

## Concept of The Genus *Acampe* (Lindl.) in India

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### Abstract

The genus *Acampe* Lindl. (Orchidaceae) has been taxonomically studied in Indian context. Out of 10 species of *Acampe* found globally, four species and one variety were recognized in India. Detailed taxonomic account including description, illustrative photo-plate along with information on phenology, habitat and distribution have been provided. The threat status of each taxon has been assessed in Indian perspective by following the IUCN guidelines.



**Keywords:** *Acampe*, Conservation, Distribution, IUCN, Orchidaceae, Taxonomy

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### Introduction

The genus *Acampe* [Family: Orchidaceae; Sub-family: Epidendroideae; Tribe: Vandae; Sub-tribe: Aeridinae (Chase et al. 2015)] was established in 1853 by John Lindley in *Folia Orchidacea*. But Garay (1972) pointed out Lindley's earlier name *Sarcanthus* (typified by *Epidendrum praemorsum* Roxb.) had priority. Subsequently, there has been considerable difference in opinion regarding the application of names (*Sarcanthus*, *Saccolabium*, *Gastrochilus* etc.) for species of *Acampe*. Presently, the name *Acampe* has been conserved.

The generic name derived from the Greek word *akampes* in reference to the rigid, brittle flowers. The genus represents epiphytic habit with monopodial growth; leaves distichous, coriaceous with bilobed apex; inflorescence axillary, racemose, corymbose or paniculate; flowers non-resupinate, fleshy; labellum attached with the base of the column, rigid, papillose or sometimes warty (Pearce & Cribb, 2002; Pridgeon et al., 2014).

The genus comprises 10 taxa globally and is distributed in tropical Himalayan region to China and Indochina, Southeast Asia, tropical and subtropical Africa, Madagascar and the island of the western Indian Ocean (Pridgeon et al., 2014). In

India, it is represented by four species and one variety [viz. *Acampe ochracea* (Lindl.) Hochr; *Acampe papillosa* (Lindl.) Lindl.; *Acampe papillosa* var. *flava* A.P. Das et al.; *Acampe praemorsa* (Roxb.) Blatt. & McCann; *Acampe rigida* (Buch. - Ham. ex Sm.) P.F. Hunt]. Singh et al. (2019) included *Acampe congesta* Lindl. (Lindl.) also, but this has been reduced under the synonymy of *Acampe praemorsa* during the present study. The genus is predominantly distributed almost throughout India in the tropical and coastal region.

As a part of the revisionary studies of monopodial orchids under the Himalayan Research Fellowship scheme of NMHS, the genus *Acampe* was studied in detail. The taxonomic study was based on the thorough morphological characterization of each taxon through study of fresh and herbarium specimens coupled with study of relevant literature. Each taxon has been provided with detailed description, photographic illustrations, information on phenology, habitat and distribution. An artificial key for identification of all the species of *Acampe* present in India has been provided. Threat status for each taxon has been assessed in accordance with IUCN guidelines (IUCN, 2012a; 2012b; 2019) in order to facilitate conservation actions.

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**Taxonomic Treatment**

*Acampe* (Lindl.) Lindl., Fol. Orchid. *Acampe*: 2. 1853; Benth. & Hook.f., Gen. Pl. 3: 579. 1883; Bose & Bhattacharjee, Orchids India: 49. 1980; N.P. Balakr., Fl. Jowai: 473. 1983; Deb, Fl. Tripura 2: 448. 1983; Katak, Orch. Meghalaya: 181. 1986; Karthik. & al., Fl. Ind. Enum. Monocot.: 106. 1989; H.J. Chowdhery, Orch. Fl. Arunachal Pradesh: 39. 1998; Sushil K. Singh & al., Orch. India: 35. 2019. **Type:** *Acampe multiflora* (Lindl.) Lindl. [= *Acampe rigida* (Buch. -Ham. ex J.E. Sm.) P.F. Hunt]. *Saccolabium* Bl. sect. (*Acampe*) Hook.f., Fl. Brit. India 6: 32.1890; King & Pantl., Ann. Roy. Bot. Gard. Calcutta 8:217. 1898. *Sarcanthus* Lindl., Bot. Reg., 10, t. 817 (1824), non. Lindl. (1826).

Epiphytic monopodial herb; roots thickly velamenous; stem woody, simple or branched. Leaves distichous, coriaceous, dorsiventrally flattened, fleshy, apex bilobed. Inflorescence

axillary, simple or branched, racemose, corymbose or paniculate, much shorter or sometimes longer than leaves. Floral bracts membranous, brownish. Flowers small to medium sized, non-resupinate, rigid and fleshy, yellowish with brown transverse bands. Sepals and petals sub-similar, labellum saccate or spurred at base; immobile, rigid, lobed, fleshy, papillose or sometimes warty; spur non septate, lacking back wall callus but hairy inside. Column erect, short, stout, fleshy, glabrous or papillose, foot absent; anther cap ovate; pollinia 4 in unequal pairs, globose waxy; stipe strap shaped, longer than wide; viscidium small, ovoid; rostellum emarginate. Capsules erect, fusiform-clavate, ridged, stalked.

**Notes:** Some species are often cultivated as ornamentals. There are reports of few species being used in traditional medicine.

**Key to the species**

- |   |                               |
|---|-------------------------------|
| 1a. Mid-lobe of the labellum warty-papillose, spur 3 – 4 mm long, cylindrical   | <b>2</b>                      |
| 1b. Mid-lobe of the labellum finely pubescent, spur sac like, 1 – 2 mm long, broadly conical  | <b>3</b>                      |
| 2a. Inflorescence paniculate or simple raceme, equal to or longer than leaves; side-lobes of labellum small, protruding at base, column with two distinct horns at apex | <b>1. <i>A. ochracea</i></b>  |
| 2b. Inflorescence umbellate to capitate, not branched, shorter than leaves, side lobes of labellum not protruding, column without prominent horns at apex               | <b>2. <i>A. papillosa</i></b> |
| 3a. Plant up to 70 cm long; leaves 2 – 3 cm wide; side-lobes of labellum reduced, truncate; disc without central pubescent ridge  | <b>3. <i>A. praemorsa</i></b> |
| 3b. Plant up to 150 cm long; leaves 2.5 – 5.5 cm wide; side-lobes of labellum well developed, broadly conical; disc with a central pubescent ridge                      | <b>4. <i>A. rigida</i></b>    |



