European Journal of Taxonomy 712: 1–15
https://doi.org/10.5852/ejt.2020.712
ISSN 2118-9773
www.europeanjournaloftaxonomy.eu
2020 · Insisiengmay O. *et al.*

Research article

Two new species of *Kaempferia* L. (Zingiberaceae) from Cambodia and Lao PDR

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Abstract. Two new species of *Kaempferia* L. (Zingiberaceae), *Kaempferia nemoralis* Insis. sp. nov. and *Kaempferia pascuorum* Insis. sp. nov., from Cambodia and Lao PDR are described and illustrated. Morphological similarities to their closely related taxa are discussed. *Kaempferia nemoralis* Insis. sp. nov. is compared with *Kaempferia larsenii* Sirirugsa in its vegetative parts, but distinguished by the following characters: whole plant taller, leaf sheath and young shoot apex green, petiole absent. It differs from *Kaempferia rotunda* L. in its floral parts by the following characters: presence of peduncle, floral tube longer, labellum purple with white line at centre, anther crest obovate, bifid, apex irregularly rounded and ovary glabrous. *Kaempferia pascuorum* Insis. sp. nov. is compared with *Kaempferia larsenii* Sirirugsa. Proposed IUCN conservation assessments are also given: *Kaempferia nemoralis* Insis. sp. nov. occurs in disturbed, open forest and is assessed as CR, whereas *Kaempferia pascuorum* Insis. sp. nov. occurs in short grassland and is assessed as EN.

Keywords. *Kaempferia nemoralis* Insis. sp. nov., *Kaempferia pascuorum* Insis. sp. nov., Cambodia, Lao PDR.

Insisiengmay O., Newman M.F. & Haevermans T. 2020. Two new species of *Kaempferia* L. (Zingiberaceae) from Cambodia and Lao PDR. *European Journal of Taxonomy* 712: 1–15. https://doi.org/10.5852/ejt.2020.712

Introduction

Kaempferia L. (Zingiberaceae, ginger family) is a genus of perennial herbs. Around 40 species are currently accepted (Mabberley 2017), although nearly 140 names are listed in the International Plant Names Index (IPNI 2020). The genus is distributed from India to southern China and Peninsular Malaysia. Several species have medicinal properties, are used in spiritual rituals, or have culinary uses (e.g., *Kaempferia galanga* L., known as kencur) and are widely cultivated, making it difficult to

know their natural ranges. The centre of diversity is undoubtedly in the monsoonal parts of SE Asia, particularly Thailand and its immediate neighbours. South of Thailand, the diversity drops sharply with four species reported from Peninsular Malaysia, only one or two of them native (Holttum 1950). To the north, only five species of *Kaempferia* extend to the tropical provinces of China, and are probably more often cultivated or naturalised than native ones (Wu & Larsen 2000).

It has been more than a century since the publication of the most recent monograph of all species of *Kaempferia* (Schumann 1904), and the most recent revision of the genus in Cambodia, Laos and Vietnam (Gagnepain 1908). Revisions of *Kaempferia* for the *Flora of Thailand* (T. Jenjittikul *et al.*, in prep.) and in Cambodia, Laos and Vietnam (O. Insisiengmay *et al.*, in prep.) are under way, and have already revealed considerably more species than were known to Gagnepain (1908) who recognised 13 species in Cambodia, Laos and Vietnam. In more recent accounts, nine species were recorded in Lao PDR (Newman *et al.* 2007), but an additional six have been described in that country in the last 12 years (Koonterm 2008; Picheansoonthon & Koonterm 2008, 2009b; Picheansoonthon 2009; Phokham *et al.* 2013), and more are expected from Cambodia and Vietnam. Twenty-seven species are recognised in the current draft of the *Flora of Thailand* revision (Ruchisansakul, pers. comm.), including 11 described in the last 9 years (Nopporncharoenkul & Jenjittikul 2017, 2018; Nopporncharoenkul *et al.* 2020; Phokham *et al.* 2013; Picheansoonthon & Koonterm 2009a; Picheansoonthon 2010, 2011; Wongsuwan *et al.* 2015) and at least three more are to be described.

Many species in the genus are very poorly known taxonomically, mainly because it is so difficult to make informative specimens from these plants, which usually bear only one, extremely delicate and short-lived flower per plant each day of the flowering period. Furthermore, the inflorescence is often held between the leaves and is a complex structure of bracts, bracteoles and a number of flowers at different stages. Several species bloom at night and must be collected in darkness. Others bloom early in the rainy season, before the leaves appear, so to obtain all parts of the plant, two collections must be made a few weeks apart. Therefore, herbarium collections are often of relatively little use to the taxonomist and must be supplemented by living material.

