



Amomum foetidum (Zingiberaceae), a new species from Northeast Thailand

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ABSTRACT: *Amomum foetidum* (Zingiberaceae), a new species from Northeast Thailand is here described, illustrated and photographed. The key to three species of *Amomum* which cited and treated in this paper is provided.

KEY WORDS: *Amomum cinnamomeum*, *Amomum foetidum*, new species, Northeast, Thailand, Zingiberaceae.

INTRODUCTION

The genus *Amomum* Roxb. is in the subfamily Alpinioideae, tribe Alpinieae of the Zingiberaceae family (Kress *et al.*, 2002). The genus as currently circumscribed is distributed from Sri Lanka and India through SE Asia to New Guinea, the Bismarck Archipelago and Australia (Mabberley, 2008). The earliest studies include the phylogenetic analysis by Kress *et al.* in 2002 and 2007, by Xia *et al.* in 2004. Indicated that *Amomum* s.l. as previously delimited was highly polyphyletic and *Elettariopsis* was probably nested in one of the *Amomum* clades (Leong-Škorničková *et al.*, 2019). “Convergent morphology in Alpinieae (Zingiberaceae): Recircumscribing *Amomum* as a monophyletic genus” the recent study of De Boer *et al.* in 2018 including the type species of *Amomum* and *Elettariopsis* which re-circumscribed the genera and placed them on clades involving most of the species previously classified under *Amomum* s.s. and *Elettariopsis* s.s. This is a confirmation of the previous studies and reclassification of *Elettariopsis* s.s. species under *Amomum* s.l. except for two species that are classified in the *Wurfbainia* and one species in the *Geocharis*.

The first author got this plant from the plant shop in Sakon Nakhon Province (located in Northeastern or Isan part of Thailand) and grow it at Brio Garden in Nakhon Nayok Province since 2017. At that time, Surapon Saensouk and Piyaporn Saensouk, who are the correspondence author and the co-author in this article, they are revising genus *Elettariopsis* s.s. for Flora of Thailand project. Saensouk and Saensouk (2014) published *Elettariopsis biphylla* from Thailand. Therefore, the first author worked with Surapon Saensouk and Piyaporn Saensouk to identify this unknown species. We found that this unknown species is similar to *Amomum cinnamomeum* (Leong-Škorničková *et al.*, 2019) and *Amomum* species which

previously have been classified in *Elettariopsis* genus; *Amomum curtisii* (Baker) Škorničk. & Hlavatá (2018) = *Elettariopsis curtisii* Baker (1892) = *Elettariopsis serpentina* Baker (1892). It did not match with any existing species and treated it as new species, described, illustrated, and photographed under the name of *Amomum foetidum* sp. nov.

TAXONOMIC TREATMENT

Amomum foetidum Boonma & Saensouk, sp. nov.

Figs. 1–3

Type: [Cultivated] THAILAND. Nakhon Nayok Province, Ban Na District, Brio Garden, 29 January 2020, Boonma T. no.13 (**Holotype:** KKU!; **isotypes:** QBG!, BKF!, BK!, TAI!), The living specimen and specimen preserved in alcohol also grow and keep at Brio Garden.

Rhizomatous herb up to 60 cm tall, all parts a pungent odor similar to the smell of the Stink Bugs. *Rhizome* creeping, white inside (when fresh) with fibers, 1.0–1.5 cm in diameter. Sheathed scales, ovate, 2.5–3.0 cm long and 2.5–3.5 cm wide at the base, white when young and turn to brown when old, glabrous. *Root* fibrous, 1.5–2.2 mm in diameter. *Sheaths* 2–3, 5–12 cm long, apex mucronate, glabrous, green. *Leaf-sheaths* distichous, 10–19 cm long, glabrous, green. *Ligule* 3–3.5 x 3–3.5 mm, bilobed with deeply divided ca. 4.5 mm, apex rounded with ciliate margin, glabrous, green. *Petiole* 0.6–8.0 cm long, ca. 4.6 x 6.4 mm in diameter, margin entire, glabrous, green. *Leafy shoot* 4–8 leaves. *Lamina* oblanceolate to narrowly elliptic, (18–)24–40 cm long and (7–)9–12 cm wide, apex caudate 1.5–3.3 cm long, base decurrent, margin glabrous except 1/3 of the margin of the leaf tip with prickly hairs ca. 0.25 mm long, pointed out of the margin and both edges of the leaf at the apex rolled in, ptyxis convolute, adaxially surface dark green with clearly embossed veins, abaxially surface green, both surfaces glabrous. *Inflorescence*