**Map 1** Distribution map of *Acampe ochracea* (Lindl.) Hochr.

**1. *Acampe ochracea*** (Lindl.) Hochr. in Bull. New York Bot. Gard. 6: 270. 1910; Pradhan, Indian Orchids 2: 525. 1979; A. Abraham and Vatsala, Intr. Orchids: 452, f. 136. 1981; B.D. Sharma & al., Fl. Karnataka: 264. 1984; Katak, Orch. Meghalaya:182, Pl.67 (1a-c). 1986; Seidenf. in Opera Bot. 95: 48, f.25. 1988; Karthik. & al. in Fl. Ind. Enum. Monocot.: 106. 1989; Lakshmin. in B.D. Sharma & al. (ed.). Fl. Maharashtra: 10. 1996; K.N. Ramakrishna in Pull. (ed.), Fl. Andhra Pradesh 3: 931. 1997; H.J. Chowdhery, Orch. Fl. Arunachal Pradesh: 39, f.11. 1998; Hynn. & al. in Hajra & U. Chatterjee (eds.), Orch. Nagaland: 27. 2000; N. Pearce & P.J. Cribb, Fl. Bhutan 3(3): 489. 2002; S. Misra, Orch. Orissa: 577. 2004; C.S. Kumar & Manilal in Manilal & C.S. Kumar (eds.), Orchid memories: 163. 2004; Lucksom, Orch. Sikkim: 807. f.487. 2007; K. Gogoi, Wild Orch. Assam: 27. 2017; P.G. Diwakar in Lakshmin. & al. (eds.), Fl.



**Fig. 1** *Acampe ochracea* (Lindl.) Hochr.: A. Habit; B. Inflorescence; C. Bract; D. Flower (front view); E. Flower (side view); F. Sepals & petals (ventral view); G. Sepals and petals (dorsal view); H. Labellum (ventral view); I. Labellum (dorsal view); J. Labellum with column, pedicel and ovary; K. L.S. of spur; L. Column; M. Column with pollinia; N. Anther cap; O. Pollinia.

Karnataka 3: 12. 2019; Sushil K. Singh & al., Orch. India: 35. 2019. **Type:** Sri Lanka (Ceylon), Horton, cult. *Loddiges* s.n. (holo. K- LINDL, photo!). *Saccolabium ochraceum* Lindl., Bot. Reg. 28: misc.2, no.4. 1842; Hook. f. Fl. Brit. India 6: 62. 1890p.p.; King & Pantl., Ann. Roy. Bot. Gard. Calcutta 8: 219, t. 291. 1898; Prain, Bengal Plants: 768. 1903. *Acampe dentata* Lindl., Fol. Orchid. 4 (Acampe): 3. 1853. *Saccolabium lineolatum* Thwaites, Enum. Pl. Zeyl.: 304. 1864. *Acampe griffithii* Rchb.f. in Flora 55: 277. 1872. *Gastrochilus ochraceus* (Lindl.) Kuntze., Revis. Gen. Pl. 2: 661. 1891.

Epiphytic monopodial herbs, up to 1 m tall; stem 0.9–1.0 cm thick; erect to ascending, enclosed in persistent, tubular, imbricate, finely striated leaf sheaths. Leaves alternate, distichous, coriaceous, 10–25 × 1.0–2.5 cm, linear-oblong, entire, apex unequally bilobed, mid-vein prominent, sheathed at base. Inflorescence paniculate or simple raceme, 7–26 cm long, lateral, extra axillary, equal to or longer than leaves, rachis laxly 8–20 flowered. Floral bracts 1.1–1.4 × 0.9–1.0 mm, minute, ovate-triangular, fleshy. Flowers widely opening, 6–7 mm across, yellow with irregular brown markings at sepals and petals, labellum white with creamy-yellow spur.

Pedicel and ovary 4 mm long, cylindrical, sparsely puberulous. dorsal sepal 5.5–6 × 1.5–2.5 mm, oblanceolate, obtuse; lateral sepals 5.0–5.6 × 1.3–2.5 mm, oblong, sub-falcate, obtuse; petals c. 5 × 2 mm, oblanceolate-spathulate, obtuse. Labellum 3.5–4.5 × 2–2.5 mm, 3-lobed, fleshy, distinctly spurred; side lobes small, erect, toothed, protruding at base; mid-lobe broadly oblong-obtuse, warty adaxially, conical projection at the abaxial side, margins undulate; spur cylindrical, 3–4 mm, hairy within. Column 1.5 mm long, with two distinct horns at apex, finely puberulous; anther cap sub-orbicular, convex with recurved beak; pollinia 4, sub-globose, cleft, stipe 1 mm, sub-clavate; viscidium small, glandular. Capsules 3.0–5 × 0.4–0.6 cm, fusiform, ridged, stalk small.

**Phenology:** September – March.

**Habitat:** Epiphytic herbs; grow on moss covered branches and rock boulders in valleys and tropical-subtropical forest at elevation up to 1500 m.

**Distribution:** India (Andhra Pradesh, Arunachal Pradesh, Assam, Karnataka, Kerala, Maharashtra, Manipur, Meghalaya, Mizoram, Nagaland, Odisha, Sikkim, West Bengal); Bangladesh; Bhutan; China; Indo-China; Myanmar; Nepal; Sri Lanka; Thailand.

