

## Short Communications

# First Report on The Naturalized *Alocasia cucullata* (Araceae) in Java, Indonesia

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### ABSTRACT

The presence of naturalized *Alocasia cucullata* (Lour.) G.Don (Araceae) in Java is reported for the first time in this paper. The species is an introduced ornamental plant native to India, Sri Lanka, and Indo-China and was only known in cultivation. In this study we collected samples from its naturalized populations in Sukabumi Regency (Cibadak Subdistrict) and Sumedang Regency (Jatinangor and Tanjungsari Subdistricts). The observed population grows along the roadside, coastal, ITB Jatinangor green space area, and palm oil plantation. In nature, *A. cucullata* may spread vegetatively either through root suckers, corms, and stem fragments. The description, distribution map, photographs, and a brief discussion are provided here.

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The horticultural trade route of ornamental plants has led to the global spread of foreign species. This trade route has spread invasive species to various parts of the world (Pyšek et al. 2017; Chowdhuri & Deka 2019; Arianoutsou et al. 2021). Recently, the international market for decorative plants has seen a surge in demand, particularly in urban areas. (Necha & Bautista-Baños 2016; Olewnicki et al. 2019; Darras 2020). Therefore, urban areas often become a starting point for the spreading of alien plants species (Mayer et al. 2017). According to Setyawati et al. (2015), about 2000 species of alien plants were recorded in Indonesia, and more than half are alien-cultivated plants, including ornamental species. Many have been naturalized or escaped from cultivation areas and become established in natural or semi-natural habitats (Tjitrosoedirdjo 2005; Tjitrosoedirdjo 2007). This number may increase in the future, considering that the ornamental plant trade is still occurring.

Araceae or arum family is one of the popular groups of flowering plants for cultivation. This family is widely distributed globally, especially in tropical America, mainland Southeast Asia, and Malesia (Boyce 2015; Wilkin & Haigh 2015; Christenhusz et al. 2017). Araceae consists

of around 4000 species grouped into 115 genera, of which 1105 native species occur in Malesia (Boyce & Wong 2012; Wilkin & Haigh 2015). Nine genera of exotic genera were introduced to Malesia, and six genera, such as *Caladium* Vent., *Dieffenbachia* Schott, *Epipremnum* Schott, *Pistia* L., *Syngonium* Shott, and *Xanthosoma* Schott, have become naturalized in the region (Chong et al. 2010; Boyce & Wong 2012; Witt 2017).

A further of the occurrence records of naturalized alien aroids in Indonesia has been published by Mustaqim & Nisyawati (2016) and Irsyam et al. (2021). During a botanical exploration of West Java from 2020 to 2021, we collected a naturalized alien aroid identified as *A. cucullata* (Lour.) G.Don which has not been previously reported in Java. Therefore, our study represents the first record for naturalized alien flora of Java. The description, photograph, and discussion are given below.

***Alocasia cucullata*** (Lour.) G.Don in R.Sweet, Hort. Brit., ed. 3: 631. 1839; Hook.f., Fl. Brit.

India 6: 525. 1893; Boyce, Thai. For. Bull. 36: 7. 2008. – *Arum cucullatum* Lour., Fl. Cochinch 2: 536. 1790. – *Caladium cucullatum* (Lour.) Pers., Syn. Pl. 2: 575. 1807. – *Colocasia cucullata* (Lour.) Schott in H.W.Schott & S.L.Endlicher, Melet. Bot.: 18. 1832. – *Caladium rugosum* Desf., Tabl. École Bot., ed. 3: 386. 1829. – *Colocasia rugosa* Kunth, Enum. Pl. 3: 41. 1841. – *Caladium colocasia* Schott ex Wight, Icon. Pl. Ind. Orient. 3: t. 787. 1844. – *Colocasia cochleata* Miq., Index Seminum (AMD) 1853. 1853. – *Alocasia rugosa* Schott, Oesterr. Bot. Wochenbl. 4: 410. 1854. – *Panzhuyuia omeiensis* Z.Y.Zhu, J. Sichuan Chinese Med. School 4(5): 50. 1985. Figure 1–3

