Forest Science and Technology

ISSN: 2158-0103 (Print) 2158-0715 (Online) Journal homepage: http://www.tandfonline.com/loi/tfst20

Sustainable thatching materials production from nipa (nypa fruticans) in Bohol, Philippines

Myrna G. Carandang , Leni D. Camacho , Antonio P. Carandang , Sofronio C. Camacho , Dixon T. Gevaa , Lucrecio L. Rebugio & Yeo-Chang Youn

To cite this article: Myrna G. Carandang , Leni D. Camacho , Antonio P. Carandang , Sofronio C. Camacho , Dixon T. Gevaa , Lucrecio L. Rebugio & Yeo-Chang Youn (2009) Sustainable thatching materials production from nipa (nypa fruticans) in Bohol, Philippines, Forest Science and Technology, 5:1, 17-22, DOI: 10.1080/21580103.2008.9656343

To link to this article: http://dx.doi.org/10.1080/21580103.2008.9656343

Forest Science and Technology Vol. 5, No. 1, pp. 17~22 (2009)

Forest Science and Technology

Sustainable Thatching Materials Production From Nipa (*Nypa fruticans*) In Bohol, Philippines

Myrna G. Carandang[1]*, Leni D. Camacho[1], Antonio P. Carandang[1], Sofronio C. Camacho[1], Dixon T. Gevaa[1], Lucrecio L. Rebugio[1] and Yeo-Chang Youn[2]

[1]College of Forestry and Natural Resources, University of the Philippines Los Baños, College, Laguna, Philippines
[2]Department of Forest Sciences, Seoul National University, Seoul 151-921 Korea

(Received May 30, 2009; Accepted June 25, 2009)

Nipa (*Nypa fruticans*), a true mangrove palm is one of the valued resources in the coastal areas of the Philippines. It has numerous economic uses, such as: production of sap for wine and vinegar, and the use of its leaves as thatching materials for rural houses, green sheds, rest cottages and other small buildings, among others. However, its production and utilization practices vary greatly from area to area. This study examines the production practices and yield of nipa in the province of Bohol, Philippines. The study shows that nipa is more utilized for shingles production other than any other uses. A mature nipa plantation can have an average of 17,233 mature plants per ha. These plants are capable of producing an average of 51,148 shingles per year. On a per site class basis, the potential production is 80,233, 52,964 and 32,243 shingles for good, average and poor sites, respectively. The study also indicates that long harvest cycles of nipa increase the percentage of wastage due to over maturing of fronds. Shorter harvest cycles yield higher mature fronds that facilitate the growth of juvenile fronds due to reduced competition for space among the nipa leaves. At least 2 to 3 juvenile fronds are left per plant during harvests and based on fronds reproduction, a 3-month harvest cycle would be best for nipa stands. This would enable frequent cleaning and release of maturing fronds from competition for space and would also prevent over maturing of fronds.

Key words **:** *Mangrove palm, nipa production, sustainable thatching materials, growth and yield*

INTRODUCTION

Nipa (*Nypa fruticans*) is a trunkless palm which thrives at the edges of rivers where water is brackish, sheltered or open mudflats and in inland swamps reached by tidal water (Encendencia, 1985). It is a true mangrove palm and is called *nipah palm* in Malaysia and Indonesia. The leaves or fronds can extend up to 9 m (30 ft) in height. The flowers are globular and yields woody nuts arranged in a cluster that separate from the ball upon maturity and float away with the tide. Some nuts germinate while still water-borne and grow as they settle on soft mud and slow moving tidal and river waters that bring in nutrients. The palm can be found as far inland as the tide can deposit the floating nuts.

In the Philippines, nipa has numerous economic uses the most common of which are the production of sap for wine and vinegar and the use of its leaves as thatching materials for rural houses, green sheds, rest cottages and other small buildings (Carandang and Carandang, 1997). Its economic potential is very promising. However, production and utilization practices vary greatly from area to area. Some producers overcut while others have irregular harvests reflecting mismanagement of

*Corresponding author
E-mail: mgc405@yahoo.com

nipa production areas. This study examines the production practices and yield of nipa in the province of Bohol, Philippines.

Objectives of the Study

The general objective of the study is to assess the productivity of nipa in Cortes, Bohol province. The specific objectives are as follows:

a. To assess the practices in nipa shingles production
b. To measure the growth and yield of nipa; and
c. To determine the optimal harvest rate of nipa leaves for thatching materials.

METHODS

Secondary data on nipa leaves production were gathered specifically on the existing production practices and productivity.

