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PANDAN (PANDANACEAE) IN FLORES ISLAND, EAST NUSA TENGGARA, INDONESIA: AN ECONOMIC-BOTANICAL STUDY

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ABSTRACT

SUSIARTI, S., DJARWANINGSIH, T. & KEIM, A. P. 2013. Pandan (*Pandanaceae*) in Flores Island, East Nusa Tenggara, Indonesia: an economic-botanical study. *Reinwardtia* 13 (5): 433–439. — The people in the Indonesian province of Nusa Tenggara Timur (then East Lesser Sunda Islands) consist of many ethnic groups, each with their own local languages. The island of Flores is the second largest island within the East Lesser Sunda Islands. The island is inhabited by 10 ethnic groups, in which four are regarded as the dominant groups: Flores, Ende, Lio and Manggarai. The pandan flora of the island is still largely unknown; the same is for their ethnobotany. The aim of this current study is to know the traditional usages and potential uses of pandan flora in the Flores Island. The study was carried out in three regencies: Ende, Nagekeo and Manggarai. The result of this study shows that there are four species of *Pandanus* (*P. amaryllifolius*, *P. dubius*, *P. kaernbachii*, and *P. tectorius*) and one species of *Freycinetia* (*F. insignis*) are recorded from the areas under study. The presence of *P. kaernbachii* in Flores Island is a new record. The people also recognise the diversity of *Pandanaceae*, especially from the genus *Pandanus*, in which they are known by local names such as “panda”, “re’a”, “waku”, and “mbojo”. Main usages of *Pandanus* are as material sources for handicrafts (mats, coffee bowls, and hats), dye, flavourings, funeral offering, and ornamental plant.

Key words: *Freycinetia*, Lesser Sunda Islands, *Pandanus*.

ABSTRAK

SUSIARTI, S., DJARWANINGSIH, T. & KEIM, A. P. 2013. Pandan (*Pandanaceae*) di Pulau Flores, Nusa Tenggara Timur, Indonesia: sebuah studi botani-ekonomi. *Reinwardtia* 13 (5): 433–439. — Masyarakat di Nusa Tenggara Timur terdiri atas banyak kelompok etnis dan masing-masing kelompok memiliki bahasa daerah sendiri. Pulau Flores adalah pulau terbesar kedua di Propinsi Nusa Tenggara Timur. Pulau ini dihuni oleh 10 kelompok etnis, diantaranya Flores, Ende, Lio dan Manggarai. Flora pandan di pulau ini belum banyak dikenal, demikian pula etnobotaninya. Tujuan penelitian ini adalah mengungkap pemanfaatan tradisional pandan di pulau Flores beserta potensinya. Penelitian dilakukan di tiga kabupaten: Ende, Nagekeo dan Manggarai. Hasil penelitian menunjukkan bahwa di tiga kabupaten tersebut terekam empat jenis *Pandanus* (*Pandanus amaryllifolius*, *P. dubius*, *P. kaernbachii*, dan *P. tectorius*) dan satu jenis *Freycinetia* (*F. insignis*). *P. kaernbachii* di Pulau Flores adalah rekaman baru. Masyarakat setempat mengenali keragaman suku pandan-pandan (*Pandanaceae*), khususnya dari marga *Pandanus*, mereka mengenal dengan beberapa nama daerah seperti: “panda”, “re’a”, “waku” dan “mbojo”. Kegunaan utama pandan sebagai bahan baku untuk kerajinan tangan (tikar, wadah kopi, dan topi), bahan pewarna, penyedap makanan, sesaji bunga pada pemakaman, dan tanaman hias.

Kata kunci: *Freycinetia*, Kepulauan Nusa Tenggara, *Pandanus*.

INTRODUCTION

Flores Island

Flores is the second largest island in the string of islands included within the province of East Nusa Tenggara. The island is surrounded in the north by

Flores Sea, in the west by Sappy Strait, in the east by Flores Strait, and in the south by Sawu Sea. The highest point in the island is Mount Kelimutu, in which the three outstanding lakes are located. These lakes are renowned for their colourful waters due to the activities of different species of algae in the water.

