

Ethnobotanical study on the Genus *Pandanus* L. f. in certain areas in Java, Indonesia

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ABSTRACT

There were two species of *Pandanus* recorded in Java, *Pandanus amaryllifolius* Roxb. and *Pandanus tectorius* Sol. The leaf of *P. tectorius* is commonly harvested as source of handicraft materials, while *P. amaryllifolius* is for culinary aromatic purposes only. The pandan kunyit (*P. tectorius* Sol.) in Bangkalan and pandan jeksi (*P. tectorius* Sol. var. *samak* Werb.) in Kebumen (Central Java) are the best resource for plaiting industry. Prospect of *Pandanus* plaiting can rise the income of farmers in the village and rise foreign exchange depend on how to fulfill the best pandan and its processing. It is hoped the good relation between farmers and government to sustain and develop the pandan production.

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Key words: ethnobotany, *Pandanus*, uses, Java.

INTRODUCTION

Pandanaceae is plants family which geographically distributed from seaside to high mountains. Pandanaceae consists of 3 genera, namely *Sararanga* Hemsl. (2 spp.), *Freycinetia* Gaidich. (175 spp.), and *Pandanus* Parkinson (600 spp.) (Stone 1976). Distribution area of genus *Freycinetia* spp. are Java, Sumatra, Maluku; *Pandanus* spp. in Java, Sumatra, Bali, Sulawesi, Kalimantan, Little Sunda Islands, Maluku, and Papua, whereas *Sararanga* spp. currently was found in eastern Indonesia (Sulawesi). The diversity of Pandanaceae gave inspiration to inventory use and its potential for Indonesian people.

Backer and Bakhuizen van den Brink Jr. (1968) stated that there are 15 types of *Pandanus* in Java, namely *P. andamanensium* (southern coast of W. and on Nusakambangan), *P. labyrinthicus* (W. coast of Sumatra; might also occur in Java), *P. faviger* (Lamongan and Bali), *P. pygmaeus*, *P. amaryllifolius*, *P. vandermeeschii*, *P. utilis*, *P. boninensis*, *P. kurzii* Merr., *P. tectorius* Soland ex Park, *P. polycephalus* Lamk, *P. furcatus* Roxb., *P. bidur* Jungh ex Miq, *P. nitidus* Kurz, and *P. hasskarlii* Merr. Based on herbarium specimen belongs to Herbarium Bogoriense (BO), LIPI there are 11 types of *Pandanus*.

Pandanus is valuable in either its benefit or

ecology *Pandanus* is useful for ritual, ornamental plants, fragrance, and as industrial material, such as bag, rope, hat, plaited, mat, house and building roofs. From ecology aspect, *Pandanus* can be used as restraining material for wind, sand erosion and tsunami wave, especially in coastal areas with mangrove. Besides wild and cultivated *Pandanus* species correlated with development of community culture currently, the shifting is occurred because of using other products, such as plastic, coconut husks, "mendong" and iron. Some references stated that Pandanaceae has various uses such as foodstuffs, traditional medicine, building material or roof, fiber material, local technology and other uses (Powell, 1976a,b; Stone, 1982, 1983, 1984; Rose, 1982; Silltoe, 1983, Hyndman, 1984; French, 1986; Haberle, 1991a,b; Milliken, 1994; Leigh, 2002; Walter and Sam, 2002).

In Java, handicrafts made from *Pandanus* are found in East Java (Madura, Lamongan) and Central Java (Karanganyar sub-district, Kebumen). Pandan handicrafts came from Banten (Bojong Manik sub-district, Rangkasbitung) are sold as local product markets at West Java and surrounding areas. *Pandanus* in East Java (Madura, Lamongan) and Central Java (Karanganyar sub-district, Kebumen) has good prospect, but the quality should be improved, so the pandan handicrafts communities can fulfill demand at foreign market. Pandan handicrafts were exported to several countries, such as plaited mat from East Java (Lamongan) were exported to China, whereas from Central Java (Karanganyar sub-district, Kebumen) were exported to Canada, China, German, France, and Japan.

