

Distribution and Traditional Uses of Sago Palms (*Metroxylon sagu* Rottb) in the Eastern and Central Visayas Regions of the Philippines

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Abstract Before the emergence of rice, sago was the main source of sustenance for the inhabitants of the Malay Archipelago because its desiccated starchy products could be stored for long periods. Sago palms can be found growing wild in marshlands where plantation and agronomic crops are difficult to grow. They are abundant in some parts of Mindanao, especially in the provinces of Agusan. In Leyte, sago palms are common along the creeks, valleys, and streams of fresh water and marshlands, which are infested with schistosomes. Recently, the palms have been found in the towns of Dulag, Palo, Tanauan, Sta Fe, Alangalang, Burauen, Julita, Pastrana, Mahaplag, and Jaro. Alangalang has the most number of sago palms with approximately more than 20 hectares of aggregate clumps and forests. On the other hand, patches or clumps of sago palms were observed in the towns of Carcar, Argao, Sibonga, Samboan, and Ginatilan of Cebu Province.

Sago is underutilized in the Philippines, while, in neighboring countries, such as Indonesia and Malaysia, it is considered to be the “staff of life” because of its numerous applications. The major use of sago palms in the Philippines is for roofing materials. The leaves of small palms and those that could still be reached by farmers are cut and weaved in a 1-meter bamboo split. Sago shingles are more durable than nipa, which lasts from 8 to 10 years. Sago leaves are also used for the walls of small huts or shanties. Midribs are used for making brooms and weaving baskets. The barks of the petiole are stripped and woven into *amacan* (weaving mat) for walls of houses and cottages.

Although the edible sago starches are accumulated in the trunk of the palms, which are used for food, especially during lean months when rice and other foods are unavailable, sago starches are generally made into sago pearls for making Filipino delicacies, such as *palagsing* or *suman* (sago starch mixed with coconut milk or coconut meat shreds and sugar wrapped with coconut leaves or banana leaves) and sweetened *landang* or *benignit* (sago porridge mixed with glutinous rice, rootcrops, ripe table banana, sugar, and coconut milk).

Hard fiber bark is used for walls and floors, temporary passageways for irrigating rice fields, and firewood. Waste from starch extraction is used to feed hogs and other animals and for garden compost and fertilizer.

フィリピン東および中央ビサヤ地域におけるサゴヤシの分布と 伝統的な利用法

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要約 水稲が伝播する以前、乾燥した澱粉質の生産物の長期保存が可能であるサゴヤシは、マレー島嶼部の住民にとって主要な食糧源であった。サゴヤシは、一般のプランテーション栽培作物や農作物が生育不可能な湿地に生育する。ミンダナオ島のいくつかの地域、とくにAgusan Provinceに多数のサゴヤシを見出すことができる。レイテ島では、住血吸虫病が頻発する地帯となっているクリーク、集水地形あるいは湿地に生育する。最近になって、レイテ島のDulag, Palo, Tanauan, Sta. Fe, Alangalang, Buraen, Julita, PastranaおよびJaroにサゴヤシが生育していることがわかってきた。Alangalangには20 ha以上のクランプおよび林と呼べるようなサゴヤシ群生地が存在する。一方、セブ島のCarcar, Argao, Sibonga, Samboan, Ginatilanにはパッチ状あるいはクランプ状のサゴヤシがみられる。生活のための素材としてサゴヤシがいろいろと利用されているインドネシアやマレーシアのような近隣諸国とは異なり、フィリピンでは、サゴヤシが十分に利用されているとは言い難い。フィリピンでは、サゴヤシは主に屋根葺き材に利用されている。年齢の若い小さいサゴヤシの葉あるいは大きく生長しているサゴヤシであっても手の届く葉を採取し、1 mの竹棒を小葉で巻き込んで織り、1枚の屋根葺き材(shingle)を製造する。これはニッパヤシの屋根葺き材よりも耐久性に優れ、8~10年間は屋根としての役割を果たす。また、サゴヤシの小葉は、小さい帽子や小屋の壁にも利用される。葉軸は箒や編み込みのバスケットに利用される。葉軸・葉柄の皮を剥ぎ取って、編み上げ、家屋や別荘の壁や編み込みマットとする。サゴ澱粉はサゴヤシの幹に蓄積しており、コメや他の食べ物が手に入らないような緊急時に利用するが、通常は、サゴ澱粉からフィリピン人が特に好んで食べる「ご馳走」、パラグシン(*palagsing*)あるいはスマン(*suman*)、甘いランダン(*landang*)あるいはベニグニ(*benignit*)を作るための材料となるサゴパールを作る。固い繊維を持つ樹皮は壁やフローリング、灌漑水田の一時的な水路、燃料として利用される。澱粉抽出残渣は、豚やその他の家畜の餌、庭木のコンポスト、肥料として利用される。