Morphologically, *Kaempferia* is distinct from other genera of Zingiberaceae. It is classified in the subfamily Zingiberoideae tribe Zingibereae which comprises genera with large, petaloid lateral staminodes, about the same size as the lip. The species of *Kaempferia* are small herbaceous perennial plants, some with two leaves appressed to the ground, others with erect leaves to about 70 cm tall. The strongly zygomorphic flowers consist of the usual parts found in Zingiberaceae, an inferior ovary, tubular calyx with three lobes, floral tube with three corolla lobes, a labellum, two lateral staminodes and a single fertile anther with two thecae which hold the style so that the stigma is presented just above the anther. The diagnostic character of the flowers of *Kaempferia* is the deeply bilobed labellum and large lateral staminodes which are often held in a single plane so that the open flower resembles, at first glance, a tetramerous, salverform flower.

A thorough account of the history of infrageneric classification of *Kaempferia* is given by Kam (1980), and the correct generic name for the African species by Burtt (1982). The first classification of the species of *Kaempferia* into infrageneric taxa was made by Horaninow (1862) who described two taxa, *Kaempferia* [unranked] *Soncorus* and *Kaempferia* [unranked] *Protanthium*. The first of these was described as '*flores centrales*' and the second as '*flores praecoces, ante folia e caudice projecti*' which is to say that species in the *Soncorus* group produce their inflorescences terminally on the leafy shoots while those in the *Protanthium* group produce them early in the growing season, before the leaves, arising from the rhizome. Horaninow placed *Kaempferia galanga* L. with seven other species in his *Soncorus* group and *K. rotunda* L. with two other species in his *Protanthium* group.

Bentham & Hooker (1883) gave Horaninow's unranked infrageneric taxa the rank of section and added a third, *Kaempferia* section *Stachyanthesis* Benth. & Hook.f., in which they placed *Kaempferia scaposa* (Nimmo) Benth. (= *Curcuma scaposa* (Nimmo) Škorničk. & M.Sabu) and *Kaempferia rosea* Schweinf. ex Baker (= *Siphonochilus kirkii* (Hook.f.) B.L.Burtt). Baker (1890) raised these sections to subgenera and added a fourth, *Kaempferia* subgenus *Monolophus* (Wall.) Baker which is now treated as the genus *Monolophus* Delafosse, Guill. & Je.Kuhn. Finally, Schumann (1904) recognised 5 subgenera, adding subgenus *Cienkowskia* K.Schum. to contain the African species now placed in *Siphonochilus*.

Since *K. galanga* is the type species of the genus, *Kaempferia* [unranked] *Soncorus* is illegitimate; it must be called *Kaempferia* [unranked] *Kaempferia* (Turland *et al*. 2018, Art. 22.2). Insisiengmay *et al.* (2018) were only able to locate a single element of original material of *K. rotunda*, and it did not match the written description in the protologue, so a proposal to conserve the name with a conserved type was made. This proposal, number 2581, has been recommended by the Nomenclature Committee for Vascular Plants (Applequist 2020).

During fieldwork in Cambodia, Laos and Vietnam in 2016 and 2017, directed towards a revision of *Kaempferia* in these three countries, we found additional undescribed taxa. Here, we describe two new species, *Kaempferia nemoralis* Insis. sp. nov. and *Kaempferia pascuorum* Insis. sp. nov., the first known only in Cambodia, the second distributed in southern Lao PDR and Cambodia. We compare the morphology of these new species to closely related taxa and we also propose a conservation status of each one using IUCN criteria.

Material and methods

A revision of *Kaempferia* in Cambodia, Laos and Vietnam formed part of the PhD thesis of the first author (Insisiengmay 2019). All names applied to species of *Kaempferia* in these and surrounding countries were examined. Protologues were gathered and specimens, including types at BK, BKF, BM, E, HNL, K, P, QBG, SING and VNM were studied. Herbarium codes follow *Index Herbariorum* (Thiers, continuously updated). Specimens were collected during field expeditions in Cambodia, Laos and Vietnam from April to August 2016 and May to September 2017. While most collections could be determined to an existing taxon, a small number of collections did not match any herbarium material examined. Among these collections, were the specimens described as two new species below.

Each collection included: flowers and inflorescences in ca 70% alcohol, dried herbarium specimens, rhizomes for cultivation and leaf material in silica gel for molecular systematic study. A complete set of herbarium vouchers and the living collections were deposited at the National Herbarium, Muséum national d'histoire naturelle (P). The species descriptions are based on the spirit material because dried herbarium specimens lack three-dimensional structures and undergo changes in dimensions of parts of the plants which are very important for species description. The botanical terminology follows the Kew Plant Glossary (Beentje 2016).

IUCN conservation assessments of both species have been made using the *Guidelines for Using the IUCN Red list categories and Criteria* ver. 3.1 (2012) and ver. 13 (2017).

