

Traditional Farming System of *Supari* (*Areca catechu*) in Rural Bangladesh

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Supari tree (*Areca catechu* L.) is commercially the most important palm grown in India, Burma and Bangladesh. It is the predominant crop of home gardens of southern coastal Bangladesh where it is widely grown as a cash crop both along the boundaries of home gardens and as block plantings within them.

Its important product is the *supari* (nut), an important constituent of mastication along with *pan* (leaves of *Piper betle*) all over Southeast Asia. Cultivation of *supari* palm for nut is an age-old practice. Marco Polo mentioned the habit of chewing of betel-nut (*supari* palm) in 1298 (Blatter 1978). Adams in his translation of Paulus Aegineta referred to the betel-nut as introduced to *Materia Medica* by the Arabs.

The palm is usually seen as a garden plant, but occasionally, and in certain localities, especially of Western and Southern India, of Sri Lanka and of Burma, where the soil and climate may be exceptionally favorable, it is grown in special gardens along with coconut, plantain, orange, mango, etc., with or without the *pan*. Inter-cropping of black pepper, nutmeg and spices with betel nut increases the profitability to the farmers (Bhosale et al. 1994; Korikanthimath & Rajendra 1994). Fischer found it growing wild in the

Attapadi valley of Malabar in dense evergreen jungle (Blatter 1978).

It is most commonly cultivated in Bangladesh, India and Burma. The tree normally grows on farmland boundaries, homesteads and marginal lands in rural districts. In certain areas, it is cultivated in orchards. The tree is planted from nursery raised seedlings and/or planting wildings. According to Rashid (1991), there were a total of 110 million *supari* trees over an area of 72,600 ha in Bangladesh. Annual production of *supari* is estimated to be 86,060 tons.

There have been a few studies on different aspects of *supari* palm husbandry. A brief account of cultivation techniques and production of *supari* in different districts of Bangladesh was given by Rashid (1991). Davis (1988) described the use of the palm in Indonesia and elsewhere in south and Southeast Asia. The present paper is an attempt to investigate *supari* palm husbandry in relation to

landholding sizes of households in an area of Bangladesh where *supari* tree is abundantly grown.

Materials and Methods

The study was carried out in the district of Comilla where the *supari* palm is a common species cultivated abundantly in homesteads and farmlands. The area falls under Brahmaputra alluvium tract, an important agro-ecological zone of Bangladesh. Soil of the tract is categorized as Meghna Estuarine Floodplain and the dominant texture of the soils is sandy loam. The soils are naturally fertile and are replenished every year by fresh deposition of silt carried down by the floodwaters. The soils are acidic in character and the pH ranges from 5.5 to 6.8 (Hussain 1992).

The study was conducted by interviewing members of rural households. The households were stratified into five categories based on landholding size: (a) landless (up to 0.20 ha), (b) marginal (0.21-0.50 ha), (c) small (0.51-1.0 ha), (d) medium (1.01-2.0 ha) and (e) large (>2.0 ha). Data were collected from two villages by randomly selecting ten households of each household category in each village totaling 100 samples of households. There were 624 households in the study villages. For each household, a semi-structured questionnaire was used to gather the field data on age and distribution of *supari* trees, yield of *supari*, marketing of products and income from the palm products.

Results and discussion

Distribution of *supari* trees in the rural landscape

In the study area, the farmers have access to several small, non-contiguous parcels of land broadly encompassing two ecologically different land types, *ucha* (high level and more or less flat land) and *nichu* (low-level and flat land). *Nichu* areas are normally flooded in the rainy season while *ucha* areas remain above flood levels. The difference in landforms and hence the ecological factors affect

the uses to which farmers put the lands. *Nichu* areas are used for growing seasonal crops including rice, other cereals and vegetables.

Ucha areas are suitable for homesteads. A typical homestead in Bangladesh is called *bari*, which contains the houses of different pairs of the extended family, their vegetable gardens, threshing grounds, cattle and poultry sheds, ponds, trees, bamboos and shrubs (Leuschner & Khaleque 1987). Farmers plant most plant species including all timber tree and selected tall fruit trees on the boundary of the homesteads. The plants of homestead edges serve the multiple needs of the farmers not only by providing products but also by acting as a live fence and as boundary demarcation. Small-crowned food and fruit producing trees dominate the part of the home garden near the living quarters, where fruits are safe from pilferage.

When distribution of sampled trees in the study area was examined, 77% of the trees were found on homesteads, 15% on pond banks and 2% on canal banks (Table 1). The rest of the trees were distributed on crop fields and along roadsides. The larger landholders held a higher number of palms in comparison to the lower landholders. However, number of trees in different sites were found significantly ($P < 0.0001$) different whereas it was insignificant ($P < 0.05$) among the various household categories. The significant variation on the number of *supari* trees in different sites was due to the presence of the highest number of trees (77%) on the homesteads.

Age-class frequency distribution of *supari* trees

Presence of trees of different age-gradations or age-classes is important for sustainable production. If the trees in a particular area consist entirely of mature and over-mature trees, the trees will go out of production at one stage, and sustained annual production will not be possible because of the absence of trees of younger age-classes. Since individuals of younger age-classes replace over-mature trees over time, an appropriate proportion

Table 1: Distribution of sampled *supari* palm in different sites on the rural landscapes.