キーワード： サゴヤシ, ビサヤ地域, フィリピン, 分布

Introduction

Sago palm (*Metroxylon sagu* Rottb.) is thought to have originated in Papua New Guinea (Yamamoto, 1998) and spread from there to south East Asia because of its tremendous usefulness. Before the emergence of rice, sago was the main source of sustenance for the inhabitants of the Malay Archipelago. Desiccated starchy products from sago can be stored for long periods and can, thus, be shipped for great distances without any evident spoilage (Flores, 2004). The palm grows wild in marshlands where plantation and agronomic crops are difficult to grow. A palm tree has pinnate leaves and stout creeping or ascending stems that can grow as high as 15 m. The starch content of immature and mature sago palms in Dulag and Leyte has been reported to range from 30 to 50 kg per palm (Okazaki and Toyota, 2003a) and 110 to 120 kg per palm

(Loreto, 2004, personal communication), although mature sago palms have a high-recovered starch content of 150 to 300 kg per palm in Malaysia (Jong, 1995), Indonesia (Osozawa, 1986), and Papua New Guinea (Shimoda and Power, 1986). Starches are deposited in the trunk of the palms (Takahashi, 1986). The palm attains maturity as starch yielding plants at approximately 15 years of age, when the stem has an enormous mass of spongy medullary matter, or 4-11 years after the start of trunk formation (Yamamoto, 1998). Starch decreases as the palms reach the flowering stage (Jong, 1995).

In this paper, the recent distribution and traditional uses of sago in the eastern and central Visayas are presented, although, at the moment, sago is underutilized in the Philippines, while, in neighboring countries, such as Indonesia and Malaysia, it is considered to be the “staff of life” because of its

numerous applications. This information is needed for future research on the possible use of sago palms for the production of starches and other products, which might alleviate rural poverty. The potential use of the sago palm is an environmental bioremediation to offset the greenhouse effect because of its year-round high carbon dioxide assimilation (Flores, 2004). The abundance of the sago palm in the Visayas will encourage environmentalists to consider using sago to trap carbon dioxide in bioremediation in the future in addition to harvesting the starch.

Distribution of sago palms in the eastern Visayas

In the early 19th Century, the palms were widely distributed in the Visayas and southern Philippines. This also occurred in parts of Cebu, Negros, Panay, Bohol, Siquijor, and parts of Mindanao (Brown, 1918). However, since most of the marshlands had already been converted into farmlands for crops, such as rice, there is no updated information regarding the distribution of sago palms in the Visayas, except for the reports of Baconguis and Panot (1991), which described the presence of sago palms in Panay, Cebu, Negros Oriental, Samar, Leyte, Agusan, and Davao Provinces as well as Misamis Oriental and those of Okazaki and Toyota (2003a, b). In addition, the government had already started constructing irrigation canals to drain excess water and to eradicate snails, which are vectors of schistosomes. In spite of these situations, sago palms were still in the creeks and near rice paddies in the central and eastern Visayas regions of the Philippines (Figure 1).

Sago palms were removed for the construction of drainage canals to drain excess water and prevent schistosomiasis in Tanauan. Hence, there has been a rapid reduction of the sago population in the areas. Nevertheless, some sago palms remain in the villages of Tanauan (Table 1 and Figure 2), especially in the barrios of Balud, Binolo, Binongto-an, Cabalagnan, Cabarasan-guti, Camire, Guindag-an, San Isidro, and Santa Elena (Mesias, 2004, personal communication). More sago palms are distributed widely in the creeks

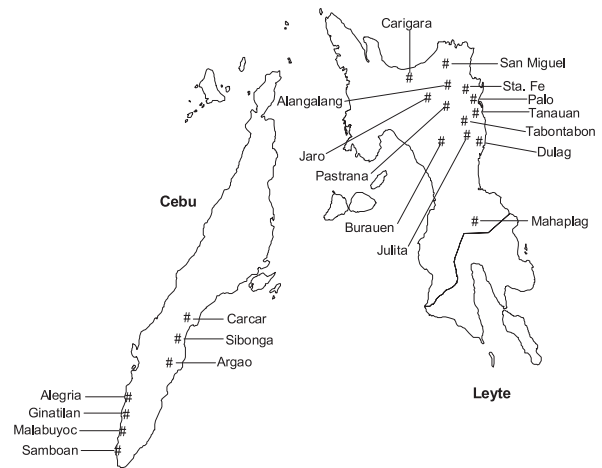


Figure 1. Map of the central and eastern Visayas regions of the Philippines where sago palms have been sighted.

