Palm Sugar in East Madura

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The island of Madura lies off the northeast coast of Java, Indonesia. It has a relatively dry climate and scarcely any remaining natural vegetation, most of the island being covered in small holdings planted with rice (where irrigated), coconuts, tobacco, vegetables, bamboo, and fruit trees, perhaps the most famous of the last being the Madurese *salak* (a variety of *Salacca edulis*). Areas of higher ground along watersheds are covered with a scrub wilderness and are not cultivated, presumably because of the lack of water and the proximity of the limestone rock to the surface; these areas serve as a source of fodder for animals and fuel. Throughout the eastern and drier part of the island, *Borassus sundaicus* is the most conspicuous palm, occurring on sand dunes, field margins and in the stony scrub wilderness. It is almost certainly planted or subspontaneous near villages but could be native in the sand dunes in the north of the island and in the scrub wilderness.

Beccari (1924) considered that collections of *Borassus* from East Java eastwards differed sufficiently from *Borassus flabellifer* L., the lontar of India, Ceylon, the Bay of Bengal, and Indochina, to constitute a separate species, *Borassus sundaicus* Becc. The differences are slight, being found in details of the fruiting corolla, absence of scales

1. A stand of *Borassus sundaicus* near Gapura, East Madura.

2. A sugar tapper, squeezer in his left hand, two curved knives in holder on his belt, a coconut holder for *laro* hanging from a holder on his belt, and a climbing-loop held in his right hand.

3. A closer view of the squeezer. The rachillae are squeezed in the curved part of the squeezer.

on the lamina, stomatal distribution, and degree of branching of the male inflorescence. As far as I know, nowhere are the two taxa in cultivation side by side and certainly herbarium specimens are almost all inadequate for assessing the relationships of the two taxa. At this stage it is not intended to discuss further the specific delimitation within *Borassus* and for the purposes of this ac-

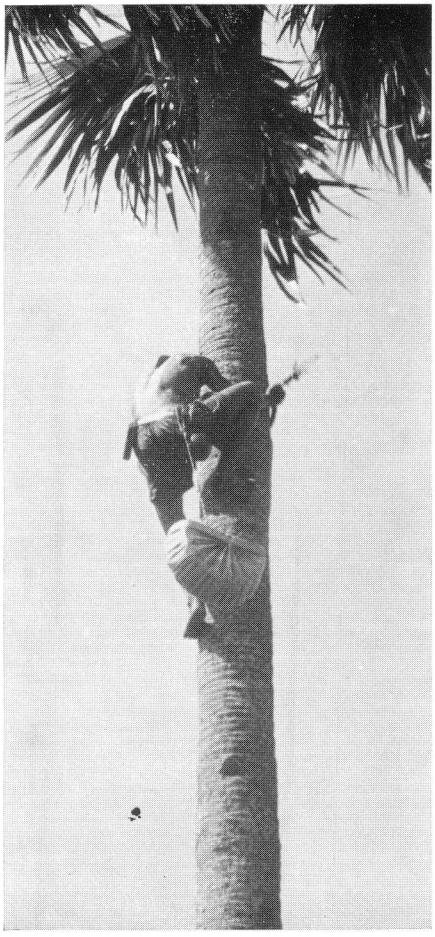
4. A tapper at work in the crown, a bucket and some covering baskets just visible.

count the Madurese taxon will be referred to as *Borassus sundaicus*.

Occurring in thousands of individuals, *Borassus sundaicus* must be one of the most important economic plants of Madura. Every part of the plant is used in some way by the Madurese villagers, even if only as a source of fuel.

The major use of *Borassus* in the east of the island is as a source of sugar, this being an important village cash crop. The palm is known as *tarebung* in Madurese and *siwalan* in Javanese. Though the method of sugar production may vary slightly from place to place, the method used in Gapura, a small village near the south coast, is probably representative. In the area around the village, both male and female trees of *tarebung* are tapped, though it is more usual for the male trees to be used. The sugar-making process is usually a family business with the men of the family tapping the palms and the women extracting sugar from the sap. In one day a man taps about 30 trees; the tapper mostly owns his own trees but he will also hire himself out for tapping.

The equipment used for tapping in Madura is very specific, each piece of the equipment having its own Madurese name. One tapper recalled how he had bought his tapping equipment from another tapper and had not made it himself, though parts are of relatively simple construction and appear to be easy to make. The equipment consists of 1) buckets (*temba*) made from folded *Borassus* leaves often smoked to make them more durable, 2) a climbing-loop (*salampar*) made from *Borassus* petiole fiber, sometimes reinforced by rawhide, held at each



5. The tapper climbs down the palm, full bucket of sap hanging from the holder on his belt.

6. Freshly collected sap is strained through a coconut leaf-sheath sieve into a clean bucket, thus removing *laro* and debris.

end in two hands behind the trunk to gain frictional support, 3) a curved knife (*pangerat*) for slicing the rachillae of the inflorescence and splitting the bracts (occasionally two knives are used, one for each job), 4) a wooden holder for the knife (*camplak*), 5) *laro*—a mixture of the powdered bark of *Lannaea coromandelica* and the crushed dried leaves of *Anacardium occidentale*, or the leaves of *Schleichera oleosa* only; this mixture is added to the bucket collecting the sap, 6) a container for *laro* (*tambut*) made from a polished coconut shell, with a loop made from *Borassus* petiole string, 7) a holder (*balajut*) for the climbing-loop and *laro* container—this can be made of wood or horn, 8) a squeezer (*pangape*) made from two polished pieces of wood tied with *Borassus* fiber at one end, used for squeezing the rachillae, 9) baskets (*bajut*) made from loosely woven *Borassus* leaflets, used for putting over the inflorescences, 10) a sieve (*tapes*) made from coconut leaf sheath, and 11) rope (*tale*) made from *Borassus* petiole fiber.

