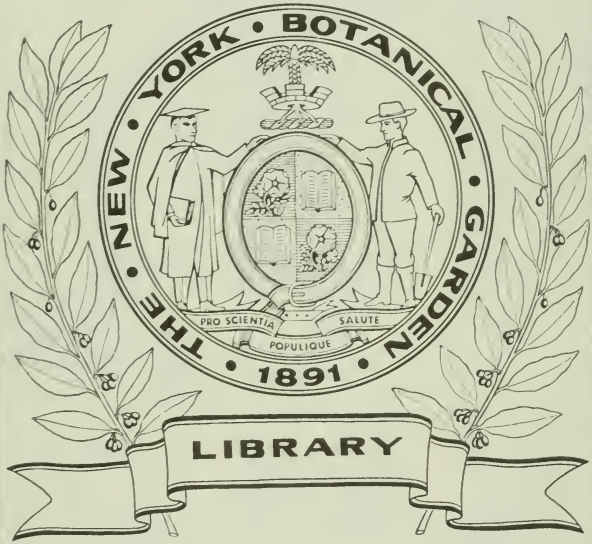
Brown, William Henry

Philippine fiber plants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By William H. Brown, Ph. D.

Chief, Division of Investigation, Bureau of Forestry; Professor of Botany, University of the Philippines; and Plant Physiologist, Bureau of Science

Department of Agriculture and Natural Resources
Bureau of Forestry

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166677

CONTENTS

ILLUSTRATIONS

PREFACE

This bulletin is intended to give a catalogue and a short account of the fiber plants, other than bamboos and palms, which are found in the Philippine forests. The bamboos and palms have been treated in previous bulletins. As no sharp line can be drawn between plants of the forest and other wild plants, it has seemed desirable to include in this discussion all wild fiber plants. This is particularly so since a large part of the waste land in the Philippines is under the administration of the Bureau of Forestry. The number of cultivated fiber plants is very small as compared with the number of wild ones. In view of this fact the more important cultivated ones are briefly discussed for the sake of completeness.

The list of fiber plants is probably far from complete, but is much more nearly so than any list that has previously appeared.

Local names and descriptions are given for the various species. The local names may be of great assistance, but are far from being infallible guides to the identification of the species, as the local names vary in different localities, and even in single localities may be applied to different species or groups of species. The descriptions are intended to give an idea of the kind of plant and to enable one to check a determination made from local names. With the help of the local names and the descriptions it is believed that in most cases it will be fairly easy to identify the species correctly.

The spelling of the local names has been corrected by Mr. E. E. Schneider, Wood Expert of the Bureau of Forestry, who is very familiar with a number of the local languages and who has taken interest in the proper spelling of Philippine words. Plates II to XXIII and Plate XXV were borrowed from the Bureau of Education and are from bulletins dealing with fiber plants used in industrial work in schools. The writer is greatly indebted to Mr. E. D. Merrill of the Bureau of Science for valuable assistance in the preparation of this bulletin. For all of the above assistance the writer desires here to express his grateful appreciation.

WILLIAM H. BROWN.

PHILIPPINE FIBER PLANTS

By William H. Brown

INTRODUCTION

With the great variety of plants occurring in the Philippines it is not surprising to find a large number which produce useful fibers. Most of the fibers derived from the wild plants are, however, of little economic value and are used very locally for making inferior grades of ropes or for other minor purposes. However, some of them, as in the case of the buri, pandan, rattans, and bamboos, are the bases of considerable industries; while abaka (Manila hemp), which produces the premier cordage of the world, is a native of the Philippines. The use of Philippine fibers in the manufacture of hats has been extensively discussed by Miller * and Robinson.† Muller ‡ has written a very good account of the various Philippine fibers used in the industrial work of the schools. A short account of some plants producing bast used in making ropes is given by Mendiola §; while King || has written a very extensive and detailed discussion of the mechanical properties of a large number of bast fibers used in rope manufacture.

Some of the most useful fibers which can be considered as forest products are derived from palms and bamboos, and have been discussed in bulletins dealing with these plants. They are used in the manufacture of hats, baskets, mats, furniture, ropes, thatching, etc.

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* Miller, H. H., Philippine hats. Bureau of Education Bulletin Number 33 (1910).

† Robinson, C. B., Philippine hats. Philippine Journal of Science, Volume VI (1911), pages 93 to 131.

‡ Muller, T., Industrial fiber plants of the Philippines. Bureau of Education Bulletin Number 49 (1913).

§ Mendiola, N. B., A study of Philippine bast fibers. Philippine Agriculturist and Forester, Volume VI (1917), pages 6 to 39.

|| King, A. E. W., Mechanical properties of Philippine bast fiber rope. Philippine Journal of Science, Volume XIV (1919).

Philippine bast fibers are derived from plants ranging in size from small shrubs to large trees and belonging chiefly to the families Sterculiaceae, Tiliaceae, Malvaceae, and Moraceae. As yet none of these fibers have entered into the external commerce of the Islands, but their manufacture into ropes is an important local industry. Mendiola has made a microscopic study of a number of these fibers and has given some data on the cost of production and the tensile strength of ropes made from them. The fibers studied by Mendiola were the basts of *Abroma fastuosa, Kleinhovia hospita, Melochia umbellata, Urena lobata, Hibiscus sabdariffa, Malachra capitata, Triumfetta bartramia, Grewia multiflora, Pipturus arborescens, Sesbania grandiflora, Columbia serratifolia, Malachra fasciata,* and *Wikstroemia ovata.* From the figures given by Mendiola it would appear that, with labor at 80 centavos a day, the cost of manufacture (not including the collection) of these fibers into rope would be greater than the present selling price; from which it would appear that there is little prospect of any considerable industry in the manufacture of such rope. However, as a local industry between seasons, it does afford a man an opportunity to utilize his spare time profitably. Some of these bast fibers, notably *Abroma fastuosa* and *Urena lobata,* have been considered as having great commercial possibilities. This subject has been extensively dealt with by King.

In Table I, taken from King, is shown the relative strength of various bast fibers both dry and wet, as compared with abaka and other standard fibers. Except where noted, the ropes were made by the plane-stripping process and so the strands contained considerable extraneous tissue in addition to the bast. Data from King are given in discussions of the various fibers studied by him.

Table II gives the dimensions of the various fibers studied by Mendiola.

TABLE I.—*Rope made of Philippine fibers arranged in the order of mean dry tensile strength, beginning with the strongest and ending with the weakest.*

[Data from King.]

	Species.	Mean tensile strength.			
		Dry.		Wet.	
		Per square centimeter.	Per square inch.	Per square centimeter.	Per square inch.
	ROPE MADE OF BAST FIBERS.	*Kilos.*	*Pounds.*	*Kilos.*	*Pounds.*
1	*Gnetum* sp.	773	11,100	1,000	14,500
2	*Ficus palawanensis*	752	10,700	766	10,900
3	*Abroma fastuosa* (retted)	643	9,100		
4	*Malachra fasciata*	637	9,030	543	7,700
5	*Bombycidendron vidalianum*	630	8,940	468	6,670
6	*Abroma fastuosa* (crude strips)	545	7,760	319	4,530
7	*Corchorus olitorius*	503	7,130	360	5,100
8	*Urena lobata*	482	6,850	366	5,200
9	*Ficus benjamina*	480	6,830	471	6,700
10	*Sida acuta*	475	6,740	502	7,190
11	*Ficus pachyphylla*	464	6,600	544	7,760
12	*Helicteres hirsuta*	438	6,230	396	5,620
13	*Bombax ceiba*	405	5,720	351	4,960
14	*Sterculia oblongata*	398	5,650	291	4,130
15	*Sterculia crassiramea*	398	5,660	308	4,380
16	*Grewia eriocarpa*	394	5,630	381	5,450
17	*Commersonia bartramia*	392	5,580	266	3,780
18	*Cordia cumingiana*	388	5,500	364	5,160
19	*Pterocymbium tinctorium*	381	5,420	435	6,180
20	*Grewia multiflora*	376	5,360	332	4,730
21	*Artocarpus communis* (old bast)	367	5,220		
22	*Artocarpus communis* (young bast)	356	5,070	340	4,830
23	*Goniothalamus amuyon*	345	4,940	293	4,180
24	*Cordia myxa*	324	4,610	263	3,730
25	*Grewia bilamellata*	320	4,570	180	2,570
26	*Kleinhovia hospita*	309	4,370	286	4,070
27	*Columbia blancoi*	302	4,270	306	4,340
28	*Sterculia stipularis*	268	3,800	366	5,200
29	*Thespesia lampas*	268	3,800	291	4,130
30	*Pterospermum diversifolium*	263	3,740	261	3,690
31	*Allaeanthus glaber*	231	3,290	253	3,590
32	*Sterculia foetida*	200	2,840	200	2,840
33	*Ficus forstenii*	154	2,200	222	3,160
34	*Trema orientalis*	134	1,920	262	3,720
	Average	406	5,770	375	5,338

