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A NEW SPECIES OF ZINGIBER (ZINGIBERACEAE) FROM ENGGANO ISLAND, INDONESIA

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ABSTRACT
ARDIYANI, M. 2015. — A new species of Zingiber (Zingiberaceae) from Enggano Island, Indonesia. Reinwardtia 14 (2): 307 – 310. — A species of Zingiber Miller (Zingiberaceae), Z. engganoensis Ardiyani, from Enggano Island, Indonesia is described. The species is only known from its type locality. It is similar to Z. spectabile Griff. but with some morphological differences. Three-loci DNA barcodes (rbcL, matK and ITS2) of the new species were generated for its identification purposes.

Key Words: DNA barcode, Enggano Island, Zingiber, Zingiberaceae.

INTRODUCTION

In 1936, a Dutch botanist, Wilhelm Jan Lütjeharms did a botanical collection on Enggano Island (van Steenis, 1950), located ca. 100 km southwest of Bengkulu, Sumatra, Indonesia. Studying the geological history of this island revealed that it was never connected to Sumatra, hence its flora is most likely unique. Lütjeharms only recorded Etlingera hemisphaerica (Blume) R.M. Sm., but no Zingiber. In the intervening years, no further collections have been done on the Island. Recently, a group of researchers from Research Center for Biology, the Indonesian Institute of Sciences revisited Enggano Island. The expedition managed to collect one species of Zingiber which morphologically resembled Z. spectabile. Nevertheless, close morphological examination reveal the taxon to be different from Z. spectabile.

MATERIALS AND METHODS

The morphology of the new species was described from living plants collected in the field. Detailed morphological measurements were made using ruler and a calibrated eye piece under a dissecting microscope. The holotype was obtained from the living plants growing in the field.

DNA extraction, amplification and sequencing were carried out for three barcoding regions of rbcL and matK, and the nuclear Internal Transcribed Spacer 2 (ITS2). DNA amplification was performed using published primers under standard conditions (see Kress and Erickson, 2007). GenBank accession numbers for the three barcoding regions are summarized in Table 2.

SPECIES DESCRIPTION

Zingiber engganoensis Ardiyani, spec. nov. Fig. 1, Plate 1. — Type: Indonesia, Bengkulu Province, Enggano Island, Jangkar River, 17 m, 5°21'37"S, 102°16'57"E, 25 April 2015, M. Ardiyani, W. Wardani & D. Rosalina, Enggano190 (holo: BO).

Zingiber engganoensis differs from Zingiber spectabile in its thin, and plicate leaves, glaucous leaf underside, structure of labellum which narrows towards the base, rounded and emarginate at the apex, and separated from the lateral staminodes. Leafy shoot to 5 m tall, not clumping, with ± 25 leaves; base light green, pubescent, 3 cm in diameter. Rhizome light brown externally, cream internally, with a few tubercles. Tubercle narrow elliptic, cream to light brown externally, cream internally. Leaf sheath covered with pubescent light red scales. Ligule bilobed and split to the base, apex acute-round, 0.5–1.7 × 1.2–1.3 cm, pubescent, light green, thin, papery in dried specimen. Petiole swollen, tilted to left or right 45°, light green, pubescent. Leaves linear-elliptic towards basal, linear-lanceolate towards terminal, 18.5 × 3.5 to 46 × 9.5 cm, pubescent, light green above, glaucous underside, base obtuse-round, oblique, apex acuminate-caudate (cauda 1–1.5 cm long), plicate (seen as thick lines in dried specimen), thin (papery in dried specimen). Inflorescence radical, attached...
to the base of the leafy shoot, erect, 40.5–49.5 cm long. Scape covered by up to 10 pubescent scales, 35–40 cm long, 2–2.5 cm diameter, pubescent, light green; scales overlapped but free, getting broader towards terminal, 2–5 cm long, light red, with dark brown longitudinal stripes in dried specimen. Spike cylindrical and tapering towards terminal, 13.5–18 × 4–4.5 cm, composed of overlapped, spirally arranged bracts. Bracts ovate with truncate apex, 2.9–3.5 × 3.1–3.5 cm, pubescent, bright red, getting white towards the base, with yellow-brown lines and black-dotted edge in spirit material, apex curled inward (curly part 2–2.5 mm long). Bracteoles cylindrical, split to the base, apex acute, cucullate, 3.6–4 × 0.5 cm, red, getting white towards the base, 3–5 mm top part protruding beyond the edge of the bracts. Calyx teethed, deeply split in one side, 1.6–1.7 × 1.3 cm, white transparent. Corolla total length 5.7 cm, cream white with reddish-brown tinge, with black-dotted edge and black lines in spirit material; dorsal lobe boat-shaped, elliptic, apex acute, slightly cucullate, 2.4–2.7 × 1 cm; lateral staminodes lobes linear-lanceolate, 2.3–2.4 × 5–6 mm. Labellum narrow at the base, getting broader towards the emarginate apex, 2.2 × 1.1 cm, reddish-brown with cream blotch; side lobes lanceolate, deeply incised, 14–16 × 4–5 mm, reddish-brown with cream dots. Anther bent ± 50°, 14 × 4 mm, 2 mm thick, yellow. Anther crest with S-shaped tip, 1.4 cm long, yellow. Stigma cup-shaped with fimbriate edge, white transparent. Ovary 5 × 4.5 mm, cream. Styles 2, subulate with acute apex, 9 × 1 mm, white. Fruit round, with cream-white calyx remnant, 1.6 × 1 cm, red, getting white towards the base. Locule contains 4 seeds, 1.4 × 7 mm. Seed oval, 8 × 4.5 mm, black, covered with white aril.