Tapping begins when the inflorescenses reach a stage just before anthesis —"five days after the inflorescenses are ripe" is the term used by the Madurese tapper—and four or five inflorescences on the tree may be tapped at the same time. The male inflorescence is massive, almost 2 m. long, consisting of about

7. The tapper returns to his village with the morning's tappings.

eight partial inflorescences of three rachillae each. There are hence at least 24 potential sources of sap in each inflorescence, but in practice only a limited number of rachillae (normally 12) is tapped at any one time. The first stage in the tapping of an inflorescence is the squeezing of the rachillae by means of the *pangape*, the rachillae being gently but firmly squeezed in the ends of the *pangape*. This squeezing process is known as *ngaremo*. After a preliminary period of squeezing (twice a day for three days), the rachillae, when cut, will begin to produce sap. This preliminary squeezing apparently induces wound activity and is comparable to the beating with sticks or burning used to stimulate secretion in *Arenga pinnata* sugar-tapping. When the inflorescence has begun to produce sap, the tapper climbs the tree twice a day every day. In the early morning he climbs, removes the *bajut*, the basket covering the inflorescence, pours the sap accumulated in the collecting bucket into another bucket hanging from his belt, slices off a section about 3 mm. thick from the rachillae to be tapped, and squeezes the rachillae in the *pangape*. He then puts a collecting bucket under the freshly cut rachillae, which may have to be tied with twine to keep them dripping into the bucket, adds the *laro*, covers up the inflorescence and the bucket with the basket, and works on to the next inflorescence. When he has finished collecting from all the inflorescences on one tree and has made fresh cuts on the rachillae, the tapper climbs down the tree. He then strains the collected sap through the coconut leaf-sheath sieve to remove debris and *laro*, the strained sap collecting in a clean bucket below.

The function of the *laro* has not been clarified but it is suggested that it has a bactericidal and/or fungicidal action, preventing fermentation of the sugars in the sap. When asked what happened if *laro* was not included in the sap, the tapper said that the sap would spoil and become sour.

One inflorescence can produce up to two and one-half liters in one day including the morning and evening collection. Usually a single climb of the tree gives about a bucket full of sap—about five liters. The freshly collected sap is delicious, cool, very sweet, and slightly soporific. It is rarely drunk neat, usually being taken home directly for sugar-making. Most tappers agree that the morning collection of sugar is greater than the evening collection and that although the palms may be tapped throughout the

8. The kitchen used for making sugar. Note the crenellated oven mouths.

9. The final stages of sugar-making when the thick syrup is beaten as it fudges.

year, the yield of sugar is much greater during the dry season. Tapping is also reduced somewhat during the wet season, probably due to pressure of other agricultural work and inclement climbing weather. Generally about 30 trees can be climbed and tapped each day, and the inflorescences, once begun, will go on yielding sap for about three months as long as the squeezing and slicing continues. Furthermore, slicing in any partial inflorescence alternates from rachilla to rachilla to give best results.

When the tapper has filled as many buckets as he can carry on a yoke over his shoulder, he returns to the sugar-making hut, usually a separate hut next to the kitchen of the house. Inside the hut on the hard earth floor is a series of hard clay hearths, built into each other, with lateral mouths for feeding the fires and crenellated openings in the upper part to hold cooking pots. The whole

10. The crystallized sugar on the left, a pot of clean water with two coconut-shell scoops in the middle, and a bucket containing the *Borassus* leaflet molds on the right.

composite hearth can hold four or more clay or iron cooking pots of various sizes, and in the huts visited about seven bucketsful of sap can be processed each day. It takes about two hours to boil down the sugar from about one and one-half buckets and the output of the hut varies from three and one-half to five kilos of sugar a day.

Sap is sieved again through a coconut leaf-sheath sieve and into the first and smallest of the cooking pots, where it is boiled down, and more sap is added several times. When it is beginning to thicken, it is transferred to the next largest pot and so on until a thick syrup is produced, when it is transferred to the largest pot and stirred constantly. When the syrup has the consistency of cream, the pot is removed from the fire and the syrup is stirred and beaten constantly until it crystallizes. As it crystallizes, beating is continued and then the fudge-like sugar is removed from the pot with a scoop made from a piece of coconut shell and pressed firmly into neat little molds made from woven *Borassus* leaflets. The molds filled with sugar are then placed on a tray made of woven bamboo and allowed to cool.

Finally, the hardened sugar is eased out of the molds and wrapped in elegant boxes made of *Borassus* leaflets or in more ordinary packs of plaited leaflets. In the relatively dry climate of Madura the sugar can be stored like this indefinitely, but in a moister climate it has a tendency to deliquesce.

To obtain really pale-colored sugar, egg white is sometimes added to the syrup, but of course such pale sugar will be much more expensive than the normal pale brown product. The sugar is quite delicious eaten by itself, being reminiscent of maple candy or fine fudge.

The owner of the sugar-making concern sells the sugar to middlemen or women who collect the sugar from week to week and sell in the local markets to further dealers who may eventually ex-

11. The sugar is scooped out and pressed into the mold, then placed on a split bamboo woven tray.

port the sugar from Madura to Java. It is generally recognized that the fine pale palm sugar from Madura is superior to that made from *Arenga* in West Java, and the Madurese sugar commands a favorable price in Javanese markets, supply rarely meeting the demand. Prices of the sugar vary but a sugar tapper and his family can live off the proceeds of sugar tapping alone if the tapping is carried out intensively full time.

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Reference

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