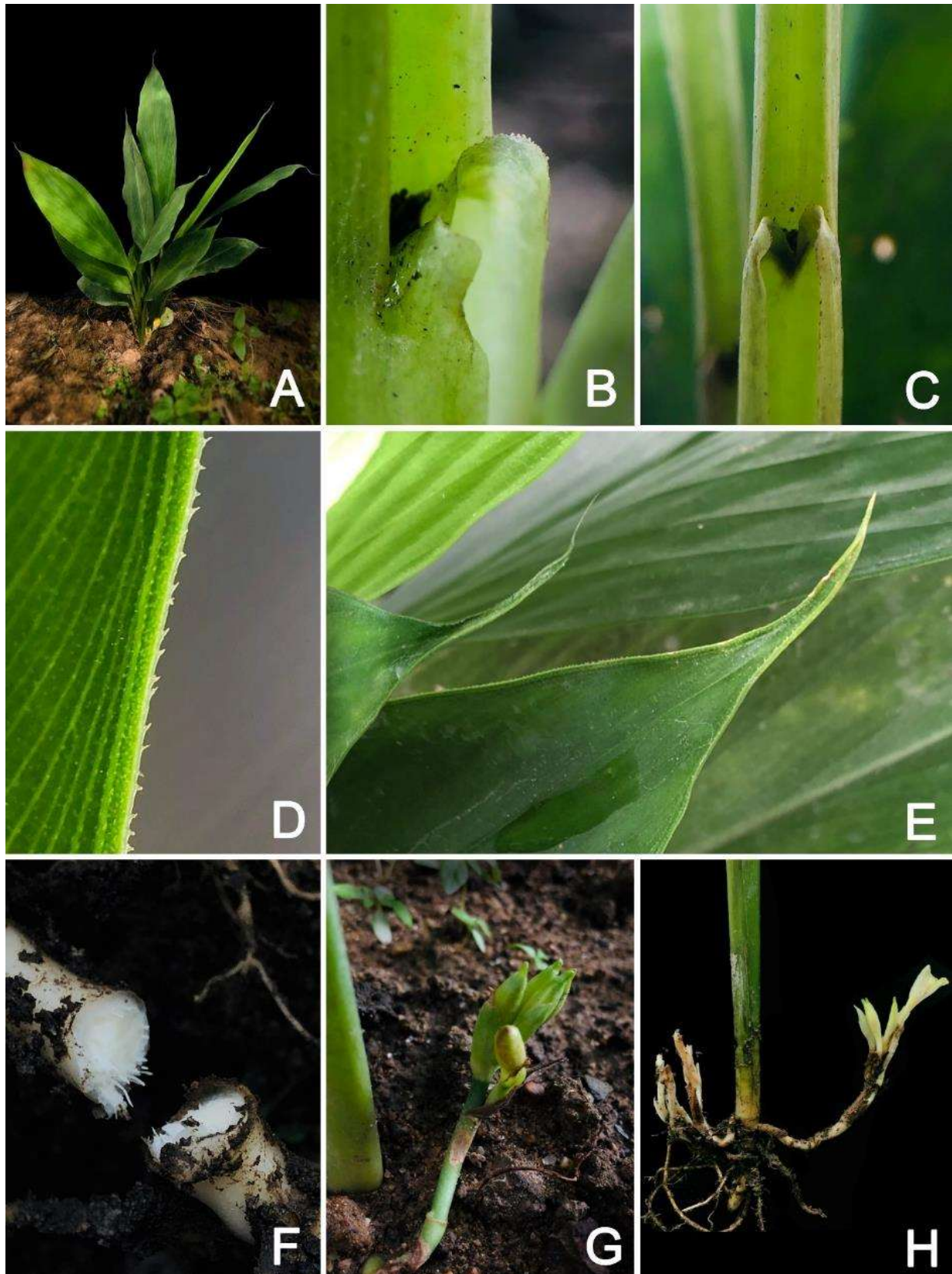


Fig. 1. *Amomum foetidum* Boonma & Saensouk; **A.** habit; **B.** ligule-side view; **C.** ligule-front view; **D.** leaf-margin with the prickly hairs at 1/3 of the leaf tip; **E.** leaf-apex; **F.** rhizome with fibers; **G.** inflorescence above the ground; **H.** inflorescences and underground part. Photographed by Thawatphong Boonma.

