SAGO PALM 21: 20－24 (2013)

Current Status of Starch Factories of Sago Palm and Cassava in Bogor, Indonesia

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Key words: Bogor, cassava, Indonesia, sago palm, starch factory, utilization

Introduction

Indonesia has a huge growing area of sago palm as well as Papua New Guinea, but the major part of the area is found in Irian Jaya (West Papua and Papua States). On the other hand, the growing areas are only 150 ha and 100 ha in Banten and West Java Province in Java Island, respectively (BPPT, 2006) (Table 1). The reports on the utilization of sago palms for starch extraction in Java Island are very few. We report here the current status of sago starch factory in Bogor in Java Island in comparison with the starch factory of cassava. The research was carried out on December in 2009.

Results researched and Discussion

Starch factory of sago palm

The factory we visited was located at Slawi Village, Tana Baru Town, Bogor Prefecture. The factory was family scale and averagely produced air-dried 300 to 500 kg starch per day from 2 ton debarked logs of sago palm (ca. 1 m long) from Serang in Banten Province. The price of log was Rp. 600 to 800/kg. The debarked logs piled along the road (Fig. 1A) were transported to the factory (distance; ca. 100 m) by 4 men and split the logs into 8 portions lengthwise by 4 men. The split logs were rasped by the two power-driven raspers with a rotary drum (Fig. 1B and 1C).

The rasped pith was put into the saran-net of 100-mesh in running water and squeezed to extract the starch by two men (Fig. 1D). The water used for the starch extraction was pumped up from the small river running along the factory. The extracted waste of sago palm was thrown away to the river. Four sedimentation tanks (Fig. 1E) were equipped and the starch was taken out from the tank and dried up in the shallow bamboo baskets with 80 to 90 cm diameter under the sun for one day (Fig. 1F). Fifty kg dried starch put into the bag made from hemp were shipped for Bogor, Jakarta and Tanjerang for using noodle making and traditional meat ball (“Bakso”). The price of the starch was Rp. 2,200/kg. There were 8 starch factories of sago palm in Bogor.

Starch factory of Cassava

In Indonesia, cassava was mainly produced in Java Island and the production in 2006 in West Java Province was 2.04 million ton (Table 2). The factory we visited was located at Kg. Batakan, Sukaraja District, North Bogor. The peeled cassava materials were bought from Gunung Pancar about 30 km away (Fig. 2A). The price for one “pikul” (about 72kg) was Rp. 56,000. The factory processed 20-30 ”pikul” (about 1,440 to 2,160 kg) of cassava per day and produced 400 to 600 kg sun-dried starch. In the factory the cassava was peeled thinly again by a man and processed by a power-driven rasper with a rotary drum by another man (Fig. 2B and 2C). The rasped material with water was spread over the wire net, 5 to 6 m and about 1 m width, with about 60 mesh through the pipe from the rasper (Fig. 2B). The wire net was moving back and front and starch was extracted by the water (underground water) shower from the pipe equipped above the wire net (Fig. 2B). The underground water was used for the starch extraction. The extracted solution containing starch was

Table 1. Sago palm growing area in Indonesia (ha)

Island	Province	Natural forest	Farming 2nd forest	Plantation	
				Developed	Planted
Sumatra	Total (129,659)	6,500	81,659	13,500	28,000
	Aceh	—	3,000	—	—
	North Sumatra	—	3,000	—	—
	West Sumatra	5,000	7,500	—	—
	Riau Island	—	20,209	—	—
	Riau	—	42,450	13,500	28,000
	Jambi	—	1,000	—	—
	Bengkulu	1,000	2,000	—	—
	South Sumatra	500	500	—	—
	Bangka Belitung	—	1,000	—	—
	Lampung	—	1,000	—	—
Kalimantan	Total (21,000)	3,000	18,000	—	—
	West Kalimantan	1,000	8,000	—	—
	Central Kalimantan	1,000	2,000	—	—
	South Kalimantan	—	3,000	—	—
	East Kalimantan	1,000	5,000	—	—
Sulawesi	Total (19,500)	2,000	17,500	—	—
	North Sulawesi	—	1,000	—	—
	Gotontalo	—	500	—	—
	Central Sulawesi	—	5,000	—	—
	South Sulawesi	—	5,000	—	—
	Southeast Sulawesi	2,000	6,000	—	—
Maluku	Total (65,000)	10,000	55,000	—	—
	Maluku	5,000	35,000	—	—
	North Maluku	5,000	20,000	—	—
Java	Total (250)	—	250	—	—
	West Java	—	100	—	—
	Banten	—	150	—	—
New Guinea	Total (850,000-950,000)	450,000-500,000	400,000-450,000	—	—
Indonesia	Total (1,085,409-1,185,409)	471,500-521,500	572,409-622,409	13,500	28,000