Results

Description of new species

Order Zingiberales Griseb.
Family Zingiberaceae Martinov
Subfamily Zingiberoideae
Tribe Zingibereae Meisn.
Genus *Kaempferia* L.
Subgenus *Kaempferia* L. (= *Soncorus* Horan.)

Kaempferia nemoralis Insis. sp. nov.
urn:lsid:ipni.org:names:77211164-1
Figs 1–3, Tables 1–2

Diagnosis

A species of *Kaempferia* subg. *Kaempferia*. Vegetative parts similar to *K. larsenii* by the shape of the leaf blade which is glabrous, parallel-veined and erect but may be distinguished by the following characters: whole plant taller, leaf sheath and young shoot apex green, petiole absent, the flower of *Kaempferia nemoralis* sp. nov. is completely different from that of *K. larsenii* in orientation, colour and size.

Fig. 1. *Kaempferia nemoralis* Insis. sp. nov. in natural habitat. Photograph: Oudomphone Insisiengmay.

Table 1. Comparison of the vegetative parts of *Kaempferia larsenii* Sirirugsa and *Kaempferia nemoralis* Insis. sp. nov.

Characters	***Kaempferia larsenii***	***Kaempferia nemoralis*** sp. nov.
Leaves		
Whole plant height	8–10 cm tall	8–20 cm tall
Leafless sheath colour	Red	Green
Young shoot colour	Red	Green
Longest leaf blade	90 × 10 mm	200 × 20 mm
Petiole	Present	Absent

Table 2. Comparison of the floral parts of *Kaempferia rotunda* L. and *Kaempferia nemoralis* Insis. sp. nov.

Characters	***Kaempferia rotunda***	***Kaempferia nemoralis*** sp. nov.
Inflorescence		
Peduncle	Shortly pedunculate	5 mm long
Floral tube	50–55 mm long	95 mm long
Staminodes	White, purple-tinted, apex acute, 20 × 16 mm	Pure white, apex rounded, 40 × 12 mm
Labellum (whole)	Light purple, 40 × 20–25 mm	Purple, 47 × 22 mm
Crest	Oblong, 3-lobed, apex acute, 9–12 × 3–4 mm	Obovate, bifid, apex irregularly rounded, 10 × 6 mm
Stamen	3 mm long	10 mm long
Ovary	Villose	Glabrous

Inflorescences and flowers similar to those of *K. rotunda* (*Kaempferia* subg. *Protanthium*) by the presence of white staminodes and size of labellum but distinguished by the following characters: presence of peduncle, floral tube longer, 95 mm long (vs 50–55 mm long in *K. rotunda*), labellum purple with white line at centre, anther crest obovate, bifid, apex irregularly rounded and ovary glabrous, the vegetative parts differ by the shape and indumentum of the leaf blade, and absence of a petiole.

Etymology

The specific epithet is from the Latin '*nemoralis*', meaning 'of woods'. The only known locality is in open forest near a small stream.

Material examined

Type

CAMBODIA • Prov. Kratié, Dist. Snuol, Sre Roneam Village, Khseum commune; 12°17′ N, 106°25′ E; alt. 74 m; *O. Insisiengmay et al. OI 234*; 9 Jul. 2017; holotype: P (dried and spirit coll.); isotype: E (spirit coll. only).

