

Curcuma suraponii sp. nov. (Zingiberaceae), a new species of *Curcuma* subgen. *Curcuma* from Thailand

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Abstract. Boonma T. 2023. *Curcuma suraponii* sp. nov. (Zingiberaceae), a new species of *Curcuma* subgen. *Curcuma* from Thailand. *Biodiversitas* 24: 4885-4895. A new species, *Curcuma suraponii* Boonma sp. nov. has been collected in Tak Province, Northern Thailand during an exploration of Zingiberaceae diversity. This species belongs to the family Zingiberaceae and the genus *Curcuma* subgen. *Curcuma*. The plant materials were collected from their natural habitats and measurements were recorded from both living and preserved specimens. This species bears resemblance to *Curcuma rubrobracteata* Škorničková, Sabu & Prasanth, but differs in certain morphological characteristics and does not match any existing species. Therefore, the author described it as a new species to science under the name *Curcuma suraponii* Boonma. The description includes detailed information on its morphological characteristics, supported by illustrations, and provides the vernacular name, ecology, phenology, traditional utilization, conservation status, distribution map, and a comparative table to highlight its differences with allied species. Additionally, a revised key of 29 species within the *Curcuma* subgen. *Curcuma* in Thailand is also presented.

Keywords: *Curcuma*, new species, taxonomy, Thailand, Zingiberaceae

Abbreviations: AAU: Aarhus University Herbarium; BK: Bangkok Herbarium; BKF: The Forest Herbarium; BM: The Natural History Museum Herbarium; C: Natural History Museum of Denmark Herbarium; CALL: Calicut University Herbarium; CMU: Chiang Mai University Herbarium; E: Royal Botanic Garden Edinburgh Herbarium; K: Royal Botanic Gardens Kew Herbarium; L: National Herbarium Nederland, Leiden University Branch; P: Muséum National d'Histoire Naturelle; PSU: Prince of Songkla University Herbarium; QBG: Queen Sirikit Botanical Garden Herbarium; and SING: Singapore Botanic Gardens Herbarium

INTRODUCTION

Plants serve as essential bioresources that intricately sustain our lives, whether through direct or indirect means and have long been harnessed for a diverse array of purposes. The wisdom of tapping into the potential of each plant has transcended generations. The family Zingiberaceae, also known as the ginger family, stands as a prime example of a family extensively utilized for a variety of purposes in Thailand. These encompass culinary applications, spice enhancement, traditional medicine, ornamental aesthetics, cut-flower arrangements, commercial cultivation, materials, rituals, and other socio-religious practices. With a species diversity of more than 400 species of Zingiberaceae distributed throughout Thailand (Saensouk et al. 2007, 2016, 2018, 2021a, b, c, d, e, 2022a, b, c, d, e, f; Khamtang et al. 2014; Saensouk and Saensouk 2014, 2019a, b, 2020a, b, 2021a, b, c, d; Nontasit et al. 2015; Maknoi et al. 2016, 2021; Tangjitman 2017; Pholhiamhan et al. 2018; Boonma and Saensouk 2019; Sangvirojjanapat et al. 2019a, b, 2020, 2021; Boonma et al. 2020a, b, 2021, 2022, 2023; Sangvirojjanapat and Newman 2021; Ragsasilp et al. 2022a, b; Inta et al. 2023; POWO 2023).

Most plants within the family Zingiberaceae, especially the genus *Curcuma* are referred to as *wan*, plants associated with Thai beliefs. They are planted as auspicious symbols,

with the belief that these plants aid in enhancing trade, bestowing charm upon the grower, increasing invincibility, protecting against danger and magic, and serving as therapeutic remedies. This tradition of utilization has been documented in numerous collections of ancient Thai textbooks that focus on *wan*, such as Hawithee (1963); Gunhakanjana (1970); Phayakorn and Kosi (1979); Khanatham (2016); Saensouk et al. (2022b, c); and Boonma et al. (2023).

The study of plant taxonomy within the genus *Curcuma* in Thailand has garnered consistent attention from both foreign and Thai botanists. Over the years, various researchers have made noteworthy contributions, such as Sirirugsa (1966), Larsen (1996), Larsen et al. (1998), Sirirugsa and Newman (2000), Mood and Larsen (2001), Maknoi et al. (2005, 2011), Larsen and Larsen (2006). Notably, Sirirugsa et al. (2007) conducted a comprehensive study on Thai *Curcuma*, resulting in the proposition of five distinct groups based on characteristics such as anther shape, the presence of epigynous glands, and the characteristics of the coma bracts. These groups consist of *Curcuma alismatifolia* Gagnep., *Curcuma cochinchinensis* Gagnep., *Curcuma ecomata* Craib, *Curcuma longa* L., and *Curcuma petiolata* Roxb.. Subsequently, Závěská et al. (2012) introduced a classification that maintained *Curcuma* subgen. *Curcuma* L. and *Curcuma* subgen. *Hitcheniopsis*