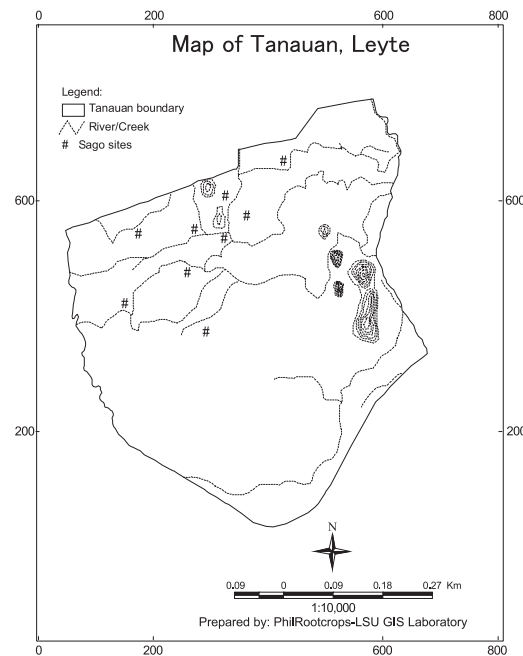


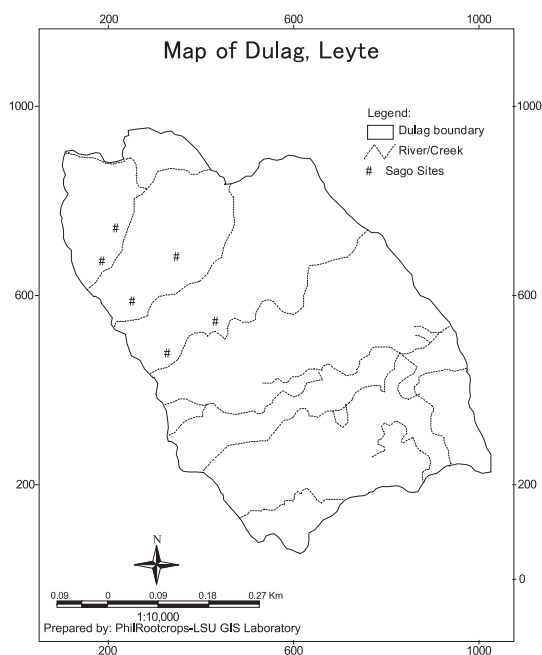
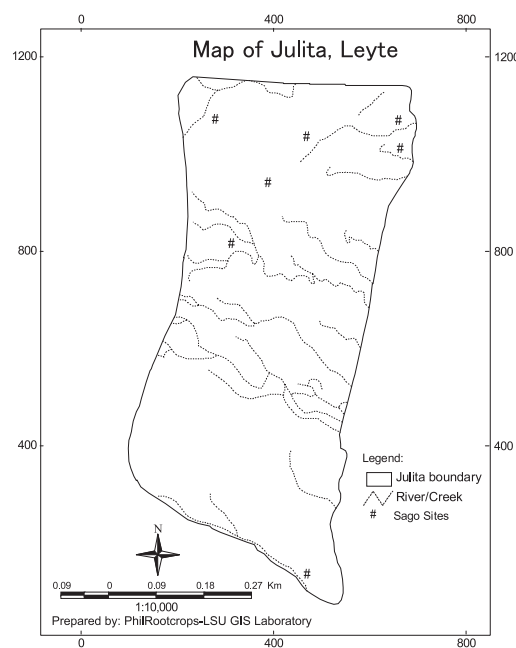
Figure 2. Sago palm areas in Tanauan, Leyte

of Dulag (approximately 4 hectares), particularly in the barrios of Tigbao, San Antonio, Bolongtuhan, Roxas, Camito, and Bulod (Figure 3). The town of Julita also has some sago clumps in the barrios of Calbasag, Gitabla, Sta. Cruz, Inawangan, Anibong Sto. Nino, Bungdo, Salvacion, and Cabatoan (Figure 4). The barrios of Sta. Fe with sago palms are those of San Roque, Victoria, and Catoogan. In Alangalang, sago is found in the barrios of Cavite, Lourdes, Buenavista, Astorga, Canbahanon, Aslob, Salvacion/San Pedro, Magsaysay from Petilla to Bugho, San Francisco (more than 10 ha), Libas, San Antonio, Divisoria, and Dapdap (more than 1 ha)

