

TWO SPECIES OF *Amorphophallus* FROM FLORES ISLAND

Dua Spesies *Amorphophallus* dari Pulau Flores

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Abstrak

Pulau Flores adalah salah satu dari empat pulau besar di Provinsi Nusa Tenggara Timur. Pulau Flores tercatat masih mempunyai kawasan hutan yang menyimpan keanekaragaman sumber daya hayati tumbuhan cukup banyak. Namun informasi mengenai data kekayaan sumber daya hayati tumbuhannya masih sangat sedikit. Ekspedisi NKRI subkorwil 6 Ende, sebagai salah satu subkorwil yang bertugas mengungkap kekayaan sumber daya hayati tumbuhan di Pulau Flores, berhasil menginventarisasi dan menemukan dua jenis tumbuhan herba anggota marga *Amorphophallus* dari suku Araceae. Kedua jenis ini adalah jenis *Amorphophallus muellerii* Blume and *Amorphophallus paeniifolius* (Dennst.) Nicolson Keberadaan *Amorphophallus* di Flores adalah aman dari gangguan, namun yang menjadi persoalan adalah habitatnya di alam mudah erosi. *Amorphophallus* jarang dikonsumsi, selama masyarakat masih dapat menemukan sumber pangan lainnya di hutan khususnya dari jenis Dioscorea, Menurut Santosa & Sugiyama masyarakat ethnic Manggarai, menggunakan pucuk *A. muellerii* untuk sayur dan tumbukan dari daunnya digunakan untuk menstimulasi produksi air susu ibu, dan juga dapat digunakan sebagai astringen dan analgetik

Kata kunci : *Amorphophallus*, Pulau Flores, Ekspedisi NKRI, Dua jenis

Abstract

Flores is one of the four largest islands in East Nusa Tenggara Province, Indonesia and retains forest areas with adequate biological diversity. However, empirical data about the biodiversity of plant resources is limited. The NKRI Expedition to Subregion 6 Ende was carried out to reveal the biodiversity of plant resources on Flores. In the expedition's inventory of plants observed, two species of the genus *Amorphophallus* (Araceae) were recorded. These are *Amorphophallus muellerii* Blume and *Amorphophallus paeoniifolius* (Dennst.) Nicolson. The existence of *Amorphophallus* in Flores is safety, but the problem is although their habitat easily erosion although their habitat easily erosion. *Amorphophallus* rarely to consume by the people in East Nusa Tenggara,

if the people easily to found the other food source in the forest such as *Dioscorea* species. According to Santoso & Sugiyama that the local people of the Manggarai ethnic group sometimes ate the young shoot of *A. muellerii* as a vegetable, and also they used the leaf paste for stimulate breast production in mother, astringent and analgetic agent

Keywords: *Amorphophallus*, Pulau Flores, Ekspedisi NKRI, Dua jenis

INTRODUCTION

Flores is one of the four largest islands in the lesser sunda islands, East Nusa Tenggara Province with an area of 13,540 km². This landscape is very mountainous and in volcanic zone, about 359 Km by 75 Km, this located east of Sumbawa and north-west of Timor (Butchart *et al.*, 1996). The islands are divided into eight regencies (local government districts); from west to east these are: Manggarai Barat (West Manggarai), Manggarai Tengah (Central Manggarai), Manggarai Timur (East Manggarai), Ngada, Nagekeo, Ende, Sikka and Flores Timur or East Flores (kemendagri, 2010).

Lesser Sunda Islands are stretch in the most south Wallacea region that are biodiversity poorly know. Most the natural for the research were done in the 18th century to the early 1990's (Monk *et al.*, 1997). Several researcher on biodiversity were conducted, such as research in Ruteng by Department Forestry and LIPI (Raharjaningtrah & Rahman, 2004). While another researches in Flores was done by Elyzabeth Anita Widjaja (1980) in Maumere.