(Baker) K.Schum., and introduced a new subgenus named *Curcuma* subgen. *Ecomatae* Škorničk. & Šída f. The subgenus *Hitcheniopsis* is distinguished by the absence of epigynous glands. In contrast, the other two subgenera possess the epigynous glands, namely subgenus *Curcuma*, typically exhibit well-developed coma bracts and closed bell-shaped flowers, while subgenus *Ecomatae* generally lacks coma bracts and features open-form flowers, and bracts fused only at the base (Záveská et al. 2012; Leong-Škorničková et al. 2015). This classification system has been applied to the current taxonomic study of *Curcuma* in Thailand (e.g., Leong-Škorničková et al. 2017, 2020, 2021, 2022; Boonma and Saensouk 2019; Maknoi et al. 2019; Soonthornkalump et al. 2020, 2021, 2022; Rakarcha et al. 2022; Saensouk et al. 2021a, c, d, e, 2022a, b, c, f; and Ruchisansakun and Jenjittikul 2023).

As presented herein, the author has discovered a taxonomically undescribed plant belonging to the genus *Curcuma* subgen. *Curcuma* in the forests of Tak Province, Northern Thailand. Consequently, an imperative lie in conducting a taxonomic study of this species to provide comprehensive data that facilitates its accurate utilization and as fundamental information for another further research.

MATERIALS AND METHODS

The plant materials were collected in 2021 from Tak Province, Northern Thailand (Figure 1). Measurements were taken from both living and preserved specimens

obtained from their respective natural habitats. To precisely document morphological traits, the author employed instruments like rulers and vernier calipers and conducted meticulous inspections using a stereoscopic microscope (Stemi 2000-C, ZEISS, Oberkochen, Germany).

Holotype specimens were appropriately deposited at the Khon Kaen University Herbarium (KKU), and isotype deposited at Queen Sirikit Botanical Garden Herbarium (QBG). The author meticulously conducted a comprehensive comparative analysis, scrutinizing the morphological characteristics of the specimens against the descriptions of all existing species in the genus *Curcuma*. Additionally, extensive use was made of available online digital images and data from herbarium collections, such as Aarhus University Herbarium (AAU), Bangkok Herbarium (BK), The Forest Herbarium (BKF), The Natural History Museum Herbarium (BM), Natural History Museum of Denmark Herbarium (C), Calicut University Herbarium (CALI), Chiang Mai University Herbarium (CMU), Royal Botanic Garden Edinburgh Herbarium (E), Royal Botanic Gardens Kew Herbarium (K), National Herbarium Nederland, Leiden University Branch (L), Muséum National d'Histoire Naturelle (P), Prince of Songkla University Herbarium (PSU), Queen Sirikit Botanical Garden Herbarium (QBG), and Singapore Botanic Gardens Herbarium (SING). Moreover, the author extensively reviewed published literature on *Curcuma*, with a special focus on the morphological descriptions of all recognized species within the *Curcuma* subgen. *Curcuma*.

