**ETLINGERA COMOSA, A NEW SPECIES (ZINGIBERACEAE: ALPINIOIDEAE) FROM CENTRAL SULAWESI**

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**ABSTRACT**

ARDIYANI, M., ARDI, W. H., HUTABARAT, P. W. K. & POULSEN, A. D. 2021. *Etlingera comosa*, a new species (Zingiberaceae: Alpinioideae) from Central Sulawesi. *Reinwardtia* 20(2): 63–68. — *Etlingera comosa* Ardiyani & Ardi, a new and unusual species from Tentena, Central Sulawesi exhibiting terrestrial as well as epiphytic habit is described here. It is compared to the morphologically closest *Etlingera sublimata* A.D.Poulsen, but differs in having tufted sheath, bilobed and asymmetric ligule, loose peduncular bracts, densely pubescent fertile bracts and longer filament. Colour plates, notes on its conservation status and DNA barcode data for the new species are also provided.

**Key words:** Acanthodes group, DNA barcode, epiphytic, *Etlingera sublimata*, Indonesia, Zingiberales.

**INTRODUCTION**

*Etlingera* Giseke (Zingiberaceae) is a genus with more than 100 species worldwide. The number of species have increased significantly in recent years, especially in Sulawesi, Indonesia, as more explorations of the island were done. The genus is distributed from India, Indo-China throughout Malesia to the Pacific Islands (Poulsen, 2012; Poulsen & Docot, 2018). A revision of the genus was carried out by Poulsen for *Etlingera* of Borneo (Poulsen, 2006), Java (Poulsen, 2007) and Sulawesi (Poulsen, 2012). Poulsen (2012) included 46 species of *Etlingera* in Sulawesi. Seven years later, a new species, *E. mamasarum* A.D.Poulsen & Ardiyani, was discovered from Mamasa, West Sulawesi (Ardiyani & Poulsen, 2019). The following year, *Etlingera tjiasmantoi* Ardiyani & Ardi was found in Central Sulawesi (Ardiyani et al., 2020). Thus, 48 species of *Etlingera* are currently known in Sulawesi.
During the expedition carried out in early 2020 by the first three authors to Central Sulawesi an interesting species of *Etlingera* was found on mossy logs and epiphytically on a tree trunk. At first, this looked very similar to *E. sublimata*, but a more thorough examinations revealed that it differs from it in several important characters, and furthermore does not match any other *Etlingera* species. Therefore, it is here described as a new species. A colour plate, notes on its conservation status and the DNA barcode of this new species are provided.

**MATERIALS AND METHODS**

The fieldwork was carried out in March 2020 in Central Sulawesi. The locality can be seen in Fig. 1. Herbarium specimens were prepared in the field including pickling flowers and inflorescence in 70% alcohol and photos of the floral dissection. Leaf tissue material was dried in silica gel for the purpose of molecular analyses (Wilkie et al., 2013). Morphological characters were noted from the living plant in the wild as well as from the herbarium specimens in BO. Measurements were made using a ruler and a calibrated eyepiece under a dissecting microscope. DNA barcoding was done using rbcL, matK, the Intergenic Spacers between trnH and psbA (Kress & Erickson, 2007), and the Internal Transcribed Spacers (ITS) (Kress et al., 2005). The barcode protocols followed Kress & Erickson (2012). DNA sequencing was done in the 1stBase company, and the sequences obtained were deposited in the NCBI GenBank (Table 2).

**RESULTS AND DISCUSSION**

*Etlingera comosa* Ardiyani & Ardi spec. nov. Fig. 2. — TYPE: INDONESIA, Central Sulawesi Province, Tentena Regency, roadside between Tentena and Bada, elevation 1,700 m, 01.80429S, 120.47046E, flowering and fruiting, 7 March 2020, M. Ardiyani, Wisnu H. Ardi, Prima Hutabarat, Zulfadli, Roland Putra, Ofin MAR1004 (Holotype BO!).

Similar to *Etlingera sublimata* A.D.Poulsen by the spiny bracts and thecae dehiscent through their entire length but *E. comosa* differs from *E. sublimata* in having tufted sheath (vs. not tufted), bilobed, asymmetric ligule (vs. entire), peduncular bracts only loosely enclosing base of spike and partly exposed the axis (vs. peduncular bracts...
Fig. 2. *Etlingera comosa* Ardiyani & Ardi spec. nov. A. Habit. B. Pseudostem, ligule and petiole. C. Leaves (upper surface). D. Inflorescence with three freshly opened flowers (semi-lateral view). E. Base of leafy shoot and inflorescence arising from the rhizome. F. Sterile bracts. G. Fertile bract, bracteole and flower. H. Flower. I. Bracteole. J. Calyx. K. Flower with bracteole and calyx removed. L. Flower with calyx, corolla lobes and labellum removed. M. Labellum. N. Corolla lobes. O. Ovary, epigynous glands, style and stigma. P. Filament, anther and part of staminal tube (lateral view). From M. Ardiyani et al. 1004. Photos by Marlina Ardiyani & Wisnu H. Ardi.
Terrestrial or epiphytic herb. Rhizome 0.5 cm diam. when dried, densely pubescent, green, scales 1.3–2.8 cm long, velvety; stilt roots 3 mm diameter when dried, brown, raising the rhizome to about 25 cm above ground. Leafy shoots to 70 cm long, 15–20 cm apart; base to 1.5 cm diameter, light green covered with dry scales; sheath greenish yellow with brown margin, tufted, margin fimbriate; ligule 3–4 mm long, bilobed, asymmetric, greenish yellow with brown dry edge, puberulous, margin ciliate; petiole 2–4 mm long, yellowish green, puberulous, some tufted; lamina 15–19 × 2.7–3.3 cm, length to width ratio 5.6–5.7, dark green above, light green with reddish brown tinge beneath, glabrous above and beneath, midrib puberulous beneath; base cuneate; apex acute, green, densely pubescent, enclosing base of spike, peduncle axis not exposed, fertile bracts densely pubescent (vs. glabrous with ciliate margin), longer stamen (9 mm vs. 5 mm), longer filament (3.5–4.5 mm vs. 0.5 mm) and shorter anther (4 mm vs. 5–5.5 mm).