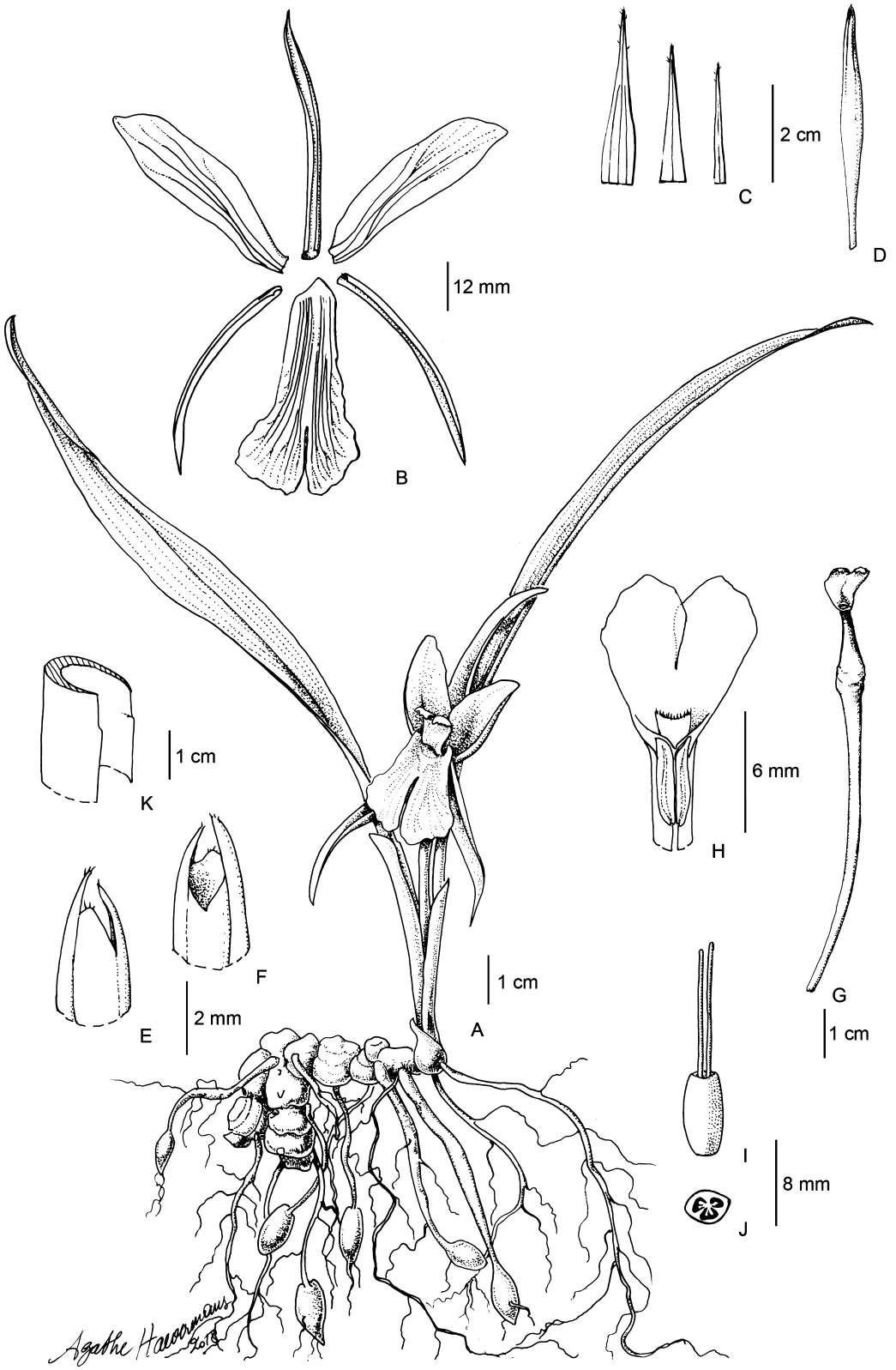

Fig. 2. *Kaempferia nemoralis* Insis. sp. nov. **A**. Whole plant. **B**. Flower dissected. **C**. Bract and bracteoles. **D**. Calyx. **E**. Calyx apex (back view). **F**. Calyx apex (front view) (dorsal corolla lobe side). **G**. Floral tube with stamen attached. **H**. Anther. **I**. Ovary and epigynous glands. **J**. Ovary cross section. **K**. Ligule. Drawing from the type material by Agathe Haevermans (*O. Insisiengmay et al. OI 234*).

Description

Perennial herb, 8–20 cm tall. Rhizome short, horizontal; roots of two kinds; tuberous, 10–15 × 3–5 mm, and filamentous. Most individuals with one or two flowering shoots. Leaves 2 with 2 leafless sheaths, green; ligule a very small rim at junction of sheaths and blade, < 1 mm long, glabrous. Longest leaf blade 200 × 20 mm, oblong, erect, base attenuate, apex attenuate, glabrous, petiole absent. Inflorescence terminal, peduncle 5 mm long, flowers 1–3. Bracts narrowly elliptic to ensiform, villose, 35 × 7 mm, hyaline, subtending one flower; bracteoles 2 per flower, opposite, narrowly elliptic to ensiform, largest one 27 × 5 mm, diminishing to 25 × 2.2 mm, hyaline, villose. Calyx tubular, 50 × 3 mm (not flattened), apex with two longer teeth dorsally, greenish and translucent, glabrous and ciliate at apex; floral tube 95 × 3 mm (not flattened), glabrous, white; dorsal corolla lobe linear-acuminate, 45 × 5 mm, white, glabrous, apex with 5 mm long mucro; lateral corolla lobes linear-acuminate, 40 × 4 mm, white, glabrous, apex acute; lateral staminodes oblong, 40 × 12 mm, white, glabrous; labellum obcordate, 47 × 22 mm, purple with white line at the centre, apex bifid, incision 15 mm, lobes narrowly oblong, emarginate; stamen: filament 10 mm long, thecae 5 mm long, dehiscing by longitudinal slits throughout their length, crest obovate, 10 × 6 mm, bifid, incision 6 mm deep, apex of sublobes irregularly rounded, white, glabrous; epigynous glands 2, colourless, subulate, 12–13 mm long; ovary ovoid, 8 × 3.5 mm, glabrous, trilocular with axile placentation, ovules 3–10 per locule, 1 × 0.5 mm; stigma 1.5 mm long, obcuneiform, curved longitudinally, ostiole ciliate. Fruit unknown.