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Pandan handicrafts from Banten (Bojong Manik sub-district, Rangkasbitung) were sold for local products at West Java and its surroundings. The pandan handicrafts has good prospects in increasing devise (foreign exchange), so collaboration of communities and government are needed to preserve and develop pandan products.

The objective of this research was to discover and describe the potential of Pandanaceae as foodstuff, local technology material, traditional medicines, ornamental plants, building materials (roofs), socio-cultural roles (tradition ritual and other social values), etc. Socioeconomic roles of Pandanaceae for communities life was also analyzed, i.e. domestication aspects (evolution of extractivisme activities to cultivation to development), post harvest technology, art and crafts techniques (indigenous technology) of Pandanaceae, its management and preservation.

MATERIALS AND METHODS

Area study. Data collecting were conducted at several villages in East Java, Central Java and Banten as follows: (i) Galis Dajah village, Konang sub-district, Bangkalan, East Java, (ii) Durjan village, Kokop sub-district, Bangkalan, East Java, (iii) Aeng Tabar village, Tanjung Bumi sub-district, Bangkalan, East Java, (iv) Saplasan village, Sepulu sub-district, Bangkalan, East Java, (v) Sumber Dadi village, Mantup sub-district, Lamongan, East Java, (vi) Grenggeng village, Karanganyar sub-district, Kebumen, Central Java, (vii) Kalirejo village, Kebumen sub-district, Kebumen, Central Java, (viii) Kebon Cau village, Bojong Manik sub-district, Rangkasbitung, Banten.

Procedures. The research used method which commonly used in anthropology, ecology, physiology, phytochemistry, socio-economy and ethnobiology research. Direct participation in communities life was essential method to obtain information. Information was obtained by open-ended interviewing, free, direct observation at communities and arranging questionnaire. Interview was carried out with customary head, traditional healers, craftsmen, labor, and communities having knowledge on Pandanaceae. Information were also obtained from direct observation at communities location, sample collection (plants and artifact), literature and its analyses.

RESULTS AND DISCUSSION

Use of pandan

Although pandan has long been used by communities in Java for various uses from plaiting mat to medication, and there are previous report on pandan ethnobotany in Java, completed scientific

record which specifically assess pandan use at industry scale at Java was reported by Hofstede (1925), where Tangerang (Banten Province now) is considered as one of pandan industry center at Java. The pandan type which most used as raw material for handicrafts industry is *Pandanus tectorius* (Keim et al., 2006). The products of pandan industry in Java Islands itself were marketed to throughout Indonesia (at that time Netherlands East Indies), even to foreign countries; such as several countries in Europe (Netherlands, France, Italy), Egypt, USA, Canada, Australia, Singapore and with export volume reached 4,8 million pandan hat of 1.049.000 guilder in production year of 1920 which considered as huge export value at that time. However, since Indonesia Independence, export volume of pandan industry was continuously decreasing and at that time pandan industry was dominated by Philippines, which has long been major competitor in Indonesia pandan industry (Hofstede, 1925). After Hofstede until present, study on pandan industry in Java, such as at Banten, Central Java particularly Kebumen, and East Java has not much been done, and also information of current pandan ethnobotany.

Observation of Pandanaceae in East Java, especially Bangkalan district, was carried out at 4 villages of 4 sub-districts. The communities used pandan as plaiting material. Survey result showed that the best quality of plaiting product was handicrafts made by communities of Galis Dajah village, Konang sub-district. Pandan handicrafts produced by communities from Sumber Dadi village, Mantup sub-district, Lamongan district have various types, such as plaited mat, slipper, trash box, tissue box, hat, shopping bag, party bag, laundry box, jewelry box, wallet, etc. Thus pandan plaiting crafts from Kalirejo village and Grenggeng village, Kebumen district has good quality for export, because the communities has good knowledge in pandan processing and making pandan plaiting crafts, from cultivation, maintaining, and use of each pandan species. The processing of raw material into pandan plaiting products was complicated, so the making of pandan plaiting crafts should be managed professionally with involving private sector (local entrepreneurs).