**Exsiccata: Andhra Pradesh:** Ebul R. F., North of Gulium, 23.02.47, *V. Narayanaswami & Party* 570 (CAL). **Arunachal Pradesh:** West Kameng, Tipi Orchid Centre, 29.11.2000, *A.N. Rao* 30616 (OHT). **Assam:** Nowgong, Khulahat Forest, 24.11.1952, *G.K Deka* s.n. (ASSAM); Pava Sanctuary, Rajabari, 03.04.1976, *Hajra* 52585 (ASSAM). **Kerala:** Pathanamthitta, Angamoozhy, 28.02.1988, *Anil Kumar. N.* 528 (CAL); Ganapathy Temple area, Pamba Sabarimala R.F, 25.04.1984, *E. Vajravelu* 80584 (CAL); Idukki, Adimala, 20.03.1991, *A. Gangaprasad* 12221 (TBGT). **Manipur:** Willong, 02.03.2011, *Nanda* 00174 (COGCEHR). **Meghalaya:** Jaintia Hills, Jowai, Raliang, 24.01.1957, *G.K Deka* 5130 (ASSAM, CAL); Garo Hills, 10 mile down to Dalu Road, 19.12.1950, *M.L. Saikia* 36177 (ASSAM). **Mizoram:** Aijawl to Sibutalung road, 19.02.1953, *G.K. Deka* s.n. (ASSAM). **Nagaland:** Tisu, *Hynniewta* 80848; Tokye, *Hynniewta* 80915 (ASSAM). Naga hills, *F. Kingdon Ward* 11208 (CAL). **Odisha:** Mayurbhanj, Simlipal, Barigam-Kabataghai, 05.01.1987, *S. Misra* SM1042 (CAL). **Sikkim:** Tropical Valley, November 1895, *Pantling* 133 (CAL). **Tripura:** s. loc., *D.B. Deb* s.n. (CAL). **West Bengal:** Jeodhara, 01.08.1900, *Prain* s.n. (CAL).



**Extent of occurrence (EOO):** 1889346 km<sup>2</sup>

**Area of Occupancy (AOO):** 228 km<sup>2</sup>

**Red list assessment:** Endangered [EN B2ab(iii)+C2a(i)].

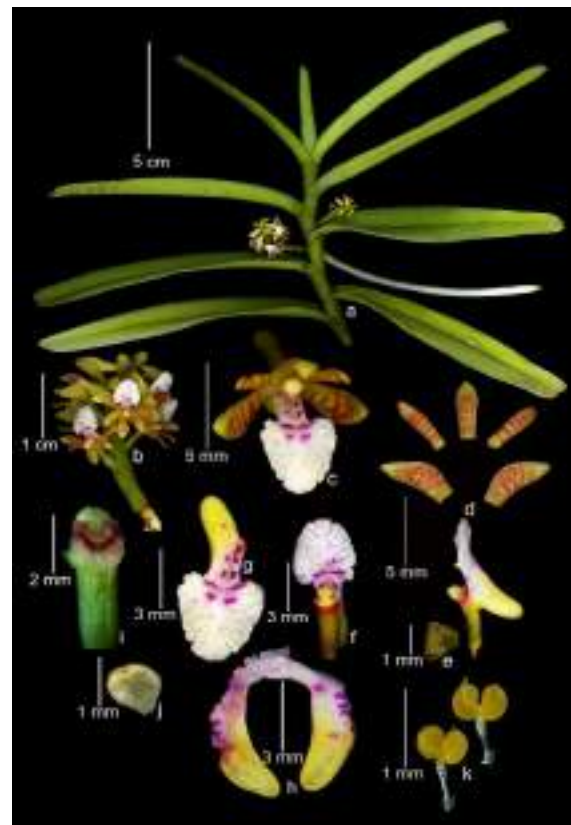
**Final assessment in Indian perspective:** Vulnerable° [VU°].

**Uses:** This species has been cultivated at some commercial Orchid nurseries and got good potential for a potted ornamental for foliage and can be hanged in lobbies and verandas.



**Map 2** Distribution map of *Acampe papillosa* (Lindl.) Lindl.

**2. *Acampe papillosa*** (Lindl.) Lindl., Fol. Orch. (*Acampe*): 2. 1853; Pradhan, Indian Orchids 2: 525. 1979; Deb, Fl. Tripura 2: 448. 1983; Kataki, Orch. Meghalaya: 183, pl.67 (2a-b). 1986; Seidenf., Opera Bot. 95: 49, f.26. 1988; Karthik. & al., Fl. Ind. Enum. Monocot.: 106. 1989; H.J. Chowdhery, Orch. Fl. Arunachal Pradesh: 41, f.12. 1998; Hynn. & al. in Hajra & U. Chatterjee (eds.), Orch. Nagaland: 28. 2000; N. Pearce & P.J. Cribb, Fl. Bhutan 3(3): 491, f.106. 2002; Lucksom, Orch. Sikkim: 807, f.482, pl.35. 2007; H.J. Chowdhery & Agrawala, Cent. West Himalayan Orch.: 82, pl.1. 2013; K. Gogoi, Wild Orch. Assam: 138. 2017; Sushil K. Singh & al.,



**Fig. 2** *Acampe papillosa* (Lindl.) Lindl.: a. Habit; b. Inflorescence; c. Flower; d. Floral parts showing lateral and dorsal sepals, petals, spurred labellum with column; e. Bract; f & g. Labellum; h. Section of spur; i. Column; j. anther cap; k. Pollinia.

Orch. India: 35. 2019. **Type:** Myanmar (Burma), Prome, coll. Wallich Wall. Cat. 7305 (holo. K-Lindl., photo!). *Saccolabium papillosum* Lindl., Bot. Reg. 18: t.1552. 1833 (excl. syn.); Hook.f. Fl. Brit.India 6: 63. 1890 (excl. syn. *Sarcochilus praemorsus* Spreng.); King & Pantl., Ann. Roy. Bot. Gard. Calcutta 8: 219, t. 290. 1898; Prain, Bengal Plants: 768. 1903; Duthie, Ann. Roy. Bot. Gard. Calcutta 9: 147. 1906; Haines, Bot. Bihar Orissa 6: 1180. 1924; Panigrahi & J. Joseph in Bull. Bot. Surv. India 8(2): 157. 1966. *Saccolabium carinatum* Griff., Not. Pl. Asiat. 3: 354. 1851. *Gastrochilus papillosum* (Lindl.) Kuntze, Rev. Gen. Pl. 2: 661. 1891; A.S. Rao & N.P. Balakr., Rec. Bot. Surv. India 20(2): 85. 1973. *Sarcanthus papillosus* (Lindl.) Tixier, Bull. Soc. Roy. Sci. Nat. Laos 9: 30. 1963. *Acampe carinata* (Griff.) Panigrahi, Taxon 34(4): 688. 1985; Deva & H.B. Naithani, Orch. Fl. NW Himalaya: 355, f. 203. 1986; S. Misra, Orch. Orissa: 580. 2004; H.A. Barbhuiya & al., Phytotaxa 303(3): 272, f.1. 2017 (excl. syn. *Acampe papillosa* var. *flava*). *Acampe praemorsa* auct. non (Roxb.) Blatt. & McCann: Guha Bakshi, Fl. Murshidabad district,

