

TWO NEW SPECIES OF *KAEMPFERIA* L. (ZINGIBERACEAE) FROM NORTHERN THAILAND

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Abstract

Two new species, *Kaempferia uttaraditensis* Picheans. & Meechonk. and *K. kamthornii* Picheans. & Meechonk. (Zingiberaceae) from northern Thailand are reported. Detailed descriptions with full illustration of both the new species are included. Taxonomic differences of each new species with its closely related taxon are discussed.

Key words: *Kaempferia kamthornii*, *Kaempferia uttaraditensis*, New taxa, Thailand, Zingiberaceae.

Introduction

The genus *Kaempferia* L. (Zingiberaceae) consists of more than sixty species. Thailand is currently known to be center of diversity of the genus (Siriruga, 1989 & 1992). Member of the subgenus *Protanthium* Horan. can be distinguished by their flowers on short flowering stems appearing before the leafy stems. The subgenus can be further divided into 2 groups, the day-blooming group and the night-blooming group, respectively. Presently, 7 taxa of the genus *Kaempferia* subgenus *Protanthium* Horan. are known for Thailand, i.e. *K. rotunda* L. (Linnaeus, 1753), *K. grandifolia* Saensouk & Jenjitt. (Saensouk & Jenjittikul, 2001), *K. lopburiensis* Picheans. (Picheansoonthon, 2010), *K. udonensis* Picheans. & Phokham (Phokham *et al.*, 2013), *K. noctiflora* Noppornch. & Jenjit. (Nopporncharoenkul & Jenjittikul, 2017), *K. graminifolia* Noppornch. & Jenjitt. (Nopporncharoenkul & Jenjittikul, 2018), and *K. kamolwaniae* Picheans., Meechonk. & Wongsuwan (Wongsuwan *et al.*, 2020). Two new species, one of which belongs to the night-blooming group, *K. uttaraditensis* Picheans & Meechonk., together with *K. kamthornii* Picheans. & Meechonk. of the day-blooming group, are reported in this publication. Full descriptions and complete illustrations of both species are given. Also, comparisons with their most resemble species are also provided.

Taxonomic treatment:

1. *Kaempferia kamthornii* Picheans. & Meechonk., sp. nov. (Figs. 1 & 2)

Type: Thailand. Tak Province, Mae Sot District, roadside along highway 12 between 63-64, April 6 2015; Pichensoonthon & Meechonkit 060416-1 (BK–holotype; MSU–isotype).

Diagnosis: This new taxon differs from *Kaempferia xiengkhouangensis* Picheans. & Phokham in its: (1) hairy petiolate leaves, (2) white markings on upper leaf surfaces, (3) hairy lower leaf-surface, (4) pubescent ligules, (5) pubescent stalks, and (6) pubescent corolla-tube.

Description: Perennial herb. Rhizome short and erect. Pseudostem with 1-2 bladeless sheaths, 2.1–2.4 × 1.2–2.5 cm, green, apex acute, sparsely hairy. Leaves 5–6; blades not prostrate, elliptic to ovate, 13.8–44.1 × 6.2–21 cm, base cuneate, apex acute to acuminate, upper leaf surface light to dark green with whitish markings, base of the midrib, hairy, lower leaf surface dark red, hairy; petiole 0.6–6 cm long, greenish, hairy; ligule, broadly triangular, 2 lobes, 0.5–1.2 cm long, reddish or greenish, apex rounded to acute, pubescent. Inflorescences produced on the leafless stem appears before the leafy stem, stalk 1.1–3.3 cm long, pubescent. Flowers 8–45; bract ovate, 1.6–4.3 × 1–3.3 cm, pale green, apex acute, pubescent; bracteole lanceolate, 0.9–2 cm × 3–5 mm, apex bilobed; calyx tube split on one side, 0.9–1 cm long, whitish, 2.4–5.6 cm long; corolla tubular, 5.2–7.7 cm long, white-colored, pubescent; dorsal lobe oblong, 2.1–3.6 cm × 4–6 mm, apex acute and hooded; lateral corolla lobe oblong to narrowly ovate, 2.7–3.1 cm × 3–4 mm, white, apex acute; staminodes obovate, 2.1–3.5 × 1.4–1.9 cm, pink, apex acute; labellum obovate, 2.2–3.8 × 3.1–3.9 cm, pink, deep pink with white patch at the base, apex divided to the base, each lobe obovate, 1.5–3.1 × 1.2–2.3 cm, apex rounded to acute; anther 4–5 mm long, anther crest ovate to rectangular, 6–7 × 3–4 mm, pink, apex bifid to trifid; ovary oblong to obovate, 3–6 × ca 2 mm long, whitish, hairy; stylodial glands 2, filiform, ca 5 mm long. Capsule ovate to oblong, 1.4–2 cm × 1–1.4 cm, pinkish, hairy. Seeds many, ovate to oblong, yellowish, ca 5 × 4 mm; arillose membranous, white.