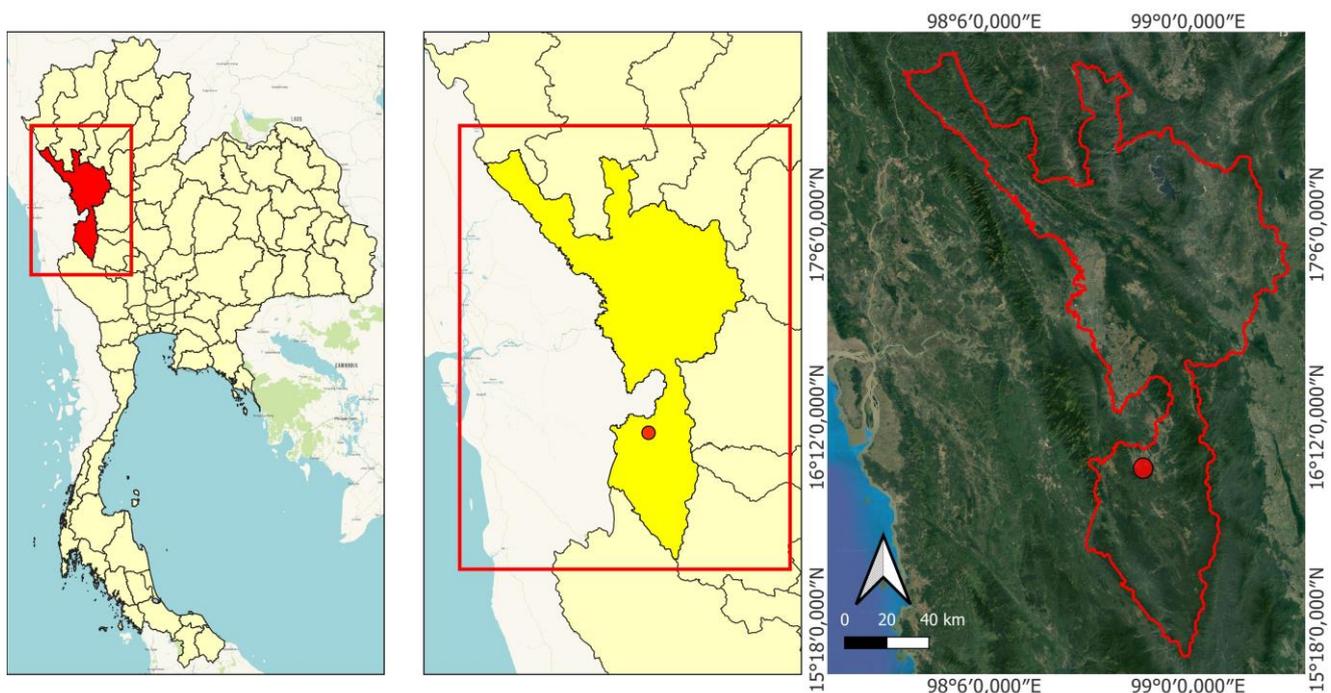


Figure 1. Distribution map of *Curcuma suraponii* Boonma sp. nov.

RESULTS AND DISCUSSION

The description of a new species, *Curcuma suraponii* Boonma (Zingiberaceae: Zingibereae), belonging to the *Curcuma* subgen. *Curcuma* was presented. The species was collected in Tak Province, Northern Thailand. The description includes detailed information on its morphological characteristics, supported by illustrations, and provides the vernacular name, ecology, phenology, traditional utilization, conservation status, distribution map, and a comparative table to highlight its differences with allied species. Additionally, a revised key of 29 species within the *Curcuma* subgen. *Curcuma* in Thailand is also present.

Taxonomic treatment

Curcuma suraponii Boonma sp. nov. - Figures 2-4, Table 1

The new species resembles *Curcuma rubrobracteata* Škorničková, Sabu & Prasanth, but exhibits certain morphological character differences. *Curcuma suraponii*

has ovoid primary rhizome with branched rhizome, yellow internally (vs. *C. rubrobracteata* has creeping rhizome, whitish yellow internally); leaf sheaths, petioles, peduncle, bracteoles, calyx, floral tube, and corolla lobes pubescent (vs. glabrous); inflorescence terminal, emerge through lateral slits of the pseudostem, 15-20 cm above ground (vs. 3-10 cm above ground); present of coma bract (vs. absent); fertile bracts pubescent on both surfaces and margin, ruby pink only at the distal part, and pale green towards the base (vs. glabrous on both surfaces, except margin hairy, bright red extends almost to the yellow base); anther 7.2×2 mm (vs. 6×2.5 mm); anther spurs 2.5 mm long (vs. 3 mm long); anther crest slightly longer than the anther lobes (vs. absent); ovary ellipsoid, 4×3 mm (vs. subglobose, 2×2.5 mm).

Type: Thailand, Tak Province, Umphang District, 600 m, Boonma 2201, 16 July 2021 (Holotype KKU! isotype QBG!).



Figure 2. *Curcuma suraponii* Boonma sp. nov. A. Front view of flower. B. Top view of inflorescence. C. Side view of inflorescence. D. Underground part: old primary rhizome, young-branched rhizomes with tuberous and fibrous roots (Photographs and designed by Thawatphong Boonma)



Figure 3. *Curcuma suraponii* Boonma sp. nov. A. Side view of inflorescence emerges through lateral slits of pseudostem. B. Front view of anther. C. Side view of anther. D. Dorsal corolla lobe. E. Lateral corolla lobe. F. Stamines. G. Labellum. H. Cross section of tuberous root. I. Cross section of rhizome. J. Fertile bract. K. Calyx and ovary. L. Side view of flowers with bracteoles (Photographs and designed by Thawatphong Boonma)



Figure 4. *Curcuma suraponii* Boonma sp. nov. A. Front and side views of anther. B. Dorsal corolla lobe. C. Lateral corolla lobes. D. Flower. E. Lateral staminodes. F. Labellum. G. Epigynous glands and ovary. H. Calyx and ovary. I. Bracteole. J. Habitus. K. Fertile bract. L. Side view of inflorescence emerges through lateral slits of pseudostem (Drawn by Thawatphong Boonma)