Household size	Sites				
	Homestead	Pond bank	Canal bank	Crop field	Road side
Landless	342	1	12	0	28
Marginal	293	37	0	0	50
Small	395	209	0	7	47
Medium	592	142	30	9	38
Large	987	131	20	1	18
Total	2609 (77%)	520 (15%)	62 (2%)	17 (1%)	181 (5%)

Table 2: Age-class frequency distribution of sampled *supari* palms growing in the study area.

Household size	Age-class in years					
	0-7	8-15	16-23	24-31	32-39	>40
Landless	114	113	91	7	58	-
Marginal	150	45	68	48	69	-
Small	177	212	116	55	80	18
Medium	127	300	136	125	55	68
Large	392	67	294	265	78	61
Total	960	737	705	500	340	147
Percentage	28%	22%	21%	15%	10%	4%

of individuals of younger age-classes is also required to make annual production sustainable (Kamaluddin et al. 1998).

Farmers in the study area had *supari* palms of different age-classes (Table 2). When distribution of individuals of different age-classes was examined, the highest number of individuals was found for the 0-7 years age-class. Frequency of over-mature trees was less than the younger and middle-aged trees, due to felling of over-mature trees. When trees become over-mature, usually at an age of more than 32 years, farmers fell them for sale or for domestic purposes.

Since middle-aged trees (16-31 years old) produce more *supari* annually, annual yield in the future will depend on the number of middle-aged trees in the area. Frequency of individuals in the middle-aged classes (16-23 and 24-31 age-classes) was 43 percent. The highest frequency of individuals in the lower age-classes indicates that there was a sustainable regeneration of *supari* palms in the study area. The number of trees among the household categories in different age-gradations was found to be significantly different at $P < 0.05$ level of probability.

Production of *supari*

Supari palms generally bear fruit at seven or eight years of age. Fruits are normally harvested every year. The fruiting life of a tree may extend from 30 to 50 or 60 years (Blatter 1978). The tree flowers in February and March and the fruits are ready for harvesting from September to December. Poor professional farmers usually do the plucking of *supari* (nut).

According to farmers, the yield of *supari* varies considerably with tree age, weather conditions, manure applied and site quality. On average each tree produces two bunches of fruit, sometimes three or four. A good bunch gives 200-300 *supari*, and an especially good one about 400. Average rate of *supari* production for the study area was 3.8

pons (1 *pon* = 80 *supari*). Younger trees produced 3.2 *pons* per tree per year (Fig. 1). Middle-aged trees (16-23 and 24-31 age-classes) produced the highest amount of nut, on average 5.6 *pons* per tree per year. Farmers believe that the use of both organic and inorganic manure and gentle rainfall during the fruiting period will give better size of the bunches and hence, large number of fruits per bunch. Unfavorable rain and cloudy weather in early fruiting causes many of the young fruits to fall off and allows only a smaller number of *supari* on each bunch to reach maturity. Farmers also believe that fertile and good drainage conditions of soil support the vigorous growth of trees and hence the production of fruits.

In the study area, there were about 15,095 harvestable *supari* trees (more than eight years old)

1. Yield of *supari* per tree per year of *supari* palms of different age-classes growing in the study area

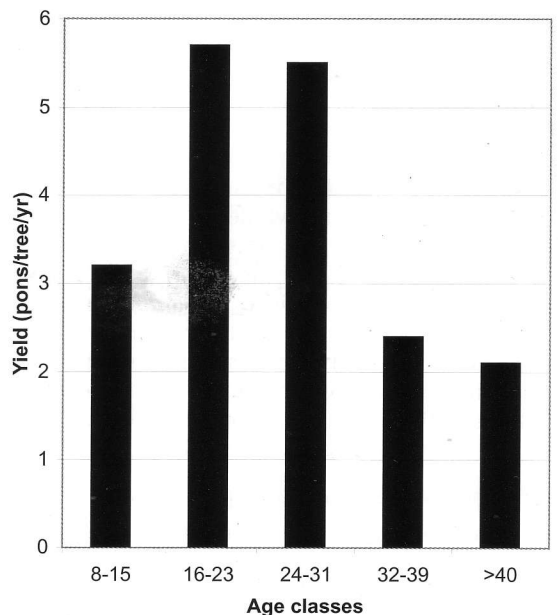


Table 3: Number of trees per household, yield of palm products per year and income per year from sale of raw *supari* and *tari* (Tk. 51.00 = 1US\$)

Household size	Average number of palms owned	Average number of harvestable palms	Palm Products		Sale Value		Income per year (Tk.)
			Raw <i>supari</i> (pon)	<i>Tari</i> (kg)	Raw <i>supari</i> @ Tk. 45/pon	<i>Tari</i> @ Tk. 125/kg	
Landless	19.15	13.45	51.11	-	2299.95	-	2299.95
Marginal	19.00	11.50	43.70	-	1966.50	-	1966.50
Small	32.90	24.05	30.46	60.93	1370.70	7616.25	8986.95
Medium	40.55	33.70	42.69	85.37	1921.05	10671.25	12592.30
Large	57.85	38.25	48.45	96.90	2180.25	12112.50	14292.75

yielding about 57,359 *pons* raw *supari* per year. Most of the *supari* is used for making *tari* (dried *supari*); it takes 1.5 *pons* to produce 1 kg of *tari*.

