Alpinia oui (Zingiberaceae), a New Species from Taiwan

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Abstract. *Alpinia oui* Y. H. Tseng & Chih C. Wang, a new species of Zingiberaceae from southeastern Taiwan, is described and illustrated. This new species belongs to subgenus *Alpinia* Roxb. sect. *Alpinia* subsect. *Catimbium* (Horan.) R. M. Sm. It resembles *A. zerumbet* (Pers.) B. L. Burtt & R. M. Sm. in the shape and size of the flowers, but differs in the denser inflorescences and the dense brown pubescence of the capsules. According to the IUCN Red List Categories and Criteria, this species is assessed as Vulnerable (VU D1), because its wild populations number less than 1000 individuals and are so far known from only one locality in southeastern Taiwan.

Key words: *Alpinia*, IUCN Red List, Taiwan, Zingiberaceae.

The genus *Alpinia* Roxb. (Zingiberaceae) comprises 230 species that are mainly distributed in the subtropical and tropical rainforests of Asia, Australia, and the Pacific Islands (Wu & Larsen, 2000); 51 species have been found in China (Wu & Larsen, 2000). Thirteen taxa of *Alpinia* were previously recognized in the *Flora of Taiwan* (Moo, 1978); more recently, 14 taxa were recognized in the second edition of the *Flora of Taiwan* (Wang, 2000). Since then two new species, *A. nantoensis* F. Y. Lu & Y. W. Kuo and *A.* ×*ilanensis* S. C. Liu & J. C. Wang, and one confirmed species, *A. koshunensis* Hayata, have been reported (Kuo et al., 2008; Liu & Wang, 2009; Tseng et al., 2010). During a recent revision of the genus in Taiwan, an unusual species was discovered. Consultation of recent works on *Alpinia* (Yang & Wang, 1998; Kuo et al., 2008; Liu & Wang, 2009; Liu et al., 2009; Tseng et al., 2010) and relevant literature from neighboring regions (Wu & Larsen, 2000; Kress et al., 2005; Chaveerach et al., 2008) support its recognition as a new species.

Alpinia oui Y. H. Tseng & Chih C. Wang, sp. nov. TYPE: Taiwan. Taitung Co., Taimali township, Yaoshan, at forest margin, along semi-shaded trail, ca. 550 m, 11 Apr. 2008, *Yen-Hsueh Tseng 4204* (holotype, TCF; isotype, HAST). Figure 1.

Haec species *Alpiniae zerumbet* (Pers.) B. L. Burtt & R. M. Sm. affinis, sed ab ea foliis abaxialiter pubescentibus, inflorescentia thyrsiformi densiore ramis inferioribus brevioribus, labello ad basim albo apicem versus luteo rubrovittato atque infructescentia capusulisque dense pubescentibus distinguitur.

Herb 2–3 m tall. Leaves with the petiole lacking or to 1 cm; blades oblong to oblong-lanceolate, 30–60 × 7–15 cm, apex acuminate to obtuse, base cuneate, glabrous on adaxial surface, pubescent on abaxial surface, margins hirsute, midrib tomentulose abaxially; ligule ca. 1 cm, entire or bilobed, membranous, outer surface and margin tomentose. Inflorescence a terminal pendulous thyrse, 15–30 cm, the peduncle puberulent; lower branches ca. 0.5 cm, with 1 or 2 flowers, upper branches with 1 flower; bracts 1 or 2, deciduous. Flowers pedicellate on upper branches; bracteole pinkish white, 1–1.5 cm, glabrous except apically pubescent, deciduous; calyx tubular, pinkish white, pubescent, ca. 1.5 cm, shallowly 3-lobed, deeply split unilaterally; corolla white, glabrous, sympetalous, 3-lobed, the dorsal lobe oblong, ca. 4 × 2 cm, lateral lobes 2, basally 1/3 connate, oblong, ca. 3 × 1.2 cm; labellum ca. 3.5 × 2.5 cm, convolute, white toward base, yellow with red stripes toward apex with a blotch of red in between; staminodes obtuse, inconspicuous; stamen 1, anther ca. 1 cm, filament ca. 1.5 cm; stigma expanded, pubescent, style slender, ca. 3 cm, glabrous; epigynous glands 2, at style base, brown, ca. 2 mm; ovary green, densely pubescent. Infructescences densely pubescent, with the lower pedicels 0.5–1 cm; fruit capsular, red at maturity, ridged, densely brown pubescent, ellipsoid; seeds 15 to 30, angled; aril white, membranous.