Phenology: The plant was found blooming during mid-March to early April, and fruits were observed from April to May.

Distribution: *Kaempferia kamthornii* is, up to now, only seen in Mae Sot District (type locality) and Phop Phra District in Tak Province of northern Thailand.

Etymology: This new taxon is named after the late Dr. Kamthorn Intharapichai for his contribution in our better understanding of the genera *Caulokaempferia* K. Larsen and *Kaempferia* L. (Zingiberaceae) in Thailand.

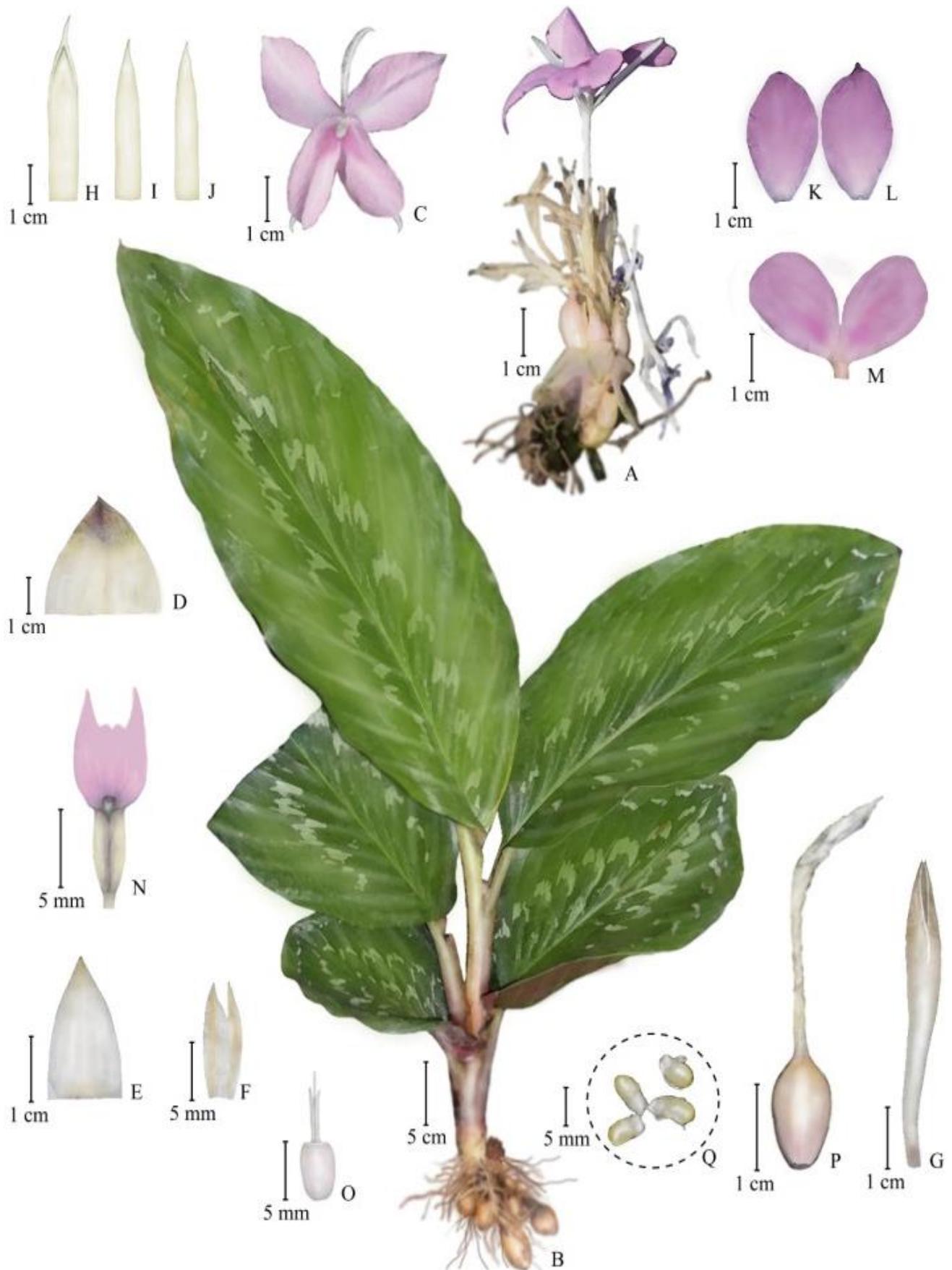


Fig. 1. *Kaempferia kamthornii* Pichens. & Meechonk. A: Roots, rhizome and Inflorescence with fruits; B: Habit; C: Flower (top view); D and E: Bracts; F: Bracteole; G: Ovary and calyx tube; H: Dorsal corolla lobe; I and J: Lateral corolla lobes; K and L: stamines; M: Labellum; N: Anthers and anther crest; O: Ovary, stylodial glands and lower part of the style; P: fruit with persistent calyx tube; Q: Seeds. Drawn by Chalermchoke Boonchit.



Fig. 2. *Kaempferia kamthornii* Pichens. & Meechonk. A: inflorescence; B: Roots, rhizome and inflorescence; C: A flower showing characteristic staminodes, labellum and anther crest; D: Fruit with persistent calyx tube and seeds; E: Lower part of a leaf showing a red ligule; F: The plant in the type location. Photographed by Penjun Meechonkit. (A-F).

Ecology: The new species grows under the shade of dipterocarp or bamboo forests.

Additional specimens examined: Thailand. Tak Province, Phop Phra District, 10 May 2015, Pichensoonthon & Meechonkit 100515-1 (MSU).

Note: Morphological comparison of this new taxon, *K. kamthornii* and its closely related species, *K. xiengkhouangensis*, is shown in Table 1.

2. *Kaempferia uttaraditensis* Pichens. & Meechonk., sp. nov. (Figs. 3 & 4)

Type: Thailand. Uttaradit Province, Phichai District, Na Yang Subdistrict, 17°30'27.9"N 100°15'21.4"E, alt. 125 m, 14 June 2016, Pichensoonthon & Meechonkit 140616-1 (BK-holotype; MSU-isotype).

Diagnosis: This new taxon differs from *Kaempferia noctiflora* Noppornch. & Jenjitt. by its (1) elliptic to lanceolate leaf blade with sparsely hairy at the base of the midrib, (2) longer petiole [1–3.5 vs. *ca* 1 cm], (3) longer peduncle [1.2–3.2 cm long vs. subsessile to 1 cm], (4) hairy bracteole, (5) hairy calyx, (6) clawed labellum, white with purplish patch at the base, and (7) glabrous ovary.

