia* Wall.; *L. horsfieldiana* Miq.; *L. javanica* Thunb.; *L. obliqua* Buch.-Ham. ex D.Don; *L. paradoxa* E.Wimm.; *Piddingtonia nummularia* (Lam.) A.DC.; *Pratia begoniifolia* (Wall.) Lindl.; *P. nummularia* (Lam.) A.Braun & Asch.; *P. papuana* S.Moore; *P. podenzanae* S.Moore; *P. wollastonii* S.Moore; *P. zeylanica* Hassk.; *Rapuntium nummularia* (Lam.) C.Presl

**Flowering & Fruiting:** June-September

**Distribution:** INDIA (Arunachal Pradesh, Himachal Pradesh, Jammu & Kashmir, Meghalaya, Mizoram, Sikkim, Uttarakhand, West Bengal); BANGLADESH, BHUTAN, CHINA, INDONESIA, LAOS, MALAYSIA, MYANMAR, NEPAL, NEW GUINEA, PHILIPPINES, SRI LANKA, THAILAND, VIETNAM.

**10. Lobelia pyramidalis** Wall., Asiat. Res. 13: 376. 1820.

*Dortmanna pyramidalis* (Wall.) Kuntze; *Lobelia wallichiana* (C.Presl) Hook.f. & Thomson; *Rapuntium pyramidale* (Wall.) C.Presl; *R. wallichianum* C.Presl

**Flowering & Fruiting:** January-June

**Distribution:** INDIA (Sikkim, Himachal Pradesh, Uttarakhand, West Bengal); BHUTAN, CHINA, MYANMAR, NEPAL, THAILAND.

**11. Lobelia rosea** Wall., Pl. Asiat. Rar. 2: 42 . 1831.

*Dortmanna rosea* (Wall.) Kuntze; *Rapuntium roseum* (Wall.) C.Presl

**Flowering & Fruiting:** October-March

**Distribution:** INDIA (Sikkim, West Bengal); BHUTAN, MYANMER, NEPAL.

**12. Lobelia seguinii** H.Lév. & Vaniot, Repert. Spec. Nov. Regni Veg. 12: 186. 1913.

*Lobelia seguinii* f. *brevisepala* E.Wimm.; *L. seguinii* f. *longisepala* E.Wimm.

**Flowering & Fruiting:** August-November

**Distribution:** INDIA (Sikkim, West Bengal); BHUTAN, CHINA, MYANMAR, NEPAL.

**13. Lobelia terminalis** C.B.Clarke in J.D.Hooker, Fl. Brit. India 3: 424. 1881.

**Flowering & Fruiting:** November-December

**Distribution:** INDIA (Assam, Arunachal Pradesh, Meghalaya, Sikkim); BHUTAN, CHINA, LAOS, THAILAND, VIETNAM.

**14. Lobelia zeylanica** L., Sp. Pl. ed. 1: 932. 1753.

*Dortmanna subcuneata* (Miq.) Kuntze; *D. succulenta* (Blume) Kuntze; *D. zeylanica* (L.) Kuntze; *Lobelia affinis* Wall. ex G.Don; *L. barbata* Warb.; *L. hirta* L.; *L. lobbiana* Hook.f. & Thomson; *L. macraeana* E.Wimm.; *L. subcuneata* Miq.; *L. succulenta* Blume; *L. zeylanica* var. *lobbiana* (Hook.f. & Thomson) Y.S.Lian; *Pratia ovata* Elmer; *P. torricellensis* Lauterb.; *Rapuntium affine* C.Presl; *R. hirtum* (L.) Mill.; *R. succulentum* (Blume) C.Presl; *R. zeylanicum* (L.) C.Presl

**Flowering & Fruiting:** April-November

**Distribution:** INDIA (Assam, Arunachal Pradesh, Bihar, Madhya Pradesh, Manipur, Meghalaya, Nagaland, Sikkim, Uttarakhand, Uttar Pradesh, West Bengal); BANGLADESH, BHUTAN, INDIA, INDONESIA, LAOS, MALAYSIA, MYANMAR, NEPAL, NEW GUINEA, PHILIPPINES, SRI LANKA, THAILAND, VIETNAM.

**Key to the species of *Lobelia* in Sikkim**

1. Prostrate herbs; nodes rooted at least lower nodes 2
  - Plants usually erect, occasionally ascending; nodes not rooted, if rooted then leaf linear-elliptic or linear-lanceolate 3
2. Anthers apically barbate; fruits capsule **L. zeylanica**
  - Anthers not barbate (at least some); fruits berry **L. nummularia**
3. Flowers many, dense, in terminal, cylindrical spike; bracts much longer, densely imbricated, deflexed, white-lanate, almost concealing flowers **L. nubigena**
  - Flower solitary or few in raceme or panicle; bracts not as above 4
4. Plants shorter, less than 70 cm tall 5
  - Plants taller, more than 1 m tall 8
5. Stems and petioles winged **L. heyneana**
  - Stems and petioles wingless 6
6. Leaves spirally arranged, villous **L. terminalis**
  - Leaves alternate, glabrous or subglabrous 7
7. Stems rooted at lower nodes; anthers all barbate apically **L. chinensis**
  - Stems not rooted at nodes; anthers not all barbate **L. alsinoides**
8. Flower solitary, axillary **L. montana**
  - Flowers many, in racemes or panicles 9
9. Racemes simple 10
  - Racemes paniculate 12
10. Raceme smaller, up to 25 cm long **L. erectiuscula**
  - Raceme longer, up to 130 cm long 11
11. Plants delicate, up to 2 m tall; capsules less than 7 mm long **L. davidii**
  - Plants robust, up to 6 m tall; capsules 7 mm or more long **L. nicotianifolia**
12. Flowers smaller, less than 2.2 cm long **L. pyramidalis**
  - Flowers larger, 2.2 cm or more long 13
13. Bracteoles present; capsules oblong-ellipsoid **L. seguinii**
  - Bracteole absent; capsules ovoid **L. rosea**

**Discussion**

The genus *Lobelia* has considerable species diversity in Sikkim. Three species, viz. *L. erectiuscula* H.Hara, *L. pyramidalis* Wall. and *L. rosea* Wall. are often considered as synonyms of *L. nicotianifolia* Roth (Singh & Diwakar, 2010; Tiwari, 2020), however, more research is needed to ascertain their taxonomic



**Figure 1:** Lobelia: A. *L. montana*; B. *L. pyramidalis*

position. In the present study, all the three names are accepted as correct following (Deyuan & Lammers, 2011; Singh et al., 2019; Gogoi et al., 2021). Gogoi et al. (2021) reported 11 species of *Lobelia* L. from Sikkim excluding *L. davidii* Franch., *L. nubigena* J. Anthony and *L. terminalis* C.B. Clarke, although Singh et al. (2019) mentioned distribution all of these 3 species in the state. Therefore, an ambiguity exists related to the actual number of species of *Lobelia* L. occurring in Sikkim as well as India. The present communication although can picture the present status of *Lobelia* L. in Sikkim to some extent, however, an effective and elaborative revisionary study on the genus is further necessary to eliminate any ambiguity remain.

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