Marketing of Products

Raw *supari* (matured) and *tari* are the principal products for market. Farmers usually pluck mature and ripe *supari* from September to December. Professional male members pick *supari* by climbing the trees; female members usually do the task of making *tari*. *Tari* is made by keeping the nuts in the husk in a heap for a week to make them ferment a bit, and then drying them in the sun for 45 to 60 days till the husk completely separates from the nut. Marketing of products normally follow a short-cut channel and is entirely done by the private sector characterized by three or four intermediaries operating between the producers and the consumers in distant centers. The shortest marketing channel is the direct sale by the growers to the neighboring consumers through primary village markets that are usually held once or twice a week. Landless and marginal farmers usually follow this type of marketing channel. Farmers having a substantial quantity of marketable surplus reach the consumers in the urban centers through *bepari*, (commissioned agent-cum-wholesalers), *arathdars* (wholesalers in city market), *farias* (local itinerant traders) and small resident traders. Farmers sell to the *beparies* in the local markets. *Beparies* supply to the *arathdars* in city markets. *Arathdars* sell to small resident traders and local itinerant traders who sell it to the consumers. The price of raw *supari* and *tari* varies from Tk. 40.00 to Tk. 50.00 per *pon* and Tk. 120.00 to Tk. 130.00 per kg., respectively.

Income from *supari* palm products

Income from *supari* products substantially increases with the increase in household size. Across households average income from the sale of *supari* products per year varies from Tk. 3000.00

to Tk. 14293.00 per household in different household categories (Table 3). In general, farmers with small landholding sell their whole amount of *supari* as raw to get immediate cash whereas rich farmers preserved two-thirds of their entire raw *supari* as *tari* to sell off-season. *Tari* is in great demand when raw *supari* is not available and the price of *tari* is almost three times higher than that of raw *supari*. Poor farmers are given four raw *supari* (equivalent to Tk. 2.50) for plucking *supari* from a tree of larger farmers.

Planting and felling strategy of farmers

Farmers in the study area were found regularly to fell over-aged and/or less-yielding trees and replace them by planting new ones. They plant *supari* trees under the canopy of other homestead plants. Two-year old seedlings are normally transplanted for better survivability. Small and marginal farmers usually purchased saplings (Tk.5.00 per saplings) from nearby markets. Farmers with medium and large landholdings raise nurseries. A nursery is prepared in a shady place near the homestead, where in October and November, ripe *supari* from mature trees are sown in parallel ridges a few centimeters apart. The nuts are slit slightly at the crown. The nursery is covered with straw or palm leaves till the seeds germinate in June or July of the following year. For high land the seedlings are transplanted in June-July, for low land in March-April. In the first transplanting, the *supari* palms are placed about three to four meters apart. When the first have come to bearing fruit, a second regular transplanting takes place. Similarly, when the second generation have come to bearing, a third regular transplanting also takes place and so on. As a result a regular age-gradation has been maintained.

Constraints in *supari* palm husbandry

Constraints faced by farmers as mentioned by the respondents during the study include crop loss

due to pests and diseases, shortages of land mainly for marginal and small farmers, distantly located markets, difficulties of communication and conflicts over land and tree tenure. There is no easy solution for shortage of land. There is not enough unutilized public land for distribution among landless or small farmers. Marginal land along roads and highways and such other public land could be distributed among local landless and small farmers giving use rights. Land and tree tenure conflicts, particularly those which emerge during family separation, are normally resolved locally by village leaders or local administrative units.

Farmers are generally reluctant to use insecticides because of the additional cost involved and in some cases due to non-availability of appropriate insecticides. Rotting and shedding of young fruits are common in the study area. Individual trees, which are severely attacked by insects every year and/or exhibit rotting and shedding of young fruits for several consecutive years, are felled and replaced by new ones. Selection of pest and disease resistant genotypes for production is an important area of research.

Conclusions

Climatic and edaphic factors in the study area are favorable for luxuriant growth and yield of *supari* palm. The physical factors together with a huge demand of *supari* have made it the most dominant tree in the agroforests. Landholding sizes of farmers are the characteristic of rural Bangladesh and play an important role in household economy. This is particularly true for the case of *supari* trees in the study area where numbers of *supari* trees increased with the increased landholding sizes of farmers and thus proportionately determined the sizes of annual household incomes from *supari* palm husbandry. Replacement of over-aged, diseased or low-yielding trees with new plantings has made it a sustainable crop and a sustainable source of annual household income. Availability of planting materials, ease of establishment, low investment in managing trees, long fruit bearing period and large market demand of *supari* are some of the opportunities for farmers

for growing *supari* trees and generating sustained household income. However, supply of improved planting stocks and infrastructure development for marketing may be areas to be considered in promoting *supari* palm husbandry in rural areas.

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