Description: Perennial herb. Rhizome short and erect. Pseudostem with 1–2 bladeless leaf, 2.3–6.6 cm long, green to purplish red, apex acute, hairy. Leaves with 1–3(–4) blade(s); blades not prostrate, elliptic to lanceolate, 8–21.3 × 2.4–9.3 cm, base cuneate, apex acuminate, upper surface green, sparsely hairy at the base of the midrib, lower surface pale green, sparsely hairy; petiole 1–3.5 cm long, greenish, hairy; ligule, small triangular, 2 lobes, 0.5–2 mm long, greenish, apex acute, hairy. Inflorescences appeared before leafy shoot, night blooming, stalk 1.2–3.2 cm, glabrous. Flowers 5–10; bracts ovate, 1.1–3.2 × 0.7–2.2 cm, pale green, apex acute to mucronate, hairy; bracteoles lanceolate, 0.7–1.7 cm × 3–5 mm, whitish, apex acute, hairy; calyx tube, 3.8–5.5 cm long, split 1.1–1.6 cm long along one side, white to pale greenish, apex bifid, hairy; corolla tubular, 3.6–6.6 cm long, glabrous, whitish; dorsal corolla lobe lanceolate-oblong, 2.9–4.1 cm × 4–7 mm, white, apex acute and hooded; lateral corolla lobe lanceolate-oblong, incurved, 2.8–3.6 cm × 4–7 mm, white, apex acute; staminodes oblong or obovate, 2.5–4.3 × 0.4–1.2 cm, white, apex rounded to acute; labellum broadly obovate, 3.1–4 × 1.9–2.7 cm, base attenuate into 0.8–1 cm × 4–5 mm claw, pure white or white with purplish patch at the base, apex bilobed divided to 1/2–2/3 of labellum length, each lobe obovate to narrowly obovate, 1.4–2.2 × 0.8–1.1 cm, apex rounded to acute or

emarginate or partly overlapping; anther sac 3–5 mm long, crest oblong, broadly obovate, or rectangular, 4–5 × 3–5 mm, white, apex bilobed to crenate; ovary oblong, 4–6 × 2–3 mm, whitish, glabrous; styloidal glands 2, filiform, 5–6 mm long. Capsules elliptic, whitish, *ca* 7.5 × *ca* 4 mm, seed numerous, ovate, whitish; aril whitish, membranous.

Etymology: The specific epithet of this new species, *Kaempferia uttaraditensis*, is referred to its type locality, Changwat Uttaradit, in northern Thailand.

Phenology: The new species was found blooming from March to April, and fruits can be observed a month later.

Distribution: *Kaempferia uttaraditensis* is so far only found in Phichai District of Uttaradit Province, Thailand.

Ecology: It grows on limestone soil near the waterway under the shade of deciduous forest, at the altitude about 125 m.

Additional specimens examined: Thailand. Changwat Uttaradit, Amphoe Phichai, 6 July 2016, Pichansoonthon & Meechonkit 060716-1 (MSU).

Note: At first glance, the new species, *Kaempferia uttaraditensis* looks somewhat resembled *K. noctiflora*. However, the hair on the basal part of upper leaves surface, bracteole, and calyx and the glabrous ovary of this new species makes it different. Moreover, it produces sweet odour upon blooming. Table 2 shows morphological character comparison of the 2 new species.

Table 1. Morphological comparison between *Kaempferia xiengkhouangensis* and *K. kamthornii*.

Characters	<i>K. xiengkhouangensis</i>	<i>K. kamthornii</i>
Leaves		
Shape and size	broadly elliptic to lanceolate, (10-) 22.5-42.5(- 55) × 7.6–12.2(-17) cm	elliptic to ovate, 13.8–44.1 × 6.2–21 cm
Upper surface	green, glabrous	light to dark green with whitish markings, base of the midrib, hairy
Lower surface	pale green, pubescent	dark red, hairy
Ligule	4-8 mm long	0.5–1.2 cm long
Petiole	sessile	0.6–6 cm long, hairy
Inflorescence		
Peduncle	0.9-2.9 cm long	1.1–3.3 cm long, pubescent
Number of flowers	10-19	8-45 overlapping
Flowers		
Corolla tube	6.3-7.5 cm long, glabrous	5.2–7.7 cm long, pubescent
Staminodes	obovate, 2.5–3 × 1–1.6 cm, deep pink, apex rounded to apiculate	obovate, 2.1–3.5 × 1.4–1.9 cm, pink, apex acute
Labellum	broadly obovate, 2.5–3 × 2.8–3.7 cm, deep pink, violet at base, apex rounded to apiculate	obovate, 2.2–3.8 × 3.1–3.9 cm, pink, deep pink with white patch at the base, apex rounded to acute
Seeds	narrowly ellipsoid to ovate, brownish, <i>ca</i> 3 × 2–3 mm	ovate to oblong, yellowish <i>ca</i> 5 × 4 mm