**Description.** Robust, evergreen herb, up to 65 cm tall. Stems erect, basally branched, with leaf scars. Leaves simple; petiole 23.5–35 cm long, weak, spongy, glabrous, green; petiolar sheath reaching up to ½ way, margin membranous; lamina broadly ovate to cordate, 11.5–25 × 6.5–14.5 cm, base cordate, margin entire, apex acuminate, veins 5–8 pairs, adaxial surface yellowish green to dark green, shiny, glabrous, abaxial surface pale green to yellowish-green, glabrous. Inflorescence solitary, subtended by membranous cataphylls; flowers unisexual; peduncle 12.5–19 cm long, glabrous, yellowish-green to green. Spathe 9 cm long; lower spathe enclosing the spadix, forming a tube with convolute margins, 3.5–6 cm long, glabrous, green; upper spathe boat-shaped, 6.5 cm long, apex mucronate, waxy-glaucous; spadix c. 9.5 cm long; female flower zone cylindrical, basal, c. 1–2 cm long; sterile interstice zone c. 2 cm long, staminodia rhomboidal, c. 3 cm long yellowish-green; male flower zone c. 4–5 cm long, yellow; appendix conical c. 2–3.5 mm long, yellowish-white; male flowers: perianths absent; stamen connate into a synandrium; synandria flat-topped, irregularly rhomboidal, 1–5 mm wide, green; female flowers: perianths absent; ovary 1, styles very short, stigma capitate, white. Fruit not seen.

**Distribution.** *Alocasia cucullata* is distributed from North East, India (Sikkim) to Taiwan and it is distributed south to Sri Lanka (Boyce 2008). *Alocasia cucullata* is introduced to other tropical countries as an ornamental plant (Hay 1998; Miyake & Yasufo 2005; Boyce 2008; Nauheimer et al. 2012).

**Habitat.** In this study, the wild populations of *A. cucullata* were found in disturbed areas, watersides, palm oil plantations, and roadsides at 522–885 m a.s.l.

**Specimen examined.** INDONESIA. JAVA – West Java • Sukabumi Regency, Cibadak Subdistrict, Neglasari, Pasir Randu Palm Oil Plantation, 6°54'51.029"S 106°44'31.3800"E, 10.IV.2021, ASD Irsyam Psrrnd 02

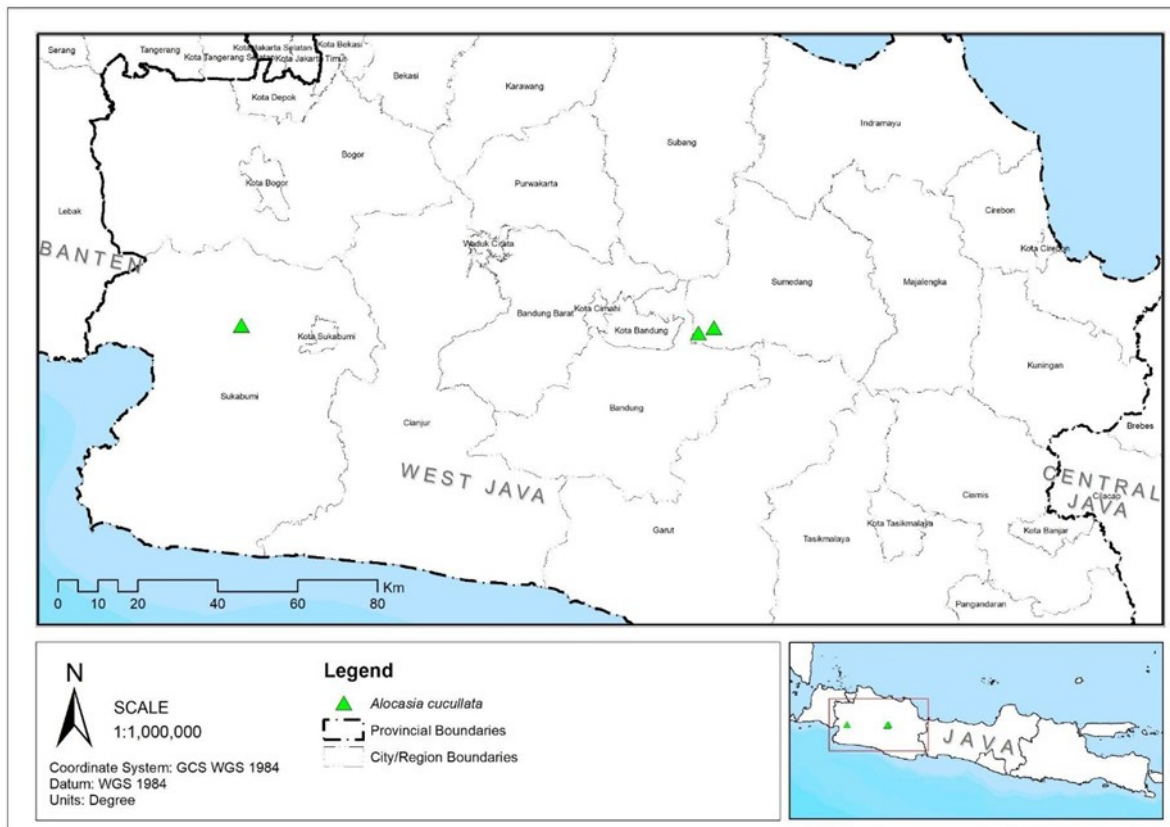


Figure 1. Distribution map of the naturalized *A. cucullata* in Java.