TABLE I.—*Rope made of Philippine fibers arranged, etc.*—Continued

	Species.	Mean tensile strength.			
		Dry.		Wet.	
		Per square centimeter.	Per square inch.	Per square centimeter.	Per square inch.
	ROPE MADE OF MISCELLANEOUS FIBERS.	*Kilos.*	*Pounds.*	*Kilos.*	*Pounds.*
1	*Musa textilis* (grade "G" abaka rope 16 mm in circumference)	1,110	15,700	1,180	16,700
2	*Musa textilis* (grade "F" abaka rope 15 mm in circumference)	974	13,800	923	13,100
3	*Musa textilis* (grade "F" abaka rope 31 mm in circumference)	943	13,400	946	13,500
4	*Musa textilis* (grade "G" abaka rope 26 mm in circumference)	744	10,600	759	10,800
5	*Agave cantala* (maguey; grade, Cebu No. 2)	739	10,400	651	9,220
6	*Dendrocalamus merrillianus*	237	3,380	179	2,540
7	*Corypha elata* (leaf of palm)	232	3,300		
8	*Corypha elata* ("buntal;" vascular fibers in petioles)	222	3,150	257	3,650
9	*Cocos nucifera* (rope 50 mm in circumference)	185	2,640	136	1,940
10	*Cocos nucifera* (rope 24 mm in circumference)	176	2,490	148	2,100
11	*Cocos nucifera* (rope 44 mm in circumference)	170	2,420	146	2,070
12	*Anamirta cocculus* (rope made from entire stems)	149	2,120	110	1,570
13	*Amomum* sp.			325	4,600
	Average	490	6,950	480	6,816

TABLE II.—*Dimensions of some Philippine bast fibers.*

[Data from Mendiola.]

Fibers.	Length.			Diameter.					
				Total.			Lumen.		
	Maximum.	Average.	Minimum.	Maximum.	Average.	Minimum.	Maximum.	Average.	Minimum.
	mm.	*mm.*	*mm.*	*mm.*	*mm.*	*mm.*	*mm.*	*mm.*	*mm.*
Abroma fastuosa	4.240	2.213	1.360	0.039	0.017	0.006	0.001	0.005	0.002
Kleinhovia hospita	2.400	1.518	.933	.031	.015	.008	.007	.005	.001
Melochia umbellata	3.067	2.045	1.107	.027	.016	.011	.012	.007	.003
Urena lobata	2.547	1.442	.973	.027	.013	.009	.005	.003	.002
Malachra capitata	4.493	2.758	1.560	.029	.015	.007	.011	.007	.002
Triumfetta bartramia	2.827	2.027	1.133	.027	.016	.009	.006	.004	.001
Grewia multiflora	2.707	1.843	1.067	.024	.015	.006	.005	.003	.001
Pipturus arborescens	6.000	5.054	3.773	.100	.069	.042	.078	.044	.017
Sesbania grandiflora	3.760	2.737	1.800	.037	.022	.008	.023	.010	.001
Columbia serratifolia	2.533	1.593	.960	.027	.014	.005	.001	.004	.008
Malachra fasciata	5.067	2.014	1.200	.042	.016	.006	.015	.007	.003
Wikstroemia ovata	4.240	2.972	1.653	.021	.012	.003	.004	.002	.001

DESCRIPTIONS OF SPECIES

Family POLYPODIACEAE

Genus DRYOPTERIS

DRYOPTERIS PTEROIDES O. Kuntze. LOKDÓ.

Local name: *Lokdó* (Samar).

In some parts of the Philippines the stems of this fern are crushed and the cord-like vascular bundles extracted for use as decorative weaves in baskets. The fibers, however, are of inferior quality.

This species is common and widely distributed, usually growing in thickets on hillsides and in valleys at low and medium altitudes. The fronds are tufted, pinnate, and usually about 1 meter in height.

Genus NEPHROLEPIS

NEPHROLEPIS HIRSUTULA Presl. ALOLOKDÓ.

Local names: *Alolokdó, lokdó, pakó-pakó* (Bisaya); *bayangbáng* (Batanes Islands); *hagnáya* (Tayabas); *korokalaság* (Bikol); *lagunton* (Abra); *pakó* (Polillo).

The fibro-vascular bundles of the stems of this plant are sometimes extracted and used to a very limited extent in the manufacture of hats, mats, and baskets.

Nephrolepis hirsutula is a coarse fern with creeping rootstocks. The narrow pinnate fronds are from 0.3 to 1.2 meters in length and 8 to 15 centimeters wide. The plant grows both in the ground and as an epiphyte, and is commonly cultivated for ornamental purposes. It is widely distributed at low and medium altitudes in the Philippines.

Genus STENOCHLAENA

STENOCHLAENA PALUSTRIS (Burm.) Bedd. (Plate I). DILIMÁN.

Local names: *Agnáya, hagnáya* (Laguna, Tayabas, Marinduque, Leyte, Camarines, Capiz, Iloilo, Palawan, Agusan); *dilimán* (Pangasinan, Pampanga, Bataan, Bulacan, Laguna, Iloilo, Occidental Negros); *gilimán* (Pampanga); *lanas* (Apayao).

The stems of this fern are noted for their durability when submerged in salt water, and for this reason are in great demand for tying together the bamboo frames of which fish traps are made. The stems are usually from 2 to 4 meters