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Fig. 3. *Kaempferia uttaraditensis* Pichens & Meechonk. A: Roots, rhizome and inflorescence; B: Habit; C: A flower, showing ovary, calyx tube, corolla tube, corolla lobes, staminodes and labellum; D: Bract; E: Bracteole; F: Ovary and calyx tube; G: Dorsal corolla lobe; H and I: Lateral corolla lobes; J and K: staminodes; L: Labellum; M: Anthers and anther crest; N: Ovary, stylodial glands and lower part of the style. Drawn by Chalermchoke Boonchit.

Table 2. Morphological comparison between *Kaempferia noctiflora* and *K. uttaraditensis*.

Characters	<i>K. noctiflora</i>	<i>K. uttaraditensis</i>
Leaves		
Shape and size	ovate to elliptic, 10–17 × 7–10 cm	elliptic to lanceolate, 8–21.3 × 2.4–9.3 cm
Upper surface	pale green to tinged purplish red, usually with tinged purplish red patch along the midvein, slightly plicate, glabrous	green, sparsely hairy at the base of the midrib
Petiole	short, <i>ca</i> 1 cm long, pale green to purplish red, with a few sparse hairs	1–3.5 cm long, greenish, hairy
Inflorescence		
Peduncle	sessile to 1 cm long	1.2–3.2 cm long
Flowers		
Bracteole	lanceolate, <i>ca</i> 1.7 cm × 6 mm, apex bilobed, apex of each lobe acute, glabrous	lanceolate, 0.7–1.7 cm × 3–5 mm, whitish, apex acute, hairy
	5.0–5.6 cm × <i>ca</i> 5 mm, slightly	
Calyx	trilobed with 2 small teeth at apex, split on one side, 0.7–1 cm long, pale yellow, glabrous	3.8–5.5 cm long, split on one side, 1.1–1.6 cm long, white to pale greenish, apex bifid, hairy
Labellum	broadly obovate, 3.5–4.0 × 2.2–3.5 cm, pure white or white with pale yellow patch from the base to sinus; each lobe obovate, 2.0–2.3 × 1.5–1.6 cm, apex acute, round to slightly bilobed	broadly obovate, 3.1–4 × 1.9–2.7 cm, base attenuate into 0.8–1 cm × 4–5 mm claw, pure white or white with purplish patch at the base, each lobe obovate to narrow obovate, 1.4–2.2 × 0.8–1.1 cm, apex rounded to acute or emarginate or partly overlapping
Anther crest	oblong, 0.7–1 cm × 3–5 mm, apex shallowly bilobed to deeply to the anther crest base, apex of each lobe acute to acuminate	oblong, broadly obovate, or rectangular, 4–5 × 3–5 mm, white, apex bilobed to crenate
Ovary	cylindrical, <i>ca</i> 6 × 2–2.3 mm, creamy yellow, sparsely hairy	oblong, 4–6 × 2–3 mm, whitish, glabrous