(FIPIA); Sumedang Regency, Jatinangor Subdistrict, ITB Campus, green space area around the lecturer dormitory building, 6°55'54.7"S 107°46'14.3"E, 21.II.2022, *ASD Irsyam 683* (FIPIA); Sumedang Regency, Tanjungsari Subdistrict, Cinanjung, Komplek PPI, 6°55'10.9"S 107°48'20.7"E, 22.II.2022, *ASD Irsyam 684* (FIPIA).

**Vernacular names.** *Nampu hijau* (Javanese) (Muhyi et al. 2020).

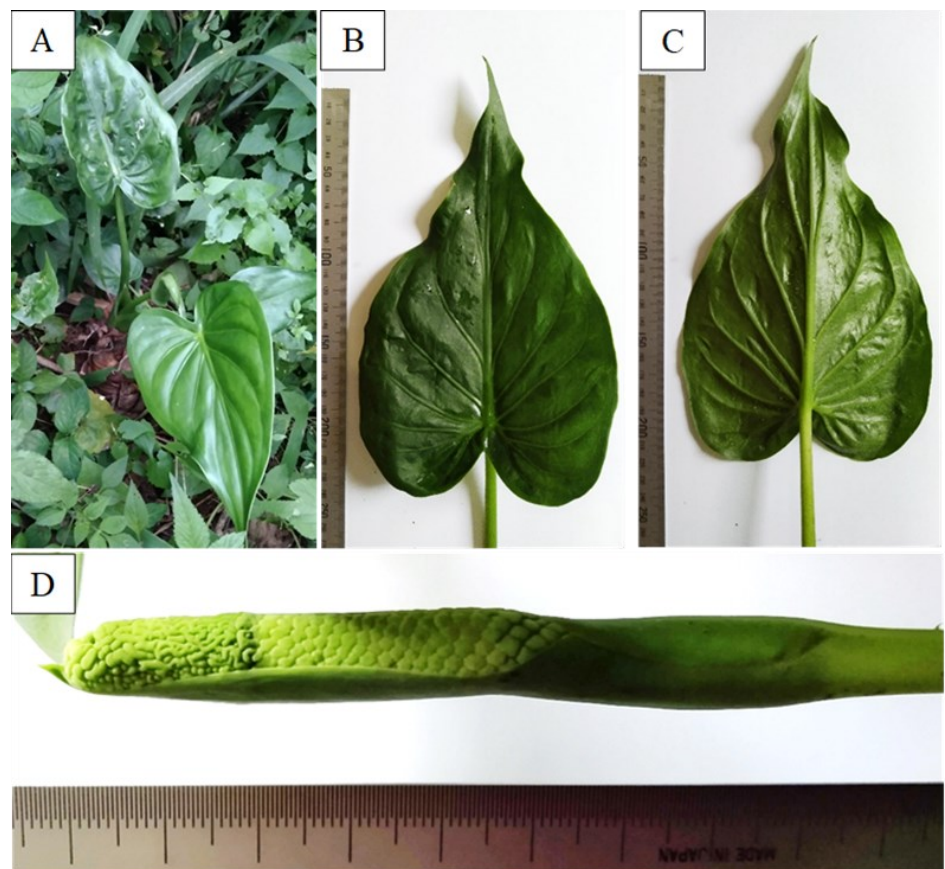
**Uses.** *Alocasia cucullata* is an ornamental plant that can be used for medicine (Asih et al. 2014). It is used externally as medicine to treat snake bites, abscesses, rheumatism, and arthritis by Chinese people (Boyce 2008). Moreover, Arora (2014) reported that the corm was edible and cooked as a vegetable. In Java, the species has only been cultivated for its ornamental purposes.

*Alocasia* (Schott) G.Don is a member of Araceae naturally distributed in tropical Asia, Australasia, Malesia, and Melanesia (Mayo et al. 1997). About 57 indigenous species of *Alocasia* occur in Malesia, of which 31 species were found in West Malesia (Hay 1998). In addition, one exotic species, *A. cucullata*, has been widely cultivated and naturalized throughout the tropics, including Malesia (Mayo et al. 1997; Hay 1998; Nauheimer et al. 2012; Truyen et al. 2015). The species is quite commonly grown as an outdoor plant in Java due to its showy leaves.

However, there is no information about naturalized *A. cucullata* on the Java Island. The previous data was obtained only from its cultivation (Nisyawati & Mustaqim 2017; Mustaqim 2019).