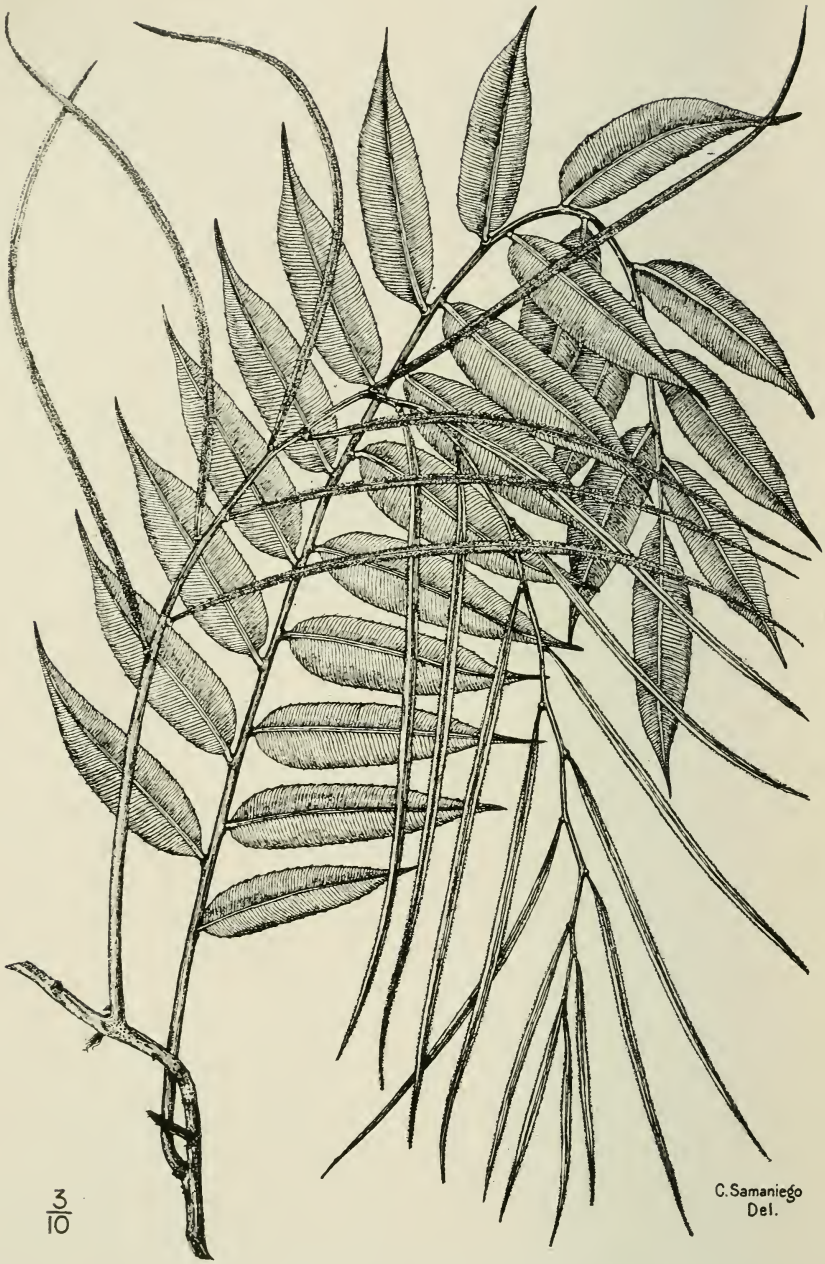

PLATE I. STENOCHLAENA PALUSTRIS (DILIMÁN).

PLATE II. GLEICHENIA LINEARIS (KILÓB).

166677——2

in length. They are gathered, dried, tied into bundles, and in this form are brought to Manila in considerable quantities. From a commercial standpoint *Stenochlaena palustris* is undoubtedly the most important of the ferns in the Philippines, as the stems supply by far the best local material for the special purpose mentioned above. As fishing with traps is a very important local industry, *Stenochlaena* enters into the economic life of the Filipinos to a considerable extent. During the year 1918, forest charges were paid on 156,456 kilos of diliman. This fern is also used for making ropes and occasionally baskets, but it is inferior for the latter purpose.

The young shoots are eaten either raw as a salad or cooked.

Stenochlaena palustris is a coarse, climbing fern of indefinite length. The stems are brown, smooth, somewhat less than 1 centimeter in diameter and sparingly branched. The sterile fronds are up to 80 centimeters in length and pinnate, with pinnae 10 to 12 centimeters long and about 8.5 centimeters wide. The fertile fronds are somewhat shorter than the sterile ones and about 3 millimeters wide. This fern is widely distributed in thickets, usually in swampy places near the sea.

Family GLEICHENIACEAE

Genus GLEICHENIA

GLEICHENIA LINEARIS (Burm.) Clarke. (Plates II, III). KILÓB.
Local names: *Gapingoi* (Benguet); *kilóg, kilób* and *tilúb* (Tagalog).

Splints are prepared by cracking the outer covering of the very long leaf-stalks and pulling out the ribbon-like vascular bundles. The splints are excellent weavers for coiled baskets and are also used in making belts.

Gleichenia linearis is characterized by very large leaves which fork repeatedly and have a bud-like structure in the forks. This fern is common and widely distributed in the Philippines and frequently forms dense tangles in open places on mountains.

Family SCHIZAEACEAE

Genus LYGODIUM

LYGODIUM spp. (Plate IV). NÍTO.

Local names: The name *níto,* for the different species of *Lygodium,* is reported from the following provinces:—Ilocos Norte and Sur, Cagayan, Isabela, Union, Zambales, Pangasinan, Cavite, Rizal, Laguna, Tayabas, Camarines, Sorsogon, Samar, Occidental and Oriental Negros, Cebu, Capiz, Antique, Iloilo,

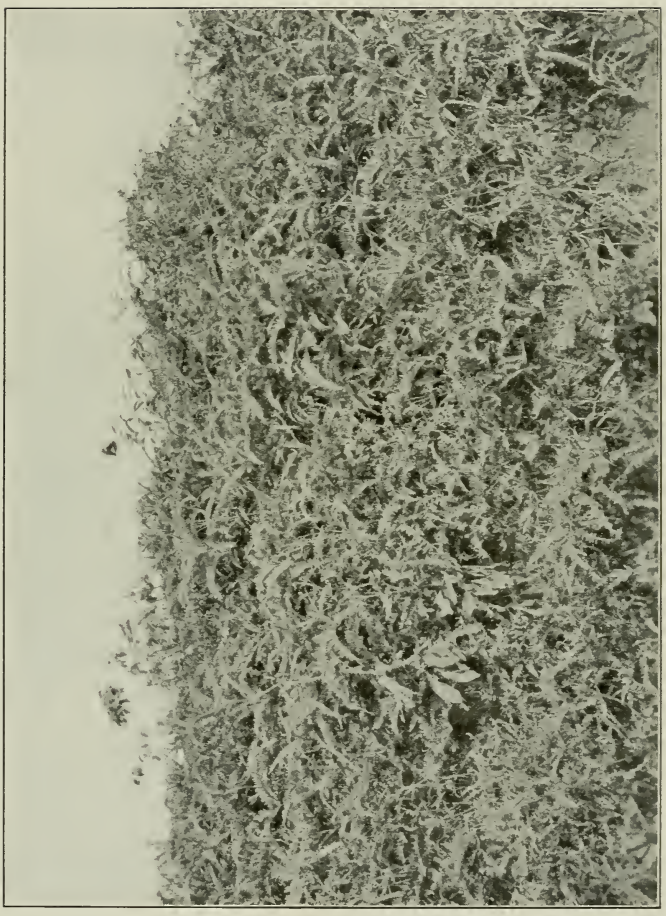

PLATE III. GLEICHENIA LINEARIS (KILÓB).

Bohol, Surigao, and Misamis. *Lygodium circinnatum* is also known as *agsám* in Albay, *nítong-putí* in Tayabas and Camarines, and *náui* in parts of Mindanao; *Lygodium flexuosum* as *katák* in Cagayan, *nítong-putí* in Rizal, *níto a dadakkél* (Iloko) in Benguet, *nítu* and *kalulúng* (Ibanak) and *sasítang* (Iloko) in Isabela; *Lygodium japonicum* as *agsám* in Camarines and *karekai* (Ibanak) in Isabela, *kulót* in Cavite, and *nítong-puti* in Rizal, Cavite and Batangas; *Lygodium scandens* as *agsám* in Camarines, *níto-nitóan* in Laguna and *nítong-párang* in Rizal; and *Lygodium semihastatum* as *antón* in Albay. The commonest and most widely known and used species is *Lygodium circinnatum*.

Splints prepared from *Lygodium* are used in the manufacture of baskets, hats, and fancy boxes. In several provinces nito splints are combined with buri or some other fiber to make various fancy articles such as cigarette cases or pocketbooks. The effect is very pleasing, particularly when the nito is black.

