

**REVISION OF FLORA OF KATHMANDU VALLEY:
LAMIACEAE**



A DISSERTATION PRESENTED TO FULFILL THE REQUIREMENTS OF THE
MASTER'S DEGREE IN BOTANY

BY

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DECLARATION

The thesis entitled “**Revision of Flora of Kathmandu Valley: Lamiaceae**” presented to the Department of Botany, Amrit Campus, Thamel, Kathmandu, Nepal for the Master’s degree in Science (MSc.) has been supervised by Prof. Dr. Lokesh Ratna Shakya, Department of Botany, Amrit Campus. This research work is carried out originally by me and has not been presented previously to any university or institute for the award of any degree.

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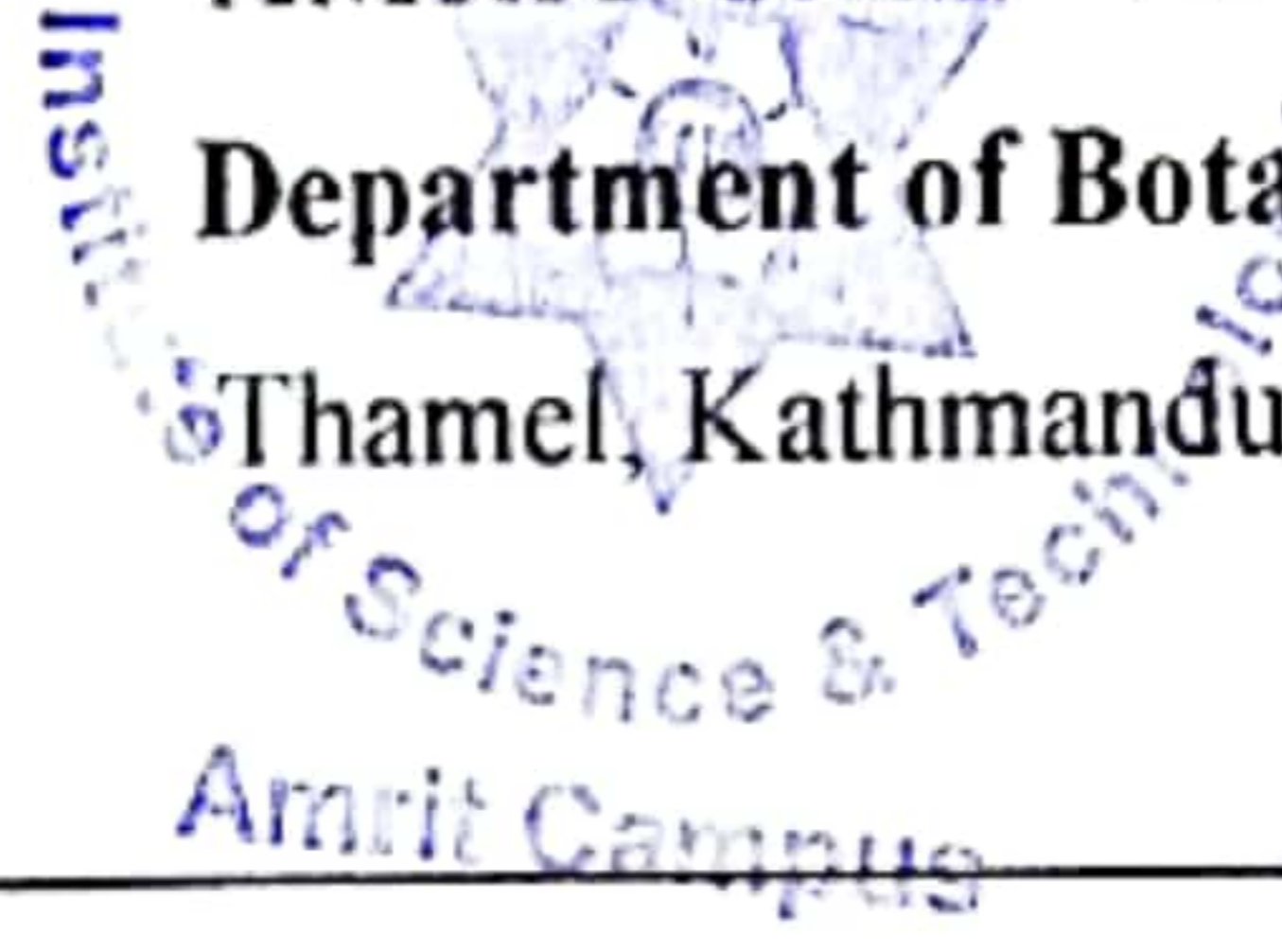


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This is to recommend that Ms. Prabina Dahal, a MSc. Botany final year student at Amrit Campus, Thamel, Kathmandu has carried out dissertation work entitled **“Revision of Flora of Kathmandu Valley: Lamiaceae”** under my supervision. The candidate has documented useful updated findings of the family Lamiaceae in the book, Flora of Kathmandu Valley. This dissertation is primarily based on data collected by the candidate herself and is not presented elsewhere for any other academic purposes yet.

This dissertation has been recommended for acceptance to fulfill the requirement of Master’s Degree in Botany at the Institute of Science and Technology, Tribhuvan University.

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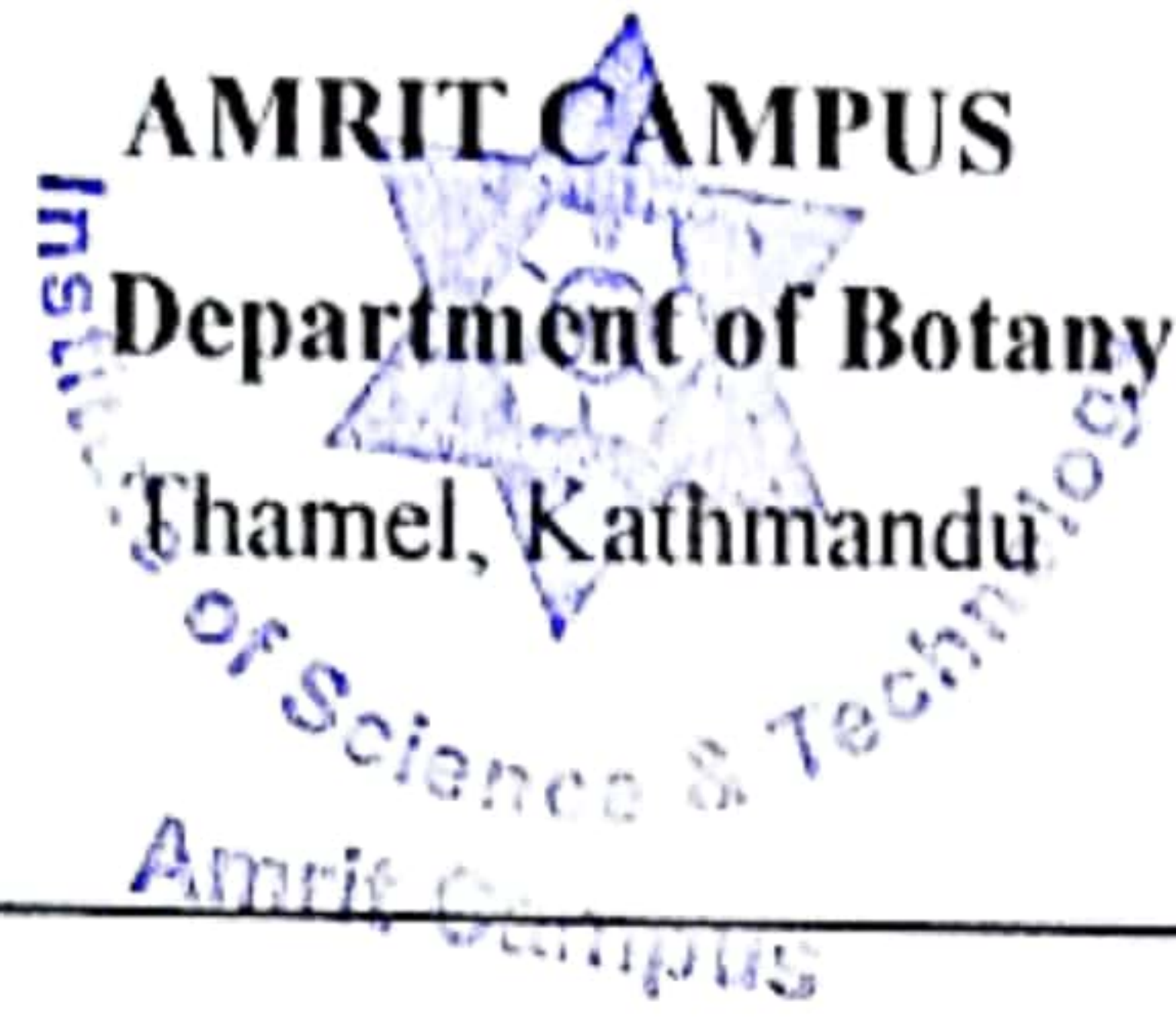
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ABSTRACT

The present study aims to enlist and describe the plant species of Lamiaceae found in the Kathmandu valley. Publications of “Flora of Kathmandu Valley” (Malla *et al.*, 1986) has been 37 years. Therefore, there may have been change in the name and number of species. For this purpose, several species of Lamiaceae were collected from different parts of Kathmandu, Bhaktapur and Lalitpur districts including the areas of Phulchoki, Pashupati-Guhyeshwori, Champadevi, Gokarna, Tokha, Chapagaun, Chandragiri and Suryabinayak. The study and description of the plant species are based on the herbarium prepared from own collection as well as from the herbarium of Amrit Campus and National Herbarium and Plant Laboratories (KATH). In the current study, the number of genera and the species which lie in the family Lamiaceae are 32 and 58 respectively. Out of 58 species, there is the addition of 10 species from Verbenaceae viz., *Callicarpa tomentosa*, *Callicarpa macrophylla*, *Clerodendrum indicum*, *Clerodendrum chinense*, *Clerodendrum japonicum*, *Holmskioldia sanguinea*, *Pseudocaryopteris bicolor*, *Pseudocaryopteris foetida*, *Rotheca serrata* and *Vitex negundo* and the occurrence of 7 species from the Lamiaceae which were not enlisted previously in the book Flora of Kathmandu Valley such as *Elsholtzia fruticosa*, *Ocimum americanum*, *Ocimum tenuiflorum*, *Salvia splendens* and *Salvia hispanica* within the valley. *Coleus barbatus* (= *Coleus forskohlii*) described in Flora of Kathmandu Valley is excluded in the present study.

Keywords: Kathmandu Valley, flora, Lamiaceae, revision.

ABBREVIATIONS AND ACRONYMS

APG	: Angiosperm Phylogeny Group
Asl	: Above the sea level
ca.	: Circa; About (approximate)
cm	: Centimeter
E	: East
<i>et al.</i>	: And others
i.e.	: That is
KATH	: National Herbarium and Plant Laboratories
m	: Meter
mm	: Millimeter
S E	: South East
S.N.	: Serial number
viz.	: such as
W	: West
QGIS	: Quantum Geographic Information Systems
°C	: Degree celsius
Eds.	: Editors

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CHAPTER 1. INTRODUCTION

1.1. Background

The word flora is defined as the reference work that explains and documents the plants of specific geographical area as well as the publication of those species with scientific details. The word, “Flora” refers to publication if the word is capitalized while the lowercased “flora” means plants prevalent in specific territory (Palmer *et al.*, 1995; Harvard University, 2023). A Flora usually comprises scientific names, its descriptions, relevant synonymies, habitats, distribution, blooming seasons and notes. The description of the taxa should be based on examination of fresh plants or herbarium specimens. The dichotomous keys to taxa are prepared to assist in easy identification of unsure plants and their nomenclature (Harvard University, 2023).

The documentation of flora are housed in the herbarium. Herbaria are of great significance to widen the concept of plant world (Harvard University Herbarium & Libraries, 2022).

Flora provides details on rare and endemic species of that area. Flora is useful in agriculture, biodiversity assessment and baselines for monitoring forest, ecosystems and land management, real estate appraisers, weed controllers, landscape architects, seed and feed companies, customs officials as well as in development of Botanical Garden and Park (Mc Gregor *et al.*, 1986; Palmer *et al.*, 1995).

Lamiales is an order of angiosperms and belongs to the subclass Asteridae i.e. Eudicotyledons. It consists of 26 families, 1041 genera and about 21,878 species (Olmstead *et al.*, 2005). The families of Lamiales are Acanthaceae, Bignoniaceae, Byblidaceae, Calceolariaceae, Carlemanniaceae, Gesneriaceae, Lamiaceae, Lentibulariaceae, Linderniaceae, Martyniaceae, Mazaceae, Oleaceae, Orobanchaceae, Paulowniaceae, Pedaliaceae, Peltantheraceae, Phrymaceae, Plantaginaceae, Plocospermataceae, Schlegeliaceae, Scrophulariaceae, Stilbaceae, Tetrachondraceae, Thomandersiaceae, Verbenaceae and Wightiaceae (Chase *et al.*, 2016).

The plants of Lamiaceae, the mint family are aromatic and comprise phenolics, alkaloids, flavonoids and terpenoids as well as they possess culinary, medicinal, and horticultural significance. They are economically essential as sources of wood,

landscape ornamentals, cosmetics, culinary herbs and medicinal herbs. Furthermore, Lamiaceae possess herbaceous habit, quadrangular stems, opposite phyllotaxy, bilabiate flowers, gynobasic style and four nutlets. Similarly, Verbenaceae possess unlobed ovary and terminal style. Both of them give continuity in lobing and separation of the fruit into single seeded unit (Zhao *et al.*, 2021).

However the earlier concept of Lamiaceae has enlarged from the phylogenetic and morphological research over the previous three decades due to inclusion of some species of Verbenaceae into Lamiaceae. A cladistic analysis of Lamiaceae and Verbenaceae was performed by Cantino (1992) on the basis of 85 morphological and anatomical characters which resulted the rejection of Lamiaceae being monophyletic and many clades of Verbenaceae belongs to Lamiaceae. Moreover, Symphorematoideae, Chloanthoideae, Caryopteridoideae, Viticoideae and the tribe Monochileae are transferred to Lamiaceae with the inclusion of only subfamily Verbenoideae into Verbenaceae. Members of Lamiaceae comprise thyrsoid inflorescence, colpate pollen and the false septa of ovary sides containing ovules, slender stigma lobes with inconspicuous stigmatic tissue, rarely hypocrateriform corollas and quadrangular stems. Nevertheless, the members of Verbenaceae have racemose inflorescence, tricolporate pollen and ovules attached to carpel margins, stigma lobes are thick containing prominent stigmatic tissue, hypocrateriform corollas, included stamen and often terete stems (Zhao *et al.*, 2021).

Lamiaceae is the largest family of Lamiales and is sixth largest angiosperm family, which comprises 12 subfamilies, 250 genera and more than 7000 species. The subfamilies are Lamioideae, Cymarioideae, Scutellarioideae, Peronematoideae, Ajugoideae, Premnoideae, Tectonoideae, Viticoideae, Symphorematoideae, Nepetoideae, Callicarpoideae and Prostantheroideae (Marchioni *et al.*, 2020). They are cosmopolitan in distribution. They comprise secondary metabolites comprising strong antiviral, antioxidant, anticancer and anti-inflammatory effects which have significance in biological activities. In addition they are essential for different purposes such as pesticide, food, pharmaceuticals, flavoring, fragrance, etc (Marchioni *et al.*, 2020; Stankovic, 2020).

There are 6,500 species of vascular plants in Nepal (Flora of Nepal, 2020). However, there are approximately 374,000 plants in the world out of which 308,312 are vascular,

295,383 angiosperms, 74,273 monocots and 210,008 eudicots (Christenhusz & Byng, 2016).

1.2. Justification

Publications of “Flora of Kathmandu Valley” has been 37 years and has not yet been revised. Therefore, there may be the chance of change in the number of species. Likewise, earlier concept of family may have been updated as well as some species may have been made the synonym based on the recent phylogenetic studies. In addition, within this gap there have been extensive collections of specimens from Kathmandu valley and are housed at KATH and Amrit Campus herbarium. Moreover, there is the change in Flora Concept, with the development of APG systems of classification and digital informations available from internet about each taxon, “Flora of Kathmandu Valley” needs revision.

This paper will contribute as the part of “Flora of Kathmandu Valley”. Moreover, it will be beneficial to ecologist, environmentalist, taxonomist, institutions, scholars and locals for the identification of various plants found in Kathmandu Valley.

1.3. Objectives

The general objective is:

- To revise flora of Kathmandu valley (Lamiaceae).

The specific objectives are:

- To describe each taxon based on the guidelines prepared for writing the Flora of Nepal.
- To prepare required keys of each taxon for identification.
- To prepare the species distribution map.

CHAPTER 2. LITERATURE REVIEW

In Nepal, the botanical explorations, first of all was commenced by a British Naturalist Sir Francis Buchanan-Hamilton (1802-1803) and N. Wallich (1820-21) in the central region of the country (Rajbhandari, 2016). Botanists from different countries including Britain, Japan, Switzerland, France, India and so on were interested in the investigation and study of plants of Nepal during eighteenth century and hence the exploration of Eastern Nepal was initiated by J.D. Hooker in 1848. This is followed by the noteworthy contribution to plant exploration by Burkill (1907), Lal Dhwoj and K.N. Sharma (1927-1931) as well as Banerji (1948) (Rajbhandari, 2002; Rajbhandari, 2016).

The first explorations reached till date about 218 years, between which there have been numerous new discoveries (Rajbhandari *et al.*, 2020).

D. Don (1825) “*Prodromus Florae Nepalensis*” enlists 93 families, 337 genera and 738 species from Nepal, out of which there are 18 genera and 36 species of Labiatae and among them, 10 genera and 13 species are from Kathmandu valley (Don, 1825). Similarly, Flora of British India accounts 55 genera and about 2600 species of Labiatae, out of which Kathmandu valley is comprised of 25 genera (Hooker, 1885).

Afterwards, different books including the documentation of plant species from Kathmandu Valley and other parts were published in different time frames such as Notes on Flora of Rajnikunj (Gokarna Forest) (1967), Flora of Phulchoki and Godawari (1969), Flora of Nagarjun (1973), Catalogue of Nepalese Vascular Plants (1976), Flora of Kathmandu Valley (1986) and Vegetation and Flora of South-West Kathmandu Valley (Chandragiri) (1999). These literatures and books published by different authors demonstrate the richness of Kathmandu valley in flora.

There are 12 genera and 15 species of Labiatae in Notes on Flora of Rajnikunj (Gokarna Forest) (Shrestha *et al.*, 1967). Catalogue of Nepalese Vascular Plants comprises 43 genera and 106 species of Labiatae (Malla *et al.*, 1976). Furthermore, there are 19 genera and 27 species of Labiatae in the book Flora of Phulchoki and Godawari (Malla *et al.*, 1969). Vegetation and Flora of South-West Kathmandu Valley (Chandragiri) enlists 12 genera and 20 species of Labiatae (Bania and Shakya, 1999). Flora of Nagarjun comprises 17 genera and 24 species of Labiatae (Malla *et al.*, 1973).

An Enumeration of the Flowering Plants of Nepal reports 48 genera and 150 species of Labiatae (Hara *et al.*, 1982).

Flora of Kathmandu Valley documents 27 genera and 42 species of Lamiaceae out of total 1312 vascular plants and 1136 species of Angiosperms found in Kathmandu valley (Malla *et al.*, 1986).

Apart from these, Annotated checklist of the flowering plant of Nepal includes 49 genera and 171 species of lamiaceae from Nepal (Press *et al.*, 2000). Moreover, Plants of Nepal reported 52 genera and 177 species of Lamiaceae in Nepal (Shrestha *et al.*, 2022). A Handbook of the Flowering Plants of Nepal enlists 51 genera and 182 species of Lamiaceae in Nepal (Rajbhandari *et al.*, 2022).

Floristic study and vegetation analysis performed in lower Kanchanjunga-Singhalila ridge (610-4360 m asl), Panchthar district, Eastern Nepal enumerated a total of 6 genera and 9 species viz., *Clinopodium umbrosum*, *Colquhounia coccinea*, *Dracocephalum wallichii*, *Elsholtzia blanda*, *Elsholtzia fruticosa*, *Elsholtzia strobilifera*, *Isodon lophanthoides*, *Leucas ciliata* and *Leucas decemdentata* (Pandey, 2009) and out of them all the species except *Dracocephalum wallichii* are found in Kathmandu valley.

There is the documentation of 18 species of Lamiaceae from Ilam within the altitude of 140-3636 m asl (Bhattarai, 2016), among which 9 genera and 10 species are found in Kathmandu valley.

Paudel *et al.* (2018) reported single species of medicinal plant belonging to Lamiaceae i.e. *Mentha arvensis* from Kathmandu valley which also corresponds with our result.

There are 7 species of Lamiaceae in Arghakanchi district (305-2515 m asl), Central Nepal viz., *Anisomeles indica*, *Colquhounia coccinea*, *Colebrookea oppositifolia*, *Elsholtzia blanda*, *Holmskioldia sanguinea*, *Hyptis suaveolens* and *Vitex negundo* (Paudel *et al.*, 2017), among which all species except *Hyptis suaveolens* are found in Kathmandu valley.

In Panchase Protected Forest (900-2500 m), Central Nepal there are 17 genera and 22 species of Lamiaceae (Bhandari *et al.*, 2018) and among them, 16 genera and 19 species are found in Kathmandu valley.

A total of 98 species of Lamiaceae are enlisted from Karnali Province within the altitudinal range of 100-5500 m asl (Acharya & Paudel, 2020), out of which 30 genera and 33 species are present in Kathmandu valley.

Chalise *et al.* (2020) enlisted *Clinopodium umbrosum*, *Elsholtzia blanda*, *Phlomoides* sp. and *Prunella vulgaris* from Daman and adjoining areas, Central Nepal, among which only *Elsholtzia blanda* and *Prunella vulgaris* are found in the valley. Moreover, Thapa Magar & Chaudhary (2022) documented *Ajuga reptans*, *Clerodendrum bracteatum*, *Elsholtzia flava*, *Leucas lanata* and *Scutellaria discolor* from Daman Simbhanjyang (116-2584 m asl), out of which only *Elsholtzia flava* and *Scutellaria discolor* are found in Kathmandu valley.

There are altogether 28 species of Lamiaceae in National Botanical Garden, Godawari (Parmar *et al.*, 2022), among them *Tectona grandis*, *Clerodendrum speciosum*, *Mentha piperita*, *Mentha spicata* and *Pogostemon plectranthoides* are not reported in our study.

Besides, different efloras and international articles have reported the number of Lamiaceae in different countries. For instance, Flora of Pakistan consists of 65 genera of Labiatae (Nasir & Ali, 1990) and among them there are 23 genera and 25 species in Kathmandu valley. Similarly, Flora of China accounts 96 genera and 807 species of Lamiaceae (Wu *et al.*, 1994-2013), out of which there are 23 genera of Lamiaceae in Kathmandu valley.

The book Flowers of the Himalaya covers the Himalaya range lying within Nepal and the Indian Western Himalaya. It comprises the description of 28 genera and 70 species of Labiatae (Polunin & Stainton, 1997), out of which 15 genera and 15 species are found in Kathmandu valley.

Flora of Bhutan consists of 43 genera and 117 species of Labiatae (Grierson & Long, 1999) and among them 26 genera and 38 species are found in Kathmandu valley.

There are 435 species of Lamiaceae in India. However, Sikkim houses 40 genera and 95 species, among which 25 genera are present in Kathmandu valley (Singh & Sanjappa, 2011).

Flora of Pan Himalaya accounts eight subfamilies of Lamiaceae viz., Callicarpoideae, Symphorematoideae, Viticoideae, Tectonoideae, Ajugoideae, Premnoideae, Peronematoideae, Scutellarioideae), 21 genera and 136 species (Chen, 2019).

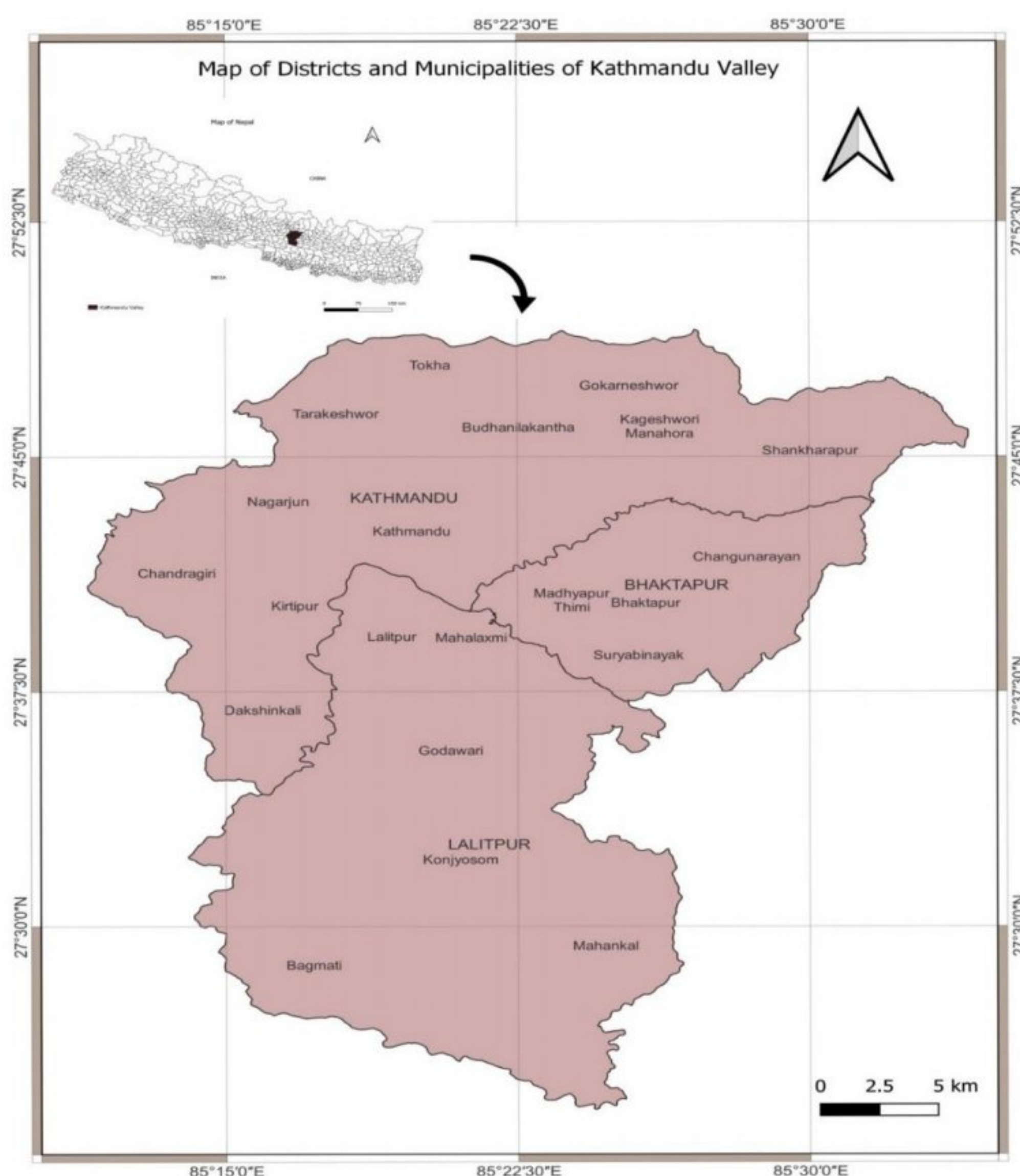
Flora Malesiana documents 180 genera and over 3000 species of Lamiaceae and among them 50 genera and 304 species are native or naturalized in the region (Flora Malesiana, 2019).

CHAPTER 3. MATERIALS AND METHODS

3.1. Study area

3.1.1. Site description

The study area is Kathmandu valley, covering an area of 899 square km. It comprises Kathmandu, Bhaktapur and Lalitpur districts and is situated at Bagmati Province, Nepal. The geographic location extends within the coordinates 27°32'14"N, 27°49'10"N latitudes and 85°11'31"E, 85° 31' 38"E longitude. There are four largest adjoining hills viz. Shivapuri Nagarjun (North West), Nagarkot (North East), Phulchoki (South East) and Chandragiri (South West). The soil is fertile and consists of dense forests (Dhani & Tiwari, 2018).



Source: QGIS

Figure 1: Map of the study area.

3.1.2. Climate

Kathmandu valley is characterized by subtropical, temperate and cool-temperate climate and four respective seasons viz. spring during March to May, summer during June to September, autumn during October to November and winter during December to February (Dhani & Tiwari, 2018). May and June can be very hot and humid until the monsoon rain occurs. The temperatures during spring and autumn are pleasant with occasional rain, whereas the winter is dry and cold. (Poudel *et al.*, 2018).

The maximum and minimum temperatures are 29°C in June and 1°C in January respectively (Dani & Tiwari, 2018). Similarly, the average rainfall during summer is between 20 to 37 cm in Kathmandu (Poudel *et al.*, 2018).

The distribution of flora and fauna in Nepal are affected by climatic factors (rainfall, temperature) and topography (aspect, altitude). North facing slope receives less solar radiation thereby retaining humidity and supports moisture loving plants than that of South facing slope (Bhujju *et al.*, 2007).

3.1.3. Vegetation type

The forests of Kathmandu valley are mainly characterized by three forests types viz. mixed *Schima-Castanopsis* forest at the lower altitude, Oak-Laurel forests in the middle and evergreen Oak forests in the upper part (Malla *et al.*, 1986).

The forest of Gokarna and Pashupati are characterized by mixed broadleaf forest. Nagarjun is comprised of four forest type namely *Schima*, Pine, mixed broadleaved and dry Oak forests in an ascending order. Moreover, Godawari-Phulchoki ranges within the elevation of 1500-2715 m and is comprised of mixed evergreen broadleaved forests (1500-1800 m), Oak-laurel forests (1800-2400 m) and Oak forests (2400 m and higher elevation) (Malla *et al.*, 1986).

The mixed broadleaf forest is usually comprised of the species of *Quercus*, *Castanopsis*, *Schima*, *Myrsine*, *Acer*, *Ilex* etc. Oak-laurel forest comprises of *Rhododendron*, *Lyonia*, *Quercus* etc. Furthermore, the Oak forest is composed of *Quercus* sp. and is associated with *Rhododendron arboreum* with white flowers and the open places are occupied by *Colquhounia coccinea*, *Berberis* sp. and Bamboos.

Similarly, Pine forests usually comprises of *Pinus roxburghii* in lower elevation and *Pinus wallichiana* at the higher (Malla *et al.*, 1986).

3.2. Methods

First of all, morphological features and additional characters such as altitude and phenology of Lamiaceae are studied from Flora of Kathmandu Valley and database of National Herbarium and Plant Laboratories (KATH).

The field visits are performed within December 3, 2022 to March 25, 2023 for eight days. Different species of Lamiaceae are collected from different parts of Kathmandu, Bhaktapur and Lalitpur districts including the areas of Phulchoki, Pashupati-Guhyeshwori, Tokha, Champadevi, Gokarna, Chapagaun, Chandragiri and Suryabinayak from the altitudinal range of ca. 1200-2700m. The study and description of the plant species are based on the herbarium prepared from own collection as well as from the herbarium collections of Amrit Campus and KATH.

3.2.1. Plant collection and herbarium preparation

The herbarium specimens of plants collected from different areas of Kathmandu valley are prepared. All the photographs of the specimens during field visit have been captured (habit as well as closeup of flowers). Each plant specimens are tagged in the field and their details are recorded in the field note book. The procedures of Forman and Bridson (1998) are followed for the plant collection in the field, herbarium preparation as well as their preservation. The collected specimens are submitted to Amrit Campus Herbarium.

3.2.2. Identification and confirmation

For the identification, the collected plants were compared with the herbarium housed at KATH, digital images of herbarium of Royal Botanic Garden, Edinburgh (E), British Museum (BM), Royal Botanic Garden, Kew (K) and University of Tokyo (TI). Furthermore, online databases viz., Global Biodiversity Information Facility (GBIF), International Plant Name Index (IPNI), Plants of World Online (POWO), World Flora Online (WFO) were consulted to update the accepted names and the synonyms of the particular specimen. Different Floras such as Flora of Bhutan (Grierson & Long, 1999), Flora of China (Wu *et al.*, 1994-2013), Flora of Pakistan (Nasir & Ali, 1972-1994), Flora of British India (Hooker, 1885), Flora of Kathmandu Valley (Malla *et al.*, 1986)

were studied for identification of species. The location details are collected from maps.me. The photographs and illustrations are viewed and tallied for the further authentication of the plant specimens.

3.2.3. Description and Nomenclature

The description of morphological characters of vegetative (stems, leaves, inflorescence) and reproductive parts (calyx, corolla, stamen, carpel, fruit) of all the collected specimens are based on my own collection and from the herbarium of KATH and Amrit Campus by following the fundamental guidelines of Flora of Nepal. The details of reproductive parts of dried plant materials of my collection and Amrit Campus Herbarium were studied after soaking in the luke warm water for some minutes whereas fresh materials are studied directly without soaking. The collected plants have been named according to the APG IV(2016) systems of classification. Meanwhile, the key to each taxon was prepared.

Description format:

FAMILY (Capital and Bold letters)

Description of the family

Key to genera

Genus (Bold and italics letters) followed by author

Description of the genus

Key to the species

Description of the species

CHAPTER 4. RESULTS AND DISCUSSION

According to Flora of Kathmandu Valley (1986), there are 27 genera and 42 species of Labiatae as well as 8 genera and 12 species of Verbenaceae in Kathmandu valley. However, the number of Lamiaceae has changed to 30 genera and 51 species with the addition of 10 species of Verbenaceae viz., *Callicarpa arborea*, *Callicarpa macrophylla*, *Clerodendrum indicum*, *Clerodendrum chinense*, *Clerodendrum japonicum*, *Holmskioldia sanguinea*, *Pseudocaryopteris bicolor*, *Pseudocaryopteris foetida*, *Rothea serrata* and *Vitex negundo*. Furthermore, due to the occurrence of 7 species of Lamiaceae which were not enlisted in the book Flora of Kathmandu Valley such as *Elsholtzia fruticosa*, *Mentha arvensis*, *Ocimum americanum*, *Ocimum tenuiflorum*, *Rothea serrata*, *Salvia splendens* and *Salvia hispanica* within the valley, the number of species found in Kathmandu valley has increased to 58 (Figure 3,5). However, *Coleus barbatus* (= *Coleus forskohlii*) is excluded because the presence of this specimen is based on the specimen of KATH, which is not in good condition for identification and description. Therefore, the Kathmandu valley houses a total of 32 genera and 58 species in the present context. Among 32 genera, the largest is *Elsholtzia*, comprising 6 species followed by *Isodon* (5 species) and *Scutellaria* (4 species) (Figure 4).

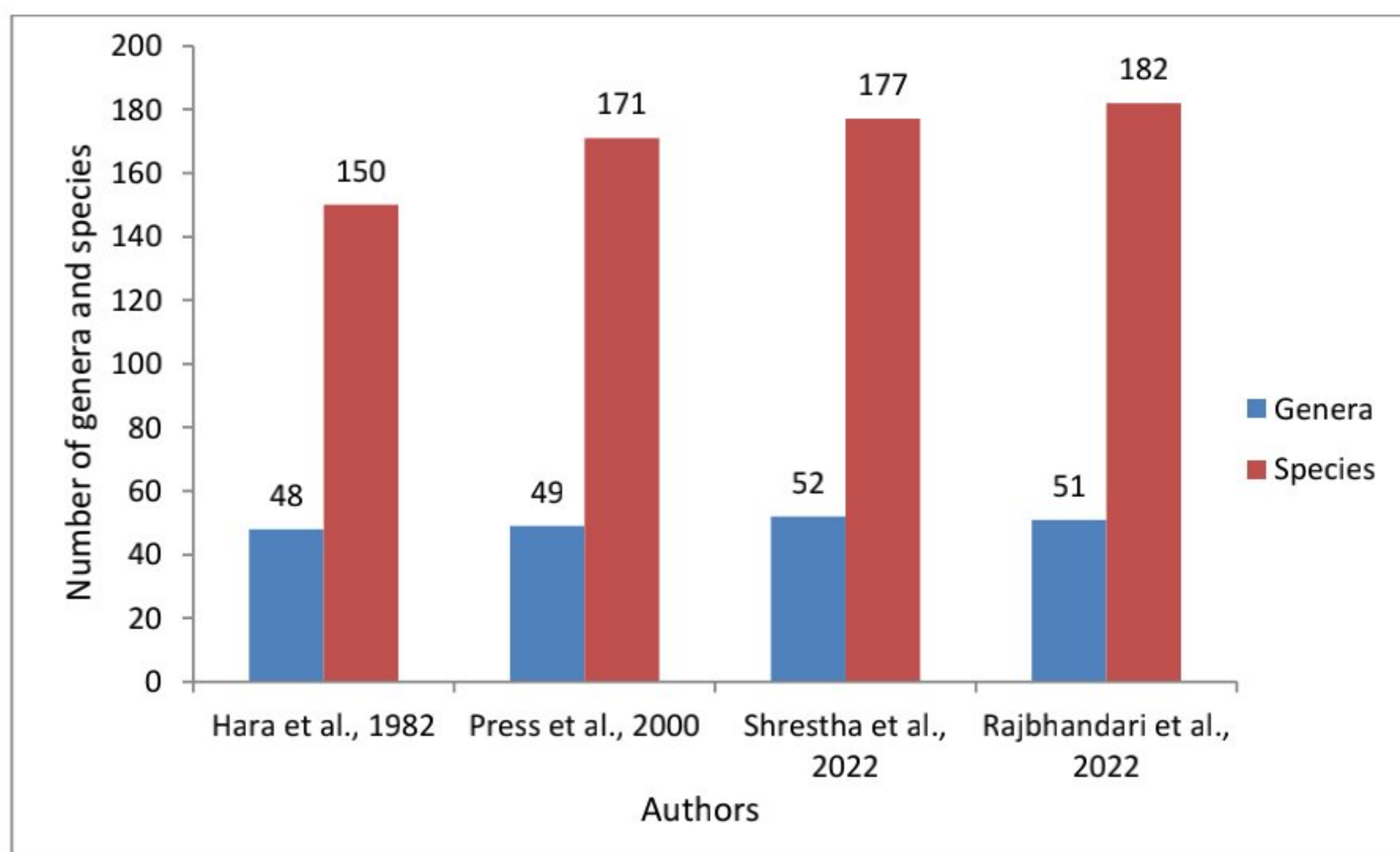


Figure 2: Total genera and species of Lamiaceae found in Nepal reported by different authors in different time frames.