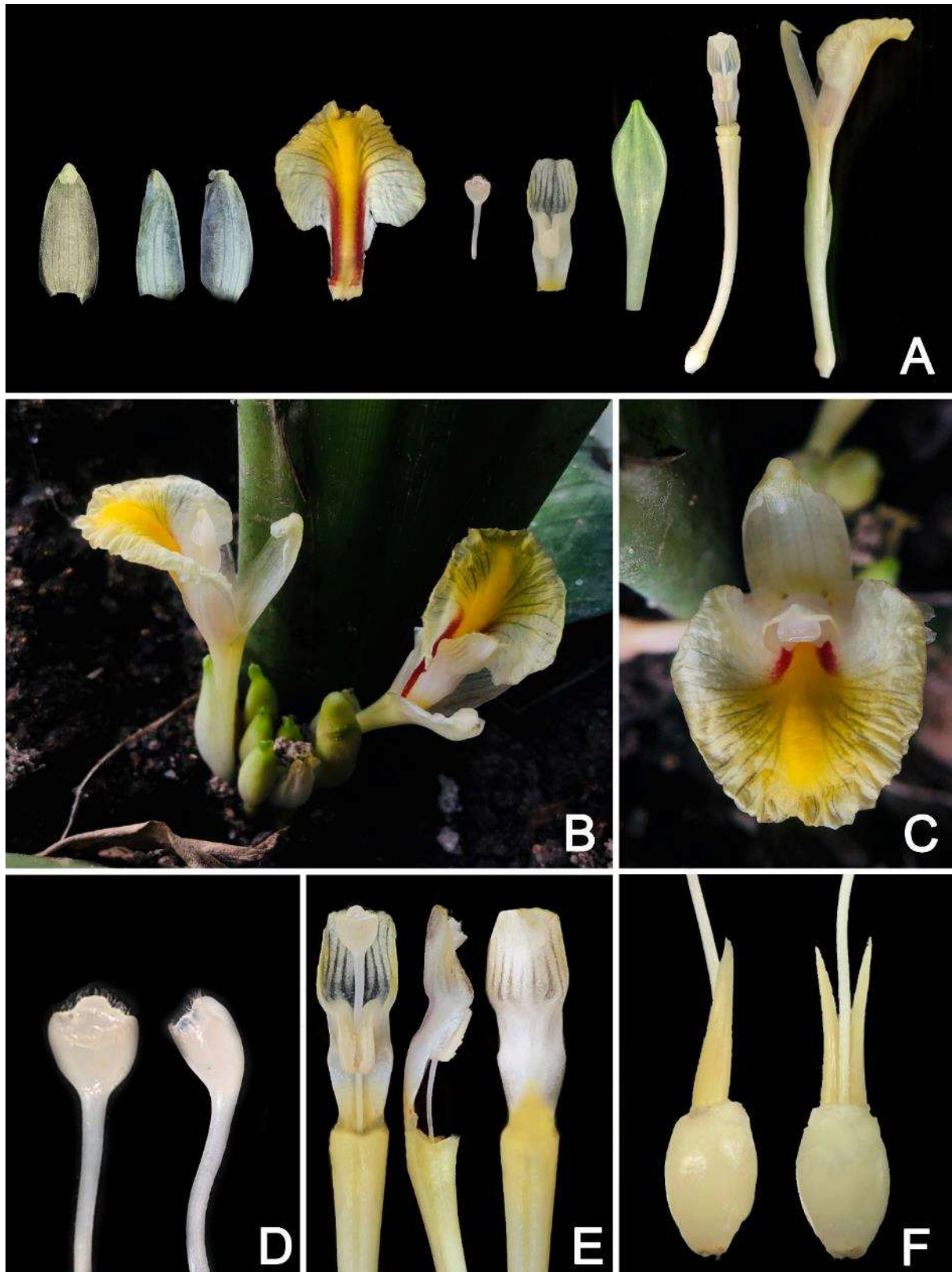


Fig. 2. *Amomum foetidum* Boonma & Saensouk; **A.** dissection (from left): dorsal corolla lobe, lateral corolla lobes, labellum, stigma, stamen, calyx, floral tube with stamen and ovary, flower (side view); **B.** flower (top and semi-side view); **C.** flower (top view); **D.** stigma (front and side view); **E.** stamen (front, side, and back view); **F.** ovary with epigynous glands (side and front view). Photographed by Thawatphong Boonma.