Source: BPPT (2006)

Table 2. Main Provinces of cassava root production and their amount in Indonesia (2006)

Province	Production (t)
East Java	3,680,567
Central Java	3,553,820
West Java	2,044,674
Lampung	1,909,661
West Kalimantan	250,173
East Kalimantan	101,249
North Sulawesi	82,416
South Kalimantan	82,389
Central Kalimantan	47,586
Indonesia	16,297,000

Source: BPS (Indonesia Statistic Agency), 2006

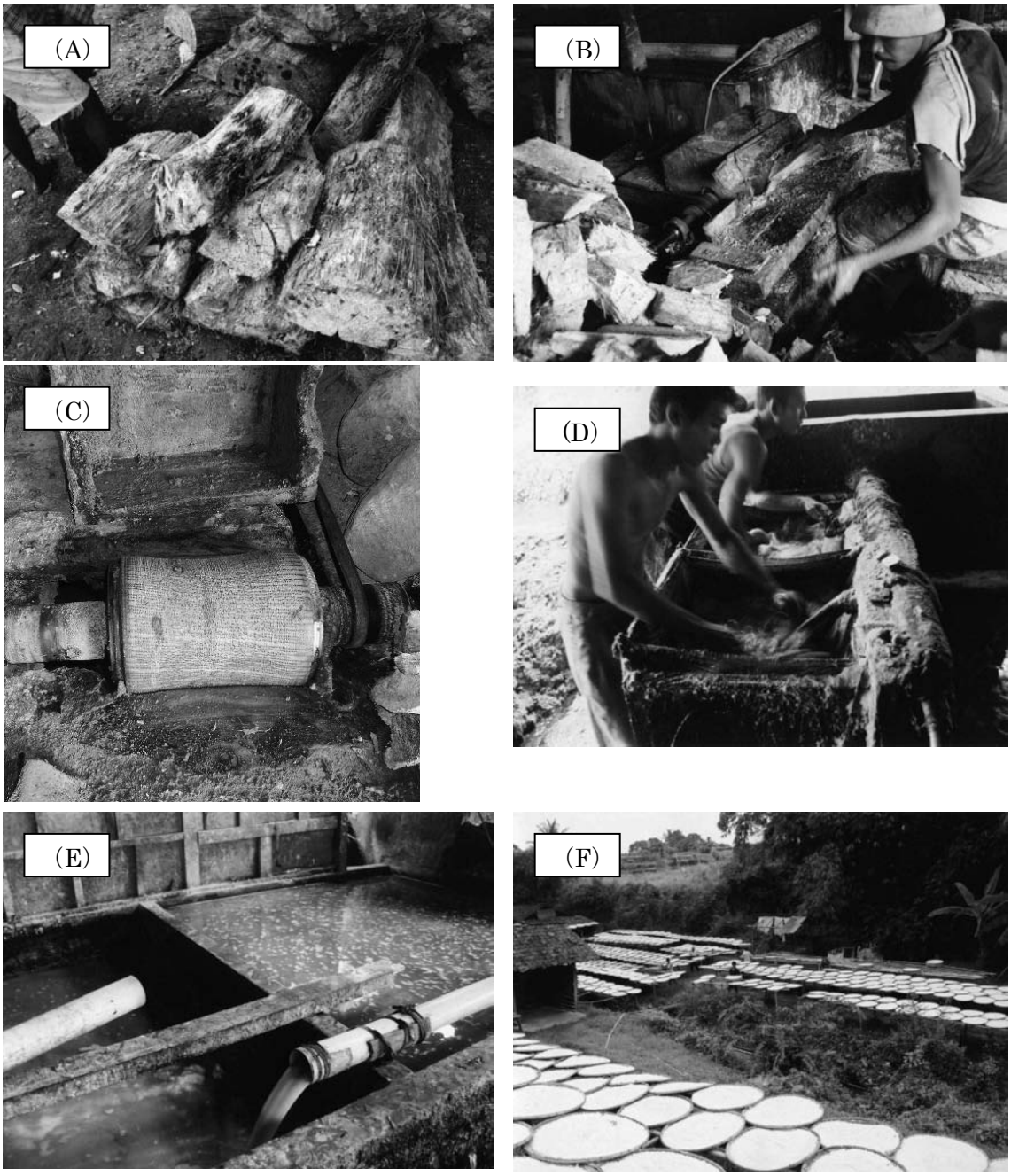

Fig. 1. Processing of starch extraction in the starch factory of sago palm in Bogor.
A: Debarked and split sago palm pith piled along the road side.
B: Raspering the pith.
C: Power-driven raspering machine.
D: Extraction of starch from the rasped pith.
E: Sedimentation tank of starch.
F: Drying of starch in the shallow bamboo baskets under the sun.