Notes

Conservation status. This species is currently only known from the type locality, which is not in a conserved area and close to the main road between Tentena and Bada. There is a possibility that the population will decline in the future if the area is not conserved. The conservation status is therefore tentatively assigned as Vulnerable D2 (IUCN, 2021).

Etymology. The epithet comosa refers to the tufted hairs of the sheath.

Phenology. Flowering in March.

Local name & uses. Not available.

Distribution. Only known from the type locality in Tentena, Central Sulawesi, Indonesia.

Habitat. Slopes in secondary, upper montane, very humid forest with open canopy less than 10 m. Most tree trunks were covered with mosses, open areas with many ferns and ericaceous shrubs, such as species of Rhododendron, Vaccinium and Gaultheria.

Etlingera comosa was quite common in this vegetation and many individuals were encountered (in one spot > 25, including juveniles) most of which grew on moss-covered dead tree trunks, or on bases of trees. The single flowering individual found was epiphytic. In this moist and open forest type, it is not surprising to see species occurring both terrestrially and as epiphytes.
Table 1. Morphological characters of *Etlingera sublimata* and *E. comosa*.

| No | Characters                  | *Etlingera sublimata* (Poulsen 2012) | *Etlingera comosa* |
|----|-----------------------------|------------------------------------|-------------------|
| 1  | Indumentum of sheath        | Puberulous                         | Tufted            |
| 2  | Ligule shape                | Entire                             | Bilobed, asymmetric |
| 3  | Petiole length              | Sessile                            | 2–4 mm            |
| 4  | Position of peduncular bracts| Enclosing base of spike, uppermost the longest; imbricate, peduncle not exposed | Not fully enclosing base of spike; loose, peduncle is partly exposed |
| 5  | Colour of peduncular bracts | Pale brown                         |                   |
| 6  | Indumentum of fertile bracts| Glabrous, margin ciliate           | Densely pubescent, margin ciliate |
| 7  | Stamen length (mm)          | 5                                  | 9                 |
| 8  | Filament dimensions (mm) size| $0.5 \times 2–2.5$ mm              | $3.5–4.5 \times 2$ mm |
| 9  | Anther dimensions (mm)      | $5–5.5 \times 2.3–3$ mm            | $4 \times 2$ mm   |

Table 2. DNA barcoding of *Etlingera comosa*

| Species          | NCBI GenBank Accession No. |
|------------------|----------------------------|
|                  | *rbcL* | *ITS* | *trnH-psbA* | *matK* |
| *Etlingera comosa* | OL631135 | OL711629 | OL752579 | OL770275 |
Sulawesi (Poulsen, 2012). Of these, the following species have spiny bracts: *Etlingera acanthodes* A.D.Poulsen, *E. chlorodonta* A.D.Poulsen, *E. doliiformis* A.D.Poulsen, *E. mucronata* A.D.Poulsen, *E. spinulosa* A.D.Poulsen and *E. sublimata* A.D.Poulsen. The latter is most similar, but *E. comosa* differs from it by the striking tufted indumentum on the sheath, the hairy bracts, ligule shape, stamen length as well as other morphological differences (Table 1).

The original description of *E. sublimata* mentions the tessellate pattern of the leaf sheath but omitted that the sheath is more or less uniformly puberulous, which is clearly observed on the neotype (*Poulsen et al. 2647, BO!, E!). It is, in any case, strikingly different to the tufted sheath of *E. comosa*. This character has, however, also been described in other species of the Acanthodes Group, such as *E. spinulosa* and *E. steringophora*. *Etlingera comosa* is morphologically dissimilar to these species and can be distinguished by multiple characters such as the bilobed and asymmetric ligule with puberulous hairs vs 19–21 mm, emarginate ligule with vilose hairs (*E. steringophora*) and 22–26 mm long, inflated, bilobed ligule and laterally extended to clasp the pseudostem (*E. spinulosa*); smaller lamina (15–19 × 2.7–3.3 cm) vs. 35–35 × 4.5–6 cm in *E. steringophora* and 63 × 16 cm in *E. spinulosa*). The shape of fertile bract and anther size are further differences. In *E. comosa*, the fertile bracts are obovate with aristate apex vs. broadly spatulate with mucronate apex (*E. steringophora*) and ovate with long acute apex (*E. spinulosa*). The *E. comosa* anther size is ca. 4 × 2 mm, while it is 6 × 3 mm in *E. spinulosa* and 5.5 × 3 mm in *E. steringophora*.

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