Amorphophallus is one the genus belong to Araceae family, consist around 200 species, widespread in tropical and subtropical Asia extending to N Australia, and tropical Africa (Jaleel *et al.*, 2011; Agung *et al.*, 2011). Indonesia is one of the center of *Amorphophallus* species distribution. (Sugimaya & Santosa, 2008). Currently about 25 species reported in Indonesia, of which 17 species are reported to be endemic to Indonesia (Yuzammi *et al.*, 2014). E.A. Widjaya (1980) has result collected an *Amorphophallus paeoniifolius* and *Amorphophallus muellerii* specimen herbarium, unfortunately it is unpublished. Jansen *et al.* (1996) has been reported that *Amorphophallus muellerii* is exist in Flores islands but with no further details in about whether the species is

found widely distributed. Meanwhile, according to the Jaleel *et al.* (2011) the species *Amorphophallus paeoniifolius* has a distribution throughout Indonesia and other Asian regions where it is widely cultivated, but not reported for Flores yet.

Generally, in Flores these species are still wild and can be found in the forest, in the side of the roads, in side the river or in open areas. In traditional Flores market we not found the *Amorphophallus* sale yet, but in there we found some other commonly crops foods as a food resources. According to Soemarwoto (2005) that *Amorphophallus* especially *A. muellerii* is still uncommonly for the farmer in Indonesia. The common root crops are such as cassava, xanthosoma, sweet potato, taro and dioscorea species. The East Nusa Tenggara people are familiar with the common root crops then *Amorphophallus* (Santosa & Sugiyama, 2016).

Santoso & Sugiyama (2016) mention that the local people of the Manggarai ethnic group sometimes ate the young shoot of *A. muellerii* as a vegetable, and also they used the leaf paste for stimulate breast production in mother, astringent and analgetic agent.

Based on the data above, the purpose of our research was to investigate further the presence of the genus *Amorphophallus* in Flores Island, to verify what had been reported by Jansen *et al.* (1996) and Santoso & Sugiyama (2016), also to search other species of *Amorphophallus*.

MATERIALS AND METHODS

Fieldwork started in Sikka and moved towards Ende, which became the center point of the research, extending into the District of Nagekeo to Ngada, into Manggarai Regency and then into West Manggarai. In each location we

recorded the presence of any kind of *Amorphophallus*. We also mapped the distribution of *Amorphophallus* in Flores using data from herbarium specimens stored in the Herbarium Bogoriense Research Center for Biology LIPI in Cibinong. These data consisted of four separate herbarium sheet specimens of *Amorphophallus paeoniifolius* and 3 sheet samples of *Amorphophallus muelleri* collected in 1980 from

the village of Egon, Maumere Flores Talibura (Figure 1). It was also used as reference to identify the *Amorphophalus* species collected during the expedition. The research was also supported by a survey of the literature relating to *Amorphophallus muelleri* and *Amorphophallus paeoniifolius* (Backer & Balhuizen v.d. Brink, 1968; Agung *et al.* 2011; Yuzammi, 2009).



Figure 1. Herbarium specimens of *A.paeoniifolius* and *A. muelleri*

RESULTS AND DISCUSSIONS

Based on the Identification result s of the *Amorphophalus* samples from the Flores island showed that the two species are *Amorphophalus muelleri* Blume (Figure 2) and *Amorphophalus paeoniifolius* (Dennts) Nicolson (Figure3). The discovery of *A. muellerii* by the Sub Korwil (SK) 6 Ende Expedition Team supports the report of Jansen et al. (1996) and the evidence of the herbarium specimen collected by EAW in Egon village in 1980. Similarly, the discovery of *A. paeoniifolius* reinforces the evidence of the herbarium specimens (No. 1086 collected by EAW, in Egon Village, Maumere in 1980).

The findings of the SK 6 Ende flora and fauna team joined by the EGI Geological

Information Agency expert team complement the data that have been accumulated previously in various sources but have not before been published. This means that the existence *A. muelleri* briefly reported nineteen years ago by Jansen et al (1996) can still be found distributed in almost all Flores areas. The presence of the species *A. paeoniifolius* in Flores recorded 35 years ago in herbarium specimens from Maumere and has not previously been published.