For primary data, twelve (12) production plots 5 m×5 m in size were established, in natural nipa stands in Bohol province for growth and yield observations. The sites were classified into good, average and poor corresponding to height classes of 5.8 m and above, 4.5-5.7 m and 4.4 m and below.

a. Among the plot information gathered are the following:
b. Total number of nipa clumps
c. Total number of mature plants
d. Total number of juvenile plants
e. Number of mature fronds (leaves)
f. Number of juvenile fronds
g. Number of utilizable leaflets per frond
h. Total heights of nipa plants

These information were reinforced by actual interviews on nipa yield from concerned farmers and from existing literature.

The growth in terms of frond and shingle yield per plot/hectare and the average yield for all plots were then computed using the standard material requirements for a shingle.

REVIEW OF LITERATURE

Mangrove swamps are complex forest ecosystem characterized with vegetation of diverse structures. It is dominated by *Rhizopora and Bruguierra Spp.* occurring on tidal flats and mouths of rivers. Commonly found along mangrove swamps is the nipa palm. It is a stemless palm that thrives well at the edges of rivers where water is brackish, sheltered or open mudflats and in inland swamps reached by tidal water. This plant has numerous uses. The flower cluster can be tapped before it blooms to yield a sweet, edible sap collected to produce a local alcoholic beverage called Tuba in the Philippines. Tuba can be stored in large earthen pots for several weeks to make vinegar. Young shoots are also edible and the flower petals can be infused to make an aromatic tisane. Young fruits are edible and used dessert ingredient in Malaysia and Singapore. The young leaves are used to wrap tobacco for smoking. Large stems are used to train swimmers in Burma as it has buoyancy (wikipedia.org/wiki). Furthermore, its leaves are made into thatch and shingles for roofing and walling of houses in rural areas, bags, coarse, baskets, hats, mats, raincoats and wrapper. The midribs from its leaves can be made into brooms while the petiole can be used as fuel or coarse brush. Tying materials can be processed from its fibers and its fruits can be good sweet preserves (Encendencia, 1985).

Reproduction of nipa is either by seed or by rhizome which is generally large, branching or creeping. The rhizome produces branches above ground with cluster of pinnate leaves consisting of about 80-84 leaflets per frond. The globose and fruiting bud is borne in specific erect stalk which later on support 65-70 nuts which are flat and about 10-12 cm by 5-7 cm wide (Encendencia, 1985).

Planting nipa by direct seeding showed a very high performance of 90 percent germination as reported by Yao (1986). In direct seeding, mature seeds are laid horizontally on the ground surface and provide anchor or a stick to prevent seeds from being washed away by tide (Melana, 1980). Pre-germination in gunny sacks before out planting can also be done. Potted seedlings could also be used with high (90%) rate of survival.

Planting techniques also vary depending on the desired products to be gathered from a nipa plantation. Although, this plant has no definite blooming season, nipa is usually planted from May to July. The seeds are planted 1.7 to 2 m apart for alcohol or sap production. Higher or elevated banks of internal channels are preferred on areas where tidal water allows only periodic submergence of palms. Encendencia (1985) further recommended having a pure nipa stand in order to save on time and labor expenses for sap gathering activities. Periodic thinning of the fronds must be done maintaining about three to four leaves per palm at a time.

Harvesting of nipa leaves is done on at least three-year old plants using a sharp bolo. The stand is first cleared of weeds and obstacles that may interfere with the workman between the plants. The drooping and drying leaves are first removed and cut into desired lengths and deposited at the base of the palm. Harvested leaves are cut as close to the ground as possible. This practice provides space for the young leaves to develop fully and grow vigorously. During the first harvesting season, all leaves are cut except one open young leaf and one bud. By the next harvesting season, which comes two months after, the open leaf has matured and is ready for harvest, and another bud has developed as the next leaf reserve (Melana, 1980).

With regards to the growth rate of nipa mangrove area, Fortes, *et al.* (1982) conducted a study on the growth rate and alcohol production of nipa in a mangrove area at Paombong, Bulacan. They reported that the rates of growth of the plants appeared to be negatively correlated with temperature, while favouring a narrow range of mean rainfall conditions. Relatively high acidiy (pH 5.2) and low phosphorus (13.3 ppm), high sodium (17.4 ppm) and potassium (1.7 ppm) content of the medium, low sand percentage (0.4) and high percentage of silt (58) favor growth as well as alcohol production from the plants.

As to yield estimates, three to five leaves are ready for harvest at the first harvesting period. A 1-ha nipa stand having 2,000 nipa palms can produce 14,000 to 16,000 nipa leaves. If a bundle needs 30 to 40 leaves, about 350 to 533 bundles are produced per hectare. One bundle of nipa leaves can yield 30-50 shingles depending upon the required thickness (Encendencia, 1985).

