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नेपालका वनस्पति

Lauraceae

Lauraceae: Webedition 2 (2017)

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Appendices
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See printed volumes of the Flora of Nepal (www.rbge.org.uk/publications/floraofnepal) and the project website (www.floraofnepal.org) for further information on the Flora of Nepal and acknowledgement of the institutes and people involved with this international collaborative project.

Royal Botanic Garden Edinburgh

Lauraceae

Colin A. Pendry

Deciduous or evergreen shrubs or trees, often aromatic. Terminal buds often very large and surrounded by numerous scales which leave dense clusters of scars in rings around the twigs (perulate buds). Leaves usually alternate, rarely opposite or whorled, pinnately veined or more or less strongly 3-veined. Stipules absent. Flowers usually small, in panicles, cymes or umbels surrounded by decussate bracts, with the umbels themselves solitary, in clusters on lateral short-shoots or rarely in racemes. Flowers bisexual or unisexual, trimerous or rarely dimerous, actinomorphic, with a more or less pronounced hypanthium. Fertile stamens usually 9, rarely 6 or 12, in whorls of 3, with the innermost whorl usually with a pair of basal glands. Inner whorl of staminodes sometimes present. Female flowers with 9 or rarely 6 or 12 staminodes with the innermost glandular. Anthers dehiscing by 2 or 4 valves. Ovary superior, 1-locular with a single apical ovule. Style simple. Fruit a drupe borne on the more or less enlarged cup-like remains of the perianth, rarely the perianth completely enclosing the fruit. Tepals persistent or caducous.

Worldwide 52 genera and 2550 species throughout the tropics and subtropics. Eleven genera and 46 species in Nepal.

Generic limits within the family are the subject of much debate, and many species have complicated synonymy due to transfer between genera (see Long, Notes Roy. Bot. Gard. Edinburgh 41: 505-525. 1984). When comparing with past works it should be noted that several specimens cited in Kostermans & Chater (Enum. Fl. Pl. Nepal 3: 182-187. 1982) were not reliably identified and are now assigned to different species: *Cinnadenia paniculata* (Hook.f.) Kosterm. is excluded for this reason (see comment under *Litsea doshia* (D.Don) Kosterm.).

In pinnately veined leaves the lowest pair of veins is always weaker than those above, while in 3-veined leaves the lowest pair is the only or the strongest pair. In some species the distinction is not so clear and the lowest pair is only slightly stronger than those above. These species are referred to as ‘weakly 3-veined’.

Key to Genera

1a Flowers solitary or several in umbels surrounded by persistent bracts, the umbels solitary, clustered on leafless short axillary shoots or racemosely arranged on short shoots. Flowers unisexual (bisexual in *Dodecadenia*) 2
b Flowers in panicles or cymes not surrounded by bracts. Flowers bisexual (unisexual in one species of *Actinodaphne*) 6

2a Flowers bisexual, flowers usually solitary, rarely in an inflorescence of up to 3 flowers. Fruits 1(–3) on thickened pedicels ..... **10. *Dodecadenia***
b Flowers unisexual, several to many per umbel. Fruits usually more than 3 per inflorescence, pedicels not thickened or only slightly thickened 3

3a Flowers dimerous ..... **9. *Neolitsea***
b Flowers trimerous 4

4a Leaves whorled at tips of twigs ..... **11. *Actinodaphne***
b Leaves alternate, rarely subopposite or opposite, sometimes clustered towards tips of twigs, but not whorled 5

5a Anthers 2-valved ..... **7. *Lindera***
b Anthers 4-valved ..... **8. *Litsea***

6a Inflorescence irregularly paniculate, the ultimate branches subopposite. Anthers 2-locular 7
b Inflorescence cymose, the ultimate branches opposite. Anthers 4-locular 8

7a Flowers with a deep, tubular hypanthium, this enclosing the ovary and later the fruit ..... **1. *Cryptocarya***
b Flowers with a cup-shaped hypanthium, the fruit unprotected on the pedicel or infrequently with small, persistent tepals at the base ..... **2. *Beilschmiedia***

8a Leaves opposite, 3-veined ..... **3. *Cinnamomum***
b Leaves alternate, pinnately veined or 3-veined 9

9a Leaves 3-veined. Inflorescences somewhat condensed and not strictly cymose ..... **4. *Neocinnamomum***
b Leaves pinnately veined. Inflorescence regularly cymose 10

10a Perianth segments persistent in fruit. Leaves often clustered at the tips of the twigs 11

b Perianth segments not persistent in fruit. Leaves usually not clustered at the tips of the twigs (except *Cinnamomum tenuipile*).....12

11a Perianth segments of flowers rigid, erect; in fruit stiff, clasping the base of the fruit .....**5. *Phoebe***
b Perianth segments of flowers soft, often spreading; spreading to reflexed in fruit..... **6. *Machilus***

12a Fruit up to 1.5 cm long, with thin mesocarp. Wild. .....**3. *Cinnamomum***
b Fruit 8–18 cm long, with fleshy, edible mesocarp. Cultivated (avocado). ..... ***Persea***

1. *Cryptocarya* R.Br., Prodr. Fl. Nov. Holland.:402 (1810)

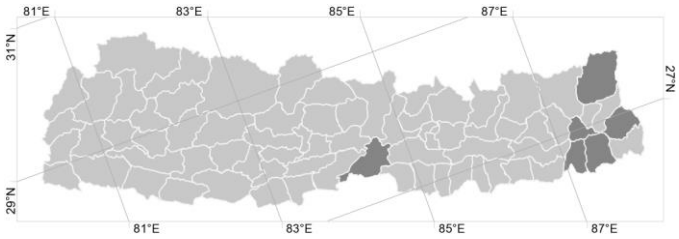
Large evergreen trees. Perulate buds absent. Leaves subopposite or alternate, evenly spaced along the twig, secondary venation pinnate. Inflorescences paniculate, axillary or terminal. Flowers small, bisexual, trimerous. Hypanthium elongate, completely enclosing the ovary. Tepals 6. Stamens 9, in 3 whorls, 2-valved. Outer whorls introrse, inner whorl extrorse. Stamens eglandular, glands present at edge of hypanthium. Staminodes 3, fleshy. Fruit completely enclosed by the enlarged hypanthium which terminates in a small circular scar, tepals not persistent.

Worldwide 300 species in Asia and Australia. One species in Nepal.

1. *Cryptocarya amygdalina* Nees, in Wall., Pl. Asiat. Rar. 2[8]:69 (1831)
Laurus amygdalina Buch.-Ham. ex Wall.*nom. nud.*; *L. floribunda* Wall.*nom. nud.*

Trees to 25 m. Twigs mid brown, minutely tomentose, glabrescent, smooth. Perulate buds absent. Leaves alternate or subopposite, evenly distributed along twig, elliptic or oblong to ovate or obovate, 4.5–22 × 3–9 cm, length:width ratio 1.5–3.2, base rounded to cuneate or attenuate, apex acuminate to obtuse or emarginate, underside glaucous or not, glabrous, secondary veins 4–12 pairs, tertiary venation reticulate-scalariform. Petioles 1–1.8 cm. Inflorescences to 14 cm, tomentose. Pedicels 1 mm. Flowers yellow, 3–5 mm, tomentose outside. Tepals narrowly ovate, 1.5–2 mm tomentose within. Stamens 1.5–2 mm, the inner whorl longest. Staminodes triangular, 1 mm. Ovary 1 mm, glabrous or sparsely hairy at apex. Style 1 mm, glabrous. Fruit on 3–5 mm pedicels, globose to ellipsoid or ovoid, 10–16 mm, conspicuously ridged.
Fig. 1a-d

Distribution: Nepal, E Himalaya, Tibetan Plateau and Assam-Burma.



Altitudinal range: 100–1600 m.

Ecology: Evergreen and mixed subtropical forests.

Flowering: February–March. **Fruiting:** April–June.

The elongate hypanthium in flower, which goes on to completely enclose the fruit, is quite unlike that of any other species of Lauraceae in Nepal.

2. *Beilschmiedia* Nees, in Wall., Pl. Asiat. Rar. 2[8]:69 (1831)

Large evergreen trees. Perulate buds present or absent. Leaves opposite or subopposite, slightly clustered or evenly spaced along the twig, secondary venation pinnate. Inflorescences paniculate, solitary in leaf axils or clustered at base of new shoots. Flowers small, bisexual, trimerous. Hypanthium cup-shaped, not enclosing the ovary. Tepals 6. Stamens 9, in 3 whorls, 2-valved. Outer whorls eglandular, introrse, inner whorl glandular, lateral. Staminodes 3, fleshy. Fruit usually lacking persistent perianth remains, rarely the unenlarged tepals persistent.

Worldwide 200 species throughout the tropics and as far south as Chile and New Zealand. Two species in Nepal.

Key to Species

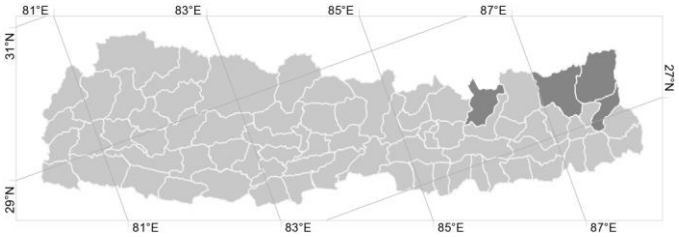
1a Perulate buds present, leaving conspicuous scars at the base of the shoots. Flowers and inflorescences glabrous ..... **1. *B. gammieana***

b Perulate buds absent, shoots without conspicuous scars at the base. Flowers and inflorescences sericeous ..... **2. *B. roxburghiana***

1. *Beilschmiedia gammieana* King ex Hook.f., Fl. Brit. India 5[13]:124 (1886)

Trees to 20 m. Twigs glabrous, initially dark reddish brown or blackish, smooth becoming paler and lenticellate. Perulate buds present. Leaves slightly clustered, elliptic or ovate, 6.5–15.5 × 2–5 cm, length:width ratio 2.6–3.3, base cuneate, apex acuminate, underside non glaucous, glabrous, secondary veins 9–11 pairs, tertiary venation reticulate. Petioles 1–1.7 cm. Inflorescences 1–2 cm, glabrous. Pedicels 2–4 mm. Flowers yellow, 2.5 mm, glabrous outside. Tepals ovate, 2.5 mm, glabrous within. Stamens 1.5–2 mm, the inner whorl the longest. Staminodes 1 mm. Ovary 1 mm, glabrous. Style 1 mm, glabrous. Fruits solitary, globose to obovoid, to 3 cm on a 1.5–2.5 cm peduncle.

Distribution: Nepal and E Himalaya.



Altitudinal range: 1000–2000 m.

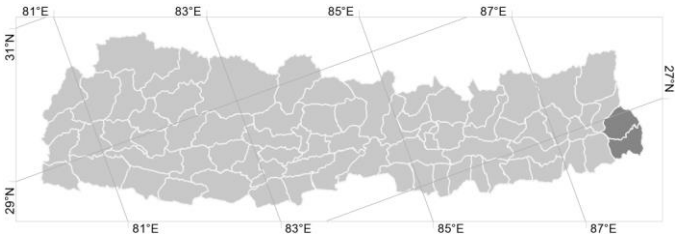
Ecology: Lower temperate broad-leaved forest.

Flowering: April. **Fruiting:** July–March.

2. *Beilschmiedia roxburghiana* Nees, in Wall., Pl. Asiat. Rar. 2[8]:69 (1831)
Laurus bilocularis Roxb.

Trees to 20 m. Twigs glabrous, initially mid brown and smooth, often becoming whitish and slightly lenticellate. Perulate buds absent. Leaves evenly spaced or slightly clustered, elliptic to slightly obovate or slightly ovate, 10–20 × 4–7.5 cm, length:width ratio 2.3–2.9, base cuneate, apex acute or slightly acuminate, underside not glaucous, glabrous, secondary veins 9–15 pairs, tertiary venation reticulate. Petioles 1.5–2.3 cm. Inflorescences 1–2 cm, sericeous. Pedicels 2–3 mm. Flowers pale yellow or yellowish, 3–4 mm, sericeous outside. Tepals oblong or ovate, 3 mm, sericeous within. Outer whorls of stamens 2 mm. Inner whorl 3 mm. Staminodes triangular, 1 mm. Ovary 1 mm, glabrous. Style 2 mm, glabrous. Fruits solitary, oblong, to 3 cm on a 1.5–2 cm peduncle.

Distribution: Nepal, E Himalaya, Tibetan Plateau, Assam-Burma, S Asia and SE Asia.



Altitudinal range: 200–400 m.

Ecology: Mixed moist subtropical forest.

Flowering: April. **Fruiting:** ?July.

3. *Cinnamomum* Schaeff.nom cons., Bot. Exped.:74 (1760)

Evergreen or deciduous shrubs to large trees. Perulate buds present or absent. Leaves alternate, subopposite or opposite or very rarely whorled, evenly spaced along the twig or more or less clustered, 3-veined or with pinnate secondary venation. Inflorescences cymose, axillary or rarely terminal. Flowers small, bisexual, trimerous. Hypanthium cup-shaped, not enclosing the ovary. Tepals 6. Stamens 9, in 3 whorls, 4-valved. Outer whorls eglandular, introrse, inner whorl glandular, extrorse. Staminodes 3, fleshy. Fruit on an enlarged, fleshy perianth cup, tepals caducous or enlarged and persistent.

Worldwide 250 species in Asia, Australia and tropical America. Five species in Nepal.

The cinnamon which is traded internationally comes from the bark of *Cinnamomum verum* J.Presl, which is native to Sri Lanka and SW India, but several other species are used locally.

Cinnamomum glaucecens (Nees) Hand.-Mazz. and *C. parthenoxylon* (Jack.) Meisn. are excluded from this account as the Nepalese records were based on misidentifications of *C. glanduliferum* (see note under this species). *Cinnamomum camphora* (L.) J.Presl (*Laurus camphora* L.) from Japan is a widespread street tree in Nepal. It has not yet been reported as naturalized so it is included in the

key but not described further.

Key to Species

1a Leaves pinnately veined, the veins clearly different from the midvein. Perulate buds present .....2.
b Leaves 3-veined(or 5-veined) at the base, the secondary veins reaching to the apex of the leaf and similar in appearance to the midvein. Perulate buds absent .....4.

2a Leaves villous below, lacking glands in axils of veins. Inflorescence and flowers tomentose ..... **5. *C. tenuipile***
b Leaves glabrous below, with glands present in axils of veins. Inflorescence and flowers glabrous .....3.

3a Leaves elliptic to obovate. Secondary veins all similar..... **4. *C. glanduliferum***
b Leaves ovate or rarely elliptic. Lowest pair of secondary veins distinctly stronger than the others ..... ***C. camphora***

4a Flowers 3–4 mm long. Leaves broadly elliptic, to 30 cm long. Petioles 1.3–2.0 cm. Length:width ratio 2.0–2.5(–2.9) .....**2. *C. bejolghota***
b Flowers 5–7 mm long. Leaves more or less ovate, to 20 cm long. Petioles 0.7–1.3 cm. Length:width ratio 2.4–3.6 .....5.

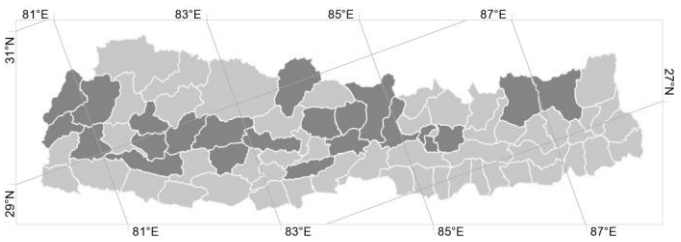
5a Upper surface of leaves flat; veins not sunken. Perianth cup of fruits with persistent tepals.....**1. *C. tamala***
b Upper surface of leaves raised between the sunken veins. Perianth cup of fruits with entire rim**3. *C. impressinervium***

1. *Cinnamomum tamala* (Buch.-Ham.) Nees & Eberm., Handb. Med.-Pharm. B. 2:426 (1831)
Laurus tamala Buch.-Ham. Trans. Linn. Soc. London, Bot. 13:555 (1822). *Cinnamomum albiflorum* Nees; *C. soncaurium* Buch.-Ham. ex Nees & Eberm.; *Laurus albiflora* Wall.*nom. nud.*; *L. soncaurium* Buch.-Ham.; *L. tazia* Buch.-Ham.

□□□□□□ Tejpat (Nepali)

Evergreen shrub or small tree, occasionally to 20 m. Twigs red-brown, smooth, sericeous when young, soon glabrescent, rarely glaucous. Perulate buds absent. Leaves 3-veined, opposite or subopposite, evenly spaced along twig, usually at least slightly ovate, rarely elliptic, 8.5–20 × 3.0–6.5 cm, base cuneate to rounded, apex acute to acuminate, margin slightly inrolled, underside more or less glaucous, minutely sparsely sericeous below, tertiary venation scalariform. Glands not present in vein axils. Petioles 0.7–1 cm. Inflorescences to 9 cm, more or less sericeous. Flowers white, 5–7 mm long, sericeous. Pedicels 4–5 mm. Tepals oblong or narrowly ovate, 4–6 mm, sericeous within. Fertile stamens 3–4 mm, the innermost whorl usually slightly longer. Staminodes 2 mm. Ovary 1–1.5 mm, hairy or sparsely hairy. Style 2–3 mm, hairy or sparsely hairy. Fruit obovoid or ellipsoid, 10–14 mm long. Tepals persistent on rim of cupule.
Fig. 1e-g

Distribution: Nepal, W Himalaya, E Himalaya, Assam-Burma and E Asia.



Altitudinal range: 400–2300 m.

Ecology: Subtropical and lower temperate broad-leaved forests, often in gullies and north-facing slopes.

Flowering: (February–)April–June. **Fruiting:** May–October.

Don (Prodr. Fl. Nepal.: 67. 1825) misapplied the name *Cinnamomum cassia* Blume to this species.
Cinnamomum tamala is distinguished from *C. bejolghota* (Buch.-Ham.) Sweet by its smaller leaves which are always ovate and not elliptic, its longer flowers and fruits with partially, instead of completely persistent tepals. Its leaves are completely flat above, in contrast with those of *C. impressinervium* Meisn. which always have sunken veins and furthermore has fruits in which the tepals are completely lost, leaving an entire rim.
The bark and leaves are used as spices and are exported from Nepal. They are also used to treat colic and diarrhoea.

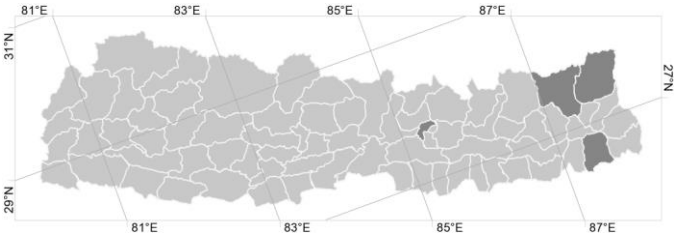
2. *Cinnamomum bejolghota* (Buch.-Ham.) Sweet, Hort. Brit.ed.1 2:344 (1826)
Laurus bejolghota Buch.-Ham. Trans. Linn. Soc. London, Bot. 13:559 (1822). *Cinnamomum obtusifolium* Roxb. ex Nees; *Laurus bazania* Buch.-Ham.; *L. obtusifolia* Roxb.*nom. nud.*

□□□□□□□□□ Sinkauli (Nepali)

Evergreen shrub or small trees to 12 m. Twigs pale brown, green or reddish, smooth, glabrous. Perulate buds absent. Leaves 3-veined, opposite, subopposite or whorled, evenly spaced along twig, elliptic or rarely slightly ovate, 10–27 × 4.0–10 cm, base cuneate to rounded, apex obtuse to acute or slightly acuminate, margin flat or inrolled, underside not or slightly glaucous, glabrous, tertiary venation scalariform or slightly reticulate. Glands not present in vein axils. Petioles 1.3–2.0 cm. Inflorescences to 24 cm, glabrous. Flowers yellow,

3–4 mm long, sericeous inside and out. Pedicels 3–6 mm. Tepals broadly ovate, 3 mm, sericeous within. Fertile stamens 2–2.5 mm, the innermost whorl usually slightly longer. Staminodes 1.5 mm. Ovary 1 mm, glabrous. Style 1.5 mm, glabrous. Fruit obovoid or ellipsoid, 15 mm long. Tepals persistent on rim of cupule.

