

A contribution to the flora of Great Himalayan National Park, Himachal Pradesh, India

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भारत के हिमाचल प्रदेश स्थित ग्रेट हिमालयन राष्ट्रीय उद्यान के वनस्पतिजात (फ्लोरा) में संयोजन

दीप शेखर दास, दिनेश सिंह रावत, नताशा श्रीवास्तव, कुमार अम्बरीश, बिपिन कुमार सिन्हा,
परमजीत सिंह एवं सुधांशु शेखर दास

सारांश

प्रस्तुत अध्ययन हिमाचल प्रदेश के कुल्लू जनपद में स्थित ग्रेट हिमालयन राष्ट्रीय उद्यान (जीएचएनपी) के वनस्पतिजात में नवीन संयोजनों पर आधारित है। ग्रेट हिमालयन राष्ट्रीय उद्यान में हाल में किये गये वानस्पतिक समन्वेषणों के दौरान 26 कुलों से सम्बन्धित कुल 39 असूचीबद्ध जातियों को अभिलेखित किया गया है। प्रत्येक जाति का फिल्ड लक्षण, फलोद्भेदिकी, वितरण एवं पारिस्थितिकी पर आधारित संक्षिप्त वर्णिकी विवरण दिया गया है।

ABSTRACT

The present study deals with new addition to the flora of the Great Himalayan National Park (GHNP), located in Kullu district of Himachal Pradesh. A total of 39 unreported species under 26 families were recorded during the recent plant exploration from the Great Himalayan National Park. A brief description based on the field character, phenology, a note on distribution and ecology has been provided here for each species.

Keywords: New additions, Floristic diversity, GHNP, Himachal Pradesh.

INTRODUCTION

The Great Himalayan National Park (GHNP) is situated in Kullu district of Himachal Pradesh between 31°38'28" – 31°51'58" N latitude and 77°20'11"

– 77°45'52" E longitude (Fig.1). The park along with Sainj Wildlife Sanctuary, Tirthan Wildlife Sanctuary and Eco-development zone together constitute the Great Himalayan National Park Conservation Area (GHNPCA). The altitude of the area ranges from 1344 m

to 6205 m msl. Singh & Rawat (2000) enumerated 805 species of flowering plants from the park while dealing the Flora of Great Himalayan National Park. Subsequently Singh & al. (2015) recorded 52 additional taxa from the same area. However, certain parts of the park are yet to be explored and documented. Recently, during our visit to GHNP in connection with setting up permanent plots for monitoring of plant diversity change in the National Park, we have collected a total of 485 plant specimens. All the species were identified with relevant literature (Hooker, 1872–97; Collett, 1921; Sharma & Kachroo, 1981; Chowdhery & Wadhwa, 1984; Polunin & Stainton, 1984; Dhaliwal & Sharma, 1999) and in consultation with the regional herbaria (BSD, CAL, DD). Interestingly, 39 species belonging to 26 families were documented, which were not been reported from the National Park before. All these species are enumerated alphabetically with the accepted name followed by a family or sub family name in parenthesis, a brief description based on the field character, data on phenology, details of specimens collected, a note on distribution and ecology.

ENUMERATION

***Bidens pilosa* L.**, Sp. Pl. 832. 1753; Hook. f., Fl. Brit. India 3: 309. 1881; Chowdhery & Wadhwa, Fl. Himachal Pradesh 2: 369. 1984. (ASTERACEAE).

Annual herbs to 1.2 m high. Stem brownish green, hairy. Leaves imparipinnate, terminal leaflet larger than the laterals. Head discoid; involucre bracts hairy. Ray floret 5, white; disc floret 5 lobed, many, yellow with brown strips. Achenes with 2–3 pappus bristle forming a corona, brown.

Flowering and Fruiting: September – October; Rolla, 28-09-2016, D.S. Das & N. Shrivastava 79443 (CAL); common; way sides, grassy and shady localities; 1900–2200 m (Sainj and Tirthan valley); in association with species of *Polygonum*, *Fagopyrum* and *Galinsago*.

***Caesalpinia decapetala* (Roth) Alston** in Trimen, Handb. Fl. Ceylon 6 (Suppl.): 89. 1931; Chowdhery & Wadhwa, Fl. Himachal Pradesh 1: 174. 1984. *C. separia* Roxb., Fl. India 2: 360. 1832. Hook. f., Fl. Brit. India 2: 256. 1878. (Sub family: CAESALPINIOIDEAE).

Shrub, branched, with hooked prickles. Leaves paripinnate, 8–11 cm; leaflets 8–10 pairs, opposite, length as