Table 1. Sago palm areas in the eastern Visayas

Town	Barrios
Leyte	
Tanauan (>1)	Balud, Binolo, Binongto-an, Cabalagnan, Cabarasan-guti, Camire, Guindag-an, San Isidro, Santa Elena
Dulag (4)	Tigbao, San Antonio, Bolongtuhan, Roxas, Camito, Bulod
Julita (>1)	Calbasag, Gitabla, Sta. Cruz, Inawangan, Anibong Sto. Nino, Bungdo, Salvacion, Cabatoan
Sta. Fe (< 1)	San Roque, Victoria, Catoogan
Alangalang (>20)	Cavite, Lourdes, Buenavista, Astorga, Canbahanon, Aslob, Salvacion/San Pedro, Magsaysay to Petilla and Bugho, San Francisco, Libas, San Antonio, Divisoria, Dapdap
Palo (10)	Pawing, San Joaquin, Cogon, Salvacion, Guindapundan, Baras, Candahog, Castilia, San Agustin, Cararasan Daku
Carigara (<1)	Tubog, Cogon, Hiloktugan, Binatuhan
Tabontabon (<1)	
Jaro (<1)	
Dagami (<1)	Sta Cruz
Burauen (<1)	Arado
Pastrana (<1)	
Mahaplag (>1)	

Figures in the parenthesis shows the sago growing areas in hectare

**Figure 3.** Sago palm areas in Dulag, Leyte.**Figure 4.** Sago palm areas in Julita, Leyte.

along the Dapdap River. Palo has also some sago palms in the barrios of Pawing, San Joaquin, Cogon, Salvacion, Guindapundan, Baras, Candahog, Castilia, San Agustin, and Cabarasan Daku, with approximately 10 hectares (Songalia, 2004, personal communication). A few clumps are in Carigara in the barrios of Tubog, Cogon, Hiloktugan, and Binatuhan

(Figure 5). These barrios had numerous clumps of sago palms before they were converted into rice fields. Today, sago is dwindling rapidly because farmers continue to expand the rice production to cope with the increasing population (Conde, 2004, personal communication). Palms have also been observed in the towns of Tabontabon, Dagami, Sta.

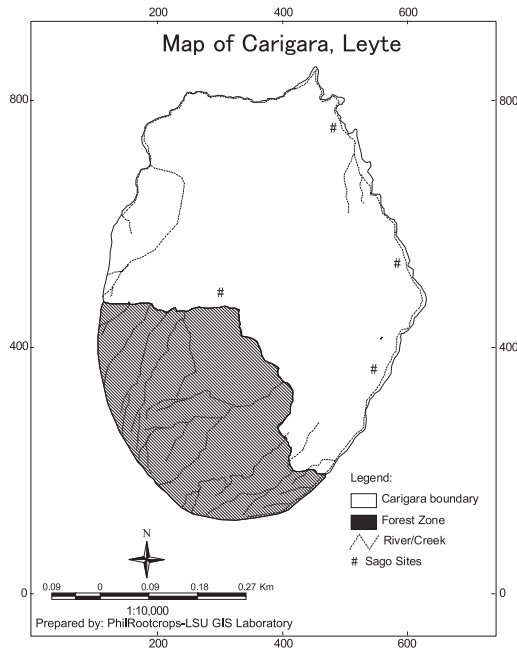


Figure 5. Sago palm areas in Carigara, Leyte

Cruz in Jaro, Arado in Burauen, Pastrana, and Mahaplag. Spiny sago palms are most common in the Cavite, Lourdes, and Dapdap barrios of Alangalang and in some barrios of Julita, especially, Gitabla and Sta. Cruz, while spineless palms are most common in the barrio of Dulag in Leyte.