Distribution and habitat. *Alpinia oui* is endemic to Yaoshan, Taimali township, Taitung County, Taiwan, and is found along semi-shaded forest margins at elevations of 500–600 m.

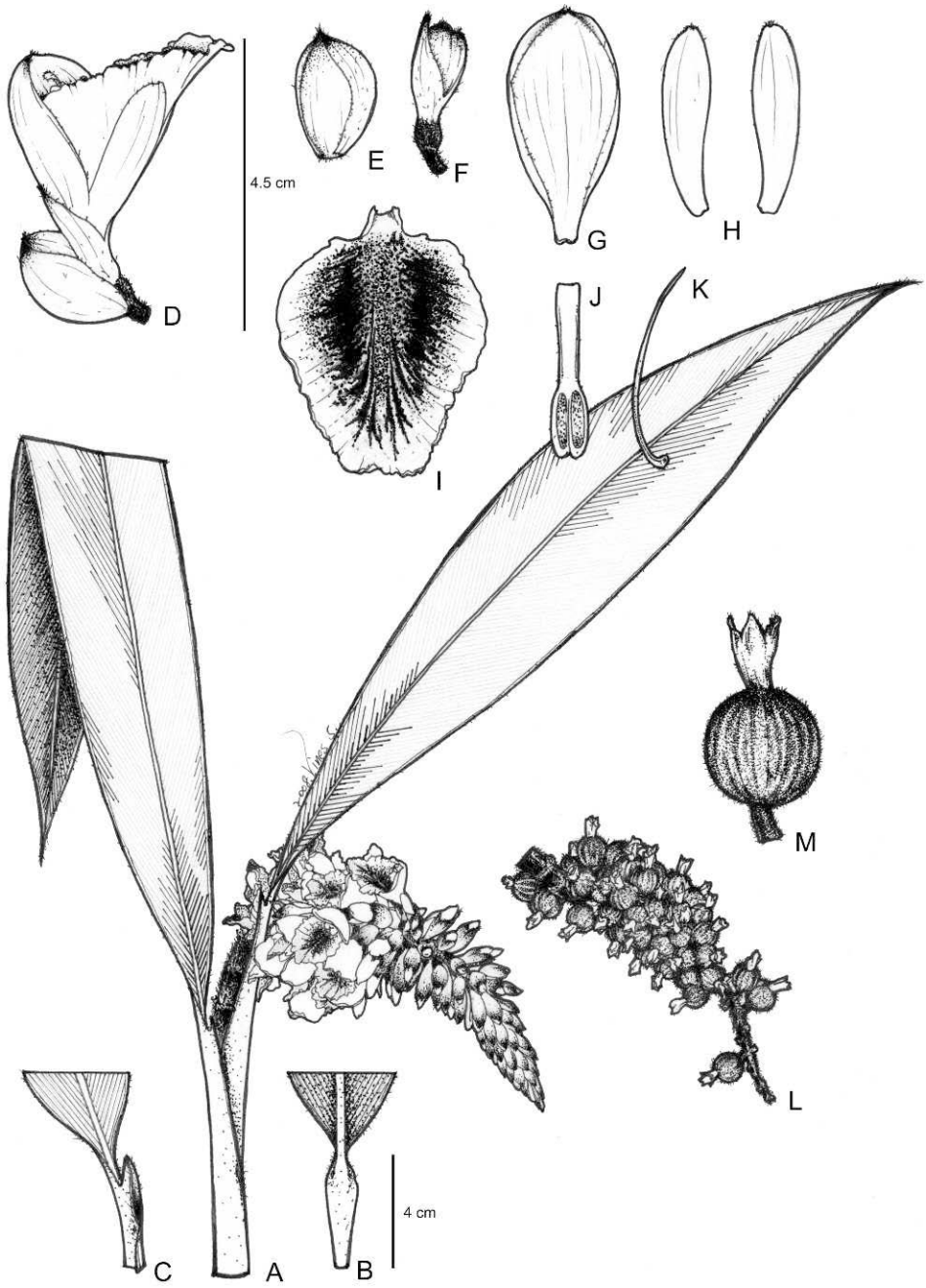

Figure 1. *Alpinia oui* Y. H. Tseng & Chih C. Wang. —A. Flowering pseudostem. —B. Leaf sheath, abaxial view. —C. Leaf sheath, lateral view. —D. Flower, lateral view. —E. Bracteole. —F. Flower petals, pistil, and stamens removed to show calyx tube. —G. Dorsal lobe of corolla. —H. Lateral lobes of corolla. —I. Labellum. —J. Stamen. —K. Style and stigma. —L. Infructescence. —M. Individual capsule, showing the villous pubescence. A–M drawn from the type *Tseng 4204*.

IUCN Red List category. According to IUCN Red List criteria (IUCN, 2008), *Alpinia oui* is treated here as Vulnerable (VU D1), with D1 indicating that the wild populations are small, with less than 1000 individuals, and are so far known from only one locality from southeastern Taiwan.

Phenology. Flowers of the new species were collected from April to June.

Table 1. Comparison of diagnostic characters of *Alpinia oui* and related species.

	A. oui	*A. zerumbet*	*A. shimadae* var. *kawakamii*
Leaf texture	herbaceous	herbaceous	herbaceous
Leaf adaxial surface	glabrous	glabrous	glabrous
Leaf abaxial surface	pubescent	glabrous	densely pubescent
Inflorescence	thyrse pendulous, densely flowered	thyrse pendulous, sparsely flowered	spike, erect
Labellum	white toward base, yellow with red stripes toward apex with a blotch of red in between	yellow with red stripes toward apex	white with red stripes toward apex
Length of infructescence pedicels	0.5–1 cm	1.5–2.5 cm	0.1–0.5 cm
Capsules	pubescent	sparsely hairy	pubescent

Etymology. The specific epithet honors Chern-Hsiung Ou, the mentor of the authors, of the Department of Forestry, National Chung Hsing University, for his contributions to the plant taxonomy and dendrology of Taiwan.