The species of *Lygodium* are slender, climbing ferns. The climbing portion is the leaf, which is of indefinite growth and length. The genus *Lygodium* is distinguished from all other Philippine ferns by these characteristics of the leaves.

Family GNETACEAE

Genus GNETUM

GNETUM GNEMON L. BÁGO.

Local names: *Bágo, magatungál* (Lanao, Cotabato); *kugitas* (Butuan); *bágo* or *bágu* (Bataan, Tayabas, Camarines); *banágo* (Bisaya); *kuman* (Davao).

The bark of this tree is made into rope. The fruits are edible when cooked, while the young leaves are cooked and eaten as a vegetable.

Gnetum gnemon is a tree reaching a height of about 10 meters. The leaves are opposite, oval, 10 to 20 centimeters in length, and usually pointed at both ends. The fruits are red, ovoid or ellipsoid, and about 2 centimeters long.

GNETUM INDICUM (Lour.) Merr. (*G. latifolium* Bl.).

Local names: *Báging* (Butuan); *biás* (Rizal); *kaliát* (Benguet); *kuliád* (Cagayan); *kuliát* (Pampanga, Bataan, Rizal, Lanao).

The bark is used for tying purposes and for making rope. The vine is also utilized as a source of drinking water in the forest. The fruits are edible when cooked.

Gnetum indicum is a coarse vine. The leaves are large, pointed at the apex, usually rounded at the base, and from 10

PLATE IV. LYGODIUM CIRCINNATUM (NÍTO).

to 22 centimeters in length. The fruits are red, oval in shape, and about 3 centimeters in length. This species is common and widely distributed in the Philippines.

GNETUM sp. KALIÁT.

Local names: *Kadiat* (Itneg); *kaliát* (Iloko).

This species is a small tree with thin, glossy, elongated, pointed leaves. Rope made from the bark had the greatest tensile strength of all the bast ropes tested by King. It was, moreover, exceptionally pliable. In both the dry and wet conditions this bast stood first both as regards tensile strength and breaking length. The bast strips have a rich, brown color, are free from irregularities, and have a rather waxy appearance.

Rope made from *Gnetum* is held in high esteem on account of its great strength, pliability, and lightness, and is considered by the Igorots and Ilocanos to be superior to that made of any other local fiber. King found the rope to have a tensile strength of 773 kilos per square centimeter. Concerning its strength King says:

> *Gnetum* sp. rope is stronger than machine-laid maguey rope made of government grade Cebu No. 2 fiber and in tenacity approaches closely cordage made of the most superior grade of abacá fiber. When wetted for twenty-four hours this bast rope increases 31 per cent in strength and is actually stronger than machine-laid abacá rope made of "F" grade fiber.

Several other species of *Gnetum* are used in making ropes.

Family TYPHACEAE

Genus TYPHA

TYPHA ANGUSTIFOLIA L. (Plate V). CAT-TAIL.

Local names: *Aníbong* (Bontok); *balanggót* (Tagalog); *buhai-búhai* (Negros Occidental); *lampakunai* (Bisaya); *tubol-tuból* (Bikol, Bisaya).

The stems and leaves of the cat-tail are used for tying purposes, while the entire or split culms are utilized for making coarse bags and baskets. The straw is well adapted for making slippers. The stems and leaves are occasionally twisted into coarse ropes which, however, have little tensile strength. The floss from the protruding heads is sometimes used for stuffing pillows.

This species reaches a height of 2 meters. The leaves are long and from 10 to 12 millimeters wide. The spikes are cylindrical, the female ones when mature are brown, 12 to 20 centimeters long, and up to 2 centimeters in diameter. This plant is locally very abundant in low, wet places and shallow, stagnant, fresh water. It is widely distributed in the Philippines.

PLATE V. TYPHA ANGUSTIFOLIA (CAT-TAIL).

Family PANDANACEAE

Genus PANDANUS

PANDANUS spp. THE PANDANS.

The pandans, or screw-pines, are characteristically tropical trees or shrubs, although they may be found in sub-tropical countries. In the Philippines there are over forty known species. A few are generally distributed in the various islands and are likewise widely distributed in the Indo-Malayan region. Most of the species are, however, of decidedly local occurrence. The Philippine species vary in size from small shrubs less than a meter high to trees 15 or more meters in height, and are always erect and never climbing. They are characterized by a peculiar spiral arrangement of the elongated, spiny leaves. The common English name, screw-pine, refers to the spiral arrangement of the leaves and the pineapple-like fruits of the more common and widely distributed species. The leaves can be readily distinguished from those of the pineapple or maguey by the presence of a middle row of spines in the pandan leaves. The leaves are never thick like those of maguey. Most of the Philippine species have prominent prop roots, and the trunks almost invariably bear small, short, and scattered spines. Pandans occur in such widely separated habitats as along sandy beaches and in virgin forests.

The fresh wood of the pandan is hard; that of some species is durable. The larger stems are used as temporary posts. Pandans are moreover frequently cultivated for ornamental purposes. Their chief value, however, lies in the leaves, which are used for making coarse and fine baskets, bags, coarse and fine hats, mats, etc.

All of the species having long leaves are potential sources of strips that may be used in weaving baskets, mats, and other articles, but there is a great deal of difference in the texture of prepared strips, due to the difference in the thickness and other characteristics of the leaves. Some forms have been found by the Filipinos to be superior for special purposes and thus only a few of the numerous Philippine species are at present utilized.

PANDANUS COPELANDII Merr. BARÍU.

Local names: *Alasás* (Tayabas); *baleau* (Occidental Negros); *baleó, balewe, balíu* (Capiz, Romblon, Bohol, Surigao); *baliku* (Surigao); *baloi, baroi* (Agusan, Surigao); *bareu* (Samar); *baríu, baréu, buruíu* (Albay, Sorsogon); *lagutlút* (Laguna); *pandán* (Cagayan, Zambales, Nueva Ecija); *pangdán* (Benguet, Pangasinan); *pataga* (Ibanag, Apayao subprovince); *sere* (Cagayan).

This species is widely distributed at low and medium altitudes from northern Luzon to southern Mindanao. It reaches a height

PLATE VI. PANDANUS SABOTAN (SABUTÁN).

of from 3 to 9 meters. The leaves are about 2 or 3 meters long and about 5 to 8 centimeters wide. It is claimed that the fibers from this species are tougher than those from *Pandanus radicans*. The leaves are used for making coarse mats and baskets.

PANDANUS DUBIUS Spreng. TABOÁN.

Local names: *Bákong* (Bohol); *taboán* (Surigao).

This is a large pandan found in the southern Philippines. It is used locally for making coarse mats.

PANDANUS LUZONENSIS Merr. ALASÁS.

Local names: *Alasás* (Zambales, Rizal,); *dasa* (Rizal); *pandan de China* (Bulacan).

This species is widely distributed in central Luzon. It reaches a height of about 7 meters. It is economically of little value, but the leaves are used for weaving baskets and mats.

PANDANUS RADICANS Blanco. OYAÑGÓ.

Local names: *Olañgó* (Leyte); *owañgó* (Surigao); *oyañgó* (Albay); *uyañgó* (Sorsogon); *wañgó* (Bohol).

This species is apparently widely distributed in the Philippines. It reaches a height of 8 meters, and has long, wide leaves and dark, brick-red fruits. It is used for making coarse mats, bags, and sometimes hats. According to Delgado, in the year 1750, fibers were extracted from the long prop roots and used for weaving a fine cloth; but Blanco, writing in 1837, states that these fibers were no longer utilized. In Mindanao the wood has been found to be excellent for the manufacture of splints used in making baskets; in fact, they are reported to be superior to rattans for this purpose.

PANDANUS SABOTAN Blanco. (Plate VI). SABUTÁN.