Distribution and habitat

Only known from the type locality where the plants were found growing in dry dipterocarp forest, near a stream, in moist, sandy soil at low altitude, 74 m.

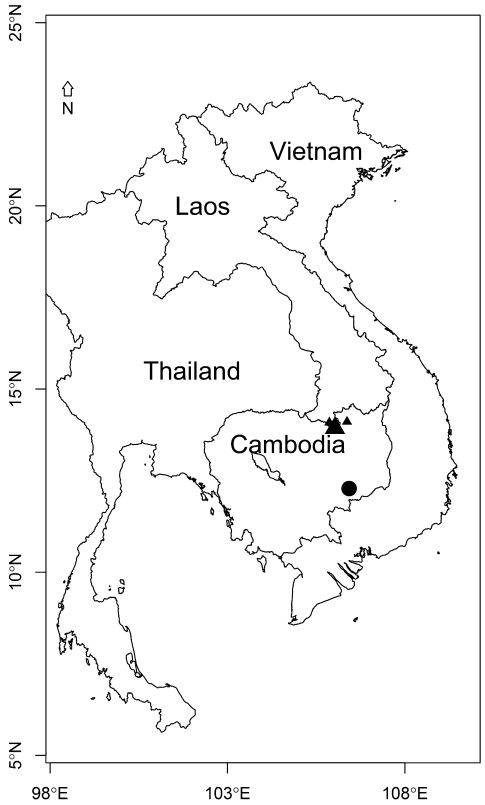

Fig. 3. Distribution of *Kaempferia nemoralis* Insis. sp. nov. (●) and *Kaempferia pascuorum* Insis. sp. nov. (▲). Type locality of *Kaempferia pascuorum* Insis. sp. nov. (▲).

Conservation status

Proposed IUCN conservation status: CR. AOO = 4 km^2, this species is known only from the type locality which is near a path at the edge of a village where tractors and herds of cattle pass frequently. The area is not protected by law. The number of mature individuals is less than 20.

Notes

Other species of *Kaempferia*, not yet determined, were also collected at the type locality of *Kaempferia nemoralis* sp. nov. These species clearly differ from *Kaempferia nemoralis* sp. nov. by having their leaves flat on the ground and by a number of characters of the floral parts.

A high-resolution image of the type specimen will be deposited at RUPP, the National Herbarium of Cambodia. Normally, a type specimen would be deposited in the country of origin, but there is very little type material of *Kaempferia nemoralis* sp. nov. and no paratypes, so it has been agreed with the curator of RUPP that it is better to keep the types at E and P where the conditions for long-term conservation, especially of spirit material, are much better.

The collections at the herbaria listed in Material and methods were searched thoroughly, but no material of *Kaempferia nemoralis* sp. nov. was discovered.

Kaempferia pascuorum Insis. sp. nov.
urn:lsid:ipni.org:names:77211165-1
Figs 4–5, Table 3

Diagnosis

Belonging to *Kaempferia* subg. *Kaempferia* and most similar to *K. larsenii* by its habit, size around 6–10 cm tall, leaf blade erect, similar in shape, parallel-veined and glabrous but distinguished by the following characters: leaf sheath and young shoot apex green, staminodes white, labellum white with purple patch, crest flabellate, apex bifid, irregularly rounded, white.

Etymology

This species epithet is derived from the Latin '*pascuorum*' (of pastures), referring to their habitat.

Material examined

Type

LAO PDR • Prov. Champassak, Dist. Khong, Cambodian-Laotian border; 13°56′ N, 106°1′ E; alt. 84 m; *O. Insisiengmay et al. OI. 116*; 16 Jun. 2016; holotype: HNL (dried coll. only); isotypes: E (dried coll. only), P (dried and spirit coll.), RUPP (dried coll. only).

Additional material

CAMBODIA • Prov. Stung Treng, Dist. Siem Pang, Siem Pang Village, Sekong Commune; 14°6′ N, 106°22′ E; alt. 71 m; *O. Insisiengmay et al. OI. 237*; 10 Jul. 2017; P (dried and spirit coll.), RUPP (dried coll. only).

LAO PDR • Champassak Province, Khong District; 14°5′ N, 105°52′ E; alt. 97 m; *O. Insisiengmay et al. OI. 112*; 17 Jun. 2016; P (spirit coll. only) • Mounlapamok District, Nong Nga village, Thong Nong Phue; 14°22′ N, 105°30′ E; alt. 107 m; *V. Lamxay et al. VL1881*; 10 Jun. 2009; E, Natl. Univ. Laos, Fac. Science, SING, VNM.

Table 3. Morphological comparison of *Kaempferia larsenii* Sirirugsa and *Kaempferia pascuorum* Insis. sp. nov.

