



# *Amorphophallus kienluongensis* (Araceae), a new species from the Mekong Delta, Southern Vietnam

V.D. Nguyen<sup>1</sup>, H.T. Luu<sup>2</sup>, Q.D. Nguyen<sup>2</sup>, W.L.A. Hetterscheid<sup>3</sup>

## Key words

*Amorphophallus*  
Araceae  
Mekong  
new species  
taxonomy  
Vietnam

**Abstract** *Amorphophallus kienluongensis* is described as a new species from southern Vietnam. It is morphologically close to *A. brevispathus* Gagnep. (Thailand) and *A. prolificus* Hett. & A. Galloway (Thailand). However, it differs from both these species by a stigma with a central depression and an obconic male portion. So far *A. kienluongensis* is known only from the Kien Luong district of the Kien Giang province, southern Vietnam. The plant grows on limestone hills where its habitat is under threat owing to quarrying for cement manufacture. Therefore this species could be ranked as CR ('critically endangered') in the IUCN ranking.

**Published on** 8 January 2016

## INTRODUCTION

The genus *Amorphophallus* includes c. 200 species (Sedayu et al. 2010, Hetterscheid et al. 2012) distributed throughout tropical Africa and Asia with one species in N Australia (Sedayu et al. 2010). Most species are adapted to life in tropical humid forests, seasonal forests, and grass savannahs, often on slopes, in forest margins, secondary forest. Many species are adapted to humus pockets on limestone.

During a field trip at Chua Hang Hill in 2009, the first author collected the new species in leaf. Later Dr Luu Hong Truong and his colleague Nguyen Quoc Dat found the species flowering at Hang Tien and Khoe La Hills in the Kien Luong district of the Kien Giang province. Herbarium specimens were sent to the first author for identification as well as several pictures to the third author. It was recognized as an undescribed species and the proposed name is *A. kienluongensis*. It is morphologically close to *A. brevispathus* (Gagnepain 1941) from Thailand in having a very short spathe relative to the spadix and the male flowers in clusters of more than 6. However, *A. brevispathus* is distinguished e.g. by a very irregularly shaped tuber with numerous thick, long rhizomatous offsets and stigma diameter smaller than the ovary. In this paper, the new species is described, with its distribution, ecology, biology, and conservation status.

## DESCRIPTION

***Amorphophallus kienluongensis*** V.D. Nguyen, Luu & Hett.,  
*sp. nov.* — Fig. 1

**Diagnosis:** *Amorphophallus kienluongensis* resembles *A. brevispathus* in having a spathe shorter than the spadix and the male flowers clustered in groups of 6 or more. It differs from *A. brevispathus* in the stigma diameter exceeding that of the ovary and in having a tuber without long rhizomatous offsets.

*Type.* Nguyen Quoc Dat & Luu Hong Truong, KG008 (holotype SGN), KG 001 (paratype VNMN, leaf), KG002 (paratype VNMN, inflorescence), KG003 (paratype L, leaf), KG004 (paratype L, inflorescence), KG 010 (paratype HN), Viet Nam, Kien Giang Province, Kien Luong District, Ba Tai Hill, 2 June 2011; KG008 (paratype HN, leaf collected from the type-plant in cultivation, 2012).

*Etymology.* The species epithet *kienluongensis* is derived from the name of the Kien Luong district of the Kien Giang province, Vietnam.

Seasonally dormant, tuberous herb, 20–50 cm tall. *Tuber* globose or slightly elongate, producing depressed globose offsets, 3.5–7 cm long, 2–6 cm thick; flesh white. *Leaf* solitary. *Petiole* cylindrical, 24–90 cm long, 1–2.6 cm diam at base, smooth, light green or dull brownish green. *Lamina* moderately decompose, 20–55 cm diam. *Leaflets* elliptical, elongate obovate, or lanceolate, 6–18 cm long, 3–5 cm across at the widest point, base attenuated, oblique, acute, or acuminate, acumen 1.5–2 mm long, upper surface medium to dark green, glossy; lateral veins abundant, prominent on the lower surface, distance 6–7 mm between veins, sometimes with intermediate veins; collective vein 2–4 mm distant from margin. *Inflorescence* appearing without the leaves. *Peduncle* 15–45 cm, 0.7–2 cm diam at base, smooth, light green. *Spathe* considerably shorter than spadix, broadly triangular, 3.5–7 cm long, 5–9 cm wide at the base, enclosing the entire fertile part of the spadix, base strongly convolute, whitish green on both surfaces, slightly darker green at the base, inside surface with a prominent wax layer. *Spadix* much exceeding spathe, sessile, 10–15 cm long; female portion slightly obconic, 1.3–1.5 cm long, 1–1.2 cm diam at the base, 1.3–1.5 cm diam at the apex, ovaries distant; male portion obconic, 4.0–5.4 cm long, 1.5 cm diam at the base, 2.4 cm diam at the apex; appendix elongate-conic, 6–11 cm long, 2–3 cm diam at the base, top acute or obtuse, surface smooth, off-white. *Ovary* globose, pale green, unilocular, 1 mm high, 2 mm diam, ovule solitary, basifix; style prominent, thick, whitish green, 1 mm long; stigma 1.2–2.2 mm diam, wider than ovary, dirty whitish, disciform with a concave depression, slightly lobed, surface uneven. *Male flowers* consisting of 3–5 stamens but flowers from the base to the top of the male zone increasingly clustered to form groups with 8 or more stamens; stamens 0.8–1.5 mm long, 1.5–3 mm diam; filaments very short, 0.2–0.4 mm long; anthers truncate, 1 mm long, yellow, connective very thin, rupturing fully at male anthesis to create a single common pore. *Infructescence* slightly elongate, ob-

<sup>1</sup> Institute of Ecology and Biological Resources – Vietnam Academy of Science and Technology, 18 Hoang Quoc Viet road, Nghia Do, Cau Giay, Hanoi, Vietnam; corresponding author e-mail: vandu178@yahoo.com.