Pandan traditionally is used by communities in Malesia and Pacific for various daily uses. Use of pandan at western part of Malesia (including western part of Indonesia) was not as broader as eastern part of Malesia or eastern part of Indonesia and Pacific (Powel, 1976a,b; Stone, 1982, 1983, 1984; Jebb, 1992; Leigh, 2002). At western part of Indonesia, pandan leaves generally was used as food flavorings (*P. amaryllifolius* Roxb.) and other uses was only for households appliances purposes, such as plaited mat, hat and traditionally ceremony (pandan samak *P. odoratissimus*; pandan bidur *P. dubius* Speng. and cangkuang *P. furcatus* Roxb.). At Lombok (West Nusa Tenggara) pandan leaves were used for war

traditional ceremony which related to soil fertility procession (Keim, 2007).

There are two species of *Pandanus* recorded from areas under study: *Pandanus amaryllifolius* Roxb. and *P. tectorius* Sol. This finding is in accordance with Hofstede (1925) that the two species are among the most cultivated species of *Pandanus* in Java, in which the leaves of *P. tectorius* is most commonly harvested for source of handicraft materials, while *P. amaryllifolius* for culinary aromatic purposes only

Species diversity

At Galis Dajah village (Konang sub-district), Durjan village (Kokop sub-district), and Aeng Tabar village (Tanjung Bumi sub-district), the communities only know one pandan species that are pandan kunyit (*Pandanus tectorius* Sol.), whereas at Saplisah village (Sepulu sub-district) it is known 4 pandan species, those are:

- (i) "Pandan langka" (the rare pandan, *Pandanus tectorius* Sol.). The plants are small and short; leaves are also small and short with length 60-90 cm, width 3-4 cm, spiny. The plants are used to make plaited mat but not preferable because of poor quality.
- (ii) "Pandan panjang" (the long pandan, *Pandanus tectorius* Sol.). The plants are big and tall, leaves with length 150-250 cm, width 5-8 cm, spiny. This plants are preferred by villagers for making plaited mat.
- (iii) Spineless pandan (*Pandanus tectorius* Sol.). This taxon was previously identified as *Pandanus tectorius* Sol. var. *laevis* by Backer and Bakhuizen van den Brink Jr. (1968). However, according to Keim (2009, *pers. comm.*) the infraspecific classification in *P. tectorius* is best avoided as *P. tectorius* is known for its morphological variability, thus the variety infraspecific category is tentative. The plants are big and tall until 10 m, spineless leaves edge. This pandan species are not used for making plaited mat, but as feedstuffs.
- (iv) "Pandan wangi" (the odorous pandan, *Pandanus amaryllifolius* Roxb.). The plants grow in clumps and have thin and sharp leaves at edge like sword, fragrant odor. Pandan wangi is used for traditional food preparation, especially at Melayu communities, it is used as dye, perfume, and appetite. Its extract has been used in food industries, such as bread and biscuit factories as dye materials, and also soya beverage and coconut milk. Pandan wangi has used for traditional medicines for morbili fever, gonorrhoea, syphilis, and anemia.

The communities of Kebumen, Central Java have known 5 pandan species, those are:

- (i) "Pandan jeksi" (*Pandanus tectorius* Sol.). Its leaves are green, thin and limp, glossy, length of 75-125 cm, flexible, short and soft spiny, fast growing. This species is used more for making

plaiting materials because the product is glossy white and has good export quality.