In this study, we reported the naturalized *A. cucullata* from Java for the first time. Although *A. cucullata* was previously only known from the western part of Java, it is probable that the species has already spread to other provinces. *Alocasia cucullata* has grown in several locations in West Java Province (Figure 1). It grows in a palm oil plantation and along a waterside at the observation site in Pasir Randu, Cibadak, Suka-

bumi Regency. For this research, the samples were collected from naturalized of *A. cucullata* at two locations in Sumedang Regency, at a green space area around the dormitory building of ITB Jatinangor and on a roadside in Regency Complex PPI Cinanjung-Tanjungsari (Figure 3). *Alocasia cucullata* has become locally abundant in shaded and humid conditions. Previous research revealed that exotic ornamental plants usually had overcome the barrier of introduction by establishing their wild population in green open space areas, arboreta, botanical gardens, and private gardens (Mayer et al. 2017). In 2020, *A. cucullata* was reported in the forest edge of Bantarbolang Nature Reserve, Pemalang, Central Java (Muhyi et al. 2020). However, Muhyi et al. (2020) did not mention whether it was cultivated or naturalized. According to Widodo (personal communication, February 21, 2021), the population of *A. cucullata* from Pemalang, Central Java Province, may result from naturalization.



**Figure 2.** Morphological characters of *A. cucullata*. (A) habit; (B) adaxial leaf surface; (C) abaxial leaf surface; (D) inflorescence.

The history of the first introduction of *A. cucullata* in Java has not been widely known, both in literature and herbarium data. This species is not recorded in the Flora of Java vol. III (Backer & Bahkuizen van den Brink 1968; Mustaqim 2019). Examination of specimens at Herbarium Bogoriense (BO) and Herbarium Bandungense (FIPIA) also showed no *A. cucullata* specimens collected from cultivated or wild populations. The specimen deposited in Herbarium Bogoriense were collected from Chiang Mai Province, Muang Fang, Thailand (BO-1339506) (Figure 4). It is estimated that *A. cucullata* entered Java in the 1970s after the Flora of Java series publication was completed.

During field observations, *A. cucullata* found in Pasir Randu and Cinanjung did not have any inflorescences. *Alocasia cucullata* with inflorescences were observed from one individual at the ITB Jatinangor Campus (Figure 2). Previous researchers also reported that *A. cucullata* rarely

produces inflorescences in the wild (Boyce 2008; Rojas-Sandoval 2019). *Alocasia cucullata* mainly propagates vegetatively through root suckers, rhizomes, and corm fragments (Rojas-Sandoval 2019). According to Boyce (2008) and Fang et al. (2020), the distribution of *A. cucullata* is associated with human disturbance. The naturalized *A. cucullata* in Jatinangor and Cinanjung turned from waste from pruning gardens or other public green spaces. The waste originating from ornamental aroids in the form of vegetative fragments such as tubers, stems, or rhizomes, corms without specific treatment can grow into new individuals near their disposal sites. Other naturalized aroid species such as *Monstera deliciosa* Liebm., *Philodendron hederaceum* (Jacq.) Schott, *Syngonium podophyllum* Schott, and *Xanthosoma sagittifolium* (L.) Schott may spread with a similar mechanism (Martin 2002; Chong et al. 2010; Bhattacharyya 2021; Irsyam et al. 2021).



**Figure 3.** The wild population of *A. cucullata* in (A) Pasir Randu palm oil plantation, Cibadak, Sukabumi Regency; (B) ITB Campus, Jatinangor, Sumedang Regency; (C) Komp. PPI Cinanjung, Tanjungsari, Sumedang Regency.

The presence of naturalized *A. cucullata* in the wild needs to be closely monitored because it can be invasive and disturb native species. Previous research has shown the species to be invasive in Cuba, Costa Rica, Hawaii, Fiji, the Cook Islands, Micronesia, Palau, and French Polynesia. (Space et al. 2009; Rojas-Sandoval 2019). *Alocasia cucullata* also escape from the Lesser Antilles cultivation area and then became naturalized in St. Lucia (Graveson 2012; Joseph & Abati 2016).



**Figure 4.** Specimen *A. cucullata* deposited in Herbarium Bogoriense (BO) (Doc. By Asih Perwita Dewi, 2022)

### AUTHORS CONTRIBUTION

ASDI and MRH designed the research. ASDI, APD, and MRH collected the plant materials, observed the specimen, and analyzed the data. ASDI, MRH, APD, RRI wrote the original draft and agreed to the final manuscript.

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### CONFLICT OF INTEREST

The authors declare no competing interests regarding the research or the research funding.

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