Distribution: Nepal, E Himalaya, Assam-Burma, S Asia, E Asia and SE Asia.



Altitudinal range: 1200–1900 m.

Ecology: Subtropical and temperate broad-leaved forests.

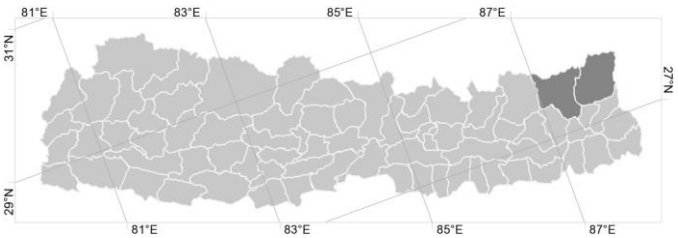
Flowering: May–July. **Fruiting:** August.

The smaller flowers and larger, more coriaceous and usually elliptic leaves distinguish *Cinnamomum bejolghota* from *C. tamala* (Buch.-Ham.) Nees & Eberm.

3. ***Cinnamomum impressinervium*** Meisn., in DC., Prodr. 15(1):21 (1864)

Evergreen shrub or small trees to 12 m. Twigs dark reddish brown, sericeous when young, soon glabrescent, smooth. Perulate buds absent. Leaves 3-veined, opposite or subopposite, evenly spaced, elliptic or ovate, length 8.5–13.5 × 2.0–5.5 cm, base rounded to cuneate, apex acuminate, margin flat; underside slightly glaucous, villous on midrib below and minutely sparsely sericeous below, tertiary venation scalariform. Glands not present in vein axils. Petioles 0.8–1.3 cm. Flowers not seen. Infructescences to 12 cm. Fruits globose. Tepals not persistent, rim of cupule entire.

Distribution: Nepal, E Himalaya and Assam-Burma.



Altitudinal range: 1700–2100 m.

Ecology: *Castanopsis* forest.

Flowering: May. **Fruiting:** August.

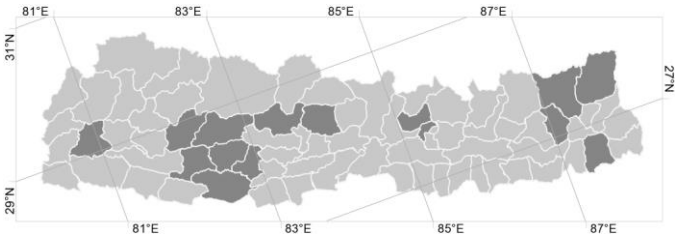
The leaves of *Cinnamomum impressinervium* always have sunken veins on the upper surface in contrast with the leaves of *C. tamala* (Buch.-Ham.) Nees which are completely flat and usually larger. The entire rim of the cupule of *C. impressinervium* also distinguishes it from *C. tamala* whose cupules have persistent tepals. Kosterman & Chater's (Enum. Fl. Pl. Nepal 3: 183. 1982) record of *C. impressinervium* from C Nepal is erroneous and is based on Banerji's (Rec. Bot. Surv. India 19(2): 80 1965) citation of a specimen from Taplejung.

4. ***Cinnamomum glanduliferum*** (Wall.) Meisn., in DC., Prodr. 15(1):25 (1864)
Laurus glandulifera Wall. Trans. Med. Soc. Calcutta 1:45 & 51 (1825). *Camphora glandulifera* (Wall.) Nees

□□□□ □□□□ Mala giri (Nepali)

Evergreen shrub or small trees to 14 m. Twigs reddish brown, glabrous, smooth. Perulate buds present. Leaves pinnate-veined, alternate or rarely subopposite, evenly spaced along the twig, elliptic to obovate, 6–13 × 2.5–5.0 cm, base cuneate, apex acute to acuminate or apiculate, margin flat or slightly inrolled, underside glaucous or not, glabrous, secondary veins 4–6 pairs, tertiary venation scalariform. Glands present in the axils of the veins. Petioles 1–2.8 cm. Inflorescences to 12 cm, glabrous or very sparsely villous especially in upper parts. Pedicels 2–4 mm. Flowers yellow, 2–3 mm long, glabrous or sparsely villous outside. Tepals ovate, 2 mm, tomentose within. Fertile stamens 1–1.5 mm, the innermost whorl sometimes slightly longer. Staminodes 0.5–1 mm. Ovary 1 mm, glabrous. Style 1–1.5 mm, glabrous. Fruit globose, 12 mm long. Tepals not persistent, rim of cupule entire.

Distribution: Nepal, E Himalaya, Tibetan Plateau, Assam-Burma, E Asia and SE Asia.



Altitudinal range: 700–2600 m.

Ecology: Temperate forests and scrub with *Quercus*, *Castanopsis* and *Magnolia*.

Flowering: April–May. **Fruiting:** June–July.

Kostermans & Chater (Enum. Fl. Pl. Nepal 3: 183. 1982) recorded *Cinnamomum glaucescens* (Nees) Hand.-Mazz. based on *Stainton 6197* & *6532*, but both specimens (BM) are *C. glanduliferum* and so this name is misapplied and this species is not yet confirmed in Nepal. Likewise *C. parthenoxylon* (Jack) Meisn. is based on a misdentification of *Stainton, Sykes & Williams 4265* (BM, E, KATH, TI) which is

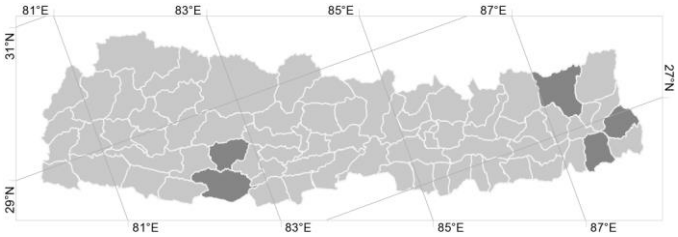
also *C. glanduliferum*.

Cinnamomum glaucescens differs from *C. glanduliferum* in having clustered inflorescences with a dense brown tomentose instead of widely spaced, almost glabrous inflorescences in the axils of the leaves. *Cinnamomum parthenoxylon* is clearly distinguished from *C. glanduliferum* by having no glands in the axils of its veins.

5. ***Cinnamomum tenuipile*** Kosterm., Reinwardtia 8(1):74 (1970)
Alseodaphne mollis W.W.Sm. Notes Roy. Bot. Gard. Edinburgh 13:153 (1921).

Deciduous trees to 25 m. Twigs brown, sometimes reddish, smooth, tomentose when young, glabrescent. Perulate buds present. Leaves pinnate-veined, alternate, more or less clustered towards the tips of the twigs, ovate, 6.5–17 × 2.5–8.0 cm, base rounded to cuneate, apex acuminate, margin flat; underside not glaucous or slightly glaucous, sparsely or densely villous below, especially on midrib and veins, secondary veins 4–7 pairs, tertiary venation scalariform or somewhat reticulate. Glands not present in vein axils. Petioles 1.5–3.5 cm. Inflorescences to 12 cm, densely tomentose. Flowers greenish yellow, 3–4 mm long, sericeous or tomentose. Pedicels 2–10 mm. Tepals ovate or oblong, 2–3 mm, sericeous or tomentose within. Fertile stamens 1.5–2 mm, the innermost whorl longer. Staminodes 1–1.5 mm. Ovary 1–1.5 mm, glabrous. Style 1–1.5 mm, glabrous. Fruit globose, 15 mm long. Tepals not persistent, rim of cupule entire.

Distribution: Nepal, E Himalaya and E Asia.



Altitudinal range: 400–1300 m.

Ecology: Temperate forests and evergreen gullies in *Shorea* forests.

Flowering: March–April. **Fruiting:** August.

Closest to *Cinnamomum glanduliferum* (Wall.) Meisn., but easily distinguished from it by its more clustered leaves with villous undersides and the absence of glands in the axils of the veins.

4. *Neocinnamomum* H.Liu, Laurac. Chine & Indochine:82 (1934)

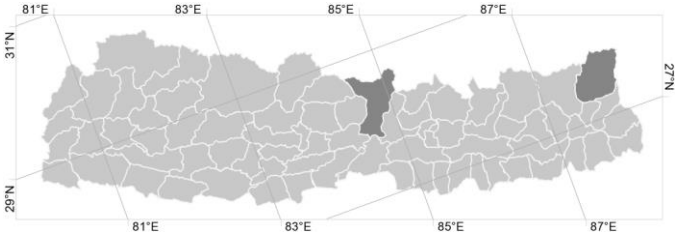
Evergreen small trees. Perulate buds absent. Leaves opposite or alternate, evenly spaced along the twig, 3-veined. Inflorescences cymose, axillary. Flowers small, bisexual, trimerous. Hypanthium cup-shaped, not enclosing the ovary. Tepals 6. Stamens 9, in 3 whorls, 4-valved. Outer whorls eglandular, introrse, inner whorl glandular, extrorse. Staminodes 3, fleshy. Fruit on an enlarged, fleshy cup with enlarged and persistent tepals.

Worldwide six species in China and SE Asia. One species in Nepal.

1. ***Neocinnamomum caudatum*** (Nees) Merr., Contr. Arnold Arbor. 8:64 (1934)
Cinnamomum caudatum Nees in Wall., Pl. Asiat. Rar. 2[8]:76 (1831). *Laurus caudata* Wall.*nom. nud.*

Small trees to 10 m. Twigs dark reddish brown, young twig sericeous, soon glabrescent, smooth. Perulate buds absent. Leaves suborbicular to broadly elliptic or elliptic, 6.5–10 × 3–6.5 cm, length:width ratio 1.6–2.0, base rounded, apex caudate or acuminate, 3-veined above the base, tertiary venation scalariform, underside non glaucous, glabrous. Petioles 0.7–1.2 cm. Inflorescences 1–6 cm, sericeous. Pedicels 4–7 mm, sericeous. Flowers greenish, 2 mm. Tepals broadly ovate, 2 mm, sericeous inside and out. Stamens almost equal, ca. 1 mm. Staminodes up to 0.5 mm. Ovary 1 mm, glabrous. Style subsessile. Pedicel elongating to 2–3.5 cm in fruit. Fruit ellipsoid, 2–2.5 cm.

Distribution: Nepal, E Himalaya, Assam-Burma, E Asia and SE Asia.



Altitudinal range: 900–2600 m.

Ecology: Subtropical and lower temperate forests. Often on riversides.

Flowering: July. **Fruiting:** August.

Neocinnamomum is close to *Cinnamomum*, but differs in its somewhat contracted inflorescence, which sometimes has small leaves present amongst the flowers, and subsequently develops into a leafy twig with very large, solitary, axillary fruits. Uniquely among the Nepalese species, *N. caudatum* has anthers with two valves opening introrsely and two opening extrorsely.

5. *Phoebe* Nees, Syst. Laur.:98 (1836)

Evergreen small to large trees. Perulate buds present or absent. Leaves alternate, evenly spaced along the twig or weakly to strongly clustered at the tips, secondary venation pinnate. Inflorescences cymose, axillary. Flowers small, bisexual, trimerous. Hypanthium cup-shaped, not enclosing the ovary. Tepals 6. Stamens 9, in 3 whorls, 4-valved. Outer whorls eglandular, introrse, inner whorl glandular, extrorse. Staminodes 3, fleshy. Fruit enclosed at base by the stiff, upright, somewhat enlarged tepals.

Worldwide 100 species in Indomalesia. Five species in Nepal.

Key to Species

1a Bud scale scars in diffuse clusters along twig .....2.
b Bud scale scars in dense rings around twig .....3.

2a Inflorescence, young twigs and undersides of leaves tomentose.....**2. *P. cathia***
b Inflorescence, young twigs and undersides of leaves glabrous or minutely sparsely sericeous.....**3. *P. pallida***

3a Leaves narrowly elliptic to slightly ovate or obovate, length:width ratio 3.4–6.0. Secondary veins 7–12 pairs .....**1. *P. lanceolata***
b Leaves broadly obovate or elliptic, length:width ratio 2.5–3.6. Secondary veins 12–24 pairs .....4.

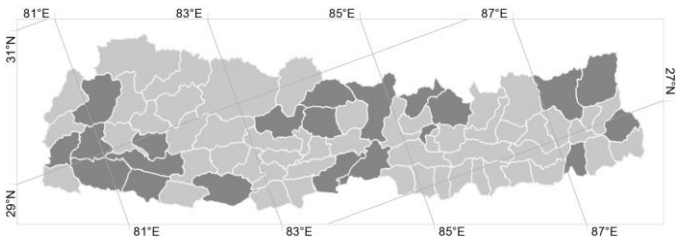
4a Young twigs tomentose. Flowers to 4 mm long on 2 mm pedicels which are not articulated in their lower half .....**4. *P. attenuata***
b Young twigs glabrous or minutely sparsely sericeous. Flowers to 6–7 mm long on 5–8 mm pedicels articulated in their lower half.....**5. *P. hainesiana***

1. *Phoebe lanceolata* (Nees) Nees, Syst. Laur.:109 (1836)
Ocotea lanceolata Nees in Wall., Pl. Asiat. Rar. 2[8]:71 (1831). *Laurus lanceolaria* Roxb.; *L. lanceolata* Roxb. ex Wall.*nom. nud.*; *L. salicifolia* Buch.-Ham. ex Nees; *L. salicifolia* Buch.-Ham.*nom. nud.*

□□□□□□□ □□□ Jhankri kath (Nepali)

Trees to 20 m. Twigs whitish, glabrous or sparsely villous and soon glabrescent, smooth or slightly lenticellate. Perulate buds present. Leaves more or less clustered at the ends of the twigs, elliptic to slightly ovate or slightly obovate, 7–26 × 2–8 cm, length:width ratio 3.4–6.0, base cuneate to attenuate or somewhat rounded, rarely oblique, apex usually long acuminate, margin flat; underside not or slightly glaucous, minutely sparsely sericeous below, secondary veins 7–12 pairs, tertiary venation reticulate-scalariform. Petioles 0.8–2.2 cm. Inflorescences to 20 cm, glabrous. Pedicels 2–7 mm. Flowers yellow, 3–4 mm long, glabrous outside. Tepals ovate, 3–3.5 mm, more or less sericeous within. Stamens 2–2.5 mm, almost equal. Staminodes 1.5 mm. Ovary 1.5 mm, glabrous. Fruit globose, 10–12 mm long, on a 6–10 mm pedicel.

Distribution: Nepal, E Himalaya, Assam-Burma, S Asia, E Asia and SE Asia.



Altitudinal range: 100–2900 m.

Ecology: Evergreen broadleaved forests including *Schima-Castanopsis* forest and evergreen gullies in *Shorea* forest.

Flowering: April–June(–August). **Fruiting:** (February–)May–November.

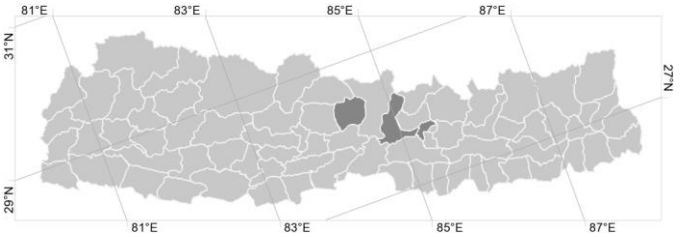
The most widespread species of *Phoebe* in Nepal. *Phoebe lanceolata* is characterized by its long, narrow leaves and glabrous inflorescences.

2. *Phoebe cathia* (D.Don) Kosterm., Nat. Hist. Bull. Siam Soc. 25(3-4):44 (1975)

Cinnamomum cathia D.Don Prodr. fl. Nepal.:66 (1825). *Laurus cathia* Buch.-Ham.*nom. nud.*; *L. paniculata* Wall.*nom. nud.*; *Ocotea paniculata* Nees; *O. pubescens* Nees

Trees to 20 m. Twigs mid to dark brown, tomentose, smooth. Perulate buds absent. Leaves evenly spaced along twig or slightly clustered towards the tips, elliptic or slightly obovate, 8–17 × 2.0–5.5 cm, length:width ratio 2.5–3.9, base cuneate, apex acuminate, margin flat or slightly inrolled, underside not or slightly glaucous, densely tomentose on veins below and sparsely tomentose on lamina, secondary veins 5–10 pairs, tertiary venation scalariform. Petioles 0.4–2 cm. Inflorescences to 10 cm, tomentose. Pedicels 2–3 mm. Flowers pale yellow, 3.5–4 mm long, tomentose or sericeous outside. Tepals ovate or broadly ovate, 3–3.5 mm, tomentose or sericeous within. Stamens 2–2.5 mm, almost equal. Staminodes 1–1.5 mm. Ovary 1 mm, glabrous. Fruit ovoid, 10 mm long on a 3–4 mm pedicel.
Fig. 1h

Distribution: Nepal, E Himalaya, Assam-Burma and S Asia.



Altitudinal range: 1300–1900 m.

Ecology: Evergreen broad-leaved forests and evergreen gullies in *Shorea* forest.

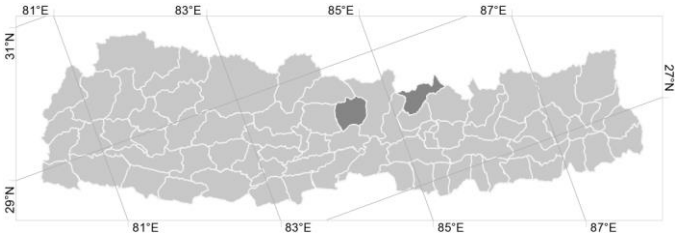
Flowering: May–September.

The absence of perulate buds and the tomentose indumentum on the young twigs, inflorescences and undersides of the leaves are found only in *Phoebe cathia*. The secondary venation of the leaves is often clearly impressed on the upper surface, and the scalariform tertiary venation rather prominent below. Most of the specimens cited in Enum. Fl. Pl. Nepal 3: 187 (1982) are misidentified *Machilus* or *Persea* species.

3. *Phoebe pallida* (Nees) Nees, Syst. Laur.:112 (1836) *Ocotea pallida* Nees in Wall., Pl. Asiat. Rar. 2[8]:71 (1831). *Laurus pubescens* Wall.*nom. nud.*

Trees to 10 m. Twigs blackish or dark reddish brown, glabrous or minutely sparsely sericeous and then soon glabrescent. Perulate buds absent. Leaves evenly spaced along the twig, elliptic or oblong, 8–17 × 1.5–3.5 cm, length:width ratio 4.4–4.6, base rounded or cuneate, apex acuminate, margin flat, underside slightly glaucous, minutely sparsely sericeous below, secondary veins 10–15 pairs, tertiary venation reticulate-scalariform. Petioles 0.5–1.1 cm. Inflorescences to 7 cm, sparsely sericeous, glabrescent in lower parts. Pedicels 2 mm. Flowers cream, ca. 2 mm long, glabrous or very sparsely pubescent outside. Tepals broadly ovate, 2.5 mm, tomentose within. Stamens ca. 1.5 mm. Staminodes 1 mm. Ovary 1 mm, glabrous. Fruit not seen.

Distribution: Nepal, W Himalaya and Assam-Burma.



Altitudinal range: 1800–2000 m.

Ecology: Temperate forests.