RESULTS AND DISCUSSION

Growth and Yield of Fronds of Nipa in Natural Stands

Twelve plots of 5 m by 5 m dimension were established in Cortes, Bohol province in the Philippines. Among the basic measurements gathered in the plots are the number of nipa palms both mature and juvenile found in the plots, and the number of both mature and juvenile fronds. On the average, there are 43 mature palms in the plots with 7 juveniles (Table 1). Likewise, there are on the average, 65 mature fronds and 53 juvenile fronds in the plots, respectively. Mature fronds are those leaves that are ready for harvest.

Table 1. Observations for nipa plots established in Cortez, Bohol.

Plot No.	Site Class	No.of Mature Plants	No. Juvenile Plants	No. Juvenile Fronds	No. of Mature Fronds
1	Good	46	3	60	87
2	Poor	29	9	45	60
3	Good	51	4	63	91
4	Good	54	5	56	98
5	Average	53	6	60	76
6	Average	37	7	37	75
7	Poor	36	11	40	56
8	Average	48	6	54	40
9	Average	45	7	73	55
10	Poor	33	9	44	56
11	Poor	45	10	60	44
12	Poor	40	11	44	38
Average		43	7	53	65

A mature nipa plant can grow 3 to 4 fronds a year. On *good sites*, nipa grows very fast with very high yield. There are at least 92 mature fronds counted on this site on the average. For each frond, there is an average of 54 utilizable leaflets (Table 2). The average length of leaflets in this site is 0.84 m. On *average sites*, there are at least 62 mature fronds present on the average with an average of 51 utilizable leaflets. The average length of leaflets in this site is 0.78 m. On *poor sites*, the number of mature fronds is about 51 on the average. Each frond on this class has on the average 42 utilizable leaflets. The average length of leaflets in this site is 0.71 m. On all site classes on the average, there are 50 utilizable leaflets per frond (Table 3). The average height of plots is 5.3, 4.1 and 3.7 m for good, average, and poor site

Table 2. Summary of plot information.

Site Class	No. of Plots	Ave Ht (m)	Ave. No of Mature Plants	Ave. No. of Juvenile Plants	Ave. No. of Juvenile Fronds	Ave. No of Mature Fronds	Ave. no of Utilizable Leaflets/Frond
Good	3	5.3	50	4	60	92	54
Average	4	4.1	50	7	56	62	51
Poor	5	3.7	37	10	47	51	42

Table 3. Utilizable leaflets counts on mature fronds of different sizes.

Plot No.	Site Class	Size of Fronds	No. of Mature Fonds in the plot	Ave. no of Uilizable Leaflets/ Fornd
		Lage	15	65
1	Good	Medium	42	56
		Small	20	37
		Medium	25	43
2	Poor	Small	35	35
		Large	35	68
3	Good	Medium	40	55
		Small	16	37
		Large	49	65
4	Good	Medium	34	60
		Small	15	47
		Large	22	61
5	Average	Medium	34	57
		Small	20	48
		Medium	45	59
6	Average	Small	30	50
		Medium	11	59
7	Poor	Small	45	49
		Medium	20	54
8	Average	Small	33	44
		Meidum	25	52
9	Average	Small	30	38
10	Poor	Small	56	40
11	Poor	Small	44	32
12	Poor	Small	38	36
Average				50

classes, respectively (also Table 2).

The average number of utilizable leaflets per frond is 50 while there is an average of 53 leaflets needed to make 1 shingle. Thus, there is almost one to one frond-shingle ratio.

On a per hectare basis, a mature nipa plantation can produce an average of 17,233 mature plants per ha (Table 4). These mature palms are capable of producing an average of 51,148 shingles per year. On a per site class basis, the potential production is 80,233, 52,964 and 32,243 shingles for good, average and poor sites, respectively.

Proper Production and harvest Practices

For purposes of establishing nipa plantations for shingles production, the seeds of nipa can be sown in nursery beds or directly sown on the ground 2 m apart and buried half of its size with the germinating portion on top. The seeds can also be pre-germinated in gunny sacks and then outplanted when the growth is around 5 to 10 cm in length. Growing period is 3 to four years. The area is regularly maintained by clearing of the weeds, replacement of dead spots and removal of over mature fronds. Damage or abrasions to the stalks and buds during cleaning should be avoided as this causes death of the leaves affected or plants themselves. Cutting of stalks should be as closed to the ground as possible to provide enough growing space for the immature fronds. The cut should be slanting downward and outward. Improper cutting where its own sap flows inside the sheaths causes slow death for the plants.