**Key to the varieties**

1. Flowers large, floral parts less fleshy, sepals pale green and marked with brown streaks on the lower side and brown blotches at the apical end; petals pale green with horizontal brown streaks and blotches at the tip; labellum white with dark spots at the base, ovate-cordate, strongly papillate throughout **2.1. *A. papillosa* var. *papillosa***

1a. Flowers small, floral parts much fleshy & shining, flowers evenly yellow throughout markings or blotches obscure; labellum pale white, **2.2. *A. papillosa* var. *flava***

West Bengal: 310. 1984; D.K. Ghosh & J.K. Mallick, Fl. Darjeeling Himalayas: 653. 2014; K. Gogoi, Wild Orch. Assam: 28. 2017.

Epiphytic, monopodial herbs up to 45 cm; stem erect to ascending; internodes 1–3 cm long, enclosed in persistent, tubular, imbricate sheaths. Leaves distichous, coriaceous, 13–16 × 1.0–2 cm, linear-oblong, apex obliquely notched, midvein prominent. Inflorescence lateral, extra-axillary, sub-umbellate to capitate, much shorter than leaves, densely many flowered; peduncle with 1-2 annular sheaths. Floral bracts 1–1.5 mm, ovate-triangular, acute. Flowers 10–12 mm across, yellowish-green with dark purple bands and spots on sepals and petals, labellum white with dark purple spots towards the base. Pedicel plus ovary 4–5 mm long, glabrous, ridged. Dorsal sepal 5–7.5 × 1.5–2 mm, oblong-oblongate, entire, obtuse; lateral sepals 5–8 × 2–2.5 mm, oblong-elliptic, sub-acute, falcate; petals 5.0–7.5 × 1–1.3 mm, oblong-elliptic, sub-acute, falcate. Labellum 6 × 4.1 mm, 3-lobed, base concave; side-lobes much reduced, not protruding out; mid-lobe 4–6 × 2.5–3 mm, large, ovate-cordate, strongly papillate throughout, obtuse, undulate, decurved; spur 3 mm long, cylindrical, pubescent at the opening and inner margin, parallel to the pedicel and ovary. Column c.1.5 mm long, short, stout, sparsely puberulous, stamens obscure; anther cap ovate; pollinia 4, globose, in two unequal pairs; stipe 0.5 mm, linear, viscidium small, glandular. Capsules fusiform, 1.8–4 × 0.4–0.5 cm, fusiform, ridged, stalk small.

**Phenology:** October – June.

**Habitat:** Epiphytic herbs; on rough surfaced trees in moist deciduous and semi evergreen forests, often on roadside trees found at elevation up to 1500 m.

**Distribution:** India (Andhra Pradesh, Arunachal Pradesh, Assam, Bihar, Chhattisgarh, Jharkhand, Madhya Pradesh, Manipur, Meghalaya, Mizoram, Nagaland, Odisha, Sikkim, Tripura, Uttarakhand, West Bengal); Bangladesh; Bhutan; China; Indo-China; Myanmar; Nepal; Thailand.

**Exsiccata:** **Arunachal Pradesh:** Lohit, near Chowkham, 24.11.1969, *J. Joseph* 48317 (ASSAM); Parshuram Kund, 01.01.1970, *J. Joseph*

48857 (ASSAM); West Kameng, Tipi, 12.11.1979, *S.N. Hegde* 527 (OHT); Tipi, 2.10.1993, *A.N. Rao* 21841 (OHT). **Assam:** Bornadi WLS, Udalguri & Baksa, Bogamati, 20.09.2010, *C. Deori & D.K. Roy* 19070 (ASSAM); Sonitpur, Sonai Rupai WLS, 11.04.1976, *Hajra* 65459 (ASSAM). **Chhattisgarh:** Surguja, 30.08.1901, *Rev. L. Candom* s.n. (CAL); 23.07.1902, *Rev. L. Candom* s.n. (CAL). **Jharkhand:** Chotanagpur, 13.09.1896, *Prain* s.n. (CAL). Jaintia Hills, Raliang-Jowai, 24.01.1957, *G.K. Deka* 5130 (ASSAM). **Manipur:** Imphal East District, Jiri, 08.11.12, 13.10.11, *Nanda et al* 00294, 00482 (COGCEHR). **Meghalaya:** Khasi & Jaintia Hills, Bornihat, 26.03.1950, *G.K. Deka* (ASSAM); Ri-Bhoi, Nongpoh, 27.10.1935, *G.K. Deka* 20269 (ASSAM); Garo Hills, *Parry* 911, 1013 (K). **Nagaland:** Mokokchung, *Hynniewta* 80399, Wokha, *Hynniewta* 80644 (ASSAM). **Odisha:** Mayurbhanj, Similipal, Bhanjbasia, 13.02.1958, *G. Panigrahi* 12342 (ASSAM); Raipani (Kaptipada-Savat), 18.09.1990, *S. Misra* 1680 (CAL). **Sikkim:** Tropical Valleys, Sep 1892, *Pantling* 243 (CAL, BM, K, W). **Tripura:** Sonamura, 15.02.57, *D.F.O. Tripura* 584 (CAL); Teliamura, 23.04.65, *D.B. Deb* 2887 (CAL); Kalasi, 29.12.59, *D.B. Deb* 2158 (CAL); Rangamura, 08.12.14, *P.M. Deb barman* 600 (CAL); Pratapgarh, South of Agartala, 29.12.14, *P.M. Deb barman* 449 (CAL). **Uttarakhand:** Dehradun, Mussoorie, 08.12.1903, *Mackinnon* (CAL); *Anonym.* 23292 (CAL, K); Lachiwala *Deva* 8835, 30.01.1962, *Malhotra* 19753 (BSD); 25.06.1966, *Arora* 36458 (BSD); Kumaon, *Inayat* 24126 (K); Pithoragarh, Tuli-Baram, G.G. Valley, 21.06.1982, *Malhotra* 51521 (BSD). **West Bengal:** Darjeeling, Mahananda WLS, Sukna, 23.11.2006, *T.K. Paul & Anant Kumar* 41295 (CAL); West Bengal, Kalimpong, Holumba Nursery, 16.12.2003, *G. M. Chhetri* 19814 (BSHC).