Sago palms are seen near rice paddies because of the presence of water in the creeks, valleys, and streams. Among the towns visited, Alangalang had the largest number of sago palms, amounting to approximately 20 hectares when the clumps and sago forests in the villages were grouped together. There are many tall sago palms, especially in the barrios of Cavite. Some were already flowering, and a few dead palms were left in the area.

Distribution of sago palms in the central Visayas

In central Visayas, sago palms are concentrated in the southern part of Cebu, especially in the towns of Carcar, Argao, Sibonga, Samboan, Malaboyoc, Genatilan, and Alegria (Table 2 and Figures 6 to 9). Most of the sago palms are scattered along the rice fields (Okazaki and Toyota, 2003b). Awayan has the widest sago area in Carcar (Figure 6) while Langtad, Talaytay, and Lamacan have several more sago clumps in Argao (Figure 7). The barrios of Tangbo and Humangpas also have some sago palms in the town of Samboan, the southernmost part of Cebu (Figure 8). It was also noted that even the mountainous barrios of Samboan have sago palms, as observed in Cañorong. Other barrios in Samboan with sago clumps are Calatagan, Tak-op, Dalahican, Balangasaran, Colasi, San Sebastian, and Basak (Pelago, 2004, personal communication). Sago clumps were also noted in the barrios of Lambo, Cerdeña, Montanesa, and Barangay Poblacion of Malaboyoc, while the hinter barrios of Guadalupe, Valencia, and Montpellier in Alegria have numerous sago clumps (Berondo, 2004, personal communication). These towns have creeks, where sago palms thrive.

Traditional uses of sago in the Visayas

Thatch and wall materials

The majority of the sago palms are used for roofing materials (Table 3). The leaves of small palms are cut and woven in a 1-meter bamboo split. Roofing

Table 2. Sago palm areas in the central Visayas

	Town	Barrios
Cebu	Carcar (> 5)	Awayan
	Argao (> 5)	Langtad, Talaytay, Lamacan
	Sibonga (< 1)	Simala, Bagakay, Cutlang
	Samboan (>5)	Tangbo, Humangpas, Canorong, Calatagan, Tak-op, Dalahican, Balangasaran, Colasi, San Sebastian, Basak
	Malaboyoc (< 1)	Lambo, Cerdena, Montanesa
	Genatilan (> 1)	Looc, Palanas, Calabawan, Anao, Canorong, Guiwanon
	Alegria (> 1)	Guadalupe, Valencia, Montpellier

Figure in the parentheses shows the surface areas in hectare.

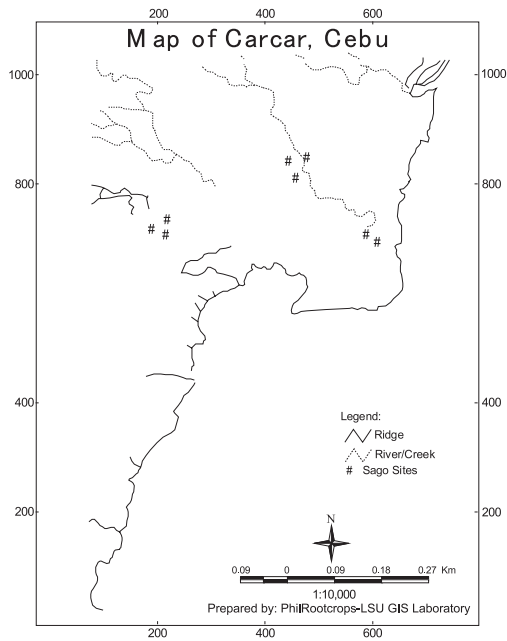


Figure 6. Sago palm areas in Carcar, Cebu.

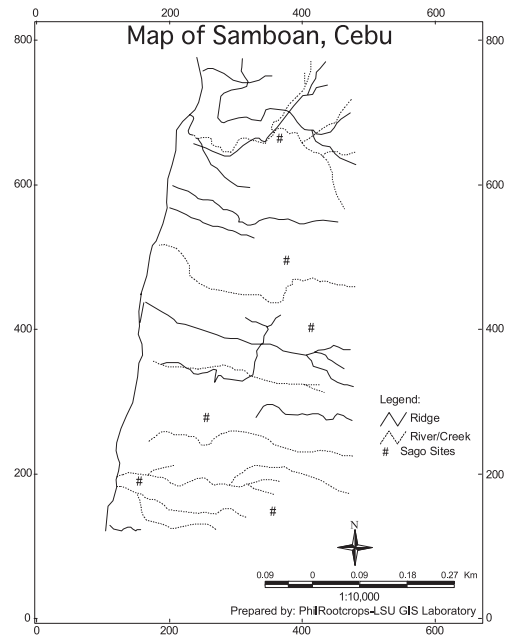


Figure 8. Sago palm areas in Samboan, Cebu.