Administratively the island is divided into 10 regencies such as Ende, Manggarai, East Manggarai, West Manggarai, Nagekeo, Ngada, and Sikka. The people live in these regencies consists of 10 ethnics, *i.e.* Ende, Flores, Lio, Manggarai, and Ngada.

Pandan Flora of Flores Island

Prior to the present study the information regarding the pandan flora of Flores was a brief accounts (supported by two black and white photos) by Rensch (1930), on a species of *Freycinetia insignis* and *Pandanus tectorius*. Furthermore, it was followed by Wiradinata (2008) as part of the floristic study of this island. The ethnobotanical information was presented by Rensch (1930), who briefly mentioned and described the widely cultivated *P. amaryllifolius* and the wild and never cultivated *P. tectorius*. Then it was followed by Temu (1995), who described the usages of the two species in relation with the ritual related purposes. However, despite those information actually there has been no report on the exact number of pandan species found in Flores. Thus, the aim of this research is to provide up to date information on the pandan flora of this magnificent island, including their traditional usages.

METHOD AND STUDY SITE

The research was conducted in the villages of Sokoria, Ndonga Kapah, Wolosambi, all are in the East Lio District, Nagekeo Regency, Nangaroro District, village of Belang Turi and Lake Rana Mese area in the Manggarai Regency (Fig. 1). Some of these areas, particularly Lake Rana Mese were previously visited and described by Rensch (1930). Herbarium preparation followed van Balgooy (1987) and Stone (1983). The research was conducted using open ended interview, field observations, and purposive sampling. The management of *Pandanaceae* also observed such as extractivism, cultivation, diversity, and utilization by local people.

RESULTS AND DISCUSSION

The result of the present study indicates that one species of *Freycinetia* (*F. insignis*) and four species of *Pandanus* (*P. amaryllifolius*, *P. dubius*, *P. kaernbachii*, and *P. tectorius*) were found in Flores. Prior to the present study only *F. insignis*, *P. amaryllifoli-*

us, and *P. tectorius* were known from the island. Hence *P. dubius* and *P. kaernbachii* may be considered as new records for Flores.

Freycinetia insignis was found in the Kelimutu National Park at 630 to 990 meters altitude. The species was also found abundantly in the Rana Mese Lake (TD 1356, TD 1362, TD 1368) at the elevation of 1260 meters (Figs. 2A & 2B). This agrees with Rensch (1930).

Pandanus amaryllifolius is a widely cultivated species, never found in the wild. It is known as “panda” in various local languages in the Flores Island. Although the origin of this well known aromatic species in Flores is still shrouded in mystery, but from our observations in the field we believe that *P. amaryllifolius* was introduced. It is usually planted in the gardens or house yards from sea level to 1000 meters altitude. *P. amaryllifolius* was introduced.

The presence of *P. dubius* in Flores was not reported by Rensch (1930) despite the fact that he carried out explorations from beaches to hinterlands of Flores. The result of this current study shows that this species is only found as an ornamental plant (Fig. 2C); it is assumed here to be an introduced species.

Pandanus kaernbachii (Fig. 3; TD 1399) is collected from Puujita in the village of Wolosambi at 220 meter altitude and known by local people as ‘waku’. This species is also found in Ndonga Kapah in Ondorea Barat village, District of Nangapanda at altitude 100 meters; and Rentung village (TD 1338) in Manggarai Regency at altitudes of 980 to 1040 meters. It inhabits wet and damp areas close to water springs and riversides. Prior to this current study (Stone, 1982; Kanehira, 1940; Jebb, 1992; Keim *et al.*, 2008; Keim, 2009) *P. kaernbachii* has never been reported in the Lesser Sunda Islands; thus it is a new record for Flores and extending the distribution of the species further west from the previously Seram Island in the Moluccas (Keim *et al.*, 2008).