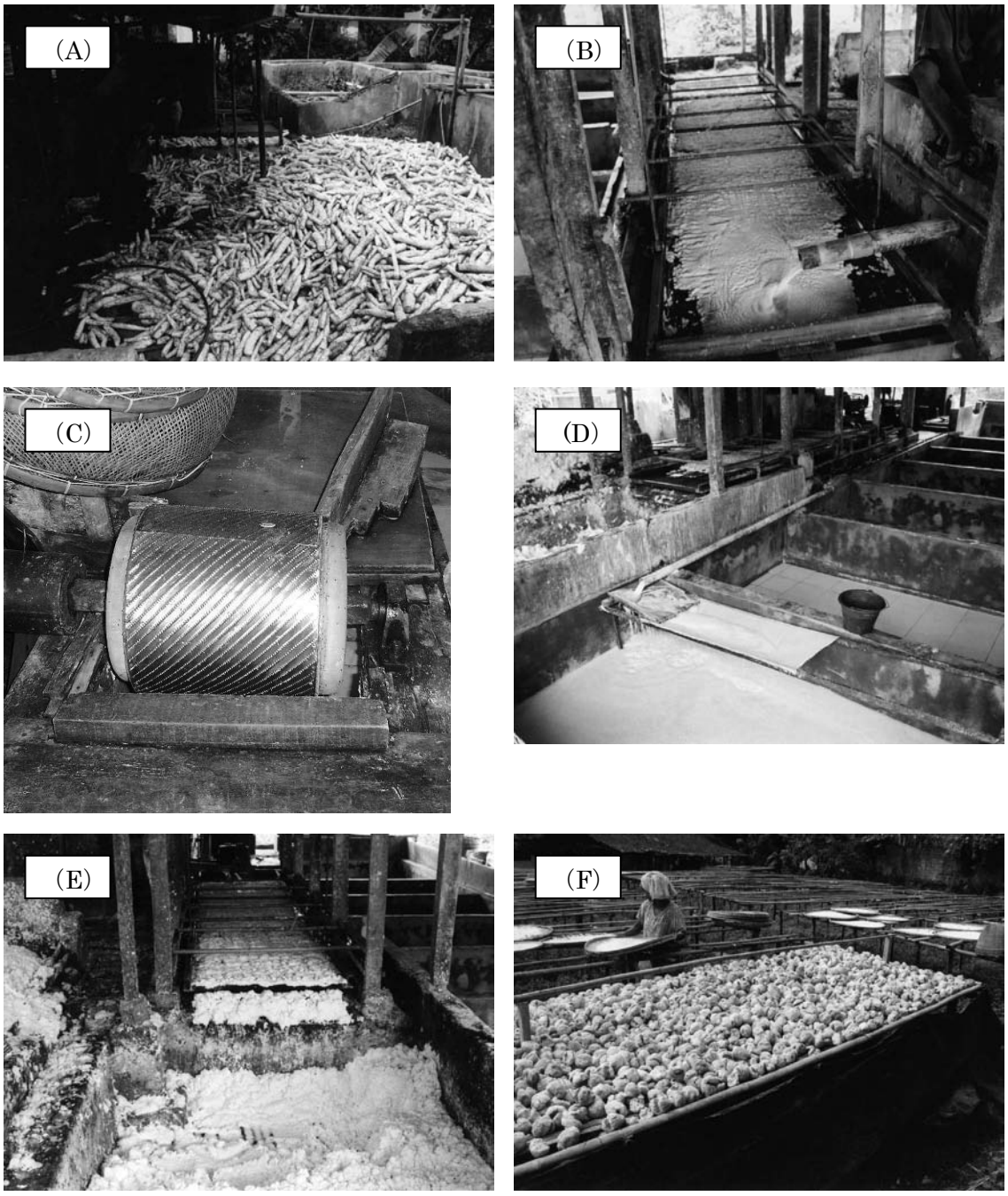

Fig. 2. Processing of starch extraction in the starch factory of cassava in Bogor.
A: Peeled and piled cassava.
B: Raspering the cassava and spreading the rasped materials with water on the wire net through the pipe. Starch was extracted by the shower water from the pipes equipped above the wire net.
C: Power-driven raspering machine.
D: Sedimentation tank of starch.
E: The storage tank of extracted waste.
F: Drying of extracted waste balls under the sun.

introduced to the sedimentation tank through the pipe after receiving the funnel (Fig. 2D). The extracted waste was dropped into the storage tank from the end of the wire net (Fig. 2E). The starch was sun-dried following the same way of sago palm in the shallow bamboo baskets for one day under fine condition by 4 persons. The sun-dried starch (50 kg in the bag made from hemp) was shipped to the local market for using cake-making (Rp. 2,000 to 3,600/kg).

The extracted waste of cassava was shaped into balls with 5 cm diameter and they were dried up under the sun for 3 to 5 days (Fig. 2F). After sun-drying, they were packed into the bags made from hemp in 40 kg and shipped for additional starch of cake, etc. (Rp. 1,000/kg). There were 7 starch factories of cassava in Bogor.

Comparisons of the current status of starch factories of sago palm and cassava are shown in Table 3. The number of laborers was 2.5 times higher in the sago palm factory than in the cassava factory, although the starch production per day in the former factory is a little less than that of the latter factory. The prices of sago palm and cassava materials were almost same in weight basis. The amount of processed materials per day was higher in the starch factory of sago palm than in that of cassava. Starch extraction efficiency (Sun-dried starch weight/fresh weight of materials x 100) was also a little less in the starch factory of sago palm than in that of cassava. Both of the starch extracted from sago palm and cassava were dried up under the sun in the same way. The purposes of utilization of the starch made from sago palm and cassava were totally different and the price of cassava starch is higher than that of sago starch.