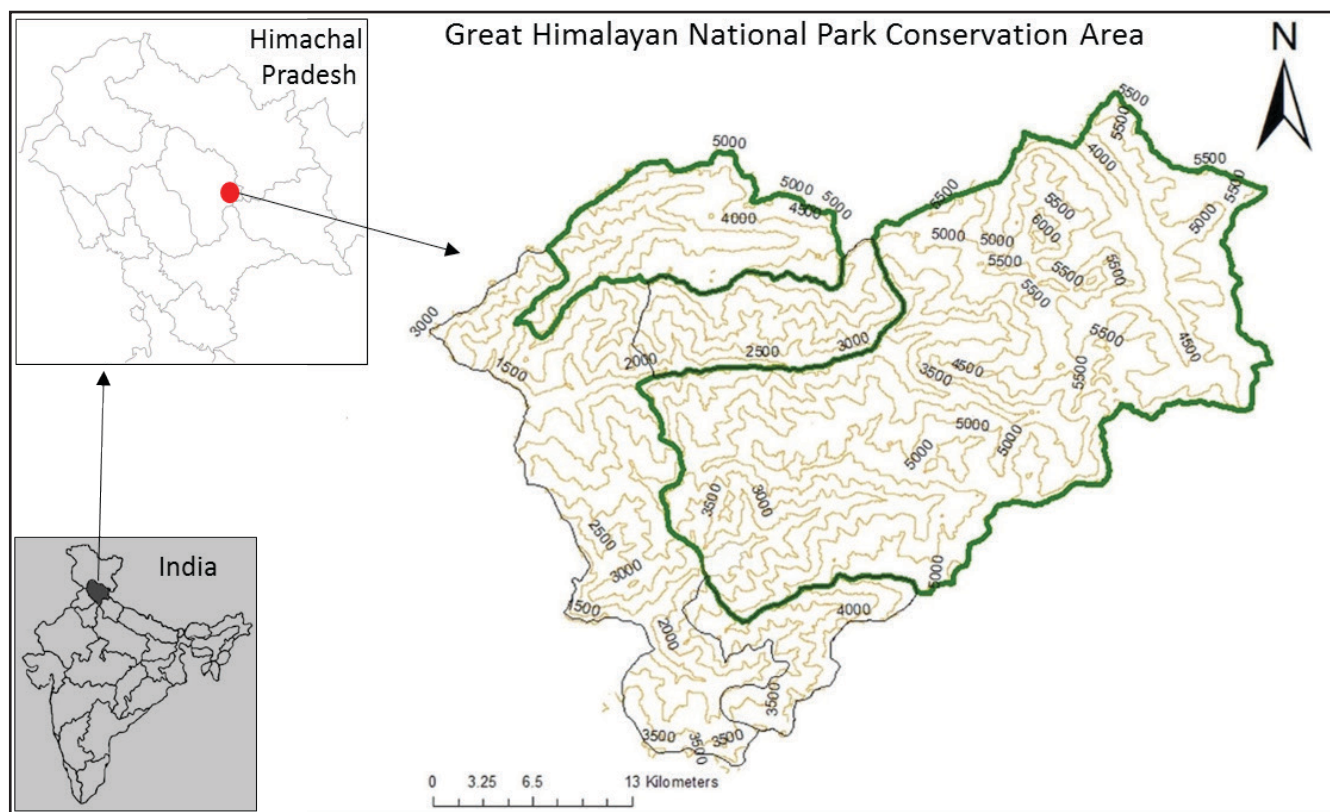


Fig. 1 Map showing study area

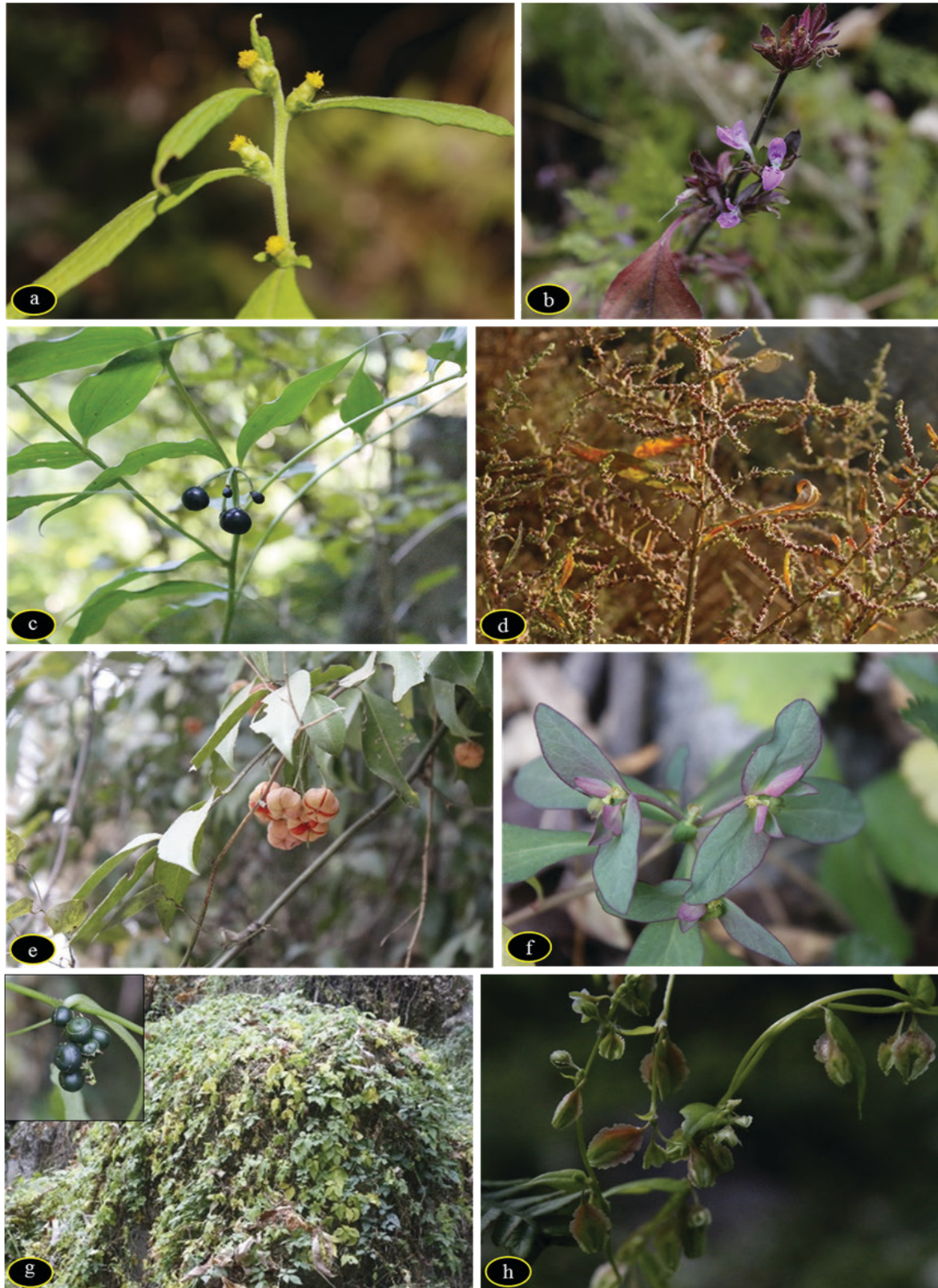


Plate -1: a. *Carpesium abrotanoides* L.; b. *Dicliptera bupleuroides* Nees.; c. *Disporum cantoniense* (Lour.) Merr.; d. *Dysphania ambrosioides* (L.) Mosyakin & Clemants; e. *Euonymus hamiltonianus* Wall.; f. *Euphorbia maddenii* Boiss.; g. *Gynostemma pentaphyllum* (Thunberg) Makino; h. *Fallopia dumetorum* (L.) Holub.



Plate -2: a. *Leptopus cordifolius* Decne.; b. *Myriactis nepalensis* Less.; c. *Osyris lanceolata* Hochst. & Steud.; d. *Rubus macilentus* Cambess.; e. *Scurrula pulverulenta* (Wall.) G. Don; f. *Senecio scandens* Buch.-Ham. ex D. Don; g. *Tricholepis elongata* DC.; h. *Viscum album* L.

double as its breadth, round to elliptic. Inflorescence terminal and axillary raceme. Flowers yellow, pedicel 1.2–2 cm long. Pods 9–10 cm long, 1.4–1.8 cm wide, beaked, dehisce longitudinally along the ventral suture.