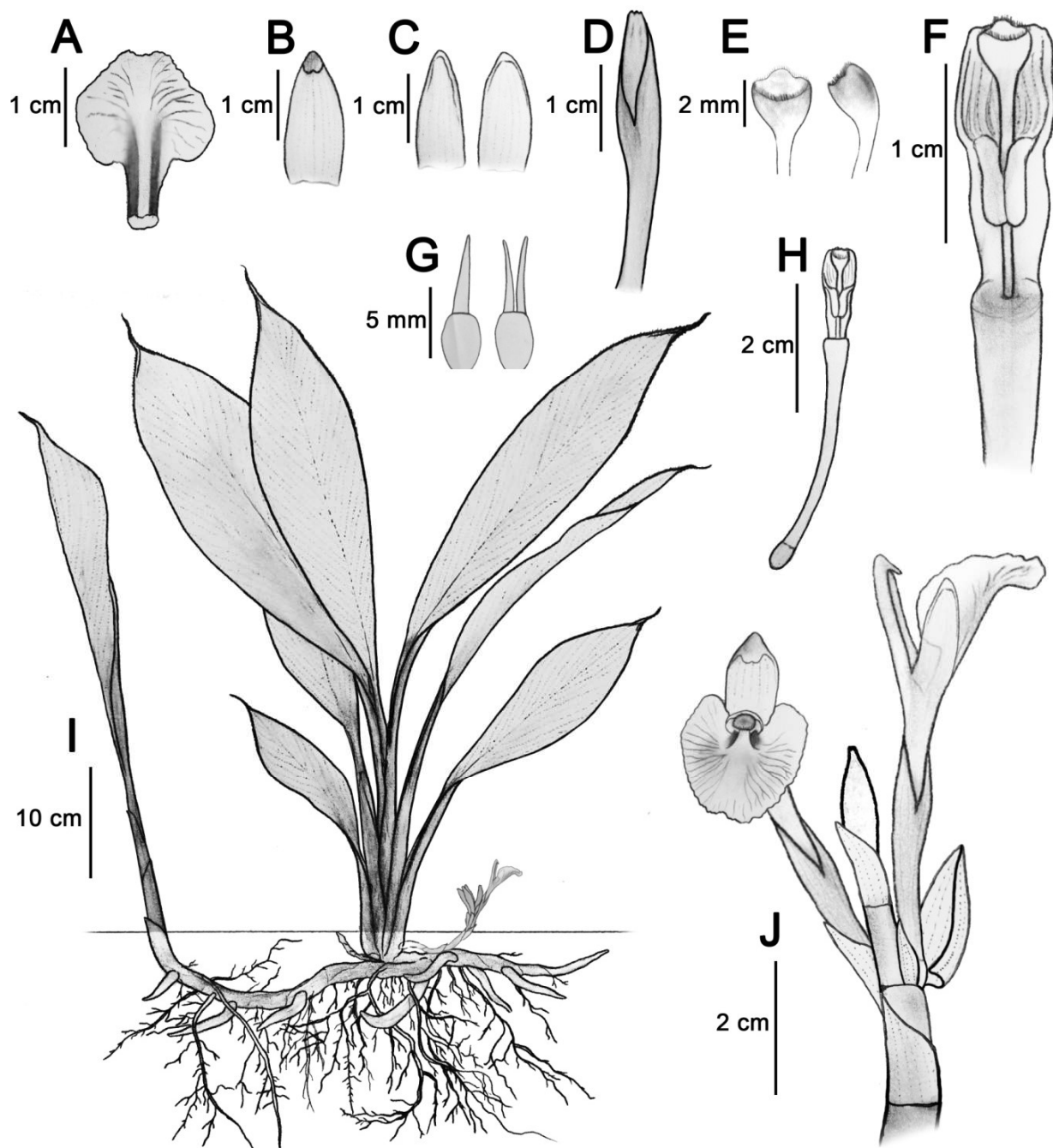


Fig. 3. *Amomum foetidum* Boonma & Saensouk; **A.** labellum; **B.** dorsal corolla lobe; **C.** lateral corolla lobes; **D.** calyx; **E.** stigma (front and side view); **F.** stamen; **G.** ovary with epigynous glands (side and front view); **H.** stamen with corolla tube and ovary; **I.** habitat with inflorescence and the underground parts; **J.** close up the inflorescence. Drawn by Thawatphong Boonma.

lateral arising from the base of the leafy shoot. *Peduncle* up to 8 cm long and 5.5–6.5 mm in diameter, covered by white sheathing bracts 2–3 cm long, 4–7 fertile bracts. *Bract* ovate, ca. 2.5 cm long and 1.5–1.8 cm wide, apex acute, white (in the underground) or green (above the ground) then turn to brown with age, glabrous. *Bracteole* triangular, ca. 9.8 mm long and ca. 3.8 mm wide, apex

acute, translucent white, glabrous on both sides with an entire margin. *Flower* 5.5–6.2 cm long; *calyx* tubular, translucent white to pale green with green at tip, apex 3-teeth and deep slit incision one side 1.2–1.4 mm long, glabrous except a slightly short-hairy at apex. *Floral tube* white with light pale yellow at tip, 2.9–3.8 cm long and 2.0–2.8 mm in diameter, glabrous; *dorsal corolla*