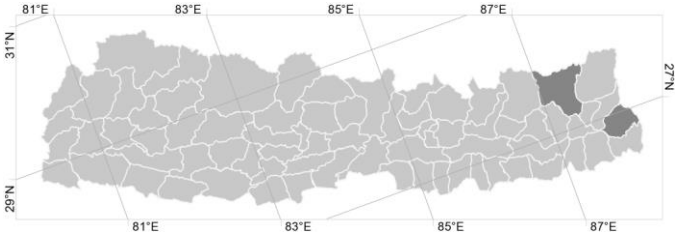
Flowering: May. **Fruiting:** June.

A rather poorly known species characterized by its small flowers and twigs which are almost glabrous, smooth and dark when young, apparently becoming paler when older.

4. *Phoebe attenuata* (Nees) Nees, Syst. Laur.:104 (1836) *Ocotea attenuata* Nees in Wall., Pl. Asiat. Rar. 2[8]:71 (1831). *Laurus attenuata* Wall.*nom. nud.*

Trees to 30 m. Twigs very pale or dark brown, tomentose, glabrescent, smooth, rugose or lenticellate. Perulate buds present. Leaves alternate, densely clustered at the tips of the twigs, obovate, 10–22 × 3.5–8.5 cm, length:width ratio 2.8–3.4, base cuneate to attenuate, apex acuminate or apiculate, margin flat; underside non glaucous, villous below, especially on veins, secondary veins 14–24 pairs, tertiary venation scalariform. Petioles 0.8–2 cm. Inflorescences to 15 cm, tomentose. Pedicels 1–2 mm. Flowers yellow, ca. 4 mm long, sericeous outside. Tepals broadly ovate, 3–3.5 mm, sericeous within. Stamens 2–3.5 mm, those of the second series the longest. Staminodes 2 mm. Ovary 1.5 mm, sparsely hairy at apex. Fruit ellipsoid, to 16 mm long on a 1–2 mm pedicel.

Distribution: Nepal, E Himalaya and Assam-Burma.



Altitudinal range: 1000–1400 m.

Ecology: Mixed moist subtropical forest.

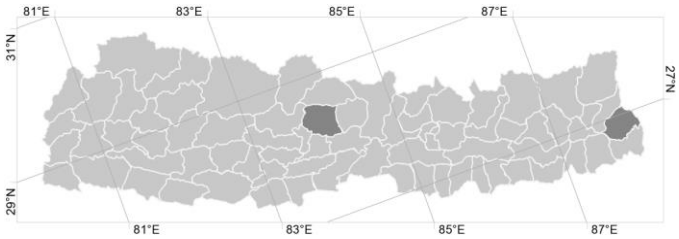
Flowering: May.

Similar in overall appearance to *Phoebe hainesiana* Brandis, but differing from it in its more obviously hairy leaves and the tomentose inflorescence with smaller flowers. *Stainton 6255 & 6854* (BM), recorded in Enum. Fl. Pl. Nepal 3: 187 (1982) as *P. attenuata*, are *P. hainesiana*.

5. *Phoebe hainesiana* Brandis, Hooker's Icon. Pl. (1906)

Trees to 30 m. Twigs pale brown or whitish, glabrous or minutely sparsely sericeous and then soon glabrescent, lenticellate or rugose. Perulate buds present. Leaves clustered at the ends of the twigs, usually obovate, sometimes elliptic or oblong, 8–19 × 3–8 cm, length:width ratio 2.5–3.6, base cuneate, sometimes oblique, apex acute to acuminate or apiculate, margin flat; underside not or slightly glaucous, glabrous or minutely sparsely sericeous below, secondary veins 12–18 pairs, tertiary venation scalariform or reticulate-scalariform. Petioles 1.2–4.5 cm. Inflorescences to 15 cm, sparsely sericeous, glabrescent in lower parts. Pedicels 5–8 mm. Flowers yellow or pale green, 6–7 mm long, sericeous outside. Tepals broadly ovate, 4–6 mm, tomentose within. Stamens 4.5–5 mm. Staminodes 3 mm. Ovary 2.5 mm, glabrous. Fruit ellipsoid, to 25 mm long on a 15 mm pedicel.

Distribution: Nepal and E Himalaya.



Altitudinal range: 1300–1600 m.

Ecology: Wet subtropical and temperate forests.

Flowering: April–May.

Phoebe hainesiana is similar to *P. attenuata* (Nees) Nees, but has larger flowers and a generally glabrous appearance. The pedicel is articulated in the lower half, with the stump persisting on the inflorescence when flowers are shed.

6. *Machilus* Nees, in Wall., Pl. Asiat. Rar. 2[6]:70 (1831)

Persea Mill.

Evergreen small to large trees. Perulate buds present or absent. Leaves alternate or subopposite, evenly spaced along the twig or somewhat clustered at the tips, secondary venation pinnate. Inflorescence cymose, axillary. Flowers small, bisexual, trimerous. Hypanthium cup-shaped, not enclosing the ovary. Tepals 6. Stamens 9, in 3 whorls, 4-valved. Outer whorls eglandular, introrse, inner whorl glandular, extrorse. Staminodes 3, fleshy. Fruit borne on small cupule with soft, spreading or reflexed tepals.

Worldwide 100 species in tropical and subtropical Asia. Seven species in Nepal.

Molecular evidence (Rohwer *et al*., Taxon 58: 1153. 2009) supports the separation of Asian *Machilus* from *Persea* which is distributed in tropical America and Macaronesia. Thus all the Nepalese species are now included within *Machilus*, and the only species of *Persea* known from Nepal is the cultivated *P. americana* Mill., the avocado.

Key to Species

1a Perulate buds absent. Leaves clustered and leaving scars at base of current year's growth, but scars not forming dense ring around twig ..... 2.
b Perulate buds present. Twigs ringed with dense clusters of scars from bud scales ..... 3.

2a Indumentum of inflorescence rachis appressed, grey, sericeous. Leaves glabrous or appressed sericeous on midrib below. Secondary venation almost equally prominent above and below ..... **6. *M. sericea***
b Indumentum of inflorescence rachis spreading, rusty-brown tomentose. Leaves with tomentose indumentum on midrib below. Secondary venation clearly more prominent below than above ..... **7. *M. glaucescens***

3a Inflorescence rachis completely glabrous, sometimes glaucous ..... 4.
b Inflorescence rachis sericeous or tomentose, at least around the axils of rachis ..... 5.

4a Leaves broadly elliptic to slightly obovate or slightly ovate, length:width ratio 2.0–4.8 Secondary veins 6–14 pairs ..... **4. *M. odoratissima***
b Leaves narrowly elliptic or oblong to slightly obovate, length:width ratio 4.2–6.0. Secondary veins 13–20 pairs ..... **5. *M. clarkeana***

5a Leaves reddish-brown villous below. Inflorescence peduncle spreading rusty-brown tomentose ..... **3. *M. pubescens***

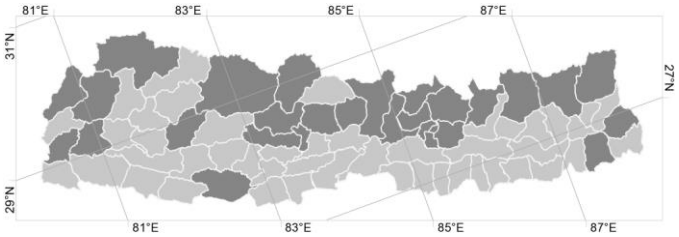
b Leaves glabrous or greyish sericeous below. Inflorescence peduncle grey rather appressed sericeous.....6.

6a Leaves 10–23 cm long, length:width ratio 3.5–5.3. Secondary veins 11–18 pairs .....**1. *M. duthiei***
b Leaves 5–16 cm long, length:width ratio 2.7–4.6. Secondary veins 6–12(–15) pairs.....**2. *M. gamblei***

1. *Machilus duthiei* King ex Hook.f., Fl. Brit. India 5[16]:861 (1890)
Persea duthiei (King ex Hook.f.) Kosterm.

Large trees to 25 m, 1 m dbh. Twigs dark reddish brown, glabrous and sometimes glaucous, lenticellate or rugose or smooth, becoming grey brown or whitish and rugose or lenticellate. Perulate buds present. Leaves alternate or occasionally subopposite, more or less clustered, oblong or elliptic to slightly obovate, 10–23 × 2–6 cm, length:width ratio 3.5–5.3, base cuneate, apex more or less acuminate, margin slightly inrolled; underside more or less glaucous, glabrous or minutely sparsely sericeous below, secondary veins 11–18, tertiary venation reticulate-scalariform, not particularly prominent below. Petioles 0.9–2.3 cm. Inflorescences 4–16 cm, sericeous. Pedicels 4–6 mm. Flowers pale greenish-yellow or rarely white, 5–6 mm long, sericeous outside. Tepals dimorphic, oblong or ovate, 4.5–5.5 mm, glabrous or sericeous inside. Fertile stamens 3.5–5 mm, the innermost whorl the longest. Staminodes 1.5–2 mm. Ovary and style glabrous. Fruits globose, 10–15 mm, glabrous, not glaucous.

Distribution: Nepal, W Himalaya, E Himalaya, Tibetan Plateau and Assam-Burma.



Altitudinal range: 1500–3200 m.

Ecology: In primary and secondary temperate forests with *Quercus*, *Magnolia*, *Rhododendron*, *Aesculus* and *Pinus*. Sometimes becoming dominant.

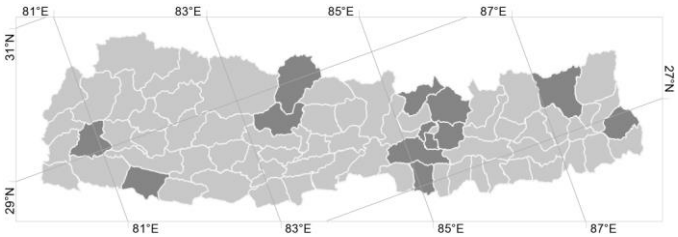
Flowering: March–May. **Fruiting:** May–November.

The large, narrow leaves of *Machilus duthiei*, often with glaucous undersides and numerous pairs of secondary veins, are distinctive. The leaves are larger than those of *M. clarkeana* King ex Hook.f., which has glabrous inflorescences. *M. duthiei* is most likely to be confused with *M. gamblei* King ex Hook.f., but the latter has shorter, relatively broader leaves.

2. *Machilus gamblei* King ex Hook.f., Fl. Brit. India 5[13]:138 (1886)
Machilus bombycina King ex Hook.f.; *Persea gamblei* (King ex Hook.f.) Kosterm.

Trees to 20 m, 80 cm dbh. Twigs dark reddish brown, glabrous or young growth tomentose and soon glabrescent, smooth or slightly ridged, sometimes lenticellate. Perulate bud present. Leaves alternate, more or less clustered, oblong, elliptic or obovate, 5–16 × 1.5–5 cm, length:width ratio 2.7–4.6, base cuneate, apex acute or acuminate, margin flat or slightly inrolled, underside slightly glaucous or non glaucous, glabrous or densely sericeous below, secondary veins 6–12(–15), tertiary venation reticulate or scalariform, not particularly prominent below. Petioles 0.6–1.8 cm. Inflorescences 4–11 cm, sericeous or tomentose or tomentose in axils of peduncle and otherwise glabrous. Pedicels 4–8 mm. Flowers greenish-yellow, 5–8 mm, sericeous outside. Tepals oblong, acute, 5–6 mm, sericeous within. Fertile stamens ca. 4 mm. Staminodes 1 mm. Ovary and style glabrous. Fruit globose or obovoid, 6 mm, glabrous, not glaucous.

Distribution: Nepal, E Himalaya, Tibetan Plateau, Assam-Burma, E Asia and SE Asia.



Altitudinal range: 700–2400 m.

Ecology: Temperate forests with Fagaceae and evergreen gullies in *Shorea* forest.

Flowering: March–May. **Fruiting:** March–July.

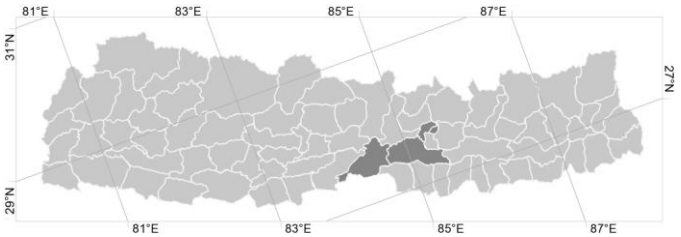
Glabrous forms of *Machilus gamblei* are most similar to *M. duthiei* King ex Hook.f but have relatively broader leaves with fewer pairs of secondary veins. The more pubescent forms of *M. gamblei* may be confused with *M. pubescens* Blume but the inflorescence of the latter has a denser indumentum of longer, more spreading hairs.

3. *Machilus pubescens* Blume, Mus. Bot. 1(21):330 (1851)
Cinnamomum tomentosum D.Don; *Persea blumei* Kosterm.

Trees to 20 m. Twigs pale brown to dark brown or blackish, sometimes slightly reddish, tomentose, glabrescent, smooth or slightly ridged or rugose, more or less lenticellate. Perulate buds present. Leaves alternate, strongly clustered, elliptic or oblong to slightly ovate or slightly obovate, 6–15 × 1.8–5 cm, length:width ratio 2.4–4.3, base cuneate, apex acute or

acuminate, margin flat or inrolled, underside glaucous or not, tomentose or villous on midrib and veins and villous on lamina below, secondary veins 8–12, tertiary venation reticulate-scalariform or reticulate, not particularly prominent below. Petioles 0.7–1.5 cm. Inflorescence 4–9 cm, tomentose, with spreading red-brown hairs. Pedicels 3–5 mm. Flowers yellow or greenish, 5–6 mm long, sericeous or tomentose outside. Tepals dimorphic, oblong, ovate or narrowly ovate, 3–5 mm, glabrous or slightly sericeous within. Fertile stamens 2.5–4 mm, the innermost whorl longest. Staminodes 1 mm. Ovary and style glabrous. Fruits globose, ca. 10 mm, glabrous, not glaucous.

Distribution: Endemic to Nepal.



Altitudinal range: 100–2500 m.

Ecology: Lower temperate forests with *Quercus*, *Magnolia* and *Rhododendron* and evergreen gullies in *Shorea* forest.

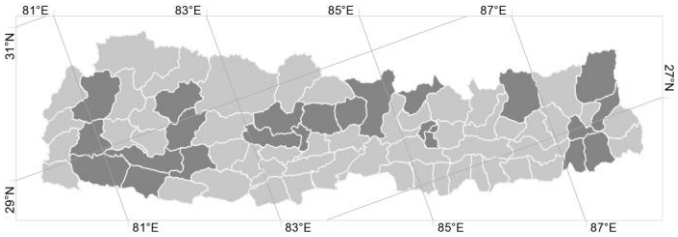
Flowering: March–April. **Fruiting:** March–June.

It is possible to confuse some forms of *Machilus gamblei* King ex Hook.f. with *M. pubescens*, but the inflorescence of *M. pubescens* always has a denser, more spreading indumentum, and furthermore some collections also have narrow 1 cm-long caducous bracts. Although *M. pubescens* (as *Persea tomentosa*) was synonymised under *Phoebe cathia* (D.Don) Kosterm. in Enum. Fl. Pl. Nepal: 3. 187. 1982) the two species are clearly distinct as *P. cathia* has smaller flowers and lacks perulate buds.

4. *Machilus odoratissima* Nees, in Wall., Pl. Asiat. Rar. 2[8]:70 (1831)
Laurus odoratissima Wall.*nom. nud.*; *Persea odoratissima* (Nees) Kosterm.

Trees to 25 m. Twigs dark reddish brown or dark brown, smooth or slightly ridged, glabrous, sometimes glaucous. Perulate buds present. Leaves alternate, slightly clustered or evenly spaced, elliptic to slightly obovate or slightly ovate, 6–19 × 2–5.5 cm, length:width ratio 4.2–5.9, base cuneate to rounded, apex acute or slightly acuminate, margin flat or slightly inrolled, underside slightly glaucous, glabrous, secondary veins 6–14, tertiary venation reticulate-scalariform, not particularly prominent below. Petioles 1–2.2 cm. Inflorescences 5–9 cm, glabrous often glaucous. Pedicels 4–9 mm. Flowers pale yellow to pale green, 4–6 mm long, more or less glabrous outside. Tepals dimorphic, ovate to elliptic or oblong, 3–5.5 mm, glabrous to tomentose within. Fertile stamens 4–4.5 mm, the innermost whorl the longest. Staminodes 2 mm. Ovary and style glabrous. Fruits obovoid or ellipsoid, 15–16 mm, glabrous, somewhat glaucous. **Fig. 1i**

Distribution: Nepal, E Himalaya, Assam-Burma and SE Asia.



Altitudinal range: 300–2200 m.

Ecology: Gullies in *Shorea* forest and mixed moist subtropical and lower temperate forests with *Quercus*, *Castanopsis*, *Magnolia* and *Pinus*.

Flowering: March–June. **Fruiting:** April–September.

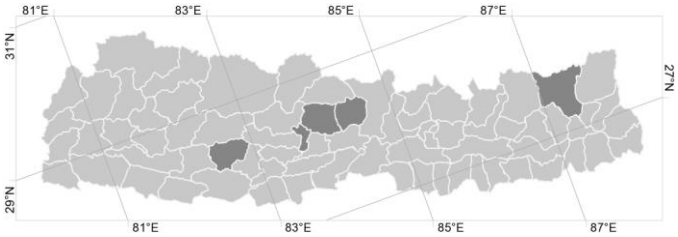
According to Kostermans (Bibliogr. Lauracearum: 640. 1964) Loureiro (Fl. Cochinch. 1: 253. 1790) misapplied *Laurus indica* L. to this species.

The glabrous and often glaucous, reddish twigs of *Machilus odoratissima* are distinctive, particularly in combination with the glabrous flowers and often glaucous fruits.

5. *Machilus clarkeana* King ex Hook.f., Fl. Brit. India 5[13]:137 (1886)
Machilus gammieana King ex Hook.f.; *Persea clarkeana* (King ex Hook.f.) Kosterm.

Trees to 15 m, 80 cm dbh. Twigs pale brown or whitish, rugose, glabrous. Perulate buds present. Leaves alternate, markedly clustered, elliptic or oblong to slightly obovate, 6–14 × 1.2–3 cm, length:width ratio 4.2–5.9, base cuneate, apex acute to acuminate, margin inrolled; underside more or less glaucous, glabrous; secondary veins 13–20, tertiary venation reticulate or reticulate-scalariform, not particularly prominent below. Petioles 0.6–1.8 cm. Inflorescences 5–9 cm, glabrous. Pedicels 6–10 mm. Flowers greenish, 8 mm long, glabrous or sparsely pubescent outside. Tepals narrowly ovate, 6–7 mm, glabrous to tomentose inside. Fertile stamens ca. 6 mm almost equal. Staminodes 2 mm. Ovary and style, glabrous. Fruits globose or broadly ellipsoid, 25 mm, glabrous, not glaucous.

Distribution: Nepal, E Himalaya and Assam-Burma.



Altitudinal range: 1600–2900 m.

Ecology: Temperate *Quercus*-Lauraceae forests.

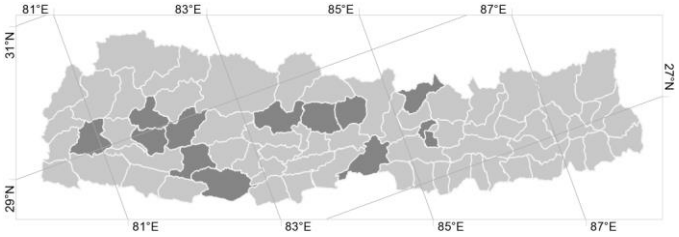
Flowering: March–April. **Fruiting:** June–September.

The combination of strongly clustered, very narrow leaves with numerous pairs of rather indistinct secondary veins and a glabrous inflorescence is found only in *Machilus clarkeana*.