The *Amorphophalus* on Floreas may be keyed out as per below:

1a. Seasonal herb with tuber, bulbils present in middle intersection of the leaflets *A.muellerii*

1b. Seasonal herb with tuber, bulbils absent*A. paeoniifolius*



Figure 2. a) bulbil; b) rachis and petiolules; c) tuber (Photo: Sayyidah Fatchyyah)

Amorphophallus muelleri**Description**

Herbaceous tuberous plants, with round or globose dark brown tuber, yellow or orange inside, diameter of tuber 20-25 cm, tuber skin smooth with fibrous roots in petiole base. Leaf solitary, petiole fleshy, yellowish green - green with pale green spots, approximately 40–50 cm long, diameter 1–5 cm. Lamina or blade with 60-175 cm diameter. divided into three parts of leaves rachis, and in the middle of the venation intersections of the leaflets there are brown bulbils. Leaflets, lanceolate or elliptic lanceolate with acuminate tip, 10-35 cm x 4-9 cm, pale green abaxially, green or dark green adaxially. Bulbils rounded or elongate, greyish brown, 0,5-6 cm in diam. Inflorescence solitary, peduncle 25-55 cm long, 0,5-3 cm in diam, inflorescence is absent during in the field worked. According to Yuzammi (2009) spathe broadly triangular or transversely elliptic, coriaceous, 7.5-27 cm long, 6-27 cm in diam. Fruit berry, oblong, green when young, became bright red when ripe, usually contain 2 seeded, infructescence also is absent during in the fieldworks.

Habitats

This species is generally found to grow well in secondary forests, teak forest, forest margins and scrub; also can be found growing on the riverbank, roadside as well as in areas that are open or in areas at elevations between 10-700 m. Yuzammi (2009) reported that this species can be grows up to 900 m

altitude. According to Santosa & Sugiyama (2016) that in East Nusa Tenggara, its grows in under canopy of timber trees at 400 m altitude. While Backer & Bakhuizen v,d, Brink (1968) mention that it can grows at 200-1000 m altitude. Good soils are required for this species; with good drainage and the high humus content and nutrients.

Amorphophallus paeoniifolius**Description**

Herbaceous bulbous, rounded or globose tuber, dark brown tuber skin, rough with several nodes and producing seasonal rhizomatous buds. Petiole about 60-150 cm height, diameter 4-10 cm, rough to nearly smooth, pale to dark green or brownish green, with large or small pale spots. Leaf compound or lamina with 3 m in diam, leaflets rounded, oval, or obovate to elliptic, with varying curvature, light green color - dark green leaf surface covered with a layer of wax and in the middle of the venation intersections of the leaflets there are no bulbils. We not find the flowers in the field but we get the unripe and ripe fruit. Yuzammi (2009) mention that the Inflorescence is solitary, peduncle 3–20 cm long, 1-8 cm in diam, elongating during anthesis, spathe campanulate, broader than long, lower spathe variable in colour, yellowish green to dark-brown background with small and large pale blotches outside. Fruit berry, oblong, 1-1.5 cm long, 0.5-0.8 cm in diam, green when young and become orange to red when ripe, contains 2 (-3) seeded. The gradation in colour of fruit ripe (figure 4).



(a)



(b)



(c)

Figure 3. a) leaves; b) petioles and rachis; c) young fruit



Figure 4. The gradation in color of fruits ripe of *A. paeoniifolius* (Photo by Inggit)

Habitats

Generally, this species is distributed from coastal areas up to a height of 700m above sea level, while Backer & Bakhuizen v.d. Brink (1968) mention it can grow up to 800 m above sea level. It is often found in secondary and disturbed forest areas, in humid and slightly open areas, alongside roads, on the banks of rivers, and even on the slopes of steep-slopes on the edges of forest and undergrowth. This species is found in Flores growing well on rocky ground.