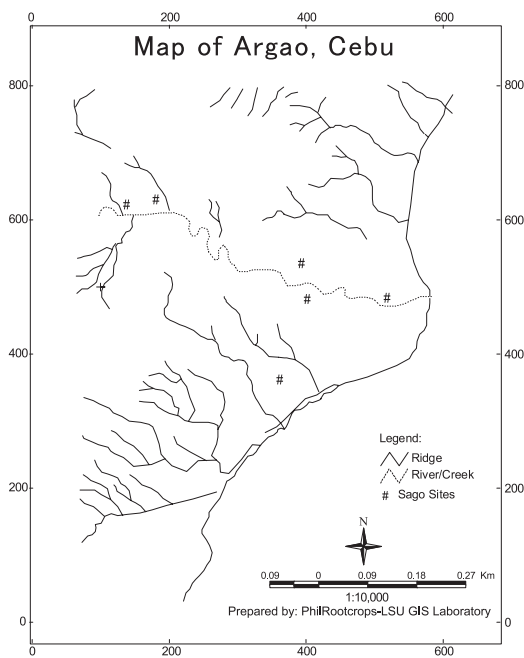


Figure 7. Sago palm areas in Argao, Cebu.

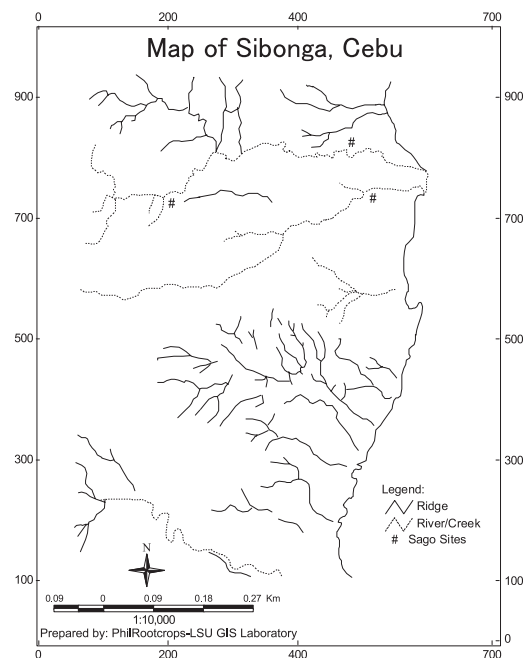


Figure 9. Sago palm areas in Sibonga, Cebu.

materials cost P1000 to P1200 for 100 shingles. Sago thatch materials are more durable than *nipa* shingles, which last 8 to 10 years. Another use of sago leaves is for the walls of small huts and shanties. The midribs, which are rigid and sturdy, are used for making baskets and brooms. The outermost covering of the petiole of sago is woven into several designs and made into *amacan* (weaving mats), which serve as wall material for houses and cottages.

Starch

The edible sago starch, which is commonly used among the indigenous population, was introduced through trade, conquest, or migration (Flores, 2004). It has been reported that sago starch and its products have long been traded in the Philippines for domestic consumption, and most of the inhabitants import sago products from Sarawak and the Dutch East Indies (Brown, 1918). Until recent years, sago starch was used when food was scarce. Starch extraction from

Table 3. Traditional uses of sago palms in the Visayas regions of the Philippines