Flowering and Fruiting: April – August; Neuli, 02-12-2016, D.S. Rawat & D.S. Das 79681 (CAL); scattered; exposed areas and way sides; 1300–1600 m (Sainj valley); associated tree species was *Pinus roxburghii*.

Cajanus platycarpus (Benth.) Maesen in Agric. Univ. Wageningen Pap. 85(4): 160. 1986. *Atylosia platycarpa* Benth. in Miq. Pl. Jungh. 243. 1852; Hook. f., Fl. Brit. India 2: 213. 1876; Chowdhery & Wadhwa, Fl. Himachal Pradesh 1: 189. 1984. (Sub family: PAPILIONOIDEAE).

Annual–perennial, trailing herbs, 15–20 cm long. Leaves 3-foliate; petiole 2.5–6 cm, glandular hairy, sticky, green; leaflets ovate–cordate, apex acute, margin entire, base rounded. Inflorescence axillary cyme. Flowers papilionaceous; pedicels 0.5–1.2 cm long. Fruit linear–oblong, pubescent, 5–7 seeded.

Flowering and Fruiting: August – October; Bah, 01-12-2016, D.S. Das & D.S. Rawat 79662 (CAL); scattered; exposed and grassy localities; 1500–1800 m (Sainj valley); associated with *Barleria cristata*, *Dicliptera chinensis* and *Tragopogon gracilis*.

Carpesium abrotanoides L., Sp. Pl. 860. 1753; Hook. f., Fl. Brit. India 3: 301. 1881; Chowdhery & Wadhwa, Fl. Himachal Pradesh 2: 373. 1984. (ASTERACEAE).

Annual–perennial herbs. Stems c. 60 cm tall, branched. Leaves simple, sub-sessile or with winged petiole; lamina elliptic–oblong, 10–15 × 2–10 cm, apex obtuse to acute, narrowed at base into a broadly winged petiole, margin dentate. Head sessile, deflexed in anthesis. Florets many. Achenes beaked.

Flowering and Fruiting: August – September; Rolla, 27-09-2016, D.S. Das & N. Shrivastava 79437 (CAL); scattered; forest edge, waysides and shady localities; 2000–2300 m (Tirthan valley); in association with *Boenninghausenia albiflora*, *Dipsacus inermis* and *Senecio rufinervis*.

Dicliptera bupleuroides Nees in Wall. Pl. Asiat. Rar. 3: 111. 1832; Chowdhery & Wadhwa, Fl. Himachal Pradesh 2: 548. 1984. *D. roxburghiana* var. *bupleuroides* (Nees) Clarke in Hook. f., Fl. Brit. India 4: 554. 1885. (ACANTHACEAE).

Annual–perennial herbs, erect, c. 20 cm tall. Stems terete, pubescent, slightly swollen at nodes, green. Leaves opposite; petioles 1–1.5 cm long; lamina ovate, 3.5–4.5 × 2.5–3.5 cm, apex acute, margin entire, base attenuated.

Inflorescence axillary or terminal dichasial cyme; peduncle 0.4–0.5 cm. Flower bilipped, pink or white;

Flowering and Fruiting: January – December; Bah, 27-11-2016, D.S. Rawat & D.S. Das 79524 (CAL); common; forest edge, waysides and in grassy localities; 1600–1800 m (Sainj and Tirthan valley); associated with *Barleria cristata*, *Crotalaria* spp., *Senecio* spp. and *Tragopogon gracilis*.

Disporum cantoniense (Lour.) Merr. in Philipp. J. Sci. 15: 229. 1919; Chowdhery & Wadhwa, Fl. Himachal Pradesh 3: 708. 1984. *Fritillaria cantoniensis* Lour., Fl. Coch. 1: 206. 1790; Hook. f., Fl. Brit. India 6: 360. 1892. (LILIACEAE).

Herb, glabrous, 70–90 cm tall. Rhizome without stolon, creeping. Leaves simple, alternate, 5-nerved, petiolate, petioles 0.4–0.5 cm, sheathing; lamina elliptic–lanceolate, 9–11 × 2.5–3.5 cm, apex acuminate, margin entire, base ovate. Inflorescences terminal cymose, 5–6 flowered, pendulous. Flowers incomplete, purple to violet. Fruits subglobose berries, 0.5–0.8 cm in diameter.

Flowering and Fruiting: April – October; Rolla, 29-11-2016, D.S. Das & D.S. Rawat 79609 (CAL); common; way sides, shady grassy slopes; 1900–2300 m (Tirthan valley); *Viola canescens*, *Ophiopogon intermedius* and *Prenanthes violaeifolia*.

Dysphania ambrosioides (L.) Mosyakin & Clemants, Ukrayins'k. Bot. Zhurn. 59: 382. 2002. *Chenopodium ambrosioides* L., Sp. Pl. 1: 219. 1753; Hook. f., Fl. Brit. India 5: 4. 1886; Chowdhery & Wadhwa, Fl. Himachal Pradesh 2: 602. 1984. (CHENOPODIACEAE).

Annual–perennial herbs, c. 60 cm tall. Stem erect, much branched ribbed, pubescent. Leaves simple; petiole short, often winged; lamina lanceolate–oblong, 4–6 × 0.8–1 cm, apex acute, margin irregularly serrate, base attenuated. Inflorescence axillary terminal panicle. Flowers white, bisexual. Fruits greenish, 0.1 cm in diameter.

Flowering and Fruiting: August – November; Niharni, 01-12-2016, D.S. Rawat & D.S. Das 79654 (CAL); scattered; waste places, agricultural fields margins; 1500–1800 m (Sainj valley); associated with *Cirsium wallichii*, *Cyathula tomentosa* and *Galinsoga parviflora*.

Erigeron annuus (L.) Pers., Syn. Pl. 2: 431. 1807. *Aster annuus* L., Sp. pl. 875. 1753. *Stenactis annua* (L.) Nees in Gen. Sp. Aster. 273–274. 1832. (ASTERACEAE).

Annual herb, 60–80 cm tall, erect. Leaves with winged petiolate; blade elliptic–ovate, 5–10 cm, apex acute or obtuse, base attenuate, margin coarsely serrate. Head in loose panicle. Ray florets 2-seriate, white or sometimes

bluish. Disk florets yellow. Achenes lanceolate, flattened, strigillose.