6. *Machilus sericea* Blume, Mus. Bot. 1:330 (1851)
Laurus sericea Wall.*nom. nud.*; *Persea wallichii* D.G.Long

Trees to 15 m. Twigs dark brown or dark reddish brown, smooth to rugose or slightly ridged, sometimes lenticellate, sericeous, glabrescent. Perulate buds absent. Leaves alternate, slightly or strongly clustered, oblong or elliptic to slightly ovate or slightly obovate, 6.5–13 × 2–5 cm, length:width ratio 2.0–3.3, base cuneate to rounded, apex acute or obtuse, margin flat, underside slightly glaucous, glabrous or minutely sparsely sericeous below, secondary veins 7–12, tertiary venation reticulate-scalariform, not particularly prominent below. Petioles 1.4–2.8 cm. Inflorescences 5–16 cm, sericeous or glabrescent in lower parts of peduncle, not glaucous. Pedicels 3–4 mm. Flowers green or yellow, 4–6 mm long, sericeous outside. Tepals elliptic or oblong, 3–5 mm sericeous within. Fertile stamens 2–3.5 mm, the innermost whorl the longest. Staminodes 1–1.5 mm. Ovary and style glabrous. Fruits globose, ca. 10 mm, glabrous, not glaucous.

Distribution: Nepal and W Himalaya.



Altitudinal range: 200–2500 m.

Ecology: Subtropical and mixed lower temperate forests with *Quercus* and *Magnolia*.

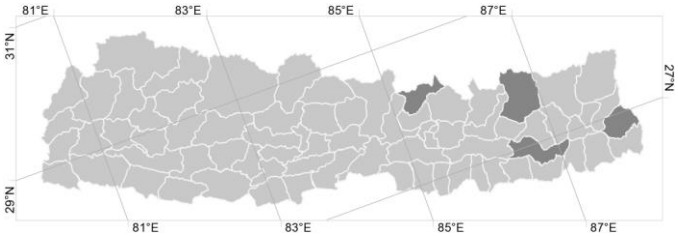
Flowering: March–May. **Fruiting:** June–August.

With its lack of perulate buds *Machilus sericea* could only be confused with *M. glaucescens* (Nees) Meisn, but the latter has leaves which are clearly tomentose on the midrib and veins below and a much more spreading, tomentose indumentum on its inflorescences.

7. *Machilus glaucescens* (Nees) Wight, Icon. Pl. Ind. Orient. 5[2]:12 (1852)
Ocotea glaucescens Nees in Wall., Pl. Asiat. Rar. 2[8]:71 (1831). *Laurus glaucescens* Roxb. ex Wall.*nom. nud.*; *L. villosa* Roxb.*nom. nud.*; *L. villosa* Roxb.; *Persea glaucescens* (Nees) D.G.Long; *Phoebe glaucescens* (Nees) Nees

Trees to 15(–25) m. Twigs dark brown or grey brown, smooth or slightly ridged, tomentose, glabrescent. Perulate buds absent. Leaves alternate, slightly or strongly clustered, elliptic or oblong to slightly ovate or obovate, 8.5–19 × 2.5–6.5 cm, length:width ratio 2.8–3.5, base cuneate, apex acuminate or apiculate, margin slightly inrolled, underside more or less glaucous, tomentose on midrib and veins below and sparsely pubescent on lamina, secondary veins 5–9, tertiary venation scalariform, prominent below. Petioles 0.9–2.5 cm. Inflorescences 15–25 cm, tomentose. Pedicels 3–9 mm. Flowers yellow or greenish-yellow, 4–5 mm long, tomentose outside. Tepals dimorphic, broadly ovate, 3–5 mm, tomentose within. Fertile stamens 2–2.5 mm, almost equal. Staminodes 1 mm. Ovary and style glabrous. Fruits globose, ca. 7 mm, glabrous or sparsely puberulous, not glaucous.

Distribution: Nepal, E Himalaya and Assam-Burma.



Altitudinal range: 300–2400 m.

Ecology: Temperate forest with *Quercus*, *Lithocarpus*, evergreen gullies in *Shorea* forest.

Flowering: February–March. **Fruiting:** March–April.

Machilus glaucescens shares the absence of perulate buds with *M. sericea* Blume, but the latter has leaves which are almost glabrous below and has an appressed sericeous indumentum on its inflorescences.

7. *Lindera* Thunb.nom cons., Nov. Gen. Pl. 1:64 (1781)

Evergreen or deciduous shrubs or small trees, rarely large trees. Perulate buds present or absent. Leaves alternate, evenly spaced along the twig, secondary venation pinnate or weakly 3-veined or strongly 3-veined. Inflorescences umbellate, enclosed by decussate bracts, solitary or in clusters on lateral short-shoots. Flowers small, unisexual, trimerous. Hypanthium cup-shaped, not enclosing the ovary. Tepals 6. Male flowers with 9 stamens in 3 whorls. Stamens 2-valved, introrse, the outer whorls eglandular, inner whorl

glandular. Rudimentary ovary present. Female flowers with 9 filiform staminodes in 3 whorls, the outer 6 eglandular and the inner 3 glandular. Fruit on a little-enlarged perianth cup, tepals persistent or not.

Worldwide 100 species primarily in tropical and subtropical Asia. Six species in Nepal.

In species in which the umbels grow on axillary short-shoots, these may or may not develop into twigs. If they do develop further the fruiting umbels appear to be solitary at the base of the twig, though their true origin can be seen by the presence of clusters of bud scale scars rather than leaf scars at the base of the twigs. *Lindera melastomacea* (Nees) Fern.-Vill. is excluded from this account as all Nepalese material (relating to *Laurus cuspidata* D.Don) is now treated as *Lindera pulcherrima* (Nees.) Hook.f. *Lindera melastomacea* is currently known eastwards from Bhutan and Assam.

Key to Species

1a Leaves 3-veined, with either a single pair of lateral veins, or the basal pair of lateral veins stronger than those above 2.
b Leaves pinnate-veined, the basal pair of lateral veins weaker than those above ..... 4.

2a Evergreen. Leaves coriaceous. Secondary venation consisting of 1 pair of lateral veins, occasionally with another pair of very weak veins towards the apex..... **1. *L. pulcherrima***
b Deciduous. Leaves membranous. Secondary venation consisting of 3–6 pairs of lateral veins..... 3.

3a Leaves suborbicular or broadly obovate, hairy below, strongly 3-veined, with the basal pair clearly stronger than those above ..... **2. *L. heterophylla***
b Leaves ovate, glabrous below, weakly 3-veined, with the basal pair only slightly stronger than those above **3. *L. neesiana***

4a Petioles at least 3 cm. Leaves 17–26 cm..... **6. *L. bootanica***
b Petioles to 1 cm. Leaves up to 18 cm..... 5.

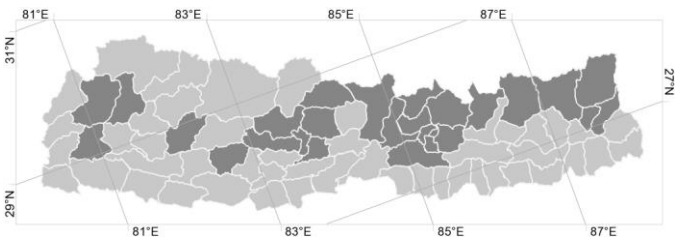
5a Perulate buds absent. Umbels on slender pedicels ..... **4. *L. assamica***
b Perulate buds present. Umbels sessile ..... **5. *L. nacusua***

1. *Lindera pulcherrima* (Nees) Hook.f., Fl. Brit. India 5[13]:185 (1886)
Daphnidium pulcherrimum Nees in Wall., Pl. Asiat. Rar. 2[8]:63 (1831). *Laurus cuspidata* D.Don; *Lindera pulcherrima* var. *attenuata* C.K.Allen; *Tetranthera pulcherrima* Wall.*nom. nud.*; *Tomex bolo* Buch.-Ham.*nom. nud.*

□□□□□ Kharane (Nepali)

Evergreen shrub or trees to 12 m. Twigs densely white sericeous when young, glabrescent and then dark reddish brown or dark brown, smooth or lenticellate. Perulate buds present. Leaves elliptic, oblong or slightly ovate, 5–16 × 2–5 cm, length:width ratio 2.5–4.8, base rounded to cuneate, apex acuminate to caudate, strongly 3-veined, secondary veins 1–2 pairs, tertiary venation scalariform, glabrous or sparsely villous, usually glaucous below. Petioles 0.6–1.7 cm. Inflorescences to 1.2 cm, with 1–3 almost sessile umbels on 2–7 mm short-shoots. Male umbels with 3–6 flowers. Pedicels 3–9 mm, sericeous. Flowers yellow or green, 3–4 mm. Tepals oblong or elliptic, 3–4 mm, sericeous outside and glabrous within. Stamens 2.5–4 mm. Female umbels with ca. 5 flowers. Pedicels 3.5–5 mm, sericeous. Flowers yellow or green, ca. 3 mm. Tepals elliptic or oblong, 3–3.5 mm, sparsely sericeous outside and glabrous within. Ovary and style equal, hairy. Infructescences to 2 cm, with 2–7 fruit. Fruit ellipsoid, 8–9 mm, on 8–12 mm pedicels.

Distribution: Nepal, W Himalaya, E Himalaya, Tibetan Plateau, Assam-Burma and E Asia.



Altitudinal range: 700–3600 m.

Ecology: Locally frequent in temperate broad-leaved forest and scrub with *Quercus*, *Lithocarpus, Rhododendron, Acer* and *Magnolia*.

Flowering: March–April(–November). **Fruiting:** (March–)May–August(–December).

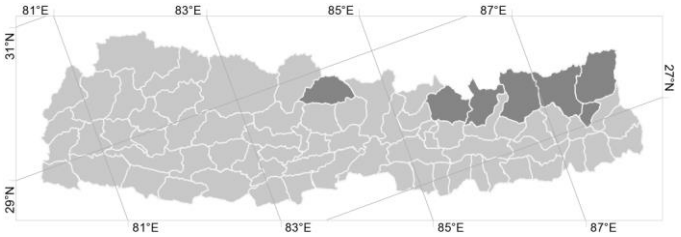
The *Cinnamomum*-like venation of the leaves is only found in *Lindera pulcherrima*, so this species is quite distinct from the other members of the genus in Nepal.

Leafy branches are used as fodder and the wood is used for fuel.

2. *Lindera heterophylla* Meisn., in A.DC., Prodr. 15(1):246 (1864)

Deciduous shrub or small trees to 5(–10) m. Twigs prominently rusty villous when young, soon glabrescent and then tomentose to glabrous, grey brown, sometimes reddish, smooth or lenticellate. Perulate buds present. Leaves suborbicular or broadly oblong to slightly ovate or slightly obovate, 4–11 × 3–8 cm, length:width ratio 1.2–1.5, base rounded to slightly cordate, apex acute or obtuse and apiculate, strongly 3-veined, secondary veins 3–6 pairs, tertiary venation scalariform, densely villous below especially on veins and midrib, underside not or slightly glaucous. Petioles 0.6–2 cm. Inflorescences to 2 cm. Umbels sessile and solitary or 2-3 grouped on shortshoots to 8 mm. Male umbels with ca. 10 flowers. Pedicels 6–9 mm, sericeous. Flowers ca. 7 mm. Tepals oblong or narrowly obovate, 6 mm, sericeous outside, glabrous within. Stamens 2 mm. Female umbels with 6–12 flowers. Pedicels 8–13 mm, sericeous. Flowers ca. 5 mm. Tepals linear, ca. 3 mm, long sericeous outside and glabrous inside. Ovary 2 mm with almost sessile style. Infructescences to 3.5 cm, with 7–16 fruit. Fruits ellipsoid, 8 mm, on 7–25 mm pedicels.

Distribution: Nepal and E Himalaya.



Altitudinal range: 1900–3200 m.

Ecology: Mixed broad-leaved forests and scrub with *Rhododendron*, *Abies* and *Larix*.

Flowering: April. **Fruiting:** May–September.

Kostermans & Chater (Enum. Fl. Pl. Nepal 3: 185. 1982) report *Litsea confertiflora* (Meisn.) Kosterm. from Nepal, but this is based on a misidentication of *Beer, Lancaster & Morris 12329* which is *Lindera heterophylla*.

Litsea heterophylla is characterized by its broad, villous, 3-veined leaves which are unlike those of any other species. Like *L. neesiana* (Nees) Kurz it flowers when leafless, but the latter has much finer twigs, and flowers up until December.

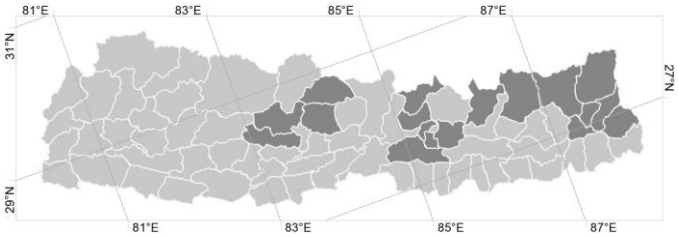
3. *Lindera neesiana* (Nees) Kurz, Prelim. Rep. Forest Pegu App. A:103 (1875)

Aperula neesiana (Nees) Blume; *Tetranthera neesiana* Wall.*nom. nud.*

□□□□ □□□ Theki phul (Nepali)

Deciduous shrub or trees to 10(–12) m. Twigs dark or mid brown, sometimes reddish, smooth, glabrous. Perulate buds present, but bud scales leaving diffuse scars. Leaves ovate, 3.5–21 × 1.5–13 cm, length:width ratio 1.6–2.4, base rounded, apex acute or slightly acuminate, weakly 3-veined, secondary veins 3–9 pairs, tertiary venation somewhat reticulate, glabrous, underside glaucous or not. Petioles 0.5–2.2 cm. Inflorescences to 1.5 cm with 1–6 umbels on 3–9 mm short-shoots. Male umbels with 5–8 flowers. Peduncles 5–8 mm, glabrous. Pedicels 2–3 mm, sericeous. Flowers cream, 2.5 mm. Tepals dimorphic, 2 mm, glabrous. Stamens 2 mm. Female umbels with 6–8 flowers. Peduncles 4–5 mm, glabrous. Pedicels 2 mm, glabrous. Flowers 2 mm. Tepals triangular, 1 mm, glabrous. Ovary and style equal, glabrous. Infructescences to 1.5 cm, with 1–8 fruit. Peduncles 4–9 mm. Fruit globose or ellipsoid, 5–7 mm on 4–7 mm pedicels.

Distribution: Nepal, E Himalaya, Assam-Burma and E Asia.



Altitudinal range: 800–2900 m.

Ecology: Woodland and scrub with *Quercus* and *Pinus*. Often associated with disturbance.

Flowering: August–December. **Fruiting:** April–October.

The glabrous, ovate leaves and perulate buds leaving diffuse clusters of scales at the base of the twigs are features unique to *Lindera neesiana* among the Nepali species of *Lindera*. Flowering specimens without leaves may appear superficially similar to *Litsea sericea* (Wall. ex Nees) Hook.f., but the latter is a spring- and early summer-flowering species.

The plant is aromatic and carminative. Powder of root and bark are used to relieve pain. Leaves and fruits are used in the treatment of skin disease. Seeds are efficacious antidote.

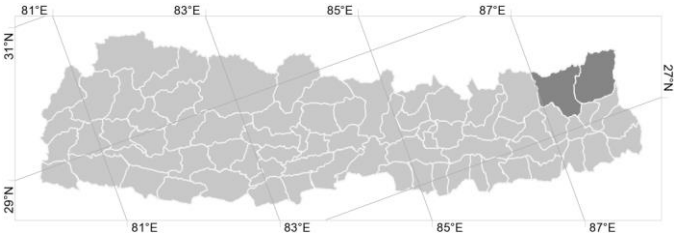
4. *Lindera assamica* (Meisn.) Kurz, Prelim. Rep. Forest Pegu App. A:103 (1875)

Aperula assamica Meisn. in A.DC., Prodr. 15(1):240 (1864).

Evergreen trees to 8(–15) m. Twigs tomentose, dark brown, sometimes reddish, smooth or slightly lenticellate. Perulate buds absent. Leaves elliptic, length 9–18 × 2–5 cm, length:width ratio 3.7–4.2, base cuneate to rounded, apex acute to acuminate, pinnate veined, secondary veins 6–9 pairs, tertiary venation reticulate-scalariform, villous on veins below and sparsely villous on lamina, underside not or slightly glaucous. Petioles 0.5–1 cm. Inflorescences to 2.5 cm, with 1–3 umbels on 3–10 mm short-shoots. Male umbels with 8–11 flowers. Peduncles 9–16 mm, subglabrous. Pedicels 3–4 mm, sericeous. Flowers 4 mm. Tepals linear, sparsely sericeous, 3 mm. Stamens to 3 mm. Female umbels with 8–15 flowers. Peduncles 5–9 mm, subglabrous. Pedicels 2–3 mm, sericeous.

Female flowers 3 mm. Tepals linear, glabrous, 2 mm. Ovary shorter than style, glabrous. Infructescences to 4 cm, with 3–6 fruit. Peduncles 7–9 mm. Fruits ellipsoid, 7–9 mm, on 15–20 mm pedicels.

Distribution: Nepal, E Himalaya and Assam-Burma.



Altitudinal range: 2000–2800 m.

Ecology: Mixed temperate forests.

Flowering: November.

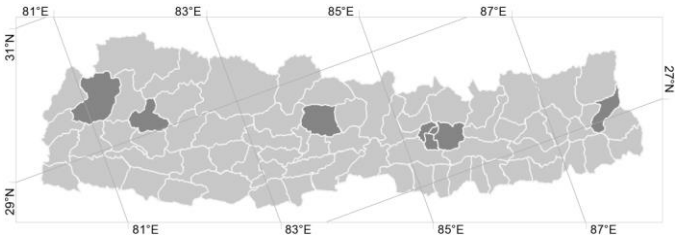
Lindera assamica is most similar to *L. nacusua* (D.Don) Merr., but is easily distinguished from it by having pedunculate rather than sessile umbels and larger leaves.

5. ***Lindera nacusua*** (D.Don) Merr., Lingnan Sci. J. 15:419 (1936)
Laurus naucushia Buch.-Ham.*nom. nud.*; *L. umbellata* Buch.-Ham. ex D.Don*later homonym, non thunb.*; *Tetranthera bifaria* Wall.*nom. nud.*; *T. vestita* Wall.*nom. nud.*

□□□□□□ □□□□ Pahenlo khapate (Nepali)

Evergreen shrub or small trees to 7 m. Young twigs densely rusty villous, later glabrous, grey brown or blackish, smooth or slightly lenticellate. Perulate buds present. Leaves elliptic to ovate, 4–18 × 2–6.5 cm, length:width ratio 1.9–2.8, base cuneate to rounded, apex acute to acuminate, pinnate veined, secondary veins 6–10 pairs, tertiary venation rather scalariform, villous below, especially on veins, underside more or less glaucous. Petioles 0.3–0.9 cm. Inflorescences to 1.1 cm, umbels solitary or up to 3 on 2–5 mm short-shoots. Male umbels with 6–10 flowers. Peduncles 1–3 mm, sericeous. Pedicels 3–5 mm, sericeous. Flowers yellow or green, 3 mm. Tepals obovate or oblong, 3 mm, glabrous inside and sparsely sericeous outside. Stamens 3 mm. Female umbels with 4–6 flowers. Peduncles 2–4 mm, sericeous. Pedicels 2–4 mm, sericeous. Flowers 2 mm. Ovary 2 mm glabrous, with style almost sessile. Infructescences to 1.5 cm, with 2–18 fruit. Fruit globose, 6–7 mm, on 2–6 mm pedicels.

Distribution: Nepal, W Himalaya, E Himalaya, Tibetan Plateau, Assam-Burma and E Asia.



Altitudinal range: 1200–2500 m.

Ecology: Broad-leaved forest.