**Extent of occurrence (EOO):** 1444363 km<sup>2</sup>

**Area of Occupancy (AOO):** 524 km

**Red list assessment:** Vulnerable [VU C2a(i)].

**Final assessment in Indian perspective:** Near Threatened° [NT°].

**Notes:** Panigrahi (1985) noted the name *A. papillosa* was illegitimate and proposed the new name *A. carinata* (Griff.) Panigrahi. Seidenfaden (1988) discussed this change and proposed an alternative solution which preserved the older, more well established, name and that has been followed here.

**2.2. *Acampe papillosa* (Lindl.) Lindl. var. *flava*** Das, Katham & Nirola, *Pleione* 4(1): 155, f.1. 2010; Sushil K. Singh & al., *Orch. India*: 35. 2019. **Type:** Nagarkata, Duars, Jalpaiguri, 17.11.2009; *A.P. Das & T.K. Katham* 4193 (NBU, not seen).



**Map 3** Distribution map of *Acampe papillosa* var *flava* A.P. Das et al

Monopodial epiphytic herbs; stem erect to ascending; internodes 1–3 cm long, enclosed in persistent, tubular, imbricate sheaths. Leaves distichous, coriaceous, 8–15 × 1.0–2 cm, linear-oblong, apex obliquely notched, midvein prominent. Inflorescence extra-axillary, sub-umbellate to capitate, much shorter than leaves; peduncle 1–2 cm, with purplish-brown annular sheaths; rachis densely many flowered. Floral bracts 1–1.5 mm, ovate-triangular. Flowers 10–13 mm across, faintly fragrant, fleshy and shining, uniformly yellow throughout without any band or blotch; labellum creamy white with yellowish flush on disc and mid-lobe; spur pale greenish-yellow. Pedicel and ovary 4–5 mm long. Dorsal sepals 5–6.5 × 1.5–2, oblong-oblongeolate, obtuse; lateral sepals 5–6.5 × 2–2.5 mm, oblong-elliptic, sub-acute, weakly falcate. Petals 5–6.3 × 1–1.5 mm, linear-elliptic, sub-acute. Labellum 4.5–6 × 3–4 mm, obscurely 3-lobed; side-

lobes erect, not protruding out; mid-lobe ovate, deflexed, obtuse, erose-undulate, surface densely papillose; spur 2.5 mm long, cylindrical-conical, white-pubescent inside.



**Fig. 3.** Inflorescence of *Acampe papillosa* var *flava*. A.P. Das et al.

**Phenology:** Flowering: August – November.

**Habitat:** Epiphytic in moist evergreen forest up to 400 m.

**Distribution:** India (West Bengal), ENDEMIC.

**Exsicata: India: West Bengal:** Jalpaiguri, Nagarkata, 17.11.2009, *A.P. Das & T.K. Katham* 4193 (NBU, could not be located).

**Area of Occupancy (AOO):** 08 km<sup>2</sup>.

**Red list assessment:** Critically Endangered [CR B1ab(iii)+2ab(iii); C2a(ii)].

**Final assessment in Indian perspective:** The assessment is of global perspective as the taxon is endemic. Critically Endangered [CR B1ab(iii)+2ab(iii); C2a(ii)]

**Notes:** Barbhuiya *et al.* (2017) have treated this as conspecific under *Acampe carinata* (= *Acampe papillosa*). This variety can be recognised by its uniform yellowish colour in sepals and petals which shows consistency in subsequent generation is significant to treat this as a separate variety. The type locality is one of the rich habitats for the variety proper i.e., var. *papillosa* and the variation is within



its population. This variety could also be located in the Duars area during 2016 with similar variations. Thus, it is treated here as a distinct taxon.

**3. *Acampe praemorsa* (Roxb.) Blatt. & McCann, J. Bombay Nat. Hist. Soc. 35: 495.1932; Santapau & Kapadia, Orch. Bombay: 233. 1966; A. Abraham and Vatsala, Intr. Orchids: 450, f.135. 1981; R.S. Rao, Fl. Goa Diu Dadra & Nagarhaveli 2: 416. 1986; A.N. Henry & al., Fl. Tamil Nadu 3: 3. 1989; Vajr., Fl. Palghat District, Kerala: 465. 1990; Lakshmin. in B.D. Sharma & al. (eds.), Fl. Maharashtra: 11.1996; K.N. Ramakrishna in Pull. (eds.), Fl. Andhra Pradesh 3: 93. 1997; S. Misra, Orch. Orissa: 584. 2004; Subba Rao & Kumari in P.S.N. Rao (ed.) in Fl. Visakhapatnam District, Andhra Pradesh 2: 238. 2008; R. Manik. & Lakshmin., Fl. Rajiv Gandhi**



**Map 4** Distribution map of *Acampe praemorsa* (Roxb.)

Blatt. & McCann

National Park, Karnataka: 377. 2013; Datar & Lakshmin., Fl. Bhagwan Mahavir (Molem) National Park, Goa: 233. 2013; Jalal, Orch. Maharashtra: 36. f. 4.1. 2018; Sushil K. Singh & al., Orch. India: 35. 2019. **Type:** India, Circar mountains, *W. Roxburgh* s.n. (holo. BM). *Epidendrum praemorsum* Roxb., Pl. Coromandel 1: 34. 1795. *Cymbidium praemorsum* (Roxb.) Sw., Nova Acta Regiae Soc. Sci. Upsal. 6: 75. 1799. *Sarcanthus praemorsus* (Roxb.) Lindl. ex Spreng., Syst. Veg. 3: 721. 1826. *Sarcochilus praemorsus* (Roxb.) Spreng., Syst. Veg. 3: 721. 1826. *Vanda congesta* Lindl., Edwards's Bot. Reg. 25: misc. 61. 1839. *Vanda wightiana* Lindl. ex-