Flowering and Fruiting: January – December; Rolla, 30-11-2016, D.S. Das & D.S. Rawat 79625 (CAL); scattered; way sides and waste places; 1400–2200 m (Tirthan valley); associated with species of *Polygonum*, *Rumex* and *Bidens*.

Eunymus hamiltonianus Wall. in Roxb. Fl. India ed. Carey. 2: 403. 1832; Hook. f., Fl. Brit. India 1: 612. 1875; Chowdhery & Wadhwa, Fl. Himachal Pradesh 1: 147. 1984. (CELASTRACEAE).

Deciduous, small trees, 7–10 m tall. Leaves simple, alternate; petiole 1–2 cm; blade ovate-elliptic, 9–12 × 2–5 cm, apex acuminate, base attenuate, margin crenulate. Flowers 4-merous, c. 0.80 cm in diameter. Capsule 4-angles with deep grooves, brown or yellow-brown to red-brown. Seeds in coloured orange-red aril.

Flowering and Fruiting: May – September; Rolla, 28-11-2016, D.S. Rawat & D.S. Das 79580 (CAL); scattered; forest; 2000–22000 m (Tirthan valley); associated with *Aesculus indica*, *Juglans regia* and *Pinus wallichiana*.

Euphorbia maddenii Boiss. in DC., Prodr. 15(2): 141. 1862; Hook. f., Fl. Brit. India 5: 263. 1887; Chowdhery & Wadhwa, Fl. Himachal Pradesh 2: 641. 1984. (EUPHORBIACEAE).

Annual-perennial, erect herb, c. 13 cm tall. Stem glabrous, branched at the base green. Leaves alternate, glabrous; petioles 0.7–1 cm, slightly winged; lamina elliptic, 2–3 × 0.8–1 cm, apex obtuse, margin entire, base attenuated. Cyathia shortly pedunculate. Flowers yellowish. Fruit trilobed.

Flowering and Fruiting: Throughout the year; way to Silth, 29-11-2016, D.S. Das & D.S. Rawat 79586 (CAL); scattered; waste places, exposed localities and way sides; 2100–2300 m (Tirthan valley); associated with *Capsella bursa-pastoris*, *Persicaria chinensis* and *Trifolium* spp.

Fallopia dumetorum (L.) Holub in Folia Geobot. Phytotax. 6: 176. 1971. *Polygonum dumetorum* L., Sp. Pl. 2: 522. 1762; Hook. f., Fl. Brit. India 5: 24. 1886; Chowdhery & Wadhwa, Fl. Himachal Pradesh 2: 615. 1984. (POLYGONACEAE).

Annual-perennial, twinning herbs. Leaves simple hairy, surface rough; petiole slender, 0.7–1.2 cm; lamina cordate, 2.5–3 × 1.8–2 cm, apex acuminate, margin entire, base cordate. Inflorescence axillary raceme. Flowers incomplete, perianth persistent, orbicular in fruit, green to reddish green. Fruits winged, wings wavy, entire. Achenes remain enclosed by persistent perianth, 0.5–0.7 cm long.

Flowering and Fruiting: August – September; Rolla, 28-09-2016, D.S. Das & N. Shrivastava 79441 (CAL); scattered; shady and moist localities of forest and along stream sides; 1900–2100 m (Tirthan valley); associated with *Boenninghausenia albiflora*, *Dipsacus inermis* and *Senecio rufinervis*.

Galium asperifolium Wall. in Roxb., Fl. India 1: 381. 1820; Chowdhery & Wadhwa, Fl. Himachal Pradesh 2: 343. 1984. *G. mollugo* auct. non L.; Hook. f., Fl. Brit. India 3: 107. 1881. (RUBIACEAE).

Annual, trailing herbs, branched. Stems 4-angular, sticky. Leaves whorled, 4–5 leaves in a whorls, sessile; blade papery, linear-lanceolate, 1–1.5 × 2–3 cm, apex acute or pointed, margin entire, base attenuated. Inflorescences dichasial cyme. Flowers greenish to brownish green, small, pale white.

Flowering and Fruiting: June – October; Tinder, 26-11-2016, D.S. Das & D.S. Rawat 79496 (CAL); scattered; forest edge, way sides and shady localities; 1400–1600 m (Tirthan valley); associated with *Anemone* spp., *Senecio* spp. and *Persicaria amplexicaulis*.

Gynostemma pentaphyllum (Thunberg) Makino, Bot. Mag. Tokyo. 16: 179. 1902. *G. pedatum* Blume in Bijdr. 23. 1825; Hook. f., Fl. Brit. India 2: 633. 1879; Chowdhery & Wadhwa, Fl. Himachal Pradesh 1: 302. 1984. (CUCURBITACEAE).

Annual-perennial, climbing herb. Stem slender, glabrous. Leaves pedately compound, 5-foliolate, pubescent; leaflets oblong-lanceolate, apex acute-acuminate, margin serrate, base attenuated; terminal leaflets larger than lateral, 6–7 × 2–3 cm. Tendrils bifid. Flowers in panicle, green. Fruit globose, green, 0.4–0.6 cm in diameter.

Flowering and Fruiting: August – October; way to Chalocha, 29-11-2016, D.S. Rawat & D.S. Das 79605 (CAL); common; forest, shady localities and stream sides; 2000–2300 m (Tirthan valley); associated tree species were *Abies pindrow*, *Quercus semecapifolia*, *Q. floribunda* and *Rhododendron arboreum*.

Holboellia latifolia Wall. in Tent. Fl. Nepal 24. 1824; Hook. f., Fl. Brit. India 1: 208. 1872; Chowdhery & Wadhwa, Fl. Himachal Pradesh 1: 43. 1984. (LARDIZABALACEAE).

Perennial, evergreen climbing shrub. Leaves digitately 3–5 foliate; petioles 8–10 cm; leaflets glabrous or minutely hairy, 1–3 cm, green; lamina lanceolate, 12–14 × 4–6 cm, apex acute, margin entire. Inflorescence raceme. Flowers monoecious; pedicel short, 0.8–1 cm; female flowers slightly larger than male flowers. Fruits

berry, green, turn into pink-red on maturity, 3–5 cm long.

Flowering and Fruiting: April – May; GHNP entry gate, 28-11-2016, D.S. Rawat & D.S. Das 79572 (CAL); rare; shady localities and along streams; 1400–1600 m (Tirthan valley) associated tree species were *Aesculus indica*, *Juglans regia* and *Rhododendron arboretum*.