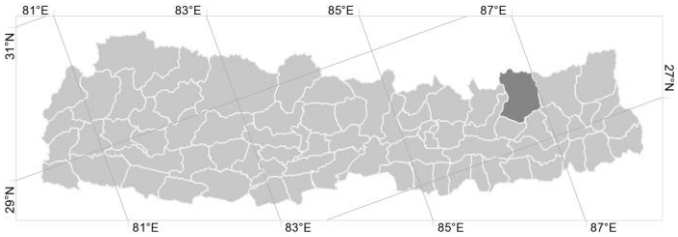
Flowering: January–April. **Fruiting:** February–October.

Lindera nacusua is most similar to *L. assamica* (Meisn.) Kurz, but differs from it in having sessile rather than pedunculate umbels and generally smaller leaves.

6. ***Lindera bootanica*** Meisn., in A.DC., Prodr. 15(1):245 (1864)
Daphnidium venosum Meisn.

Deciduous trees to 25 m. Twigs grey brown, smooth, glabrous. Perulate buds present. Leaves evenly spaced, elliptic or slightly obovate, 17–26 × 6–10 cm, length:width ratio 2.6–2.9, base rounded to cuneate, apex slightly acuminate, pinnate veined, secondary veins 8–12 pairs, tertiary venation reticulate, villous on veins below and sparsely villous on lamina; underside slightly glaucous. Petioles 3–4 cm. Inflorescences to 2 cm, 2–3 umbels on 3–5 mm short-shoots. Peduncles 10–13 mm, sericeous. Mature flowers not seen. Infructescences to 5 cm. Fruits globose, ca. 15 mm, on 12–16 mm pedicels.

Distribution: Nepal and E Himalaya.



Altitudinal range: 1800–2000 m.

Ecology: Broad-leaved forest.

Flowering: October.

With its large pinnately-veined leaves and large inflorescences and fruits, *Lindera bootanica* is unlikely to be confused with any other species. When treating *L. venosa* as conspecific with this species, Long (Notes Roy. Bot. Gard. Edinburgh 41: 507. 1984) selected *L. bootanica* as the correct name.

8. ***Litsea*** Lam., Encycl. 3(2):574 (1792)

Evergreen or deciduous shrubs, small trees or large trees. Perulate buds present or absent. Leaves alternate, evenly spaced along the twig or more or less clustered at the tips, secondary venation pinnate. Inflorescences umbellate, enclosed by decussate bracts, solitary or on lateral short-shoots. Flowers small, unisexual, trimerous. Hypanthium cup-shaped, not enclosing the ovary. Tepals usually 6, absent in one species. Male flowers usually with 9 stamens in 3 whorls. Stamens 4-valved, introrse, the outer whorls eglandular, inner whorl glandular. Rudimentary ovary present. Female flowers usually with 9 filiform staminodes in 3 whorls, the outer 6 eglandular and the inner 3 glandular. Fruit on a scarcely or distinctly enlarged perianth cup, tepals persistent or not.

Worldwide 300 species in tropical and subtropical Asia, Australia and America. 11 species in Nepal.

While umbels are in axillary clusters or in apparently racemose inflorescences, the rachis of these inflorescences are actually shoots with vegetative terminal buds. In some cases the buds develop into shoots, leaving the individual umbellate infructescences apparently solitary on the previous year's wood.

The following three species reported in Kostermans & Chater (Enum. Fl. Pl. Nepal 3: 185. 1982) are excluded from this account: *Litsea confertiflora* (Meisn.) Kosterm., based on *Beer, Lancaster & Morris 12329* (BM), determined in this revision as *Lindera heterophylla* Meisn.; *Litsea glabrata* (Wall. ex Nees) Hook.f., based on *Stainton 6518* (BM), determined as *L. panamanja* (Buch.-Ham. ex Nees) Hook.f.; and *Litsea lancifolia* (Roxb. ex Nees) Hook.f. included on the basis of the report by Shrestha (Bull. Dep. Med. Pl. 1: 42. 1967), itself apparently based on *Pradhan 4459* (KATH), determined here as *Lindera nacusua* (D.Don) Merr.

Key to Species

1a Perulate buds present, twigs with clusters of scars from bud scales (rather diffuse in L. kingii) .....2.
b Perulate buds absent, twigs lacking clusters of scars from bud scales .....4.

2a Umbels with reflexed peduncles, solitary or several on short-shoots. Leaves glabrous, conspicuously shiny above .....**2. *L. kingii***
b Umbels with straight peduncles, solitary. Leaves more or less villous below, not conspicuously shiny above.....3.

3a Deciduous, leaves absent at time of flowering. Pedicels 2–9 mm in flower, 10–22 mm in fruit. Perulate bud scales glabrous .....**1. *L. sericea***
b Evergreen, leaves present at time of flowering. Pedicels to 2 mm in flower, 4–6 mm in fruit. Perulate bud scales sericeous.....**3. *L. elongata***

4a Umbels more or less racemosely arranged in (2–)3–9 cm long open inflorescences .....5.
b Umbels in dense axillary clusters to 1.5 cm long, or in dense inflorescences to 2 cm long on short, thick, persistent shoots.....7.

5a Umbels arranged in a subumbellate cluster at the end of 1–3 cm long stalk.....**11. *L. glutinosa***
b Umbels racemosely arranged along length of stalk.....6.

6a Leaves not or scarcely glaucous below. Inflorescences 2–5 cm. Longest stamens greater than 7 mm. Style 2.5 mm. Fruit ellipsoid or ovoid, not enclosed by enlarged cupule.....**4. *L. doshia***
b Leaves glaucous below. Inflorescences 3–9 cm. Longest stamens up to 7 mm. Style 1 mm. Fruit globose, half enclosed by enlarged cupule.....**5. *L. panamanja***

7a Umbels densely arranged on persistent 2–3 mm-thick shoots to 15 mm long .....8.
b Umbels in dense axillary clusters or on 1 mm-thick shoots to 8 mm long .....9.

8a Leaves broadly elliptic or obovate. Length:width ratio 1.3–2.5. Stamens 9 ..... **6. *L. monopetala***
b Leaves oblong or elliptic or slightly obovate. Length:width ratio 2–3. Stamens 12..... **7. *L. hookeri***

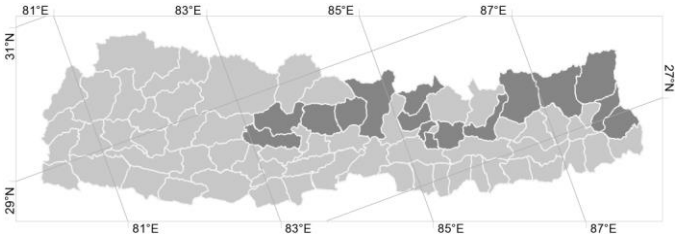
9a Inflorescences with 6–15 umbels in axillary clusters or on shoots to 5 mm long. Secondary veins 10–13 pairs. Tertiary venation scalariform, faint or rather prominent. ..... **8. *L. salicifolia***
b Inflorescences with up to 6 umbels on shoots to 8 mm long. Secondary veins 6–10 pairs. Tertiary venation reticulate, rather faint.....10.

10a Leaves membranous, narrowly ovate or rarely elliptic. Fruit globose, to 6 mm on a scarcely enlarged perianth cup to 3 mm across.....**9. *L. cubeba***
b Leaves coriaceous, elliptic. Fruit ellipsoid, to 17 mm on an enlarged perianth cup 7–15 mm across....**10. *L. chartacea***

1. *Litsea sericea* (Wall. ex Nees) Hook.f., Fl. Brit. India 5[13]:156 (1886)
Tetranthera sericea Wall.*nom. nud.*

Deciduous shrub or small trees to 8(–12) m. Twigs dark brown or blackish, smooth or lenticellate, tomentose or glabrous. Perulate buds to 18 mm. Leaves more or less clustered, elliptic, 4–13 × 1–4 cm, base cuneate, apex acute or slightly acuminate, secondary veins 4–12 pairs, tertiary venation scalariform or reticulate, more or less villous below, sometimes villous on veins above, often glabrescent; occasionally somewhat glaucous below. Petiole 0.7–1.8 cm. Umbels solitary, to 1.2 cm, produced before leaves emerge. Umbel buds 5–6 mm in diameter. Male umbels with 9–14 flowers. Peduncles length 2–4 mm. Male flowers pale yellow to mid yellow, 3–5 mm, sericeous. Pedicels 3–9 mm. Tepals oblong, 2.5–3 mm. Stamens 9, 1.5–2 mm. Female umbels with 6–8 flowers. Peduncles 2–4 mm. Female flowers yellow, 3 mm, sericeous. Pedicels 2–6 mm. Tepals oblong, 2 mm. Staminodes 9. Style 0.5 mm, glabrous. Infructescences with 2–4 fruit. Peduncles 5–8 mm. Pedicels 10–22 mm, 0.6–1.5 mm in diameter, evenly thickened or slightly thicker beneath fruit. Cupules 2–3 mm across. Fruits globose or ellipsoid, 5–7 mm.

Distribution: Nepal, E Himalaya, Tibetan Plateau, S Asia and E Asia.



Altitudinal range: 1300–3900 m.

Ecology: Temperate forest with *Quercus*, *Rhododendron*, *Abies* and *Tsuga*.

Flowering: March–May(–July). **Fruiting:** June–August.

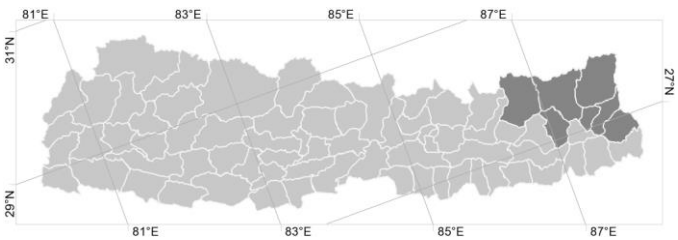
The combination of glabrous, perulate buds with blackish twigs and solitary umbels with long pedicels is characteristic of *Litsea sericea*. Some collections with reddish twigs and slender petioles are superficially similar to *L. cubeba* (Lour.) Pers., but the latter has glabrous leaves and the umbels are always clustered. Flowering specimens appear similar to *L. kingii* Hook.f., but the latter has shorter, glabrous pedicels and its young leaves are also glabrous. Fruiting material also has similarities with *Lindera nacasua* (D.Don) Meisn. and *Lindera assamica* (Meisn.) Kurz, but the former have shorter pedicels (2–6 mm) and the leaves of the latter have a shorter indumentum and more pronounced and scalariform tertiary venation. Umbel buds apparently develop over the summer and remain dormant till the spring flowering. Specimens with rufous indumentum on the lower surface of the leaves may prove to be distinct, and should be investigated further.

The plant is used as fodder.

2. *Litsea kingii* Hook.f., Fl. Brit. India 5[13]:156 (1886)

Deciduous trees to 15 m. Twigs dark reddish brown or blackish, smooth or slightly ridged, glabrous. Perulate buds to 17 mm. Leaves evenly spaced, elliptic or slightly obovate, 6–13 × 1.8–5 cm, base cuneate to attenuate, apex acute to acuminate or apiculate, secondary veins 9–12 pairs, tertiary venation reticulate, glabrous; underside glaucous or not. Petiole 0.5–1 cm. Inflorescences to 1.3 cm, produced before leaves emerge. Umbels solitary or 2–4 clustered on slender, 3–10 mm shoots. Umbel buds 4–5 mm in diameter. Male umbels with 5–8 flowers. Peduncles 5–11 mm. Male flowers yellow, 3 mm, glabrous. Pedicels 1–2 mm. Tepals ovate or obovate, sometimes clawed, 1.5–3 mm. Stamens 9, 2–3 mm. Female umbels with 4–5 flowers. Peduncles 6–11 mm. Female flowers 2–2.5 mm, glabrous. Pedicels 2–3 mm. Tepals ovate or obovate sometimes clawed, 2–3 mm. Staminodes 5–10. Style 1–1.5 mm, glabrous. Infructescences with 1–4 fruit. Pedicels 9–14 mm, 1–1.5 mm diameter, evenly thickened or slightly thicker beneath fruit. Cupules ca. 2 mm across. Fruit ovoid, obovoid or globose, 10 mm.
Fig. 2a

Distribution: Nepal, E Himalaya, Tibetan Plateau, Assam-Burma and E Asia.



Altitudinal range: 1900–2900 m.

Ecology: Temperate forests with *Quercus* and *Alnus*.

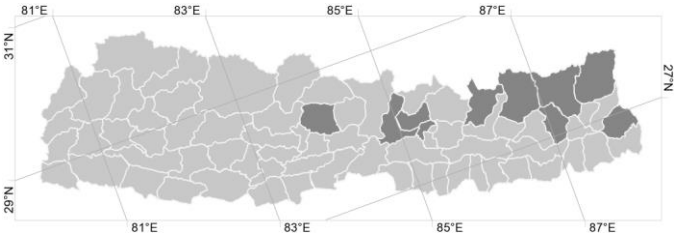
Flowering: March–May. **Fruiting:** May–October.

Although treated as as a synonym of *Litsea cubeba* (Lour.) Pers. by Kostermans & Chater (Enum. Fl. Pl. Nepal 3: 185. 1982) *L. kingii* is a distinctive species. With its reflexed peduncles and leaves with shiny upper surfaces, *L. kingii* is unlikely to be confused with any other species of *Litsea* except for flowering specimens which appear similar to *L. sericea* (Wall. ex Nees) Hook.f. The latter has longer, silkier pedicels and its young leaves are silky. Umbel buds apparently develop over the summer and remain dormant till the spring flowering. The rings of scars left by the perulate bud scales are more diffuse than those of *L. sericea* and *L. elongata* (Nees) Hook.f.

3. *Litsea elongata* (Nees) Hook.f., Fl. Brit. India 5[13]:165 (1886)
Daphnidium elongatum Nees in Wall., Pl. Asiat. Rar. 2[8]:63 (1831). *Tetranthera elongata* Wall.*nom. nud.*

Evergreen trees to 30 m, 60 cm dbh. Twigs dark or mid brown, slightly ridged or rugose, tomentose. Perulate buds to 40 mm. Leaves evenly spaced, elliptic, oblong or slightly obovate, 6.5–15 × 1.5–4.5 cm, base cuneate, apex acute or slightly acuminate, secondary veins 5–12 pairs, tertiary venation scalariform, villous below, not glaucous. Petiole 0.8–1.5 cm. Umbels solitary, produced after leaves have emerged, to 1.5 cm long, buds 3–6 mm in diameter. Male umbels with ca. 6 flowers. Peduncles 4–5 mm. Male flowers 7 mm, sericeous. Pedicels to 2 mm. Tepals ovate or oblong, 3–4 mm. Stamens 8–11, outer stamens 4–6 mm, inner stamens 4–5 mm. Female umbels with ca. 3 flowers. Peduncles ca. 6 mm. Female flowers 3 mm, sericeous. Pedicels 1 mm. Tepals narrowly ovate, 1.5 mm. Style 2 mm, glabrous. Infructescences with 2–4 fruit. Peduncles 6–12 mm. Pedicels 4–6 mm, 1–2 mm diameter, markedly thicker beneath fruit. Cupule 6–7 mm across. Fruits 10 mm, barrel-shaped.

Distribution: Nepal, W Himalaya, E Himalaya, Tibetan Plateau, Assam-Burma and E Asia.



Altitudinal range: 1500–3700 m.

Ecology: Temperate forest with Fagaceae, *Rhododendron*.

Flowering: September–November. **Fruiting:** May–August.

Litsea elongata is usually easily recognisable by its leaves with very pronounced scalariform tertiary venation (secondary and even tertiary venation may be impressed above) and often densely villous undersides. It can be confused with *L sericea* (Wall. ex Nees) Hook.f., but *L. sericea* has glabrous bud scales and blackish twigs which are much less tomentose. Umbel buds apparently develop over the summer and remain dormant till the spring flowering.

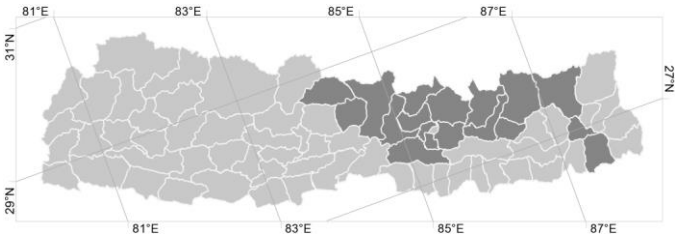
4. *Litsea doshia* (D.Don) Kosterm., J. Sci. Res. [Jakarta] 1:90 (1952)
Tetranthera doshia D.Don Prodr. fl. Nepal.:65 (1825).
Tetranthera oblonga Wall.*nom. nud.*; *T. oblonga* Wall. ex Nees; *Tomex doshia* Buch.-Ham.*nom. nud.*

□□□□ □□□□□ Kathe kaulo (Nepali)

Trees to 16 m, 70 cm dbh. Twigs pale brown or whitish, more or less lenticellate or scarcely lenticellate, glabrous. Perulate buds absent. Leaves evenly spaced, oblong or elliptic to slightly ovate or slightly obovate, 7–16 × 2–5 cm, base cuneate, apex acute, secondary veins 8–11 pairs, tertiary venation reticulate or reticulate-scalariform, glabrous, underside not or slightly glaucous. Petiole 1.4–1.9 cm.

Inflorescences to 2–5 cm long, umbels racemosely arranged on twig-like 2–25 mm shoots, produced after leaves have emerged. Umbel buds 5–6 mm in diameter. Male umbels with 4–6 flowers. Peduncles 8–18 mm. Male flowers yellow, 6–8 mm, sericeous. Pedicels to 1 mm. Tepals oblong, 2.5–4 mm. Stamens 9–13, outer stamens 7–8 mm, inner stamens ca. 5 mm. Female umbels with 2–5 flowers. Peduncles 5–6 mm. Female flowers pale yellow or white, 4 mm, sericeous. Pedicels 2 mm. Tepals ovate or oblong, 1.5–2.5 mm. Staminodes 9–10. Style 2.5 mm, glabrous. Infructescences with 1–9 fruit. Peduncles 8–10(–15) mm. Pedicels 8–15(–20) mm, 2–3 mm diameter, often markedly thicker beneath fruit. Cupule ca. 9 mm across. Fruits ellipsoid or ovoid, 12–20 mm.

Distribution: Endemic to Nepal.



Altitudinal range: 300–2900 m.

Ecology: Temperate forests with Fagaceae, *Rhododendron*, *Betula* and *Abies*.

Flowering: (May–)August–December. **Fruiting:** May–August(–October).

Litsea doshia is apparently endemic to Nepal. Records of its presence in E Himalaya, Assam and Burma relate to *L. albescens* (Hook.f) D.G.Long (Fl. Bhutan 1: 277. 1984).

Litsea doshia is characterized by its pale twigs and leaves with yellow midribs and secondary venation which contrast with the green of the glossy upper surfaces. With its open, racemose inflorescence, *L. doshia* is most similar to *L. panamanja*, but the latter has much larger inflorescences which are up to 20 cm in some collections from Burma. Kostermans & Chater (Enum. Fl. Pl. Nepal, 3: 183. 1982) recorded *Cinnadenia paniculata* (Hook.f.) Kosterm. from Nepal based on *Kanai & Shrestha 672656* (TI & KATH), a collection now identified as *L. doshia*.

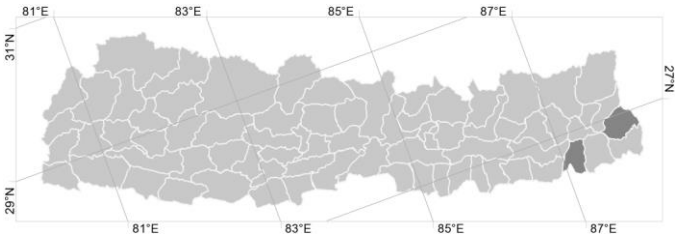
The plant is used as fodder.