Wight, Icon. Pl. Ind. Orient. 5: t.1670. 1851. *Saccolabium papillosum* auct. non. Lindl.: Wight, Icon. Pl. Ind. Orient. 5: 9, t.1672. 1851; Dalzell & Gibson, Bombay Fl.: 264. 1861. *Acampe excavata* Lindl., Fol. Orchid. 4 (Acampe): 3. 1853. *Saccolabium praemorsum* (Roxb.) Hook.f., Fl. Brit. India 6: 62. 1890 (excl. syn. *Aerides undulata*). non. (Willd.) Lindl. *nom. illeg.*; Prain, Bengal Plants: 1022. 1903; Haines, Bot. Bihar Orissa 6: 1180. 1924. *Gastrochilus praemorsus* (Roxb.) Kuntze, Revis. Gen. Pl. 2: 661. 1891. *Acampe wightiana* (Lindl. ex-Wight) Lindl. Fol. Orchid. 4 (Acampe): 2. 1853; T. Cooke, Fl. Pres. Bombay 2: 705. 1907; C.E.C. Fisch. in Gamble, Fl. Pres. Madras 3: 1447. 1928. *Vanda fasciata* Gardner ex Lindl. Fol. Orchid. 4



**Fig. 4.** *Acampe praemorsa* (Roxb.) Blatt. & McCann: A. Habit; B. Capsules; C. Mature capsule with seeds; D. Inflorescence; E. Side view of flower; F. Front view of flower; G-H. Sepals and Petals; I-K. Labellum; L. Front view of lip and column; M. Labellum & ovary; N. Front view of column; O. Side view of column; P-Q. Anther cap; R. Pollinia.

(Acampe): 2. 1853. *Acampe congesta* (Lindl.) Lindl., Fol. Orchid. 4 (Acampe): 2. 1853; C.E.C. Fisch. in Gamble, Fl. Pres. Madras: 1447. 1928; C.S. Kumar & Manilal in Manilal & C.S. Kumar (eds.), Orchid Memories: 163. 2004. **syn. nov.** *Saccolabium wightianum* (Lindl. ex-Wight) Hook.f., Fl. Brit. India 6: 62. 1890, *nom. illeg.*; Gammie, J. Bombay Nat. Hist. Soc. 20: 126, t.10. 1910. *Saccolabium congestum* (Lindl.) Hook.f., Fl. Brit. India 6: 63. 1890. *Gastrochilus congestus* (Lindl.) Kuntze, Revis. Gen. Pl. 2: 661. 1891.

Epiphytic, monopodial herbs up to 70 cm or more. Stem woody, erect to ascending, internodes 1–1.2 cm long, enclosed in persistent, tubular, imbricate, finely striated sheaths. Leaves distichous, coriaceous, 8–20 × 1.5–3 cm, linear-oblong, entire, unequally bilobed at apex, deeply channeled, mid-vein prominent, T.S. of leaf ‘V’ shaped. Inflorescence lateral, extra-axillary, corymbose, sometimes branched, 3–6 cm long, much shorter than leaves, peduncle with annular sheaths at base, densely flowered. Pedicel and ovary 5–6 mm, glabrous. Flowers 1.2–1.8 cm across, not widely opening, pale yellow with purplish-brown horizontal bands; labellum white, with purple spots at the base; sepals and petals thick, fleshy; dorsal sepal 9–10 × 4.5–5 mm, ovate-oblong, entire, obtuse; lateral sepals 8–9 × 4.5–5 mm, slightly oblique, oblong-ovate, entire, obtuse; petals 7–8 × 1.5–2 mm, oblanceolate, entire, sub-falcate, obtuse. Labellum 6–7 × 4–4.5 mm, fleshy, concave at base, 3-lobed; side lobes small, erect, entire, truncate; mid-lobe broad, deflexed, ovate, erose-undulate, truncate at apex, surface densely pubescent, not warty; spur reduced, sac like, pubescent inside. Column 2–2.5 mm, stout, with 2 erect conical horns at apex; anther cap 2 × 2 mm long, triangular-ovoid; pollinia 4 in unequal pairs, waxy, yellow, globose; stipe 0.5 mm slender; viscidium small, glandular. Capsules 4–5 cm long, cylindrical, longitudinally ridged.

**Phenology:** March – December.

**Habitat:** Epiphytic; found in dry deciduous forests and coastal forests from sea level up to 700 m.

**Distribution:** India (Andhra Pradesh, Chhattisgarh, Daman & Diu, Dadra & Nagar Haveli, Goa, Gujarat, Jharkhand, Karnataka, Kerala, Madhya Pradesh, Maharashtra, Odisha, Rajasthan, Tamil Nadu); Sri Lanka.

**Exsicata:** **Andhra Pradesh:** near Gummada, 16.05.1979, *G.V. Subba Rao* 62439 (CAL); Polavaram, Papikanda R.F., 27.09.1962, *D.C. S. Raju* 503 (CAL). **Daman & Diu:** Daman, 04.05.63, *S.R. Rolla* 89008 (CAL). **Goa:** Parvorim village, 04.09.1963, *K.C. Kanodia* 89755(CAL); Molem, 15.02.2003, *Datar* 187592. **Kerala:** Kottayam, Nalukodi, Changanacherry, 20.05.1987, *V.T.*

*Sastry* 1438 (CAL); Kasaragod, Olavara, 12.05.1982, *V.J. Nair* 73864 (CAL); Quilon, Nadayara, 18.12.1979, *C.N. Mohanan* 63794 (CAL).