Inula cuspidata (Wall. ex DC.) C.B. Clarke in Compos. India 125. 1876; Chowdhery & Wadhwa, Fl. Himachal Pradesh 2: 395. 1984. *Amphirhapis cuspidata* Wall. ex DC., Prodr. 5: 343. 1836; Hook. f., Fl. Brit. India 3: 296. 1881. (ASTERACEAE).

Perennial herbs, erect. Stems hairy to tomentose. Leaves simple, alternate; petioles 1.2–1.5 cm, hairy; lamina ovate-lanceolate, 7–9 × 3–3.5 cm, apex acute, margin serrulate, base attenuated. Heads terminal corymbs, 0.7–1 cm in diameter. Ray florets ligulate; ligule up to 0.6 cm; Disc florets 5-lobed, 1–1.2 cm long. Achenes white, hairy. Pappus fimbriate or feathery.

Flowering and Fruiting: April – November; Niharni, 01-12-2016, D.S. Rawat & D.S. Das 79634 (CAL); scattered; forest edge, grassy slopes and way sides; 1500–1800 m (Sainj valley); associated with *Barleria cristata*, *Senecio* spp., and *Campylotropis eriocarpa*.

Leptodermis lanceolata Wall. in Roxb., Fl. India ed. Carey & Wall. 2: 191. 1824; Hook. f., Fl. Brit. India 3: 198. 1881; Chowdhery & Wadhwa, Fl. Himachal Pradesh 2: 347. 1984. (RUBIACEAE).

Shrub, 1–2 m tall. Stem scabrid hispid. Leaves ovate-lanceolate, 2–8 × 1–3 cm; petiole 3–6 mm long. Inflorescence lateral cymes. Flowers white, 1.2–1.8 cm long. Calyx ciliate, c. 0.5 cm. Corolla 0.8–1.2 cm long. Capsule c. 0.8 cm long. Seeds fusiform.

Flowering and Fruiting: June – October; Bah, 27-11-2016, D.S. Rawat & D.S. Das 79531 (CAL); scattered; shady localities and stream sides; 1500–2100 m (Sainj and Tirthan valley); associated with *Berberis* spp., *Prinsepia utilis* and *Spirea canescens*.

Leptopus cordifolius (Wall. ex Decne.) Decne. in Jacquem., Voy. Inde 4: 155. 1844. *Andrachne cordifolia* (Wall. ex Decne.) Muell. Avg. in DC., Prodr. 15(2): 234. 1866; Hook. f., Fl. Brit. India 5: 283. 1887; Chowdhery & Wadhwa, Fl. Himachal Pradesh 2: 636. 1984. (PHYLLANTHACEAE).

Deciduous shrub, 2–3 m tall. Stems weak, glabrous. Leaves simple, blade elliptic-ovate, 3–3.5 × 1–1.5 cm, rounded to obtuse, margin entire; petioles 0.5–1.5 cm. Inflorescence in axillary cyme. Flowers yellow; pedicels

3–3.5 cm long, glabrous. Fruits tri-lobed, persistent calyx. Seeds brown to black, angular.

Flowering and Fruiting: May – October; Tinder, 26-11-2016, D.S. Rawat & D.S. Das 79508 (CAL); scattered; shady localities and stream sides; 1400–1700 m (Tirthan valley); associated with *Daphne papyracea*, *Sarcococca prunifolia* and *Lonicera quinquelocularis*.

Lespedeza juncea* var. *sericea (Thunb.) Lace & Hemsley in J. Linn. Soc. (Bot.). 23: 181. 1887; Chowdhery & Wadhwa, Fl. Himachal Pradesh 2: 214. 1984. *L. sericea* (Thunb.) Miq. in Ann. Mus. Lag. Bat. 3: 49. 1867. (Sub family: PAPILIONOIDEAE).

Annual-perennial, undershrubs, 50–80 cm tall, hairy. Leaves 3-foliate; petiole reduced, 0.2–0.5 cm; leaflets linear-oblong, mucronate, entire, base attenuate, 1–1.2 × 0.4–0.6 cm in length, hairy on both surfaces. Inflorescence in raceme. Flowers yellowish or whitish, papilionaceous. Fruit obovate or globose, brown in colour.

Flowering and Fruiting: July – October; Bah, 01-12-2016, D.S. Das & D.S. Rawat 79659 (CAL); scattered; forest edge, exposed localities and way sides; 1500–1800 m (Sainj valley) associated with *Spermadictyon suaveolens*, *Woodfordia fruticosa* and *Zanthoxylum armatum*.

Ligustrum compactum (Wall. ex G. Don) Hook. f. & Thomson ex Brandis in For. Fl. India 310. 1874; Chowdhery & Wadhwa, Fl. Himachal Pradesh 2: 454. 1984. *Olea compacta* Wallich ex G. Don, Gen. Hist. 4: 48. 1837; Hook. f., Fl. Brit. India 3: 616. 1882. (OLEACEAE).

Deciduous trees, 8–10 m tall, branched. Leaves sub-opposite; petiole 0.7–1 cm long, reddish, glabrous; lamina lanceolate, 8–11 × 2.5–3 cm, apex acute, entire, rounded to cuneate, yellowish green. Panicles terminal, many flowered. Flowers subsessile. Fruits dark red to black, globose, 0.3–0.4 cm.

Flowering and Fruiting: July – November, Tinder, 26-11-2016, D.S. Rawat & D.S. Das 79517 (CAL); rare; open forest at river sides; 1400–1700 m (Tirthan valley); associated with *Aesculus indica*, *Juglans regia* and *Pinus wallichiana*.

Myriactis nepalensis Less. in Linnaea 6: 128, t. 2. 1831; Hook. f., Fl. Brit. India 3: 247. 1881; Chowdhery & Wadhwa, Fl. Himachal Pradesh 2: 404. 1984. (ASTERACEAE).

Annual herbs, erect. Leaves ovate or elliptic-lanceolate, 4–5.5 × 2–3 cm, acute at tip, margin coarsely serrate, base rounded to cordate. Heads globose, c. 0.8 cm across; involucre bracts acute, reflexed. Ray florets c. 10-seriate. Disc florets few. Achenes 0.2–0.3 cm long, greenish.

Flowering and Fruiting: September – November; Rolla, 29-11-2016, D.S. Rawat & D.S. Das 79598 (CAL); scattered; open forest slopes and grassy localities; 2000–2500 m (Tirthan valley); associated with *Senecio* spp., *Taraxacum officinale* and *Agrimonia pilosa*.