Table 1. Morphological comparison of different characters of *Curcuma suraponii* and *C. rubrobracteata*

Characters	<i>C. suraponii</i> Boonma sp. nov. (present study)	<i>C. rubrobracteata</i> Škorničková, Sabu & Prasanth. (Škorničková et al. 2003)
Rhizome	Ovoid with branched rhizome, yellow internally, Branches 9-12 cm long, 1.8-2.3 cm in diam.	Slender creeping, whitish yellow internally, Creeping, 15-30 cm long, c. 1 cm in diam.
Tuberous roots	Narrowly elongate ovoid: lanceolate shape when cut in a longitudinal section, 3.0-4.5 × 1.0-2.0 cm, white with pale yellowish white core, distanced 6-10 cm away from rhizome	Ovoid: ovate shape when cut in a longitudinal section, 1.5-2.5 × 1.0-1.5 cm, white inside, distanced 1-5 cm away from rhizome
Leaf sheaths	Pubescent	Glabrous
Ligule	5-6 mm long	1-2 mm long
Petiole	Pubescent	Glabrous
Lamina	Broadly elliptic, 40-66 × 16-20 cm	Elliptic-lanceolate or ovate, 35-60 × 10-16 cm
Inflorescence	Terminal, emerge through lateral slits of the pseudostem, 15-20 cm above ground	Terminal, emerge through lateral slits at the base of the pseudostem, 3-10 cm above ground
Peduncle	20-25 cm long, 1.4-1.6 cm in diam., greenish, pubescent	5-10 cm long, 0.7 cm in diam., whitish, glabrous
Spike	15-25 cm long, 9-10 cm in diam.	6-10 cm long, 7-9 cm in diam.
Coma bract	Present, 5-9, broadly obovate, 4.6-5.0 × 3.0-3.7 cm, apex acute slightly mucronate, ruby at distal half and greenish white to the base, pubescent on both surfaces	Absent
Fertile bracts	28-35 per spike, 4.5-5 × 3.3-3.7 cm, upper apex acute, lowest bracts apex rounded to truncate, pubescent on both surfaces and margin, fused about half of the length, ruby pink only at the distal part, and pale green towards the base	20-26 per spike, 3.5-4 × 3.5 cm, all bracts apex rounded to obtuse, glabrous on both surfaces, except margin hairy, fused almost only at the base, bright red extends almost to the base, with yellow base
Bracteoles	Pubescent	Glabrous
Flower	5.5-5.6 cm long	6 cm long
Calyx	Pubescent	Glabrous
Floral tube	4 cm long, pubescent	3.7 cm long, glabrous
Dorsal corolla lobe	16-17 × 10-11 mm, sparsely hairy	14 × 8 mm, glabrous
Lateral corolla lobes	16-17 × 10-11 mm, sparsely hairy	12 × 7 mm, glabrous
Lateral staminodes	Uniquely asymmetric obovate, 14.5-16 × 9-10 mm, apex rounded	Broadly obovate, 10 × 11 mm, Apex obtuse
Filament	4.5-5.0 mm long, c. 3.5 mm wide at the base	5 mm long, 4 mm wide at the base
Anther	7.2 mm long)measurement side view including spurs(, 2 mm wide, yellow	6 mm long)measurement side view including spurs(, 2.5 mm wide, orange
Anther thecae	4 mm long	5 mm long
Spurs	2.5 mm long, yellow	3 mm long, orange
Crest	Slightly longer than the anther lobes, c. 1 mm long, apex rounded	Absent
Ovary	Ellipsoid, 4 × 3 mm	Subglobose, 2 × 2.5 mm

Perennial herb, *Rhizome* ovoid, brownish externally, yellow internally, 5-8 × 3-4 cm, light fragrance, bitter taste. *Branches* usually occur in opposite sideways or stabbed into the ground, curved, bent up at the end to form a new shoot, new shoot is usually far apart from the primary rhizome, 9-12 cm long, 1.8-2.3 cm in diam., covered by triangular sheaths scales, young-branched rhizome whitish with pale yellow core, mature-branched rhizome more yellowish internally with occasionally produce short sub-branched. *Root* consists of fibrous roots and tubers. *Tubers* narrowly ovoid, 3.0-4.5 cm long, 1.0-2.0 cm in diam., and positioned about 6-8 cm from the rhizome. *Leafy shoot* 90-130)-170(cm tall. *Sheathing bracts* 1-2, up to 30 cm long, green, or brownish green, apex mucronate, pubescent. *Leaf-sheaths*)4-(6-7, 40-55 cm long, distichous, green, or brownish green, pubescent; *ligule* bilobed, 5-6 mm long, green, apex rounded, ciliate; *petiole* green, canaliculate, 12.5-30 cm long, pubescent. *Lamina* broadly elliptic, 40-66 × 16-20 cm)the first leaf usually shortest(, apex acuminate, base attenuate, margin entire with translucent white