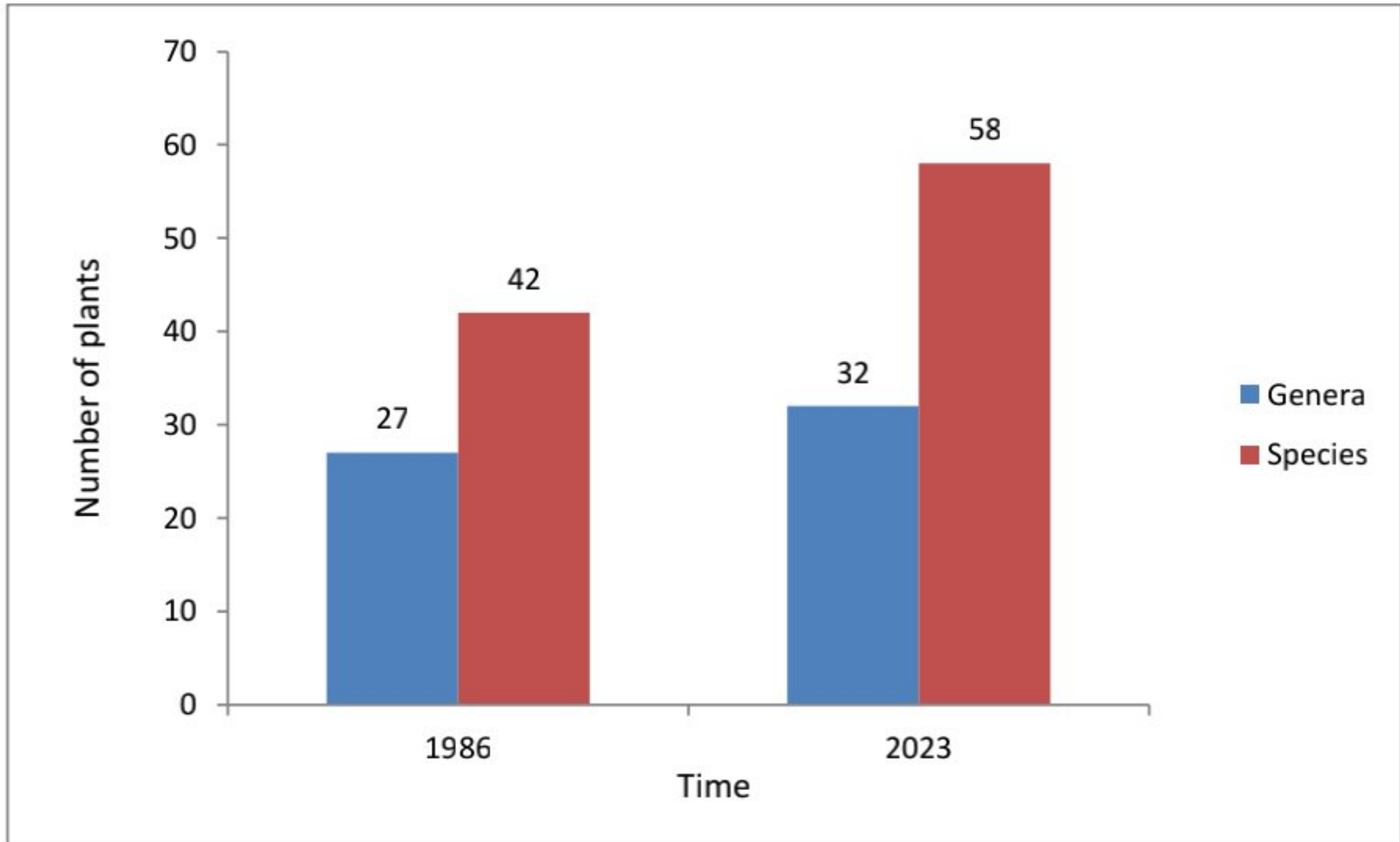


Figure 3: Total number of genera and species of Lamiaceae during 1986 and 2023 in the Kathmandu Valley.

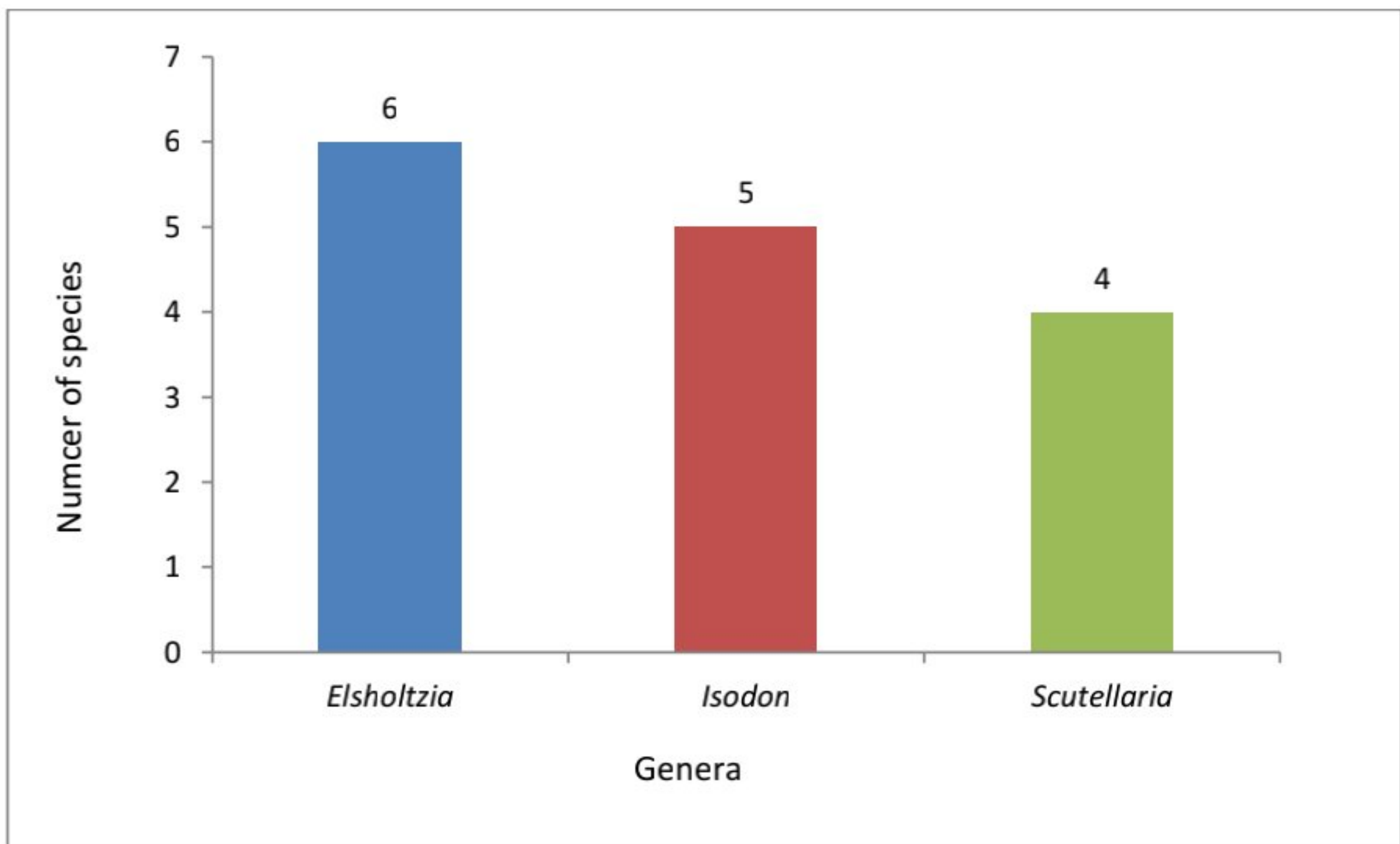


Figure 4: Top three genera based on the number of species.

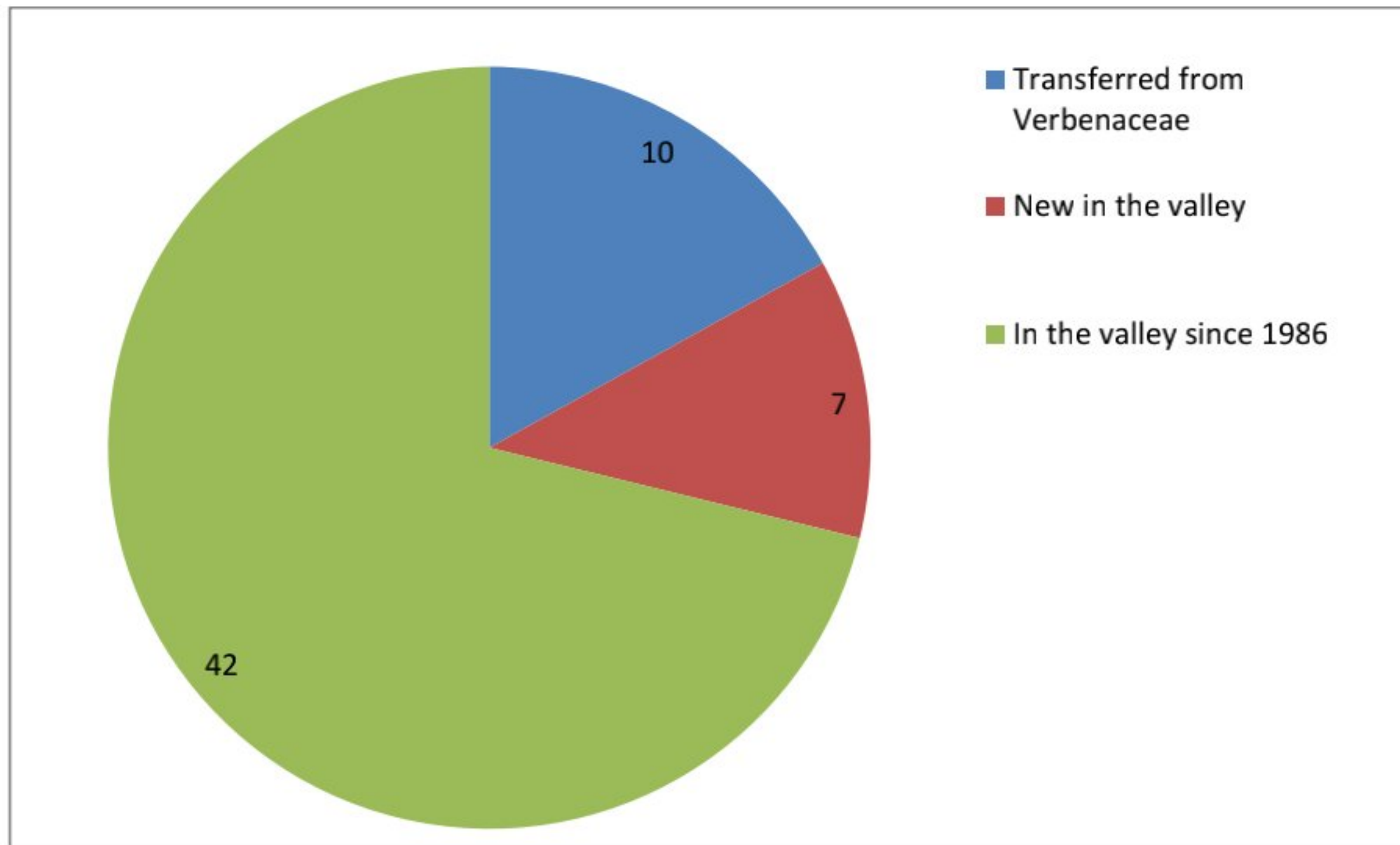


Figure 5: Total species of Lamiaceae after transferred from Verbenaceae and new record for the Valley.

4.1. Taxonomic treatment

Eudicots

ORDER: LAMIALES

FAMILY: LAMIACEAE

Herbs, subshrubs, scandent shrubs, shrubs, rarely small trees, rarely aromatic. Stems usually quadrangular, rarely terete or subterete; erect or prostrate. Leaves simple, rarely compound; opposite decussate, rarely opposite whorled; exstipulate. Inflorescence verticillasters, spike-like, thyrses, corymbose, paniculate, rarely cymes. Bracts caducous or persistent. Calyx usually bilabiate and 5-lobed, rarely 4-lobed, 10-lobed and unlobed. Corolla bilabiate, 4 or 5-lobed, sometimes with deep sinus on upper lip. Stamens 4, exserted or included, didynamous, rarely equal; 2 with 2 staminode or sometimes modified into sterile petals. Anthers 2-celled, rarely 4-celled. Style terminal or gynobasic. Fruit drupe, nutlets, rarely capsule or not seen; enclosed by persistent calyx.

Key to Genera

- 1a** Inflorescence usually cymose rarely racemose. Style terminal. Fruit drupe, rarely capsule **2**
- b Inflorescence verticillasters. Style gynobasic. Fruit 4-nutlets **7**
- 2a** Leaves palmately compound **32. Vitex**
- b Leaves simple **3**
- 3a** Calyx petaloid, unlobed **11. Holmskioldia**
- b Calyx sepaloid, lobed **4**
- 4a** Corolla 4-lobed **3. Callicarpa**
- b Corolla 5-lobed **5**
- 5a** Corolla bilabiate **27. Pseudocaryopteris**
- b Corolla not bilabiate **6**
- 6a** Calyx deeply lobed **4. Clerodendrum**
- b Calyx minutely lobed **28. Rothea**
- 7a** Calyx bilabiate **8**
- b Calyx not bilabiate **19**
- 8a** Stamens 2, staminodes 2 **9**
- b Stamens 4 **10**
- 9a** Calyx throat glabrous **29. Salvia**
- b Calyx throat not glabrous **19. Mosla**
- 10a** Deep sinus instead of upper corolla lip **31. Teucrium**
- b Deep sinus absent; upper corolla lip present **11**
- 11a** Upper corolla lobes 3 or 4 **12**
- b Upper corolla lobes 2, lobes free or fused **15**
- 12a** Upper corolla lobes 3. Style globose **21. Orthosiphon**
- b Upper corolla lobes 4. Style bifid **13**

13a Upper calyx lip single lobed	10. Equilabium
b Upper calyx lip 3-lobed	14
14a Leaves upto 15.5 cm. Calyx with pits	24. Platostoma
b Leaves upto 3 cm. Calyx without pits	20. Ocimum
15a Upper calyx lip with scutellum	30. Scutellaria
b Upper calyx lip without scutellum	16
16a Upper corolla lip 2-lobed	16. Melissa
b Upper corolla lip entire or emarginate	17
17a Upper corolla lip entire, galeate	26. Prunella
b Upper corolla lip emarginate, not galeate	18
18a Inflorescence in verticillasters with many flowers, headlike	5. Clinopodium
b Inflorescence in verticillasters with 2-flowers, dense spike-like	22. Perilla
19a Calyx lobes not equal	20
b Calyx lobes equal	23
20a Branches tufted. Leaves less than 1 cm	18. Micromeria
b Branches not tufted. Leaves more than 1 cm	21
21a Nutlets with large areole	1. Ajuga
b Nutlets without large areole	22
22a Bracts subreniform, caducous. Leaves abaxially white tomentose. Nutlets obovoid or ovoid	15. Leucosceptrum
b Bracts usually ovate, not caducous. Leaves abaxially not white tomentose. Nutlets oblong	12. Isodon
23a Corolla not bilabiate.....	24
b Corolla bilabiate	25
24a Filaments glabrous	17. Mentha

b Filaments pubescent	25. Pogostemon
25a Calyx 10-lobed	14. Leucas
b Calyx 5-lobed	26
26a Calyx plumose	6. Colebrookea
b Calyx not plumose	27
27a Calyx lobes with apical hooked spine	23. Phlomis
b Calyx lobes without apical hooked spine	28
28a Leaves semiclasping	13. Lamium
b Leaves not semiclasping	29
29a Anterior anthers 2-celled; posterior anthers single celled	2. Anisomeles
b All anthers 2-celled	30
30a Corolla upper lip entire	8. Cranitome
b Corolla upper lip emarginate	31
31a Nutlets winged	7. Colquhounia
b Nutlets not winged	9. Elsholtzia

1. *Ajuga* L. Sp. Pl.: 561 (1753).

Herbs. Stems erect, prostrate or stoloniferous, pubescent. Leaves simple, opposite decussate, circular to elliptic-circular or ovate-elliptic. Petioles winged or not. Verticillasters in spike or axils of leaves; sometimes subtended by bracts. Calyx campanulate or funnelform, regular or sub-bilabiate, 5-lobed, subequal. Corolla bilabiate, tubular, tube sometimes gibbous; upper lip short, 2-lobed; lower lip longer, 3-lobed. Stamens 4, didynamous, anterior 2 longer, exserted from upper lip. Nutlets oblong-obovoid or obovoid, large areole covering 2/3 of length.

Worldwide about 64 species. Seven species in Nepal and two species in Kathmandu Valley.

Key to Species

1a Leaves circular to elliptic-circular, base cordate-subtruncate. Petioles not winged.
Calyx campanulate. Corolla tube not gibbous, not annulate inside **1. A. lobata**

b Leaves ovate-elliptic, base cuneate-attenuate. Petioles winged. Calyx funnelform.
Corolla tube gibbous, annulate inside **2. A. macrosperma**

1. *Ajuga lobata* D. Don, Prodr. Fl. Nepal.: 108 (1825).

Plants ca. 7-12 cm tall. Stems erect or stoloniferous. Leaves circular to elliptic-circular, 1-3.4 x 0.6-3.3 cm, base cordate to subtruncate, apex rounded to obtuse, margin irregularly crenate, ciliate; sparsely pubescent but densely on abaxial veins, abaxial blades purplish. Petioles 0.8-4.8 cm, not winged. Verticillasters few, in axils of leaves. Floral leaves resemble to stems leaves. Pedicel 2 mm. Flower solitary. Calyx campanulate, ca. 5 mm, quite swollen. Calyx lobes ovate-lanceolate, 3.2 mm, posterior tooth slightly shorter and somewhat obtuse, ciliate. Corolla purple or reddish purple, straight, ca. 2 cm, pubescent; annulate, subglabrous inside; upper lip erect, semicircular, emarginate; middle lobe of lower lip flabellate, 2-lobed, lateral lobes oblong-lanceolate. Nutlets ca. 2 x 1.2 mm, oblong-obovoid.



Figure 6: Distribution of *Ajuga lobata* in Kathmandu valley.

Distribution: Kathmandu Valley (Bagdwar, Phulchoki, Shivapuri), Nepal, E Himalaya and East Asia.

Altitudinal range: 2100-2600 m.

Flowering: June-August

Specimens examined: Kathmandu Valley; Lalitpur District; Phulchoki; 10/06/1969; *H. Kanai 130604* (KATH). Kathmandu District; Shivapuri; 03/08/1965; *T.B. Shrestha 130581* (KATH). Lalitpur District; Phulchoki; 03/08/1965; *T.B. Shrestha 130585* (KATH).

2. *Ajuga macrosperma* Wall. ex Benth., N. Wallich, Pl. Asiat. Rar. 1: 58 (1830).

Vernacular name(s): घोके घाँस *Ghoke ghans* (Nepali).

Plants upto 90 cm. Stems erect or prostrate sometimes stoloniferous. Leaves ovate-elliptic, 4.5-6 x 2.3-2.8 cm, base cuneate-attenuate, apex acute, rarely obtuse, margin crenate-serrate, pubescent. Petioles upto 1.5 cm long, narrowly winged. Verticillasters distant or conferted, lowermost subtended by bracts less than 1.5 cm long. Spikes 1.5-8.5 x 0.6-1.2 cm; terminal floral leaves bract like, ovate-lanceolate, almost longer than verticillasters. Bract 1.4 cm. Pedicel very short or obsolete. Flowers blue in continuous or interrupted whorls. Calyx funnelform, 5 mm, veins and margin pubescent. Corolla blue-purple, 6 mm, obliquely spreading, upper side near base gibbous; pubescent, annulate inside; upper lip 2 mm, oblong, lobes subovate; middle lobe of lower lip narrowly cordate, apex emarginate; lateral lobes oblong, slightly longer than upper lip. Nutlets ca. 2.3 x 1.5 mm, obovoid.

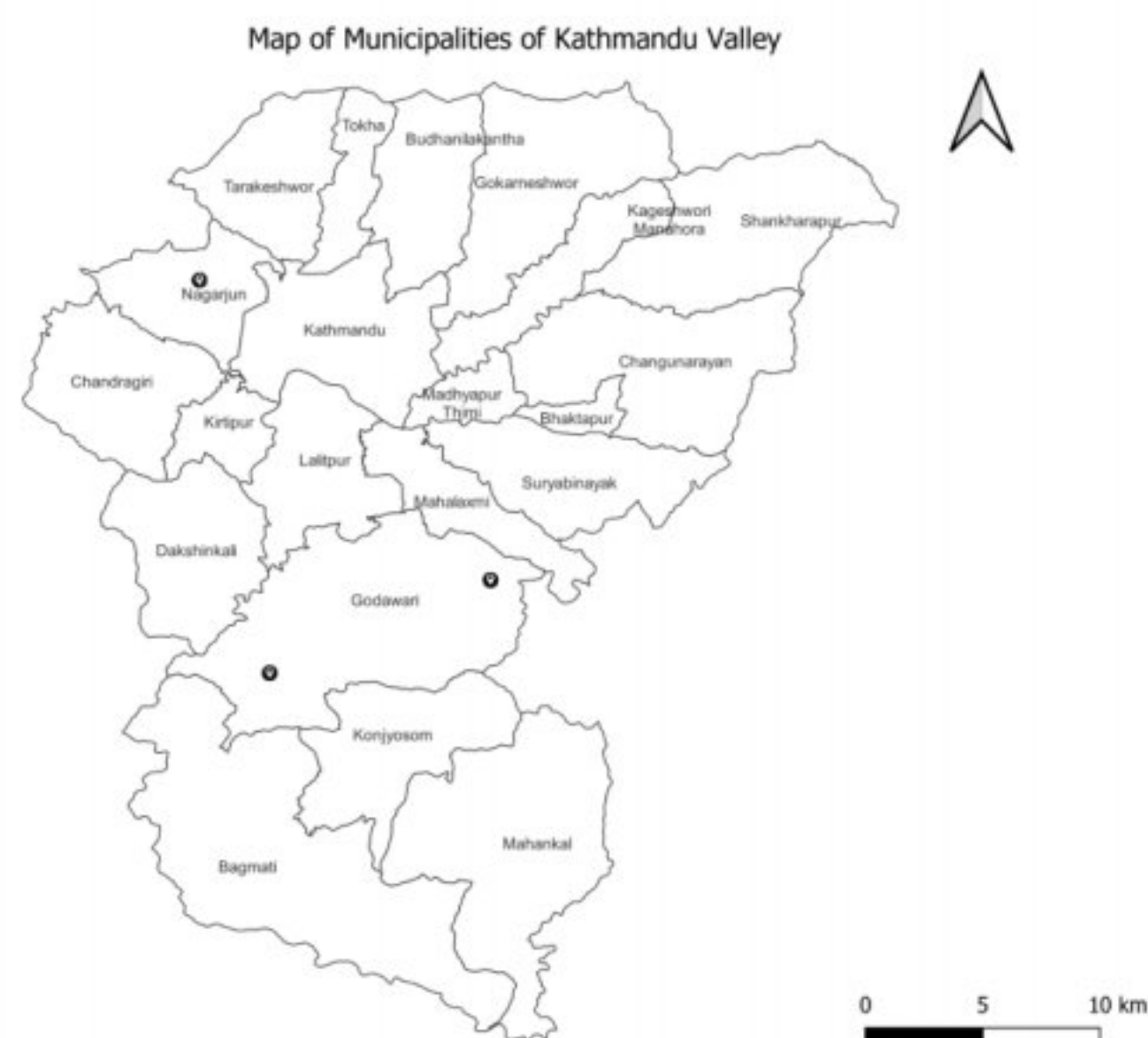


Figure 7: Distribution of *Ajuga macrosperma* in Kathmandu valley.

Distribution: Kathmandu Valley (Chapagaun, Godawari, Nagarjun), Nepal, West Himalaya, East Himalaya, Assam-Burma and SE Asia.

Altitudinal range: 1500-1800 m.

Flowering: March-June.

Specimens examined: **Kathmandu Valley;** Kathmandu District; Nagarjun; 09/06/1968; *S. Gurung & P. Pradhan 130831* (KATH). Lalitpur District; Godawari; 26/06/2021; *Netra Kumari Sidali 11* (Amrit Campus Herbarium). Lalitpur District; Godawari; 26/03/2022; *Sita Chalaune 3* (Amrit Campus Herbarium). Lalitpur District; Phulchoki; 26/06/202; *Preeti Tamang 11* (Amrit Campus Herbarium). Lalitpur District; Chapagaun; 08/03/2023; *P. Dahal, E. Rai, K. Maharjan, M. Neupane, R. Chaudhary, S. Sharma, S. Poudel, S. Desai, 21* (Amrit Campus Herbarium).

2. *Anisomeles* R. Br., Prodr. Fl. Nov. Holland.: 503 (1810), num. cons.

Herbs. Stems erect, quadrangular, branched. Leaves simple, opposite decussate, ovate. Inflorescence spike-like. Bracts filiform. Calyx campanulate, slightly enlarged in fruit; 5-lobed, subequal, straight. Corolla bilabiate; tube straight, sparsely pubescent annulate inside; upper lip entire; lower lip 3-lobed, longer than upper; middle lobe larger than lateral lobes, emarginate. Stamens 4, didynamous, exerted, anterior pairs longer. Anterior anthers 2-celled, posterior anthers single celled. Style bifid, lobes subequal. Nutlets globose.

Worldwide about 18 species. Single species in Nepal and Kathmandu Valley.

1. *Anisomeles indica* (L.) Kuntze, Revis. Gen. Pl. 2: 512 (1891)

Nepeta indica L., Sp. Pl.: 571 (1753).

Vernacular name(s): रातो चारपाते Rato charpate, झुसुले Jhusule (Nepali).

Plants ca. 1- 2 m tall. Stems densely pubescent. Leaves 1.4-5.2 x 0.4-2.2 cm, base broadly truncate-cuneate, margin unevenly dentate, pubescent. Petioles 1-4.5 cm. Inflorescence upto ca. 2.9 cm in diameter; verticillasters many flowered. Floral leaves short petiolate or sessile, longer than verticillasters. Bract 4 mm. Calyx ca. 9 mm, glandular, pubescent; lobes purple-red, triangular-lanceolate, ca. 3 mm, ciliate. Corolla purplish, ca. 1.2 cm, glabrous outside; tube funnelform, mouth upto 3 mm wide; upper lip oblong, ca. 5 x 3 mm, margin entire; lower lip subhorizontally spreading, ca. 9 x 5

mm; middle lobe obcordate ca. 3 x 4.5 mm, slightly undulate, bearded; lateral lobes ovate. Nutlets ca. 1.5 mm in diameter.



Figure 8: Distribution of *Anisomeles indica* in Kathmandu valley.

Distribution: Kathmandu Valley (Nagarjun, Phulchoki), Nepal, W Himalaya, E Himalaya, Assam-Burma and SE Asia.

Altitudinal range: 1500-2200 m.

Flowering: September-November.

Specimens examined: Kathmandu Valley; Kathmandu District; Nagarjun; 02/10/1969; *M.S. Bista and H. Kanai* 130727 (KATH). Lalitpur District; Phulchoki; 26/09/1967; *Miss Manandhar and Party* 130730 (KATH). Kathmandu District; Nagarjun; 06/11/1967; *P.R. Shakya and P. Pradhan* 130731 (KATH). Lalitpur District; Phulchoki; 30/09/1969; *Miss Manandhar and Party* 120729 (KATH).

3. *Callicarpa* L., Sp. Pl.: 111 (1753).

Shrubs or trees. Stems erect, slightly cylindrical to nearly quadrangular, tomentose. Leaves opposite, oblong-elliptic or ovate to oblong-lanceolate. Flowers small in lax axillary cymes. Calyx campanulate, shallowly 4-lobed, stellate tomentose, sometimes glandular. Corolla not bilabiate, equally 4-lobed. Stamens 4; anthers exerted,

sometimes glandular; style slender; stigma swollen minutely bifid densely stellate tomentose or puberulent. Drupe globose.

Worldwide about 140 species. Four species in Nepal and two species in Kathmandu Valley.

Key to Species

1a Leaves base rounded, rarely cuneate, margin entire, abaxially densely yellow-brown stellate tomentose. Peduncles as long as petioles. Cymes 8-9 cm across. Drupes purplish brown **1. *C. arborea***

b Leaves base cuneate, margin serrulate-dentate, abaxially subglabrous. Peduncles shorter than petioles. Cymes 3-5.7 cm across. Drupes white **2. *C. macrophylla***

1. *Callicarpa arborea* Roxb., Fl. Ind. 1: 405 (1820).

Vernacular name(s): मास गेडि Mas gedi, घुँयालो Ghunyalo (Nepali).

Trees ca. 8 m tall. Stems slightly cylindrical. Leaves ovate to oblong-elliptic, 14.5-17.7 x 5.7-6.2 cm, base rounded, rarely cuneate, apex aristulate to caudate, margin entire; adaxially glabrous, dark green and shiny, abaxially densely yellow-brown stellate tomentose, gland-dotted. Petioles ca. 3.5- 4 cm, densely tomentose. Cymes 8-9 cm across. Peduncle quadrangular, longer than Petioles. Calyx densely gray stellate tomentose outside, ca. 1 mm. Corolla purple, ca. 3 mm. Drupes ca. 2 mm in diameter, purplish brown.



Figure 9: Distribution of *Callicarpa arborea* in Kathmandu valley.

Distribution: Kathmandu Valley (Nagarjun), Nepal, S Asia.

Altitudinal range: 1500-1700 m.

Fruiting: June-October.

Specimens examined: **Kathmandu Valley;** Kathmandu District; Nagarjun; 30/05/1968; *Misses Pradhan and Miss Gurung* 130657 (KATH). Kathmandu District; Nagarjun; 23/06/1969; *R. Thapa and P. Pradhan* 130668 (KATH). Kathmandu District; Nagarjun; 02/10/1969; *M.S. Brita* 130660 (KATH).

2. *Callicarpa macrophylla* Vahl, Symb. Bot. 3: 13 (1794).

Vernacular name(s): दहिचाम्ले Dahichamle, घुँयालो Ghunyanlo (Nepali).

Shrubs or small trees ca. 2 m tall. Stems nearly quadrangular. Leaves oblong-lanceolate, 14.5-25.2 x 5-9.5cm, base cuneate, apex acuminate, margin serrulate to dentate, mucronate tip; adaxially stellate tomentose, abaxially subglabrous. Petioles 1.2-2.7 cm, stellate tomentose. Peduncles shorter than petioles. Cymes ca. 3-5.7 cm across. Calyx ca. 1 mm, gray stellate tomentose, yellow glandular. Corolla purple, ca. 2.4 mm, slightly stellate pubescent. Drupes ca. 2 mm in diameter, white, puberulent, glandular.



Figure 10: Distribution of *Callicarpa macrophylla* in Kathmandu valley.

Distribution: Kathmandu Valley (Gokarna, Nagarjun, Phulchoki), Nepal, W Himalaya, E Himalaya, Assam-Burma and SE Asia.

Altitudinal range: 1300-2000 m.

Fruiting: June-November.

Specimens examined: Kathmandu Valley; Kathmandu District; Gokarna; 04/11/1966; *D.H. Nicolson 012609* (KATH). Kathmandu District; Nagarjun; 04/02/1966; *S.B. Malla 130193* (KATH). Kathmandu District; Nagarjun; 04/07/1966; *S.B. Malla 130929* (KATH). Kathmandu District; Nagarjun; *130930* (KATH). Lalitpur District; Phulchoki; 26/06/1967; *S.B. Malla et al. 130931* (KATH).

4. *Clerodendrum* L., Sp. Pl.: 637 (1753).

Shrubs or subshrubs. Stems erect, quadrangular, pubescent to glabrescent. Leaves opposite or whorled, broadly ovate-subcordate or narrowly lanceolate to oblong-lanceolate or subcordate. Flowers in terminal thyrses or dense corymbose cymes, bracteate. Calyx campanulate at base, 5-lobed, pubescent or glabrous, glandular. Corolla white, pink or red; lobes subequal. Stamens 4, filaments curved; anthers long exserted. Style filiform, exserted; stigma bifid. Stamens and ovary rarely modified into sterile petals. Drupes globose or subglobose, rarely not seen.

Worldwide about 400 species. Eight species in Nepal and three species in Kathmandu Valley.

Key to Species

- 1a** Leaves whorled, margin entire or sinuate; glabrous **2. *C. indicum***
b Leaves opposite, margin not entire or sinuate; pubescent **2**
2a Leaves base truncate. Calyx lobes linear-lanceolate or lanceolate ... **1. *C. chinense***
b Leaves base cordate. Calyx lobes ovate **3. *C. japonicum***

1. *Clerodendrum chinense* (Osbeck) Mabb., Plant-book, reimpr.: 707 (1989).

Cryptanthus chinensis Osbeck, Dagb. Ostind. Resa: 215 (1757).

Shrubs ca. 0.5-1.2 m tall. Stems pubescent when young, glabrescent. Leaves opposite, broadly ovate-subcordate, ca. 3-6 x 1.5-5.8 cm, base broadly truncate, apex acuminate, margin slightly irregularly dentate; pubescent, abaxially glandular. Petioles ca. 0.4-1.5 cm, pubescent. Flowers in dense corymbose cymes. Bract lanceolate. Calyx ca. 1.7 cm, pubescent; lobes linear-lanceolate or lanceolate, ca. 8 mm. Corolla white, pinkish or

red; lobes elliptic, ca. 1.5 x 0.6 cm. Stamens and ovary modified into sterile petals. Fruits not seen.



Figure 11: Distribution of *Clerodendrum chinense* in Kathmandu valley.

Distribution: Kathmandu Valley (Chapagaun, Nagarjun), Nepal, E Himalaya, Assam-Burma and SE Asia.

Altitudinal range: 1500 m.

Flowering: March-April.

Specimens examined: **Kathmandu Valley;** Kathmandu District; Nagarjun; 13/04/1988; *Kishor Dutta Baral* (Amrit Campus Herbarium). Lalitpur District; Chapagaun; 08/03/2023; *P. Dahal, E. Rai, K. Maharjan, M. Neupane, R. Chaudhary, S. Sharma, S. Poudel, S. Desai* 22 (Amrit Campus Herbarium).

2. *Clerodendrum indicum* (L.) Kuntze, Revis. Gen. Pl. 2: 586 (1891).

Siphonanthus indicus L. in Sp. Pl.: 109 (1753).

Vernacular name(s): भार्गी Bhargi, चिन्डे Chinde (Nepali).

Shrubs or subshrubs ca. 1-2 m tall. Stems branchlets channeled, glabrous except for pubescent nodes. Leaves whorl of 3-5 leaves per node or opposite, narrowly lanceolate to oblong-lanceolate, ca. 3-6 x 0.5-1.2 cm, base attenuate, apex acuminate, margin entire to sinuate; glabrous, abaxially glandular. Petioles ca. 0.6 cm, pubescent at petiole base. Flowers in leafy thyrses, ca. 12-15 x 7.5-9.5 cm. Bract linear-lanceolate to

lanceolate. Calyx 1.5 cm; lobes elliptic or ovate-oblong, ca. 1 cm. Fruiting calyx crimson, upto 2 cm in diameter, glabrous. Corolla creamy white ca. 9-12 cm; lobes spreading, obovate, ca. 9 x 3 mm. Drupes ca. 5 mm in diameter, globose, dark blue.

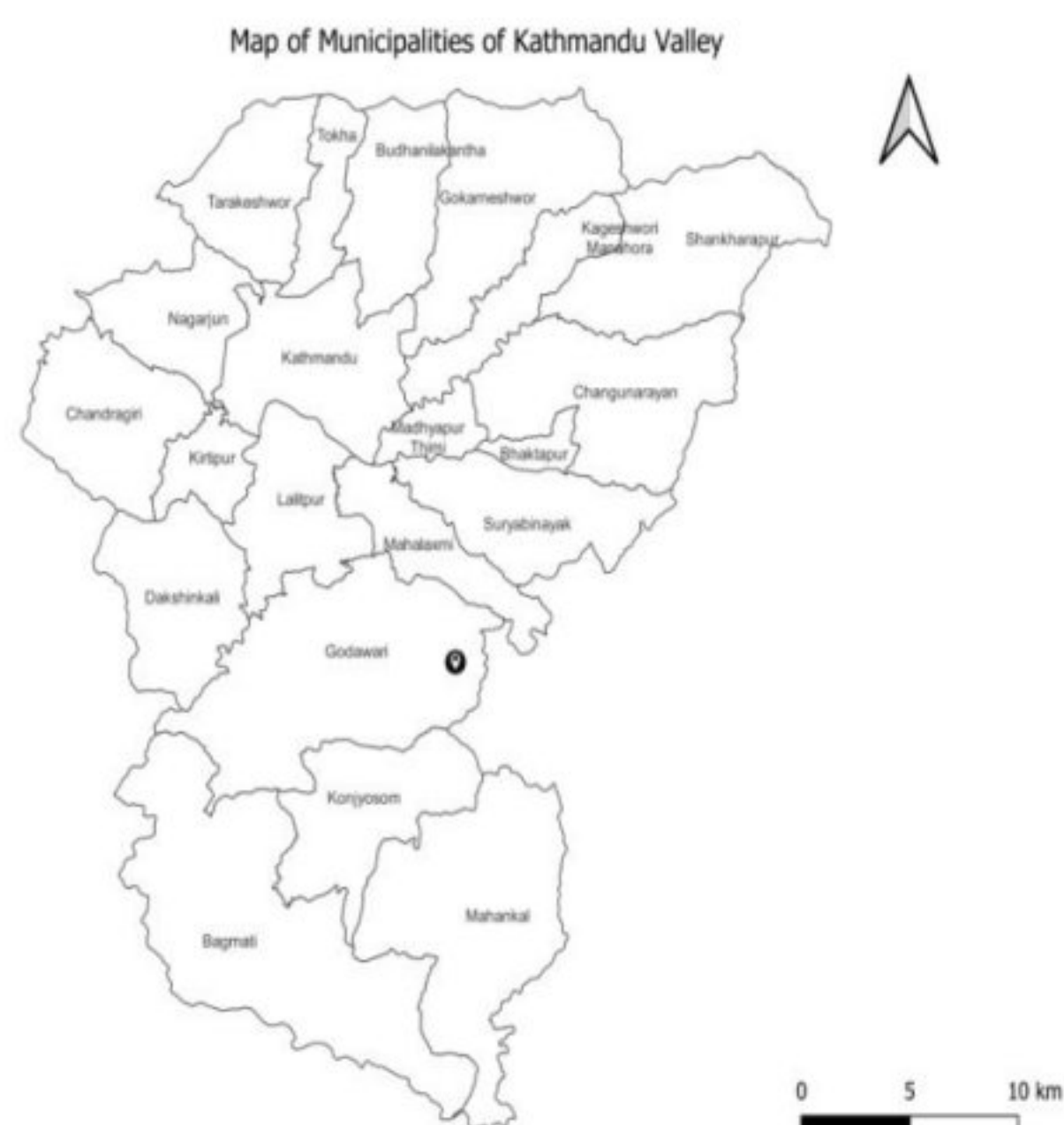


Figure 12: Distribution of *Clerodendrum indicum* in Kathmandu valley.