Characters	***Kaempferia larsenii***	***Kaempferia pascuorum*** sp. nov.
1. Leaves		
Leafless sheath colour	Red	Green
Young shoot colour	Red	Green
Longest leaf blade	90 × 10 mm	200 × 25 mm
Petiole	Present	Absent
2. Inflorescence		
Peduncle	Absent	5–18 mm long
Flowers	8	1–6
Floral tube	55 mm long	75–90 mm
Staminode colour	Pink	Pure white
Labellum colour	Pink with white patch at middle	White with purple patch at middle
Anther crest	Obovate, apex rounded, entire or slightly crenate, with pink patch	Flabellate, bifid, apex irregularly, white
Filament	Absent	2 mm long

Fig. 4. *Kaempferia pascuorum* Insis. sp. nov. in natural habitat. Photograph: Oudomphone Insisiengmay.

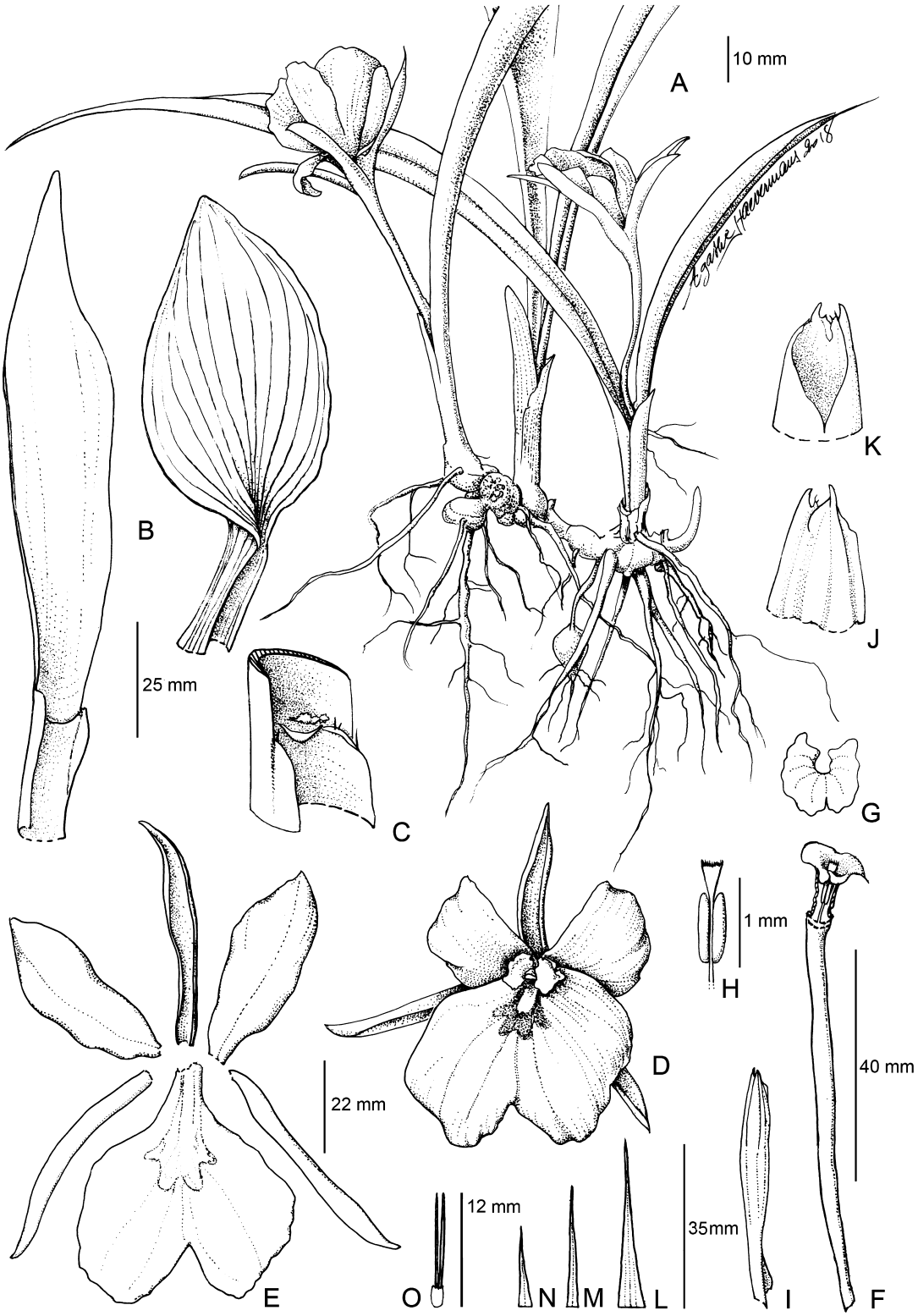

Fig. 5. *Kaempferia pascuorum* Insis. sp. nov. **A**. Whole plant. **B**. Leaves. **C**. Ligule. **D**. Flower. **E**. Flower dissected. **F**. Floral tube with anther attached. **G**. Anther crest from above. **H**. Stamen and stigma. **I**. Calyx. **J–K**. Apex of calyx from two different views. **L**. Bract. **M–N**. Bracteoles. **O**. Ovary and epigynous glands. Drawing from the type material by Agathe Haevermans (*O. Insisiengmay et al. OI. 116*).