hyaline; adaxially green, short hairs along the embossed veins; midrib green; abaxially paler green, glabrous. *Inflorescence* spike, cylindrical, terminal, emerge through lateral slits of the pseudostem, 15-20 cm above ground; *spike* 15-25 cm long, 9-10 cm in diam.; *peduncle* 20-25 cm long, 1.4-1.6 cm in diam., greenish, paler at base, pubescent. *Coma* 5-9, broadly obovate, 4.6-5.0 × 3.0-3.7 cm, apex acute slightly mucronate, ruby at distal half and greenish white to the base, pubescent on both surfaces. *Fertile bracts* 28-35 per spike, broadly obovate, 4.5-5 × 3.3-3.7 cm, lower bracts apex rounded to truncate, upper bracts apex acute, ruby at distal part and pale green to the base, pubescent on both surfaces and margin hairy, bracts fused about half of the length. *Bracteoles* obovate, one per flower, keeled, 3.0-3.8 cm long, semi-translucent pale yellow, apex acute, hooded, with slightly mucronate tip 0.8 mm long, pubescent. *Flower* yellow, 5.5-5.6 cm long, closed form)staminodes were covered by dorsal corolla lobe(, cincinni 3-5 flowers. *Calyx* tubular c. 10 mm long, apex trilobed, each lobe apex truncated with unilateral

incision up to 3 mm long, white, translucent, pubescent. *Floral tube* tubular and enlarged to conical at distal part, 4 cm long, yellow, pubescent; *dorsal corolla lobe* 1, triangular-ovate, 16-17 × 10-11 mm, apex mucronate, cucullate, reddish gradually yellowish at the base, sparsely hairy; *lateral corolla lobes* 2, triangular-ovate, 16-17 × 10-11 mm, apex obtuse, cucullate, yellow with reddish tinge, sparsely hairy. *Lateral staminodes* 2, uniquely asymmetric obovate, 14.5-16 × 9-10 mm, apex rounded, yellow. *Labellum* orbicular, 15-16 × 16-17 mm, slightly tri-lobed, mid lobe with apex shortly emarginate with an incision 2 mm long, yellow. *Stamen* 1; filament flat 4.5-5.0 mm long and 3.5 mm wide at the base, sparsely hairy. *Anther* 7.2 mm long (including spurs), 2 mm wide, yellow, pubescent; *spurs* conical, 2.5 mm long, yellow, pointing downwards; *crest* slightly longer than the anther lobes, 0.5 mm long, apex rounded, slightly darker yellow. *Stigma* conical, whitish, glabrous, ostiole ciliate. *Epigynous glands* 2, 4 mm long, apex blunt, yellow. *Ovary* ellipsoid, 4 × 3 mm, yellowish-white, pubescent, hairs 0.8-1 mm long; *ovule* axile placentation. Fruit and seeds are not seen.

Vernacular name: *Khamin Ajarn Sauce* where *Khamin* refers to plants in the genus *Curcuma*, *Ajarn* means teacher or educator In Thai. It's also used as a respectful prefix before a person's name to acknowledge their expertise or knowledge in a field, and *Sauce* is named after the nickname of Prof. Dr. Surapon Saensouk.

This species also known as *Wan Krabi Thong*, is found in the oldest recorded instance available, dating back to 1963 in the book "The sacred and magical properties of Wan" written by Hawithee (1963), where *wan* is a term used by Thai sacred plant collectors to refer to plants that are popularly cultivated for medicinal purposes as medicinal herbs and including rituals and other socio-religious practices. These plants are believed to have the power to make humans invincible and bring good fortune, fascination, or popularity to those who cultivate them. Each species has specific details regarding the date, time, and spells incorporated into the planting method, which vary according to the specific beliefs passed down from generation to generation or found in old textbooks about *wan*. Some practitioners believe that bringing flowers or any part of the plant with them enhances enchantment, often by soaking the flowers in sandalwood oil (Hawithee 1963; Gunhakanjana 1970). While *krabi* means *sabur*, *thong* means golden referring to its inflorescence resembling the *sabur*, and its yellow rhizome internal colour which Thais usually compare the yellow shade to gold. Furthermore, in addition to the short description and its usage, an alternate synonymous name, "Wan Nang Wanthong Haam Thap", was also documented (Hawithee 1963). It was subsequently mentioned in a record by Gunhakanjana (1970). The name "Nang Wanthong Haam Thap" lacks an explained origin for its meaning. However, "Nang Wanthong" holds significance as a prominent character in the Thai literary work "Khun Chang Khun Phaen." Additionally, the term "Haam Thap" pertains to the act of ceasing hostilities between two opposing forces. While in horticulture, this species is known as "Ribbon *Curcuma*" (Wannakrairoj 1996).