Distribution: Kathmandu Valley (Phulchoki), Nepal, E Himalaya, Assam-Burma and SE Asia.

Altitudinal range: 2200 m.

Fruiting: July.

Specimens examined: Kathmandu Valley; Lalitpur District; Phulchoki; 05/07/1968; Miss Manandar and Party 131908 (KATH).

3. *Clerodendrum japonicum* (Thunb.) Sweet, Hort. Brit.: 822 (1826).

Volkameria japonica Thunb. In J.A. Murray, Syst. Nat., ed. 14: 578 (1784).

Vernacular name(s): धागो फुल Dhago phul (Nepali).

Shrubs ca. 1-4 m tall. Stems channeled when dry, pubescent to glabrescent, nodes pubescent. Leaves opposite, subcordate, ca. 2.3-19.3 x 2.2-18.2 cm, base cordate, apex acuminate-acute, margin minutely serrulate-dentate; slightly pubescent, abaxially glandular. Petioles ca. 0.4-1.7 cm, pubescent. Flowers in thyrses, ca. 10.5-15 x 11.5-17 cm. Bract linear-lanceolate. Calyx ca. 8 mm; lobes narrowly ovate, pubescent, outside

sandy glandular; lobes ovate-lanceolate to ovate, ca. 6 mm. Corolla white or red; tube ca. 2 cm; lobes oblong, ca. 6-9 mm. Drupes ca. 6-9 mm in diameter, subglobose, blue-black.



Figure 13: Distribution of *Clerodendrum japonicum* in Kathmandu valley.

Distribution: Kathmandu Valley (Balaju, Godawari), Nepal, E Himalaya, Assam-Burma.

Altitudinal range: 1200 m.

Flowering: May.

Specimens examined: **Kathmandu Valley;** Kathmandu District; Balaju; 19/05/1971; *Purushottam Kharel* 7 (Amrit Campus Herbarium). Kathmandu District; Balaju; 30/05/1968; 4 (Amrit Campus Herbarium). Lalitpur District; Godawari; 28/05/1997; *Dependra Kumar* 13 (Amrit Campus Herbarium).

5. *Clinopodium* L., Sp. Pl.: 587 (1753).

Herbs. Stems slender, terete or quadrangular, pubescent. Leaves simple, opposite decussate, rhombic or ovate. Flowers cymose in lax-whorls, bracteate. Calyx tubular, bilabiate, unequal, 5-lobed, pubescent, veins conspicuous. Corolla bilabiate; tube straight; upper lip emarginate; lower lip 3-fid, slightly longer than upper one, pubescent. Stamens 4, didynamous. Style bifid, unequal. Nutlets subglobose or ovoid.

Worldwide about 150 species. Five species in Nepal and two species in Kathmandu Valley.

Key to Species

1a Stems terete. Leaves rhombic, base attenuate. Bract subulate. Nutlets subglobose
 **1. C. piperitum**

b Stems quadrangular. Leaves ovate, base round to broadly cuneate. Bract linear.
 Nutlets ovoid **2. C. umbrosum**

1. *Clinopodium piperitum* (D. Don) Murata, Acta Phytotax. Geobot. 28: 30 (1977).

Thymus piperitus D. Don, Prodr. Fl. Nepal.: 112 (1825).

Vernacular name(s): पिपरमिन्ट् Piparmint (Nepali).

Plants ca. 18.5 cm. Stems decumbent, terete. Leaves rhombic, 2-4 x 0.5-2 cm, base attenuate, apex acute, margin minutely serrate. Petioles 0.5-1 cm. Bract ca. 5 mm, subulate, ciliate, pubescent; abaxially glandular. Pedicel 2 mm. Verticillasters up to 10 flowers, axillary, ca. 7 mm. Calyx ca. 1.1 cm, purplish-green; lobes 5, 3-triangular, ca. 2.5 mm; 2-subulate, ca. 3 mm, spinescent. Corolla purple, 2.2 cm; tube ca. 1.7 cm; upper lip ca. 2.2 mm; middle lobe of lower lip ca. 3.2 mm; lateral lobes ca. 3 mm, ovate. Nutlets ca. 1 mm, ovoid, brown.

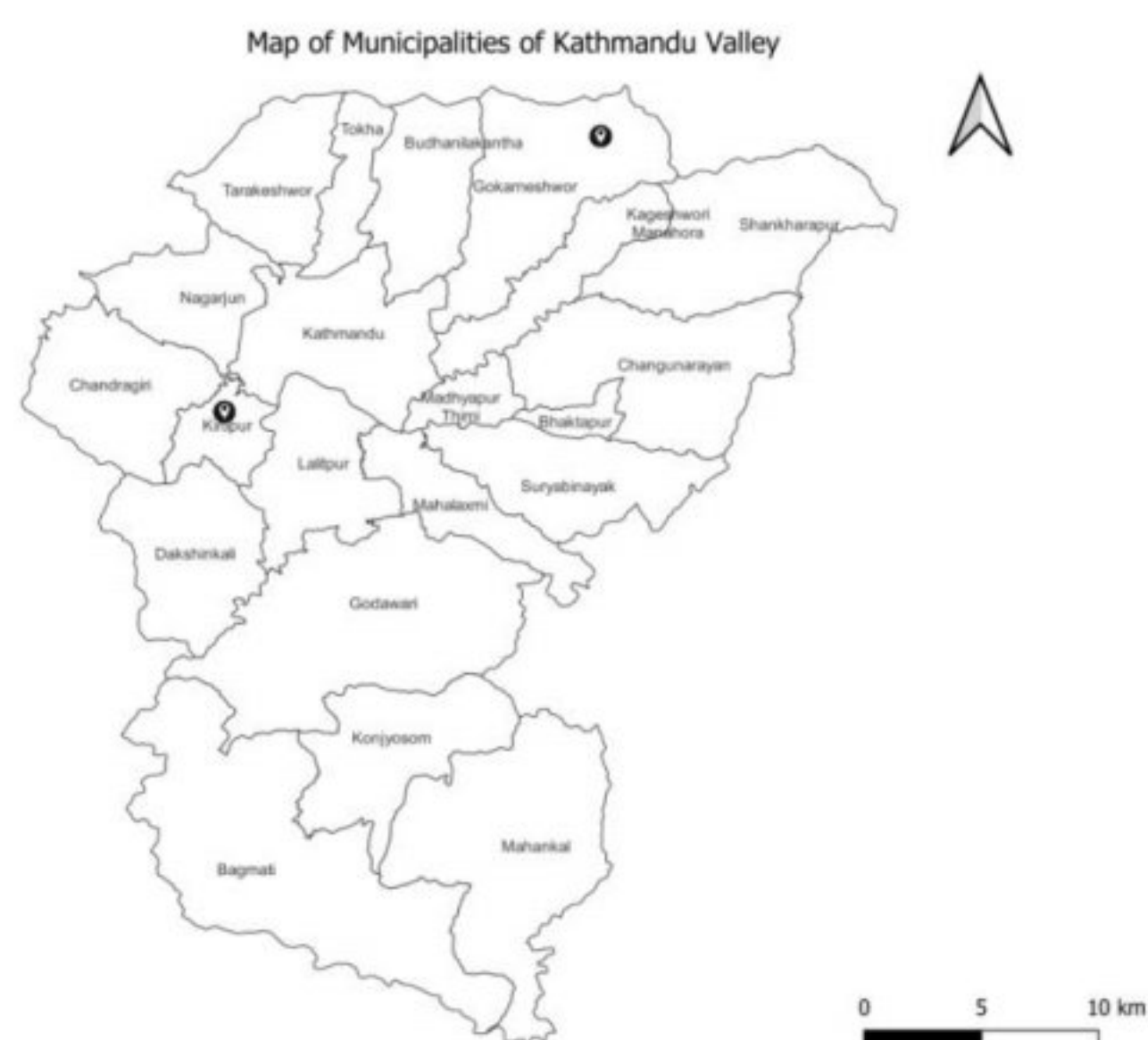


Figure 14: Distribution of *Clinopodium piperitum* in Kathmandu valley.

Distribution: Kathmandu Valley (Champadevi, Shivapuri), Nepal and W Himalaya.

Altitudinal range: 1800-1900 m.

Flowering: January-March.

Specimens examined: **Kathmandu Valley;** Kathmandu District; Champadevi; 28/01/2023; *P. Dahal, D. Gharti, E. Rai, N. Karki, R. Pandey, R. Chaudhary 16* (Amrit Campus Herbarium). Kathmandu District; Shivapuri; 16/03/1970; *T.B. Shrestha and Shakya 035870* (KATH).

2. *Clinopodium umbrosum* (M.Bieb.) K.Koch, *Linnaea* 21: 673 (1849).

Melissa umbrosa M.Bieb., *Fl. Taur.-Caucas.* 2:63 (1808).

Vernacular name(s): सुपरनसा Suparnasa, बिलाजोर Bilajor (Nepali).

Plants ca. 24.2 cm. Stems prostrate, quadrangular. Leaves ovate, 1.5-3 x 0.7-1.5 cm, base round to broadly cuneate, apex acute, margin serrate, pubescent; abaxially glandular. Petioles 1.5- 3cm. Verticillasters in axils of upper leaves; 10-20 flowered, terminal and axillary. Bract ca. 2 mm, linear, ciliate. Pedicel 4 mm. Calyx 5 mm, green; lobes upper 3 triangular, ca. 2 mm; lower 2 subulate, slightly longer, ciliate. Corolla purplish white, pubescent; tube 8 mm; upper lip ca. 1 mm; middle lobe of lower lip ca. 1.6 mm; lateral lobes ca. 1.3 mm, ovate. Nutlets ca. 9 x 7 mm, subglobose, pale-brown, glabrous, white scar at base.

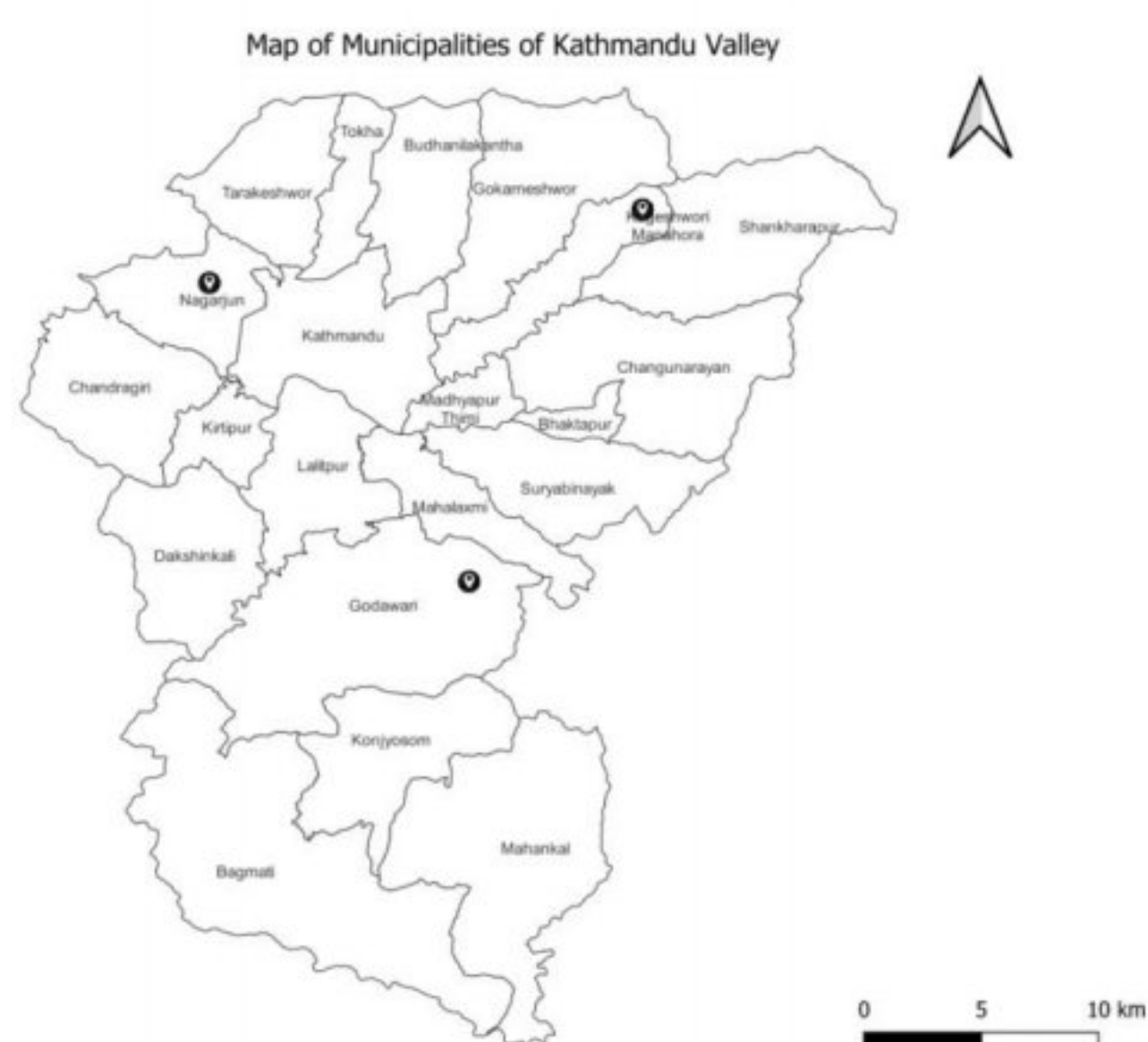


Figure 15: Distribution of *Clinopodium umbrosum* in Kathmandu valley.

Distribution: Kathmandu Valley (Godawari, Manichur, Nagarjun), Nepal, W Himalaya, E Himalaya and Assam.

Altitudinal range: 1600-2100 m.

Flowering: June-October.

Specimens examined: **Kathmandu Valley;** Kathmandu District; Nagarjun; 01/09/1969; *T.B. Shrestha and M.S. Bista 131219* (KATH). Kathmandu District; Manichur; 27/10/1986; *N.K. Bhattarai 130604* (KATH). Lalitpur District; Godawari; 10/06/1965; *Schilling and Sayers 131271* (KATH).

6. *Colebrookea* Sm., Exot. Bot. 2: 111 (1806).

Shrubs, gynodioecious. Stems erect, quadrangular, much branched. Leaves simple, opposite decussate, oblong-elliptic-lanceolate. Spikes arranged in a panicle; verticillasters dense, globose. Calyx campanulate, pubescent, veins conspicuous; 5-lobed, subulate, plumose. Corolla bilabiate; upper lip ovate-oblong, emarginate; lower lip elongated. Stamen 4, exserted; anthers 1-celled. Style slightly longer than corolla, erect, bifid, subequal. Nutlets obovoid.

Single species worldwide, in Nepal and in Kathmandu Valley.

1. *Colebrookea oppositifolia* Sm., Exot. Bot. 2: 111 (1806).

Vernacular name(s): धुसुरे Dhusure, धुर्सुल Dhursul (Nepali).

Plants ca. 1-3 m tall. Stems densely lanate-tomentose, yellow-brown. Leaves ca. 1.1-12 x 0.3-3.8 cm, base broadly cuneate to rounded, apex long acuminate, margin crenulate-serrulate; adaxially rugulose and puberulent, abaxially tomentose. Petioles ca. 1.5 cm. Panicles 6.5-9.5 cm, branches 2-7 cm; verticillasters 10-20 flowered. Calyx ca. 0.7 mm; tube ca. 0.2 mm; lobes ca. 0.5 mm. Corolla ca. 1.8 mm; tube ca. 0.8 mm, puberulent; upper lip ca. 0.3 mm; lower lip ca. 0.8 mm; middle lobe oblate; lateral lobes ovate, ca. 0.3 mm. Nutlets ca. 0.3 mm, yellowish-brown, small basal white scar.



Figure 16: Distribution of *Colebrookea oppositifolia* in Kathmandu valley.

Distribution: Kathmandu Valley (Budhanilakantha, Chapagaun, Gokarna, Phulchoki, Suryabinayak, Thankot), Nepal, W Himalaya, E Himalaya and SE Asia.

Altitudinal range: 1245-1900 m.

Flowering: March-December.

Specimens examined: Kathmandu Valley; Kathmandu District; Budhanilakantha; 04/03/1975; *D.P. Joshi and K.R. Rajbhandari 131610* (KATH). Lalitpur District; Phulchoki; 09/12/1970; *131295* (KATH). Lalitpur District; Chapagaun; 13/04/1988; *Bharat Subedi 11* (Amrit Campus Herbarium). Kathmandu District; Gokarna; 25/02/2023; *P. Dahal, M. Neupane, N. Karki, R. Chaudhary, S. Sharma, S. Poudel 36* (Amrit Campus Herbarium). Bhaktapur District; Suryabinayak; 25/03/2023; *P. Dahal, A. Twayana, E. Rai, M. Neupane, R. Chaudhary 29* (Amrit Campus Herbarium). Kathmandu District; Thankot; 27/11/1971; *Badri Man Shrestha 61* (Amrit Campus Herbarium).

7. *Colquhounia* Wall., Trans. Linn. Soc. London 13: 608 (1822).

Scandent shrubs. Stems terete, branched, stellate tomentose. Leaves opposite decussate, ovate to ovate-lanceolate. Inflorescence in lateral branches, 9-13 flowered verticillasters in axils of leaves, stellate hairy. Calyx tubular-campanulate, stellate hairy, inconspicuously veined; glabrous inside; 5-lobed, equal, straight, broadly triangular. Corolla bilabiate; tube curved towards out; throat dilated; upper lip emarginated, slightly galeate; lower lip 3-lobed, subequal. Stamen 4, epipetalous,

exserted; anthers 2-celled. Style bifid, unequal. Nutlets oblanceolate, winged at the apex.

Worldwide about 6 species. Two species in Nepal and single species in Kathmandu Valley.

1. *Colquhounia coccinea* Wall., Trans. Linn. Soc. London 13: 608 (1822).

Vernacular name(s): झिप झिप Jhip Jhip, सानो तुसारे Sano tusare (Nepali).

Plants ca. 1-4.5 m tall. Stems terete, rust colored. Leaves ca. 1.5-8.2 x 0.5-3.8 cm, base cuneate, apex acuminate, margin crenulate; papery; both surface stellate tomentose, glandular, veins pubescent. Petioles ca. 0.7-2.7 cm. Peduncle ca. 0.2-1.1 cm, hairy, dark red. Pedicel ca. 6 mm. Bracteole ca. 2 mm. Calyx ca. 1 cm; lobes ca. 3 mm, 11-veined. Corolla orange-red to scarlet, ca. 2.6 cm, sparsely stellate hairy; tube ca. 1.5 cm, throat dilated to 6 mm; upper lip ca. 9 mm; lower lip ca. 4 mm. Nutlets ca. 7 mm.

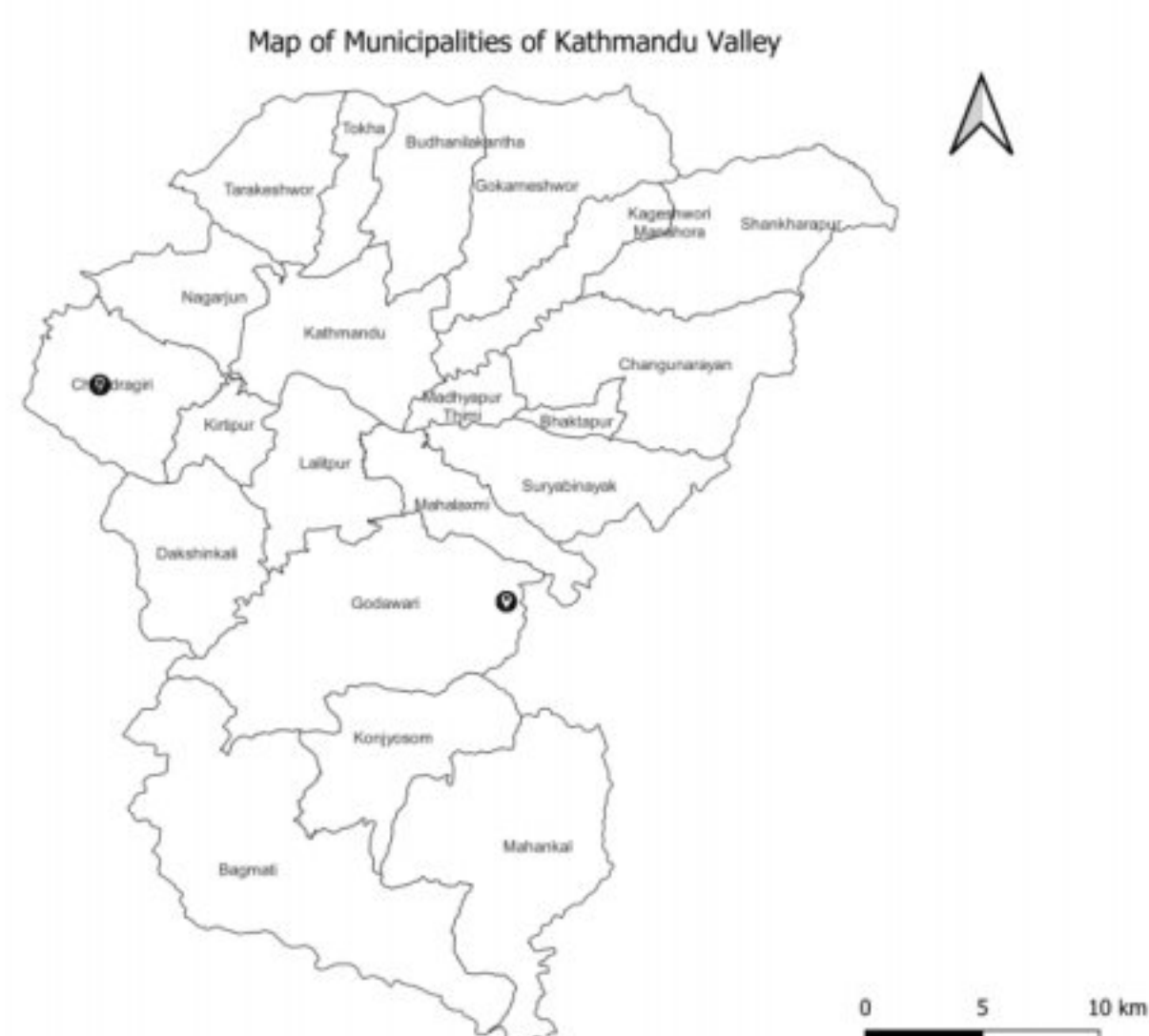


Figure 17: Distribution of *Colquhounia coccinea* in Kathmandu valley.

Distribution: Kathmandu Valley (Chandragiri, Phulchoki), Nepal, W Himalaya, E Himalaya and Assam-Burma.

Altitudinal range: 1600-2100 m.

Flowering: March.

Specimens examined: **Kathmandu Valley;** Lalitpur District; Phulchoki; 15/03/1973; A. Amatya and Bhattacharya 131934 (KATH). Kathmandu District; Chandragiri;

11/03/2023; P Dahal, E. Rai, R. Chaudhary, S. Sharma, S. Poudel 27 (Amrit Campus Herbarium).

8. *Craniotome* Rchb., Iconogr. Bot. Exot. 1: 39 (1825).

Herbs. Stems erect, quadrangular, base subwoody, branched. Leaves opposite decussate, broadly ovate-cordate. Inflorescence of paired, pedunculate cymes. Calyx campanulate, 5-lobed. Corolla bilabiate, pubescent; upper lip entire, minute; lower lip 3-lobed, sparsely longer than upper. Stamens 4, didynamous, included; anthers 2-celled. Style bifid, flattened in the apical part. Nutlets ellipsoid.

Worldwide about 7 species. Single species in Nepal and Kathmandu Valley.

1. *Craniotome furcata* (Link) Kuntze, Revis. Gen. Pl. 2: 516 (1891).

Ajuga furcata Link, Enum. Hort. Berol. Alt. 2: 99 (1822).

Vernacular name(s): बाटुले सिलाम Batule silam (Nepali).

Plants ca. 1-2 m tall. Stems densely pubescent. Leaves ca. 1.9-6.7 x 1-4.8 cm, base rounded to shallowly cordate, margin crenate-serrate; membranous, densely pubescent, golden glandular. Petioles ca. 0.5-5 cm, densely hirsute. Lower floral leaves leaf like, ca. 5 x 3 mm, ovate; upper leaves spatulate, ca. 3.5 mm. Peduncle ca. 0.7-1.5 cm. Bracteole shorter than calyx tube, ca. 1.3 mm. Calyx ca. 2.5 mm, pubescent, glandular; lobes narrowly triangular, ca. 1.2 mm, apex acute. Corolla reddish or purple-red, ca. 4.2 mm. Nutlets ca. 1 x 0.5 mm, brown, scar minute.

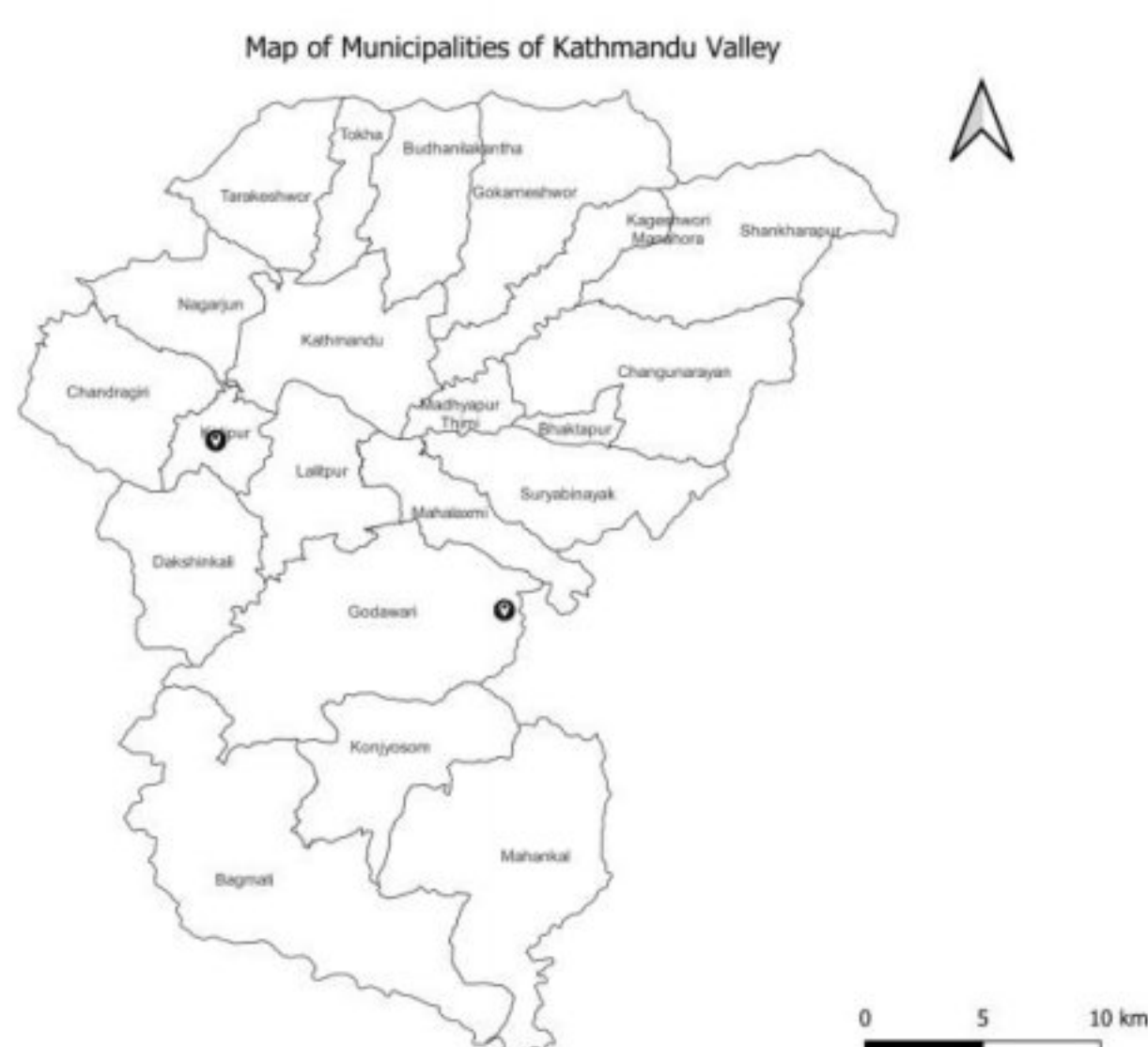


Figure 18: Distribution of *Craniotome furcata* in Kathmandu valley.

Distribution: Kathmandu Valley (Champadevi, Phulchoki), Nepal, W Himalaya, E Himalaya, Assam-Burma and SE Asia.

Altitudinal range: 1800-2300 m.

Flowering: October-March.

Specimens examined: Kathmandu Valley; Kathmandu District; Phulchoki; 26/10/1967; *Miss Manandhar and Party 132297* (KATH). Lalitpur District; Phulchoki; 03/12/2022; *P. Dahal, M. Neupane, R. Chaudhary, S. Bhusal, S. Sharma 5* (Amrit Campus Herbarium). Lalitpur District; Phulchoki; 15/09/2014; *K.R. Rajbhandari, S.K. Acharya, M.L.Pathak, T.R. Pandey and R. Acharya 013093* (KATH). Kathmandu District; Champadevi; 11/03/2023; *P. Dahal, D. Gharti, E. Rai, N. Karki, R. Pandey, R. Chaudhary 38* (Amrit Campus Herbarium).

9. *Elsholtzia* Willd. Bot. Mag. (Romer and Usteri) 4(11): 3 (1790).

Herbs, shrubs or subshrubs. Stems erect or procumbent, quadrangular or subterete branched, rarely bark exfoliating in shrubs or subshrubs, sometimes grooved, variously pubescent. Leaves simple, opposite decussate, usually ovate, rarely elliptic-lanceolate to oblong and rhombic-ovate. Spikes terminal and axillary, rarely terminal only; whorls usually conferted. Flowers small bractate. Calyx tubular or campanulate; 5-lobed, lobes usually lanceolate rarely subulate, linear or triangular; subequal. Corolla bilabiate; tube funnel-form; upper lip emarginate; lower lip 3-lobed. Stamens 4, didynamous; anther 2-celled. Style bifid, subequal. Nutlets oblong or ellipsoid, yellow or brown.

Worldwide about 33 species. Eleven species in Nepal and six species in Kathmandu Valley.

Key to Species

- 1a** Shrubs. Corolla 5-7.5 mm **2**
- b** Herbs. Corolla 3-4.5 mm **3**
- 2a** Leaves ovate, base round or oblique **2. *E. flava***
- b** Leaves elliptic-lanceolate to oblong, base attenuate **3. *E. fruticosa***
- 3a** Bract united into a shallow cup **6. *E. strobilifera***
- b** Bract not united into shallow cup **4**

- 4a** Bract longer than corolla. Stems pilose, procumbent, not grooved. Verticillasters overlapping **4. E. pilosa**
- b** Bract shorter than corolla. Stems pubescent, erect, grooved. Verticillasters not overlapping **5**
- 5a** Leaves elliptic-lanceolate, serrate. Spike sub secund **1. E. blanda**
- b** Leaves rhombic-ovate, incised serrate. Spike not sub secund **5. E. stachyodes**

1. *Elsholtzia blanda* (Benth.) Benth., Labiat. Gen. Spec.: 162 (1833).

Aphanochilus blandus Benth., N. Wallich, Pl. Asiat. Rar. 1: 29 (1830).

Vernacular name(s): वन सिलाम Ban silam, इहासिलाम Ihasilam (Nepali).

Herbs upto 1 m tall. Stems erect, grooved, densely pubescent. Leaves elliptic lanceolate, 2.3-7.5 x 0.9-2.6 cm, base cuneate, apex cuneate to attenuate, margin serrate; glandular; adaxially puberulent; abaxially glabrous, veins pubescent. Petioles 3-7 mm. Spikes terminal and axillary, subsecund, ca. 5.3 cm, mostly pubescent. Peduncle 5 mm. Bract ca. 0.5-1.5 mm, subulate to lanceolate, shorter than corolla. Pedicel less than 1 mm. Calyx tubular, 2-2.5 mm, in fruit ca. 3.2 mm; lobes lanceolate, ca. 1 mm. Corolla white, ca. 3 mm; middle lobe of lower lip subcircular, slightly concave; lateral lobes semicircular. Nutlets 0.8 x 0.5 mm, ellipsoid, brown.

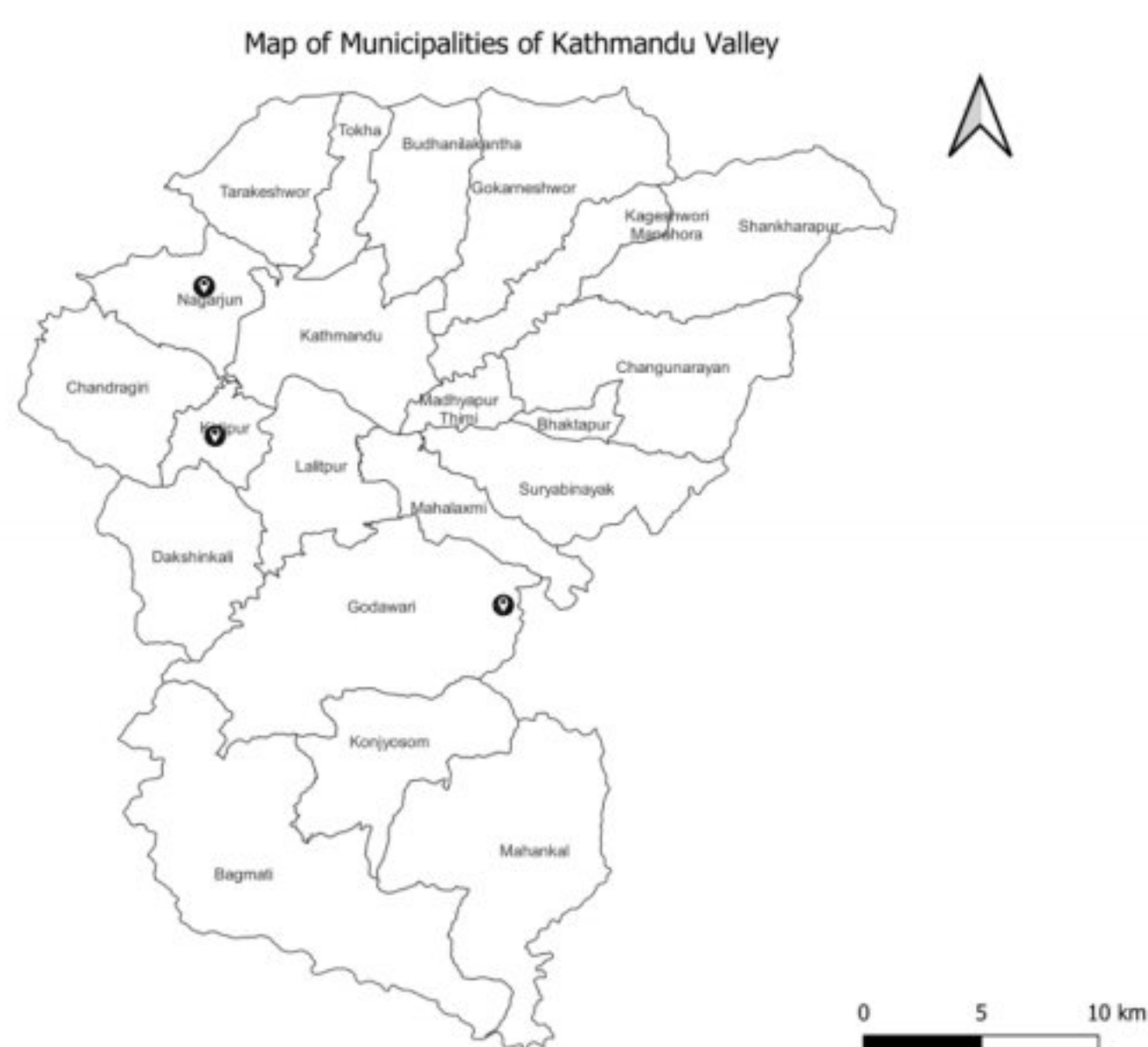


Figure 19: Distribution of *Elsholtzia blanda* in Kathmandu valley.

Distribution: Kathmandu Valley (Champadevi, Phulchoki, Nagarjun), Nepal, E Himalaya, Assam-Burma and SE Asia.

Altitudinal range: 1500-2100 m.

Fruiting: September-January.

Specimens examined: Kathmandu Valley; Kathmandu District; Champadevi; 28/01/2023; *P. Dahal, D. Gharti, E. Rai, N. Karki, R. Pandey, R. Chaudhary* 32 (Amrit Campus Herbarium). Lalitpur District; Phulchoki; 30/09/1969; *Miss Manandhar and Party* 035510 (KATH). Lalitpur District; Phulchoki; 28/01/2023; *P. Dahal, M. Neupane, R. Chaudhary, S. Bhusal, S. Sharma* 6 (Amrit Campus Herbarium). Kathmandu District; Nagarjun; 12/01/1964; *Saman and Shrestha* 035514 (KATH).