lobe narrowly ovate, 1.8–2.0 cm long and 0.8–1.0 cm wide, semi-translucent white with light pale yellowish-green at apex, apex obtuse with hooded ca. 3.3×3.5 mm, glabrous on both surfaces; *lateral corolla lobes* narrowly ovate, 16–18 mm long and 5–7 mm wide, semi-translucent white with very light pale yellow at apex, apex obtuse, glabrous on both surfaces; *labellum* obovate, ca. 21.2 mm long, ca. 17.5 mm wide, white with a yellow patch at the center and extending to apex, and two red lines on both sides of the yellow stripe from the base to the middle of the half-length of the labellum, the red line 13.8–14.5 mm long and ca. 1 mm wide, glabrous on both surfaces; *lateral staminodes* absent. *Stamen* 13.9–14.5 mm long; *filament* 4–5 mm long, 2.6–2.9 mm wide at the base and 3.7–4.0 mm broad at apex, white with light pale yellow at base, glabrous on both surfaces; *anther* 9.5–9.8 mm long including crest; *anther thecae* ca. 4.7 mm long, light pale yellow; *anther crest* 5.0–5.1 mm long and 5.0–5.5 mm wide, white with light pale yellow at outer surface and edge, the shape almost rectangular, apex truncate and base concave, glabrous on both surfaces. *Epigynous glands* two, ca. 6 mm long, each one ca. 1.3 mm in diameter, yellow. *Ovary* ca. 3.8 mm in diameter and ca. 3.9 mm long, prolate spheroid, pale yellow, glabrous. *Style* white, glabrous; *Stigma* ca. 2.65×2.67 mm, funnel-shaped with three ambiguous lobes at apex, ciliate. *Fruit* not seen. The flowering period from December to March.