<sup>2</sup> Southern Institute of Ecology – Vietnam Academy of Science and Technology, 1 Mac Dinh Chi, District 1, Ho Chi Minh City, Vietnam; e-mail: hongtruongluu@yahoo.com.

<sup>3</sup> Von Gimbom Arboretum, Velperengh 13, 3941 BZ Doorn, The Netherlands; e-mail: hetter@xs4all.nl.



**Fig. 1** *Amorphophallus kienluongensis* V.D. Nguyen, Luu & Hett. a. Habitat and habit with mature leaves; b. habitat and habit with seedling and more mature leaves; c. inflorescence; d. spadix exposed; e. ovary and stamens; f. infructescence with mature fruits; g. fruit in longitudinal and cross section. — Scale bar = 1 cm.

conical, to 7 cm long and 2 cm diam at the base and 3 cm at the apex, berries lax, 1.6–2.0 by 1.0–1.4 cm, elongate ovate, shiny dark blue when mature.

**Distribution** — Only known from the Kien Luong Karst system, Kien Giang Province, Mekong Delta, southern Vietnam.

**Ecology** — Coastal forests on karst limestone, 5–50 m altitude. Flowering in June and fruiting in September.

**Conservation status** — *Amorphophallus kienluongensis* is known to occur only on several small adjacent isolated limestone hills including Khoe La, Hang Tien, Chua Hang, and Ba Tai in the Kien Luong district. Khoe La is quarried for cement manufacture, and it is foreseen it will be destroyed within the next years. The area in which the species grows is less than 3 km<sup>2</sup> and combined with threats from quarrying the species is recommended to be ranked as globally Critically Endangered (CR) according to the IUCN Red List criteria (v. 2.3) (<http://www.iucnredlist.org>).

**Specimens studied.** *Nguyen Van Du s.n.*, Viet Nam, Kien Giang province, Kien Luong district, Chua Hang, 29 Nov. 2009 (HN, leaf); *Luu Hong Truong KG250* (SGN, inflorescence), Hang Tien, Kien Luong distr.; *Luu Hong Truong KG251* (SGN, inflorescence), *KG252* (SGN, leaf), Khoe La, Kien Luong distr., 17 June 2010; *Nguyen Quoc Dat & Luu Hong Truong, KG005* (SGN, inflorescence), *KG 006* (SGN, leaf), *KG007* (SGN, leaf), *KG 008* (SGN, inflorescence), *KG009* (HN, inflorescence) and *KG011* (SGN, leaf), Viet Nam, Kien Giang province, Kien Luong district, Chua Hang, 2 June 2009.

**Notes** — The combination of characters in *A. kienluongensis* of male flowers in large groups, a rupturing connective, and berries ripening blue suggests the species to be a member of a subclade of five other species with this same unique character combination: *A. atrorubens* Hett. & Sizemore (Hetterscheid & Van der Ham 2001, Thailand), *A. brevispathus* (Thailand), *A. gallowayi* Hett. (Hetterscheid 2006, Thailand), *A. interruptus* Engl. & Gehrm. (Engler 1911, N Vietnam), and *A. prolificus* (Hetterscheid 2006, Thailand). Sedayu et al. (2010: 482, f. 3) failed to resolve these species as a monophyletic group although only two species (*A. brevispathus* and *A. interruptus*) were included. As yet unpublished molecular phylogenetic information based on 130 species, resolved the above listed species as a monophyletic group with full statistical support (Bayesian post. prob. = 1).

**Acknowledgements** The first author would like to thank the NGS for support through grant no. 904011 and from NAFOSTED through grant no. 106.11.38.09 for his studies of *Araceae* in Vietnam. The field trips by Luu Hong Truong and Nguyen Quoc Dat were supported by project 09-92488-000-GSS funded by the John D. and Catherine T. MacArthur Foundation.

## REFERENCES

- Engler A. 1911. *Araceae-Lasioideae*. Das Pflanzenreich IV, 23C. Engelmann Verlag, Leipzig.
- Gagnepain F. 1941. *Aracees nouvelles Indochinoises*. Notulae Systematicae 9, 1/2: 116–140.
- Hetterscheid WLA. 2006. Notes on the genus *Amorphophallus* (Araceae) 15. New species from SE Asia. *Aroideana* 29: 53–79.
- Hetterscheid WLA, Van der Ham RWJM. 2001. Notes on the genus *Amorphophallus* (Araceae) 11. New and obsolete species from east Malaysia and continental southeast Asia. *Blumea* 46: 253–282.
- Hetterscheid WLA, Wistuba A, Amoroso VB, et al. 2012. *Amorphophallus natolii* (Araceae), a new species from limestone on Palawan, Philippines. *Botanical Studies* 53: 415–420.
- Sedayu A, Eurlings MCM, Gravendeel B, et al. 2010. Morphological character evolution of *Amorphophallus* (Araceae) based on a combined phylogenetic analysis of trnL, rbcL and LEAFY second intron sequences. *Botanical Studies* 51: 473–490.