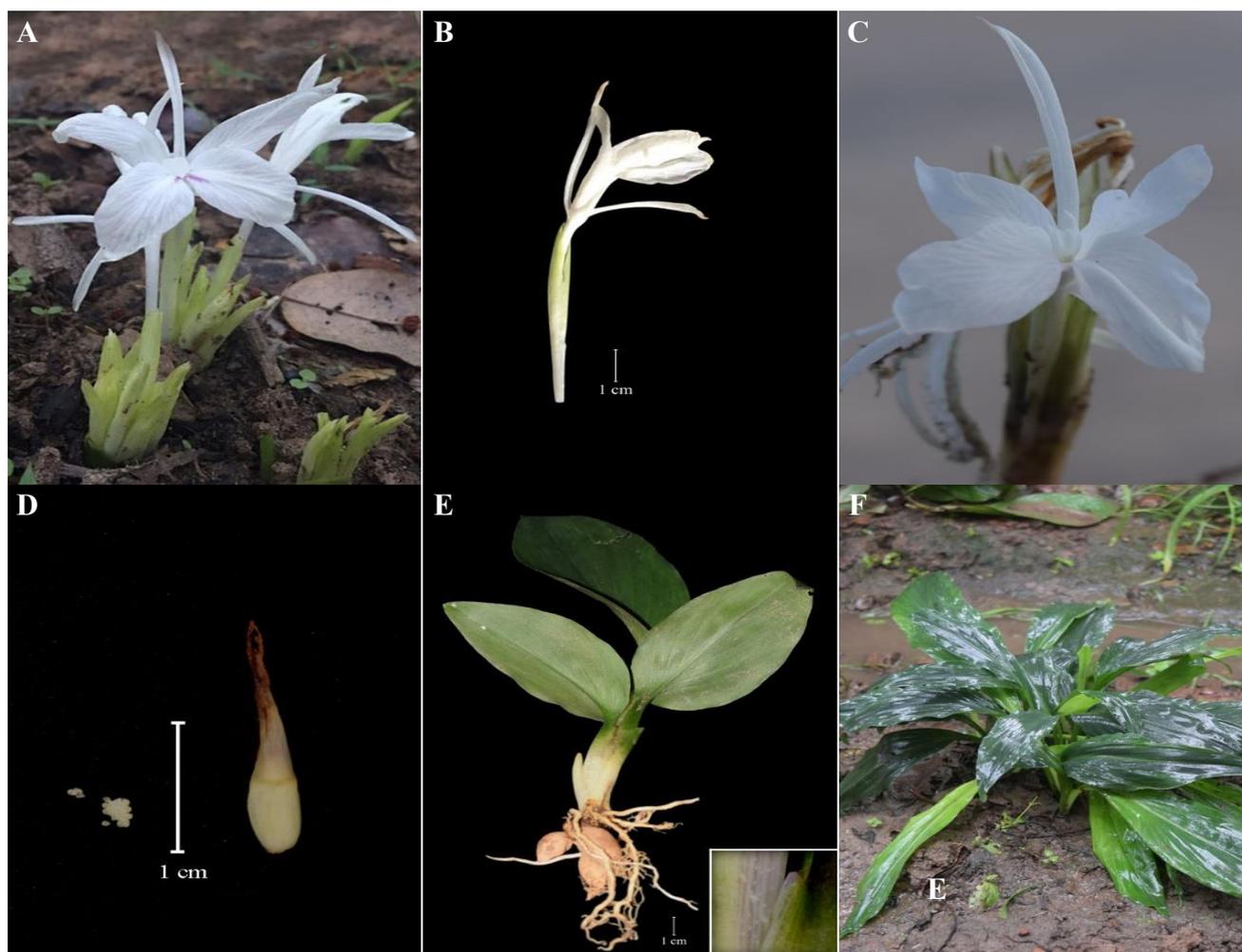


Fig. 4. *Kaempferia uttaraditensis* Pichens. & Meechonk. A: Inflorescence; B: A flower, showing ovary, calyx tube, corolla tube, corolla lobes, staminodes and labellum; C: A flower showing an anther crest; D: Fruit with persistent calyx and seeds; E: Plant habit (inset: lower part of a leaf showing ligule); F: The plant in the type location. Photographed by Chayan Pichansoonthon (A-B) and Penjun Meechonkit (C-F).

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