5. *Litsea panamanja* (Buch.-Ham. ex Nees) Hook.f., Fl. Brit. India 5[13]:175 (1886)
Tetranthera panamanja Buch.-Ham. ex Wall.*nom. nud.*

Evergreen trees to 20 m. Twigs whitish, pale brown to dark brown, smooth or slightly ridged, glabrous. Perulate buds absent. Leaves evenly spaced, oblong, elliptic or slightly obovate, 9.5–28 × 3.8–10 cm, base cuneate, sometimes oblique, apex acute or obtuse, slightly acuminate, secondary veins 7–12 pairs, tertiary venation reticulate or reticulate-scalariform, glabrous; underside more or less glaucous. Petiole 1–2.5 cm. Inflorescences 3–9 cm, with 4–15 umbels

racemosely arranged on 3.5–40 mm shoots, produced after leaves have emerged. Umbel buds 3–5 mm in diameter. Male umbels with 6–8 flowers. Peduncles 7–16 mm. Male flowers yellow, 7 mm, sparsely sericeous. Pedicels 1–2 mm. Tepals oblong, 2–3 mm. Stamens 11–12, outer stamens 2–3.5 mm, inner stamens 1.5–2.5 mm. Female umbels with 4–6 flowers. Peduncles length 3–10 mm. Female flowers 2–2.5 mm, sericeous. Pedicels 1 mm. Tepals obovate, 1 mm. Staminodes 12. Style 1 mm, glabrous. Infructescences with 1–3 fruit. Peduncles 5–10 mm. Pedicels 4–5 mm, 3–5 mm diameter, markedly thicker beneath fruit. Cupule 15–20 mm across. Fruit globose, 15 mm.

Distribution: Nepal, E Himalaya, Assam-Burma, E Asia and SE Asia.



Altitudinal range: 700–800 m.

Ecology: Subtropical forest.

Flowering: March–May.

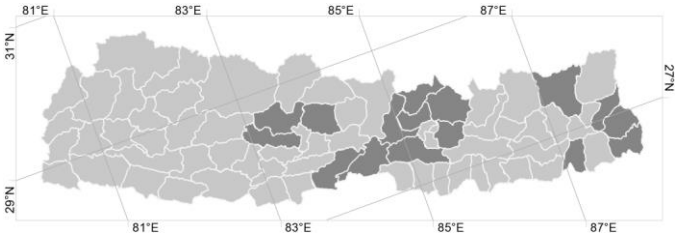
Litsea panamanja is most similar to *L. doshia* (D.Don) Kosterm., but has larger inflorescences and leaves with glaucous undersides. In some collections the inflorescence shoots develop small leaves along with the umbels.

6. *Litsea monopetala* (Roxb.) Pers., Syn. Pl. 2(1):4 (1806) *Tetranthera monopetala* Roxb. Pl. Coromandel 2[6]:26 (1800). *Litsea polyantha* Juss.; *Tetranthera macrophylla* Roxb.; *T. quadriflora* Roxb.

□□□□□□□ Kutmero (Nepali)

Evergreen trees to 15 m. Twigs mid brown or reddish, densely tomentose, glabrescent. Perulate buds absent. Leaves evenly spaced or slightly clustered, broadly elliptic or obovate, 11–14 × 6–11 cm, base rounded or slightly cordate, apex obtuse, secondary veins 7–12 pairs, tertiary venation scalariform, villous below; underside not glaucous. Petiole 1.8–2 cm. Inflorescences to 2 cm, with 2–8 umbels densely arranged on stout, 3–15 mm long shoots, produced after leaves have emerged. Umbel buds 3–5 mm in diameter. Male umbels with 6–8 flowers. Peduncles to 6 mm. Male flowers green or yellow, 4 mm, sericeous. Pedicels 1–1.5 mm. Tepals strap shaped, 2–2.5 mm. Stamens 9, outer stamens 3 mm, inner stamens 2 mm. Female umbels with 4–9 flowers. Peduncles 4–6 mm. Female flowers pale yellow-green, 3–3.5 mm, sericeous. Pedicels 2–2.5 mm. Tepals strap shaped, 2 mm. Staminodes 9. Style 1.5 mm, glabrous. Infructescences with 2–5 fruit. Peduncles 5–7 mm. Pedicels 6–12 mm, diameter 1–1.5 mm, slightly thickened beneath fruit. Cupules 4–5 mm across. Fruit ovoid, 10 mm.
Fig. 2b

Distribution: Nepal, W Himalaya, E Himalaya, Assam-Burma, S Asia, E Asia and SE Asia.



Altitudinal range: 80–2100 m.

Ecology: *Schima-Castanopsis* forest and evergreen and deciduous subtropical riverine forests.

Flowering: January–June(–October). **Fruiting:** April–July.

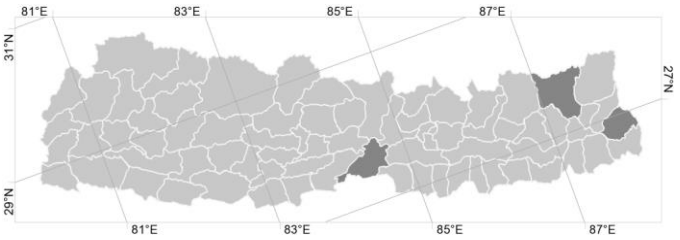
Litsea monopetala and *L. hookeri* (Meisn.) D.G.Long have the same type of inflorescence characterised by persistent, stout, tomentose inflorescence shoots with evident peduncle scars. *L. monopetala* has relatively broader leaves with a denser, reddish tomentum.

Leafy branches are used as fodder. The bark is astringent and used to treat diarrhoea. Powdered bark and roots are used in external applications to relieve pain.

7. *Litsea hookeri* (Meisn.) D.G.Long, Notes Roy. Bot. Gard. Edinburgh 41(3):510 (1984)
Cylicodaphne hookeri Meisn. in A.DC., Prodr. 15(1):209 (1864). *Litsea khasyana* Meisn.; *L. meissnerii* Hook.f.*nom. superfl.*; *Tetranthera khasyana* Meisn.

Evergreen trees to 20 m. Twigs pale brown, slightly ridged, tomentose. Perulate buds absent. Leaves evenly spaced, oblong or elliptic or slightly obovate, 17–22 × 5.5–9 cm, base cuneate, apex acute, secondary veins 10–12 pairs, tertiary venation reticulate-scalariform, tomentose below on midrib and veins and sparsely pubescent on lamina; underside slightly glaucous. Petiole 1.2–1.8 cm. Inflorescences to 1.5 cm, with 2–8 umbels densely arranged on stout, 4–8 mm shoots, produced after leaves have emerged. Umbel buds 3–5 mm in diameter. Male umbels with 5–8 flowers. Peduncles 10 mm. Male flowers green, 5 mm, sericeous. Pedicels 2–2.5 mm. Tepals oblong or obovate, 3–3.5 mm. Stamens 12, outer stamens 3 mm, inner stamens 1.5 mm. Female umbels with 5–8 flowers. Peduncles 6–8 mm. Female flowers yellow, 3.5 mm, tomentose outside and glabrous inside, pedicels 2.5–3 mm. Tepals ovate, 2 mm. Staminodes 10–11. Style 2 mm, glabrous. Fruit not seen.

Distribution: Nepal, E Himalaya and Assam-Burma.



Altitudinal range: 200–800 m.

Ecology: Subtropical forests.

Flowering: March–May.

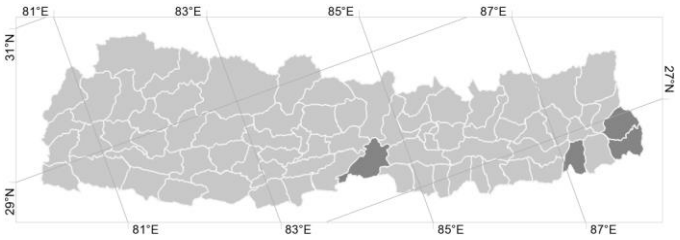
Litsea hookeri is clearly close to *L. monopetala* (Roxb.) Pers. as both of them are characterized by persistent, stout, tomentose inflorescence shoots with evident peduncle scars. *L. hookeri* is distinguished by its more elongate leaves which are pale below, cuneate at the base and with a sparse, pale brown, not reddish tomentum.

8. *Litsea salicifolia* (Roxb. ex Nees) Hook.f., Fl. Brit. India 5[13]:167 (1886)
Tetranthera salicifolia Roxb. ex Nees in Wall., Pl. Asiat. Rar. 2[8]:66 (1831). *Tetranthera glauca* Wall.*nom. nud.*

□□□□□□ Pahenli (Nepali)

Evergreen trees to 10 m. Twigs pale to dark brown, smooth or slightly ridged, tomentose, glabrescent. Perulate buds absent. Leaves evenly spaced, elliptic to oblong or slightly obovate or slightly ovate, 6.2–18 × 1.6–5 cm, base cuneate or slightly rounded, apex acute to obtuse or acuminate, secondary veins 7–13 pairs, tertiary venation scalariform, sometimes sericeous below, underside glaucous or not. Petiole 1–4 cm. Inflorescences to 1.2 cm long, with 6–15 umbels in sessile clusters or densely arranged on slender, 2–5 mm shoots, produced after leaves have emerged. Umbel buds 2–4 mm in diameter. Male umbels with 4–5 flowers. Peduncles 4–7 mm. Male flowers white or yellowish green, glabrous, 4 mm. Pedicels 1–1.5 mm. Tepals ovate or oblong, 2–2.5 mm. Stamens 4–7, outer stamens 4 mm, inner stamens 2.5–4 mm. Female umbels with ca. 4 flowers. Peduncles 3–4 mm. Female flowers yellow or green, 3 mm, glabrous. Pedicels 1 mm. Tepals elliptic, sometimes slightly clawed, 2 mm. Staminodes 10. Style 2 mm, glabrous. Infructescences with 1–4 fruit. Peduncles 5–6 mm. Pedicels 3–5 mm, 1–2 mm diameter, slightly thickened beneath fruit. Cupule 3–4 mm across. Fruit ovoid, 10 mm.

Distribution: Nepal, E Himalaya, Assam-Burma, S Asia, E Asia and SE Asia.



Altitudinal range: 100–800 m.

Ecology: Subtropical deciduous or evergreen forest. Often associated with rivers.

Flowering: March. **Fruiting:** May.

Momiyama (Fl. E. Himalaya: 102. 1966) misapplied the name *Litsea oblonga* (Wall. ex Nees) Hook.f. to this species.

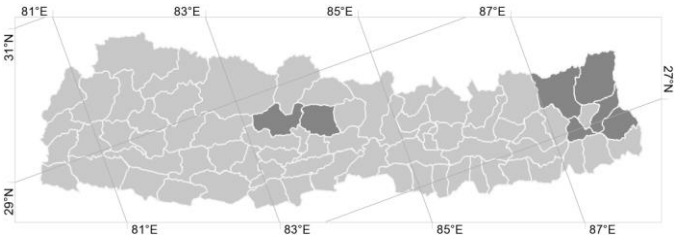
A vegetatively variable species, *L. salicifolia* can have large leaves with glaucous undersides and prominent secondary venation or small leaves with much less distinct venation. The axillary clusters of many umbels are characteristic, as are the almost glabrous flowers. Whilst it is usually recorded as a small tree, one collection, *Troth 708* (KATH), refers to it as a large tree. The plants with large leaves and prominent scalariform venation are perhaps distinct from those with the glaucous undersides.

9. *Litsea cubeba* (Lour.) Pers., Syn. Pl. 2(1):4 (1806)
Laurus cubeba Lour. Fl. Cochinch. 1:252 (1790). *Benzoin cubeba* (Lour.) Hatus.; *Daphnidium cubeba* (Lour.) Nees; *Lindera aromatica* Brandis; *L. dielsii* Lév.; *Litsea citrata* Blume; *Persea cubeba* (Lour.) Spreng.; *Tetranthera cubeba* (Lour.) Kostel.; *T. polyantha* Wall.*nom. nud.*; *T. polyantha* Wall. ex Nees

□□□□□□□□□ Siltimur (Nepali)

Evergreen trees to 18 m, 34 cm dbh. Twigs dark, often reddish brown, smooth or slightly ridged, glabrous. Perulate buds absent. Leaves evenly spaced, narrowly ovate or elliptic, 7–11.5 × 1.8–3.5 cm, base rounded to cuneate or slightly attenuate, apex acute to acuminate, secondary veins 6–10 pairs, tertiary venation reticulate, glabrous, underside not or slightly glaucous. Petioles 1–1.6 cm. Inflorescences to 1 cm long, 1–6(–10) umbels densely arranged on slender, 2–8 mm shoots, produced after leaves have emerged. Umbel buds 2–4 mm in diameter. Male umbels with ca. 5 flowers. Peduncles 4–7 mm. Male flowers 4 mm, glabrous. Pedicels to 2 mm. Tepals oblong, 2.5 mm. Stamens 9, to 3 mm. Female umbels with 3–6 flowers. Peduncles 4–6 mm. Female flowers 1.5–3 mm, sericeous. Pedicels 1–1.5 mm. Tepals obovate, oblong or ovate, 1–1.5 mm. Staminodes 9. Style 1 mm, glabrous. Infructescences with up to 7 fruit. Peduncles 6–7 mm. Pedicels 2–6 mm, 1 mm diameter, evenly-thickened. Cupules 1.5–3 mm across. Fruits globose, 5–6 mm.

Distribution: Nepal, E Himalaya, Assam-Burma and E Asia.



Altitudinal range: 1000–2600 m.

Ecology: Temperate forests or scrub with *Quercus*.

Flowering: November–March. **Fruiting:** July–November.

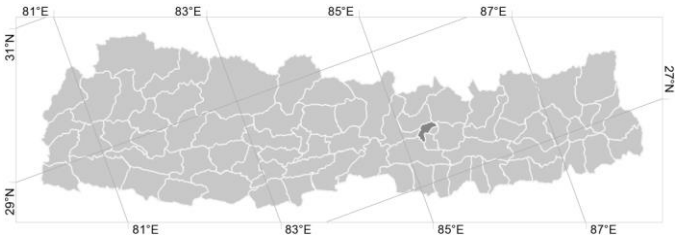
Litsea cubeba is easily recognized by its slender, smooth, often reddish twigs and slender petioles. It is most similar to *L. chartacea* (Wall. ex Nees) Hook.f., but is distinguished by its papery leaves and smaller fruits. It is distinguished from *L. salicifolia* (Wall. ex Nees) Hook.f. by its smaller, narrowly ovate leaves with fine secondary venation. Some individuals of *L. sericea* are vegetatively similar, but its leaves are always at least slightly hairy below.

The species has many medicinal properties and is used in the treatment of coughs, bronchitis and lung diseases. The edible fruits are aromatic and carminative and are used for dizziness, headache, hysteria, paralysis and loss of memory. An essential oil extracted from the seeds is used for genitourinary conditions such as cystitis and gonorrhoea.

10. *Litsea chartacea* (Wall. ex Nees) Hook.f., Fl. Brit. India 5[13]:170 (1886)
Tetranthera chartacea Wall. ex Nees in Wall., Pl. Asiat. Rar. 2[8]:67 (1831). *Tetranthera chartacea* Wall.*nom. nud.*

Evergreen trees to 8 m. Twigs dark, often reddish brown, smooth or slightly ridged, glabrous. Perulate buds absent. Leaves evenly spaced, elliptic, 8–16 × 2.5–6.5 cm, base cuneate, apex acute to acuminate, secondary veins 6–9 pairs, tertiary venation reticulate, glabrous or minutely pubescent below, underside more or less glaucous. Petioles 1–1.5 cm. Inflorescences to 1.5 cm long, 1–5 umbels densely arranged on slender, 2–5 mm shoots, produced after leaves have emerged. Umbel buds 4–6 mm in diameter. Male umbels with 5–7 flowers. Peduncles 5–12 mm. Male flowers 5 mm, sericeous. Pedicels ca. 1 mm. Tepals oblong, to 2.5 mm. Stamens 9, to 4 mm. Female flowers not seen. Infructescences with up to 4 fruit. Peduncles to 12 mm. Pedicels to 15 mm, to 2 mm diameter, thicker towards apex. Cupules 7–15 mm across. Fruits ellipsoid, to 17 mm.

Distribution: Nepal and E Himalaya.



Altitudinal range: 1500–1800 m.

Ecology: Warm broad-leaved forests.

Flowering: May–June. **Fruiting:** October.

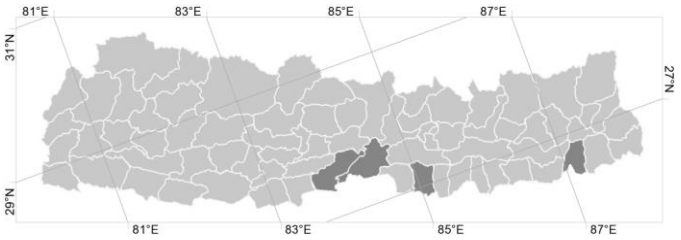
Litsea chartacea is an infrequently collected species most similar to *L. cubeba* (Lour.) Pers., but distinguished by its larger, more leathery elliptic leaves, and by its very much larger fruits.

11. *Litsea glutinosa* (Lour.) C.B.Rob., Philipp. J. Sci. 6:321 *Sebifera glutinosa* Lour. Fl. Cochinch. 2:638 (1790). *Laurus involucrata* Roxb.*later homonym, non lam.*; *Litsea sebifera* var. *glabraria* Hook.f.; *Tetranthera apetala* Roxb.; *T. laurifolia* Jacq.; *T. polycephala* Wall. ex Meisn.; *T. roxburghii* Nees; *Tomex sebifera* Willd.; *T. tetranthera* Willd.

□□□□ Maida (Nepali)

Deciduous trees to 15 m. Twigs pale brown to blackish, smooth or slightly ridged, tomentose, glabrescent. Perulate buds absent. Leaves evenly spaced or slightly clustered, elliptic or oblong to ovate or obovate, 6.5–19 × 2.3–7 cm, base cuneate or rounded, rarely oblique, apex acute or obtuse, sometimes slightly acuminate, secondary veins 6–12 pairs, tertiary venation scalariform or reticulate, glabrous or pubescent below and on veins and midrib above; underside not or slightly glaucous. Petiole 1.3–3 cm. Inflorescences 2.5–6 cm, with 3–7 umbels in a subumbellate cluster at the end of 1.5–4 cm shoots, produced after leaves have emerged. Umbel buds 3–7 mm in diameter. Male umbels with ca. 12 flowers. Peduncles 12–18 mm. Male flowers green or yellow, 6 mm, sericeous. Pedicels 4 mm. Tepals absent. Stamens 18, outer stamens 4–5 mm, inner stamens 3–4 mm. Female umbels with 8–9 flowers. Peduncles 4–11 mm. Female flowers pale green, 2–2.5 mm, sericeous. Pedicels 1.5–2 mm. Tepals absent or strap-shaped, ca. 1 mm. Staminodes 12–14. Style 1.5–2 mm, glabrous. Infructescences with 2–3 fruit. Peduncles 8–11 mm. Pedicels 4–5 mm, 1–2 mm diameter, slightly thicker beneath fruit. Fruit globose, 9 mm.

Distribution: Nepal, W Himalaya, E Himalaya, Assam-Burma, S Asia, E Asia and SE Asia.



Altitudinal range: 100–1000 m.

Ecology: Subtropical mixed forests and woodlands.

Flowering: March–July. **Fruiting:** August.

Litsea glutinosa is a vegetatively variable species and Hooker (Fl. Brit. Ind. 5: 157. 1886) recognized three varieties (within *Litsea sebifera*), two of which are present in Nepal. Glabrous, oblong-leaved specimens are referable to *L. sebifera* var. *sebifera*, while the ovate-leaved more tomentose specimens are *L. sebifera* var. *glabraria*. These varieties may be transferable to *L. glutinosa*, but more research is needed. Although tepals may be irregularly formed in other species (especially *L. doshia* (D.Don) Kosterm.), *L. glutinosa* is the only species which regularly has no tepals whatsoever.