Local name: *Sabután* (Laguna, Rizal, Tayabas).

According to Mr. E. D. Merrill, the botanical status of this species is doubtful. It seems probable that it is a cultivated form or variety of the common and widely distributed *Pandanus tectorius*. This plant, from which the sabutan fiber is obtained, is well known and has been cultivated in Laguna province for at least two centuries. It greatly resembles the common *Pandanus tectorius* in appearance, but the fruits have never been collected. The plant is from 2 to 4 meters in height. The leaves resemble those of *Pandanus tectorius*, but are of finer texture. Sabutan is cultivated in and about towns along the eastern and northern shores of Laguna de Bay, in parts of Tayabas province, and on the island of Polillo; but has never been found wild, although it not infrequently occurs where cultivation has been abandoned. It is easily propagated by axillary suckers which grow from the lower parts of the stems.

Fig. 1. Pandanus simplex. (Karagómoi).

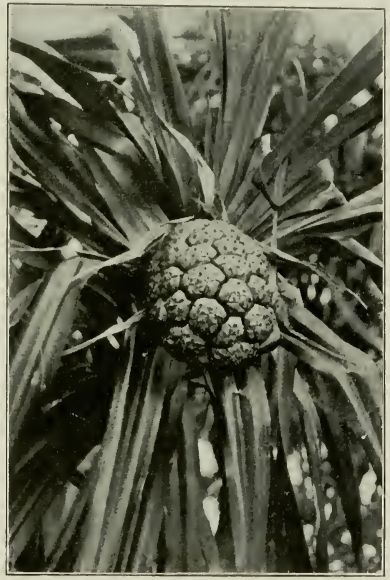

Fig. 2. Pandanus tectorius. (Pandan).

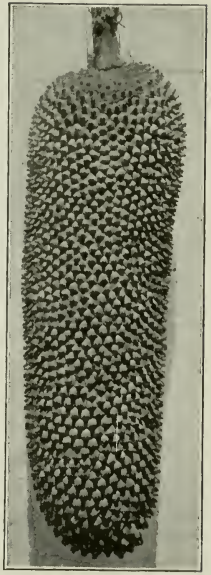

Fig. 3. Pandanus simplex. (Karagómoi).

PLATE VII.

The chief use of this plant is in the production of the fiber used in manufacturing sabutan hats. Hats made of sabutan are strong and durable, and in texture more nearly resemble the Panama hat than any other kind manufactured in the Philippines. The unbleached hats are a light green color, and the chief objection to them is that they do not bleach readily. Good sabutan hats, however, command high prices in the Philippines.

Sleeping mats of excellent quality are made from sabutan fibers either in natural or dyed shades.

PANDANUS SIMPLEX Merr.(Plate VII). KARAGÓMOI.

Local names: *Kalagímai* (Tayabas); *karagómoi* (Tayabas, Camarines, Albay, Catanduanes, Sorsogon, Leyte, Cebu); *pandán* or *pandán-totóo* (Laguna); Luisiana pandan, Cavinti pandan, Majayjay pandan (from towns in Laguna where it is much used); *bangkoáng* (Laguna, Tayabas, hat trade in Manila, mat trade in Camarines and Albay).

This species is found in the provinces of Nueva Vizcaya, Rizal, Laguna, Tayabas, Camarines, Albay, Sorsogon, Leyte, Cebu, and on the islands of Polillo and Catanduanes. It is usually planted in the Banahao region, where it is of great economic importance, and is frequently cultivated in Camarines. The Karagomoi variety, of the Bikol provinces, has leaves 6 to 10 centimeters wide and up to 3.5 meters long; the variety cultivated in the Banahao region, the "Majayjay pandan," has leaves up to 20 centimeters wide and 5 meters long.*

The prepared strips of the leaves are very extensively used for making coarse and fine mats, hats, bags, and telescope baskets. They are also used extensively for making fancy articles such as picture frames, wall pockets, hand bags, and fancy slippers.

In preparing the fiber, the spiny margins and the midribs of the leaves are removed and the leaves cut into strips of desired width. The strips are then dried in the sun and allowed to wilt. To make them pliable they are rolled under one end of a heavy log. They are further dried in the sun and are then ready for use.

PANDANUS TECTORIUS Soland. (Plates VII, VIII). COMMON OR BEACH PANDAN.

Local names: *Baroi* (Sorsogon); *pandán* (Pampanga, Tarlac, Rizal, Batangas, Tayabas, Camarines, Albay, Mindoro, Iloilo, Antique, Oriental Negros, Leyte, Cebu, Surigao, Davao, Zamboanga); *pangdán* (Abra, Pangasinan, Camiguin Island); *panglán* (Iloko and Sambali in Zambales); *sabután* (Rizal); *uhañgo* (Batanes Islands).

This species is the most common and widely distributed pandan in the Islands. It is abundant along the seashore and

* The "pandan of Majayjay" is described by Muller and Robinson as *Pandanus utilissimus* Elmer: this is a synonym of *P. simplex*.

PLATE VIII. PANDANUS TECTORIUS (COMMON PANDAN).

usually forms a stand immediately back of the beach. It is never found very far inland. Under favorable conditions it reaches a height of 5 to 6 meters. The size and length of the leaves vary greatly.

This pandan is of comparatively little economic value. The leaves are split into strips and this material is used, to a limited extent, for making mats or, when bleached, for weaving hats. The longer leaves are sometimes utilized for weaving coarse, temporary baskets. Material from a form of this species is extensively used in Formosa and Liukiu for making imitation Panama hats.

The lower part of the mature fruit is covered by a yellowish-red pulp. This is rarely eaten, although its flavor is excellent.

Family GRAMINEAE

Genus ANDROPOGON

ANDROPOGON HALEPENSIS var. **PROPINQUUS** (Kunth) Merr. BATAD-BATÁRAN.

Local names: *Aróro* (Camarines); *batád* (Bukidnon); *batád-batáran* (Tagalog); *uginai* (Bukidnon).

The stalks of this grass are split into strips and occasionally utilized in making hats.

Andropogon halepensis is a coarse, perennial grass reaching a height of 3 meters. It has stout, cylindrical, solid stems, broad leaves, and open panicles.

This species is found in thickets and open, damp places, and is common and widely distributed in the Philippines.

ANDROPOGON ZIZANIOIDES (L.) Urb. MORAS or VETIVER.

Local names: *Amóra* (Cebu); *amóras* (Ilocos Norte); *anias* or *anias de móras* (Pampanga); *anis de móro* (Ilocos Sur, Abra, Pangasinan); *geron, giron* (Iloilo); *ilíb* (Pampanga); *móra* or *móras* (Pampanga, Tarlac, Rizal, Manila, Laguna, Camarines, Albay, Sorsogon, Antique, Cebu, Occidental Negros); *rimódas* (Capiz); *rimóra* (Zambales); *rimóras* (Camarines); *tres móras* (Capiz).

The roots are used for weaving fans which are prized on account of their agreeable odor. For this purpose the roots are prepared by dipping them in water for about 20 minutes and then pounding them with a light, wooden club to remove the outer portion. They are then pressed and woven into fans. These are sometimes sold in oriental curio shops in America as "sandal-root" fans.

The stalks are used in making hats. For this purpose flower stalks of suitable size are selected, and the inflorescence and

outer covering removed. They are then put in boiling water for about twenty minutes, after which they are dried in the sun for two or three days. The stalks are then scraped with a sharp knife until smooth and clean. Brooms are also occasionally made from the stalks. The leaves are sometimes used for thatching.

Vetiver oil is obtained from this grass.

Andropogon zizanioides is a coarse, tufted grass 1 to 2 meters in height. It is commonly planted on the dikes of rice fields and is frequently abundant in uncultivated rice lands, especially in low, damp soil. It is sometimes planted on river banks to prevent erosion.