2. *Elsholtzia flava* (Benth.) Benth., *Labiata. Gen. Spec.*: 161 (1833).

Aphanochilus flavus Benth., *Pl. Asiat. Rar.* 1: 28 (1830).

Vernacular name(s): वन सिलाम Ban silam, इहासिलाम Ihasilam (Nepali).

Subshrubs 0.6-2.6 m tall. Stems erect, grooved, densely pubescent, bark not exfoliating. Leaves broadly ovate, ca. 1.4-3.5 x 0.6-7.6 cm, base rounded or oblique, apex caudate to acuminate, margin serrate-dentate, mucronate; adaxially pubescent on veins; abaxially glabrous, densely glandular, puberulent on veins. Petioles 0.1-3.6 cm. Spikes terminal and axillary, ca. 2-5.5 cm, densely pubescent; lower verticillasters widely spaced. Peduncle ca 1.1-2 cm. Bract ca. 4 mm, broadly ovate. Pedicel ca. 1 mm. Calyx campanulate, ca. 3.5 mm, in fruit ca. 4 mm; lobes subulate-linear, ca. 1.5 mm. Corolla yellow, ca. 7.5 mm; tube ca. 5 mm; middle lobe of lower lip sub circular; lateral lobes sub oblong, rounded. Nutlets ca. 1mm, oblong, dark brown.



Figure 20: Distribution of *Elsholtzia flava* in Kathmandu valley.

Distribution: Kathmandu Valley (Chitlang-Chandragiri-Thankot, Manichur, Phulchoki, Shivapuri), Nepal, W Himalaya, E Himalaya and Assam-Burma.

Altitudinal range: 1900-2600 m.

Flowering: September-November.

Specimens examined: Kathmandu Valley; Kathmandu District; Chitlang-Chandragiri-Thankot; 04/09/1970; *H. Kanai and T.B. Shrestha 035674* (KATH). Kathmandu District; Manichur; 01/11/1966; *P.R. Shakya 035673* (KATH). Lalitpur District; Phulchoki; 08/09/1967; *Miss Manandhar and Party 035677* (KATH). Kathmandu District; Shivapuri; 09/09/1977; *P. Pradhan and Nirmala Shrestha 035678* (KATH).

3. *Elsholtzia fruticosa* (D. Don) Rehder, C.S. Sargent, Pl. Wilson. 3: 381 (1916).

Perilla fruticosa, D. Don, Prodr. Fl. Nepal.: 115 (1825).

Vernacular name(s): सानो सिलाम Sano silam (Nepali).

Shrubs 0.8-2 m tall. Stems erect, pubescent-tomentose, stems subterete when older, bark exfoliating. Leaves elliptic-lanceolate to oblong, 3.7-14.8 x 1.3-5 cm, base attenuate, apex acuminate, margin irregularly dentate except for entire base; densely glandular, adaxially pubescent; abaxially glabrous except for sparsely puberulent veins. Petioles ca. 4 mm, sometimes obsolete. Spikes terminal, ca. 2-6.5 x 0.4 cm in flower,

base interrupted mostly densely pubescent; verticillasters short, many flowered. Peduncle 2 mm. Bract ca. 2.5 mm, lanceolate-subulate. Calyx campanulate, ca. 1.5 mm; lobes triangular-subulate, ca. 0.5 mm., in fruit ca. 3 mm. Corolla white to yellowish, ca. 5 mm; tube ca. 3.5 mm; upper lip erect; middle lobe of lower lip circular, lateral lobes semicircular. Nutlets ca. 2 x 0.5 mm, oblong, yellowish brown.



Figure 21: Distribution of *Elsholtzia fruticosa* in Kathmandu valley.

Distribution: Kathmandu Valley (Shivapuri summit-Borlang Bhanjyang, Shivapuri), Nepal, W Himalaya, E Himalaya, Assam.

Altitudinal range: 2300-2500 m.

Flowering: September.

Specimens examined: Kathmandu Valley; Kathmandu District; Shivapuri summit-Borlang Bhanjyang; 14/09/1988; *M. Suzuki, T. Maeda, N. Naruhashi, R. Watanabe, M.N. Subedi, M.Minaki, S. Noshiro, H. Ikeda* 026468 (KATH). Kathmandu District; Shivapuri; 09/09/1977; *P. Pradhan and Nirmala Shrestha* 035767 (KATH).

4. *Elsholtzia pilosa* (Benth.) Benth., *Labiata. Gen. Spec.*: 163 (1833).

Aphanochilus pilosus Benth, N. Wallich, *Pl. Asiat. Rar.* 1: 30 (1830).

Herbs 17 cm tall. Stems procumbent, pilose. Leaves ovate, ca. 0.5-3 x 0.3-1.5 cm, base cuneate-decurrent, apex acute, margin crenate; both surfaces pilose, sessile glandular. Petioles 2-7 mm. Spikes terminal, 0.5-2.5 x 0.3-0.8 cm, verticillasters overlapping,

many flowered. Rachis densely pilose. Bract ca. 4.5 mm, linear-subulate, longer than corolla. Calyx campanulate, ca. 2.5 mm, in fruit ca. 4.2 mm; lobes lanceolate, ca. 1.1 mm. Corolla red ca. 4 mm; tube ca. 3 mm, funnelform, to 1.5 mm wide at throat; upper lip sparsely curved; middle lobe of lower lip circular, margin incised; lateral lobes semicircular. Nutlets ca. 1.3 x 0.8 mm, oblong, yellow.



Figure 22: Distribution of *Elsholtzia pilosa* in Kathmandu valley.

Distribution: Kathmandu Valley (Chandrahari), Nepal, W Himalaya, E Himalaya and Assam-Burma, SE Asia.

Altitudinal range: 2300 m.

Fruiting: September.

Specimens examined: Kathmandu Valley; Kathmandu District; Chandrahari; 29/09/1966; *M.S. Bista 035792* (KATH).

5. *Elsholtzia stachyodes* (Link) Raizada and H.O. Saxena, Indian Forester 92: 309 (1966).

Hyptis stachyodes Link, Enum. Hort. Berol. Alt. 2: 106 (1822).

Vernacular name(s): इमोबु स्वाँ Imobu swan (Nepali).

Herbs 30-100 cm. Stems erect, grooved, pubescent. Leaves rhombic-ovate, 1.4-4 x 0.7-2.7 cm, base cuneate and decurrent, apex acuminate, margin incised-serrate above base; thin papery; adaxially sparsely pubescent; abaxially glabrescent, slightly glandular,

veins pubescent. Petioles 0.3-2.5 cm, white. Spikes terminal and axillary, terminal ones 5-8 cm, interrupted; verticillasters few flowered. Bract ca. 2 mm, subulate, shorter than corolla. Pedicel ca. 0.4 mm. Calyx campanulate, ca. 1.3 mm; in fruit ca. 2 mm; lobes lanceolate, ca. 0.6 mm. Corolla white, ca. 3 mm; middle lobe of lower lip elliptic, lateral lobes rounded. Nutlets ca. 1 x 0.3 mm, ellipsoid, yellow.

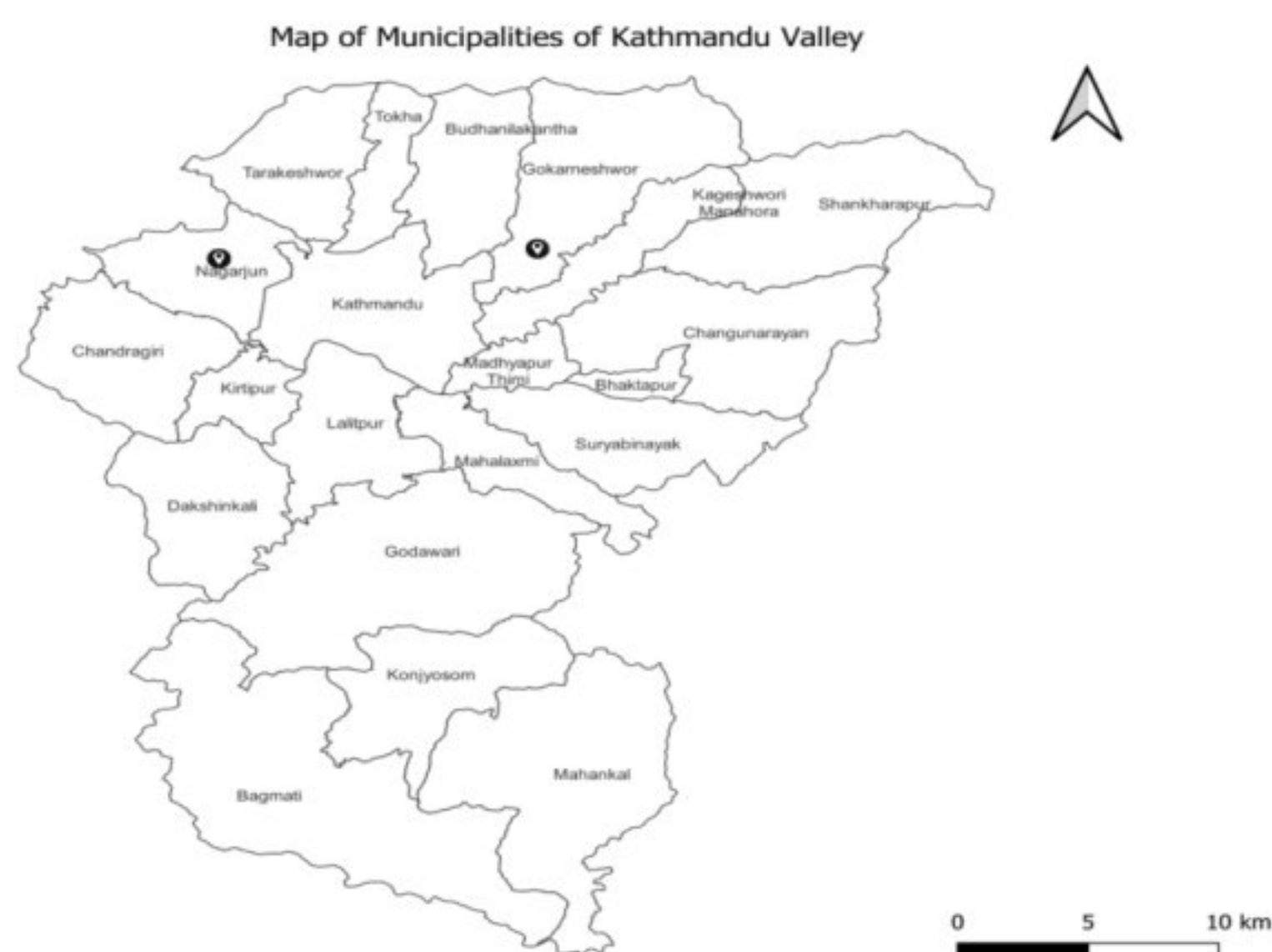


Figure 23: Distribution of *Elsholtzia stachyodes* in Kathmandu valley.

Distribution: Kathmandu Valley (Gokarna, Nagarjun), Nepal, W Himalaya, E Himalaya, Burma and SE Asia.

Altitudinal range: 1300-1550 m.

Flowering: June-November.

Specimens examined: **Kathmandu Valley;** Kathmandu District; Gokarna; 03/11/1966; *P. Pradhan and R. Thapa* 035795 (KATH). Kathmandu District; Nagarjun; 10/06/1967; *P.R. Shakya and P. Pradhan* 035799 (KATH).

6. *Elsholtzia strobilifera* (Benth.) Benth., Labiat. Gen. Spec.: 163 (1833).

Cyclostegia strobilifera Benth., Edward's Bot. Reg. 15: t. 1282 (1829).

Vernacular name(s): वन बाबरी Ban babari, चिनिके झार Chinike jhar (Nepali).

Herbs 22 cm tall. Stems erect, pilose. Leaves ovate, 0.6-2.7 x 0.3-1.2 cm, base cuneate, apex acute, margin serrate; abaxially fine pilose, brownish glandular, densely pilose on veins; both surfaces pilose. Petioles 0.2-1.2 cm, densely pilose. Spikes terminal, ca. 0.6-

4.5 x 0.3-0.8 cm; verticillasters 6-10-flowered. Bract ca. 4 mm, united into a shallow cup at each node, densely overlapping. Calyx tubular, ca. 3 mm, in fruit ca. 3.8 mm. Calyx lobes lanceolate, ca. 1 mm. Corolla white or red, 4.5 mm; tube slender; middle lobe of lower lip longer and broader, margin entire. Nutlets ca. 0.2 x 0.1 mm, ellipsoid, yellow.

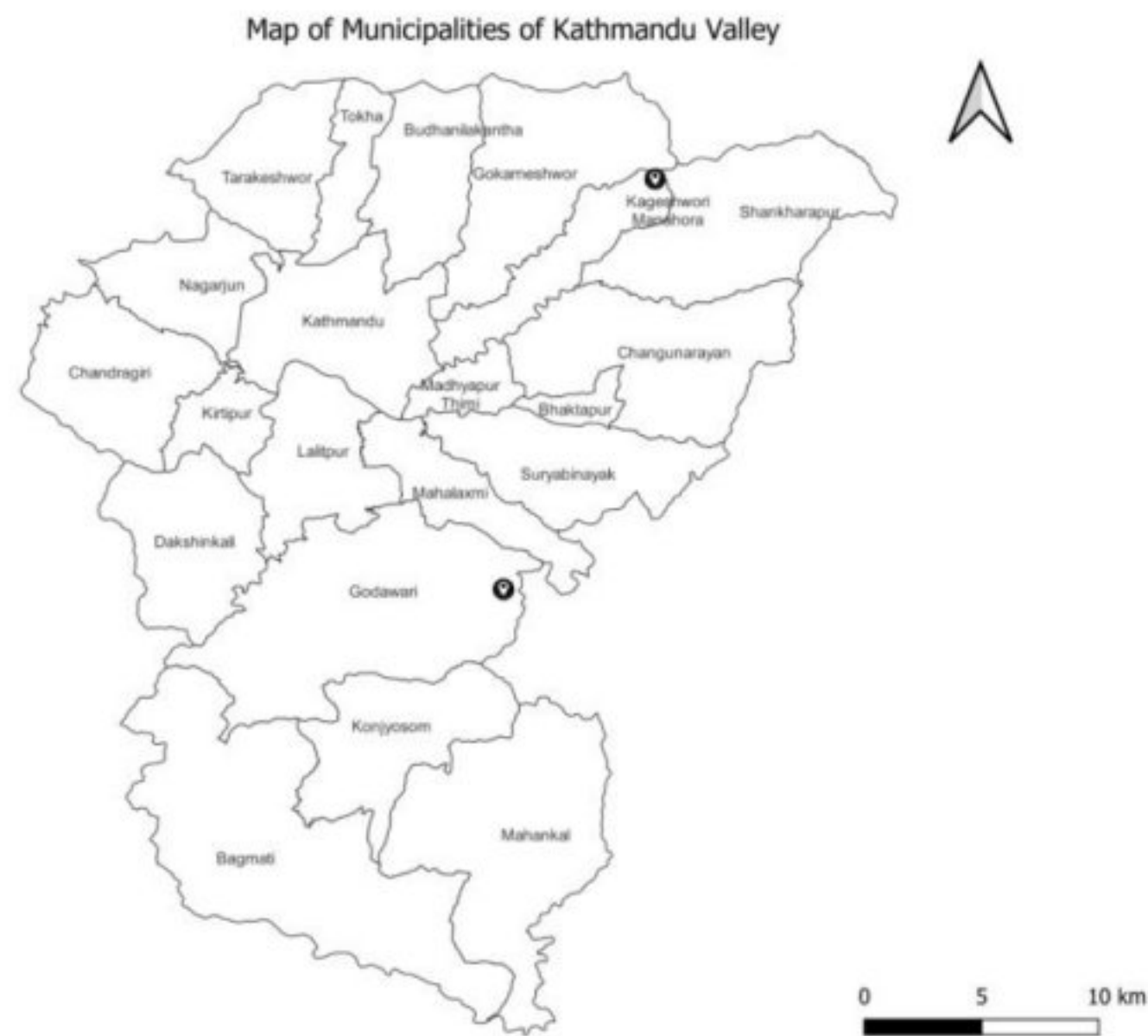


Figure 24: Distribution of *Elsholtzia strobilifera* in Kathmandu valley.

Distribution: Kathmandu Valley (Manichur, Mt. Phulchoki), Nepal, W Himalaya, E Himalaya and Burma.

Altitudinal range: 1900-2700 m.

Flowering: October-November.

Specimens examined: **Kathmandu Valley;** Kathmandu District; Manichur; 30/10/1966; *P.R. Shakya 035816* (KATH). Lalitpur District; Mt. Phulchoki; 12/11/1966; *D.H. Nicolson 012649* (KATH).

10. *Equilabium* Mwan., A.J. Paton & Culham, Bot. J. Linn. Soc. 188: 367 (2018).

Subshrubs or herbs. Stems quadrangular. Leaves opposite decussate, ovate. Inflorescence paniculate or spike-like. Calyx campanulate, glandular-puberulent; bilabiate; upper lip single lobed, large; lower lip 4-lobed. Corolla bilabiate; upper lip 4-lobed; lower lobe entire, concave. Stamen 4, equal to lower lip. Style bifid. Nutlets globose.

Worldwide about 42 species. Single species in Nepal and Kathmandu Valley.

1. *Equilabium molle* (Aiton) Mwan. and A.J. Paton, PhytoKeys 129: 120 (2019).

Ocimum molle Aiton, Hort. Kew. 2: 322 (1789).

Vernacular name(s): गुब्ब्य शिला Gubya shila (Nepali).

Herbs ca. 30-80 cm. Stems erect, pubescent above, glabrescent below. Leaves ca. 3-10.5 x 2.5-9.5 cm, base cordate, margin crenate-serrate; veins pubescent, pubescent to glabrescent elsewhere. Petioles 1-10 cm. Inflorescence of branched, lax spikes ca. 9-25 cm, cymes paired or 1-3 flowered. Bract obovate, ca. 5 mm, pubescent. Calyx 2-3 mm; fruiting calyx dilated to ca. 1 cm; upper lobe 1 ovate, apex acute; lower 4 triangular-subulate, apex spinescent, longer than upper. Corolla pale pink or mauve, ca. 7 mm; tube ca. 4 mm; upper lip erect, ca. 2.3 mm, lobes obtuse; lower lip ca. 3 mm. Nutlets ca. 2 mm in diameter, pale brown.



Figure 25: Distribution of *Equilabium molle* in Kathmandu valley.

Distribution: Kathmandu Valley (Balaju, Gokarna, Nagarjun), Nepal, W Himalaya, E Himalaya and Assam-Burma.

Altitudinal range: 1400 m.

Flowering: August-September.

Specimens examined: **Kathmandu Valley;** Kathmandu District; Balaju; 23/09/1963; H. Hara, H. Kanai, S. Kurosawa 134391 (KATH). Kathmandu District; Gokarna;

10/09/1966; *P. Pradhan and R. Thapa 134379* (KATH). Kathmandu District; Nagarjun; 31/08/1969; *T.B Shrestha and M.S. Bista 134382* (KATH).

11. *Holmskioldia* Retz., *Observ. Bot.* 6: 31 (1791).

Shrubs. Stems erect, angular, pubescent. Leaves simple, opposite, ovate. Flowers in terminal and axillary racemes. Calyx saucer-shaped, unlobed, petaloid, bright crimson. Corolla bilabiate, 5-lobed; upper lip 2-lobed; lower lip longer, 3-lobed. Stamens 4, epipetalous; anthers exserted. Style filiform, bifid; subequal to stamens. Drupe obovoid.

Single species worldwide, in Nepal and in Kathmandu Valley.

1. *Holmskioldia sanguinea* Retz., *Observ. Bot.* 6: 31 (1791).

Vernacular name(s): जुरे फूल Jure phul (Nepali).

Plants 2-5 m tall. Leaves ca. 3.2-9.2 x 1.9-6.1 cm, base truncate-cordate, apex caudate-acuminate, margin serrate; sparsely pubescent, eglandular hairs and with sessile glandular scales. Petioles 0.8-2.5 cm. Inflorescence 3-6 flowered, ca. 2-6 cm. Peduncle 1.3 cm, glandular pubescent. Bract 1.1 cm. Calyx diameter 1.9-2.4 cm, glandular-pubescent; tube turbinate, membranous, truncate at apex. Corolla orange or crimson, 1.2-1.4 cm; tube funnel-form, curved, 2.1 cm, glandular-pubescent; upper lip ca. 5 mm; lower lip ca. 2 mm. Drupe ca. 7 mm diameter.



Figure 26: Distribution of *Holmskioldia sanguinea* in Kathmandu valley.

Distribution: Kathmandu Valley (Godawari, Sundarijal, Thamel), Nepal, W Himalaya, E Himalaya and Assam-Burma.

Altitudinal range: 1500-1600 m.

Flowering: August-November.

Specimens examined: Kathmandu Valley; Lalitpur District; Godawari; 07/08/1982; *D.P. Joshi 021913* (KATH). Kathmandu District; Sundarijal; 27/10/1993; *Jyotsna Mainali 1* (Amrit Campus Herbarium). Kathmandu District; Thamel; 23/11/1972; *Laxmi Prajapati 2* (Amrit Campus Herbarium). Lalitpur District; Godawari; 31/10/2015; *Pathak S.* (KATH).

12. *Isodon* (Benth.) Schrad. Ex Spach, Hist. Nat. Veg. 9: 162 (1840).

Herbs, subshrubs or shrubs. Stems usually erect, rarely ascending, quadrangular, branched, variously pubescent. Leaves simple, usually opposite decussate, rarely in whorls; ovate, ovate-lanceolate, ovate-oblong, circular-ovate to broadly ovate, narrowly lanceolate-oblong. Inflorescences panicles of lax cymes or spikes of dense cymes, terminal and axillary, usually pedunculate, usually bracteate, rarely ebracteate. Lower floral leaves resemble to stems leaves, reduced and bract-like upward. Calyx campanulate, glandular, pubescent outside; 5-lobed, sometimes inconspicuously bilabiate with upper lip 3-lobed, lower lip 2-lobed. Corolla bilabiate; tube exerted; upper lip 4-lobed, recurved; lower lip entire, usually concave, navicular. Stamens 4, didynamous, declinate; anthers 1-celled. Styles bifid. Nutlets obovoid or ovoid, yellow or brown, glabrous or with black markings.

Worldwide about 100 species. Nine species in Nepal and four species in Kathmandu Valley.

Key to Species

- 1a** Leaves usually in whorls of 3 or 4, rarely opposite. Inflorescence dense, spike-like **5. *I. ternifolius***
- b Leaves always in pairs and opposite. Inflorescence lax panicles **2**
- 2a** Corolla tube gibbous **3**
- b Corolla tube not gibbous **4**

3a Lateral veins of leaves 3-paired. Nutlets pale brown **1. I. coetsa**

b Lateral veins of leaves 4-5-paired. Nutlets yellow **4. I. scrophularioides**

4a Calyx not bilabiate, 5-lobed, subequal. Nutlets glabrous **3. I. phulchokiensis**

b Calyx bilabiate; upper 3 shorter, lower 2 longer. Nutlets with black markings
..... **2. I. lophanthoides**

1. *Isodon coetsa* (Buch.-Ham. ex D. Don) Kudo, Mem. Fac. Sci. Taihoku Imp. Univ.
2: 131 (1929).

Plectranthus coetsa Buch.-Ham. ex D. Don, Prodr. Fl. Nepal.: 117 (1825).

Vernacular name(s): पिर्रे Pirre (Nepali).

Herbs or subshrubs ca. 0.5-2 m tall. Stems pubescent. Leaves ovate, ca. 1.5-5 x 0.7-2.5 cm, base cuneate, decurrent, apex acuminate, margin crenate-serrate; pubescent, abaxially glandular; densely minutely hispid on veins; lateral veins 3-paired. Petioles ca. 0.3-2.5 cm. Panicles 4-9 cm, narrow, pubescent; cymes 3-5 flowered. Lower floral leaves sessile, ovate; upper floral leaves bract-like, ovate-lanceolate, shorter than pedicels. Peduncle ca. 1.5-4.5 cm. Lower bracts leaf-like; upper bract ovate. Pedicel ca. 1-3 mm. Calyx ca. 2.5 x 1.5 mm, slightly 2-lipped. Calyx lobes 5, ovate-triangular, ca. 0.8 mm, subequal. Fruiting calyx tubular-campanulate, dilated to ca. 3.5 mm, netted at apex. Corolla purple to purple-blue, ca. 6 mm; tube ca. 2.5 mm, gibbous; upper lip ca. 2.2 mm; lower lip broadly ovate, ca. 3.5 mm, lower lip length longer than tube. Stamen included. Nutlets ca. 0.8 x 0.5 mm, obovoid, pale brown, glabrous.



Figure 27: Distribution of *Isodon coetsa* in Kathmandu valley.

Distribution: Kathmandu Valley (Godawari, Gokarna, Nagarjun, Phulchoki), Nepal, W Himalaya, E Himalaya, Assam-Burma and SE Asia.

Altitudinal range: 1300-2000 m.

Flowering: November.

Specimens examined: Kathmandu Valley; Lalitpur District; Godawari; 24/11/1974; Indira, Murari and Manandhar 132470 (KATH). Kathmandu District; Gokarna; 01/11/1966; P. Pradhan and R. Thapa 132465 (KATH). Kathmandu District; Gokarna; 01/11/1966; P. Pradhan and R. Thapa 132461 (KATH). Kathmandu District; Nagarjun; 06/11/1967; P.R. Shakya and P. Pradhan 132456 (KATH). Lalitpur District; Phulchoki; 12/11/1966; D.H. Nicolson 132459 (KATH).

2. *Isodon lophanthoides* (Buch.-Ham. ex D. Don) H. Hara, J. Jap. Bot. 60: 235 (1985).

Hyssopus lophanthoides Buch.-Ham. ex D. Don, Prodr. Fl. Nepal.: 110 (1825).

Vernacular name(s): मसिनो चारपाते Masino charpate (Nepali).

Herbs ca. 0.4-1 m tall. Stems erect or ascending, repent at base, underground globose root tubers, scaled retrorse hairs. Leaves ovate to ovate-lanceolate, ca. 1.5-3 x 0.8-1.5 cm, base cuneate to truncate, apex acuminate, margin crenate to serrate; adaxially sparsely pubescent, abaxially fewer hair, numerous dark red glands, densely pubescent on veins. Petioles ca. 5 mm. Panicle terminal and axillary; 8.5-14 x 3-6 cm, 11 to 13

flowered. Floral leaves bract-like, ovate. Peduncle ca. 1.5 cm. Rachis upto 0.7 cm. Bract ovate, leaf-like. Pedicel 0.9 cm. Calyx 5, ca. 3 mm, dark-red gland-dotted, puberulent; lobes ovate, entire; upper 3 shorter, ca. 0.7 mm; lower 2 longer ca. 1 mm. Corolla white with purple spots on limb, ca. 1.8 cm, pubescent; tube not gibbous, straight, ca. 4 mm; upper lip ca. 2 mm; lower lip 3.5 mm, slightly longer. Stamen much exserted. Nutlets ca. 1 mm, obovoid, brown with black markings, basal white scar, cottony white hair on the scar.

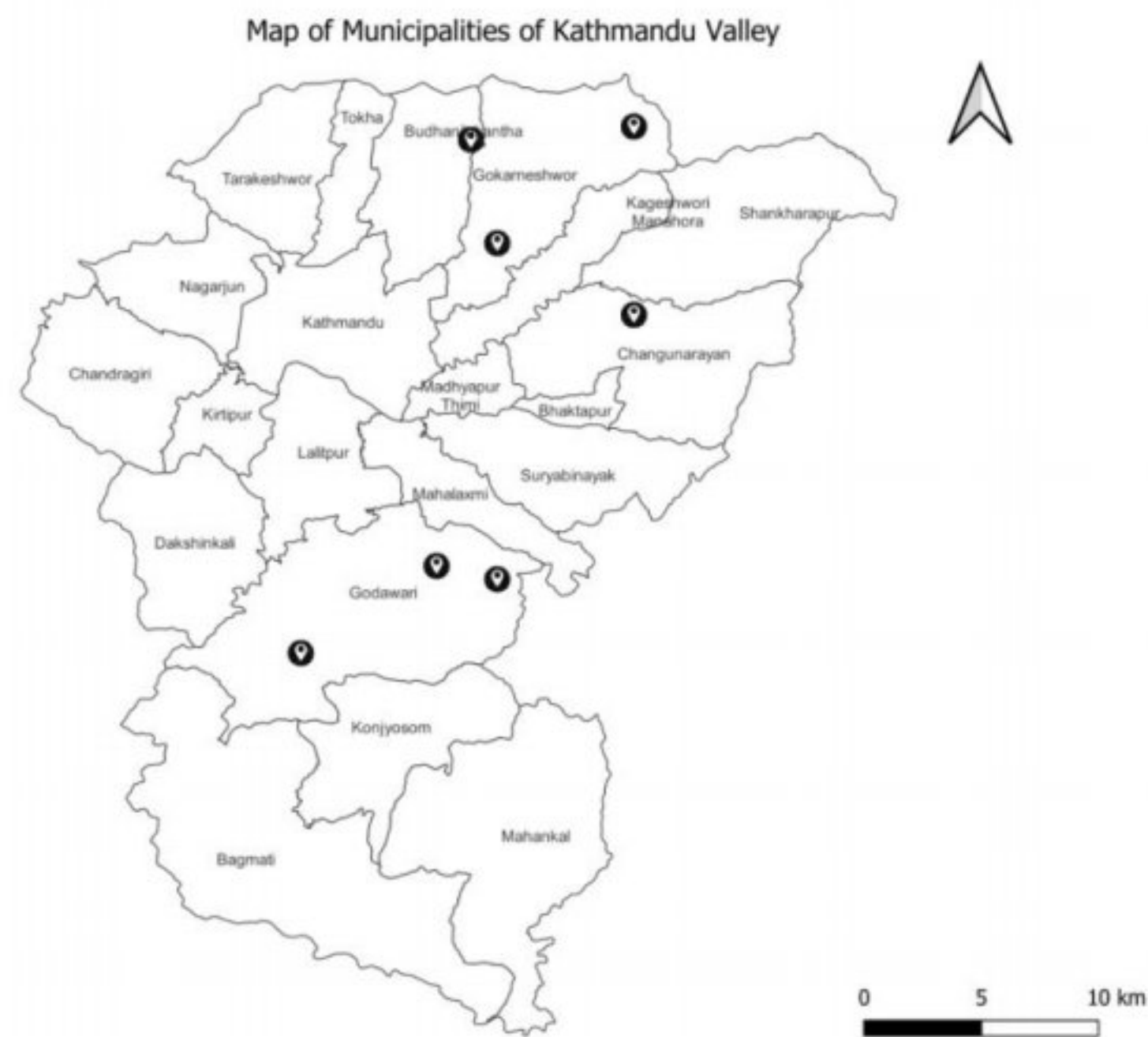


Figure 28: Distribution of *Isodon lophanthoides* in Kathmandu valley.

Distribution: Kathmandu Valley (Bajrabarahi, Changunarayan, Godawari, Gokarna, Manichur, Phulchoki, Shivapuri), Nepal, W Himalaya, E Himalaya, Assam-Burma and SE Asia.

Altitudinal range: 1500-2500 m.

Flowering: September-November.

Specimens examined: Kathmandu Valley; Lalitpur District; Bajrabarahi; 12/10/1972; 133148 (KATH). Bhaktapur District; Changunarayan; 27/10/1966; *D.H. Nicolson* 133176 (KATH). Lalitpur District; Godawari; 01/11/1969; 133202 (KATH). Kathmandu District; Gokarna; 02/11/1966; *P. Pradhan and R. Thapa* 133166 (KATH). Kathmandu District; Manichur; 23/09/1963; *D.H. Nicolson* 133177 (KATH). Lalitpur District; Phulchoki; 26/10/1967. *Miss Manandhar and Party* 133201 (KATH). Kathmandu District; Shivapuri; 24/11/1966; *T.B. Shrestha* 133164 (KATH).

3. *Isodon phulchokiensis* (Murata) H. Hara, J. Jap. Bot. 60: 236 (1985).

Rabdosia phulchokiensis Murata, Fl. E. Himal., 3rd. Repr.: 96 (1975).

Herbs ca. 40-100 cm tall. Stems branched, with recurved short hairs. Leaves ovate to ovate-oblong, ca. 1.1-5.3 x 1.2-3.3 cm, base broadly cuneate, apex acute-subacute, margin serrate-crenate; adaxially pubescent, abaxially glandular, pubescent midrib and veins, veins conspicuous. Petioles ca. 4-15 mm. Panicles composed of 5-9 flowered cymes. Floral leaves similar to cauline leaves, apically gradually reduced. Peduncle ca. 0.7-1.5 cm, slender, hirsute. Bract ovate-lanceolate. Pedicel 2-7 mm. Calyx ca. 2 mm, up to 3 mm in fruit, inconspicuously 2-lipped; lobes 5, triangular, ca. 0.8 mm, subequal. Corolla ca. 7 mm, reddish-brown; tube ca. 4 mm, not gibbous; upper lip erect, much shorter than lower, 4-fid, ca. 1.5 mm; lower lip obovate, ca. 3 x 2 mm, rounded at apex, boat-shaped; lower lip length shorter than the tube. Stamen much exerted. Nutlets ca. 0.15 x 0.1 mm, obovoid, brown, glabrous.

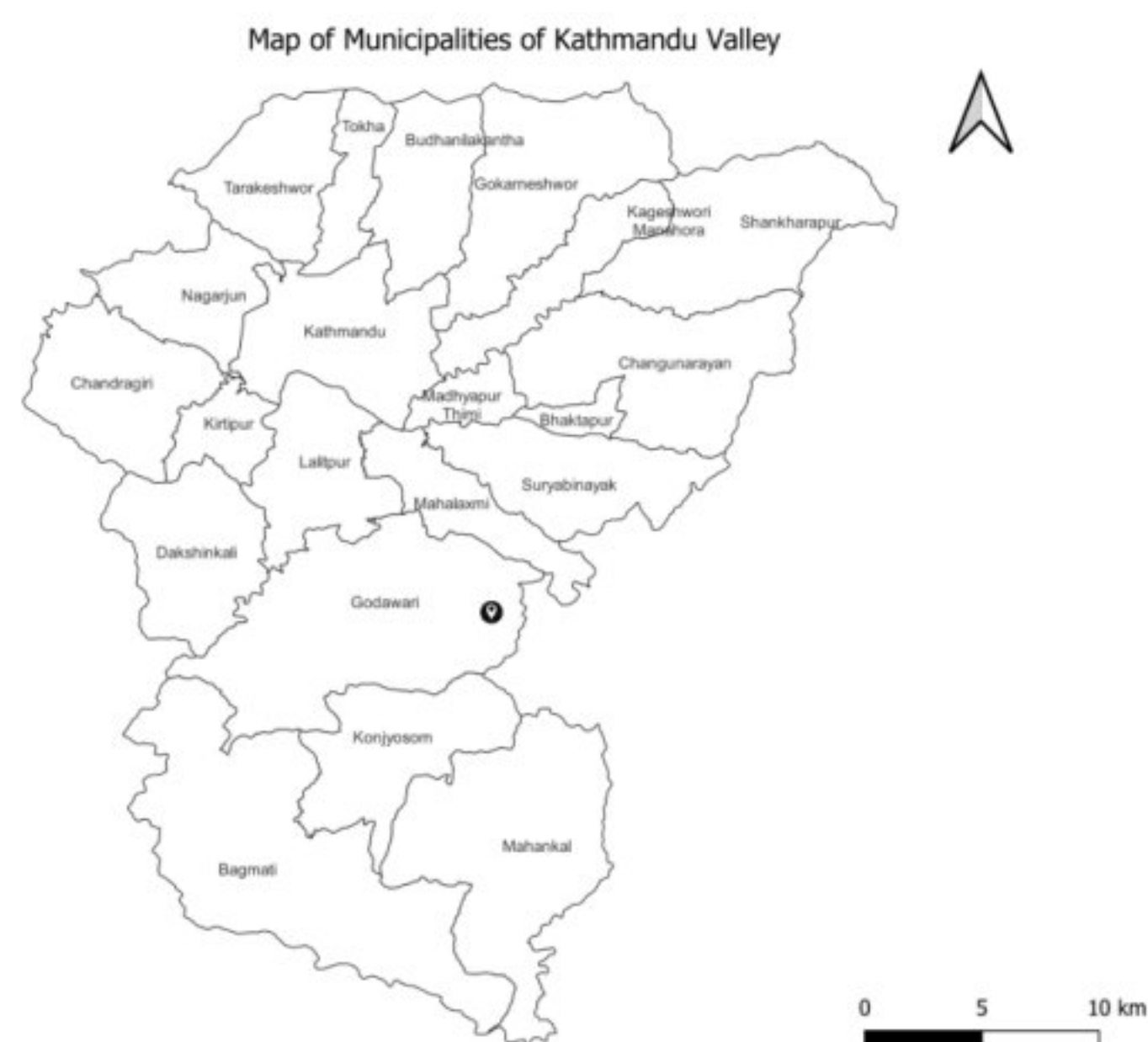


Figure 29: Distribution of *Isodon phulchokiensis* in Kathmandu valley.

Distribution: Lalitpur District (Phulchoki), Nepal.

Altitudinal range: 2200-2700 m.

Flowering: September-October.

Specimens examined: Kathmandu Valley; Lalitpur District; Phulchoki; 19/09/1970; H. Kanai and Chuma 00039049 (TI, holotype; digital image).

4. *Isodon scrophularioides* (Wall. ex Benth.) Murata, Acta Phytotax. Geobot. 22: 21 (1966).

Plectranthus scrophularioides Wall. ex Benth., N. Wallich, Pl. Asiat. Rar. 2: 16 (1830).