Distribution: So far known from Sakon Nakhon province and mostly cultivated in Northeastern Thailand.

Etymology: The specific epithet “*foetidum*” is derived from the Latin word refers to pungent odor which this plant emits the smell similar to the smell of the Stink Bugs (*Tessaratomia papillosa* Drury) when sniffing near its flower or crushed the part of this plant.

Provisional IUCN Red List category: Only a few populations have been found, but it is expected to be found in adjacent areas as suitable habitat still seems to exist and waiting for further field studies and observations, we suggest treating this species as data deficient (DD).

Uses: used to substitute the stink bugs (*Tessaratomia papillosa* Drury) in cooking.

Notes: all parts of the plant have a pungent odor similar to the smell of stink bugs (*Tessaratomia papillosa* Drury), bracts and peduncles are white when young or if it in the underground but it will be green if it above the ground.

DISCUSSION

This species is well known in the name of “*Mangkhang*” which is an Isan word, the dialect of the Northeast region of Thailand used to call the Stink Bugs (*Tessaratomia papillosa* Drury - the insect in Tessaratomidae Family). Normally the Isan people use this Stink Bugs in cooking by roasting or grilling and the

most popular is used to make the chili paste called “*Jaew-Mangkhang*” serve with sticky rice. Because every part of this undescribed species of *Amomum* has a pungent odor like the smell of this insect, so the word “*Mangkhang*” is also used to call this plant too. And this plant also used to replace the stink bugs in cooking which easier to find throughout the year while the stink bugs are easy to find only in the spring.

Amomum foetidum is similar to *Amomum cinnamomeum* Škorničk. Leong-Škorničková *et al.* (2019), *Amomum curtisii* (Baker) Škorničk. & Hlavatá (2018) \equiv *Elettariopsis curtisii* Baker (1892) = *Elettariopsis serpentina* Baker (1892) in some characters but differs. The outstanding characteristics that make *A. foetidum* different from other similar species and easy to identify is the leaf margin glabrous except 1/3 of the margin of the leaf tip has the prickly hairs ca. 0.25 mm long, pointed out of the margin and both edges of the leaf at the apex are rolled in while *A. curtisii* glabrous and *A. cinnamomeum* has a few sharp small teeth spaced well apart at the apex. The color of the calyx of *A. foetidum* is translucent white to pale green with green at the tip but *A. curtisii* is white and *A. cinnamomeum* is translucent cream white. Considering the existence of lateral staminodes, *A. curtisii* is the only one species in the comparison which has the short staminodes while *A. cinnamomeum* and *A. foetidum* are absent. The labellum of *A. cinnamomeum* has densely hairy at the center in the lower half making it different from *A. foetidum*. Moreover, the ovary of *A. cinnamomeum* is cylindrical, pale green with pink tinge and puberulous but the ovary of *A. foetidum* is a prolate spheroid, light pale yellow and glabrous. The epigynous glands of *A. foetidum* ca. 6 mm long while *A. cinnamomeum* ca. 3 mm long and *A. curtisii* ca. 3.5–4 mm long. The comparison of morphological characters of *Amomum cinnamomeum*, *A. curtisii* and *A. foetidum* sp. nov. are provided in Table 1. The key to three species of *Amomum* which cited and treated in this paper is presented below.

Key to species

- 1a. Lateral staminodes small, fleshy, ca. 3 mm long, leaf margin glabrous *Amomum curtisii*
 1b. Lateral staminodes absent 2
 2a. Ovary cylindrical, pale green with pink tinge, puberulous *Amomum cinnamomeum*
 2b. Ovary prolate spheroid, light pale yellow, glabrous *Amomum foetidum*

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**Table 1.** Comparison of morphological characters of *Amomum cinnamomeum*, *A. curtisii* and *A. foetidum*.