This species is widely distributed in the settled areas of the Archipelago.

Genus **APLUDA**

APLUDA MUTICA L. KURUKAUÁYAN.

Local names: *Kauakauáyan* (Rizal); *kolokauáyan* (Laguna); *kurukauáyan* (Camarines); *magkauáyan* (Bohol); *maykauáyan* (Samar).

The stalks of this grass are occasionally utilized for making hats, but such hats never or seldom enter even the local trade.

Apluda mutica is a tall, erect or half climbing, somewhat slender grass 1 to 2 meters in height. The stems are smooth, branched, and solid. The leaves are 10 to 30 centimeters long, 5 to 10 centimeters wide, pointed at the apex and with a narrow base. The spikes are about 8 millimeters long and green or purplish.

This grass is widely distributed in the Philippines in thickets.

Genus **COIX**

COIX LACHRYMA-JOBI L. TIGBÍ OR JOB'S TEARS.

Local names: *Abukai* (Palaui Island); *adlái* (Bikol); *agagai* (Batanes Islands); *aglái* (Misamis); *apagi* (Lepanto); *attakai* (Bontoc); *balantakan* (Pampanga); *bintikái, burubayokó* (Bikol); *dumau* (Cebu); *kalabugau* (Bukidnon); *kambót* (Abra); *katigbí* (Bohol); *koldásan* (Bikol); *kudlásan* (Polillo, Balabac Island); *paliás* (Mindoro); *puyás, lamudiás* or *alimudiás* (Negros Occidental); *pintaká* (Bikol, Bisaya); *tigbí* (Samar, Bukidnon, Camarines, Laguna, Manila, Rizal, Batangas, Bontoc); *tigbikai* (Bikol).

The chief value of this coarse grass is in the hard fruits. These are gathered and strung as beads, sometimes used as rosaries, sometimes in making bead curtains, or on various kinds of ornamental baskets, trays, etc.

This species is widely distributed in the settled areas of the Philippines. It is probably not a native of the Archipelago, but of prehistoric introduction.

Genus **ELEUSINE**

ELEUSINE INDICA Gaertn. PALAGTIKI or YARD GRASS.

Local names: *Balili* (Bontoc); *baráñgan* (Camarines); *bilabila* (Laguna); *damo* (Cagayan); *gagabútan* (Tagalog); *kabit-kabit* (Bataan); *palagtiki* (Bisaya); *parañgis-sabúñgan* (Pampanga); *sabung-sabúñgan* (Pampanga).

This grass is apparently introduced in the Philippines, but is widely distributed, and especially abundant in and about towns and along roads and trails throughout the settled areas. The culms are sometimes used in making hats, but this industry is very local and irregular.

Eleusine indica is a rather stout, tufted, erect, smooth, annual grass 10 centimeters to 1 meter in height. The leaves are 10 to 30 centimeters long and 3 to 7 millimeters wide. The flowering stalk has three to six spikes, 2.5 to 10 centimeters long, 3 to 5 millimeters thick, and all occurring in a terminal whorl, or one or two somewhat lower down on the stem.

This species is distributed throughout the Philippines and is very common in waste places, along roads, etc.

Genus **IMPERATA**

IMPERATA EXALTATA Brongn. KÓGON.

A description of this species is given in the bulletin on paper pulp.

The leaves of this grass are extensively used for thatching in all of the interior parts of the Archipelago, where it is difficult to transport nipa shingles.

The tender shoots of kogon are used for grazing, and kogon areas are frequently burned over so that the young shoots may be utilized for this purpose.

Kogon stems are used locally to a limited extent in the manufacture of hats, while some of the industrial schools have utilized the plant for making round, braided mats suitable for bathroom use.

Genus **ISCHAEMUM**

ISCHAEMUM ANGUSTIFOLIUM Hack. (Plate IX). KOBBÓOT.

Local names: *Danu, pueng, puenig* (Bontoc); *kobbóot* (Iloko).

In the parts of Luzon where this grass grows it is utilized for making rope, on account of its tensile strength. Owing to its durable qualities it is also used for making both the soles and uppers of grass slippers. The straw is prepared by simply drying it in the sun.

This grass varies in height from 0.6 to 1 meter. It is tufted and the swollen bases of the stems are densely woolly. *Ischae-*

PLATE IX. ISCHAEMUM ANGUSTIFOLIUM (KOBBÓOT).

166677——3

mum angustifolium is widely distributed in northern Luzon, growing on open slopes, but it is not known from other parts of the Philippines.

Genus **MISCANTHUS**

MISCANTHUS SINENSIS Anders. BIGÁO.

Local names: *Biau* (Batanes Islands); *bigáo, bigáho, gáho, gísa* (Bikol); *bi-idu* (Benguet); *rúno* (Igorot); *taláhib* (Zambales).

This coarse grass is used for thatching houses. The stems are used like wattles for making side walls of houses and sometimes even for covering the floors. In Sorsogon, splints made from the stems are used in making screens and window shades. The stems are sometimes employed for making shafts of arrows.

Miscanthus sinensis is a coarse, erect, gregarious grass 1 to 3 meters in height. It occurs in abundance at medium and high altitudes, especially in the Mountain Province of Luzon. When repeated fires have occurred this grass frequently occupies an area to the almost entire exclusion of other vegetation, just as *Imperata exaltata* (kogon) and *Saccharum spontaneum* (talahib) do at lower elevations.

Genus **ORYZA**

ORYZA SATIVA L. RICE.

Rice straw is used in Ilocano districts for making hats for home use, and in schools in Ilocos Norte for the upper soles of slippers. Sometimes rice straws are tied into bundles and are used as brooms for rough housework.

Genus **PHRAGMITES**

PHRAGMITES KARKA (Retz) Trin. LUPÍ.

Local names: *Lupí* (Camarines); *sabunóg* (Negros Occidental); *tanúbong* (Bontoc Subprovince).

This species is larger and rarer than *Phragmites vulgaris* and apparently is used for the same purposes.

PHRAGMITES VULGARIS Trin. (Plates X, XI). TAMBÓ.

Local names: *Bagang, tabúnak, tangbó* (Bisaya); *lupí* (Bikol); *tambó* (Tagalog, Bisaya, Bikol); *tagísi* (Ibanag); *tambú* (Bulacan, Rizal, Manila vicinity, Batangas); *tanóbong* (Pangasinan).

The chief use of this grass appears to be in the manufacture of a peculiar type of dustbroom used for sweeping highly polished floors. The panicles arranged in a fan-like manner form the broom, while the culms tightly bound to a central strengthening piece of bamboo form the handle. These brooms are of great utility and are extensively used in the Philippines. The best grade of *Phragmites* broom is manufactured from the

PLATE X. PHRAGMITES VULGARIS (TAMBÓ).

very young panicles, gathered before the flowering glumes have developed. Better grades are made from *Thysanolaena* panicles.

In some of the islands the stems are used in manufacturing coarse hats.

Phragmites vulgaris is a coarse, erect grass attaining a height of at least 3 meters. The stems are cylindrical and hollow. It is locally very abundant in shallow swamps and along muddy streams; and is often gregarious, occupying considerable areas to the exclusion of other vegetation. It is widely distributed in the Philippines at low and medium altitudes.

Genus SACCHARUM

SACCHARUM OFFICINARUM L. SUGAR CANE.

The flowering stalks of the sugar cane are sometimes used for making picture frames.

SACCHARUM SPONTANEUM L. TALÁHIB.

Local names: *Bugáng, tigbáo* (Bisaya); *sikál* (Isabela); *sidda* (Iloko); *taláhib* (Tagalog, Bikol).