Herbs ca. 50-60 cm tall. Stems subglabrous, angles pilose. Leaves circular-ovate to broadly ovate, ca. 2.3-13 x 0.9-9 cm, base cuneate with lamina slightly decurrent petioles, apex acute to short acuminate, margin crenate to crenate-dentate; thin papery, adaxially sparsely pubescent, densely pubescent on veins, abaxially sparsely red glandular, slightly pubescent veins; lateral veins 4-5 paired. Petioles ca. 0.5-8.5 cm. Panicles ca. 6.5-26 x 3.5-4.9 cm, glandular puberulent; cymes pedunculate, 3-11 flowered. Lower floral leaves subsessile, upper floral leaves bract-like, ovate. Bract ovate to ovate-oblong. Pedicel ca. 3-6 mm. Calyx ca. 3-5 mm; 2-lobed, teeth triangular, upper 3, ca. 2.5 mm, apex acute; lower 2 ca. 1.5 mm; subequal; fruiting calyx ca. 5.5 x 4 mm. Corolla whitish, ca. 8.5 mm; tube ca. 4 mm, gibbous; upper lip ca. 1.5 mm; lower lip ca. 3.5 mm. Stamen long exserted. Nutlets ca. 1.3 x 1.1 mm, ovoid, yellow, glabrous.

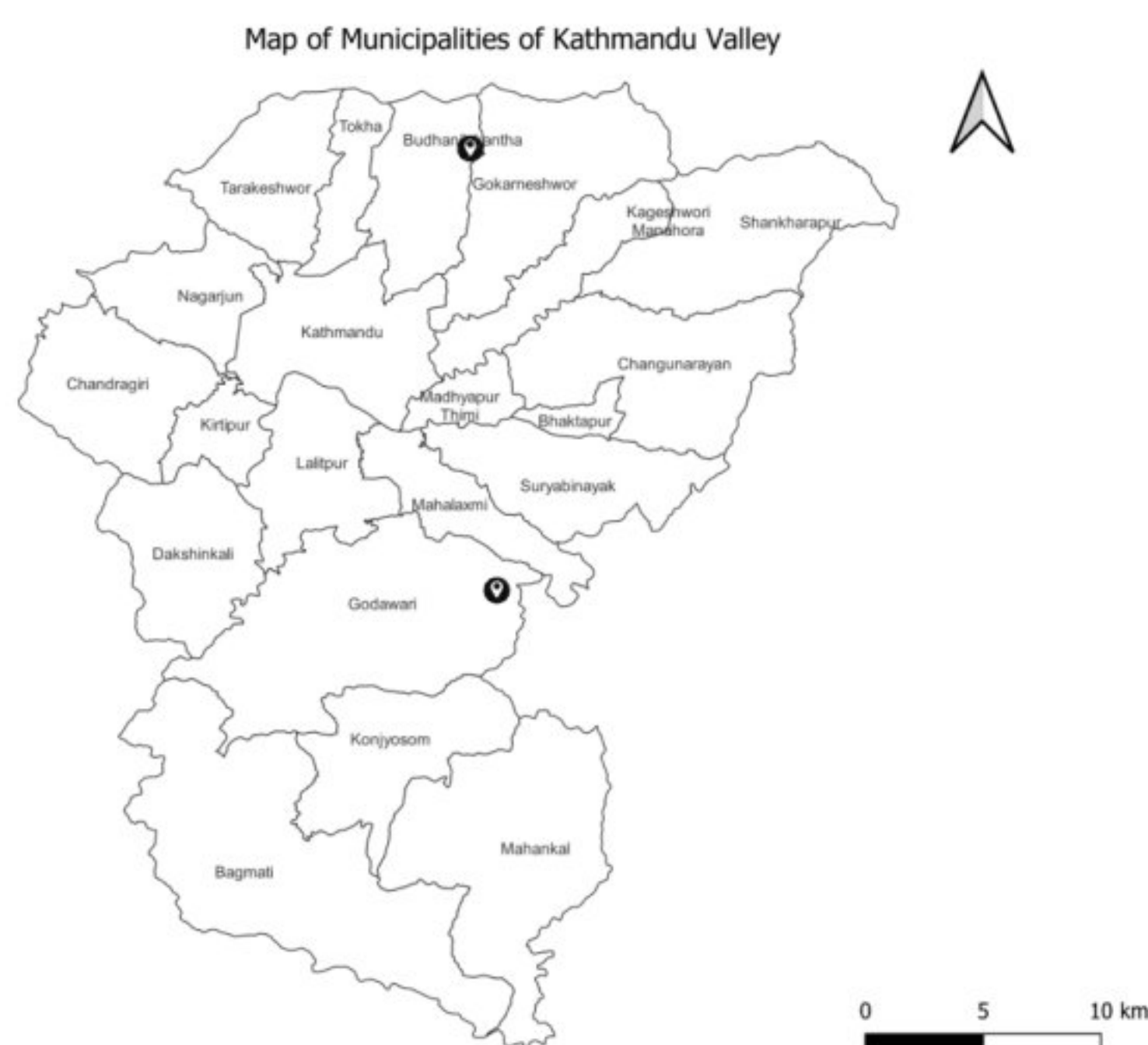


Figure 30: Distribution of *Isodon scrophularioides* in Kathmandu Valley.

Distribution: Kathmandu Valley (Phulchoki, Shivapuri summit-Borlang Bhanjyang), Nepal, W Himalaya, E Himalaya and Burma.

Altitudinal range: 2500-2650 m.

Flowering: September.

Specimens examined: Kathmandu Valley; Lalitpur District; Phulchoki; 15/09/2014; *K.R. Rajbhandari, S.K. Acharya, M.L. Pathak, T.R. Pandey and R. Acharya 132774* (KATH). Kathmandu District; Shivapuri summit-Borlang Bhanjyang; 14/09/1988; *M. Suzuki, T. Maeda, N. Naruhashi, R. Watanabe, M.N. Subedi, M. Minaki, S. Noshiro, H. Ikeda 132790* (KATH).

5. *Isodon ternifolius* (D. Don) Kudo, Mem. Fac. Sci. Taihoku Imp. Univ. 2: 140 (1929).

Plectranthus ternifolius D. Don, Prodr. Fl. Nepal.: 117 (1825).

Robust herbs or shrubs ca. 0.5-7 m tall. Stems densely tomentose-villous. Petioles ca. 3-6 mm. Leaves opposite or in the whorls of 3 or 4, narrowly lanceolate to oblong, ca. 2-7 x 0.5-1.7 cm, base cuneate, apex acute to shortly acuminate, margin serrate; corrugate, adaxially pubescent, abaxially dull yellow tomentose. Inflorescence spike-like, terminal and axillary, compact, ca. 10.5-24 x 2.5-5 cm. Cymes many flowered, in lax thyrses. Floral leaves similar to stems leaves, apically gradually reduced, bract-like. Bract ovate. Calyx ca. 2.5 x 2 mm; lobes triangular, equal, ca. 0.5 mm. Fruiting calyx ca. 4 x 2 mm, inconspicuously veined. Corolla white to purplish, 6 mm; tube gibbous; upper lip purple spotted, 2.5 mm; lower lip straight, ca. 1.2 mm. Stamen included. Nutlets ca. 1.6 x 0.8 mm, ovoid, brown, triquetrous, glabrous.

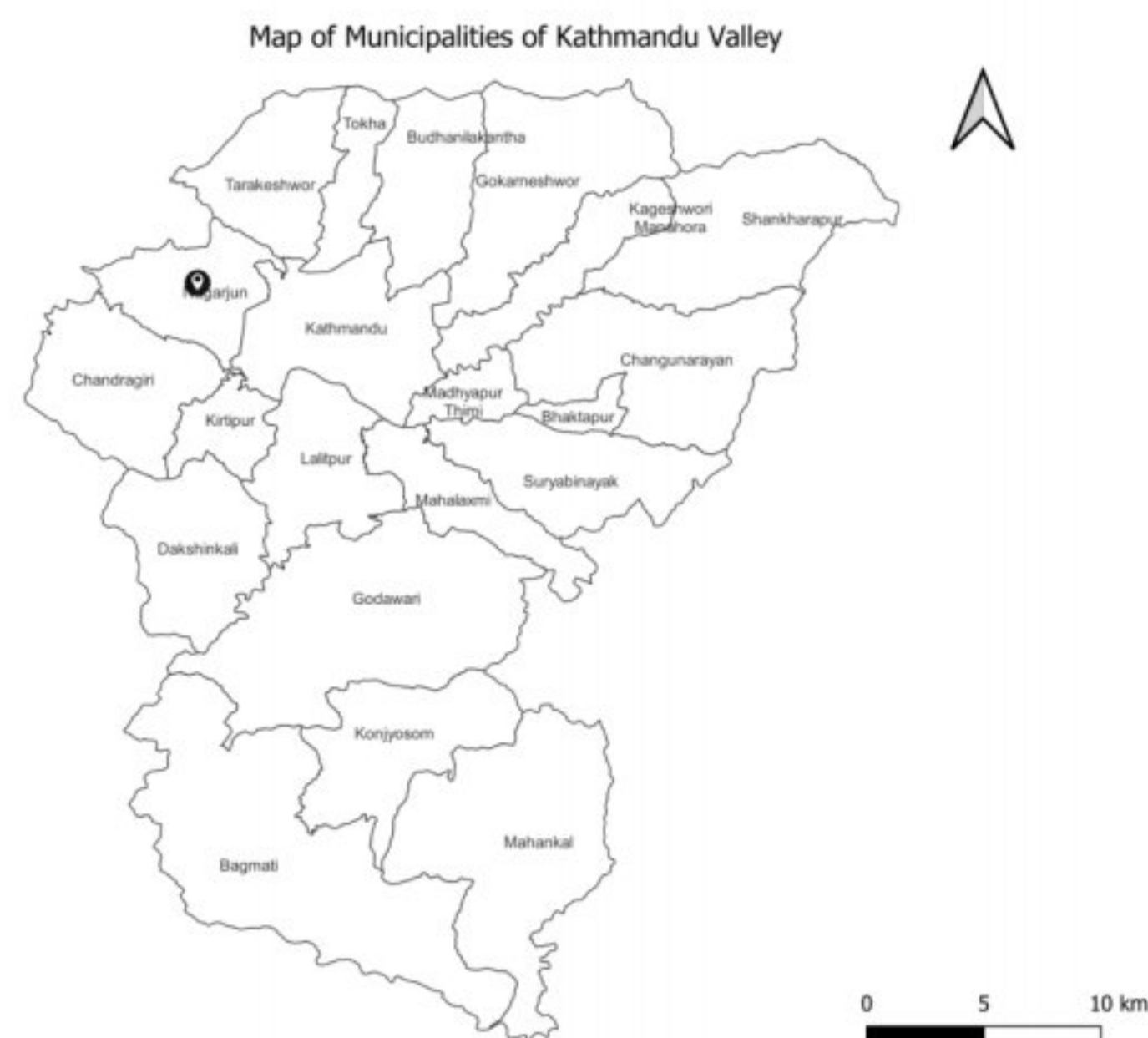


Figure 31: Distribution of in *Isodon ternifolius* Kathmandu valley.

Distribution: Kathmandu Valley (Nagarjun), Nepal, W Himalaya, E Himalaya, Assam-Burma and SE Asia.

Altitudinal range: 1800-2500 m.

Flowering: September.

Specimens examined: **Kathmandu Valley;** Kathmandu District; Nagarjun; 16/09/1962; 132795 (KATH). Kathmandu District; Nagarjun; 16/09/1962; *T.B. Shrestha and Party* 132797 (KATH).

13. *Lamium* L., Sp. Pl.: 579 (1753).

Herbs. Stems erect, ascending or prostrate, slender, quadrangular. Leaves opposite, circular to reniform, semi-clasping; upper leaves sessile, lower leaves petiolate, margin deeply crenate to lobed. Verticillasters in axils of leaves. Calyx tubular-campanulate; 5-lobed, lobes equal. Corolla bilabiate; tube dilated at throat; upper lip entire, pubescent outside; lower lobe 3-lobed, subequal to upper lip; middle lobe emarginate, tapering at base. Stamens 4, didynamous; posterior pair shorter than anterior, anthers 2-celled, pubescent. Style bifid. Nutlets obovoid, triquetrous, scar minute.

Worldwide about 30 species. Two species in Nepal and single species in Kathmandu Valley.

1. *Lamium amplexicaule* L., Sp. Pl.: 579 (1753).

Vernacular name(s): मृत रोम *Mrita rom* (Nepali).

Plants upto ca. 30 cm. Stems sub glabrous, much branched at base. Leaves opposite decussate, ca. 1-3.7 x 0.7-3.6 cm, base truncate to widely truncate-cuneate, apex rounded; slightly pubescent. Verticillasters 6-10 flowered. Calyx ca. 5 x 1.5 mm, densely villous, glabrous, white villous apically inside. Calyx lobes lanceolate-subulate, 1.5-2 mm, margin ciliate. Corolla purple-red or reddish, ca. 1.7 cm, puberulent; tube ca. 1.3 cm, throat ca. 2.5 mm broad. Nutlets ca. 2 x 1 mm, grayish yellow, constricted at base, white tuberculate.



Figure 32: Distribution of *Lamium amplexicaule* in Kathmandu valley.

Distribution: Kathmandu Valley (Godawari, Manichur, Shivapuri), Nepal, W Himalaya and E Himalaya.

Altitudinal range: 1600-2150 m.

Flowering: March-September.

Specimens examined: Kathmandu Valley; Lalitpur District; Godawari; 16/09/1962; *P. Pradhan* 132728 (KATH). Kathmandu District; Manichur; 14/03/1975; *D.P. Joshi and K.R. Rajbhandari* 132733 (KATH). Kathmandu District; Shivapuri; 24/03/1966; *Ramala Thapa* 132725 (KATH).

14. *Leucas* R. Br., Prodr. Fl. Nov. Holland.: 504 (1810).

Herbs. Stems erect or twisted, slender, quadrangular, grooved, branched, pubescent. Leaves simple, opposite decussate, ovate-lanceolate or lanceolate or ovate. Verticillasters terminal or axillary, compact globose or distant, many flowered, bracteate. Calyx tubular, veins conspicuous, 10-veined, slightly curved, pubescent, glabrous inside; 10-lobed, subequal. Corolla bilabiate; upper lip entire, densely pubescent outside; lower lip 3-lobed; longer than upper lip, median lobe larger than lateral lobes. Stamens 4, ascending; anthers 2-celled. Style bifid, lobes unequal. Nutlets ovoid or obovoid, dark brown.

Worldwide more than 200 species. Seven species in Nepal and three species in Kathmandu Valley.

Key to Species

- 1a** Calyx apex oblique. Verticillasters terminal. Bract concealing calyx **1. *L. cephalotes***
- b Calyx apex straight. Verticillasters axillary. Bract not concealing calyx **2**
- 2a** Leaves lanceolate. Calyx lobes spreading star-like in fruit **2. *L. ciliata***
- b Leaves ovate. Calyx lobes not spreading star-like in fruit..... **3. *L. decemdentata***

1. *Leucas cephalotes* (Roth) Spreng., Syst. Veg., 2: 743 (1825).

Phlomis cephalotes Roth, Nov. Pl. Sp.: 262 (1821).

Vernacular name(s): द्रोण पुष्पि Drona puspi, गान्ते फूल Gante phul, गुम्पाती Gumpati (Nepali).

Plants 9-22 cm tall. Stems erect. Leaves ovate to lanceolate, 2-5 x 0.6-1.7 cm, base cuneate, apex acute, margin serrate; membranous, pubescent. Petioles ca. 7 mm. Verticillasters terminal, globose, many flowered, 1.8-3.5 cm in diameter. Bract narrow lanceolate, overlapping, concealing calyx, ca. 1.3 cm. Calyx tubular, 1.5 cm, apex slightly oblique, softly pubescent. Calyx lobes very short, subulate, 1.2 mm. Corolla white, 1.4 cm; tube ca. 1 cm; upper lip ca. 3 mm, densely brown, pubescent; lower lip ca. 4 mm. Nutlets ca. 3 x 1.2 mm, obovoid.



Figure 33: Distribution of *Leucas cephalotes* in Kathmandu valley.

Distribution: Kathmandu Valley (Gokarna), Nepal, W Himalaya, E Himalaya and Assam-Burma.

Altitudinal range: 1300-1350 m.

Flowering: July-September.

Specimens examined: Kathmandu Valley; Kathmandu District; Gokarna; 10/09/1966; *D.H. Nicolson* 132875 (KATH). Kathmandu District; Gokarna; 02/07/1966; *P. Pradhan and R. Thapa* 132876 (KATH). Kathmandu District; Gokarna; 06/07/1971; *Ramola and Party* 132877 (KATH).

2. *Leucas ciliata* Hochst. ex Benth., A.P.de Candolle, Prodr. 12: 530 (1848).

Vernacular name(s): दुल्फी Dulfi (Nepali)

Plants 30-100 cm. Stems erect. Leaves lanceolate, ca. 1.5-4.7 x 0.7-2.2 cm, base broadly cuneate, apex acute, margin shallowly serrate; adaxially pubescent, abaxially gland-dotted; sparsely pubescent. Petioles ca. 5 mm. Verticillasters axillary, globose, upto 2.5 cm in diameter. Bract subulate, 5mm, at least as long as calyx tube. Calyx tubular, ca. 1 cm, apex straight, apically enlarged, slightly curved, mouth truncate; lobes spinescent, spreading star-like in fruit upto 5 mm, pubescent, margin ciliate. Corolla white or purple, ca. 2.8 cm; tube ca. 1 cm, glabrous but throat puberulent outside; upper lip ca. 5.5 mm, spreading; lower lip ca. 9.5 mm. Nutlets ca. 2.8 mm, ovoid, triquetrous.

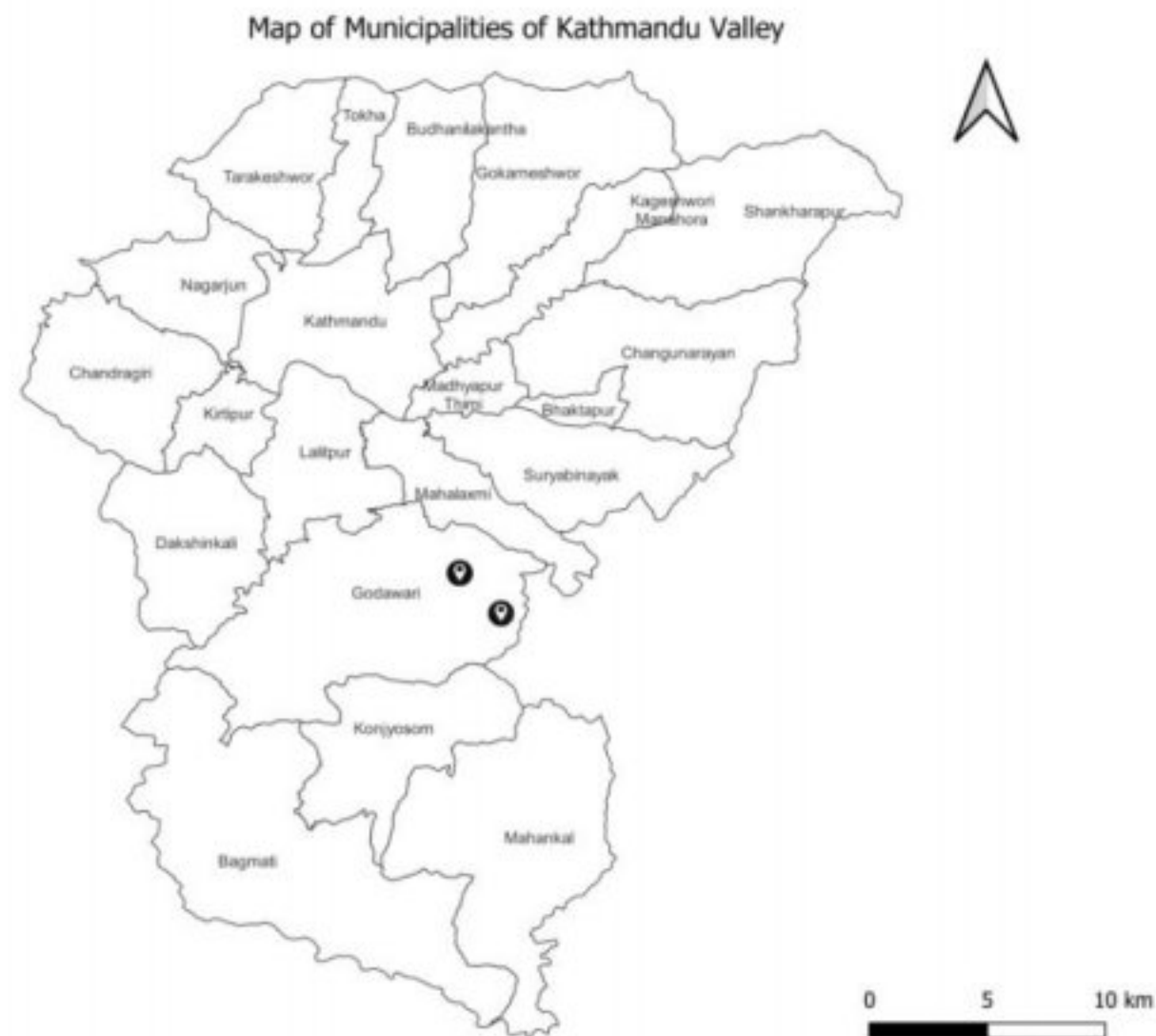


Figure 34: Distribution of *Leucas ciliata* in Kathmandu valley.

Distribution: Kathmandu Valley (Godawari, Phulchoki), Nepal, W Himalaya, E Himalaya, Assam-Burma and SE Asia.

Altitudinal range: 2200-2600 m.

Fruiting: August-December.

Specimens examined: Kathmandu Valley; Lalitpur District; Phulchoki; 28/11/1968; 132909 (KATH). Lalitpur District; Phulchoki; 13/08/1967; 132908 (KATH). Lalitpur District; Godawari; 03/12/2022; *P. Dahal, M. Neupane, R. Chaudhary, S. Bhusal, S. Sharma* 2 (Amrit Campus Herbarium).

3. *Leucas decemdentata* (Willd.) Sm., A. Rees, Cycl.20: n. ° 6 (1812).

Phlomis decemdentata Willd., Sp. Pl., ed. 4. 3: 124 (1800).

Vernacular name(s): धुसुरे खर Dhusure khar (Nepali).

Plants 0.5-1.5 m tall. Stems twisted. Leaves opposite, ovate, 1.4-2.5 x 0.7-1.6 cm, base broadly cuneate to cordate, apex acute, margin crenate-serrate; adaxially densely pubescent, corrugate, abaxially greenish white. Petioles ca. 5 mm. Verticillasters axillary, distant, 8-10 flowered. Bract ca. 4 mm, linear-subulate. Calyx tubular, ca. 7 mm, apex straight; lobes triangular-subulate, subequal, ca. 1 mm. Corolla white, yellowish or reddish, ca. 1.3 cm, tube ca. 8 mm, puberulent near throat outside, annulate inside; upper lip ca. 3.5 mm; lower lip spreading, ca. 4.9 mm; middle lobe largest, obcordate; lateral lobes oblong, pubescent at base outside, glabrous inside. Nutlets ca. 1.5 x 1.3 mm, ovoid, triquetrous.

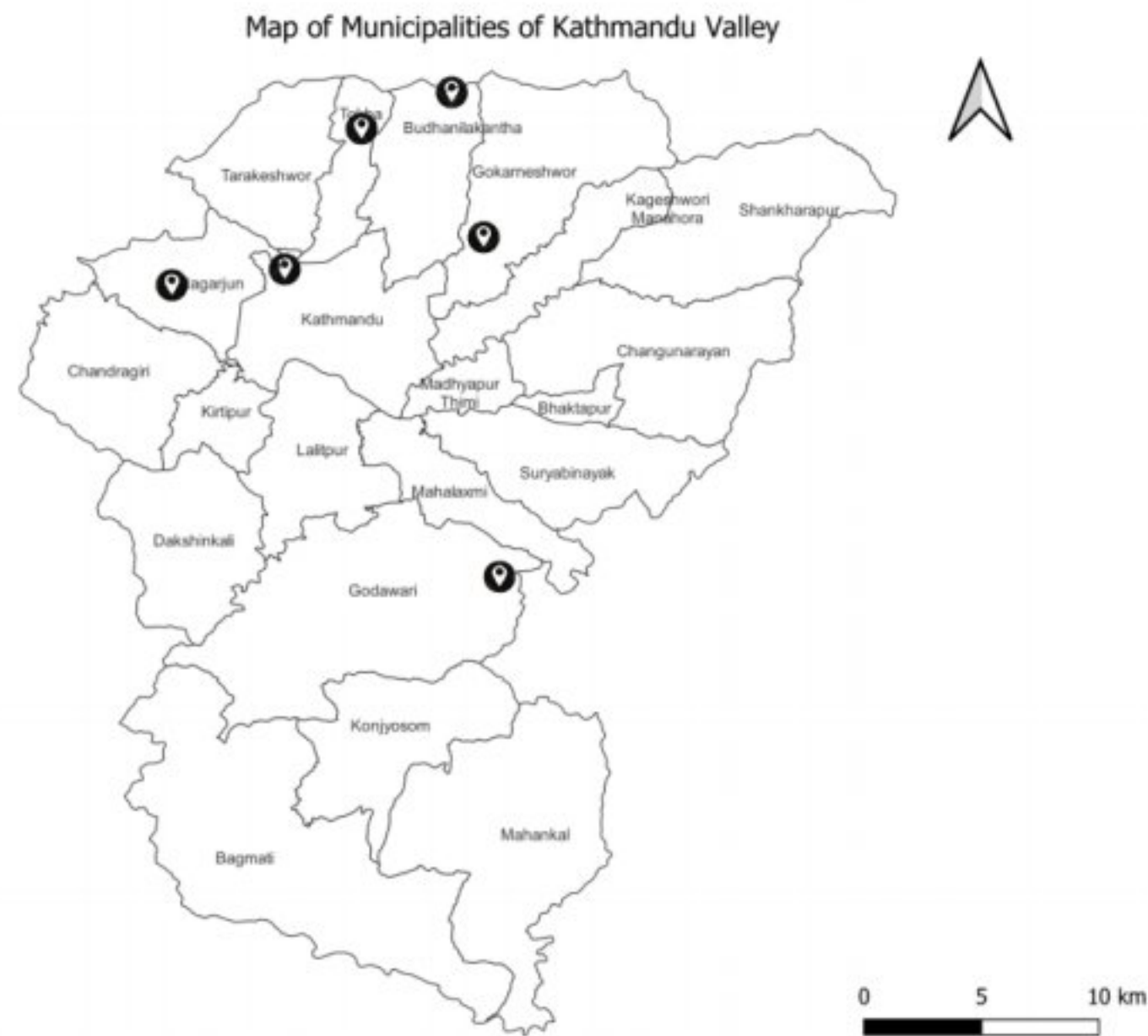


Figure 35: Distribution of *Leucas decemdentata* in Kathmandu valley.

Distribution: Kathmandu Valley (Balaju, Forest office-Chhap-Shivapuri summit, Gokarna, Nagarjun, Phulchoki, Tokha), Nepal, W Himalaya, E Himalaya, Assam-Burma and SE Asia.

Altitudinal range: 1500-2150 m.

Fruiting: May-December.

Specimens examined: Kathmandu Valley; Kathmandu District; Forest office-Chhap-Shivapuri summit; 13/09/1988; *M. Suzuki, T. Maeda, N. Naruhasi, R. Watanabe, M.N. Subedi, M. Minaki, S. Noshiro, H. Ikeda* 026467 (KATH). Kathmandu District; Nagarjun; 19/10/1968; *Bista, Pradhan and Thapa* 133447 (KATH). Kathmandu District; Gokarna; 19/10/1969; *P. Pradhan and R. Thapa* 133444 (KATH). Kathmandu District; Balaju; 29/05/1994; *Neeru* 21 (Amrit Campus Herbarium). Lalitpur District; Phulchoki; 19/05/2006; *Anup Basnet* 15 (Amrit Campus Herbarium). Kathmandu District; Tokha; 12/01/2023; *P. Dahal, R. Chaudhary, S. Poudel* 12 (Amrit Campus Herbarium).

15. *Leucosceptrum* Sm. Exot. Bot. 2: 113 (1806).

Shrub or small tree. Stems erect, quadrangular. Leaves opposite, oblanceolate. Inflorescence dense, terminal, cylindrical spike. Bracts subreniform, caducous. Calyx sub-bilabiate, 5-lobed, tubular-campanulate, lobes subequal. Corolla bilabiate, 5-lobed; upper lip emarginate; middle lobe of lower lip larger. Stamens 4, epipetalous, exserted,

anterior pair of stamen longer. Style slender bifid; lobes subequal, subulate. Nutlets oblong, triquetrous.

Single species worldwide, in Nepal and Kathmandu Valley.

1. *Leucosceptrum canum* Sm. Exot. Bot. 2: 113 (1806).

Vernacular name(s): भुसुरे Bhusure, घुर्मिस Ghurmis (Nepali).

Plants upto 8 m tall. Stems white tomentose when young, bark smooth, stellate tomentose. Leaves ca. 6.5-18.2 x 1.3-5.1 cm, base cuneate, apex acuminate, margin crenate; adaxially subglabrous, abaxially white tomentose. Petioles ca. 2.2 cm. Inflorescence ca. 8.5 x 1.4 cm. Bract ca. 3 mm. Pedicel ca. 2 mm. Bracteoles minute, linear. Calyx ca. 6 mm, densely tomentose, slightly curved, 10-15 veined; lobes ca. 1 mm, triangular, subequal. Corolla ca. 9 mm, white or reddish to purple red, pubescent annulus inside; tube ca. 6 mm; upper lip ca. 1 mm, lobes obtuse; lower lip ca. 3 mm. Nutlets ca. 5 mm, apex truncate, minute basal scar.

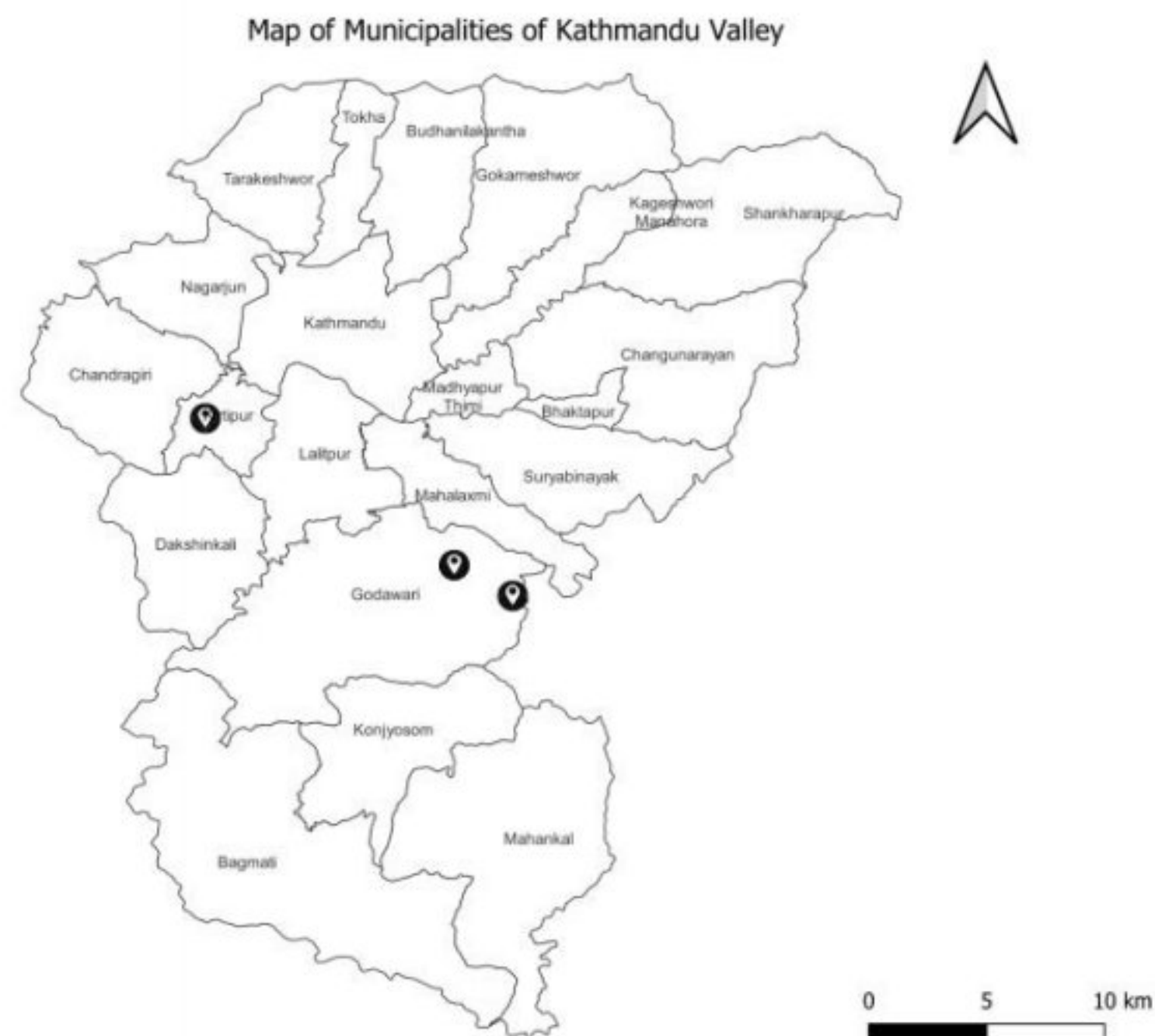


Figure 36: Distribution of *Leucosceptrum canum* in Kathmandu valley.

Distribution: Kathmandu Valley (Champadevi, Godawari, Phulchoki), Nepal, W Himalaya, E Himalaya, Assam-Burma, SE Asia.

Altitudinal range: 1700-1800 m.

Flowering: January-March.

Specimens examined: Kathmandu Valley; Lalitpur District; Phulchoki; 14/02/1967; *P. Pradhan and R. Thapa 133390* (KATH). Kathmandu District; Champadevi; 28/01/2023; *P. Dahal, D. Gharti, E. Rai, N. Karki, R. Pandey, R. Chaudhary 15* (Amrit Campus Herbarium). Lalitpur District; Godawari; 26/03/2022; *Preeti Tamang 12* (Amrit Campus Herbarium). Lalitpur District; Godawari; 26/03/2022; *Sita Chalaune 13* (KATH).

16. *Melissa* Benth., N. Wallich, Pl. Asiat. Rar. 1: 65 (1830).

Herbs. Stems erect, quadrangular. Leaves opposite decussate, ovate to ovate-lanceolate. Inflorescence of widely spaced verticillasters in leaves axils. Calyx bilabiate, tubular-campanulate; tube pubescent; upper lip 3-lobed, reflexed; lower lip 2-lobed, slightly longer than upper. Corolla bilabiate; tube recurved; upper lip 2-lobed; lower lip 3-lobed. Stamens 4, didynamous, included; anthers 2-celled. Nutlets obovoid.

Worldwide about 5 species. Two species in Nepal and single species in Kathmandu Valley.

1. *Melissa flava* Benth., N. Wallich, Pl. Asiat. Rar. 1: 65 (1830).

Plants ca. 2.5 m. Stems pubescent at apex, glabrescent at base. Leaves ca. 1-3.4 x 0.3-1.8 cm, base cuneate, apex acuminate, margin serrate to serrate-crenate, ciliate; adaxially subglabrous, abaxially glabrous except pubescent on veins. Petioles ca. 4-9 mm. Verticillasters 2-10 flowered. Bract ca. 4 mm, obovate-lanceolate, ciliate. Pedicel ca. 5-7 mm. Calyx blue-purple, ca. 9-10 mm, veins pubescent, glabrous inside; fruiting calyx upto 1.3 cm. Corolla yellow, ca. 1.7 cm, pubescent; tube ca. 1.1 cm; upper lip ca. 4 mm; lower lip ca. 6 mm, lobes circular. Nutlets ca. 2.4 x 1.3 mm, brown.



Figure 37: Distribution of *Melissa flava* in Kathmandu valley.

Distribution: Kathmandu Valley (Godawari, Nagarjun, Phulchoki), Nepal, W Himalaya and E Himalaya.

Altitudinal range: 1350-2200 m.

Flowering: April-May.

Specimens examined: Kathmandu Valley; Lalitpur District; Phulchoki; 12/05/1966; *Banerji and P.R. Shakya 133313* (KATH). Kathmandu District; Nagarjun; 25/04/1968; *P. Pradhan and K.P. Shrestha 133318* (KATH). Lalitpur District; Godawari; 19/05/2006; *T.R. Dhakal 4* (Amrit Campus Herbarium).

17. *Mentha* L., Sp. Pl.: 576 (1753).

Herbs, aromatic. Stems erect or ascending, simple or branched below, quadrangular. Leaves opposite decussate, ovate. Verticillasters widely spaced, sub-globose. Calyx tubular-campanulate, 5-lobed, pubescent, glandular. Corolla 4-lobed, lobes subequal. Stamens 4, subequal, exserted, filaments glabrous. Style bifid, lobes subequal. Nutlets ovoid.

Worldwide about 30 species. Three species in Nepal and single species in Kathmandu Valley.

1. *Mentha arvensis* L. Sp. Pl.: 577 (1753).

Vernacular name(s): बाबरी Babari (Nepali).

Plants ca. 34 cm. Stems purplish, pubescent. Leaves ovate to ovate-elliptic, ca. 1.5- 4.5 x 0.4-1.8 cm, base cuneate, apex acute, margin serrate; pubescent, abaxially glandular. Petioles ca. 8 mm. Verticillasters ca. 1.8 cm in diameter; flowers axillary. Peduncle ca. 3 mm. Bract ca. 4 mm, linear-lanceolate. Calyx ca. 1.5 mm; lobes ca. 1 mm, triangular, ciliate. Fruiting calyx dilated ca. 2.5 mm. Corolla 4-lobed, lobes erect, broad, rounded, white or pale lilac, ca. 4.5 mm, lips subequal; tube ca. 2.7 mm; upper lip emarginate; lower lip 3, sub equal, rounded. Nutlets ca. 1 x 5 mm, brown.