Etymology: The specific epithet name *suraponii* is named in honor of Prof. Dr. Surapon Saensouk, a botanist at Walai Rukhavej Botanical Research Institute, Mahasarakham University, who has been working on Thai Zingiberaceae for over 20 years, and Congratulations on his appointment as a "Professor" in botany in 2023! His guidance and support have been invaluable throughout the author's journey in botany, serving as a constant source of inspiration and shaping the author's growth and understanding in this field.

Distribution: It occurs within the natural forest habitat of Tak Province, Northern Thailand.

Ecology: It is found in mixed deciduous and dry evergreen forests with rich humus soil at elevations of 570-800 m above sea level, where *Kaempferia takensis* Boonma & Saensouk is also found in nearby areas.

Phenology: Flowering in late June to August; flowers fully open in the early morning about 6.30-8.00 am., anthesis time in the morning about 7.30-10.00 am., and last a single day. Leafy shoot emerges in late April and dormancy begins in November. Fruit and seed not seen.

Utilization: Young inflorescences are commonly consumed either fresh or boiled, often served alongside chili paste for a flavorful meal. Fresh rhizome is used medicinally by chewing or taking it in the mouth to alleviate conditions, such as sore throat, chapped tongue, canker sores, mouth ulcers, throat, and nasal ulcers, and to aid in the healing of diphtheria. Pound fresh rhizomes thoroughly, mix with white wine or lime water, then filter and drink only water to help relieve stomach pain (Hawithee 1963; Gunhakanjana 1970). Rub fresh rhizome against a grinding stone and then mixed with lime water, the resulting mixture is applied to the abscess, whether in the mouth or nose, to help neutralize the inflammatory toxins and facilitate the collapse of the abscess. The utilization of this plant in rituals and beliefs is used to help enhance invincibility for the owner, to solve or remove magic from enemies, and to prevent danger. Additionally, it was employed for soaking weapons before going into battle, believed to aid in annihilating the enemy's invulnerability (Phayakorn and Kosi 1979; Khanatham 2016).

Conservation status: The new species was recently discovered in 2021, and there is still a lack of sufficient information about its distribution range in nearby areas, including the neighboring country of Myanmar. Therefore, the author considering ranking this species in the Data Deficient (DD) category, following the IUCN (2022) criteria. In addition to describing a new species, I have examined various specimens of the most similar species, *Curcuma rubrobracteata* Škorničková, Sabu & Prasanth., which I gathered and organized alphabetically by the country name of the additional specimens that were examined as follows:

Bangladesh: Chittagong, Rangamati District, Rampahar, Baluchhara, 6 September 1999, *Newman M.F. & Rahman M.A. 984* (E).

India: Mizoram, Lawngtlai District, on the way to Ngengpui Wildlife Sanctuary-Khomoi, 10 September 2002,

Škorničková & Prasanthkumar 86241 (Holotype MH; iso CALI, K, SING); same locality, 10 September 2002, Škorničková & Prasanthkumar 86239 (CALI).

Myanmar: Shan state, Me Mue (Khleng Yai, Burmese side), 17 June 1922, *Kerr A.F.G.* 6145 (E); Sagaing Division, Katha District, Mohuyin Reserve, 9 July 1911, *Lace J.H.* 5324 (E).