Description

Perennial herb, 6–10 cm tall. Rhizome short, horizontal; roots of two kinds, tuberous, ca 6–10 × 3–5 mm, and filamentous. Most individuals with one flowering shoot. Leaves two with two leafless sheaths, 10–50 × 5–20 mm, green; ligule a very small rim at junction of sheath and blade, < 1 mm long, sparsely ciliate; longest leaf blade 200 × 25 mm, narrowly elliptic to narrowly ovate, erect, glabrous, base attenuate, apex attenuate; petiole absent. Inflorescence terminal, peduncle 5–18 mm long, flowers 1–6. Bracts narrowly elliptic, glabrous, 35 × 4 mm, hyaline, subtending a single flower; bracteoles 2 per flower, opposite, narrowly triangular to subulate, largest one 27 × 1.5 mm, diminishing to 25 × 1 mm, hyaline, glabrous. Calyx tubular, 45 × 4 mm (not flattened), glabrous, apex 3-dentate, greenish and translucent; floral tube 75–90 × 4 mm (not flattened), glabrous, white; dorsal corolla lobe linear-acuminate, 40 × 6 mm, white, glabrous, apex with 5 mm long mucro; lateral corolla lobes linear-acuminate, 35 × 5 mm, white, glabrous, apex acute; lateral staminodes oblong, 30 × 10 mm, white, glabrous; labellum obcordate, 35–40 × 15–20 mm, white with purple patch at centre, glabrous, apex bifid, divided to 15–20 mm, lobes emarginate; stamen attached at mouth of floral tube, filament 2 mm long, thecae 4 mm long, dehiscing by longitudinal slits, crest flabellate, 3 × 5 mm to 12 × 6 mm, bifid, irregularly divided to 1–3 mm, white, glabrous; epigynous glands two, subulate, 6–8 mm long; ovary cylindrical, 5 × 3 mm, glabrous, trilocular with axile placentation, ovules 2–6 per locule, 1 × 0.5 mm; stigma 1 mm long, obcuneiform, curved longitudinally, ostiole ciliate. Fruit dehiscent irregularly, cylindrical, obovate-oblong, ca 10–15 × 4–7 mm, calyx persistent; mature seeds not seen.

Distribution and habitat

Southern Lao PDR and Cambodia, paddy fields or in very open areas, in sandy soil.

Conservation status

Proposed IUCN status EN B1, B2, a, b(iii). EOO = 480 km^2, AOO = 12 km^2. This species is only known at three locations near the Cambodian-Lao border, none of which is protected in law. The main threat in Lao PDR comes from agriculture, particularly the creation of pathways to and between fields. The Cambodian location is within a built-up area in Siem Pang town. It may be developed in future. The number of mature individuals found at each location is less than 20.

Key to species of Kaempferia *in Cambodia and Lao PDR*

1. Flowers appearing before leaves (subgenus *Protanthium*) 2
– Flowers and leaves appearing at the same time (subgenus *Kaempferia*) 3

2. Leaves 2–4; blade oblong, green or purple, pubescent; petiole 10–20 mm long ..... ***K. rotunda*** L.
– Leaves 5–7; blade elliptic, upper surface glabrous, lower pubescent; petiole absent ..... ***K. xiengkhouangensis*** Picheans. & Phokham

3. Ligule present, > 2 mm long and clearly visible; flowers flat, directed upward 4
– Ligules very small, ≤ 2 mm long or absent; flowers cup-shaped, directed upward or sideward, or flat, directed upward 8

4. Leaves erect, blade oblong ..... ***K. sawanensis*** Picheans. & Koonterm
– Leaves flat on the ground, blade oblong or ovate to orbicular 5

5. Lateral staminodes and labellum pink to purple; anther crest pink, apex non bifid ..... ***K. marginata*** Carey ex Roscoe
– Lateral staminodes white; labellum white with violet patch; anther crest white, apex bifid 6

6. Anther crest rectangular, bifid, divided by 1 mm, apex rounded-emarginate ..... ***K. laotica*** Gagnep.
– Anther crest elliptic or cuneate-flabellate, bifid, divided to the base 7

7. Anther crest elliptic, 4 × 4 mm, lobes rounded ..... ***K. galanga*** L.
– Anther crest cuneate-flabellate, 6 × 7 mm, lobes emarginate-acute ..... ***K. harmandiana*** Gagnep.