Myriactis wallichii Less. in Linnaea 6: 129. 1831; Hook. f., Fl. Brit. India 3: 247. 1881. (ASTERACEAE).

Annual herbs, sparsely hairy, branched. Stem terete. Leaves alternate, petioles winged, 0.4–0.7 cm; lamina elliptic–lanceolate, 5.5–7.5 × 0.7–1.5 cm, hispid hairy, apex acute, margin unequally serrated. Head subglobose, 0.7–0.8 cm in diameter; involucre bracts erect. Flowers 3–5 seriate, greenish–white. Achenes linear, c. 0.3 cm long.

Flowering and Fruiting: August – September; Rolla, 25-09-2016, D.S. Das & N. Shrivastava 79412 (CAL); scattered; open forest, way sides and grassy localities; 1900–2300 m (Tirthan valley); in association with *Anemone* spp., *Barleria cristata* and *Senecio* spp.

Neolitsea pallens (D. Don) Momiyama & Hara in J. Jap. Bot. 47: 269. 1972. *Tetradenia pallens* D. Don, Prodr. Fl. Nepal. 66. 1825. *Litsea umbrosa* var. *consimilis* (Nees) Hook. f., Fl. Brit. India 5: 180. 1886; Chowdhery & Wadhwa, Fl. Himachal Pradesh 2: 628. 1984. (LAURACEAE).

Evergreen small trees, c. 6 m tall, branched. Leaves simple, alternate, glabrous, yellowish green; lamina lanceolate, apex acute to shortly acuminate, margin entire, base attenuated. Flower in axillary clusters. Fruit globose, 0.3–0.5 cm in diameter, glabrous, yellowish brown.

Flowering and Fruiting: March – May; Ropa, 02-12-2016, D.S. Rawat & D.S. Das 79672 (CAL); rare; forest and forest edges; 1400–1600 m (Sainj valley); associated with *Alnus nepalensis*, *Lyonia ovalifolia* and *Rhododendron arboreum*.

Nicandra physalodes (L.) Gaertn., Fruct. Sem. Pl. 2: 237, t. 137. 1791; Chowdhery & Wadhwa, Fl. Himachal Pradesh 2: 506. 1984. *Atropa physalodes* L., Sp. Pl. 1: 181. 1753; Hook. f., Fl. Brit. India 4: 240. 1883. (SOLANACEAE).

Annual herb, c. 1 m tall. Stems angular, glabrous. Leaves ovate–elliptic, 8–18 × 4–8 cm; petiole 2–3 cm; apex acute or blunt, margin lobed, base cuneate or attenuated. Flower showy, axillary; pedicel 2–4 cm. Calyx large, deeply parted, almost covering the corolla; corolla blue. Fruit berry, with persistent calyx.

Flowering and Fruiting: August – October; Lapah, 02-12-2016, D.S. Rawat & D.S. Das 79670 (CAL); scattered; forest edge, way sides and agricultural land; 1400–1700 m (Sainj

and Tirthan valley); in association with *Cirsium wallichii*, *Cyathula tomentosa* and *Galinsoga parviflora*.

Osyris lanceolata Hochst. & Steud. Unio Itin., Schimper s.n. 1832. *O. quadripartita* Salzm. ex Decne., Ann. Sci. Nat., Bot. II, 6: 65 1836; Chowdhery & Wadhwa, Fl. Himachal Pradesh 2: 6355. 1984. *O. arborea* Wall. ex DC., Prodr. 14: 633. 1857. Hook. f., Fl. Brit. India 5: 232. 1886. (SANTALACEAE).

Shrub, 4–5 m tall, branched. Leaves opposite, 3.5–5 × 1.2–1.5 cm, oblong–lanceolate, apex acute, margin entire, base cuneate. Inflorescence 5–6 flowered in umbel. Flowers yellow to brown, 0.10–0.12 cm. Fruits drupe, subglobose, 0.5–0.7 cm in diameter, orange red.

Flowering and Fruiting: August – October; Ropa, 02-12-2016, D.S. Rawat & D.S. Das 79694 (CAL); rare, dry grassy slopes and exposed localities; 1300–1600 m (Sainj valley); associated with *Spermadictyon suaveolens*, *Woodfordia fruticosa* and *Zanthoxylum armatum*.

Parochetus communis Buch.-Ham. ex D. Don, Prodr. Fl. Nepal 240. 1825; Hook. f., Fl. Brit. India 2: 86. 1876; Chowdhery & Wadhwa, Fl. Himachal Pradesh 2: 220. 1984. (Sub family: PAPILIONOIDEAE).

Perennial, prostrate herbs. Stem reduced; hairy. Leaves 3-foliate; petiole 13–16 cm, hairy; leaflets nearly equal, 1.8–2 × 1–1.2 cm, ovate, apex slightly notched, margin entire, base cuneate. Flowers papilionaceous, 1.2–1.5 cm, blue. Pods linear–lanceolate, 1.5 cm in length, sometimes beaked, 8–10 seeded, glabrous, green.

Flowering and Fruiting: May– September; Rolla, 28-09-2016, D.S. Das & N. Shrivastava 79449 (CAL); scattered; moist localities; 2000–2100 m (Tirthan valley); associated with *Oxalis corniculata*, *Stellaria aquatica* and *Trifolium repens*.

Phyllanthus parvifolius Buch.-Ham. in D. Don., Prodr. Fl. Nepal 63. 1825; Hook. f., Fl. Brit. India 5: 294. 1887; Chowdhery & Wadhwa, Fl. Himachal Pradesh 2: 645. 1984. (PHYLLANTHACEAE).

Deciduous shrubs, monoecious, c. 1 m tall. Stems terete, glabrous, brown. Leaves simple, alternate, glabrous, green; lamina ovate–elliptic, 0.4–1 × 0.3–0.5 cm, apex obtuse, margin entire, base cuneate. Fruits globose with persistent calyx. Seeds dark brown, angular, 0.1–0.2 × 0.1 cm.

Flowering and Fruiting: January – October; Lapah, 02-12-2016, D.S. Das & D.S. Rawat 79684 (CAL); scattered; exposed and grassy slopes; 1800–2100 m (Sainj valley); associated with *Myrsine africana*, *Desmodium multiflorum* and *Berberis* spp.

Plantago major L., Sp. Pl. 112. 1753; Hook. f., Fl. Brit. India 4: 705. 1885; Chowdhery & Wadhwa, Fl. Himachal Pradesh 2: 594. 1984. (PLANTAGINACEAE).