Thailand: Northern (N): Chiang Mai Province [Doi Chiang Dao, 12 July 1950, *Garrett 1334* (K); Mae Rim, 17 July 1968, *Larsen et al.* 2586 (AAU, BKF); Along the road Fang-Chiang Mai, 27 July 1968, *Larsen et al.* 2766 (AAU, BKF); Mae Sa Noi Waterfall, QBG, 18 July 2003, *Maknoi 337* (AAU, BKF, PSU, QBG); Mae Mao reservoir, Fang, 22 July 2003, *Maknoi 358* (AAU, BKF, PSU, QBG); Doi Nawong Hoy, Mae Rim Sa-Moeng road, 10 August 1989, *Maxwell 89-1019* (CMU, E); Doi Chiang Dao, 25 June 1989, *Maxwell 89-807* (CMU); Mawk Fa Falls, along Mae How stream, 18 August 1990, *Maxwell 90-890* (CMU); Ban Wieng Pa, Si Dong Yen subdistrict, Fang, 8 July 1991, *Maxwell 91-619* (AAU, CMU, E, P); Wahng Hahng Falls, Doi Suthep-Pui, 10 September 1992, *Palee 74* (CMU)]; Lampang Province [Doi Khun Than National Park, Hang Chat, 29 July 1994, *Maxwell 94-821* (CMU); Jae Son National Park, Mueang Pan, 24 August 1995, *Maxwell 95-576* (BKF, CMU); Jae Son National Park, Pha Ngaem (Nahn Kaht) cave, 25 August 1995, *Maxwell 96-1137* (BKF, CMU); Jae Son National Park, Wang Nuea, 2 June 1996, *Maxwell 96-781* (CMU); Jae Son National Park, Wang Nuea, 27 June 1996, *Maxwell 96-918* (CMU); Jae Son National Park, Mueang Bahn (Pan), 24 May 1996, *Panatkool 53* (CMU); Muang Ngao, 15 July 1931, *Put 3998* (C, K, L)]; Mae Hong Son Province [Mae Sariang, 17 July 1998, *Kress 98-6213* (AAU); Ban Pang Pake, Pai, 24 July 2003, *Maknoi 377* (AAU, BKF, PSU, QBG)]; Phitsanulok Province [Thung Salaeng Luang National Park, 25 July 1966, *Larsen et al.* 878 (AAU, BKF, P)]; Tak Province [Thung Yai, 17 June 1922, *Kerr 6145* (BK, BM, C, K); Me Mue, Muan, 20 June 1922, *Kerr 6145A* (BK, BM, K); Mu Kee Haw (Karen) village, Pawo, Mae Sot, 18 August 1994, *Maxwell 94-893* (BKF, CMU); Khao Pha Wo, 23 July 1973, *Murata et al.* T16871 (AAU, BKF); Mae Sot, 14 July 1999, *Ngamriabsakul 45* (BKF, E); Chedi Ko, Mae Sot, 11 July 1972, *Smitinand & Seidenfaden 11621* (AAU, BKF, L)]; **Southwestern (SW):** Kanchanaburi Province [Between Huai Ban Kao and Kriti, 2 July 1973, *Geesink et al.* 6071 (C); Ka Tha Lai, Wangka, 4 June 1946, *Kostermans 798* (BKF, K, P); Thung Kang Yang, 2 July 1963, *Larsen et al.* 10431 (AAU); Thung Kang Yang, 2 July 1963, *Larsen et al.* 10441 (AAU); Thung Kang Yang, 6 July 1963, *Larsen et al.* 10538 (AAU); Srisawat, 26 June 1974, *Larsen et al.* 33800 (AAU, K, QBG); Thung Pha Phum to Sangkhla Buri, 11 Aug. 2003, *Maknoi 453* (AAU, BKF, PSU, QBG); Thung Pha Phum, 6 July 1973, *Maxwell 73-174* (AAU, BK); Huai Ban Kao, Kanchanaburi, 13 July 1973, *Maxwell 73-293* (AAU, BK); Thung Yai Naresuan, Sangkhla Buri, 17 June 1993, *Maxwell 93-645* (CMU); Klu Nam Ron, 27 June 1934, *Put 32* (K); Hin Dat, 29 June 1926, *Put 39* (K); Ban Wang Kalang, Pan Paung River Valley, Ka Tha Lai, 4 June 1946, *Kostermans A.J.G.H.* 798 (K, P)].

Notes: *Curcuma rubrobracteata* Škorničková, Sabu & Prasanth. is native to China (Menghai Xian, southern Yunnan) according to the records in the study by Chen and Xia (2010), where living plants were collected in the field and cultivated at the South China Botanical Garden, Chinese Academy of Sciences.

The morphological comparison of different characters between *Curcuma suraponii* Boonma sp. nov. and *C. rubrobracteata* Škorničková, Sabu & Prasanth is presented in Table 1.

The subgenus *Curcuma*, within the genus *Curcuma*, is distinguished by the presence of epigynous glands in its flowers, mostly produces cylindrical inflorescences, typically features well-developed coma, and mostly has a bell-shaped and closed form a flower. The global diversity within this subgenus comprises more than 70 known species (Leong-Škorničková et al. 2015), while the species diversity of accepted species within *Curcuma* subgen. *Curcuma* in Thailand, when counted with a new species, *C. suraponii*, totals 29 species distributed throughout the country. A revised key for identifying *Curcuma* subgen. *Curcuma* in Thailand has been prepared to facilitate the identification of this new species, as follows:

Key to 29 species of *Curcuma* subgenus *Curcuma* in Thailand

- 1a. Rhizome without branches..... 2
- 1b. Rhizome with well-developed branches 4
- 2a. Produces both terminal and lateral inflorescence.....
.....*C. angustifolia*
- 2b. Produces only terminal inflorescence 3
- 3a. Sheaths glabrous; leaf abaxially surface glabrous.....*C. plicata*
- 3b. Sheaths pubescent; leaf abaxially surface pubescent or glabrescent.....*C. attenuata*
- 4a. Produces lateral inflorescence..... 5
- 4b. Produces terminal inflorescence 16
- 5a. Lamina pubescent on the abaxial surface..... 6
- 5b. Lamina glabrous on the abaxial surface..... 10
- 6a. Midrib of leaf green 7
- 6b. Midrib of leaf red or reddish-purple 8
- 7a. Rhizome yellow; lamina broadly lanceolate *C. aromatica*
- 7b. Rhizome pale yellow; lamina oblong.....*C. elata*
- 8a. Bracts glabrous*C. zedoaroides*
- 8b. Bracts pubescent..... 9
- 9a. Spike almost globular less than 10 cm long; peduncle short, embedded in the ground *C. globulifera*
- 9b. Spike cylindrical more than 10 cm long; peduncle long, erect above the ground *C. latifolia*
- 10a. Petioles and leaf sheaths reddish brown ochraceous
..... *C. rubescens*
- 10b. Petioles and leaf sheaths green 11
- 11a. Midrib of leaf green 12
- 11b. Midrib of leaf red or reddish-purple 14
- 12a. Fertile bracts pale pink; rhizome pale ochraceous.....
.....*C. comosa*
- 12b. Fertile bracts green; rhizome white to pale yellow 13
- 13a. Bracts glabrous..... *C. leucorrhiza*
- 13b. Bracts pubescent..... *C. mangga*
- 14a. Rhizome aeruginous green..... *C. aeruginosa*
- 14b. Rhizome yellow or orange..... 15
- 15a. Corolla lobes nearly white or with a very pale pink tinge; rhizome pale straw internally*C. picta*

15b. Corolla lobes conspicuously pink to red; rhizome deep orange to yellowish orange.....	<i>C. zanthorrhiza</i>
16a. Anther ecalcarate.....	17
16b. Anther calcarate.....	18
17a. Flowers deep yellow to orange-yellow.....	<i>C. aurantiaca</i>
17b. Flowers cream-white with yellow in the midrib of labellum.....	<i>C. roscoeana</i>
18a. Inflorescence emerges at or near the base of the pseudostem through lateral slits.....	19
18b. Inflorescence between the innermost leaf sheaths above the pseudostems.....	20
19a. Rhizome creeping; coma bracts absent; fertile bracts bright red almost to the base.....	<i>C. rubrobracteata</i>
19b. Rhizome non-creeping; coma bracts present; fertile bracts ruby pink only at the tip.....	<i>C. suraponii</i>
20a. Bracts glabrous.....	21
20b. Bracts pubescent.....	22
21a. Ovary glabrous.....	<i>C. antinaia</i>
21b. Ovary pubescent.....	<i>C. sattayasaiorum</i>
22a. Coma bracts greenish white.....	<i>C. viridiflora</i>
22b. Coma bracts pink or with pink at the distal part.....	23
23a. Peduncle red.....	<i>C. phrayawan</i>
23b. Peduncle green.....	24
24a. Midrib of leaf red or reddish-purple.....	<i>C. wanenlueanga</i>
24b. Midrib of leaf green.....	25
25a. Rhizome deep orange-yellow.....	<i>C. longa</i>
25b. Rhizome pale yellowish white to pale yellow.....	26
26a. Thyse inverted conical.....	27
26b. Thyse long cylindrical.....	28
27a. Leaf abaxially puberulous; rhizome with the smell of green mango.....	<i>C. amada</i>
27b. Leaf abaxially glabrous; rhizome non-aromatic ..	<i>C. rangjued</i>
28a. Fertile bracts pubescent; coma bracts white with violet tip or violet.....	<i>C. cordata</i>
28b. Fertile bracts glabrous; coma bracts pink.....	<i>C. petiolata</i>

In conclusion, a newly discovered species, *Curcuma suraponii* Boonma, is categorized within the *Curcuma* subgen. *Curcuma* due to the presence of epigynous glands, well-developed coma, closed bell-shaped flowers, and fertile bracts that are fused for about half of their length. Superficially, *C. suraponii* might bear a resemblance to *C. rubrobracteata*, as they both produce the inflorescence that emerges through the lateral slits of the pseudostem, and they both have flowers with calcarate anthers. However, their differences can be readily distinguished. *C. suraponii* has non-creeping branched rhizomes, which are internally yellow. In contrast, *C. rubrobracteata* possesses creeping rhizomes that are internally whitish yellow. Furthermore, *C. suraponii* exhibits coma bracts, unlike *C. rubrobracteata*, which lacks coma bracts. The fertile bracts of *C. suraponii* are ruby pink at the distal part, with pale green reaching the base. This is different from *C. rubrobracteata*, whose bracts are bright red and extend almost down to the yellow base.

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