Distribution. At present this species is known only from the type locality.

Habitat. Grows in secondary forest along the steep river bank on thin soil over coral.

| Table 1. Comparison of morphological characters of Z. engganoensis Ardiana and Z. spectabile |
|---------------------------|-----------------------------|-----------------------------|
| Habit                     | Z. engganoensis Ardiana     | Z. spectabile               |
| Ligule                    | Non-clumping                | Clumping                    |
| Petiole                   | Bilobed, split to the base with rounded apex | Entire                      |
| Leaf colour               | Light green with no clear greenish-white midrib above | Dark green with clear greenish-white midrib above |
| Leaf coating              | Glaucous underside          | Glaucous                    |
| Leaf shape                | Linear-elliptic to linear-lanceolate with obtuse-round base and acuminate-caudate apex | Linear-lanceolate with obtuse-round base and acuminate apex |
| Leaf surface              | Plicate, thin               | Non-plicate, thick          |
| Flower labellum           | Narrow at the base with rounded and emarginate apex | Broad at the base, getting narrow towards the apex with deeply incised side lobes |
| Lateral staminodes        | Separated from labellum     | Joined with the labellum    |
Table 2. Voucher information and Genbank accession numbers for *Zingiber engganoensis*

<table>
<thead>
<tr>
<th>Species</th>
<th>Gene region</th>
<th>Genbank accession number</th>
<th>Voucher (Herbarium location)</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>Zingiber engganoensis</em></td>
<td><em>rbcL</em></td>
<td>KT026199</td>
<td>Enggano190 (BO)</td>
</tr>
<tr>
<td></td>
<td><em>matK</em></td>
<td>KT026200</td>
<td>Enggano190 (BO)</td>
</tr>
<tr>
<td></td>
<td><em>ITS2</em></td>
<td>KT026201</td>
<td>Enggano190 (BO)</td>
</tr>
</tbody>
</table>

Fig. 1. Line drawing of *Zingiber engganoensis* Ardiyani. A. Leaves B. Swollen petiole and split ligule C. Leafy shoot, inflorescence peduncle and root system D. Inflorescence E. A single flower sits on the bract F. Bract and bracteole G. Whole flower H. Flower with labellum and lateral staminodes removed I. Calyx J. Calyx spread up K. Ovary longitudinal section with stylodes L. Ovary cross section M & N. Anther and appendage O. S-shaped appendage and pistillum P. Fruit Q. Locule containing seeds R. Individual seed covered with arils. (Line drawing by Marlina Ardiyani).
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Map/line drawing illustration/photograph. Map, line drawing illustration, or photograph preferably should be prepared in landscape presentation to occupy two columns. Illustration must be submitted as original art accompanying, but separated from the manuscript. The illustration should be saved in JPG or GIF format at least 350 pixels. Legends or illustration must be submitted separately at the end of the manuscript.

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