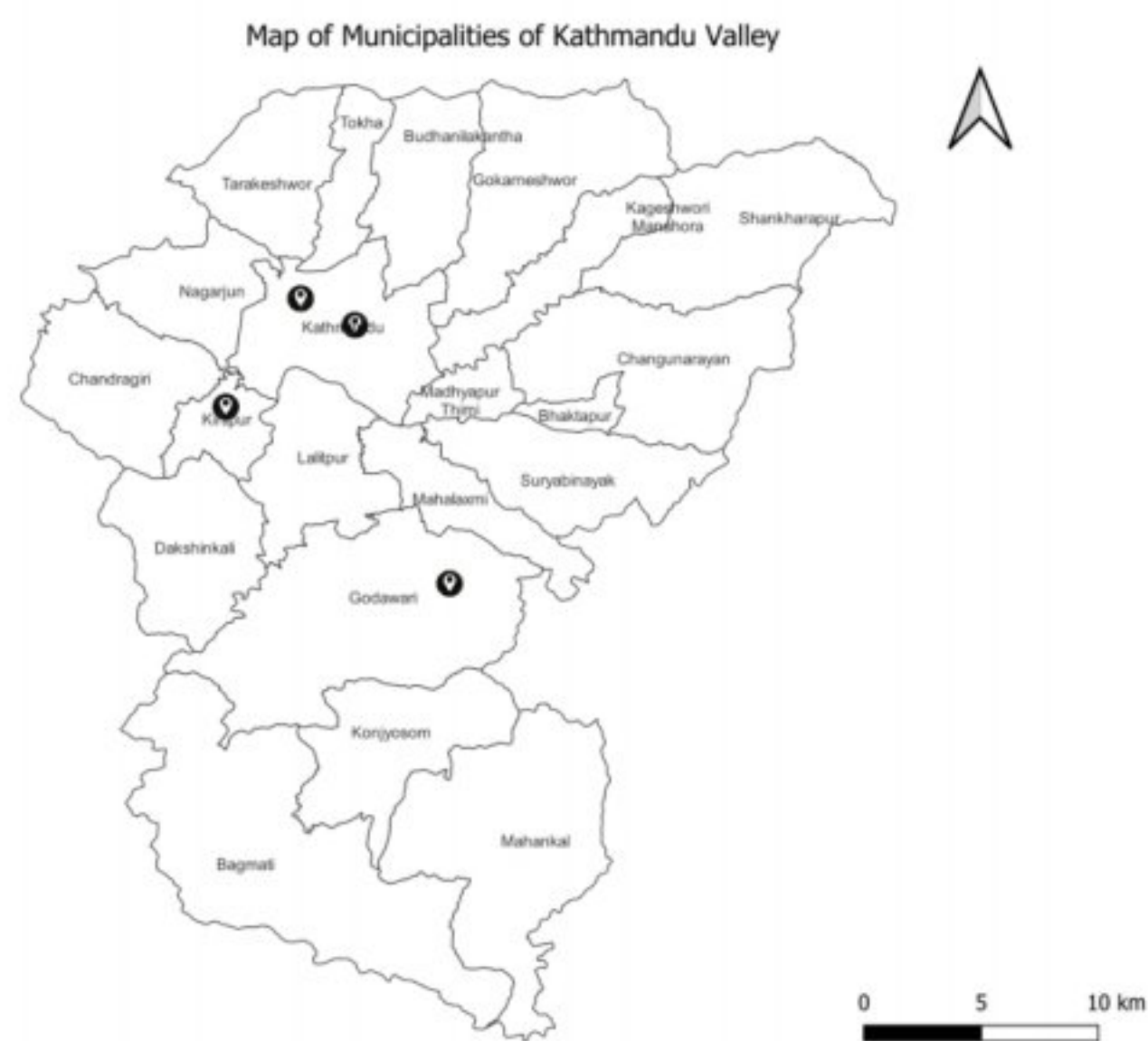


Figure 38: Distribution of *Mentha arvensis* in Kathmandu valley.

Distribution: Kathmandu Valley (Galkopakha, Godawari, Kritipur, Thapathali), Nepal, W Himalaya and E Himalaya.

Altitudinal range: 1240-1400 m.

Flowering: June-September.

Specimens examined: Kathmandu Valley; Lalitpur District; Godawari; 16/06/1964; *Asfaque 133253* (KATH). Kathmandu District; Thapathali; 25/08/1964; *133251* (KATH). Kathmandu District; Kritipur; 28/09/1982; *H. Tabata, D.P. Joshi, K. Tauchiya and Y. Yasuda 012681* (KATH). Kathmandu District; Galkopakha; 12/09/1962; *A.M. Singh 00101* (Amrit Campus Herbarium).

18. *Micromeria* Benth., Edwards's Bot. Reg. 15: t. 1282 (1829), nom. cons.

Herbs. Stems ascending, prostrate, numerous, subterete, tufted branches, slender. Leaves opposite decussate, ovate, less than 1 cm. Inflorescence shortly pedunculate,

cymes axillary. Calyx tubular, subbilabiate; 5-lobed, lobes unequal. Corolla bilabiate; upper lip emarginate; lower lip slightly longer with 3 wider lobes. Stamens 4, anterior stamens nearly included; lower pair longer; anthers 2-celled. Style bifid, lobes unequal. Nutlets oblong.

Worldwide about 70 species. Single species in Nepal and in Kathmandu Valley.

1. *Micromeria biflora* (Buch.-Ham. ex D.Don) Benth., Labiat. Gen. Spec.: 378 (1834).

Vernacular name(s): पिनासे झार Pinase jhar, पानासिक Parnasak (Nepali).

Plants upto 20 cm. Stems densely pubescent, red purple. Leaves ca. 3-6 x 1-3 mm, base rounded to shallowly cordate, apex acute, margin entire or recurved; glandular, sparsely puberulent on midrib. Petioles 0.5 mm. Verticillasters 1-5 flowered. Peduncle upto 4 mm. Bract ca. 2 mm, linear, subulate, ciliate. Pedicel 3 mm. Bracteole ca 1.5 mm, subequal, linear-subulate, ciliate. Calyx ca. 4 mm, veins puberulent, ciliate; upper 3 lobes narrowly triangular ca. 1 mm, acuminate; lower 2 lobes subulate, ca. 2 mm, spinescent. Corolla pink to mauve, sparsely puberulent; tube 4 mm; upper lip ca. 2 mm; lower lip ca. 2.5 mm. Nutlets ca. 1 mm, brown, glabrous.



Figure 39: Distribution of *Micromeria biflora* in Kathmandu valley.

Distribution: Kathmandu Valley (Balaju, Godawari, Gokarna, Sanga bhanjyang, Nagarjun, Shivapuri, Sundarijal, Tikabhairab), Nepal, W Himalaya and E Himalaya.

Altitudinal range: 1500-1700 m.

Flowering: March-November.

Specimens examined: Kathmandu Valley; Lalitpur District; Godawari; 16/04/1962; *S.B. Malla and S.B. Raj Bhandari 133633* (KATH). Kathmandu District; Gokarna; 16/03/2023; *P. Pradhan and R. Thapa 133636* (KATH). Kathmandu District; Nagarjun; 06/11/1967; *P. Pradhan and P.R. Shakya 133634* (KATH). Bhaktapur District; Sangha bhanjyang; 25/08/1964; *D.P. Joshi and K.R. Rajbhandari 133624* (KATH). Kathmandu District; Shivapuri; 20/08/1968; *M.M. Amatya; 133637* (KATH). Kathmandu District; Sundarijal; 13/07/1969; *H. Kanai 133635* (KATH). Kathmandu District; Balaju; 29/05/1994; *Neeru 15* (Amrit Campus Herbarium). Lalitpur District; Tikabhairab; 13/04/1988; *Sumitri 13* (Amrit Campus Herbarium). Kathmandu District; Nagarjun; 13/02/1964; *Keshav PD. Lamshal* (KATH).

19. *Mosla* (Benth.) Bull. Acad. Imp. Sci. Saint-Petersbourg, ser. 3, 20: 456 (1875).

Herbs, aromatic. Stems erect, quadrangular. Leaves opposite decussate, ovate-lanceolate to rhombic-lanceolate. Spikes axillary and terminal; verticillasters 2-flowered. Calyx campanulate, bilabiate; lobes upper lip 3-lobed; lower lip 2-lobed; throat pubescent. Corolla subbilabiate, 5-lobed; anterior lobe smaller. Stamens 4, posterior 2 fertile, anterior 2 reduced to staminodes; anther cells 2. Style bilabiate, lobes subequal. Nutlets globose, reticulated.

Worldwide about 26 species. Single species in Nepal and Kathmandu Valley.

1. *Mosla dianthera* (Buch.-Ham. ex Roxb.) Maxim., Bull. Acad. Imp. Sci. Saint-Petersbourg, ser. 3, 10: 457 (1866).

Lycopus diantherus Buch.-Ham. ex Roxb., Fl. Ind. 1: 144 (1820).

Plants upto 1 m tall. Stems subglabrous, much branched. Leaves ca. 1.6-3.2 x 0.6-1.6 cm, base attenuate, apex acute, margin serrate; papery, adaxially subglabrous, abaxially glabrous, impressed glandular. Petioles ca. 0.4-1.5 cm, adaxially puberulent. Racemes ca. 3.5-13 cm. Bracts linear-lanceolate, base broadly cuneate, apex acuminate, to 1.5 mm. Pedicel ca. 1 mm, to 2.5 mm in fruit. Calyx ca. 2 x 2 mm, 10-veined, dilated to ca. 6 x 4 mm in fruit. Corolla purplish, 3.5 mm, puberulent, sparsely hairy annulate inside. Nutlets ca. 1.2 mm in diameter, gray-brown, areolae basal, dot-like white.



Figure 40: Distribution of *Mosla dianthera* in Kathmandu valley.

Distribution: Kathmandu Valley (Gokarna, Kritipur, Phulchoki, Shivapuri), Nepal, W Himalaya, E Himalaya and Assam-Burma, SE Asia.

Altitudinal range: 1300-2200 m.

Fruiting: September-November

Specimens examined: **Kathmandu Valley;** Kathmandu District; Gokarna; 02/11/1966; *P. Pradhan and R. Thapa* 012706 (KATH). Kathmandu District; Kritipur; 28/09/1982; *H. Tabata, D.P. Joshi, K. Tsuchiya* 133594 (KATH). Lalitpur District; Phulchoki; 26/09/1967; *Miss Manandhar and Party* 133597 (KATH). Lalitpur District; Phulchoki; 26/09/1967; *Miss Manandhar and Party* 133593 (KATH). Kathmandu District; Shivapuri; 01/10/1962; *T.B. Shrestha* 133596 (KATH).

20. *Ocimum* L., Sp. Pl.: 597 (1753).

Herbs, aromatic. Stems erect, quadrangular, pubescent, branched, sometimes woody. Leaves opposite decussate, ovate or ovate-oblong. Inflorescences of terminal and axillary spikes. Verticillasters 4-10 flowered. Bracts rhombic, oblanceolate or cordate, caducous. Flowers small, pedicellate. Calyx bilabiate, campanulate, enlarged in fruit; upper lip 3-lobed, middle lobe decurrent, becomes suborbicular in fruit; lower lip 2-lobed, acuminate-lanceolate, apex spinescent, lateral teeth shorter than lower lip teeth. Fruiting calyx conspicuously veined. Corolla bilabiate; tube as long as calyx or slightly exserted, puberulent, not pubescent annulate inside; upper lip subequally 4-lobed;

lowerlip elongated, flat or concave. Stamen 4, didynamous, exerted, anthers 1-celled. Style bifid. Nutlets ovoid, glandular-foveolate, with minute basal scar.

Worldwide about 150 species. Four species in Nepal and three species in Kathmandu Valley.

Key to Species

1a Bracts cordate. Fruiting pedicels spreading **3. *O. tenuiflorum***

b Bracts not cordate. Fruiting pedicels appressed to inflorescence axis and erect **2**

2a Leaf base cuneate. Fruiting calyx ca. 4 mm. Nutlets black **1. *O. americanum***

b Leaf base attenuate. Fruiting calyx ca. 8.5 mm. Nutlets dark brown .. **2. *O. basilicum***

1. *Ocimum americanum* L., Cent. Pl. 1: 15 (1755).

Vernacular name(s): बाबरी Babari, श्याम तुलसी Shyam tulasi (Nepali).

Plants ca. 20-60 cm tall; usually smaller in all respects and more woody than *O. basilicum*. Leaves ovate, ca. 0.8-2.2 x 0.3-0.9 cm, base cuneate, apex acute, margin serrulate to subentire; puberulent, glandular, ciliate, lateral veins 4 or 5 paired. Petioles ca. 5-12 mm. Thyse 10-14 cm. Bract ca. 3.5 mm, rhombic, apex caudate. Pedicel ca. 2 mm; fruiting pedicels appressed and erect. Calyx ca. 3.5 x 2 mm; tube ca. 2.5 mm; fruiting calyx ca. 4 mm. Corolla white, straight, ca. 5.8 mm, lobes slightly puberulent, glabrous inside; tube exerted, obconical; lower lip concave, oblong, entire. Stamens free, twice as long as corolla. Nutlets ca. 1.3 x 0.5 mm, ovoid, black.



Figure 41: Distribution of *Ocimum americanum* in Kathmandu valley.

Distribution: Kathmandu Valley (Tokha), Nepal, W Himalaya, E Himalaya, Assam-Burma and SE Asia.

Altitudinal range: 1300.

Flowering: June.

Specimens examined: **Kathmandu Valley;** Kathmandu District; Tokha; *Anisha Dhakal* (Amrit Campus Herbarium).

2. *Ocimum basilicum* L., Sp. Pl.: 597 (1753).

Vernacular name(s): बाबरी Babari, राम तुलसी Ram tulasi (Nepali).

Plants ca. 20-80 cm tall. Leaves ovate to oblong, ca. 0.9-3 x 0.7-1.8 cm, base attenuate, apex subobtuse to acute, margin irregularly serrate-crenate or subentire; subglabrous, abaxially glandular. Petioles ca. 0.7-1.8 cm. Thyse 5-20 cm. Bracts ca. 5.2 mm, oblanceolate, apex acute. Pedicel ca. 3 mm in flower to 4.5 mm in fruit; fruiting pedicels appressed and erect. Calyx ca. 4.5 x 3 mm; tube ca. 3 mm; fruiting calyx ca. 8.5 mm. Corolla pink, pale purple or white, ca. 7 mm, lobes puberulent outside; tube ca. 4 mm, wide at throat; upper lip ca 5 x 3 mm; lower lip ca. 2.5 mm. Posterior 2 stamens dentate, base puberulent. Nutlets ca. 2 x 1 mm, ovoid, dark brown.

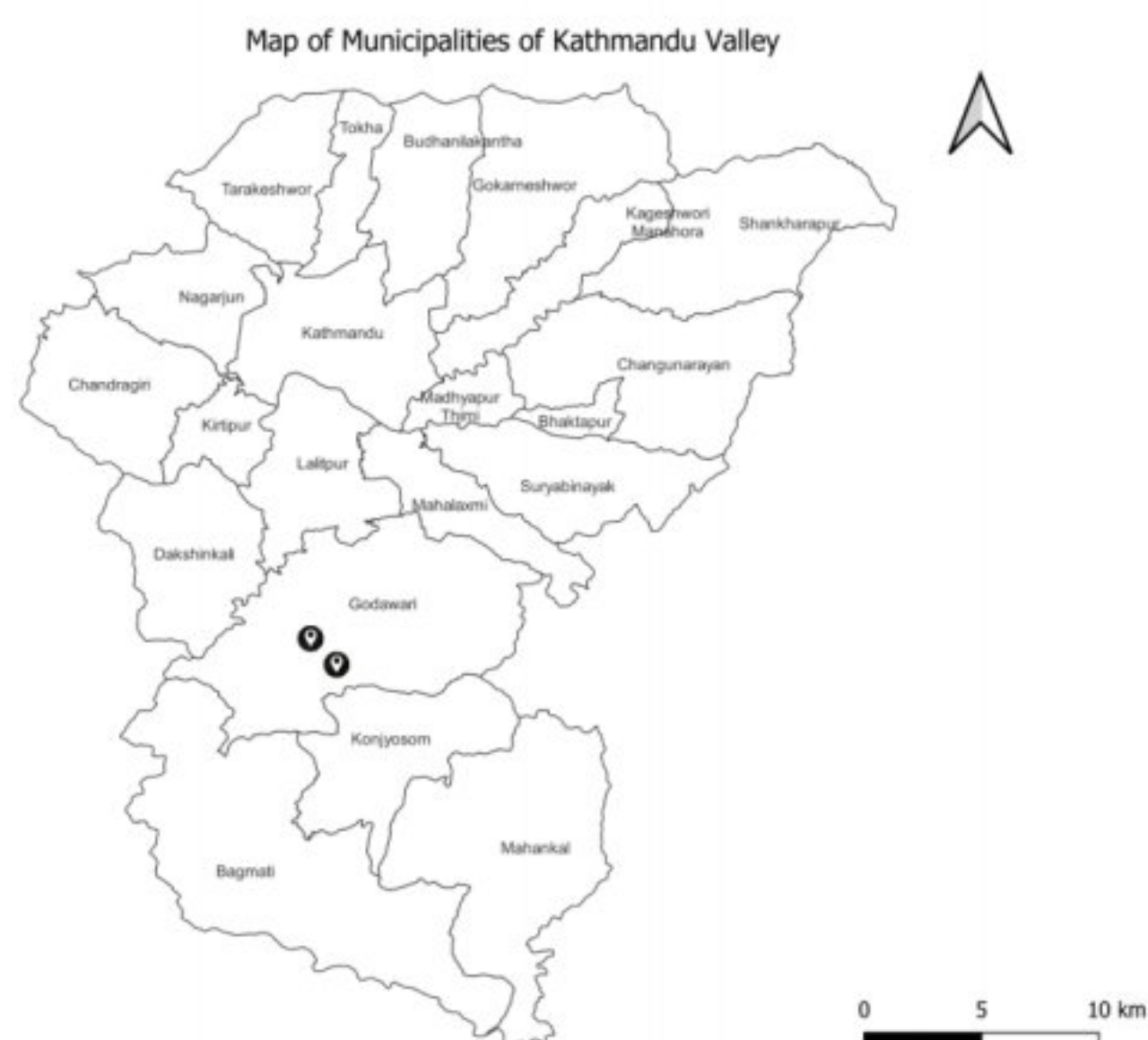


Figure 42: Distribution of *Ocimum basilicum* in Kathmandu valley.

Distribution: Kathmandu Valley (Chapagaun, Sunaguthi), Nepal, W Himalaya, E Himalaya, Assam-Burma and SE Asia.

Altitudinal range: 1400 m.

Flowering: February-March.

Specimens examined: **Kathmandu Valley;** Lalitpur District; Sunaguthi; 10/02/2023; *Lokesh Ratna Shakya* (Amrit Campus Herbarium). Lalitpur District; Chapagaun; 08/03/2023; *P. Dahal, E. Rai, K. Maharjan, M. Neupane, R. Chaudhary, S. Sharma, S. Poudel, S. Desai* 20 (Amrit Campus Herbarium).

3. *Ocimum tenuiflorum* L., Sp. Pl.: 597 (1753).

O. sanctum L. Mant. Pl. 1: 85 (1767).

Vernacular name(s): कृष्ण तुलसी *Krishna tulasi* (Nepali).

Plants ca. 26.5 cm to 1 m tall. Leaves ovate-oblong, ca. 0.5-1.4 x 0.3-0.8 cm, base cuneate- rounded, apex acute, margin serrulate-serrate; puberulent, glandular. Petioles ca. 5 mm. Thyrses ca. 3-7 cm. Bracts ca. 1.5 x 1.3 mm, cordate, apex acute. Pedicel ca. 2.5 mm; fruiting pedicels spreading. Calyx ca. 2.3 mm; tube ca. 1.4 mm; fruiting calyx ca. 5.5 x 3.7 mm. Corolla white or pink, exserted, ca. 2.5 mm, slightly puberulent, tube ca. 2 mm, wide at throat, upper lip ca. 0.9 x 2.3 mm, lobes ovate; lower lip ca. 1 x 0.5 mm. Stamens free, posterior filaments puberulent at base. Nutlets ca. 1 x 0.8 mm, ovoid, brown.



Figure 43: Distribution of *Ocimum tenuiflorum* in Kathmandu valley.

Distribution: Kathmandu Valley (Nepal), Nepal, W Himalaya, E Himalaya, Assam-Burma and SE Asia.

Altitudinal range: 1300 m.

Fruiting: June.

Specimens examined: **Kathmandu Valley;** Kathmandu District; Nepal; 19/06/2016; *Bindu K.C.* (Amrit Campus Herbarium).

21. *Orthosiphon* Benth., Edwards's Bot. Reg. 15: t. 1300 (1830).

Herbs. Stems erect, quadrangular, pubescent. Leaves opposite decussate, ovate-lanceolate. Inflorescence slender, terminal, in long thyrses. Bracts ovate, entire. Calyx bilabiate; upper lip ovate, reflexed; lower lip 4-lobed, lobes awned, spinescent, ciliate; anterior lobe longer than lateral lobes. Fruiting calyx dilated. Corolla bilabiate; tube funnelform; upper lip 3-lobed; lower lip entire, concave. Stamens 4, anterior 2 longer, posterior 2 shorter; anthers 1-celled. Style globose. Nutlets ellipsoid.

Worldwide about 40 species. Three species in Nepal and single species in Kathmandu.

1. *Orthosiphon incurvus* Benth., N. Wallich, Pl. Asiat. Rar. 2: 15 (1830).

Vernacular name(s): रात पाते Rat pate (Nepali).

Plants 22-65.5 cm tall. Leaves ca. 4-7 x 1.2-3.5 cm, base attenuate, margin serrate, pubescent. Petioles ca. 0.5-1 cm. Whorls lax-flowered, interrupted in a raceme, ca. 6-20.5 x 2.7 cm, verticillasters 8-flowered. Peduncle ca. 2-4.3 cm. Bracts 2.5 mm, apex acuminate, pubescent. Pedicel 4 mm. Calyx ca. 7 mm, pubescent, ribbed; upper lip recurved, oblate, ca. 3 mm; lateral 2 lobes of lower lip ca. 1 mm, awned, spinescent, ciliate; middle 2 lobes ca. 2 mm, spinescent, ciliate. Fruiting calyx ca. 9 mm. Corolla ca. 1.8 cm, pink, pubescent; tube ca. 1.3 cm; upper lip ca. 5 mm; lower lip ca. 3 mm. Nutlets ca. 2 x 1.3 mm, dark brown, glabrous, white scar at the base.



Figure 44: Distribution of *Orthosiphon incurvus* in Kathmandu valley.

Distribution: Kathmandu Valley (Nagarjun), Nepal, E Himalaya and Assam-Burma.

Altitudinal range: 1300 m.

Flowering: July.

Specimens examined: **Kathmandu Valley;** Kathmandu District; Nagarjun; 06/07/1966; *Dr. S.B. Malla 134066* (KATH). Kathmandu District; Nagarjun; 06/07/1966; *Dr. S.B. Malla 134057* (KATH).

22. *Perilla* L., Gen. Pl., ed. 6. : 578 (1764).

Herbs, aromatic. Stems erect, quadrangular, sparsely pubescent. Leaves opposite decussate, broadly ovate. Inflorescence dense, spike-like, terminal and axillary. Verticillasters 2-flowered in terminal and axillary secund racemes. Calyx campanulate, bilabiate, upper lip 3-lobed; lower lip 2-lobed. Corolla bilabiate, sparsely puberulent; upper lip emarginate; lower lip 3-lobed. Stamens 4, sparsely exerted; anthers 2-celled. Style bifid, lobes equal. Nutlets globose, conspicuous reticulation.

Worldwide about 4 species. Single species in Nepal and Kathmandu Valley.

1. *Perilla frutescens* (L.) Britton, Mem. Torrey Bot. Club 5: 277 (1894).

Ocimum frutescens L., Sp. Pl.: 597 (1753).

Vernacular name(s): सिलाम Silam (Nepali).

Plants 0.3- 2 m tall. Stems green or purple. Leaves ca. 4-8 x 1.6-5 cm, base broadly cuneate, apex short acuminate-mucronate, margin narrowly to coarsely serrate; green,

purplish or purple black, pubescent. Petioles ca. 3-5 cm. Racemes ca. 1-10.5 cm, densely pubescent. Bracts ca. 4 x 3 mm, short, acuminate, red-brown glandular. Pedicel ca. 1 mm, densely pubescent. Calyx ca. 3.5 mm, erect, base pubescent, yellow glandular; lower lip longer than upper lip; pubescent inside. Fruiting calyx ca. 1 cm, base pubescent. Corolla ca. 3 mm, white to purple red; tube ca. 2.5 mm. Nutlets ca. 2 mm in diameter, gray-brown.

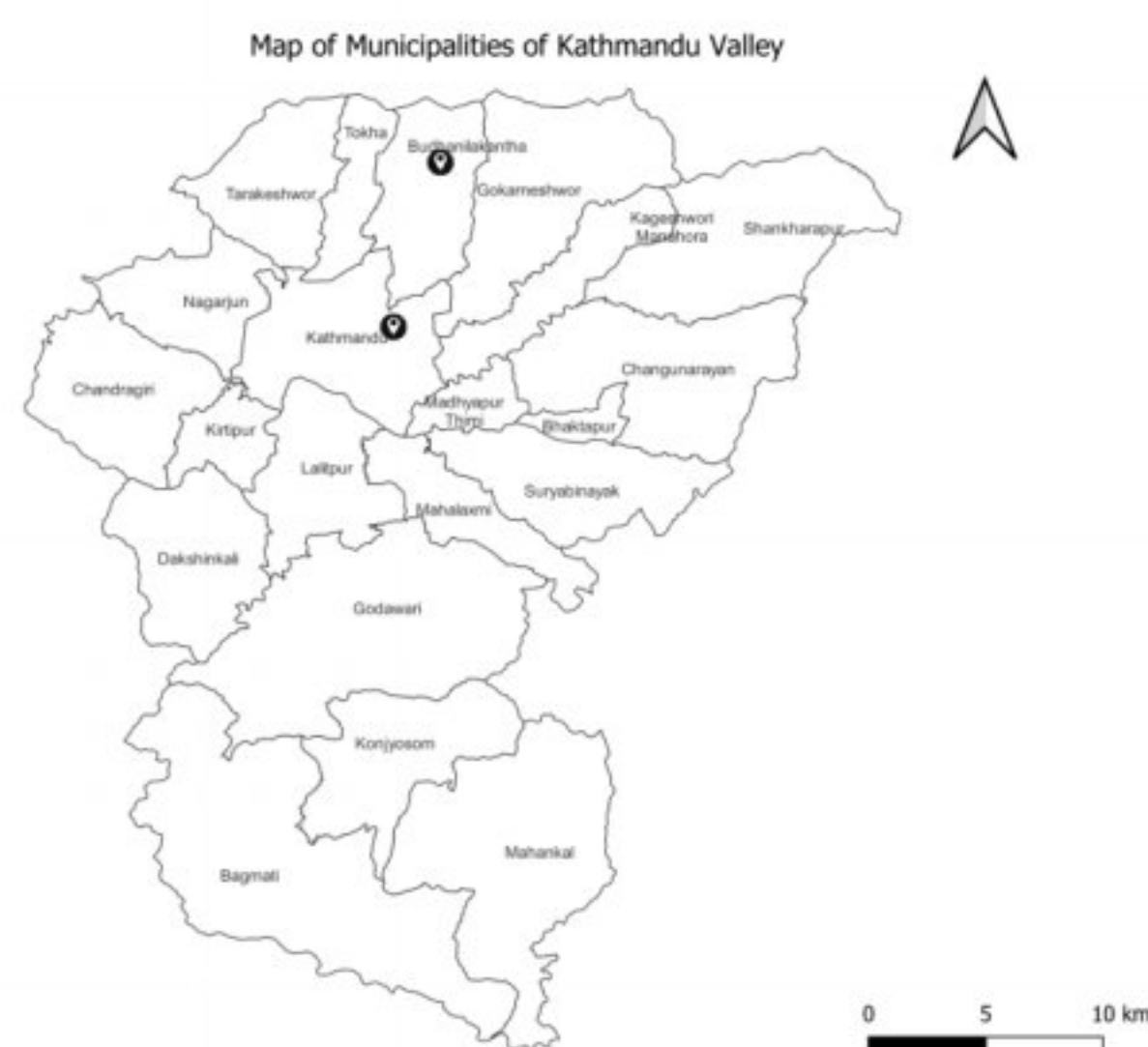


Figure 45: Distribution of *Perilla frutescens* in Kathmandu valley.

Distribution: Kathmandu Valley (Budhanilkantha, Guhyeshwori), Nepal, W Himalaya, E Himalaya, Assam-Burma and SE Asia.

Altitudinal range: 1280-1600 m.

Fruiting: November.

Specimens examined: **Kathmandu Valley;** Kathmandu District; Budhanilkantha; 11/1968; *T.B. Shrestha 134285* (KATH). Kathmandu District; Budhanilkantha; 11/1968; *T.B. Shrestha 134277* (KATH). Kathmandu District; Guhyeshwori area; 07/11/2022; *Prabina Dahal 11* (Amrit Campus Herbarium).

23. *Phlomooides* Moench, *Methodus*: 403 (1794).

Herbs. Stems erect, quadrangular. Leaves opposite decussate, ovate-elliptic. Inflorescence axillary, verticillasters globose. Bracts linear, rigid, apex hooked, longer than corolla. Calyx tubular, 5-lobed with apical hooked spine. Corolla bilabiate; tube straight, glabrous, pubescent throat inside; upper lip erect, galeate, entire; lower lip 3-lobed, subequal to upper. Stamen 4, didynamous, anterior 2 longer; anthers close

together in pairs, with 2 divergent cells. Style filiform, subequally bifid. Nutlets oblong, triquetrous.

Worldwide more than 130 species. Eight species in Nepal and single species in Kathmandu Valley.

1. *Phlomoides hamosa* (Benth.) Mathiesen, Kew Bull. 66: 96 (2011).

Notochaete hamosa Benth., N. Wallich, Pl. Asiat. Rar. 1: 63 (1830).

Plants 1-2.5 m, upto 5 mm in diameter at base; woody. Stems erect, rhizomes robust, stellate pubescent. Leaves ca. 6-12.5 x 3-8 cm, base cordate to rounded, apex acuminate, margin serrate; adaxially slightly scabrid, abaxially sparsely pubescent. Petioles 2.5-8 cm, flattened laterally. Verticillasters ca. 2 cm in diameter in flower, upto 3 cm in fruit. Bract ca. 1 cm, pubescent, linear, rigid, apex hooked, longer than corolla, ca. 1.2 cm, stellate on basal half outside, glabrous inside, densely pubescent at throat. Calyx lobes deltoid, ca. 4 mm including spine, to 6 mm in fruit. Corolla reddish or yellow, ca. 6 mm; tube erect, ca. 4.5 mm; lower lip subequally 3-lobed; pubescent outside, glabrous inside. Nutlets ca. 4 x 2 mm, brown glabrous, apex truncate.



Figure 46: Distribution of *Phlomoides hamosa* in Kathmandu valley.

Distribution: Kathmandu Valley (Toplung-Chandragiri), Nepal, E Himalaya.

Altitudinal range: 2000 m.

Fruiting: November.

Specimens examined: **Kathandu Valley;** Lalitpur District; Toplung-Chandragiri; 08/11/1966; *M.S. Bista 036590* (KATH). Lalitpur District; Toplung-Chandragiri; 08/11/1966; *M.S. Bista 036588* (KATH).

24. *Platostoma* P. Beauv., Fl. Oware 2: 61 (1818).

Herbs. Stems erect or prostrate, rarely shrubby, quadrangular. Leaves opposite decussate, ovate-lanceolate to lanceolate. Verticillasters many flowered, distant in terminal racemes. Bracts softly bony at base. Calyx ovoid, bilabiate, pubescent, constricted at throat, veins pubescent, raised; parts other than veins consists of pits; upper lip 3, middle lobe larger; lower lip 2-lobed. Corolla bilabiate; upper lip 4-lobed; lower lip narrowly lanceolate, entire, longer. Stamens 4, exserted; anthers 2-celled. Style bifid. Nutlets ovoid, apex bristly.

Worldwide about 46 species. Two species in Nepal and single species in Kathmandu Valley.

1. *Platostoma coloratum* (D. Don) A.J. Paton, Kew Bull. 52: 274 (1997).

Plectranthus coloratus D. Don, Prodr. Fl. Nepal.

Vernacular name(s): वन बाबरी Ban babari (Nepali).

Plants ca. 1 m. Stems scaly puberulent. Leaves ca. 7-15.5 x 2-2.5 cm, base cuneate, apex acuminate, margin serrate; sparsely pubescent; veins densely pubescent. Petioles ca. 1 cm. Inflorescence ca. 16.5 cm long; flowers in whorls of 12. Bract ovate, ca. 4 mm. Calyx ca. 6 x 2 mm, ca. 11 veins; upper lobe ca. 1.5 mm; lower lobes 3, lateral 2 triangular, middle lobe flat, ca. 2 mm, apex obtuse. Corolla white with purple spots, ca. 5.5 mm, sparsely pubescent; throat campanulate, dilated, densely pubescent; tube ca. 4 mm. Stamen anterior longer; filaments base slightly enlarged, slightly puberulent; anthers ovoid. Nutlets ca. 1.5 mm, shiny black, basal scar minute.



Figure 47: Distribution of *Platostoma coloratum* in Kathmandu valley.

Distribution: Kathmandu Valley (Nagarjun), Nepal, W Himalaya, E Himalaya and Assam-Burma.

Altitudinal range: 1400-1500 m.

Fruiting: August-November.

Specimens examined: **Kathmandu Valley;** Kathmandu District; Nagarjun; 31/08/1969; *T.B. Shrestha and M.S. Bista* 132575 (KATH). Kathmandu District; 25/11/2022 (Amrit Campus Herbarium).

25. *Pogostemon* Desf., Mem. Mus. Hist. Nat. 2: 154 (1815).

Herbs. Stems quadrangular, glabrescent or densely pubescent, erect or prostrate basally. Leaves opposite decussate, narrowly ovate-lanceolate or oblong to ovate-oblong or ovate. Spikes with whorls conferted or interrupted, verticillasters many flowered. Bract subulate or ovate-lanceolate. Calyx obovoid, campanulate or ovoid-tubular, 5-lobed, lobes subequal. Corolla 4-lobed, subequal. Stamens 4, exserted, filaments pubescent. Style bifid. Nutlets ovate-trigonous, ovoid or subglobose.

Worldwide about 94 species. Nine species in Nepal and three species in Kathmandu Valley.

Key to Species

- 1a** Stems prostrate, densely pubescent. Leaf base rounded to shallowly cordate. Nutlets subglobose **2. *P. auricularius***

b Stems erect, glabrescent. Leaf base cuneate. Nutlets not subglobose 2

2a Spike whorls much interrupted **1. P. amaranthoides**

b Spike whorls often conferted **3. P. glaber**

1. *Pogostemon amaranthoides* Benth., A.P.de Candolle, Prodr. 12: 153 (1848).

Vernacular name(s): रुदिलो Rudilo (Nepali).

Plants ca. 60-150 cm. Stems erect-sprawling, glabrescent. Leaves narrowly ovate to lanceolate, 3-6.5 x 1-2.8 cm, base cuneate, apex acuminate, margin irregularly serrate; subglabrous, abaxially glandular. Petioles 0.7-2.5 cm. Spikes slender, 1.5-10.5 x 0.6-0.8 cm, whorls interrupted. Peduncle 0.5-1.5 cm. Bract ca. 0.3 x 0.1 cm, subulate. Calyx obovoid, 3 mm; lobes triangular-ovate, ca. 1 mm, ciliate, subequal. Corolla white, faintly pinkish, ca. 4 mm; lobes ca. 0.6 mm, acute or obtuse. Nutlets ca. 0.8 x 0.5 mm, broadly ovate, trigonous, slightly winged at base.



Figure 48: Distribution of *Pogostemon amaranthoides* in Kathmandu valley.

Distribution: Kathmandu Valley (Nagarjun), Nepal, W Himalaya, E Himalaya and Assam-Burma.

Altitudinal range: 1850 m.

Flowering: February.

Specimens examined: **Kathmandu Valley;** Kathmandu District; Nagarjun; 19/02/1969; *Bista, Pradhan and Thapa* 134237 (KATH). Kathmandu District; Nagarjun; 08/03/1969; *H. Kanai* 134631 (KATH).

2. *Pogostemon auricularius* (L.) Hassk., Tijdschr. Natuurl. Gesch. Physiol. 10: 127 (1843).

Mentha auricularia L., Mant. Pl. 1: 81 (1767).

Plants ca. 0.4-2 m tall. Stems prostrate basally, rooting at nodes, densely pubescent. Leaves oblong to ovate-oblong, 1.5-3.5 x 0.9-2 cm, base rounded to shallowly cordate, apex acute, margin serrate; pubescent, impressed glandular. Petioles ca 1.5 mm. Spike ca. 2.5 cm, apex caudate-acuminate, ca. 1.3 cm in diameter in flower, continuous or sometimes interrupted at base. Bract ca. 3 mm, ovate-lanceolate. Calyx campanulate, ca. 1 x 1 mm, glabrous, yellow, glandular; lobes broadly triangular. Corolla subequal; purplish to white, ca. 3 mm, glabrous. Nutlets ca. 0.5 mm in diameter, sub globose, brown.