Discussion. *Alpinia oui* closely resembles *A. zerumbet* (Pers.) B. L. Burtt & R. M. Sm., but it is distinct in having denser thyrses; the labellum of the flower white toward the base, yellow with red stripes toward the apex with a blotch of red in between (vs. the labellum yellow with red stripes toward the apex in *A. zerumbet*); the lower infructescence pedicels ranging from 0.5–1 cm (vs. longer, 1.5–2.5 cm); and densely pubescent capsules (vs. sparsely hairy capsules). The two species occupy different ecological niches. *Alpinia oui* is a rare species restricted to semi-shaded forest margins at altitudes of ca. 550 m in southeastern Taiwan. *Alpinia zerumbet*, on the other hand, is more widespread in Taiwan, ranging from semi-shaded forest margins to fully exposed grasslands, and has been collected from sea level to 1500 m in elevation. *Alpinia oui* is also very similar to *A. shimadae* Hayata var. *kawakamii* (Hayata) Jeng J. Yang & J. C. Wang, but it can be distinguished by having pendulous inflorescences (vs. erect in *A. shimadae* var. *kawakamii*); different coloration and patterning of the labellum (white toward the base, yellow with red stripes toward the apex with a blotch of red in between vs. white with red stripes toward the apex); and infructescence pedicels 0.5–1 cm (vs. shorter, 0.1–0.5 cm). Diagnostic characters of the three species are compared in Table 1.

In this paper, 18 taxa of *Alpinia* are recognized in Taiwan and are included in the following key. All of these belong to *Alpinia* subg. *Alpinia* sect. *Alpinia*, but range among the four subsections: *Presleia* (Valeton) R. M. Sm., *Alpinia*, *Catimbium* (Horan.) R. M. Sm., and *Cenolophon* (Blume) R. M. Sm. We classify the new species *A. oui* in subsection *Catimbium* because of its large bracts that completely enclose the flower, its large buds and flowers, and the thyrse inflorescences.