In almost all local languages spoken in the area understudy *P. tectorius* (Fig. 4) is known as “re’a” except in the Bajawa, where it is called “ze’a”. Linguistically this is an interesting finding. The language spoken in Bajawa is known as Ngada, a language which is classified as belonging to the Sumba-Flores Group, Ende-Manggarai (Western-Central Flores) Subgroup (Blust, 2009). Unlike other languages within the group, the Ngada language is considered unique as it has no prefixes and suffixes at all (Mc Whorther, 2006). As there has been few reports on the phonology of the language (Djawanai, 1980; Baird, 2002; Suparsa, 2009) the



Fig. 1. Study site

finding raises a question if there is a phenomenon of sound shift from “r” in other Ende-Manggarai languages to “z” in Ngada as indicated by the vernacular names described above (thus “re’a” to “ze’a”). Further linguistic study is essential for basic knowledge.

In Flores *P. tectorius* is known as “re’a” in almost all local languages except in the Bajawa, where it was named “ze’a”. In the wild *P. tectorius* is abundantly found at the beaches and seashores particularly at Nangaroro, Nagekeo District, where they are usually found in flowering and fruiting on July to August. This current study shows that this species is common throughout the Kelimutu National Park at altitude of 630 to 990 asl. In Rentung village, Manggarai, which is located at 980 to 1040 meters altitude (TD 1352) this species is even found at approximately 1000 meters altitude. These are surprising discoveries as *P. tectorius* is previously known as predominantly seashores and beaches dwellers; thus adding new information on the species distribution in relation with elevation gradient. *Pandanus tectorius* is harvested for its leaves, which are widely used throughout Flores as raw materials for mats and handicrafts (Figs. 5 & 6). Apparently due to this reason *P. tectorius* is cultivated.

This present study records the presence of a taxon of *Pandanus* known by local people at Ndonga Kapah, Nangapanda District as ‘mbojo’. The leaves are not used, only the stems that are used

for building materials. Unfortunately by the time this study was conducted the taxon was neither in flowering nor fruiting. Thus, the identification of this taxon to the species level is practically impossible.

ETHNOBOTANY OF FLORES PANDANS

The result of this study shows that in Flores *P. tectorius* is the commonest species to be used. The species is mostly harvested for its leaves. This finding is in accordance with Rensch (1930). *Pandanus tectorius* is usually planted in home yards, gardens and in rice fields (particularly in the non irrigated sections). The other but less utilised species is *P. kaernbachii*. The use of leaves from *P. kaernbachii* in Flores Island has never been reported before, it is a new ethnobotanical record for the island.

Prior to this present study the usage of materials from pandan origin by local inhabitants in the villages surrounding the Ruteng Ecotourism Park, Manggarai reported by Wawo (1998) but was only for mats.

This current study records that in Flores the leaves from “re’a” (*Pandanus tectorius*) are used as raw materials for many purposes such as:

Handicrafts

a. Mats



Fig. 2. A. Habitat and habit of *Freycinetia insignis*; B. Infructescence of *Freycinetia insignis*; Habit of *Pandanus dubius*

As in other areas in Indonesia (Hofstede, 1925; Rahayu *et al.*, 2009; Susiarti & Rahayu, 2010) in Flores mats are also made following simple process started from selecting the leaves, removing the spines then dried in the sun. After the leaves are dried for a day, the leaves are rolled up and stored. The next day the leaves are dried again. This process of sun drying can take 1 to 2 days until the leaves are completely dried. The leaves then knitted to create a mat. About 30 leaves are used to make a 2×2 meters mat (Fig. 5). The knitting process is commonly practised by women after working in the rice fields. A mat can be finished in a week. Mats are usually used for domestic purposes or sold in local market.