Annual-perennial herbs. Roots fibrous. Leaves in rosette, petioles 2–3.5 cm; lamina ovate-ellipsoid, 7 × 5 cm, margin wavy or entire, apex obtuse, base cuneate. Inflorescence spike; peduncle 15–50 cm long. Flowers sessile to subsessile, white, minute; fruits brown at maturity. Seeds brownish, obovate to ellipsoid.

Flowering and Fruiting: May – August; GHNP entry gate, 30-11-2016, D.S. Rawat & D.S. Das 79619 (CAL); scattered; shady moist localities; 1400–1700 m (Sainj valley); associated with *Oxalis corniculata*, *Rumex hastatus* and *Trifolium repens*.

Rubus macilentus Cambess. in Jacquem., Voy. Inde. 4: 49. 1844; Hook. f., Fl. Brit. India 2: 336. 1878; Chowdhery & Wadhwa, Fl. Himachal Pradesh 2: 256. 1984. (ROSACEAE).

Prickly shrubs, 2–3 m tall. Stem prickly; prickles straight, 0.5–0.7 cm. Leaves imparipinnately compound, prickly; leaflets 3, hairy, veins hairy; lamina ovate-lanceolate, 2.5–3 × 1.5–2 cm, apex acuminate, margin serrate to biserrate. Inflorescence terminal or axillary cyme, prickly. Flowers pedicellate, white or pinkish white. Fruits red.

Flowering and Fruiting: April – September; Rolla, 28-11-2016, D.S. Rawat & D.S. Das 79540 (CAL); scattered; open forests; 1900–2400 m (Sainj and Tirthan valley); associated with *Deutzia compacta*, *Rosa* spp. and *Sarcococca prunifolia*.

Scrophularia himalensis Royle ex Benth. Scroph. India 18. 1835. Hook. f., Fl. Brit. India 4: 255. 1883; Chowdhery & Wadhwa, Fl. Himachal Pradesh 2: 531. 1984. (SCROPHULARIACEAE).

Annual undershrub, c. 70 cm tall. Leaves ovate-lanceolate 3–6 × 2–3 cm. Flowers loose terminal panicle, green, 0.4–0.5 mm long. Sepal 5-lobed, upper lobes longer than others. Fertile stamens are much protruded from flowers. Seed globose.

Flowering and Fruiting: July – October; Niharni, 01-12-2016, D.S. Rawat & D.S. Das 79637 (CAL); scattered; exposed localities, way sides and agricultural field margins; 1400–1700 m (Sainj valley); associated with *Carpesium nepalense*, *Strobilanthes atropurpureus* and *Prenanthes violaeifolia*.

Scurrula pulverulenta (Wall.) G. Don in Gen. Hist. 3: 421. 1834; Chowdhery & Wadhwa, Fl. Himachal Pradesh 2: 633. 1984. *Loranthus pulverulentus* Wall. in Roxb., Fl.

India 2: 221. 1824; Hook. f., Fl. Brit. India 5: 211. 1886. (LORANTHACEAE).

Epiphytic shrubs, branched. Leaves opposite; petiole 1.5–2 cm; lamina ovate-oblong, leathery, 8–10 × 3–4 cm, apex acute, margin entire, base rounded. Racemes solitary axillary; pedicel 0.5–0.6 cm. Flowers cream coloured, tomentose. Fruits berry, clavate shaped, one seeded.

Flowering and Fruiting: September – November; way to Rolla, 01-12-2016, D.S. Rawat & D.S. Das 79631 (CAL); scattered; forest edge and agricultural field margins; 1500–1800 m (Sainj valley) associated with *Alnus nepalensis*, *Juglans regia* and *Pyrus pashia*.

Senecio scandens Buch.-Ham. ex D. Don, Prodr. Fl. Nepal. 178. 1825; Hook. f., Fl. Brit. India 3: 352. 1881; Chowdhery & Wadhwa, Fl. Himachal Pradesh 2: 417. 1984. (ASTERACEAE).

Annual-perennial, herb, scandent. Stem branched, often zigzag, glabrous. Leaves alternate; petioles c. 1.5 cm; lamina ovate-lanceolate, 7–8 × 2.5–3 cm, apex acute to acuminate, margin serrate-dentate. Head radiate. Ray florets 8–10, yellow. Disk florets many, yellow. Achenes cylindrical; pappus white.

Flowering and Fruiting: September – November; way to Chalocha, Western Himalaya, Kullu, GHNP, 27-11-2016, D.S. Rawat & D.S. Das 79522 (CAL); common; open forest, waysides and forest edge; 1400–2400 m (Sainj and Tirthan valley); associated with *Berberis* spp., *Prinsepia utilis* and *Spiraea canescens*.

Silene edgeworthii Bocquet in Candollea. 22: 13. 1967; Chowdhery & Wadhwa, Fl. Himachal Pradesh 1: 95. 1984. *Lychnis indica* var. *fimbriata* Edgew. & Hook. f., Fl. Brit. India 1: 225. 1874. (CARYOPHYLLACEAE).

Annual-perennial herbs, 60–70 cm tall. Stem hairy, green. Leaves ovate-lanceolate, sub-sessile; lamina 4 × 1.5 cm; margin entire, apex acuminate, base cuneate. Inflorescence axillary cyme. Flowers, campanulate, 1.5–2.5 cm, greenish white. Petals 5, bilobed, fimbriate. Fruits capsule, rarely exceeding the calyx.

Flowering and Fruiting: September – October; way to Silth, 29-09-2016, D.S. Das & N. Shrivastava 79454 (CAL); scattered; forest, way sides and shady slopes; 1900–2200 m (Tirthan valley); associated with *Aster thomsonii*, *Prenanthes violaeifolia* and *Senecio* spp.

Smilax glaucophylla Klotzsch in Klotzsch & Garcke, Bot. Reise Pr. Waldemar 45, t. 91. 1862; Chowdhery & Wadhwa, Fl. Himachal Pradesh 2: 715. 1984. *S. parviflora* Wall. ex Hook. f., Fl. Brit. India 6: 304. 1892. (SMILACACEAE).

Perennial, climber, branched. Stem terete, often unarmed. Leaves simple, ovate-lanceolate, 3-nerved, 4–7 × 1–2 cm, apex acute to acuminate, margin entire, base round. Inflorescence axillary umbellate. Flowers small, pale white. Fruits berry, c. 0.5 cm in diameter, black.