**Madhya Pradesh:** Indore near Haralpur-5miles to Manpur, 24.04.1963, *A.R.K. Sastry* 87617 (CAL).

**Maharashtra:** Gadchiroli: Surajgad, *Govekar* 1652 (BAMU); Kolhapur: Udegiri, *M. Sardesai* 1723

(SUK); Amba, *M. Sardesai* 1264 (SUK); Kaas, *M.P. Bachulkar* 5010 (SUK); Mumbai Suburban: Borivali, 19.04.1956, *P.S. Herbert* 1615 (BLAT); Andheri, 03.05.1949, *H. Santapau* 10015 (BLAT); Malad, 30.04.1959, *G.L. Shah* 9846 (BLAT); Goregaon, 13.04.1958, *S.C. Tavakari* 1055 (BLAT); Devbag, Malvan, 20 m, 24.07.2012, *J.S. Jalal* 200504 (BSI); Adale, Vengurla, 5 m, 27.08.2013, *J.S. Jalal* 194988 (BSI); Pulas, Sawantwadi, 65 m, 29.08.2013, *J.S. Jalal* 195028 (BSI); Thane: Mal, 100 m, 24.11.2012, *J.S. Jalal* 200729 (BSI); Kamda forest Badlapur range, 07.06.1967, *K.V. Billore* 110803 (BSI); near Usla village, Murbad range, 13.04.1968, *K.V. Billore* 110903 (BSI); Mumbra, 25.03.1954, *K.V. Shenoy* 2437 (BLAT); Dudhani, 10.05.63, *S.R. Rolla* 89181 (CAL); Ghodbunder, 12.05.75, *N. Subrahmanyam* s.n. (CAL). **Odisha:** Koraput, Kondakamberu, 25.04.63, *D.C. S. Raju* 847 (CAL). **Tamil Nadu:** Travancore, Tenmalai on rock behind Bungalow, 12.09.1918, *C.C. Calder & M.A. Ramaswami* 870 (CAL); Travancore, Dec-10, *A. Meebold* 12957 (CAL); Tirunelveli, Palakkadu, Karaiyar to Gouthalaiyar, 23.05.1988, *R. Gopalan* 88638 (CAL).

**Extent of occurrence (EOO):** 103747.80 km<sup>2</sup>.

**Area of Occupancy (AOO):** 488 km<sup>2</sup>.

**Red list assessment:** Endangered [EN B2ab(iii)+C2a(i)].

**Final assessment in Indian perspective:** Vulnerable° [VU°].

**Notes:** This species is mis-understood by many authors and often mixed together with either *Acampe papillosa* or *Acampe rigida*. It has vegetative structure, more allied to *Acampe papillosa* whereas the flowers are closer to *Acampe rigida* with very short, shallow spur and densely pubescent, non-warty mid-lobe of labellum. The imperfectly known *Acampe congesta* has been placed herewith because of extreme similarity in both vegetative as well as floral characters.

**4. *Acampe rigida*** (Buch. -Ham. ex J.E. Sm.) P.F. Hunt, Kew Bull. 24: 98. 1970; Pradhan, Indian Orchids 2: 524. 1979; Deva & H.B. Naithani, Orch. Fl. NW Himalaya: 357, f.203a. 1986; Katak, Orch. Meghalaya: 182. 1986; Seidenf., Opera Bot. 95: 45, f.24. 1988; Lakshmin. in B.D. Sharma & al. (eds.), Fl. Maharashtra: 11.1996; H.J. Chowdhery, Orch. Fl. Arunachal Pradesh: 41, f.13. 1998; Hynn. & al. in Hajra & U. Chatterjee (eds.), Orch. Nagaland: 28. 2000; N. Pearce & P.J. Cribb, Orch. Bhutan: 491. 2002; C.S. Kumar & Manilal in Manilal & C.S. Kumar (eds.), Orchids Memories: 163. 2004; S.



Misra, Orch. Orissa: 587, f.588 – 590. 2004; Lucksom, Orch. Sikkim: 806, f. 486, pl. 35. 2007; D.K. Ghosh & J.K. Mallick, Fl. Darjeeling Himalayas: 654. 2014; K. Gogoi, Wild Orch. Assam: 29. 2017; Sushil K. Singh & al., Orch. India: 39. 2019. **Type:** Nepal, icon Buchanan-Hamilton (holo. LINN, photo!). *Aerides rigida* Buch. -Ham. ex J.E. Sm. in Rees, Cyclop. (Addenda) 39: *Aerides*, no. 12. 1819. *Vanda multiflora* Lindl., Coll. Bot.: t.38. 1826. *Vanda longifolia* Lindl., Gen. Sp. Orchid. Pl.: 215. 1833. *Acampe multiflora* (Lindl.) Lindl., Fol. Orch. Acampe: 1. 1853; R.S. Rao, J. Bombay Nat. Hist. Soc.: 322. 1964; H.J. Chowdhery, Orch. Fl.

Arunachal Pradesh: 39. 1998. *Acampe longifolia*



**Map 5** Distribution map of *Acampe rigida* (Buch.-Ham. ex Sm.) P.F. Hunt

(Lindl.) Lindl., Fol. Orchid. 4 (*Acampe*): 1. 1853; A.S. Rao & N.P. Balakr., Rec. Bot. Surv. India 20(2): 204. 1973. *Acampe intermedia* Rchb.f. in Otto. & Dietr., Allg. Gartenz 24: 217. 1856; Hook.f. Fl. Brit. India 6: 66. 1890. *Acampe wightiana* var. *longipedunculata* Trimen, Syst. Cat. Ceylon: 90. 1885. *Saccolabium longifolium* (Lindl.) Hook.f., Fl. Brit. India 6: 62. 1890; King & Pantl., Ann. Roy. Bot. Gard. Calcutta 8: 220. t.292. 1898. *Acampe praemorsa* var. *rigida* (Buch. -Ham. ex J.E. Sm.) Barbhuiya, D. Verma & Vik. Kumar, Phytotaxa 303(3): 274. f.3. 2017.

Plants up to 100 cm long or more, often forming large colonies. Stem much stout, elongated, erect or ascending; internodes 2–5 cm long, 10–15 mm diam., enclosed by sheathing leaf-bases. Leaves

distichous, all along the stem, 10–45 × 3–5 cm, fleshy, oblong, obtuse, unequally and obliquely 2-lobed, mid-vein thickened below, base articulate, sheathing, lignified and striated at maturity.



**Fig. 5** *Acampe rigida* (Buch.-Ham. ex Sm.) P.F. Hunt: a. Habit; b. Inflorescence; c. Bract; d1 - d2. Flower (front and back view); e1 - e2. Sepals & petals (ventral and dorsal view); f. Labellum with column; g1 - g3. Labellum (front, back and side view); h1 - h3. Column (front, back and side view); i. anther cap; j. pollinia; k. capsules.