8. Nyctanthous (night-flowering) 9
– Hemeranthous (day-flowering) 10

9. Ligule present, < 1 mm long; blade ensiform, coriaceous; lateral staminodes spathulate; stamen sessile ..... ***K. fissa*** Gagnep.
– Ligule absent; blade subulate, soft; lateral staminodes obovate; stamen attached at mouth of floral tube, filament 2 mm long ..... ***K. filifolia*** K.Larsen

10. Bracteoles two per flower, fused at base, outside of floral tube puberulous ..... ***K. gigantiphylla*** Picheans. & Koonterm
– Bracteoles two per flower, opposite, outside of floral tube glabrous 11

11. Ovary puberulous ..... ***K. parviflora*** Wall. ex Baker
– Ovary glabrous 12

12. Leaf one, blade flat on the ground, orbicular ..... ***K. siamensis*** Sirirugsa
– Leaf one to three, blade flat on the ground to erect, oblong to ovate 13

13. Floral tube ≤ 55 mm long; lateral staminodes obovate 14
– Floral tube ≥ 55 mm long; lateral staminodes oblong or obovate or spatulate 15

14. Rhizome short, vertical; lateral staminode and labellum pink, anther crest entire or slightly crenate with pink patch ..... ***K. larsenii*** Sirirugsa
– Rhizome short horizontal and very slender; lateral staminodes and labellum pure white; anther crest bifid and pure white ..... ***K. champasakensis*** Picheans. & Koonterm

15. Floral orientation sideward; floral tube > 90 mm long; staminodes oblong, 40 × 12 mm; anther crest obovate, 10 × 6 mm; ovary 8 × 3.5 mm diameter ..... ***K. nemoralis*** Insis. sp. nov.
– Floral orientation upward; floral tube ≤ 90 mm long; staminodes oblong or spatulate; anther crest flabellate or narrowly ovate to ovate; ovary 5 × 0.5–3 mm diameter 16

16. Floral tube 75–90 mm long; staminodes oblong, 30 × 10 mm; anther crest flabellate, 3 × 5 mm to 12 × 6 mm, white; ovary 5 × 3 mm diameter ..... ***K. pascuorum*** Insis. sp. nov.
– Floral tube 55–62 mm long; staminodes spatulate, 20 × 12–16 mm; anther crest narrowly ovate to ovate, 4–6 × 3 mm; ovary 5 × 0.5 mm diameter ..... ***K. attapeuensis*** Picheans. & Koonterm

Discussion

This paper describes and illustrates two new species of *Kaempferia*, recently discovered in Cambodia and Lao PDR, adding to the overall biodiversity of these countries. A key is provided to distinguish the two new species from the other species known in these countries. The Vietnamese species of *Kaempferia* are not all included in this key because of the number of taxonomic uncertainties which remain. Further work is under way to produce a revision of *Kaempferia* in Cambodia, Lao PDR and Vietnam, including a molecular phylogenetic survey of the genus. More field collections are needed to complete our studies of poorly known species and to discover new taxa for which we have not yet obtained complete material. An assessment of the variation of species across their ranges is also required. In conclusion, our taxonomic

and field work have already enriched botanical knowledge and collections, but more work is urgently needed in Cambodia, Lao PDR and Vietnam which are experiencing a high rate of deforestation and land conversion (Lang 2001).

Acknowledgements

The authors wish to thank the staff of the Ministry of Science and Technology, Lao PDR, especially Mrs Keophayvanh Douansavanh, general secretary of the Cabinet of the Lao Academy of Science and Technology and Mr Phouthasack Vichitra, director of the Cabinet. Also, the staff in Science and Technology at provincial and district level for all their support and help during our field work in Lao PDR. We are grateful to Assist. Prof. Dr Vichith Lamxay, Mr Sengmany Bouta and Miss Kobkeo Phethsomphou for their help. Mrs Youleang Peou, Mr Sovanrith Nheb and Miss Kunthea Chieb of the Department of Biology, Royal University of Phnom Penh, and Miss Sunisa Sangvirotjanapat, Chulalongkorn University, Bangkok assisted us greatly during our Cambodian field work. Mrs Agathe Haevermans made the beautiful drawings. The authors wish to thank the Franklinia Foundation who contributed to this fieldwork through a grant to the Muséum national d'histoire naturelle for the Flora of Cambodia, Laos and Vietnam. This paper is part of a project (AAP3-96) supported by the Sud Expert Plantes Developpement Durable programme. The Royal Botanic Garden Edinburgh (RBGE) is supported by the Scottish Government's Rural and Environmental Science and Analytical Services Division.

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Manuscript received: 5 December 2018
Manuscript accepted: 10 June 2020
Published on: 4 September 2020
Topic editor: Frederik Leliaert
Desk editor: Connie Baak