From an economic standpoint this plant ranks very low. The very young shoots are grazed by domestic animals, but the mature plant is too hard and harsh for forage. In some regions the culms are used for shafts of arrows, while they are very frequently utilized for making temporary fences, and for wings or runs to fish weirs. In some provinces they are used as wattles for making house walls. The stalks, entire or split, have been utilized by some schools in industrial work for making brooms, hats, screens, picture frames, and wall pockets. The panicles are occasionally utilized for stuffing pillows. As superior material for all the above purposes is usually to be had in the Philippines, most of the uses for this coarse grass here indicated are apparently very limited and very local.

A description of this plant is given in the bulletin on paper pulp.

Genus SPOROBOLUS

SPOROBOLUS ELONGATUS R. Br. BAKUÍT.

Local names: *Bakuít, bangkuít* (Iloilo); *sangsañgítan* (Bontoc).

A fairly fine straw of medium length is obtained from the flower stalks and utilized at times in Iloilo as a hat material.

Sporobolus elongatus is a grass with slender stems, numerous, rather long and narrow leaves, and long narrow panicles. It reaches a height of 1 meter, but is usually shorter. This species is distributed from northern Luzon to southern Mindanao, but is most abundant in the Mountain Province.

PLATE XI. PHRAGMITES VULGARIS (TAMBÓ).

SPOROBOLUS INDICUS R. Br.

The tough culms of this grass are used in Panay for the manufacture of hats.

Sporobolus indicus is usually a rather densely tufted, perennial, slender, wiry grass with erect, branched stems, 1 meter or less in height. The leaves are 10 to 20 centimeters long, and flat; when dry, rolled up lengthwise. The panicles are slender, erect or somewhat nodding, and 10 to 35 centimeters in length.

This species is widely distributed in the Philippines in waste places, along roadsides, etc.

Genus THYSANOLAENA

THYSANOLAENA MAXIMA Kuntze. (Plate XII). LÁSA or TIGER GRASS.

Local names: *Bugúbi*, *bugúbui* (Pampanga); *buibúi* (Iloko, Bontoc); *gatbó* (Camarines); *lása* (Tagalog); *tagádeu* (Bontoc); *tagisa* (Misamis); *tambú* (Bulacan, Rizal, Mindoro).

In the Philippines a very characteristic, light dustbroom is made of the panicles of several of the coarser grasses, notably *Thysanolaena* and *Phragmites*. These brooms are extensively used for sweeping the highly-polished hardwood floors so characteristic of the better houses in the Philippines. *Thysanolaena* panicles make the best grade of these brooms, and for this purpose they are gathered extensively in some parts of the Islands. The handles of the brooms are made of the flowering stems variously interwoven or bound together, the panicles being arranged in a fan-like fashion to form the broom itself. The brooms are decidedly pretty and very effective for their special purpose. *Thysanolaena* brooms are more durable than those made from *Phragmites* and command a higher price.

Thysanolaena maxima is widely distributed in Luzon, but is of local occurrence, especially at low and medium altitudes. At higher altitudes it is much more abundant, and in the pine region of the Mountain Province it is one of the characteristic, coarse grasses of ravines. It is distinguished by its ample, open panicle and its very numerous, minute spikelets.

Family CYPERACEAE

Genus CYPERUS

CYPERUS MALACCENSIS Lam. (Plates XIII, XIV). BALANGGÓT.

Local names: *Bagá-as* (Bisaya); *balanggót* (Tagalog, Bisaya); *balonggát* (Pampanga); *baranggót* (Camarines); *tíkog* (Agusan).

The stems of this sedge are used for tying purposes, for making coarse hats, slippers, mats, and perhaps for baskets. For coarse work the entire stem is employed, but for the finer

PLATE XII. THYSANOLAENA MAXIMA (LÁSA OR TIGER GRASS).

grades the stems are split. The splitting is done when the stems are fresh or, at least, before they become dry. Mats made from balanggót are very attractive. The manufacture of slippers of this material is carried on to a considerable extent in some towns of Bulacan Province, Luzon.

Cyperus malaccensis is a rather coarse, usually gregarious, perennial sedge reaching a height of from 0.5 to 1.5 meters. The stems are leafless and sharply three-angled, almost three-winged near the top. This sedge occurs in brackish swamps, along tidal streams, bordering nipa areas, and is often abundant back of the mangrove swamps when this area is not wooded. In some regions it is very plentiful.

CYPERUS RADIATUS Vahl. ALÍNANG.

Local names: *Alínang* (Bikol, Bisaya); *balabalanggútan* (Tagalog); *bal-laayang* (Union); *dagkó, óbod-óbod* (Bisaya); *upópi* (Cagayan).

In some parts of the Philippines the outer portions of the stems are stripped, dried in the shade, and used for weaving mats, mattings, and screens. This utilization is apparently local.

Cyperus radiatus is a coarse sedge 0.2 to 1 meter in height. The leaves are one-half to two-thirds as long as the stems and 7 millimeters or less in width. The inflorescence is subtended by long, leaf-like bracts. It is widely distributed in the settled areas of the Philippines at low altitudes, and occurs in shallow swamps and open wet places.

Genus FIMBRISTYLIS

FIMBRISTYLIS DIPHYLLA Vahl. TABTÁBIN.

Local names: *Muthá* (Manila); *pauai* (Benguet); *tabtábin* (Zambales); *tayok-tayók* (Zambales, Panay, Occidental Negros).

The stems of this species are used for much the same purposes as those of *Fimbristylis globulosa,* but are inferior to them. The material is prepared by drying in the sun.

Fimbristylis diphylla is a small, slender sedge growing in wet situations. The leaves are slender and grow in considerable numbers from the base of the stem.

This species is found throughout the settled areas of the Philippines and is the commonest representative of the genus.

FIMBRISTYLIS GLOBULOSA Kunth (Plate XV). TÍKUG.

Local names: *Anahúan, táyok-táyok, tíkog, tíkug, pilokong* (Bisaya); *badang-badáng* (Ilocos Norte); *mutá* (Pampanga); *pakupakúan* (Bulacan); *sud-súd* (Moro).

This is apparently the most important matting sedge in the Philippines. It is extensively utilized in the Bisaya Islands

PLATE XIII. CYPERUS MALACCENSIS (BALANGGÓT).