9. *Neolitsea* (Benth.) Merr.nom cons., Philipp. J. Sci. Suppl. 1:56 (1906)

Evergreen or deciduous large or small trees. Perulate buds present. Leaves alternate or subopposite, more or less clustered at the tips, secondary venation strongly or weakly 3-veined. Inflorescences umbellate, enclosed by decussate bracts, solitary or in clusters on lateral short-shoots. Flowers small, unisexual, dimerous. Hypanthium cup-shaped, not enclosing the ovary. Tepals 4. Male flowers usually with 6 stamens in 3 whorls. Stamens 4-valved, introrse, the outer whorls eglandular, inner whorl glandular. Rudimentary ovary present. Female flowers usually with 6 filiform staminodes in 3 whorls, the outer whorls eglandular and the inner whorl glandular. Fruit on a scarcely enlarged perianth cup, tepals not persistent.

Worldwide 80 species in Indomalesia, E Asia and Australia. Three species in Nepal.

Key to Species

1a Leaves to 28 cm long, hairy below, at least around the veins, with inrolled margins, very strongly clustered at tips of twigs and below previous year's bud scars. Fruits clearly ovoid.....**1. *N. cuipala***

b Leaves to 15 cm long, completely glabrous, with flat margins, weakly clustered towards tips of twigs or rather evenly spaced along twig. Fruits globose or slightly ellipsoid .....2.

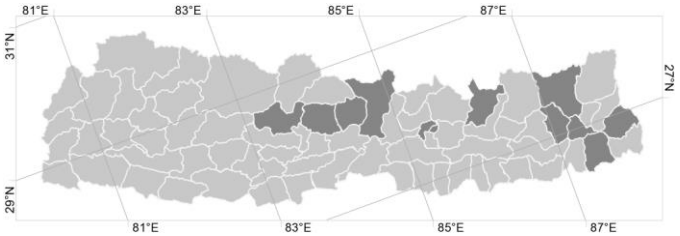
2a Largest leaves to 15 cm, strongly 3-veined at base ..... **2. *N. foliosa***

b Largest leaves to 10 cm, weakly 3-veined at base so that the basal pair of veins is not clearly distinguished from the other veins.....**3. *N. pallens***

1. *Neolitsea cuipala* (D.Don) Kosterm., Bull. Bot. Surv. India 10:287 (1968)
Tetranthera cuipala D.Don Prodr. fl. Nepal.:65 (1825). *Laurus cuipala* Buch.-Ham.*nom. nud.*; *Litsea cuipala* (D.Don) Nees; *Tetranthera lanuginosa* Wall.*nom. nud.*

Trees to 20 m. Twigs glabrous or minutely tomentose. Resting buds to 2 mm, glabrous or sericeous. Perulate buds 10–25 mm, sericeous. Leaves strongly clustered, elliptic to slightly obovate or slightly ovate, 8.5–28 × 2.3–6.5 cm, base cuneate, apex acute or slightly acuminate, margin flat or inrolled, more or less tomentose or strigose below, underside glaucous; clearly 3-veined secondary veins 3–6 pairs. Petioles 0.6–2.5 cm. Male inflorescences ca. 6-flowered, clusters to 1.6 cm across. Flowers 8 mm, sericeous. Pedicels 3 mm. Tepals broadly or narrowly ovate with acute apex, 4–5 mm. Outer whorl of anthers 7–9 mm, inner whorl 6–8 mm. Rudimentary ovary and style glabrous. Female inflorescence 5–6-flowered, clusters to 1.5 cm across. Flowers 3 mm long, sericeous. Pedicels 3–8 mm. Tepals narrowly triangular, 2.5–3 mm. Staminodes 1–2 mm. Ovary and style glabrous. Infructescences with up to 12 fruit. Pedicels 5–7 mm, evenly thickened. Perianth remains 4 mm in diameter. Fruits ovoid, to 13 mm.

Distribution: Nepal, W Himalaya, E Himalaya and Assam-Burma.



Altitudinal range: 900–2100 m.

Ecology: Warm temperate and subtropical forests. Frequently with *Castanopsis*.

Flowering: March. **Fruiting:** May–October.

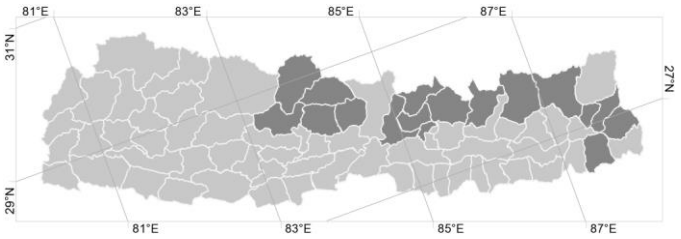
Neolitsea cuipala is easily identified by its very large and strongly clustered, 3-veined leaves. Bud size was used to differentiate between *N. cuipala* and *N. foliosa* (Nees) Gamble by Long (Fl. Bhutan 1: 278. 1984) but this character is misleading as the size of the buds varies enormously according to the season. Perulate buds are most prominent between January and April, though early stages may also be seen between August and December. They are not present between May and July. Trees flower as perulate buds are developing, so flowers are on the current twig. By the time fruit has been set the bud has expanded and the new twig grown, so that fruits are on the previous year's wood.

Oil from the seed is applied to boils and scabies.

2. *Neolitsea foliosa* (Nees) Gamble, Fl. Madras 2[7]:1240 (1925)
Litsea foliosa (Nees) Nees; *Tetranthera foliosa* Wall.*nom. nud.*

Small trees to 10 m, or rarely large trees to 20 m. Twigs glabrous. Resting buds to 2 mm, glabrous. Perulate buds to 33 mm, sericeous. Leaves evenly spaced or strongly clustered, elliptic or oblong to slightly ovate or slightly obovate, 7–15 × 1.4–4.8 cm, base cuneate, apex acuminate, margin flat or inrolled, glabrous; underside glaucous; clearly 3-veined secondary veins 3–5 pairs. Petioles 0.8–2 cm. Male inflorescences ca. 5-flowered, clusters to 1.2 cm across. Flowers yellow, 4–6 mm, sparsely sericeous. Pedicels 2–4 mm. Tepals ovate, 2.5–4 mm, acute or obtuse. Outer whorl of anthers ca. 5 mm, inner whorl 3–4 mm. Rudimentary ovary and style glabrous. Female inflorescences 4–10-flowered, clusters to 0.7–1 cm. Flowers pale yellow or green, ca. 3 mm long, sericeous. Pedicels 2–5 mm. Tepals broadly or narrowly ovate, 2 mm. Staminodes 1–2 mm. Ovary glabrous or hairy at apex. Style glabrous or hairy. Infructescences with 2–7 fruits. Pedicels 6–12 mm, rather thickened beneath the fruit. Perianth remains 4–5 mm in diameter. Fruits globose or ellipsoid, 10–13 mm.
Fig. 2c-e

Distribution: Nepal, E Himalaya and Assam-Burma.



Altitudinal range: 1500–3500 m.

Ecology: Moist evergreen broad-leaved forest, often with *Quercus lamellosa*, sometimes rather abundant.

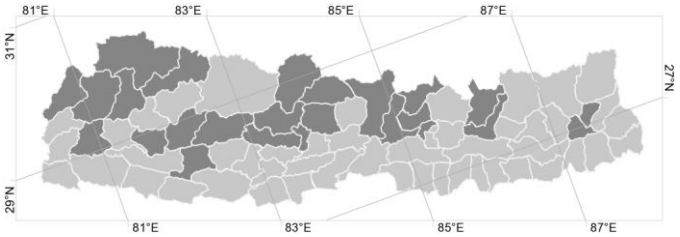
Flowering: March–April(–October). **Fruiting:** (May–)July–October.

Neolitsea foliosa and *N. pallens* (D.Don) Moimy. & H.Hara ex H.Hara are very close, and are distinguished by the larger more coriaceous leaves of the former.

3. *Neolitsea pallens* (D.Don) Momiy. & H.Hara ex H.Hara, J. Jap. Bot. 47:269 (1972)
Tetranthera pallens D.Don Prodr. fl. Nepal.:66 (1825). *Tetradenia consimilis* Nees; *Tetranthera umbrosa* Wall.*nom. nud.*

Small trees to 10 m, or rarely large trees to 25 m. Twigs glabrous or minutely tomentose. Resting buds to 2 mm, glabrous or sericeous. Perulate buds 12–25 mm, sericeous. Leaves more or less clustered, elliptic or oblong to slightly ovate or slightly obovate, 4–9.5 × 1.2–3 cm, base cuneate or rarely rounded, apex acute to acuminate, margin flat, glabrous; underside usually glaucous; weakly 3-veined, secondary veins 3–6 pairs. Petioles 0.7–1.7 cm. Male inflorescences 4–6-flowered, clusters to 1–1.3 cm. Flowers yellow or orange-yellow, 4–7 mm, sericeous or sparsely sericeous. Pedicels 2–4 mm. Tepals ovate, 2.5–4 mm, acute or obtuse. Outer whorl of anthers 4.5–5 mm, inner whorl 3.5–6 mm. Rudimentary ovary hairy at apex. Style more or less hairy. Female inflorescence ca. 6-flowered, clusters to 0.8 cm. Flowers yellow, 2.5 mm long, sericeous. Pedicels ca. 3 mm. Tepals narrowly ovate, 2.5 mm. Staminodes 1 mm. Ovary glabrous or hairy at apex. Style slightly hairy. Infructescences with 1–7 fruits. Pedicels 6–13 mm, evenly thickened or slightly thicker beneath fruit. Perianth remains 3 mm in diameter. Fruits ellipsoid, 9–10 mm.
Fig. 2f

Distribution: Nepal, W Himalaya and Tibetan Plateau.



Altitudinal range: 1700–3500 m.

Ecology: *Quercus-Rhododendron* forest, with *Quercus lamellosa* or *Q. semecarpifolia*. In gullies and exposed sites, sometimes very abundant.

Flowering: (December–)February–June. **Fruiting:** May–October(–January).

Although it is close to *Neolitsea foliosa* (Nees) Gamble, *N. pallens* is distinguished by its smaller, more chartaceous leaves.

A paste of the fruit is used to treat skin diseases.

10. *Dodecadenia* Nees, in Wall., Pl. Asiat. Rar. 2[8]:61 (1831)

Small, evergreen trees. Perulate buds present. Leaves alternate, evenly spaced along the twig, secondary venation pinnate. Flowers large, solitary or rarely in clusters of up to 3, each flower enclosed by numerous persistent bracts, bisexual or rarely unisexual, trimerous. Hypanthium cup-shaped, not enclosing the ovary. Tepals usually 6. Stamens usually 12 in 4 whorls, 4-valved, all introrse. Outer whorls eglandular, inner whorls glandular. Female flowers with 12 staminodes, the inner whorls glandular. Fruit on an enlarged perianth cup, tepals not persistent.

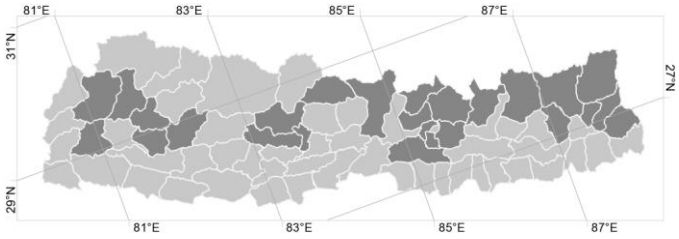
A monotypic genus from the Himalayas.

1. *Dodecadenia grandiflora* Nees, in Wall., Pl. Asiat. Rar. 2[8]:63 (1831)
Dodecadenia griffithii Hook.f.; *Laurus macrophylla* D.Don; *Tetranthera grandiflora* Wall.*nom. nud.*

□□□□□ Kaule (Nepali)

Trees to 15 m. Young twigs glabrous or greyish tomentose, often reddish, becoming grey brown, rugose and lenticellate. Perulate buds present. Leaves elliptic or oblong to slightly obovate, 7–14 × 1.5–4.5 cm, length:width ratio 3.3–4.7, apex slightly acuminate, base cuneate, secondary veins 7–11 pairs, tertiary venation reticulate, glabrous, underside glaucous or not. Petioles 0.8–1.5 cm. Flowers pale green or yellow, bisexual or rarely unisexual. Bisexual and male inflorescences to 1.5 cm, female inflorescences to 1 cm. Peduncles 2–3 mm. Pedicels 2 mm. Bisexual and male flowers 8–10 mm. Tepals 6–8, 6–10 mm, or elliptic or oblong, sericeous inside and out. Stamens 7–10 mm, those of the outer whorls longest. Ovary 2 mm, glabrous or hairy. Style 5 mm, sparsely hairy. Female flowers to 7 mm, with 4–5 mm tepals. Staminodes 3–4 mm. Infructescences to 3 cm, with 1(–3) fruit. Peduncles 2–4 mm. Pedicels stout, to 7 mm. Perianth remains 5–9 mm across. Fruit ellipsoid, 13–15 mm.

Distribution: Nepal, E Himalaya, Tibetan Plateau, Assam-Burma and E Asia.



Altitudinal range: 600–3400 m.

Ecology: Temperate *Quercus*-Lauraceae forests with *Rhododendron* and *Tsuga*.

Flowering: February–April(–September). **Fruiting:** May–October.

Each flower is solitary within its bracts, but sometimes 2 or very rarely 3 are grouped together in a single cluster. Occasionally unisexual flowers are found, with male and female flowers on different trees. Female inflorescences are very much smaller (less than 1 cm long) and the flowers have 4–5 mm long tepals and 12 3–4 mm long staminodes. The male flowers have normally sized ovaries and therefore appear to be bisexual, but as ovules were not found in their ovaries they are functionally male.

11. *Actinodaphne* Nees, in Wall., Pl. Asiat. Rar. 2[8]:68 (1831)

Large or small evergreen trees. Perulate buds present. Leaves whorled or alternate and densely clustered, secondary venation pinnate or weakly 3-veined. Flowers small, unisexual, trimerous, in panicles or umbels enclosed by decussate bracts, the umbels solitary or in cluster on lateral short-shoots. Hypanthium cup-shaped, not enclosing the ovary. Tepals 6. Male flowers usually with 9 stamens in 3 whorls. Stamens 4-valved, introrse, the outer whorls eglandular, inner whorl glandular. Rudimentary ovary present. Female flowers usually with 9 staminodes in 3 whorls. Fruit on an enlarged perianth cup, tepals not persistent.

Worldwide 100 species in Indomalesia and E Asia. Four species in Nepal.

The leaves are more strongly whorled than in *Litsea*, otherwise these genera can be rather difficult to separate. *Actinodaphne reticulata* Meisn. was reported from Sankhuwasaba by Hara (Fl. E. Himalaya: 99. 1966), but it has not been possible to verify this record and it is likely that it should be referred to *A. longipes* Kosterm. and so is excluded from this account.

Key to Species

1a Inflorescences paniculate. Leaves weakly 3-veined, more than 8 cm wide. Twigs 5–10 mm thick ..... **2. *A. obovata***

b Inflorescences umbellate. Leaves pinnate veined, up to 6 cm wide. Twigs up to 5 mm thick, usually much finer.....2.

2a Leaves to 2.5–6 cm broad, with 5–8 pairs of secondary veins. Umbels on 3–5 mm peduncles.....**1. *A. angustifolia***
b Leaves to 3 cm broad, with 9–23 pairs of secondary veins. Umbels sessile, solitary or several on short-shoots .....3.

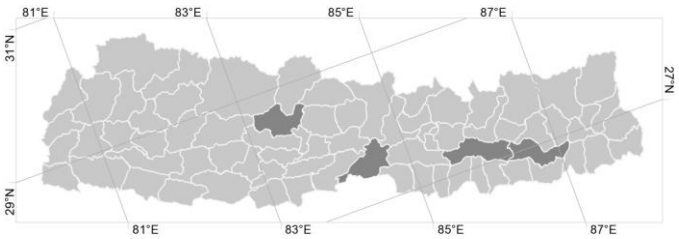
3a Leaves with 11–23 pairs of secondary veins and length:width ratio > 4..... **3. *A. longipes***
b Leaves with 9–11 pairs of secondary veins and length:width ratio < 4.....**4. *A. sikkimensis***

1. *Actinodaphne angustifolia* (Blume) Nees, in Wall., Pl. Asiat. Rar. 3[11]:31 (1832)
Litsea angustifolia Blume Bijdr. Fl. Ned. Ind. [11]:566 (1826). *Tetranthera angustifolia* (Blume) Nees

□□□□□□□ Lampate (Nepali)

Trees to 20 m. Twigs slender, to 4 mm in diameter, mid brown or pale brown, smooth, densely orange tomentose when young tomentose, glabrescent. Perulate buds present. Leaves elliptic, oblong or slightly obovate, 10–22 × 2.5–6 cm, base cuneate, apex more or less acuminate, margin sometimes inrolled at base, otherwise flat, pinnate veined, secondary veins 5–8 pairs, tertiary venation scalariform, rather villous on midrib and veins below, sometimes also on lamina, underside glaucous. Petioles 1–2.2 cm. Umbels on 2–7 mm short-shoots. Male inflorescence not seen. Female inflorescences with 2–4 umbels. Female flowers not seen. Infructescences with 3–12 globose, 10 mm-long fruit on perianth cups 4–5 mm across. Pedicels 3–7 mm.

Distribution: Nepal, E Himalaya and Assam-Burma.



Altitudinal range: 400–700 m.

Ecology: Subtropical forests.

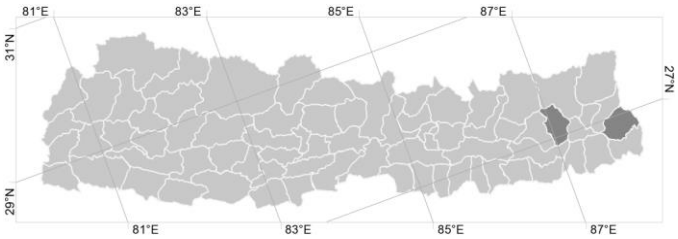
Flowering: October. **Fruiting:** November–February.

Actinodaphne angustifolia is distinguished by large, pinnate-veined leaves and velvety young twigs. The misspelling '*angusifolia*' by Kostermans & Chater (Enum. Fl. Pl. Nepal 3: 182. 1982) has been followed by later authors (e.g. Annot. Checkl. Fl. Pl. Nepal: 160. 2000; Enum. Fl. Pl. Nepal: 7: 2001). The timber is used for construction.

2. *Actinodaphne obovata* (Nees) Blume, Mus. Bot. 1:342 (1851)
Tetradenia obovata Nees in Wall., Pl. Asiat. Rar. 2[8]:64 (1831). *Laurus obovata* Buch.-Ham. ex Nees*nom. inval.*; *Tetranthera obovata* Buch.-Ham. ex Wall.*nom. nud.*

Trees to 15 m. Twigs stout, to 5–10 mm in diameter, blackish, smooth or lenticellate, tomentose. Perulate buds present. Leaves obovate to slightly ovate, 24–32 × 10–13 cm, base cuneate, apex acute or slightly acuminate, margin flat, weakly 3-veined, secondary veins 5–8 pairs, tertiary venation scalariform, tomentose on midrib and veins and sparsely pubescent on lamina, underside glaucous or not. Petioles 3.5–9 cm. Flowers in paniculate inflorescences. Male inflorescences 4–5 cm. Male flowers yellowish green, 8 mm, sericeous. Pedicels 1–5 mm. Tepals broadly ovate, 6 mm. Stamens 6–7 mm. Female inflorescences to 3 cm. Tepals ca. 2.5 mm. Fruit ellipsoid, 15–20 mm long on a perianth cup ca. 10 mm across.
Fig. 2g-j

Distribution: Nepal, E Himalaya, Tibetan Plateau, Assam-Burma and E Asia.



Altitudinal range: 300–1600 m.

Ecology: Subtropical forests.

Flowering: March.

