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The characteristic study of nipa (*Nypa fruticans*) kernel oil

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Abstract

Nipa kernel oil was extracted from kernel of nipa palm (*Nypa fruticans*). In Indonesia, nipa palm tree grows naturally at East of Sumatra bay from Lampung to Aceh, almost all part of Kalimantan bay, some of Sulawesi bay and Papua bay. The nipa palm tree grows at approximately total of about one thousand square kilometers. The objective of the study was to determine oil yield fresh mature of nipa kernel through soxhlet method. Also the oil yields were practically determined through both wet method and dry method. In the study, characteristics of the oil kernel obtained by soxhlet extraction were also determined. The characteristics determined were viscosity, iodine value, and saponification value. Data showed that the yields of nipa kernel oil were 27,4% (by soxhlet extraction), 23,2% (by dry method), and 25,1% (by wet method). The characteristic data showed that 76,39 cSt,27°C of viscosity value, 25,55% of iodine value, and 32,86 mg KOH/g of saponification value.

Keywords: nipa, kernel oil, yield

Introduction

There are more than 30 species of palms have been studied demographically, from montane forest (Homeier *et al.*, 2002) to hill forest (Rozainah *et al.*, 2000) and lowland forest (Pinero *et al.*, 1986).

The family Arecaceae (Palmae) is one of the largest monocotyledonous families, comprising over 200 genera and totalling about 2,600 species (Dransfield *et al.*, 2008). Among them, only several species of palms are associated with the mangrove—*Calamus erinaceus*, *Oncosperma tigillarium* and *Phoenix paludosa*—or found as outliers of swamp communitiessuch as *Phoenix reclinata* and species of *Euterpe*, *Manicaria*, *Mauritia* and *Raphia* (see Tomlinson, 1986). However, *Nypa fruticans* is considered the sole member within the family which constitutes as a major element in the mangrove flora (Tomlinson, 1986; Duke, 2006; Dransfield *et al.*, 2008).

Nypa fruticans is a mangrove palm found distributed in South East Asia and Australia. It was considered to be widely distributed in the east and west coasts of India several centuries ago1. However, presently it is found in the Sunderbans, and Andaman and Nicobar Islands along the Bay of Bengal. Although several mangrove plants have been taken up for revegetation of mangrove forests in India and elsewhere, *N. fruticans* has not been considered either for plantation in other mangrove sites or for onservation. Hence its plantation in other mangrove formations along both the east and west coasts of India may be considered and attempted. Badve & Sakurkar (2003). Nipah (*Nypa fruticans*) is a plant species of palm including the family *Arecaceae* (*palmae*) that grows in the mangrove forest. This plant is the only palm species from mangrove areas. Nipah able to survive on land that is somewhat dry or dry at low tide.

Nipah plant is similar to the young sago plants, but not prickly and trunked. Leaves and flowers grow from a horizontal rhizome that sank in the mud. Actually nipah plants have stems that creep on the ground, forming roots immersed in mud, only the rosette leaves that emerges above ground. From the rhizome appears compound pinnate leaves typical of palm, upright or nearly upright, towering up to 9 m above the ground and the stem length between 1 - 1.5 m. Nipah flowers appear in auxiliary panicles, the female flowers gathered at the tip to form a ball while male flowers are arranged in panicles similar strands, each strand consisting of 4-5 grains of male flowers with a length of about 5 cm. Bunches of fruit can be tapped approximately four to five months after the flowers grow (Wikipedia, 2009).

Nipa plant has benefits in terms of economic and non economic. In terms of economic, nipa plants can be used as a source of food and non food as mentioned above. In terms of non-economic, nipa plants have intangible benefits. Rachman & Sudarto (1992) says that the intangible benefits of palm plants include: 1). As a buffer crop ecosystems like

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Table 1 The Effect of Wet and Dry Method on Yield for All Treatments

Treatment	Least Square Means[1]	Probability > T Comparison of all means	
		Wet	Dry
Wet	25.1	---	.0001
Dry	23.2		---

[1]Least Square Means of yield (%)

mangrove plants, 2). Holding soil erosion on the banks of river discharge and resist abrasion caused by wind and tides, and 3). Some types of fish and shrimp often raise their children in the area around the nipah forests, so that the nipah forests can serve as a nursery ground or feeding ground, it can even also as a place to spawn for several species of fish such as mullet, white snapper, milkfish, crabs and so on (Teo, *et al.*, 2009).

Nipa (*Nypa fruticans* Wurmb.) is a potential source of biofuel because of its high yield of sugar-rich sap, which can be converted to alcohol upon fermentation (Rasco & Ragas, 2011)

Nypa fruticans, known as the attap palm (Singapore), nipa palm (Philippines), and mangrove palm or buah atap (Indonesia), buah nipah (Malaysia), dừa nước (Vietnam), Ging Pol in Sinhala in Sri Lanka and gol pata (Bangladesh), dani (Burma). It is the only palm considered a mangrove in the Mangroves Biome. This species is a monotypic taxon, the only one in the genus *Nypa*, grows in southern Asia and northern Australia within the Indomalaya ecozone.

Unfortunately, this colonization has considerable ecological implications. It has been observed that *Nypa* is a highly opportunistic species and the dense monospecific stands that the species forms are out-competing the indigenous mangrove vegetation. This opportunism is exacerbated by the fact that much of the mangrove forest of Nigeria and Cameroon is being felled to provide fuel wood for smoking fish for commercial sale. The resulting exposed mudflats are ideal colonization areas for *Nypa*, and the indigenous (Sunderland and Morakinyo, 2002).

Materials and Methods

Fresh of nipa fruit had taken from Tanjung Api Api, South Sumatera. Two methods of extraction were performed, namely wet method and dry method. Wet method,meat from nipa kernel was ground, then water (60°C) was added, and pressed (2000 kgf). Nipa milk then heated at tempeture of 105°C until the emulsion of oil had been separated, and oil then was taken and yield was determined. Dry method, fresh meat from nipa kernel was dried using vacuum oven at temperature of 70°C for 24 hours, then the dry meat of nipa kernel was pressed (2000 kgf), then the oil was taken and yield was determined. The two methods of extraction were repeated 5 times. In this study, soxhlet extraction of meat kernel nipa oil was also applied, and yield was determined as well as the characteristics, namely viscosity, iodine value, and saponification number. The data analysis was using SAS.

Results and Discussions

Extraction of nipa kernel oil showed (in Table 1.) that the wet method has higher yield (25.1%) comparing to that the dry method (23.2%) ($p<.001$)

By extraction of wet method, oil mostly mixed with water (60°C) added and formed emulsion, the by the process of heating (105°C) and pressing (2000 kgf), much more oil was separated from the meat of nipa kernel oil.

Further more, the characteristics oil extracted by soxhlet has yield of 27.4%, viscosity of 76.79 cSt at 27°C, iodine value of 25.55%, and sapinification number of 32.86 mg KOH/g (Table 2.)

Table 2 The Characteristics of Nipa Kernel Oil

Characteristics	Value
Viscisity, cSt,27°C	76.79
Iodine , %	25.55
Saponification, mg KOH/g	32.86

Conclusions

Yields of nipa kernel oil were 27.4% (by soxhlet extraction), 23.2% (by dry method), and 25.1% (by wet method). The characteristic data showed that 76.39 cSt at 27°C of viscosity value, 25.55% of iodine value, and 32,86 mg KOH/g of saponification value.

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