The most conspicuous difference between the two factories was found in the utilization of the waste of starch extraction. In the cassava factory, the waste was simply processed and sun-dried for shipping to local markets. On the other hand, the waste was not utilized in the starch factory of sago palm and thrown away to the river running along the factory. The cleanliness of the cassava factory was far higher than that of the sago palm factory due to the differences in the waste treatment and the starch extraction processing.

The starch extracted from sago palm and cassava may have been playing important roles regarding to supply of cheaper starch materials for the local food industries. However, the starch production might be fluctuated by the amount of materials and their prices in future.

Table 3. Comparison sago palm and cassava starch factory in Bogor, Indonesia (2006).

Item	Sago palm factory	Cassava factory
Location	Slawi Village, Tanah Baru Town	Batakan Village, Sukaraja District
No. of labours	15 persons	6 persons
Place collected materials	Western Areas in Banten Province	Gunung Pancar, Bogor
Price of materials	Rp.600-800/kg	Rp.778/kg
Processed materials (a)	2,000 kg/day	1,440-2,160 kg/day
Starch production (b)	300-500 kg/day (Sun-dried)	400-600 kg/day (Sun-dried)
Efficiency (b/a)	15-25%	28%
Raspering	Motor driving rasper	Motor driving rasper
Starch extraction	Hand	Automated
Drying	Sun-dried	Sun-dried
Waste of extraction	Through away	Utilized
Packing*	50 kg bag	50kg bag
Shipping for;	Bogor, Jakarta, Tangerang	Local market in Bogor
Price of starch*	Rp. 2,200/kg	Rp. 2,000-3,600/kg
Utilization of starch	Noodle, Meat ball ("Bakso")	Cake
Smell of starch fermentation	Yes	No

*Sun-dried starch. The starch production fluctuated by the season (wet and dry) and amount of materials supplied.