This species is included among endangered plants according to the IUCN Red List Data Book 2013 categorized in the status of Least Concern, so that it requires oversight of the existence of populations and of threats to its habitat in nature. However, there are the cultivation efforts being carried out.

Based on the result data which have compiled from literature survey, herbarium sample and field worked data showed that the distribution of *A.*

muelleri and *A. paeoniifolius* in Flores is follow in figure 5.

When the studies done, based on the interviewed result to the people in Sikka, Ende, Nagekeo, Manggarai and West Manggarai show that just a few peoples knew *Amorphophallus* and this uses. Meanwhile according to Santoso and Sugiyama (2016) that quite a few people of the Manggarai ethnic groups knew *A. muelleri* and *A. paeoniifolius*. *Amorphophallus* is rarely consume, because the people prefer the other food source for their food especially *Dioscorea*.

When we have done to found these species, we not conducted to account the population of *A. muellerii* and *A. paeoniifokius* in each district at Flores, but we can be found these species easily. The problem which were damaged the existence of *Amorphophalus* species in Flores that their habitat is very rocky and easily erosion.

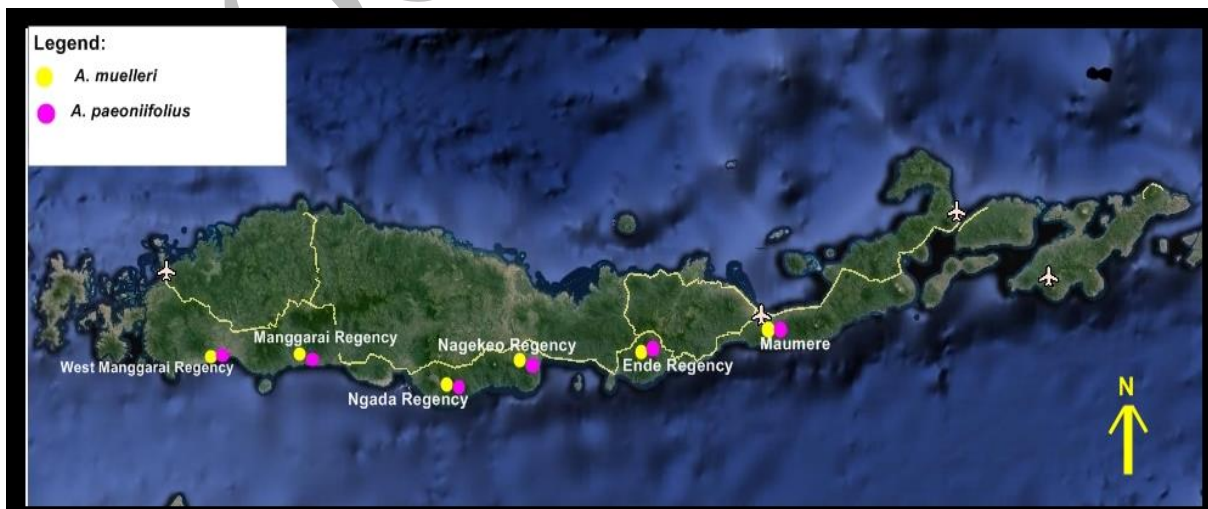


Figure 5. Distribution Map of *A. muelleri* and *A. paeoniifolius* on the island of Flores.