Inflorescence 1-many, extra-axillary, corymbose, often branched, erect, rigid, much shorter than leaves, 5–20 cm long; peduncle 1–4 cm long (up to 15 cm in branched ones), thick, jointed at nodes, with brownish, annular sheaths; rachis 1–2 cm long, thick, ridges, densely many-flowered. Floral bracts 3–3.5 × 3–3.5 mm, ovate-triangular, obtuse, clasping, greenish with maroon spots, persistent. Flowers spirally arranged, 15–20 mm across, not widely spreading, slightly fragrant, pale yellow with purplish-brown, transverse bands at ventral surface and with purplish-brown spots dorsally; labellum white to pale yellow with pink-purple bands and spots at both surfaces, spur yellowish, column pink-purple in front. Pedicel plus ovary 10–17 mm long, fleshy, greenish-yellow. Sepals and petals thick textured, rigid, weakly concave, dorsally thickened; dorsal sepal 10–14 × 7–9 mm, oblong-obovate, rounded; lateral sepals 9–13 × 6–8 mm, slightly falcate, oblong-obovate, rounded; petals 8–12 × 4–5 mm, oblanceolate-spathulate, falcate, rounded. Labellum 8–10 × 4–5 mm (through mid-lobe), saccate at base, 3-lobed; side-lobes conspicuous, broadly triangular, erect;

mid-lobe large, deflexed at apex, ovate, erose-undulate, obtuse-truncate, upper surface densely glandular-pubescent, not warty; disc with a densely pubescent, elevated, longitudinal callus at centre, extending up to base of mid-lobe; spur highly reduced, represented by a broadly triangular, shallow sac, 1.5–2 × c. 2 mm, pubescent inside. Column 2–3 mm tall, stout, with two erect, conical horns at apex; anther sub-orbicular; pollinia globose; stipe c. 1.5 mm long, clavate; viscidium oblong, small; rostellum bifid. Capsules 5–7 × 0.6–0.8 cm, erect, cylindrical-clavate, ridged, sub-sessile.

**Phenology:** April – December.

**Habitat:** Epiphytic, grows on trees in moist deciduous and semi evergreen forests up to 1500 m.

**Distribution:** India (Andaman & Nicobar Islands, Andhra Pradesh, Arunachal Pradesh, Assam, Jharkhand, Kerala, Manipur, Meghalaya, Mizoram, Nagaland, Odisha, Sikkim, Tripura, Uttarakhand, West Bengal); Africa; Bangladesh; Bhutan; China; Indo-China; Malaysia; Myanmar; Nepal; Philippines; Sri Lanka; Thailand.

**Exsicata: Andaman & Nicobar Islands:** North Andamans, HE Project Area, Sep. 2005. *P.G. Diwakar* 17595 (PBL). **Arunachal Pradesh:** Tirap, Chenglang, 16.10.1959, *R.S. Rao* 20238 (ASSAM); Nisa to Niusa, 29.08.1958, *G. Panigrahi* 14847 (ASSAM); Lohit, Tezu to Denning Road 20.09.1969, *A.S. Rao* 47991 (ASSAM). **Assam:** Kadam R.F, 12.03.1962, *G. Panigrahi* 27781 (ASSAM); Lakhimpur, North Lakhimpur, *Baruah* 74019 (ASSAM); Lakhimpur, 26.11.1957, *G. Panigrahi* 11571 (ASSAM, CAL); Udalguri, Rowta, 08.09.1982, *S.N. Hegde* 3663-2 (OHT). **Kerala:** Thrissur, Peechi Range, 04.09.1976, *K. Ramuamurthy* 47626 (CAL). **Manipur:** Saikul, *C. Sathish Kumar* 28750 (TBGT). **Meghalaya:** Khasi and Jaintia Hills, 30.07.1958, *G.K. Deka* 1401 (ASSAM); Umsaw forest, 10.04.1949, *G.K. Deka* 36169 (ASSAM); Nongpoh, 06.11.1952, *G.K. Deka* 36171 (ASSAM). **Nagaland:** Kohima, *Hynniewta* 79977; Nyasia, *Hynniewta* 79948, Zunhebato, *Hynniewta* 80835 (ASSAM). **Odisha:** Malkangiri, Balimela to Bandamamidi, 24.05.1959, *G. Panigrahi* 18561 (ASSAM); Mayurbhanj, Simlipal, Jenabila, 18.06.1985, *S. Misra* SM 848 (CAL). **Sikkim:** East Sikkim, Ranipool – 32<sup>th</sup> mile (Namli), 1100 m, 13.06.2014, *D. K. Agrawala* 37851 (BSHC); Dikchu Right- Flank, 800 m., 09.12.1997, *B. K. Shukla* 19682 (BSHC); Tropical Valleys, May & June 1892, *Pantling* 250 (CAL). **Uttarakhand:** Pithoragarh, 20.05.1983, *Hajra* 74471 (BSD). **West Bengal:** Calcutta, *Schiller* s.n. (B); Birbhum,

Kotasur (Sainthia), 23.07.1966, *Basak* 451 (CAL); Kurseong, 16.04.09, *Kari* 1068 (CAL).

**Extent of occurrence (EOO):** 3291804 km<sup>2</sup>

**Area of Occupancy (AOO):** 212 km<sup>2</sup>

**Red list assessment:** Endangered [EN B2ab(iii); C2a(i)].

**Final assessment in Indian perspective:** Vulnerable° [VU°].

**Notes:** *Acampe rigida* (Buch. -Ham. Ex Sm.) P.F. Hunt and *Acampe praemorsa* (Roxb.) Blatt. & McCann are quite close together and often treated as similar species. However, in this study they are found as distinct species (refer key to the species). Whereas, *Acampe rigida* is widespread in most part of the country, *Acampe praemorsa* is confined only in peninsular India.

### Conclusion

This study has provided complete taxonomic information on five taxa of Indian Orchids. This will not only help in correct identification of these species, but also help in understanding the relationship with allied taxa. The threat status assessment as per IUCN guidelines will catalyze conservation action and help in sustainable utilization of this important bioresource. The identification standards developed in the study will definitely help the custom authorities to check bio-piracy. These species, together with other Orchidaceae members are included in the APPENDIX-II of CITES. Members of *Acampe* are having good ornamental potential and are compatible in hybridization experiments. Present study will surely help in understanding this important group of plants.

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