Flowering and Fruiting: April – October; GHNP entry gate, 28-11-2016, D.S. Rawat & D.S. Das 79564 (CAL); common; forest edge, open forest and way side; 1900–2100 m (Tirthan valley); associated with *Berberis* spp., *Prinsepia utilis* and *Spiraea canescens*.

Solanum viarum Dunal in DC., Prodr. 13(1): 240. 1852; Chowdhery & Wadhwa, Fl. Himachal Pradesh 2: 510. 1984. *S. khasianum* var. *chatterjeeanum* G. S. Gupta in Bull. Bot. Surv. India 3: 412–415. 1961. (SOLANACEAE).

Perennial, undershrubs, spiny, tomentose. Stems terete, pubescent; spines straight, 1–1.5 cm. Leaves simple, unequal; petioles slender, 4–6 cm long, armed; lamina lanceolate, 8–14 × 6–9 cm, spines on veins, apex acute, margin wavy, base round. Inflorescence axillary; peduncle short, 0.3–0.5 cm. Flowers white. Berry yellowish, globose, 2–2.5 cm in diameter.

Flowering and Fruiting: June – December; Tinder, 02-12-2016, D.S. Rawat & D.S. Das 79683 (CAL); scattered; way sides, exposed slopes and grassy localities; 1400–1600 m (Tirthan valley); in association with *Barleria cristata*, *Dicliptera chinensis* and *Tragopogon gracilis*.

Staphylea emodi Wall. ex Brandis, For. Fl. India, 114. 1874; Hook. f., Fl. Brit. India 1: 698. 1875; Chowdhery & Wadhwa, Fl. Himachal Pradesh 2: 161. 1984. (STAPHYLEACEAE).

Deciduous shrub, 4–6 m tall, branched. Leaves opposite, 3-foliate; petioles 10–12 cm; leaflets elliptic-lanceolate, apex acute, margin sharply serrated, base rounded. Inflorescence axillary cyme. Flowers white; pedicels 2.5–3 cm long; Sepal persistent in fruit. Capsule bulbous, 4–6 cm, dehisce longitudinally downwards from the apex.

Flowering and Fruiting: April – September; Chalocha, 28-09-2016, D.S. Das & N. Shrivastava 79478 (CAL), scattered; shady localities of the forest along the streams; 2000–2300 m (Sainj and Tirthan valley); in association with *Daphne papyracea*, *Leycesteria formosa* and *Lonicera quinquelocularis*.

Trachelospermum lucidum (D. Don) Schum. in Engl. & Prantl, Nat. Pflanzenfam. 4(2): 159. 1895; Chowdhery & Wadhwa, Fl. Himachal Pradesh 2: 659. 1984. *T. fragrans* (Wall. ex G. Don) Hook. f., Fl. Brit. India 3: 667. 1882. *Alstonia lucida* D. Don, Prodr. Fl. Nepal. 131. 1825. (APOCYNACEAE).

Evergreen climbing shrub. Leaves elliptic-lanceolate, shining green above, paler beneath 10–15 × 2–4 cm, apex acuminate, margin entire, base acute. Flowers white, fragrant. Calyx lobes erect. Corolla tube, c. 1 cm long, lobes overlapping to the right in bud. Seeds linear, flattened, c. 1.5 cm long, brown.

Flowering and Fruiting: April – October; Tinder, 30-11-2016, D.S. Rawat & D.S. Das 79616 (CAL); rare; grows at shady localities, stream or river sides; 1500–1900 m (Tirthan valley); in association with *Alnus nepalensis*, *Lyonia ovalifolia*, *Persea* spp. and *Rhododendron arboreum*.

Tricholepis elongata DC., Prodr. 6: 563. 1837; Hook. f., Fl. Brit. India 3: 380. 1881; Chowdhery & Wadhwa, Fl. Himachal Pradesh 2: 426. 1984. (ASTERACEAE).

Annual, erect herbs, 60–90 cm tall, pubescent. Leaves simple, alternate, pubescent, green; petioles short, 0.5–0.8 cm; lamina lanceolate, 6–7 × 1.2–1.5 cm, apex acute, margin wavy, base cuneate. Head 1.5–2.0 cm across; involucre bracts acicular, tips ciliate. Flowers yellowish or white. Achenes linear, yellowish; pappus shining.

Flowering and Fruiting: August – November; Rolla, 29-11-2016, D.S. Rawat & D.S. Das 79592 (CAL); scattered; exposed grassy localities; 1800–2300 m (Sainj and Tirthan valley); associated with *Barleria cristata*, *Dicliptera chinensis* and *Tragopogon gracilis*.

Veronica persica Poir. in Lam. & al., Encycl. Meth. Bot. 8: 542. 1808; Chowdhery & Wadhwa, Fl. Himachal Pradesh 2: 537. 1984. (SCROPHULARIACEAE).

Annuals–perennial, branched at base, scandent herbs, 20–30 cm tall, hairy. Stem densely pubescent, green. Leaves opposite–decussate; lamina ovate, 1.2–2 × 0.7–0.9 cm, margin crenate, apex subrounded, base cordate. Inflorescence axillary cyme. Flowers blue. Sepals 4. Petals 4, 3 equal, lanceolate. Fruits capsule.

Flowering and Fruiting: January – December; Rolla, 28-11-2016, D.S. Rawat & D.S. Das 79578 (CAL); scattered; shady moist habitat, way and camp sides, 1800–2000 m (Tirthan valley); associated with *Oxalis corniculata*, *Stellaria aquatica* and *Trifolium repens*.

Viscum album L., Sp. Pl. 1023. 1753. Hook. f., Fl. Brit. India 5: 223. 1886; Chowdhery & Wadhwa, Fl. Himachal Pradesh 2: 633. 1984. (VISCACEAE).

Epiphytic shrub. Stem dichotomously branched, nodes swollen, slender, minutely pubescent, green to yellowish green. Leaves sessile, elliptic-lanceolate, 4.5–6 × 1.5–2 cm, 5-nerved, pubescent, glossy, margin entire. Inflorescence 2–5 flowered. Flowers sessile; bracts 2, 0.2–0.3 cm

long. Berry 0.5 cm in diameter, globose. Seeds subglobose, flattened, embedded in a white viscid pulp.

Flowering and Fruiting: June – November; Niharni, 26-11-2016, D.S. Rawat & D.S. Das 79488 (CAL); scattered; epiphyte; 1400–1700 m (Sainj valley); commonly grows on trunk and branches of *Alnus nepalensis*, *Juglans regia* and *Pyrus pashia*.

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