CONCLUSIONS

There are two species of *Amorphophallus* on Flores Island, *Amorphophallus muelleri* Blume, and *A. paeoniifolius* (Dennst.) Nicolson. The existence of *A. muelleri* in Flores Island was published by Jansen et al. 19 years ago, while the existence of *A. paeoniifolius* was only known from unpublished herbarium voucher specimens collected 35 years ago. Our study has confirmed the presence of these two species on Flores and mapped their approximate distribution on the island. The existence of *Amorphophallus* species in Flores is safety although their habitat easily erosion. *Amorphophallus* rarely to consume by the people in East Nusa Tenggara, if the people easily to found the other food source in the forest such as *Dioscorea* species. According to Santoso & Sugiyama that the local people of the Manggarai ethnic group sometimes ate the young shoot of *A.muellerii* as a vegetable, and also they used the leaf paste for stimulate breast production in mother, astrigent and analgetic agent

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REFERENCES

- Agung, K., I. P. Agus Hendra Wibawa and Bayu Adjie. 2011. Species diversity of *Amorphophallus* (Araceae) in Bali and Lombok with attention to genetic study in *A. paeoniifolius* (Dennst.) Nicolson. Biodiversitas. Volume 12, Number 1. 7 -11. ISSN: 1412-033X (printed edition), ISSN: 2005-4722 (electronic).
- Backer, C.A. & R.C. Bakhuizen van den Brink Jr. 1968. Flora of Java: Araceae. Volume III. Wolters-Noordhoff. N.V.-Groningen-The Netherlands. 111-113.
- Butchart, S.H.M., T.M. Brooks, Davies C.W.N, Dharmaputra G, Dutson, G.C.L., Lowen, J.C. and A. Io Sabu. 1996. The Conservation Status of Forest Birds on Florest and Sumbawa, Indonesia. Bird Conservation International 6 : 335-370
- Jaleel, V.A., M. Swadansan, A.H. Alfarhan, J. Thomas and A.A. Alatar. 2011. Revision of *Amorphophallus* BLUME Exdecne. Sect.*Rhaphophallus* (Schott) Engl. (ARACEAE) In India. Bangladesh J. Plant Taxon. **18**(1): 1-26,
- Jansen, P.C.M., C. van der Wilk, and W.L.A. Hetterscheid. 1996. *Amorphophallus* Blume ex Decaisne. In Flach, M. and F. Rumawas (eds.). PROSEA: Plant Resources of South East Asia No 9. Plant Yielding Non - seed Carbohydrates. Leiden: Backhuys Publishers.
- Monk, K.A, de Fretes.Y and Lilley.G. 1997. The Ecology of Nusa Tenggara and Maluku Periplus: Singapore. 4-6
- Raharjaningtrah, W & Z. Rahman. 2004. Study on the Distribution, Habitat, and Ecology of Flores Hawk-eagle *spizaetus cirrhatius floris* in Lombok, Sumbawa, Flores, Komodo and Rinca Islands, Nusa Tenggara Indonesia. Annual Report of Pro Natural Fund. Volume 13 : 177-192
- Romand-Monnier, F. 2013. *Amorphophallus paeoniifolius*. The IUCN Red List of Threatened Species. Version 2015.2. <www.iucnredlist.org>. Downloaded on 12 August 2015.
- Soemarwoto (2005). Iles-Iles (*Amotphophallus muellerii* Blume Description and other Characteristics. Biodiversitas 6 (3): 185-190
- Santoso, E. and N. Sugiyama, 2016. *Amorphophallus* Species in East Nusa Tenggara Islands, Indonesia. Tropical Agriculture Development. 60 (1): 53-57

- Sugiyama, N. & E. Santoso. 2008. Edible *Amorphophalus* in Indonesia. Potential Crops in Agroforestry. Gadjah Mada University Press.1-6
- Yuzammi, J.R. Witono and W.A. Hettterscheid. 2014. Conservation Status of *Amorphophallus discophorus* Backer & Alderw. (ARACEAE) in Java, Indonesia. REINWARDTIA Vol 14, No 1, pp: 27-33
- Yuzammi. 2009. The Genus *Amorphophallus* Blume ex Decaisne (Araceae-Thomsonianeae) in Java. Reinwardtia 13 (1): 1-12
- Kemendagri. 2010. Kode dan Data Wilayah Administrasi Pemerintahan Provinsi Nusa Tenggara Timur. Retrieved http://www.kemendagri.go.id/media/filemanager/2010/01/29/1/9/19__ntt.pdf

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