It was also observed that long harvest cycles increase the percentage of wastage due to over maturing of fronds. Based on the analysis of

Table 4. Potential shingle yield per plot per ha of nipa plantation.

Plot No.	Site Class	Estimated No. of Plants/Ha	No. of Mature Fronds/Ha	Potential Shingle yield/Ha
1	Good	18,400	104,400	64,458
2	Poor	11,600	24,000	36,453
3	Good	20,400	36,400	81,971
4	Good	21,600	39,200	94,270
5	Average	21,200	30,400	67,200
6	Average	14,800	30,000	65,853
7	Poor	14,400	22,400	45,265
8	Average	19,200	16,000	40,130
9	Average	18,000	22,000	38,672
10	Poor	13,200	22,400	35,502
11	Poor	18,000	17,600	22,315
12	Poor	16,000	15,200	21,682
Average		17,233	31,667	51,148

Figure 1. Nipa stands and newly-made shingles, a common sight in Cortes, Bohol.

Figure 2. Nipa shingles ready for market.

actual reported harvest and harvest cycles, it was found that shorter harvest cycles yield higher number of mature fronds and facilitate the growth of immature fronds due to reduced competition for space among the nipa leaves. At least 2 to 3 immature fronds are left per plant during harvests. Based on the production of 3 to 4 mature fronds per mature plant per year, a 3-month harvest cycle would be best for nipa stands as this will enable frequent cleaning and release of maturing fronds from competition for space and will also present over maturing of fronds. Cycles of longer months results to poor yield because of over-maturing of fronds.

CONCUSION

Nipa is one of the valued resources in the coastal

Figure 3. A poorly-managed nipa plantation with preponderance of over- matured fronds.

municipalities of Bohol, particularly in Cortes town where this palm is widely grown. Here, it is more utilized for shingles production other than any other use. A mature nipa plant can grow 3 to 4 fronds a year. On *good sites*, nipa grows very fast with very high yield. On the average, there are at least 92 mature fronds counted on plots on this site with an average of 54 utilizable leaflets. On *average sites*, there are at least 62 mature fronds present with an average of 51 utilizable leaflets. On *poor sites*, the number of mature fronds is about 51 with 42 utilizable leaflets. On the whole, the average number of utilizable leaflets per frond is 50 while there is an average of 53 leaflets needed to make 1 shingle. Thus, there is almost one to one frond-shingle ratio.

A mature nipa plantation can have an average of 17,233 mature plants per ha. These mature palms are capable of producing an average of 51,148 shingles per year. On a per site class basis, the potential production is 80,233, 52,964 and 32,243 shingles for good, average and poor sites, respectively.

During harvesting, damage or abrasions to the stalks and buds should be avoided as this causes death of the leaves affected or plants themselves. Cutting of stalks should be as closed to the ground as possible to provide enough growing space for the immature fronds. The cut should be slanting downward and outward. Improper cutting where its own sap flows inside the sheaths causes slow death for the plants. It was also observed that long harvest cycles increase the percentage of wastage due to over maturing of fronds. The shorter harvest cycles, the higher the yield higher of mature fronds as this facilitate the growth of immature fronds due to reduced competition for space among the nipa leaves. At least 2 to 3 immature fronds are left per plant during harvests and based on fronds reproduction, a 3-month harvest cycle would be best for nipa stands as this will enable frequent cleaning and release of maturing fronds from competition for space and will also prevent over maturing of fronds.

LITERATURE CITED

Carandang, M.G. and Carandang, A.P. 1997. Growth, Yield and Optimum Production of Nipa for Thatching Materials. Fisheries Sector Project Report (1997), Philippine Institute of Development Studies (PIDS), Philippines.

Encendencia, M.E.M. 1985. Versatile Nipa, Potential resource for Various Economic Needs. NSTA Technical Journal 10(3): pp 4-12.

Fortes, M.D. and Lorica, R.G. 1982. Growth rates and alcohol production of nipa (Nypa fruticans) in a mangrove area at Paombong, Bulacan (Philippines). Symposium on Mangrove Forest Ecosystem, Productivity in Southeast Asia. (Proceedings, April 20-22, 1982, Bogor, Indonesia). pp. 83-91.

Melana D.M. 1980. Leaf Harvesting and juice extraction techniques of nipa in Alabat Island, Quezon, Philippines. Canopy 6(9): pp 27-31.

Yao, C.E. 1986. Mangrove reforestation in Central Visayas, Philippines. Canopy 12(2): 6-9.