Characters	<i>Amomum cinnamomeum</i>	<i>Amomum curtisii</i>	<i>Amomum foetidum</i>
Sheathed scales	white with pink-red when young	unexplained	white when young
Bladeless sheath	shortly puberulent (scaberulous)	glabrous	glabrous
Leaf-sheaths	shortly puberulent, (rough to touch)	bearing leaf-shoots at intervals of 6–20	glabrous
Ligule	1.5–2.5 mm, bilobed, dull green, glabrous with ciliate margin	short, to 7 mm tall, shallowly bilobed	bilobed with deeply divided ca. 4.5 mm; stipule green, 3.0–3.5 mm long, glabrous, apex rounded with ciliate margin
Leaves-shape and size	elliptic, (12–)15–25 cm long and 5.5(–7) cm wide	3– more or less elliptic, widest at or above middle, 24–68 cm long and 4–10 cm wide	oblanceolate to narrowly elliptic, (18–)24–40 cm long and (7–)9–12 cm wide
Leaf-apex	long caudate (4–6.5 cm long)	acuminated to slightly caudate	caudate (1.5–3.3 cm long)
Leaf-base	obtuse	decurrent	decurrent
Leaf -margin	glabrous, hyaline, smooth throughout but with a few sharp small teeth spaced well apart at the apex (rough to touch)	glabrous	glabrous except 1/3 of the margin of the leaf tip has the prickly hairs ca. 0.25 mm long, pointed out of the margin and both edges of the leaf at the apex are rolled in
Bracteole	3–5 × 2–3 mm, glabrous with ciliate margin	8–13 mm long, split to the base on one side, apex broadly rounded and slightly notched	ca. 9.8 mm long, ca. 3.8 mm wide, triangular, translucent white, apex acute, glabrous on both sides with an entire margin
Bract	acute, mostly mucronate apex, almost white at base, pale green, variously tinged pink (outermost bracts usually richer in tinge, innermost greener)	pinkish, or white with red tips, open, broadly pointed	apex acute, white (in the underground) or green (above the ground) then turn to brown with age
Calyx	puberulent at basal half (rough to touch), nearly glabrous in apical half	up to 3 cm long, cleft a third of its length down one side, apex with 3 short blunt teeth	glabrous except for the apex of the calyx, apex slightly short-hairy
Calyx-color	translucent cream white	white	translucent white to pale green with green at the tip
Calyx-margin	densely pubescent margins	glabrous	glabrous
Corolla tube	externally white and glabrous at the base, cream-white and puberulous towards the apex	white, 1–3 cm longer than calyx, slender, glabrous	white with light pale yellow at the tip, glabrous
Labellum-shaped	broadly obovate, ca. 28 mm long, ca. 30 mm wide at the broadest point	ca. 3 × 2.7 cm, base narrow and widening abruptly, apex reflexed and crinkled at edges	obovate, ca. 21.2 mm long, ca. 17.5 mm wide at the broadest point and ca. 4.8 mm wide at the base
Labellum-surfaces	densely hairy at the center in the lower half	glabrous	glabrous on both surfaces
Lateral staminodes	absent	small, fleshy, ca. 3 mm long	absent
Filament	glabrous but with puberulous pinkish patch running along the midline of the inner surface,	ca. 4 mm long and broad	white with light pale yellow at base, glabrous on both surfaces
Anther	anther ca. 13 mm long (including crest), connective tissue white, glabrous	anther thecae ca. 5 mm long	9.5–9.8 mm long including crest, glabrous on both surfaces
Anther crest	7–8 × 6.5–7 mm, white	thin, about 4.5–5.5 mm long and broad, concave and obliquely reflexed, lateral margins incurved slightly to face each other, apex broadly acute	5.0–5.1 mm long and 5.0–5.5 mm wide, white with pale yellow at the margin
Epigynous glands	ca. 3 mm long	3.5–4 mm long	ca. 6 mm long
Ovary	cylindrical, pale green with pink tinge, puberulous	trilocular, glabrous	prolate spheroid, light pale yellow, glabrous
Reference	Leong-Škorničková <i>et al.</i> , (2019)	Kam Yee Kiew (1982) and Voucher specimen of BRG1999-078 (WJK 99-6322)	



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