Key to Species of *Alpinia* in Taiwan

1. Inflorescences pendulous 2
1′. Inflorescences erect 3
2. Thyrses densely flowered; labellum white toward the base, yellow with red stripes toward the apex with a blotch of red in between; infructescences densely pubescent; lower pedicels 0.5–1 cm; capsules densely pubescent..... *A. oui* Y. H. Tseng & Chih C. Wang
2′. Thyrses sparsely flowered; labellum yellow with red stripes toward the apex; infructescences sparsely hairy to glabrous; lower pedicels 1.5–2.5 cm; capsules sparsely hairy..... *A. zerumbet* (Pers.) B. L. Burtt & R. M. Sm.
3. Inflorescences curved and ascending 4
3′. Inflorescences not curved and ascending 5
4. Labellum white-yellow with red stripes ..... *A. mesanthera* Hayata
4′. Labellum deep yellow with red stripes..... *A. tonrokuensis* Hayata
5. Inflorescences branched, usually with 2 or 3 ascending lateral axes; the labellum smaller than corolla lobes ..... *A. flabellata* Ridl.
5′. Inflorescences unbranched, only a single central axis; labellum larger than corolla lobes 6
6. Labellum deeply bilobed at apex; corolla lobes revolute ..... *A. galanga* (L.) Willd.
6′. Labellum entire or slightly bilobed at apex; corolla lobes not revolute 7
7. Labellum spread completely at anthesis 8
7′. Labellum not spread completely at anthesis 9
8. Labellum white-yellow, with red stripes; capsules conical, with rims ..... *A. formosana* K. Schum.
8′. Labellum white, with red stripes; capsules globose, without rims ..... *A. intermedia* Gagnep.
9. Labellum yellow, with red stripes 10
9′. Labellum white, with red stripes 12
10. Labellum milky yellow with red stripes; fruits pubescent, repressed globose, red at maturity.. ..... *A. kusshakuensis* Hayata
10′. Labellum deep yellow, with red stripes 11
11. Fertile peduncle, rachis, and pedicel pubescent; pedicels 0.2–0.5 cm; fruit pubescent, without ridges, orange at maturity ..... *A. uraiensis* Hayata

11′. Fertile peduncle, rachis, and pedicel glabrous; pedicels 1–2 cm; fruit glabrous, ridged, red at maturity ..... *A. koshunensis* Hayata
12. Bracteole absent 13
12′. Bracteole present 14
13. Leaves glabrous on both surfaces, except on margins and the lower midrib; mature fruits with many rims, sparsely hairy .... *A. pricei* Hayata var. *pricei*
13′. Leaves glabrous on adaxial surface, densely pubescent abaxially; mature fruits with 1 or 2 rims, pubescent..... *A. shimadae* var. *kawakamii* (Hayata) Jeng J. Yang & J. C. Wang
14. Bracteole small, < 0.5 cm, inconspicuous, deciduous; ovary visible and conspicuous 15
14′. Bracteole conspicuous, > 1 cm, persistent or deciduous; ovary concealed by bracteole 16
15. Labellum with the apex 2-lobed or emarginate, 1–1.2 × 0.9–1.1 cm, with red stripes extending to labellar margin ..... *A. japonica* (Thunb.) Miq.
15′. Labellum apex emarginate or rounded, 1.4–1.8 × 1.2–1.5 cm, with red stripes not reaching the labellar margins..... ..... *A.* ×*ilanensis* S. C. Liu & J. C. Wang
16. Bracteole tuberous, usually present on the calyx tube of mature fruits .... *A. nantoensis* F. Y. Lu & Y. W. Kuo
16′. Bracteole not tuberous 17
17. Bracteole length longer than calyx, persistent on mature infructescences ..... *A. pricei* var. *sessiliflora* (Kitam.) Jeng J. Yang & J. C. Wang
17′. Bracteole length shorter than calyx, most deciduous at anthesis, with a few persistent on mature infructescences .... *A. shimadae* Hayata var. *shimadae*

Paratypes. TAIWAN. **Taitung Co.:** Taimali Township, Yaoshan, en route on semi-shaded forest margins, 25 Apr. 2008, *Yen-Hsueh Tseng 4208* (TCF), 6 July 2008, *Chih-Chiang Wang s.n.* (TCF).

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