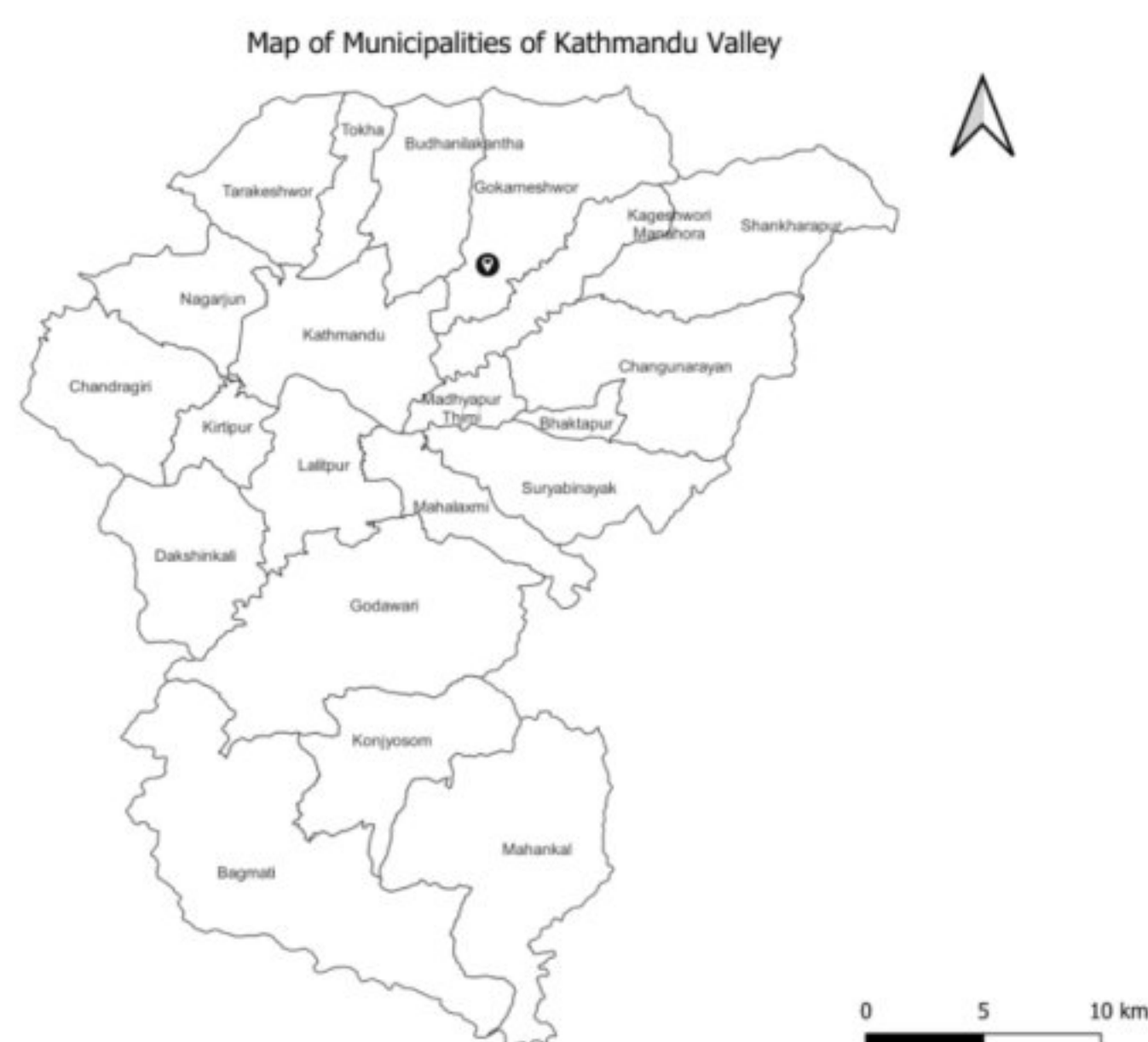


Figure 49: Distribution of *Pogostemon auricularius* in Kathmandu valley.

Distribution: Kathmandu Valley (Gokarna), Nepal, E Himalaya, Assam-Burma and SE Asia.

Altitudinal range: 1300 m.

Flowering: May-August.

Specimens examined: **Kathmandu Valley;** Kathmandu District; Gokarna; 07/08/1966; *P. Pradhan and R. Thapa 134317* (KATH). Kathmandu District; Gokarna; 07/08/1966; *P. Pradhan and R. Thapa 134319* (KATH). Kathmandu District; 25/05/1988; *Surendra 18* (Amrit Campus Herbarium).

3. *Pogostemon glaber* Benth. N. Wallich, Pl. Asiat. Rar. 1: 31 (1830).

Vernacular name(s): नाम पानी Nam pani (Nepali).

Plants ca. 0.5-2 m tall. Stems erect, glabrescent. Leaves ovate, ca. 6-14 x 2.8-8 cm, base cuneate, apex acuminate, margin irregularly serrate, adaxially subglabrous, abaxially glabrous, glandular. Petioles 1.5-5 cm. Spikes ca. 4.5-10 x 0.8-0.9 cm, terminal and axillary, whorls conferted. Peduncle ca. 2.2-3.5 cm. Bract subulate, ca. 4 mm. Calyx ovoid-tubular, ca. 3.2 mm, gland-dotted; lobes subequal, triangular, ca 1 mm. Corolla ca. 5 mm, white; lobes ca. 0.5 mm. Nutlets ca. 0.2 x 0.1 mm, ovoid-oblong, glabrous.

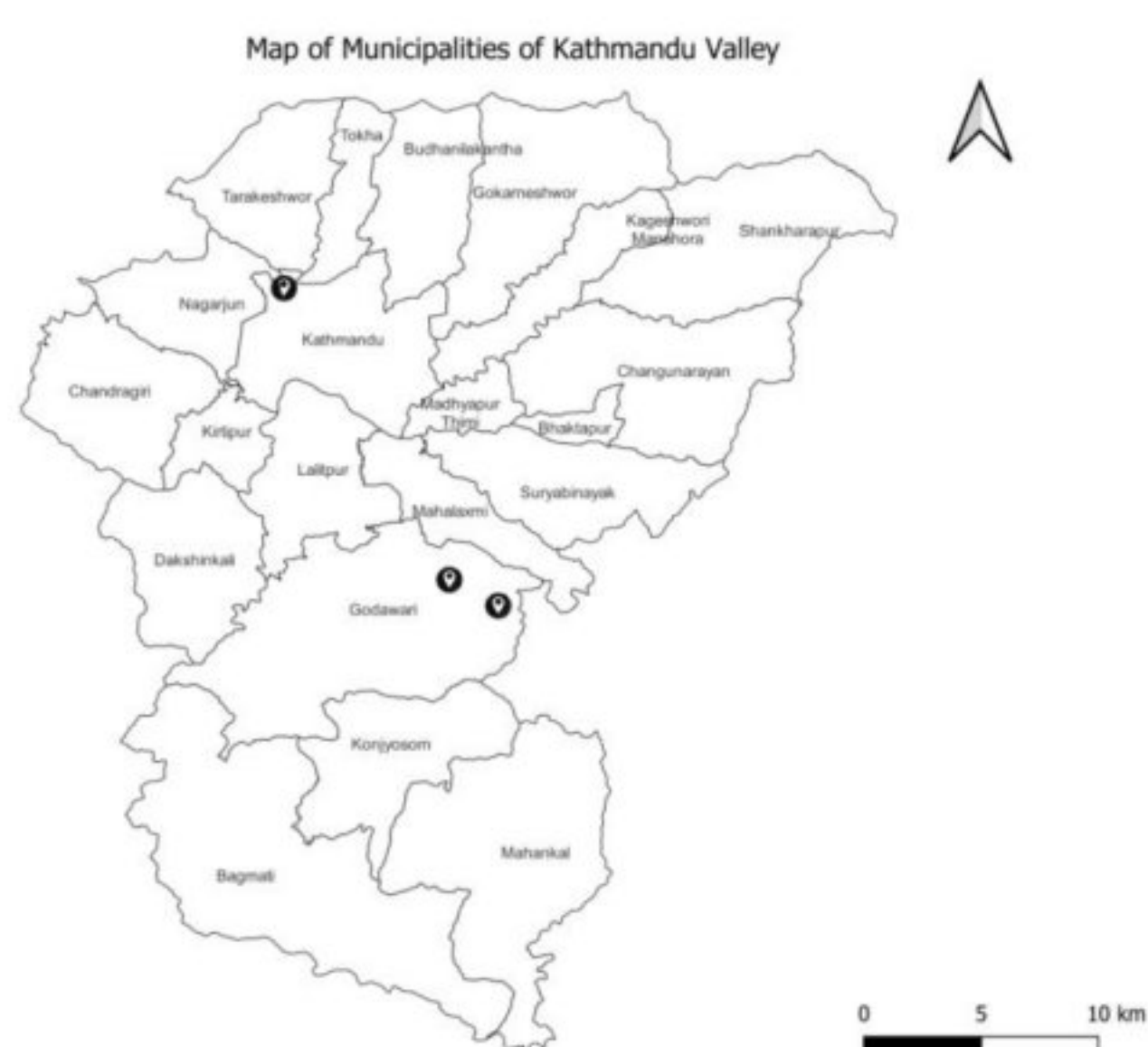


Figure 50: Distribution of *Pogostemon glaber* in Kathmandu valley.

Distribution: Kathmandu Valley (Balaju, Godawari, Lakuri bhanjyang-Phulchoki), Nepal, E Himalaya, Assam-Burma, SE Asia.

Altitudinal range: 1600-1800 m.

Flowering: March-June.

Specimens examined: **Kathmandu Valley;** Lalitpur District; Lakuri bhanjyang-Phulchoki; 10/06/1969; *K.R. Rajbhandari, R. Chhetri, T.K.Thapa and R. Ghimire 127081* (KATH). Lalitpur District; Godawari; 10/06/1969; *Mrs Prabha and Miss Ramol 134236* (KATH). Kathmandu District; Balaju; 10/03/1988; *Kamal Sapkota 12* (Amrit Campus Herbarium).

26. *Prunella* L., Sp. Pl.: 600 (1753).

Herbs. Stems erect, quadrangular, base much branched, subglabrous. Leaves opposite decussate, lanceolate to ovate. Inflorescence dense terminal spike. Bracts broadly cordate. Calyx campanulate, bilabiate, lips subequal, upper lip truncate, sparsely 3-lobed; lower lip 2-lobed, lobes lanceolate, mouth closed in fruit. Corolla bilabiate, upper lip galeate, subcircular; lower lip 3-lobed, middle lobe largest, subobcordate; lateral lobes oblong, reflexed; annulate. Stamens 4, anterior 2 longer, anthers 2-celled. Style bifid, glabrous. Nutlets oblong-ovoid, furrowed.

Worldwide about 15 species. Single species in Nepal and Kathmandu Valley.

1. *Prunella vulgaris* L., Sp. Pl.: 600 (1753).

Plants ca. 20-30 cm. Stems slender, purple-red. Leaves ca. 1-2.8 x 0.7-2 cm, base truncate to decurrent, apex obtuse to rounded, serrate-undulate to entire; glabrous to sparsely pubescent. Petioles ca. 0.8-2.8 cm. Spikes 1.5-3 x 1.7 cm. Floral leaves resemble to cauline leaves, sessile or short petiolate, sub ovate. Bract purplish, ca. 6.5 x 9 mm, cuspidate, overlapping; veins sparsely pubescent. Calyx ca. 7 mm, sparsely pubescent; tube ca. 3 mm, ca. 9-10 veins; bilabiate. Corolla purplish or white, ca. 6.5 mm, glabrous; tube ca. 4 mm, ca. 2 mm wider at throat; upper lip ca. 3.5 mm in diameter, emarginate; lower lip ca. 1.3 mm. Nutlets ca. 1.9-0.9 mm, brown.

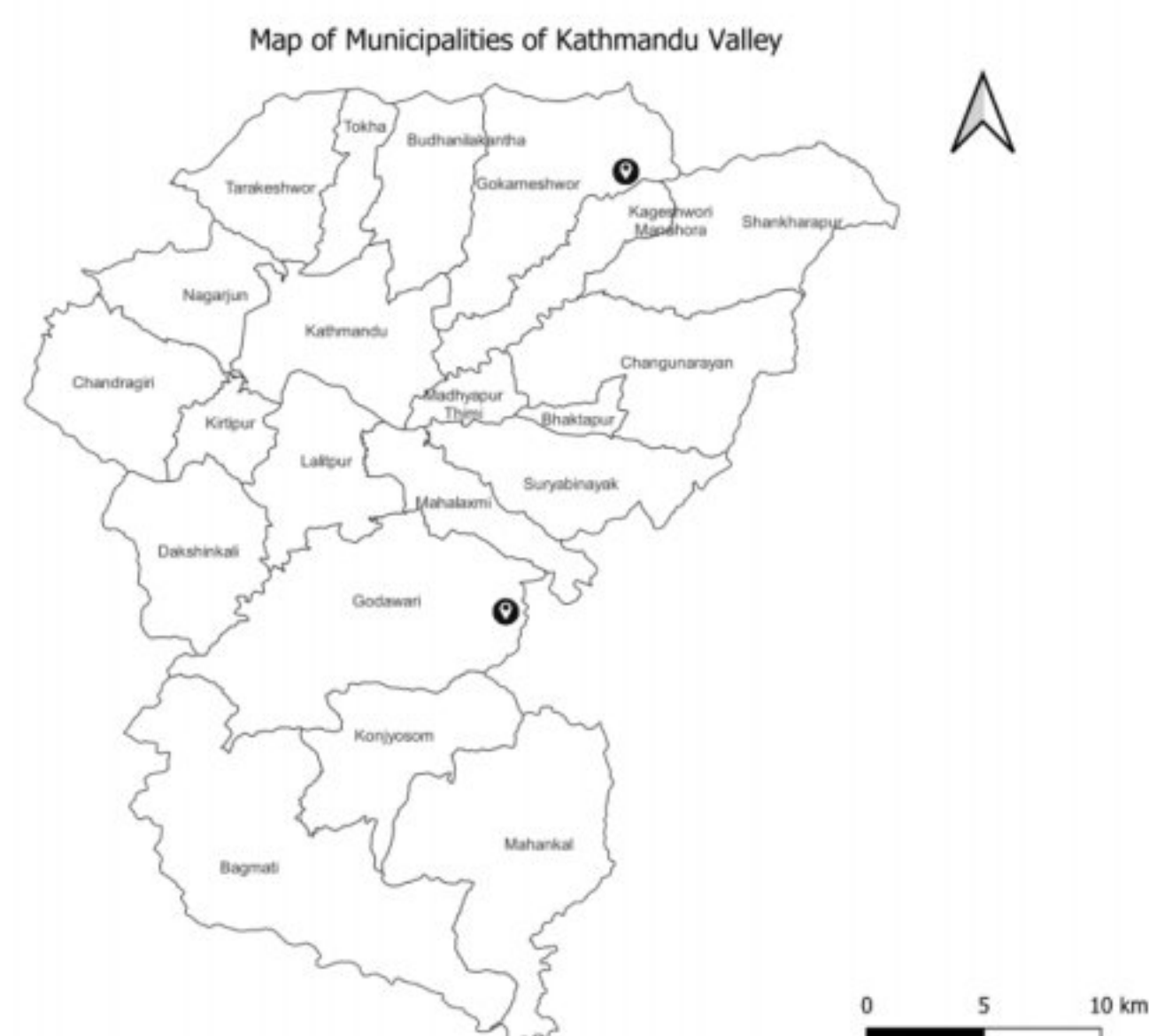


Figure 51: Distribution of *Prunella vulgaris* in Kathmandu valley.

Distribution: Kathmandu Valley (Manichur, Phulchoki), Nepal, W Himalaya, E Himalaya and Assam.

Altitudinal range: 1850 m.

Flowering: July.

Specimens examined: Kathmandu Valley; Lalitpur District; Phulchoki; 02/07/1968; 135354 (KATH). Kathmandu District; Manichur; 19/07/1966; *S.B. Malla 134799* (KATH).

27. *Pseudocaryopteris* (Briq.) P. D. Cantino, Syst. Bot. 23: 380 (1998 publ. 1999).

Shrubs. Stems erect, almost cylindrical, pubescent. Leaves opposite decussate, lanceolate-elliptic or ovate-lanceolate. Flowers in terminal or axillary cymes. Calyx 5-lobed, pubescent, glandular. Corolla bilabiate, limbs 5, upper limb 4-lobed; lower limb longer; pubescent, glandular. Stamen 4, exserted, didynamous, curved. Style slender, curved, bifid, exserted. Capsule globose or subglobose.

Worldwide about 3 species. Three species in Nepal and two species in Kathmandu Valley.

Key to Species

1a Leaf base rounded. Flowers in axillary cymes. Corolla white with pink patches inside
..... **2. *P. foetida***

b Leaf base cuneate. Flowers in terminal thyse. Corolla bluish purple ... **1. *P. bicolor***

1. *Pseudocaryopteris bicolor* (Roxb. ex Hardw.) P.D. Cantino, Syst. Bot. 23: 381 (1998 publ. 1999).

Volkameria bicolor Roxb. ex Hardw., Asiat. Res. 6:366 (1799).

Vernacular name(s): बाघ मुखे Bagh mukhe, मुगे पाती Munge pati (Nepali).

Shrubs 1-3 m tall. Leaves lanceolate-elliptic, 1.3-10 x 0.4-2.9 cm, base cuneate, apex acuminate, margin slightly serrate to subentire; papery; adaxially subglabrous, abaxially pubescent and glandular. Petioles ca. 5-10 mm. Flowers in tight terminal thyrses, densely pubescent; axillary flower, 2.5 cm across. Peduncle ca. 6 mm. Bract lanceolate, upto ca. 1 cm, margin entire. Pedicel ca 2.5 mm. Calyx ca. 4.5 mm; fruiting

calyx ca. 6 mm. Corolla bluish purple; tube ca. 5.5 mm; upper lip ca. 7 mm, 4-lobed, subequal, oblong, rounded; lower lip ca. 1.1 cm, bilobed. Capsule ca. 3.5 mm in diameter, subglobose.



Figure 52: Distribution of *Pseudocaryopteris bicolor* in Kathmandu valley.

Distribution: Kathmandu Valley (Chandragiri, Lakuri Bhanjyang, Nagarjun, Phulchoki, Shivapuri), Nepal, W Himalaya, E Himalaya, Assam-Burma and SE Asia.

Altitudinal range: 1800-2200 m.

Flowering: January-June.

Specimens examined: Kathmandu Valley; Kathmandu District; Chandragiri; 12/01/1975; *Joshi, Rajbhandari and Ghimire 131834* (KATH). Lalitpur District; Lakuri Bhanjyang; 10/02/2022; *K.R. Rajbhandari, R. Chhetri, T.K. Thapa and R Ghimire 127079* (KATH). Kathmandu District; Nagarjun; 10/06/1969; *A.B. Shrestha and Party 131793* (KATH). Lalitpur District; Phulchoki; 04/03/1974; *S. Bhattarai and M. Gorkhali 131843* (KATH). Kathmandu District; Shivapuri; 23/03/1975; *D.P. Joshi, K.R. Rajbhandari 131838* (KATH). Kathmandu District; Chandragiri; 11/03/2023; *P Dahal, E. Rai, R. Chaudhary, S. Sharma, S. Poudel 28* (Amrit Campus Herbarium).

2. *Pseudocaryopteris foetida* (D. Don) P.D. Cantino, Syst. Bot. 23: 381 (1998 publ. 1999).

Clerodendrum foetidum D. Don, Prodr. Fl. Nepal.: 103 (1825).

Vernacular name(s): बाघ मुखे Bagh mukhe, खोसामे घाँस Khosame ghans (Nepali).

Plants ca. 60 cm. Leaves ovate-lanceolate, 2-7.3 x 0.6-2.3 cm, base rounded, apex acuminate, margin serrate; adaxial sparsely pubescent, glandular; abaxially pubescent and densely pubescent on veins. Petioles ca. 0.5-2.2 cm. Flowers in compact, axillary cymes, ca. 3 cm across. Peduncle ca. 5 mm. Bracts ca. 4-7 mm, oblanceolate-ovate. Pedicel ca. 2 mm. Calyx ca. 4 mm; lobes broadly triangular, apex acute, ca. 2 mm, margin ciliate; inside glabrous, white gland dotted towards teeth. Corolla white, pink patches inside, ca. 5.5 mm; tube ca. 3 mm; upper lip ca. 2.2 mm, obovate, mucronate; apex acute; lower lip ca. 2.5 mm, concave. Capsule ca. 5 mm, globose.

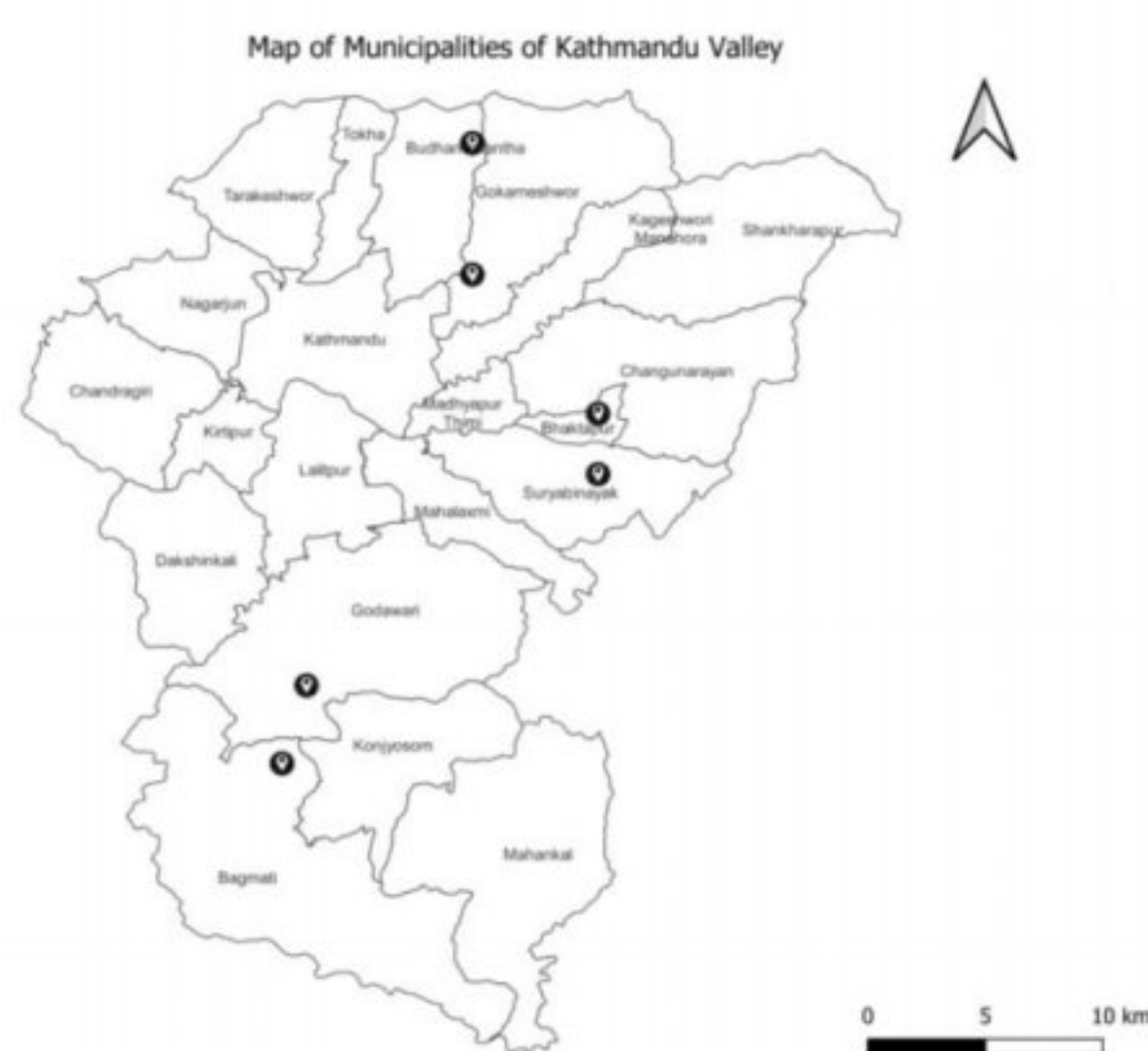


Figure 53: Distribution of *Pseudocaryopteris foetida* in Kathmandu valley.

Distribution: Kathmandu Valley (Godawari, Tikabhairab-Champi, Shivapuri, Gokarna, Chapagaun, Nala Amaldol, Suryabinayak), Nepal, W Himalaya, E Himalaya and Assam-Burma.

Altitudinal range: 1300-1800 m.

Flowering: March-June.

Specimens examined: Kathmandu Valley; Lalitpur District; Godawari; 10/06/1969; *S.B. Malla and S.B. Rajbhandari 131416* (KATH). Kathmandu District; Shivapuri; 17/03/1970; *Shrestha and Shakya 131413* (KATH). Lalitpur District; Tika Bhairab-Champi; 16/03/1973; *M. Amatia and Bhattacharya 131410* (KATH). Kathmandu District; Gokarna; 26/04/1966; *R. Thapa and P. Pradhan 131445* (KATH). Lalitpur District; Chapagaun; 08/03/2023; *P. Dahal, E. Rai, K. Maharjan, M. Neupane, R. Chaudhary, S. Sharma, S. Poudel, S. Desai 23* (Amrit Campus Herbarium). Bhaktapur

District; Suryabinayak; 25/03/2023; *P. Dahal, A. Twayana, E. Rai, M. Neupane, R. Chaudhary 31* (Amrit Campus Herbarium). Bhaktapur District; Nala Amaldol; 09/03/1975; *D.P. Joshi and K.R. Rajbhandari 131426* (KATH).

28. *Rothea* Raf., Fl. Tellur. 4: 69 (1838).

Shrubs or subshrubs. Stems erect, quadrangular, pubescent to glabrescent. Leaves opposite or in threes, oblanceolate-oblong, elliptic-ovate. Flowers in terminal thyrses, bracteate. Calyx campanulate at base, truncate to minutely 5-lobed, pubescent. Corolla 5-lobed, lobes subequal; pubescent. Stamens 4, exserted, base pubescent. Style filiform, bifid, exserted. Drupes subglobose.

Worldwide about 60 species. Single species in Nepal and in Kathmandu Valley.

1. *Rothea serrata* (L.) Steane and Mabb., Novon 8: 206 (1998).

Volkameria serrata L., Mant. Pl. 1: 90 (1767).

Vernacular name(s): अन्देखी Andekhi, चुवा Chuwa (Nepali).

Plants ca. 1-4 m tall. Stems branchlets densely pubescent mainly on nodes when young; glabrous on maturity. Leaves ca. 1.5-18 x 0.6-5 cm, base attenuate, apex acuminate-acute, margin subentire to distantly serrate; sparsely pubescent, abaxially glandular; papery, veins 10-11 pairs. Petioles 6 mm. Terminal thyrses, densely yellow-brown pubescent ca. 24.5 x 11 cm. Bract sessile, ovate, ca. 1.7 x 0.9 cm, pubescent, lower ones 4.3 x 3 cm. Bracteole lanceolate, ca. 1 x 0.8 cm. Calyx ca. 4 mm. Corolla pink; tube ca. 8.5 mm; lobes ca. 8 mm, obovate. Style long, exserted, ca. 2.5 cm. Drupes ca. 0.5 x 0.6 cm, black.



Figure 54: Distribution of *Rotheca serrata* in Kathmandu valley.

Distribution: Kathmandu Valley (Shivapuri), Nepal, W Himalaya, E Himalaya, Assam-Burma and SE Asia.

Altitudinal range: 1500 m.

Flowering: September.

Specimens examined: **Kathmandu Valley;** Kathmandu District; Shivapuri; 02/09/1970; *M.M. Amatya 134463* (KATH). Kathmandu District; Shivapuri; 02/09/1970; *M.M. Amatya 134456* (KATH).

29. *Salvia* L., Sp. Pl.: 23 (1753).

Herbs. Stems erect, quadrangular, pubescent. Leaves simple, opposite decussate, triangular-ovate or ovate. Verticillasters distant or conferted in spikes or raceme. Calyx tubular or campanulate, glandular, veins conspicuous; bilabiate; upper lip entire; lower lip 2-toothed; throat glabrous. Corolla bilabiate; upper lip 2, fused, straight, apex entire; lower lip 3-lobed, middle lobe largest. Stamens fertile 2, exserted, staminodes 2. Style bifid. Nutlets obovoid or ellipsoid.

Worldwide about 1000 species. Twelve species in Nepal and three species in Kathmandu Valley.

Key to Species

- 1a** Leaf base oblique. Corolla purplish white **2. S. hispanica**
- b Leaf base not oblique. Corolla not purplish white **2**
- 2a** Abaxial leaf glandular. Calyx red. Lower corolla lip shorter than upper. Nutlets dark brown without spots, ellipsoid, apex pleated **3. S. splendens**
- b Abaxial leaf eglandular. Calyx not red. Lower corolla lip longer than upper. Nutlets yellow brown with black spots, obovoid, apex not pleated .. **1. S. coccinea**

1. *Salvia coccinea* Buc'hoz ex Etl., Salv.: 23 (1777).

Plants upto 70 cm. Leaves ovate to triangular-ovate, ca. 2.2-2.8 x 1.3-1.4 cm, base cordate to sub truncate, apex acute, margin serrate or obtusely serrate; abaxially eglandular. Petioles ca 0.5-2 cm. Racemes ca. 8.5 cm; verticillasters distant. Pedicel ca. 3 mm, green. Calyx tubular-campanulate, ca. 9 mm, puberulent, glandular; upper lobe ovate, ca. 2 x 3 mm, apex mucronate, lower lip 2 x 3 mm, deeply 2-toothed. Corolla scarlet or deep red, ca. 2.7 cm; tube ca. 2 cm; lower lip longer than the upper. Nutlets ca. 2 mm, obovoid, yellowish brown with blackish spots, apex not pleated.

Note: Exotic, commonly cultivated as ornamental garden plant.

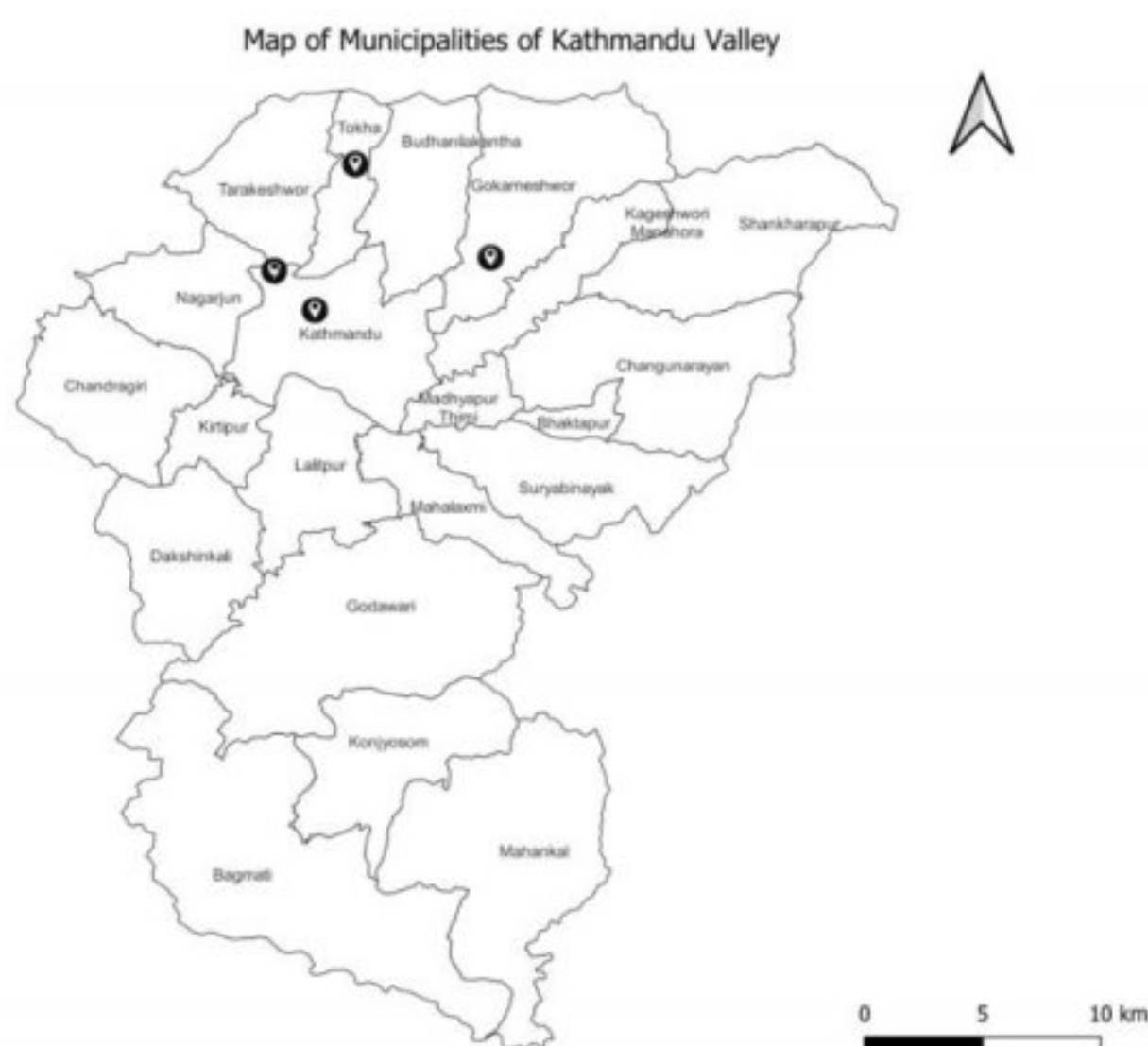


Figure 55: Distribution of *Salvia coccinea* in Kathmandu valley.

Distribution: Kathmandu Valley (Balaju, Gokarna, Sorakhutte, Tokha), Nepal, Burma and South Asia.

Altitudinal range: 1200-1500 m.

Flowering: June-July.

Specimens examined: **Kathmandu Valley;** Kathmandu District; Balaju; 15/06/1985; *H. Van T. and Irene S. Cotter 035328* (KATH). Kathmandu District; Gokarna; 03/07/1966; *P. Pradhan and R. Thapa 035337* (KATH). Kathmandu District; Gokarna; 03/07/1966; *P. Pradhan and R. Thapa 035336* (KATH). Kathmandu District; Sorakhutte; 01/07/2023; *Prabina Dahal 35* (KATH). Kathmandu District; Tokha (Amrit Campus Herbarium).

2. *Salvia hispanica* L., Sp. Pl.: 25 (1753).

Chia (Common English name).

Plants upto 1 m. Leaves ovate, 2.7-7 x 1.3-3.7 cm, base oblique, apex acute, margin serrate; adaxially pubescent, abaxially glandular. Petioles 0.5-3 cm. Spikes ca. 5-17 cm with verticillasters conferted or distant. Peduncle ca. 6 cm. Calyx tubular, ca. 8 mm, pubescent, glandular; upper lip ovate, apex acute, ca. 2.8 x 3 mm; lower two lobes triangular, apex acuminate, ca. 2.7 x 1.3 mm. Corolla purple and white, ca. 8 mm; tube ca. 6 mm; lower lip longer than upper. Nutlets ca. 0.8 mm, obovoid, brown.

Note: Native to central and southern Mexico and Guatemala, naturalized in Gorakhnath-Guhyeshwori area (Kathmandu Valley).



Figure 56: Distribution of *Salvia hispanica* in Kathmandu valley.

Distribution: Kathmandu Valley (Gorakhnath-Guhyeshwori, Sorakhutte), Nepal, Mexico-Guatemala.

Altitudinal range: 1245-1300 m.

Flowering: December.

Specimens examined: Kathmandu Valley; Kathmandu District; Gorakhnath-Guhyeshwori area; 07/12/2022; *P. Dahal, A. Twayana, R. Chaudhary, S. Poudel, S. Sharma 10* (Amrit Campus Herbarium). Kathmandu District; Sorakhutte; 15/12/2022; *Prabina Dahal 34* (Amrit Campus Herbarium).

3. *Salvia splendens* Sellow ex Nees, Flora 4: 300 (1821).

Plants upto 90 cm. Leaves ovate-triangular, ca. 2.5-5.8 x 1.3-3.6 cm, base truncate-rounded, apex acuminate, margin serrate, abaxially glandular. Petioles ca. 0.8-3.2 cm. Racemes ca. 10.9 cm, verticillasters distant. Pedicel 1-6 mm, red. Calyx campanulate, red, ca. 1.9 cm, glandular, veins, pubescent, 2-lipped to ca. 1/3 its length. Calyx upper lobe triangular-ovate, ca. 7 x 8 mm, apex mucronate; lower lobe slightly longer than upper; deeply 2-toothed, teeth triangular 8 mm. Corolla scarlet, ca. 3-3.3 cm; tube slightly dilated at throat; upper lip straight, concave, oblong, ca. 6 mm; lower lip smaller than upper, ca. 1 mm. Nutlets ca. 3.5 mm, ellipsoid, darkish brown, apex irregularly pleated.

Note: Exotic, commonly cultivated as ornamental garden plant.

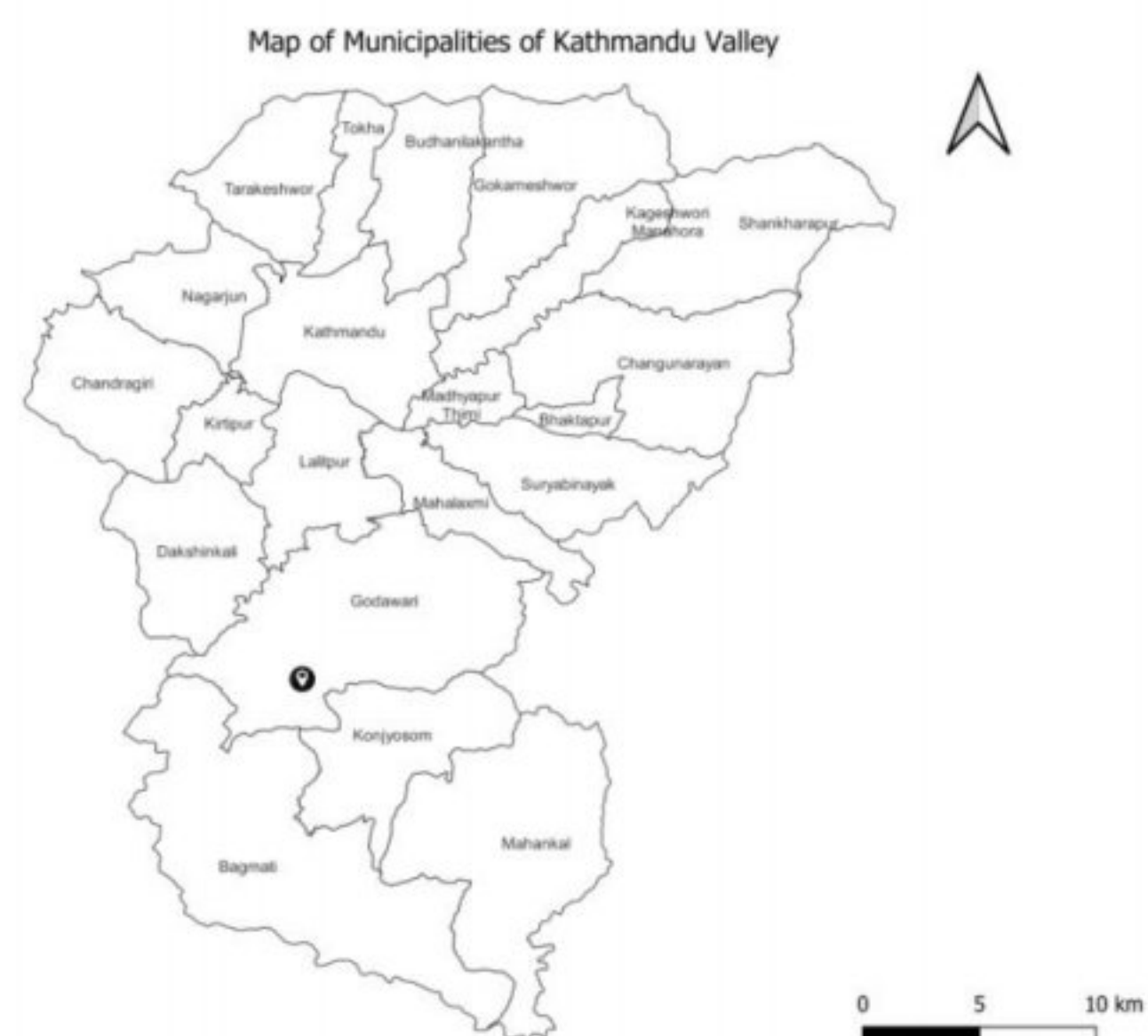


Figure 57: Distribution of *Salvia splendens* in Kathmandu valley.