- (ii) "Pandan sari" (*Pandanus tectorius* Sol.). The leaves are not too long only 100-160 cm, soft spiny, slow growing. This species was more used for sewing plaiting border of various crafts.
- (iii) "Pandan jaran" (the horse pandan, *Pandanus tectorius* Sol.). The leaves are longer than pandan jeksi (150-190 cm), rigid and easy to break. This species is seldom used for plaiting because of yellow spotted leaves.
- (iv) "Pandan pantai" (the beach pandan, *Pandanus tectorius* Sol.). Grow at coastal areas, the tree was tall, its leaves are rigid, less used for plaiting.
- (v) "Pandan wangi" (*Pandanus amaryllifolius* Roxb.). The plants grow in clumps and have thin wide 4.5 cm and length of 40-80 cm and also sharply at the edge like sword. In Java, the plants can be found at home yard because of fragrant odor and generally used for fragrant and food colorants (Heyne 1927).

Based on data collected on pandan types used at Java with same local names compare to data recorded by Heyne (1927), it showed that until present the pandan types are still used by communities. This proved that pandan was considered as commodity which can support daily living of rural communities.

Processing of pandan

Generally processing of pandan at each village was similar, but there are several differences at boiling, soaking, and shaving stages. The processing of pandan was done without boiling, through soaking process, and without soaking process. Besides, duration of soaking process and shavings process also differ based on quality of processed pandan products. The processing stages will affect the quality of plaiting materials. The processing stages of pandan plaiting crafts are as follows: (i) Taking pandan leaves at planting fields (garden, backyard, rice field) using knife. (ii) Removing thorn using string. (iii) Dividing one leaf into 4-8 based on leaves width and its uses, using glass-thread/string. (iv) Boiling pandan leaves for 1 hour and then air-dried. (v) Soaking in cold water for 2 days and the water was changed every day to get pandan color into white and glossy. (vi) Sun-drying of pandan leaves. (vii) Leaves shavings using bamboo. (viii) Sun-drying of pandan leaves. (ix) Leaves shavings using bamboo. (x) Plaiting pandan leaves.

At plaiting stages, it is requires skill and patient. It takes 2 days to make plaited mat with size 1x2 m², if it is done continuously, but if it is done in leisure time it will take longer. For size of plaited mat, it is used "cengkol" term. One cengkol is measured from elbow to middle finger. Plaited mat with size 5x3 cengkol is sold at price Rp 20,000.

At Durjan village, Kokop sub-district. There are traditional market every Wednesday where villagers

buy and sell their daily basic needs, such as foods, medicine, materials for ritual, crafts materials and handicrafts (plaited mat). Raw pandan plaited mat or without boiling process with size 1.2x2 m² and colored brown was sold at Rp 15,000 per sheet., while plaited mat with same size but with boiling process was sold at Rp. 30,000 and colored glossy white. Plaiting materials in ribbon form, boiled, and unshaved was sold at Rp. 7,000/bound. One bound was enough to make small size plaited mat. The estimation of length of pandan leaves and plaiting product are as follows:

Table 1. Length of pandan leaves and plaiting product

Length of pandan leaves	Plaiting product
70 cm	40 cm
85-90 cm	50 cm
100 cm	60 cm

At Kalirejo village (Kebumen) and Sumber Dadi (Lamongan), pandan plaiting products was dyed using synthetic dyes.

Diversity of pandan species

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CONCLUSION

The communities of Konang, Kokop and Tanjung Bumi sub-districts, East Java province only know one pandan species, that are pandan kunyit (*Pandanus tectorius* Sol.), whereas at Saplasmah village, Sepuluh sub-district the communities know 4 *Pandanus* species, those are pandan langka (*Pandanus tectorius* Sol.), pandan panjang (*Pandanus tectorius* Sol.), spineless pandan (*Pandanus tectorius* Sol. var. *laevis*) and pandan wangi (*Pandanus amaryllifolius* Roxb.). In Central Java, pandan Jeksi (*Pandanus tectorius* Sol. var. *samak* Werb.) has good quality and good prospect as plaiting materials, because the plants are big, tall, green-colored and long leaves; pandan sari (*Pandanus tectorius* Sol.), pandan jaran (*Pandanus tectorius* Sol.), pandan pantai (*Pandanus tectorius* Sol.), and pandan wangi (*Pandanus amaryllifolius* Roxb.). In West Java, there is one pandan species that are *Pandanus tectorius* Sol.

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