The mats are commonly called as “re’a” as well by the people in Flores except in Nangaroro, Sokoria, and Wolosambi, where they are called “te’e re’a”. In Rentung the mats are named “loce re’a”. Whatever the local name is the word “re’a” is always used. This refers to the plant from which the raw materials are harvested, *P. tectorius* and the fact that all languages in the area understudy belong to the Ende-Manggarai (Western-Central Flores) Subgroup).

Some people in Flores also use leaves from a different species for making mats that is the leaves of *P. kaernbachii* or locally known as “waku” as can be seen in Nangaroro, Manggarai and Puujita, Wolosambi. The mat-producing process is the same as in *P. tectorius*. Waku itself means umbrella in the local languages spoken in those areas which refers to the other usage of the leaves (Fig. 6).

b. Coffee container

The leaves of *P. tectorius* can also be used for making traditional coffee container called “roto”. “Roto” is used as container for storing coffee beans during coffee harvesting time as can be seen in Manggarai. “Roto” can also be used as a container for piper leaves, betel nuts, and chinks. It is usually layered by bamboo.

c. Hat

Making hats from pandan leaves are more complicated than making mats as the leaves are more narrowly pieced, carefully knitted, and coloured in red and blue. This hat-producing activity is rarely seen now. Nevertheless, the hat making industry is not totally closed as the traditional hats are still highly regarded and used in the Government Ceremonial Feast as can be commonly found in Manggarai and usually shown together with the symbol of the East Nusa Tenggara Province, the Komodo dragon (Berybe, 2007).

d. Pillow

The process of making a traditional pillow is started by making mats. After the mat has been created, it is rolled up and sewed then filled with kapok (*Ceiba pentandra*). It is usually coloured in red and blue. These traditional pillows can also be used as ceremonial tables as can be seen in Rentung, Manggarai.

Natural food colouring and flavouring

As in other parts of Indonesia in Flores the most common species used for natural food colouring and flavouring is the leaves harvested from *P. amaryllifolius*, the famous aromatic pandan. In local languages it is simply known as “panda”. The leaf produces natural green colour and characteristic flavour for the prepared food.

Building materials

In Flores the stems from a taxon of *Pandanus* locally known as “mbojo” are used as building materials. Unfortunately, the individuals found were not in fruiting by the time the exploration made, thus were not collected.



Fig. 3. A. The habit of *Pandanus kaernbachii* found at Puujita within the vicinity of Wolosambi village at 220 meter altitude. This finding marks the new record of the species for the Lesser Sunda Islands; B. The obvious prop roots of *Pandanus kaernbachii*. The prop roots of *P. kaernbachii* are not used by the local people; C. *Pandanus kaernbachii* showing the single elongate-lanceolate leaf, mature cephalia, and juvenile individual ready to be planted.



Fig. 4. A. The habit of *Pandanus tectorius* planted at Nangaroro beach; B. The male inflorescence of *Pandanus tectorius* at anthesis; C. The mature cephalium of *Pandanus tectorius*. The cephalium of *P. tectorius* is not consumed by local people.



Fig. 5. A. A lady is harvesting pandan leaves; B. Clearing the spines from pandan leaves; C. Making mats from coloring pandan leaves.



Fig. 6. A. Traditional umbrella made from Waku; B. Traditional hat as a symbol of East Nusa Tenggara Province.

Ornamental plants

The result of this present study indicates that in Flores *P. dubius* and *P. tectorius* are planted as ornamental plants. In Nangaroro *P. dubius* is the most favourite ornamental plant and it is planted in small pots.

Ritual purposes

The leaves from *P. amaryllifolius* are used as a part of offering in rituals of visiting graveyards or sacred places. The pleasant aroma produced by the leaves of this well-known aromatic pandan is regarded by the people as sacred and enchanting.

Other purposes

Hidayat *et al.* (2001) reported that powder made from the prop roots of a species of *Pandanus* is used for medical infusion. This current study does not record the same practise in the study area. Furthermore, they also recorded the use of the stems of *F. scandens* as ropes. The result of this current study is in accordance with them.

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