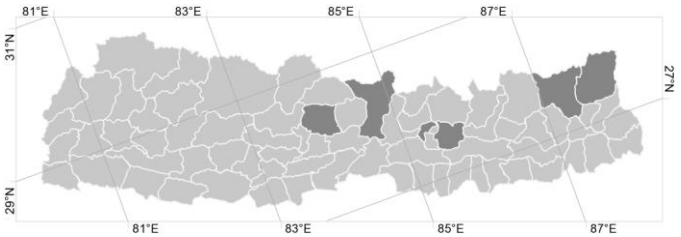
Large, weakly 3-veined leaves are found only in *Actinodaphne obovata*, and with its stout twigs and paniculate inflorescences it is quite distinct from the other Nepalese *Actinodaphne* species.

3. *Actinodaphne longipes* Kosterm., Reinwardtia 9:98 (1974)
Actinodaphne reticulata var. *glabra* Meisn.; *Laurus gushia* Buch.-Ham.*nom. inval.*

Trees to 15 m. Twigs slender, to 2 mm in diameter, pale brown or grey brown, glabrous, smooth or lenticellate. Perulate buds present. Leaves elliptic to slightly ovate or slightly obovate, 8–16 × 1.4–3 cm, base cuneate, apex slightly acuminate, margin slightly inrolled or inrolled at base and otherwise flat, pinnate veined, secondary veins 11–23 pairs, tertiary venation reticulate, glabrous or minutely sparsely sericeous below,

underside glaucous. Petioles 0.5–1.3 cm. Umbels on 2–4 mm short-shoots, buds 4–7 mm in diameter. Male inflorescences to 1.5 cm, consisting of 1–3 sessile umbels, with ca. 6 flowers per umbel. Male flowers white, 10 mm long, densely sericeous. Pedicels 3–4 mm. Tepals oblong or narrowly ovate, 4–5 mm. Stamens 6–8 mm. Female inflorescences to 1 cm, consisting of 2 or 3 sessile umbels, with 5–6 flowers per umbel. Female flowers 4 mm long, densely sericeous. Pedicels 3–4 mm. Tepals strap-shaped, 2 mm. Infructescences with 1–5 broadly ellipsoid fruit, ca. 15 mm long, on perianth cups 9–10 mm across. Pedicels 2–3 cm.

Distribution: Nepal, E Himalaya and Assam-Burma.



Altitudinal range: 1600–2600 m.

Ecology: Temperate forest.

Flowering: March, October. **Fruiting:** April.

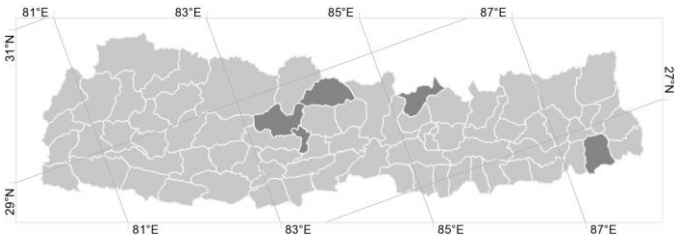
The very long, narrow leaves clustered at the tips of the twigs are diagnostic for *Actinodaphne longipes*.

4. ***Actinodaphne sikkimensis*** Meisn., in A.DC., Prodr. 15(1):213 (1864)

□□□□ Khapate (Nepali)

Trees to 6 m. Twigs slender, to 2 mm diameter, mid brown, sometimes reddish, smooth, glabrous. Leaves oblong or elliptic to slightly ovate, 7–13 × 1.5–3 cm, base cuneate, apex slightly acuminate, margin flat, pinnate veined, secondary veins 9–11 pairs, tertiary venation scalariform, glabrous, underside glaucous. Petioles 0.7–1 cm. Umbels solitary, on 2 mm short-shoots. Male inflorescences not seen. Female inflorescences not seen. Infructescences with 1–4 ellipsoid fruit, 11–14 mm long, on perianth cups 2 mm across. Pedicels 4–7 mm.

Distribution: Nepal, E Himalaya and Assam-Burma.



Altitudinal range: 1600–2700 m.

Ecology: Subtropical and warm temperate forests.

Flowering: October. **Fruiting:** May.

Fig. 1.
LAURACEAE. **Cryptocarya amygdalina**: a, inflorescence and leaf; b, opened flower with pistil removed; c, pistil; d, infructescence. **Cinnamomum tamala**: e, inflorescence and leaves; f, opened flower with pistil removed; g, pistil. **Phoebe cathia**: h, infructescence and leaves. **Machilus odoratissima**: i, inflorescence and leaves.

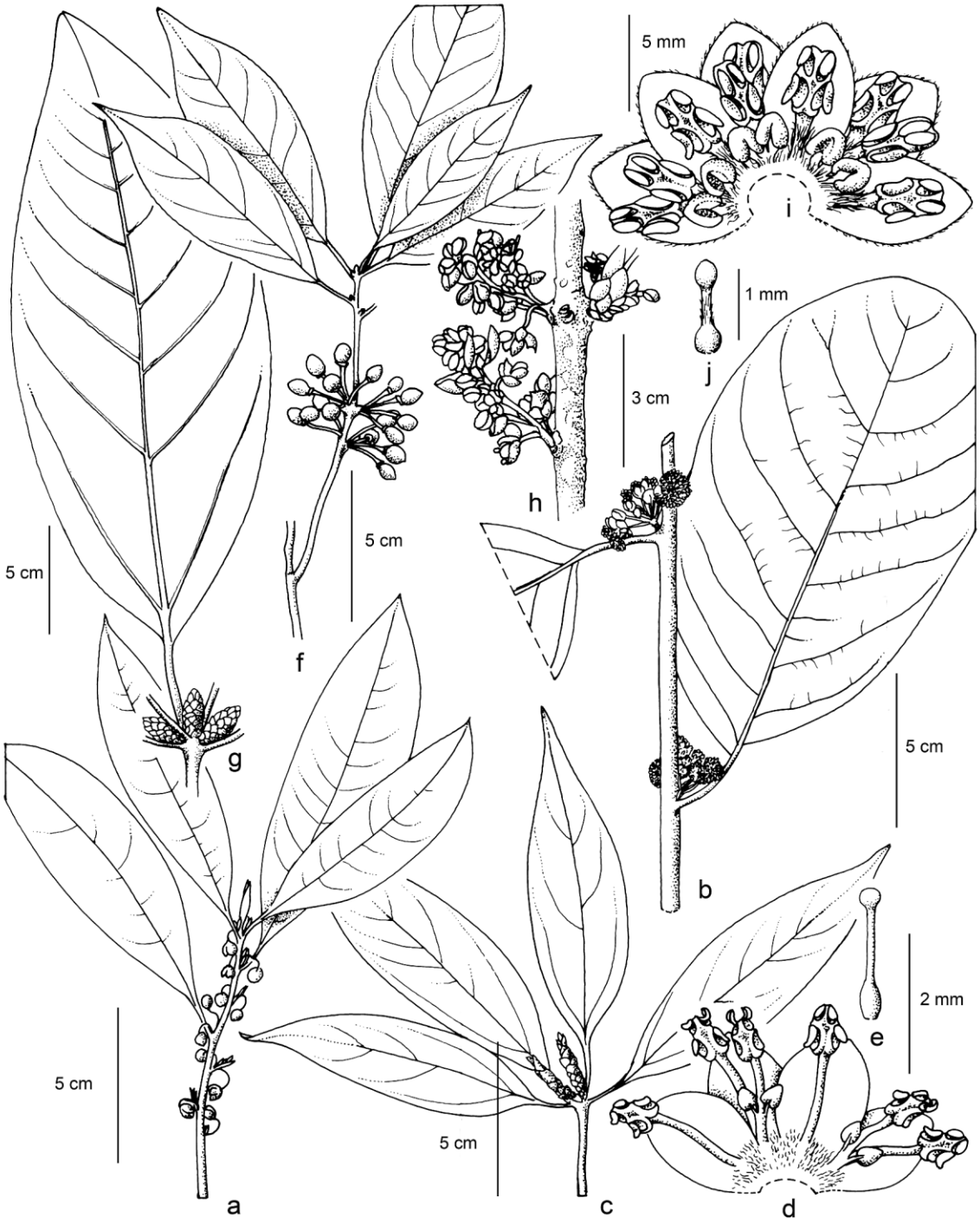


Fig. 2.
LAURACEAE. **Litsea kingii**: a, shoot with flower buds. **Litsea monopetala**: b, twig with flowers. **Neolitsea foliosa**: c, shoot with perulate buds; d, opened flower with pistil removed; e, pistil. **Neolitsea pallens**: f, shoot with fruits. **Actinodaphne obovata**: g, shoot with perulate buds; h, flowering branch; i, opened flower with pistil removed; j, pistil.

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Fig. 1
a-i Louise Olley
Fig. 2
a-j Louise Olley

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This Web-edition pdf document forms part of a set of Flora accounts for families and genera that have been finalized, including those in volumes yet to be printed. These pdf documents are made accessible via the *Flora of Nepal* website (www.floraofnepal.org) and will be periodically updated in numbered versions, permanently available and citable.

Flora of Nepal takes an innovative approach to Flora writing, with an underlying data base system managing the *Flora of Nepal Knowledge Base* from which the printed volumes and the 'online Flora' (www.floraofnepal.org) are generated. The Internet-accessible dataset augments the printed Flora by presenting all herbarium specimen data, detailed taxonomic information (such as full nomenclatural references and typification), distribution maps with point occurrences and images used when preparing the Flora. Much of this information is accumulated as a normal part of taxonomic working practices when undertaking a floristic revision, but it is usually lost to a wider audience as it is rarely included in the traditional printed Flora.

Flora of Nepal includes all native and fully naturalized vascular plants recorded within the political borders of Nepal, including brief references to agricultural and horticultural plants as appropriate. For pragmatic reasons the arrangement of families in the printed *Flora of Nepal* follows a modified Englerian sequence, closely following that of the *Flora of China* and, to a lesser extent, the *Flora of Bhutan*.[1, 2] In recent years the world view on the arrangement of families has radically changed following overwhelming phylogenetic evidence. The emergent family-level classification, now in its third iteration as APG III, is reasonably stable and widely accepted.[3] It has not been possible to alter the family sequence in *Flora of Nepal* printed volumes midway through the project, but as the data are stored separately in a database, the families can be reorganized electronically at a later date to reflect alternative classifications. Circumscription of families and genera, however, generally does follow a contemporary understanding of their relationships, except where group experts advise otherwise. Genera and species are treated in taxonomic order, or if there is disagreement then morphologically similar species are usually grouped together or occasionally listed alphabetically. Infraspecific taxa are always presented in alphabetical order. Intermediate ranks, such as subfamily, tribe, subgenus, section and series, are only used when they are useful in the treatment of large families or genera.

Information on nomenclature and classification is given for all accepted scientific names and synonyms pertaining to Nepal and nearby regions. Emphasis is given to those names listed in the primary checklists for Nepal: *Enumeration of the Flowering Plants of* Nepal,[4] *Annotated Checklist of the Flowering Plants of* Nepal,[5] and *Flowering Plants of Nepal (Phanerogams)*.[6] At the generic level, synonyms widely used in the Asian literature are included. Full bibliographic citation with authorship is given for all accepted names and their basionyms at the rank of genus and below. As far as possible, the bibliographic citations of all accepted names and their basionyms have been verified with the original literature. The basionym precedes all other synonyms, which are listed alphabetically. Misapplied names (misidentifications encountered in the literature) are not included in synonymy, but are discussed in the supporting information at the end of a taxon. Authors of plant names follow the standard forms given in *Authors of Plant Names* and its continuously updated online supplement (www.ipni.org).[7] Bibliographic references are given using the standard abbreviations in BPH-2 for serial publications (journals and periodicals) and in TL-2 (and its supplements) for books.[8, 9] In some cases books were published in several fascicles on different dates, sometimes over different years, but not indicated as such in the printed work. Date of publication is critical for establishing nomenclatural priority, and so it is important to be precise when citing names published in such works. The fascicle composition and publication dates of these often complex cases are clearly explained in TL-2, but the standard abbreviation does not differentiate between them. In these instances the TL-2 abbreviation has been amended with brackets to clearly indicate which fascicle is being referred to, for example Wallich, N., Pl. As. Rar. 2[8]. 1831. Books and periodicals not included in these two standard references have been abbreviated according to the recommendation in Appendix A of BPH-2.

Where a taxon has a widely recognized local name this is given in Devanagri script, followed by its transliteration into the Latin alphabet and the language of the vernacular name in parentheses ‘( )’. One local name is given in the printed Flora, whereas multiple alternative vernacular names in different languages may be included in the *Flora of Nepal Knowledge Base* and made available

online. Separate indexes to vernacular names in Devanagri, their Latin transliterations and scientific names are included at the end of each volume.

Descriptions are given for all taxa (family, genus, species, infraspecies and occasionally intermediate ranks) and wherever possible are based on primary observations and measurements made on specimens from Nepal. If no such material was available to authors, descriptions are taken from specimens from adjacent countries or secondary sources, and annotated as such. Most descriptions are about 150 words long, but exceptionally they are shorter or longer depending on the complexity of the taxon being described. For species with more than one infraspecific taxon, a full description is given for the species and short diagnoses for the lower taxa. Descriptions aim to be consistent and parallel between taxa of the same rank within a higher taxon. Authors were asked to standardize descriptive terms using the definitions given in *Plant Identification Terminology*.[10] If a single measurement is given it refers to length, and if width is also given it is in the format length × width. Ranges are separated by an en-dash (–) and discontinuous states by the word 'or'. Exceptional measurements are given in parentheses '( )'. Taxon statistics and short statements on worldwide distribution are provided for families and genera, with summary statistics of lower taxa represented in Nepal.

Identification keys are dichotomous and presented in a bracketed format, with all elements strictly parallel between the two leads of each couplet. Keys are artificial and not intended to reflect any taxonomic classification. There is usually a single key to genera within a family, combining flowering, fruiting and vegetative characters, but where this is unwieldy separate keys are given for flowering and fruiting material (e.g. Cruciferae, Rosaceae). Keys are also given for species within a genus and taxa within a species. Figures are provided to aid identification by illustrating the diagnostic characters of each family and genus, and for large genera variation in major morphological features is represented.

The geographic distribution within Nepal is indicated for each species and infraspecific taxon at the political district level by a shaded distribution map. The distribution maps are evidence-based, produced from the *Flora of Nepal Knowledge Base* using locality information taken from authenticated herbarium specimens and records of plants *in situ* made by credible observers. Ideally all specimens identified by authors should be geo-referenced and databased when they are preparing *Flora of Nepal* accounts, but where this is not possible a minimum of one specimen per district is required. Sometimes the distribution of a species is greater than the sum of the distribution maps of its infraspecific taxa. This is a result of some herbarium specimens only being identifiable to species level. Occasionally species are known only from poorly localised collections, especially those from the early 19th century. For example, Wallich often only gave 'Napalia' as the locality for many of his 1820–1821 collections. These specimens are most likely to have come from the Kathmandu Valley, known as the 'Nepal Valley' or just 'Nepal' at that time, but they might also have been collected during his inward and outward journeys from India via Hetauda, or by pilgrims going north to 'Gossainthan' (Gossainkund). It is therefore impossible to be sure of the correct district and in such cases this is noted in the supporting information and the map omitted. The *Flora of Nepal* website gives access to the underlying distribution and specimen information through an interactive dot map plotting all geo-referenced occurrence records and a listing of all material recorded.

Distribution for species and infraspecific taxa occurring outside Nepal is indicated by a list of geographical regions, with the resolution becoming coarser with increasing distance from Nepal. In order to utilise information contained within other published Floras these areas are defined according to political borders, with countries or provinces grouped to form regions that have some underlying biogeographic basis. For example, although the Tibetan Plateau extends into parts of Sichuan and Yunnan, we limit it to Xizang and Qinghai. *Flora of Nepal* takes no stance on any politically disputed border areas and is following the current international mapping convention of using the 'lines of control' to delineate its regions. The names used for the regions are intended to be descriptive and non-political. The regions are:

W Himalaya	India (Jammu & Kashmir, Himachal Pradesh, Uttarakhand), northern Pakistan (Khyber Pakhtunkhwa, previously known as North West Frontier Province).
E Himalaya	Sikkim, Darjeeling, Bhutan, NE India (Arunachal Pradesh).
Tibetan Plateau	China (Xizang, Qinghai).
Assam-Burma	Assam, Nagaland, Manipur, Myanmar.

S Asia	Eastern Pakistan (Punjab, Sind, Islamabad), Peninsular India, Sri Lanka, Bangladesh, Maldives.
E Asia	China (excluding Xizang, Xinjiang, Qinghai), Korea, Japan, Taiwan.
SE Asia	Thailand, Laos, Cambodia, Vietnam, Malaysia, Indonesia, Philippines, New Guinea.
N Asia	China (Xinjiang), Russia, Mongolia.
C Asia	Kazakhstan, Uzbekistan, Turkmenistan, Tajikistan, Kyrgyzstan.
SW Asia	Afghanistan, western Pakistan (Baluchistan, Federally Administered Tribal Areas), Iran, Middle East, Arabian Peninsula, Turkey, Azerbaijan, Armenia, Georgia.
Asia	collective term for all above areas of Asia.
Europe	includes Ukraine, Belarus, Baltic republics.
Africa	includes Madagascar.
N America	includes C America south to Panama.
S America	south of Panama.
Australasia	Australia, New Zealand, Pacific Islands.
Cosmopolitan	collective term for a generally worldwide distribution.

Altitudes (elevation above sea level) are based on herbarium specimen data or records from credible observers. They are given to the nearest 100 m rounded up or down, with exceptional altitudes given in parentheses '( )'. Likewise, flowering and fruiting times are based on specimens collected from Nepal, or on material from adjacent regions if these data are lacking and a note is provided to explain this. The short statement on the ecological preference of each species and infraspecific taxon is mostly taken from herbarium specimen data. Currently these often lack detail, a reflection of the shortcomings of poor-quality data recorded by the past collectors of herbarium material, but these will improve with more field studies.

Supplementary information is given at the end of a taxon account discussing taxonomic issues, highlighting spot characters useful for identification, noting similar species that could cause confusion, and detailing the misapplication of names. Summary information is provided for ethnobotanical and other uses, but this is not intended to be exhaustive and is derived from secondary sources, such as *Plants and People of Nepal* and *A Compendium of Medicinal Plants of* Nepal.[11, 12]

Abbreviations

Standard abbreviations for the International System of Units (SI) are used for measurements. Herbaria are cited using the standard abbreviation in *Index Herbariorum*.[13] Other abbreviations used in the text include:

C	central.
ca.	*circa* – about, approximately.
comb. nov.	*combinatio nova* – new combination of name and epithet.
dbh	diameter at breast height – measured on tree trunks at 1.3 m above the ground.
E	east, eastern.
et al.	*et alia* – and others.
fig.	figure.
N	north, northern.
nom. cons.	*nomen conservandum* – name officially conserved in ICBN.[14]
nom. illegit.	*nomen illegitimum* – illegitimate name, according to ICBN.[14]
nom. inval.	*nomen invalidum* – invalid name, according to ICBN.[14]
nom. nud.	*nomen nudum* – name lacking a description, or reference to an effectively published description, and so invalid according to ICBN.[14]
nom. rej.	*nomen rejiciendum* – name officially rejected in ICBN.[14]
nom. superfl.	*nomen superfluum* – name superfluous when published, and so illegitimate according to ICBN.[14]
pl.	plate.
q.v.	*quod vide* – which see.
S	south, southern.
s.l.	*sensu lato* – for a taxon treated in a broad sense.
s.s.	*sensu stricto* – for a taxon treated in a narrow sense.

sect.	section.
subfam.	subfamily.
subgen.	subgenus.
subsp.	subspecies.
subvar.	subvariety.
syn.	synonym
var.	variety.
W	west, western.
>	greater than
<	less than

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