Visayas regions	Traditional uses
Eastern Visayas	Leaves used as thatch materials
	Leaves used as walling materials
	Starch
	- <i>sago pearls</i>
	- <i>landang</i>
	- <i>suman</i>
	Hard fiber for temporary passage of irrigation water in rice fields
	Hard fibers used as flooring and walling of huts
	Young pith crown used for making salad
	Central Visayas
	Leaves weaved and used as walling materials
	Starch
	- <i>palagsing</i>
	- <i>binignit</i>
	- <i>sago pearls</i>
	Hard fibers used as firewood
	Hard cover used for walling and flooring for small huts
	- waste from starch extraction used for feeding hogs and other animals
	- used as compost for plants
	Midribs of leaflets used for making broom and weaving baskets
	Bark of petiole used for making <i>amacan</i> (weaved mat)

sago palms is done in Dulag and Burauen of Leyte when the harvest of rice is lean or food is scarce, usually in the months of February and September. Processors from the barrio of Arado in Burauen extract the starch frequently (Rivas, 2004, personal communication). On the other hand, the farmers in Carcar and Argao of Cebu process sago pearls every month as a source of income. Likewise, farmers of Samboan in the barrios of Tapon-Poblacion and Cañorong also process sago pearls. The bulk of processing takes place in the months before the Christian season of Lent or Holy Week. Massive buying of logs in nearby sago areas starts in March through April, and the material is immediately processed into sago pearls. Sunny days are common in March and April (Toyota and Okazaki, 2003). Hence, the quality of sago pearls processed at that time is superior to that of those processed in other months.

Sources of sago logs for those processors in Argao are Lamacan, Langtad and Simala, while Valladolid, Dungguan, Baraca and Cabuntan and Simala are sources for processors in Carcar. Tak-op – Poblacion processors in Samboan obtained their sago logs from

nearby villages with known sago palms, such as Cañorong, Humangpas, Colasi, and Balangbaran, and, in rare cases, in the nearby town of Ginatilan. Their processed sago pearls are marketed within their towns and in nearby towns, such as Dalaguete and Sibonga. The rest of the products are sold in Cebu City. Recently, sago pearls have been used in the preparation of native delicacies, such as *palagsing* or *suman* (sago starch mixed with coconut milk or coconut meat shreds and sugar wrapped with coconut leaves or banana leaves) and sweetened *landang* or *benignit* (sago porridge mixed with glutinous rice, rootcrops, ripe table banana or ripe jackfruit, sugar, and coconut milk). Some sago pearls sold in the market are not from sago palms but from cassava and buri palms.

Waste products from starch extraction are used as feeds. In some cases, starches that are inferior in quality are fed to animals. Sago palm is used for feed as flour or as roughage to cattle and older pigs. The meal is very digestible and can be fed to all types of livestock. Up to 50% of pig rations and up to 25% of poultry rations can be sago flour or roughage.

Hard fiber

Hard fiber or the bark of sago palms is used as

firewood in Cebu, while, in Leyte, the bark near the base is used for the construction of floors and walls of huts and shanties. However, care should be taken to avoid exposure to heavy moisture or water to preserve the hardness of the material. In some instances, bark that has a cylindrical shape is used as a temporary pipe for the irrigation of rice paddies. Such pipes last one or two cropping seasons in Leyte (Conde, 2004, personal communication).

Discussion

The distribution of sago palms is most common in the swampy areas of Leyte and along creeks in Cebu, particularly in the southernmost part. Sago palms grow near rice paddies, usually at the periphery of the canals. A thorough survey of sago forests and clumps in the Philippines must be done to estimate the extent of production and rate of utilization in known growing areas. The major use of sago palms, particularly small palms, is for roofing. Sago palms are also used in the production of starch, which is made into sago pearls and then used in the manufacture of several native delicacies. With the increasing population, sago has decreased dramatically in the Visayas. However, this situation could be reversed with a continuous and attractive market for sago starch processors. More farmers in Cebu than in Leyte process sago palms into starch and earn their livelihood in this way.

The survival of sago palms in the Philippines requires strong and sustainable markets for starch products. There is a need to develop a long-range plan that would tap sago palms for the export of starch. The demand-driven markets will ultimately demonstrate to farmers and the government of the Philippines that sago is an important crop with the potential to generate income in the countryside. More research into applications for sago starch or flour is necessary with the goal of marketing such products outside of the production area. Efforts must be made to increase the yield of starch and shorten the time that a mature palm can produce useable starch.

Initially, there will be a need to develop efficient processing machines that will improve starch production. Using sago for bioremediation to offset the increase of carbon dioxide in the environment will result in maintaining or increasing the area of production and usefulness of the palms. The sustainability of available mature sago palms will be enhanced when sago forests and clumps are preserved in the growing areas. Likewise, there is a need to preserve and conserve the local and foreign germ-plasm collection.

Acknowledgment

The authors gratefully acknowledge Mr. Dale P. Loreto for painstakingly digitizing the maps of the towns of Leyte and Cebu.

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