Distribution: Kathmandu Valley (Chapagaun), Nepal, W Himalaya, E Himalaya, Assam-Burma and South Asia.

Altitudinal range: 1400 m.

Flowering: March.

Specimens examined: **Kathmandu Valley;** Lalitpur District; Chapagaun; 08/03/2023; *Prabina Dahal* 22 (Amrit Campus Herbarium). Kathmandu District; 01/12/2015; *Hira Bahadur Ramtel* (Amrit Campus Herbarium).

30. *Scutellaria* L. Sp. Pl. 2: 598 (1753).

Herbs rarely subshrubs. Stems erect or prostrate, quadrangular, pubescent. Leaves opposite decussate, ovate rarely elliptic-orbicular. Racemes terminal or axillary. Flowers bracteate rarely ebracteate; rarely bracteolate, usually secund. Calyx bilabiate, lips entire, the upper lip with scutellum, fruting closed by lips. Corolla bilabiate, white, greenish yellow or purple; tube long, usually sharply recurved above base, pubescent outside; upper lip erect, galeate; lower lip flat. Stamens 4, didynamous, epipetalous. Style subulate, bifid, lobes unequal. Nutlets oblate, ovoid or obovoid.

Distribution: Worldwide about 470 species. Seven species in Nepal and four species in Kathmandu Valley.

Key to Species

- 1a** Plant subshrubs **4. *S. scandens***
- b** Plant herbs **2**
- 2a** Stems unbranched. Leaves elliptic-orbicular, mostly confined near stems base
..... **2. *S. discolor***
- b** Stems branched, leaves not elliptic-orbicular, not confined near stems base **3**
- 3a** Leaves ovate-lanceolate, margin shallow dentate. Nutlets black **1. *S. barbata***
- b** Leaves ovate-cordate, margin crenate-serrate. Nutlets pale brown **3. *S. repens***

1. *Scutellaria barbata* D.Don, Prodr. Fl. Nepal. 109 (1825).

Vernacular name(s): निलो बुट्टे घाँस *Nilo butte ghans* (Nepali).

Herbs ca. 12-55 cm tall. Leaves triangular-ovate to ovate lanceolate, 0.9-1.4 x 0.3-0.7 cm, base subtruncate, apex acute, margin obtusely shallow dentate, sparsely pubescent only on veins. Petioles 1-3 mm, slightly pubescent. Racemes terminal. Floral leaves

similar to stems, reduced and elliptic to narrowly elliptic upward. Pedicel upto 2 mm, puberulent. Bracteole needle-like, ca. 0.6 mm, included at middle of pedicels. Flowers axillary. Calyx ca. 2 mm, puberulent on veins outside, margin ciliolate, upto 4 mm in fruit. Scutellum ca. 1.3 mm to 2 mm in fruit. Corolla purple-blue, 6.5-9 mm, pubescent outside, sparsely pubescent on throat inside; tube saccate at base, ca. 7 mm broad at middle, gradually dilated to 3.8 mm broad at throat; upper lip ca. 1.5 mm; middle lobe of lower lip trapeziform, ca. 1.5 x 2 mm, margin entire; lateral lobes triangular-ovate, ca. 1.5 mm wide, apex acute. Stamens included. Nutlets ca. 0.6 mm in diameter, oblate, black, warty.



Figure 58: Distribution of *Scutellaria barbata* in Kathmandu valley.

Distribution: Kathmandu Valley (Gokarna, Jhor, Sunaguthi), Nepal, W Himalaya, E Himalaya, Assam-Burma and S E Asia.

Altitudinal range: 1300-1500 m.

Flowering: May-December.

Specimens examined: **Kathmandu Valley;** Kathmandu District; Gokarna; 27/04/1966; *P. Pradhan and R. Thapa* 134968 (KATH). Kathmandu District; 17/05/1969; *L.H.J. Williams* 012748 (KATH). Lalitpur District; Sunaguthi; 23/12/2022; *Lokesh Ratna Shakya* (Amrit Campus Herbarium). Kathmandu District; Jhor; 10/06/1969; *Deepmala Shrestha* (Amrit Campus Herbarium).

2. *Scutellaria discolor* Wall. ex Benth.

N. Wallich, Pl. Asiat. Rar. 1:66 (1830)

Vernacular name(s): निलो बुट्टे घाँस Nilo butte ghans (Nepali).

Herbs rhizomatous ca. 16.5 cm. Stems ascending to erect, reddish, unbranched, apically leafless. Leaves elliptic-orbicular, 1-4 x 0.7-3 cm, base cordate-shallowly cordate, apex rounded to obtuse, margin undulate-crenate, leaves in 2-4 pairs; papery, pubescent on veins, adaxially densely puberulent, abaxially green or purplish, veins pubescent. Petioles 0.3-3.6 cm. Racemes secund. Floral leaves sessile to short petiolate, ovate to elliptic, 0.6-2.6 x 0.4-1.5 cm, base rounded-truncate, obtuse. Peduncle ca. 3.7 cm. Bract ca. 0.2 cm, ovate, pubescent, margin entire. Pedicel ca. 3 mm, purplish, densely pubescent. Flowers opposite or alternate. Calyx upto 3 mm, glandular pubescent outside. Scutellum spreading, semicircular, ca. 1 mm, reflexed. Corolla purple, glandular pubescent outside, 0.5-1.4 cm; tube 0.8-1 cm, base bent, 3 mm wide at throat; upper lip ca. 3 mm, puberulent inside; middle lobe of lower lip ovate-orbicular; lateral lobes ovate to oblong-ovate. Nutlets ca. 1 x 0.8 mm, ovoid, darkish brown, with acuminate tubercles tipped by a whorl of hooks.



Figure 59: Distribution of *Scutellaria discolor* in Kathmandu valley.

Distribution: Kathmandu Valley (Sundarijal, Godawari-Mt. Phulchoki, Tau Daha pond, Suryavinayak), Nepal, W Himalaya, E Himalaya, Assam-Burma and S E Asia.

Altitudinal range: 1200-1700 m.

Flowering: May-October.

Specimens examined: Kathmandu Valley; Kathmandu District; Sundarijal; 20/08/1969; Malla and Kanai 13854 (KATH). Lalitpur District; Godawari-Phulchoki;

3/10/1995; *M. Mikage, T. Shimizu and K. Yonekura 134853* (KATH). Kathmandu District; Kirtipur; 28/11/1982; *H. Tabata, D.P. Joshi, K. Tsuchiya and Y. Yasuda 134857* (KATH). Bhaktapur District; Suryabinayak; 27/05/1619; *Shrestha and Party 134869* (KATH). Lalitpur District; Godawari; 21/05/2006; *P. Maharjan 08* (Amrit Campus Herbarium). Lalitpur District; Godawari; 05/09/1989; *Rekha Maharjan* (Amrit Campus Herbarium). Kathmandu District; Sundarijal; 05/09/1989; *Keshav Suweddy* (Amrit Campus Herbarium). Lalitpur District; Phulchoki; 04/08/1996; *Pranita Shrestha 11* (Amrit Campus Herbarium).

3. *Scutellaria repens* Buch.-Ham. ex D. Don, Prodr. Fl. Nepal.: 110 (1825).

Vernacular name(s): सेतो चारपाते Seto charpate (Nepali).

Herbs ca. 20-70 cm tall. Stems prostrate, ascending branches. Leaves ovate, ca. 1.2-4 x 0.9-3 cm, base truncate, rarely oblique-cordate, apex acute, margin crenate-serrate; both surface pubescent, abaxial veins conspicuous and pubescent. Petioles ca. 0.7-2 cm. Simple or branched racemes ca. 7-13 cm. Bract ca. 5 x 4 mm, ovate, serrate, acute. Calyx 2-lobed, ca. 2.5 mm, glandular pubescent. Calyx 2-lobed, semicircular, apex subacute, ca. 1 x 2 mm, margin entire. Scutellum recurved, glandular pubescent, ca. 2.1 mm. Corolla ca. 1.1-1.7 cm, pubescent; tube recurved, ca. 1.1 cm; upper lip ca. 6 mm, creamy; lower lip bluish-purple at tip ca. 4 mm. Nutlets ca. 0.2 x 0.15 mm, obovoid, pale brown, minutely granulate.

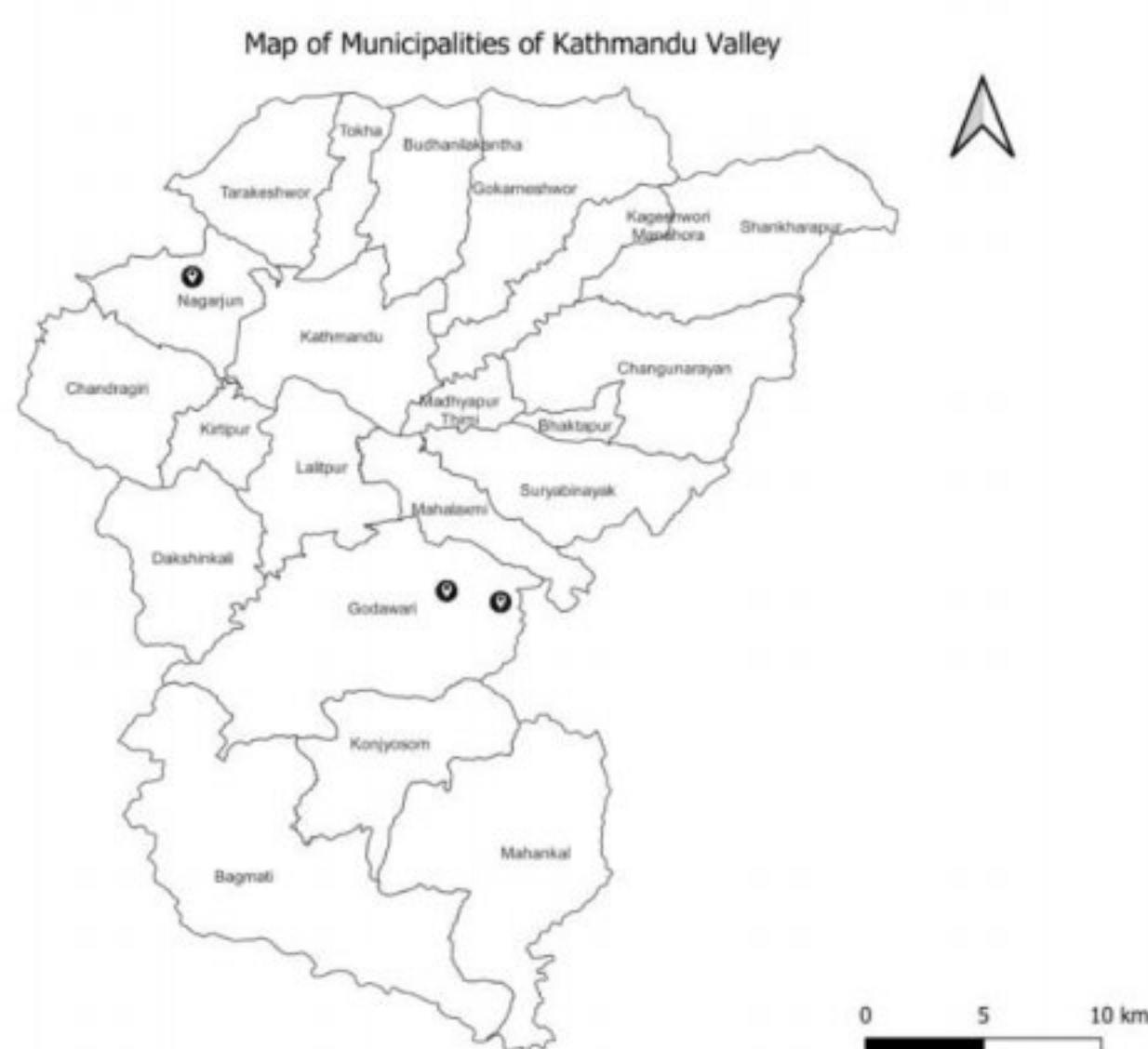


Figure 60: Distribution of *Scutellaria repens* in Kathmandu valley.

Distribution: Kathmandu Valley (Godawari, Nagarjun, Phulchoki), Nepal, W Himalaya, E Himalaya and S Asia.

Altitudinal range: 1500-2200 m.

Flowering: September-December.

Specimens examined: Kathmandu Valley; Lalitpur District; Phulchoki; 26/09/1969; *Miss Manandhar and Party 135041* (KATH). Kathmandu District; Nagarjun; 06/11/1967; *P. Pradhan and P.R. Shakya 135046* (KATH). Lalitpur District; Godawari; 24/11/1974; *Murari, Indira and Madhavi 135059* (KATH).

4. *Scutellaria scandens* D. Don, Prodr. Fl. Nepal.: 110 (1825).

Vernacular name(s): चारपाते Charpate, कन्कमे Kankame (Nepali).

Rambling subshrubs. Stems obtusely winged, subglabrous but nodes pubescent, much branched. Leaves ovate-cordate, 0.8-5.7 x 0.6-1.6 cm, base cordate to subrotund, apex acuminate, margin serrate to crenate, adaxially sparsely pubescent, abaxially subglabrous, veins finely pubescent. Petioles 0.5-1.3 cm, densely pubescent. Racemes terminal on lateral branches, 6.5-8.3 cm. Peduncle 2.8 cm. Bract ca. 7 mm, deltoid, pubescent. Pedicel ca. 2 mm, puberulent. Calyx 6, ca. 3 mm, sparsely pubescent. Scutellum flabellate, ca. 3 mm, sparsely reflexed, ciliate. Corolla tube funnelform, ca. 1.6 cm, pubescent; throat pubescent; upper lip 3-lobed, middle lobe oblate, ca. 3 mm, lateral lobes triangular, apex acute, slightly reflexed, ca. 5 mm; lower lip emarginate, middle part slightly raised, purple dotted, both the lateral sides slightly notched, ca. 7 mm. Stamens included, filaments pilose at the attachments, curved towards apex. Anthers whitish and purplish, bearded; style bifid, unequal. Nutlets ca. 1 x 0.5 mm, ovoid, darkish brown, tuberculate.



Figure 61: Distribution of *Scutellaria scandens* in Kathmandu valley.

Distribution: Kathmandu Valley (Phulchoki, Chapagaun, Chandragiri), Nepal, W Himalaya, E Himalaya and S Asia.

Altitudinal range: 1400-1500 m.

Flowering: February-March.

Specimens examined: Kathmandu Valley; Lalitpur District; Phulchoki; 08/02/2023; *Lokesh Ratna Shakya, Tilkumari Thapa* (Amrit Campus Herbarium). Lalitpur District; Phulchoki; 08/03/2023; *P. Dahal, M. Neupane, R. Chaudhary, S. Bhusal, S. Sharma* 19 (Amrit Campus Herbarium). Kathmandu District; Chandragiri; 11/03/2023; *P Dahal, E. Rai, R. Chaudhary, S. Sharma, S. Poudel* 26 (Amrit Campus Herbarium).

31. *Teucrium* L., Sp. Pl.: 562 (1753).

Herbs. Stems erect, sub terete, densely pubescent. Leaves opposite decussate, cordate to oblong- ovate. Spikes on main stems and branches of apical part. Calyx campanulate; bilabiate or 5-lobed; upper lip 3-lobed; lower lip 2-lobed. Corolla with deep sinus instead of upper lip; 1-lipped; tube not pubescent annulate inside; lower lip 5-lobed, middle lobe large, obovate-subcircular; lateral lobes 4. Stamens 4, curved, exserted, anterior pair longer. Style bilabiate. Nutlets obovate-subglobose.

Worldwide more than 300 species. Four species in Nepal and single species in Kathmandu Valley.

1. *Teucrium quadrifarium* Buch.-Ham. ex D. Don, Prodr. Fl. Nepal.: 108 (1825).

Vernacular name(s): भत्र्या पात Bhatrya pat (Nepali).

Plants ca. 30- 110 cm tall. Leaves ca. 1.3-2 x 1.4-2.7 cm, base sub cordate to truncate, apex obtuse to acute, margin double serrate; veins pubescent. Petioles ca. 0.5-1 cm. Panicles ca. 1.5-8.5 cm. Bract ca. 5-11 x 4-9 mm, apically caudate-acuminate. Calyx purplish, ca. 4.5 x 2 mm; middle tooth of upper lip obovate-oblate, reflexed, ca. 1.5 x 1.3 mm, lateral teeth truncate or oblate, 0.5 x 1.2 mm, lobes of lower lip lanceolate, ca. 1 x 0.5 mm. Corolla pink, ca. 1.1 cm, finely pubescent and glandular; tube ca. 5 mm; middle lobe of lower lip ca. 1 mm, lateral lobes ovate- oblong, ca. 1 mm, posterior lobes reflexed, ca. 4 x 3 mm. Nutlets ca. 1 mm, dark brown, scar ca. 0.4 mm.

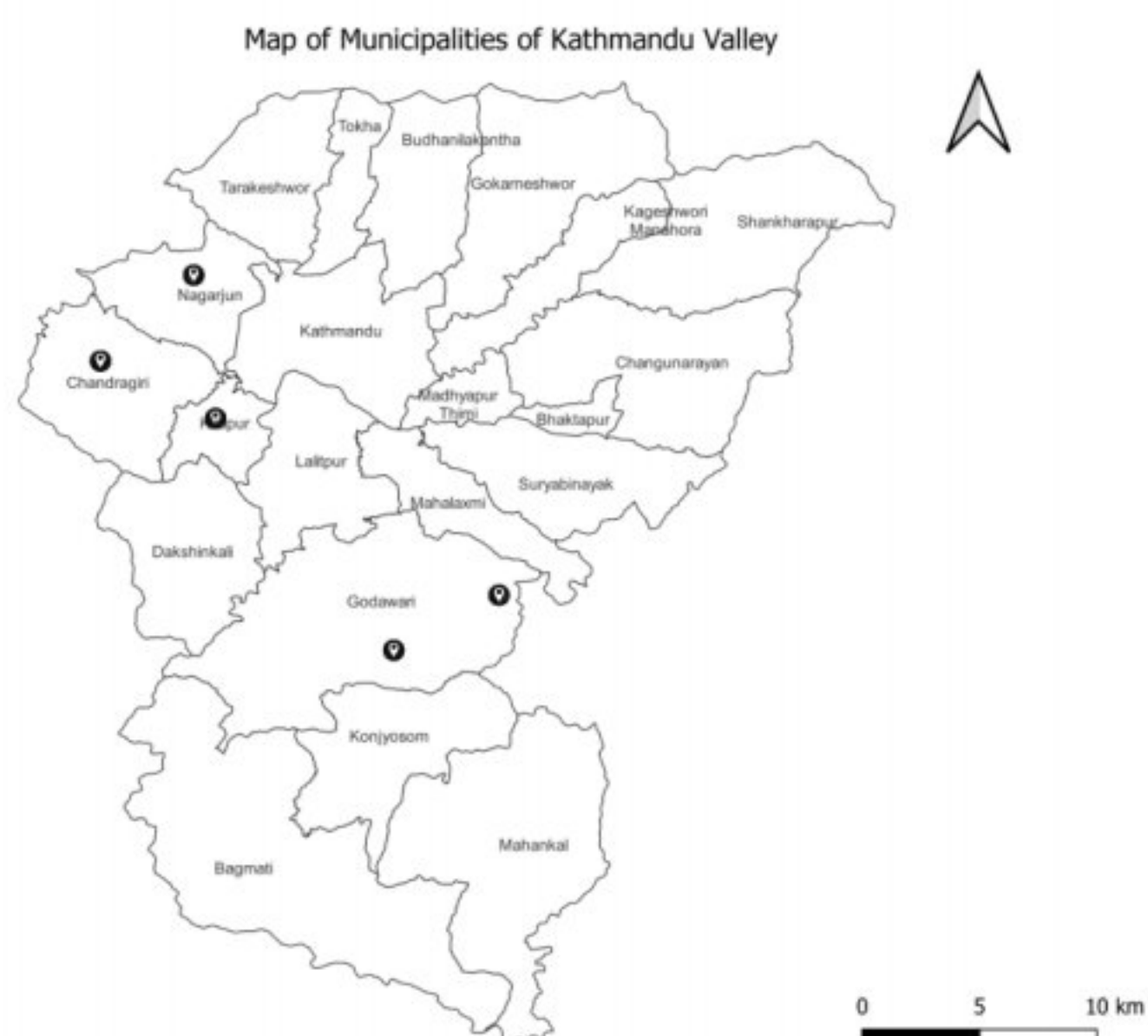


Figure 62: Distribution of *Teucrium quadrifarium* in Kathmandu valley.

Distribution: Kathmandu Valley (Badikhel, Champadevi, Chandragiri, Nagarjun, Phulchoki), Nepal, W Himalaya, E Himalaya, Burma and SE Asia.

Altitudinal range: 1500-2200 m.

Flowering: September-January.

Specimens examined: **Kathmandu Valley;** Kathmandu District; Nagarjun; 19/10/1968; *Bista, Pradhan and Thapa* 135290 (KATH). Kathmandu District; Champadevi; 28/01/2023; *P. Dahal, D. Gharti, E. Rai, N. Karki, R. Pandey, R. Chaudhary* 18 (Amrit Campus Herbarium). Lalitpur District; Phulchoki; 03/12/2022; *P. Dahal, M. Neupane, R. Chaudhary, S. Bhusal, S. Sharma* 3 (Amrit Campus

Herbarium). Lalitpur District; Badikhel; 26/11/2022; *Kritana Maharjan 12* (Amrit Campus Herbarium). Kathmandu District; Chandragiri; 27/09/2022; *Kailash Pokhrel* (Amrit Campus Herbarium). Kathmandu District; 25/11/2022 (Amrit Campus Herbarium).

32. *Vitex* L., Sp. Pl.: 638 (1753).

Shrubs or small trees. Stems erect, quadrangular, pubescent. Leaves compound, palmately 3-5 foliate, opposite, narrowly lanceolate. Flowers in terminal or axillary slender panicles. Calyx campanulate, bilabiate, 5-lobed. Corolla tubular at base, bilabiate, 5-lobed; upper lip 2-lobed; lower lip 3-lobed, middle lobe larger. Stamens 4, didynamous, exserted. Style slender, bifid, exserted. Drupes subglobose.

Worldwide about 36 species. Three species in Nepal and single species in Kathmandu Valley.

1. *Vitex negundo* L., Sp. Pl.: 638 (1753).

Vernacular name(s): सिमली Simali, इन्द्रायणी Indrayani (Nepali).

Plants 2-10 m tall. Leaves ca. 2.8-10.5 x 0.9-1.8 cm, base cuneate, apex acuminate, margin entire or serrate; adaxially glabrous, abaxially densely pubescent; terminal petiole 0.3-1.4 cm, lower lateral leaflets sessile. Petioles 1.5- 4.3 cm, unwinged. Inflorescence cymose. Peduncle 2-9 mm, pubescent. Pedicel ca. 3 mm. Panicles ca. 12.5-15.5 x 1.2-2.4 cm. Calyx 3 mm, pubescent; lobes ca. 1 mm, margin entire. Corolla violet, blue, purple, throat pubescent, ca. 0.8 cm; upper lip 3 mm; lower lip 1 mm. Drupes ca. 3 mm, black.



Figure 63: Distribution of *Vitex negundo* in Kathmandu valley.

Distribution: Kathmandu Valley (Nayabazar), Nepal, W Himalaya, E Himalaya, Assam-Burma and SE Asia.

Altitudinal range: 1600 m.

Flowering: November.

Specimens examined: Kathmandu Valley; Kathmandu District; Nayabazar; 21/11/2015; *Manisha Shrestha 19* (Amrit Campus Herbarium).

Excluded species

Coleus barbatus (Andrews) Benth. ex G. Don, J.C. Loudon, Hort. Brit.: 483 (1830).

Plectranthus barbatus Andrews in Bot. Repos. 10: t. 594 (1810).

The presence of this species from the valley is based on herbarium specimen deposited at KATH. This species is not in good condition for identification and description.

CHAPTER 5. CONCLUSION

The description of this paper have been prepared on the basis of plants collected from different areas of Kathmandu valley as well as herbarium specimens studied from Amrit Campus and KATH. The prepared herbarium specimens are submitted to the Amrit Campus herbarium. Artificial keys and checklist of different species of Lamiaceae have been prepared according to the detail characters of particular herbarium specimen. Besides, distribution map of each taxon is prepared.

The addition of 10 species of Verbenaceae into Lamiaceae changed the morphological concept of the family Lamiaceae. Moreover, this dissertation serves as an update to the family Lamiaceae of the book entitled “Flora of Kathmandu valley” due to the addition of altogether 17 species, out of which 10 species are from Verbenaceae whereas 7 species are new in the valley.

Furthermore, it will be beneficial to ecologist, pharmaceutical companies, environmentalist, taxonomist, institutions, scholars and locals for the identification of various plants found in Kathmandu Valley.

RECOMMENDATIONS

The field visit could not be performed in every forests and was only limited to eight different areas of Kathmandu, Bhaktapur and Lalitpur districts due to time limit and plants were studied from Herbarium of KATH and Amrit Campus. Therefore, all the forest of Kathmandu Valley should be explored.

Kathmandu valley is the capital city of Nepal and due to the inflow and attractions of people in terms of settlement, business purposes and so on, the forests are being destroyed. For instance, certain areas of Gokarna forest are cleared to replace by golf courses. Moreover, forest fire was seen during the field visit to Champadevi and plants were cut down for the ease of pedestrians on the route to Chandragiri. As a result, this destroyed the important plants of that area. Thus, government and public should be aware about the conservation of plants.

Besides, the detail study requires several replicates of good quality of the herbarium specimens but due to its unavailability, *Coleus barbatus* was excluded. Moreover, it is recommended to include plant details in the herbarium sheet as most of them lack complete details of the collected specimens like ecology, habitat, altitude etc in KATH and Amrit Campus Herbarium.

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APPENDICES

Appendix I. List of genera with respective species.

S.N.	Genus	Species
1	<i>Ajuga</i>	<i>A. lobata</i> , <i>A. macrosperma</i>
2	<i>Anisomeles</i>	<i>A. indica</i>
3	<i>Callicarpa</i>	<i>C. macrophylla</i> , <i>C. tomentosa</i>
4	<i>Clerodendrum</i>	<i>C. chinense</i> , <i>C. indicum</i> , <i>C. japonicum</i>
5	<i>Clinopodium</i>	<i>C. piperitum</i> , <i>C. umbrosum</i>
6	<i>Colebrookea</i>	<i>C. oppositifolia</i>
7	<i>Colquhounia</i>	<i>C. coccinea</i>
8	<i>Craniotome</i>	<i>C. furcate</i>
9	<i>Elsholtzia</i>	<i>E. blanda</i> , <i>E. flava</i> , <i>E. fruticosa</i> , <i>E. pilosa</i> , <i>E. stachyodes</i> , <i>E. strobilifera</i>
10	<i>Equilabium</i>	<i>E. molle</i>
11	<i>Holmskioldia</i>	<i>H. sanguinea</i>
12	<i>Isodon</i>	<i>I. coetsa</i> , <i>I. lophanthoides</i> , <i>I. phulchokiensis</i> , <i>I. scrophularioides</i> , <i>I. ternifolius</i>
13	<i>Lamium</i>	<i>L. amplexicaule</i>
14	<i>Leucas</i>	<i>L. cephalotes</i> , <i>L. ciliata</i> , <i>L. decemdentata</i>
15	<i>Leucosceptrum</i>	<i>L. canum</i>
16	<i>Melissa</i>	<i>M. flava</i>
17	<i>Mentha</i>	<i>M. arvensis</i>
18	<i>Micromeria</i>	<i>M. biflora</i>
19	<i>Mosla</i>	<i>M. dianthera</i>

20	<i>Ocimum</i>	<i>O. americanum, O. basilicum, O. tenuiflorum</i>
21	<i>Orthosiphon</i>	<i>O. incurvus</i>
22	<i>Perilla</i>	<i>P. frutescens</i>
23	<i>Phlomis</i>	<i>P. hamosa</i>
24	<i>Platostoma</i>	<i>P. coloratum</i>
25	<i>Pogostemon</i>	<i>P. amaranthoides, P. auricularia, P. glaber</i>
26	<i>Prunella</i>	<i>P. vulgaris</i>
27	<i>Pseudocaryopteris</i>	<i>P. bicolor, P. foetida</i>
28	<i>Rotheca</i>	<i>R. serrate</i>
29	<i>Salvia</i>	<i>S. coccinea, S. hispanica, S. splendens</i>
30	<i>Scutellaria</i>	<i>S. barbata, S. discolor, S. repens, S. scandens</i>
31	<i>Teucrium</i>	<i>T. quadrifarium</i>
32	<i>Vitex</i>	<i>V. negundo</i>

Appendix II. Field visits in different parts of Kathmandu valley.

S.N.	Date of field visits	Forests
1	Dec. 3, 2022	Phulchoki, Lalitpur
2	Dec. 7, 2022	Pashupati- Guhyeshwori area, Kathmandu
3	Jan. 12, 2023	Tokha, Kathmandu
4	Jan. 28, 2023	Champadevi, Kathmandu
5	Feb. 25, 2023	Gokarna, Kathmandu
6	Mar. 8, 2023	Chapagaun, Lalitpur
7	Mar. 11, 2023	Chandragiri, Kathmandu
8	Mar. 25, 2023	Suryabinayak, Bhaktapur

Appendix III. Representative photo plates



Ajuga macrosperma
Wall. ex Benth.



Colquhounia coccinea
Wall.



Clerodendrum chinense
(Osbeck) Mabb.



Clinopodium piperitum
(D. Don) Murata



Coleobrookea oppositifolia Sm.



Elsholtzia blanda (Benth.)
Benth.



Leucas decemdentata
(Willd.) Sm.



Leucosceptrum canum Sm.



Pseudocaryopteris foetida (D.
Don) P.D. Cantino



Salvia hispanica L.



Salvia hispanica L.
inflorescence



Scutellaria scandens D. Don



Studying the plant parts



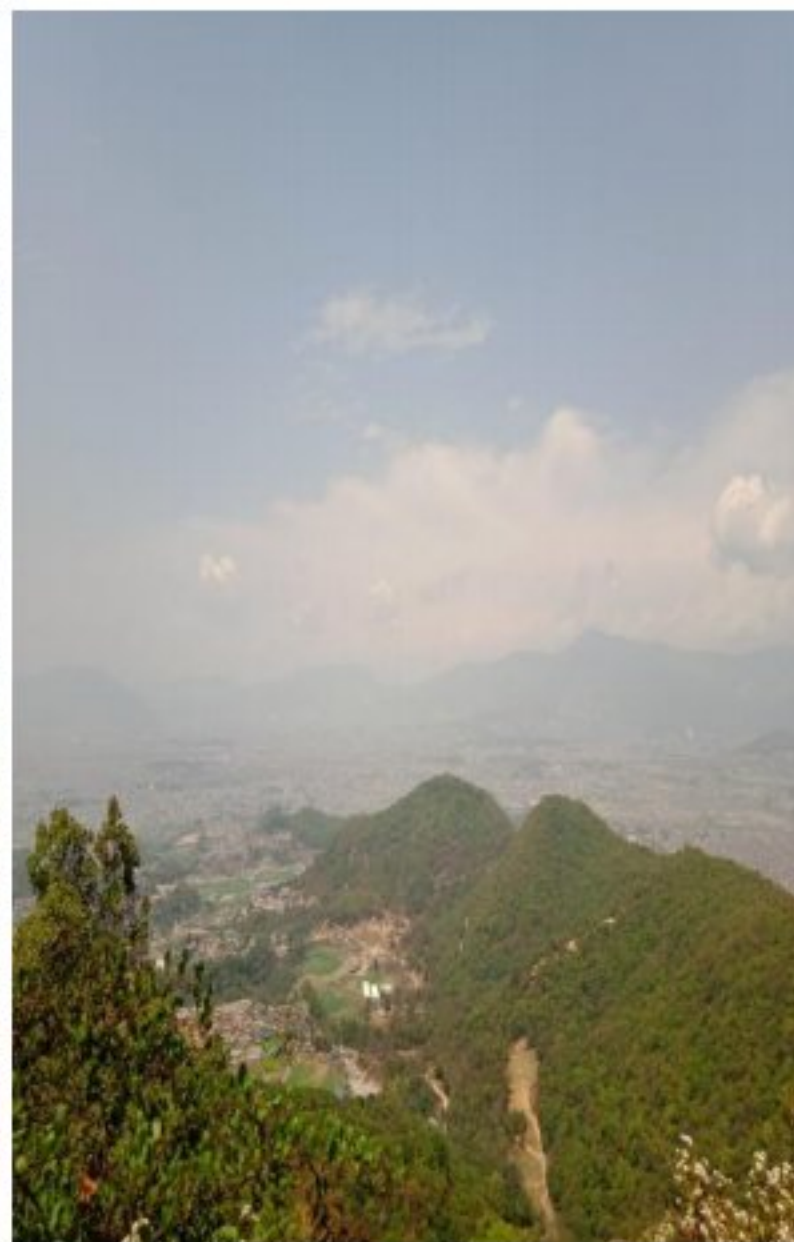
Noting location details in the field book



Local people collecting *Elsholtzia blanda*



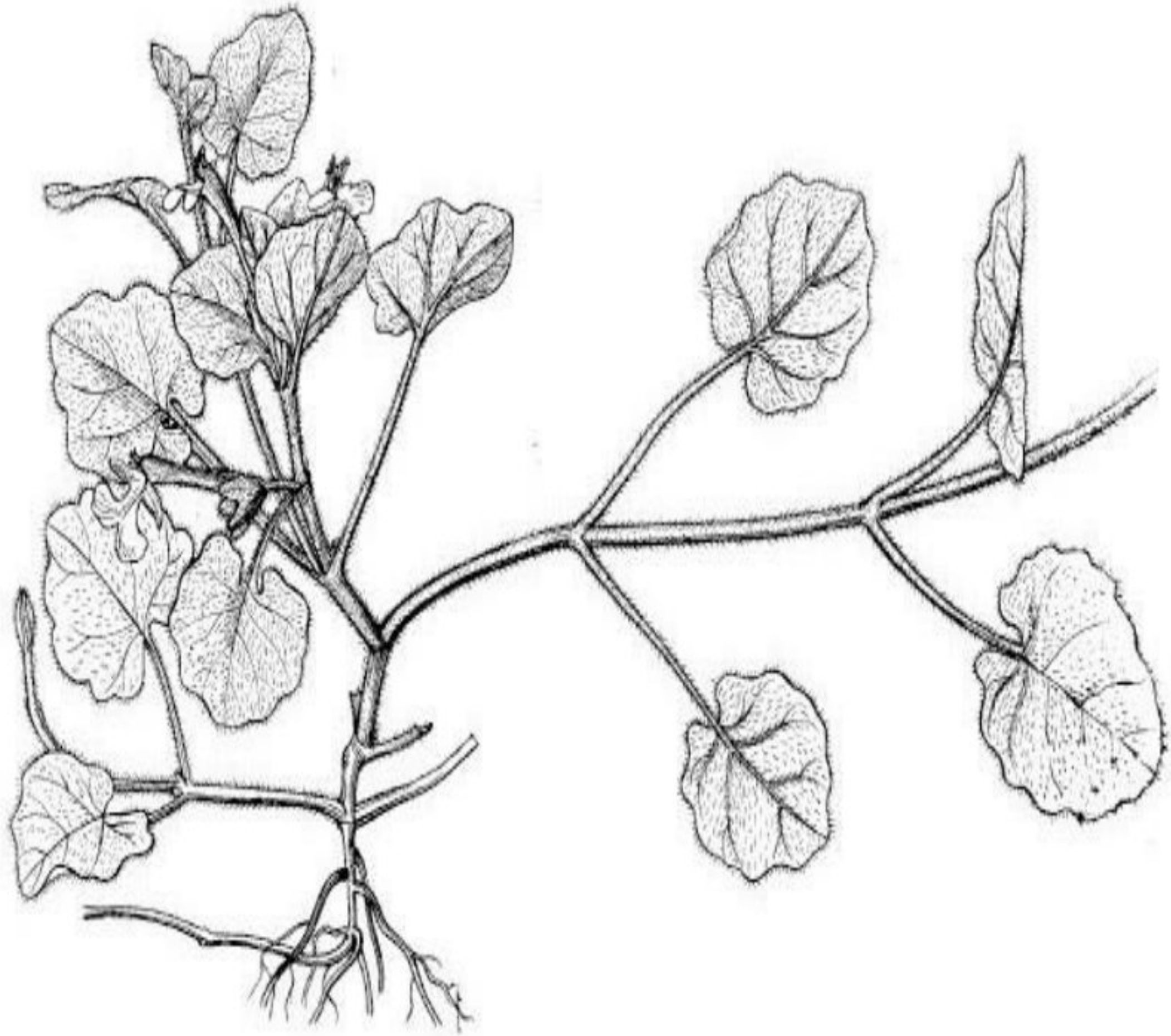
Chapagaun



Suryabinayak



Forest fire in the forest of Champadevi



Ajuga lobata D. Don



Craniotome furcata (Link) Kuntze



Isodon coetsa (Buch.-Ham. ex D. Don) Kudo



Lamium amplexicaule L.



Leucas ciliata Hochst. ex Benth.



Phlomis hamosa (Benth.) Mathiesen



Prunella vulgaris L.