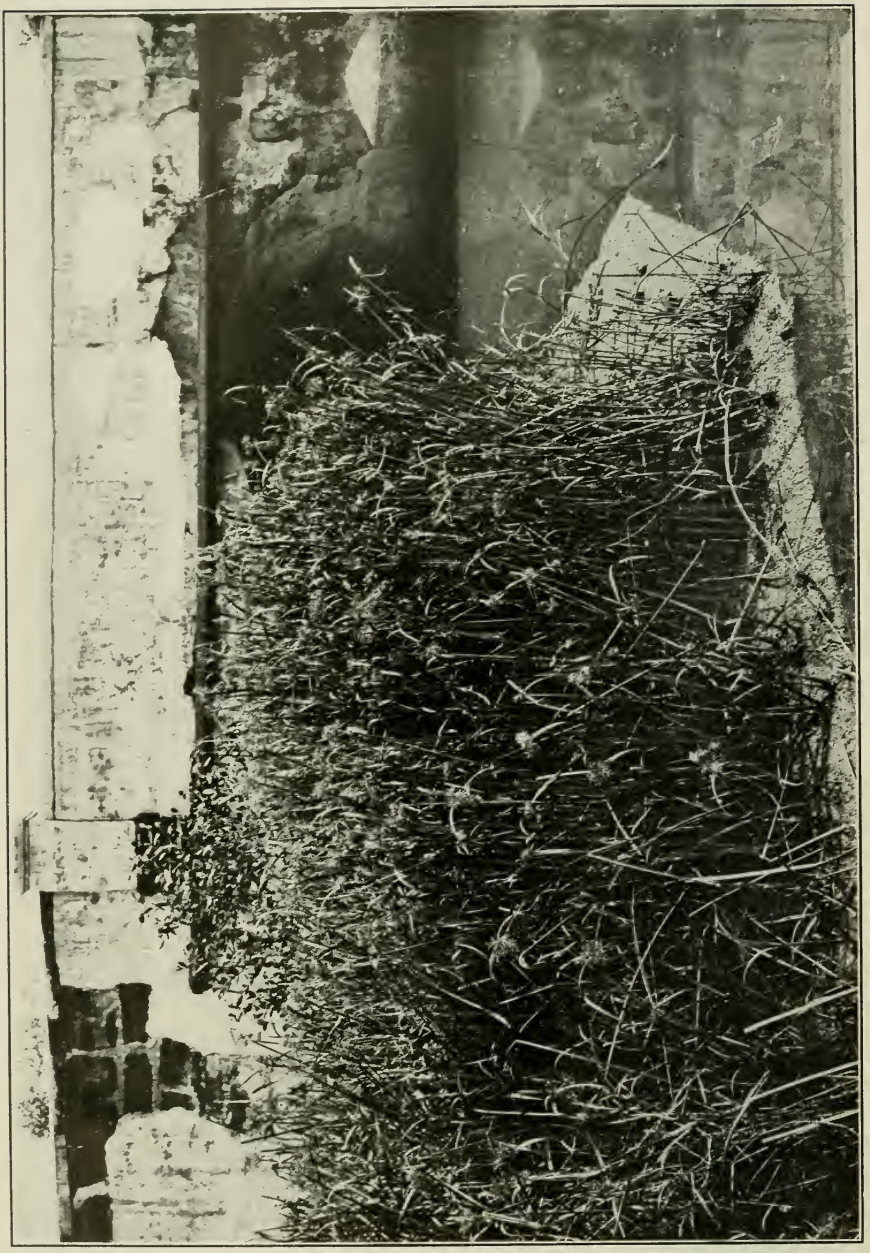

PLATE XIV. CYPERUS MALACCENSIS (BALANGGÓT).

PLATE XV. FIMBRISTYLIS GLOBULOSA (TÍKUG).

for the manufacture of sleeping-mats, floor mats, and to a less extent for hats, slippers, tobacco cases, cushions, etc. The stems are used either whole or split. After being gathered they are bleached for several days by spreading in the sun. They cannot be woven when too dry as they are then brittle.

Fimbristylis globulosa is widely distributed in the Philippines and although of somewhat local occurrence, is frequently found in great abundance. It occurs at low altitudes in the settled areas, and grows in low, wet, swampy places and in rice lands.

In favorable habitats it is said to attain sometimes a height of 3 meters, but is usually less than half this height. This species is much more common in the central and southern Philippines than in Luzon. It is claimed that when once established in rice lands, it is difficult to eradicate; but in spite of this it would seem that, in some places, its cultivation would be justified as a source of material for mats.

Genus RHYNCHOSPORA

RHYNCHOSPORA CORYMBOSA (L.) Britt. RAGÍU.

Local names: *Agás* (Bisaya, Bikol); *báriu-báriu, ragiu-díu, ragíu, rakído, píso-píso* (Bikol).

In the provinces of southern Luzon this sedge is utilized to some extent in the manufacture of mats, sandals, baskets, and screens. The stems are used either whole or split. From an economic standpoint this plant is probably of little value.

Rhynchospora corymbosa is a coarse sedge, about 1 meter in height. The stems are distinctly triangular and the leaves broad and long. This species is widely distributed in open, wet places at low and medium altitudes.

Genus SCIRPIODENDRON

SCIRPIODENDRON GHAERI (Gaertn.) Merr. GÁAS.

Local name: *Gáas* (Bisaya).

In Leyte the leaves of this sedge are used to some extent in making hats, but the material is apparently of inferior quality.

Scirpiodendron ghaeri is the largest and coarsest sedge in the Philippines, greatly resembling a narrow-leaved pandan in appearance. The leaves are from 1 to 4 meters in length and very numerous. The edges are armed with numerous short spines. The fruits are distinctly ridged, over a centimeter in length, and borne in compact clusters subtended by large leaf-like bracts. The plant is gregarious and often found in large quantities in open ravines, along small streams, in swamps at low altitudes, and sometimes around the borders of lakes.

Genus **SCIRPUS**

SCIRPUS GROSSUS L. f. TÍKIU.

Local names: *Agás, bangkuáng* (Bikol); *baga-ás, báki-báki* (Bisaya); *ragiudíu* (Camarines); *tíkug* (Agusan); *tíkiu, títiu* (Tagalog).

The whole stems of this sedge are used to a slight extent in making thick sleeping-mats, and the split stems for making fine mats. The stems are also used for making special types of bags or baskets.

Scirpus grossus is one of the coarsest sedges found in the Philippines. It has triangular stems up to 2 meters in height. The large inflorescences are subtended by broad leaf-like bracts up to 60 centimeters in length. This species is abundant in open swamps at low altitudes, and is widely distributed in the Philippines.

SCIRPUS LACUSTRIS Linn. TÍKER.

Local name: *Tíker* (Iloko).

This species occurs in northern Luzon, where it is utilized for weaving mats. In Formosa it is said to be cultivated for this purpose.

Scirpus lacustris grows in swamps, and in the shallow ponds of the Ilocos provinces and Cagayan. The rounded stems are a meter or more in height.

This species has been reported only from northern Luzon.

Family ARACEAE

In the Philippines, as in other tropical countries, there are many monocotyledonous vines which climb up in the trees and send down aërial roots, which may stretch from the tops of tall trees to the ground. These air roots are frequently very stout and in their natural state are used for tying purposes, or are variously prepared and used industrially. In the Philippines, the air roots used are chiefly those of aroids. Woodsmen have undoubtedly used air roots for tying purposes for ages, but it has remained for the public schools to show that they are useful for industrial purposes. They are employed chiefly in the manufacture of baskets. They were first tried for baskets in the schools of the Bikol peninsula, and the Bikol name "amlong" has come into general school use.

The only part of the roots used in making baskets is the inner part or central cylinder. This cylinder should be removed from the surrounding tissue immediately after collection, as it is then easier to pull out. This moreover obviates the necessity of carrying superfluous tissue. The central cylinder furnishes a strong, round, pliable material with a uniform diameter. It is

used either entire or split. Amlong is white, brown, or black, depending on the species from which it is obtained. Brown and black amlong can be bleached by treating with a solution of sodium peroxide.

Genus EPIPREMNUM

EPIPREMNUM spp.

This genus is very similar to *Raphidophora* in appearance and in the situations in which it grows. Material secured from the air-roots is used for weaving baskets. It is apparently mostly white.

Epipremnum is distributed from Luzon to Mindanao.

Genus POTHOIDIUM

POTHOIDIUM LOBBIANUM Schott. BALONGKAHÍNAI.

Local names: *Ariman* (Cagayan); *balongkahínai* (Negros Occidental); *baralta* (Cavite, Rizal, Batangas); *magutapílak* (Butuan); *malagayáman* (Zambales).

This species is used as tying material for fish corrals. It is collected in considerable quantities in Negros and some of it reaches the Iloilo market.

Pothoidium lobbianum is very similar in appearance to *Pothos*, and grows in similar situations. It can be distinguished from *Pothos* by the fact that the inflorescences are compound, while those of *Pothos* are simple.

This species is apparently common and widely distributed in the Philippines.

Genus POTHOS

POTHOS spp. (Plate XVI).

Local names: *Bagi, malagayáman* (Tayabas); *bagu-balának* (Samar); *mala-ang lako lakop* (Samar); *palipe* (Camarines); *tibátib* (Bulacan); *uarat-uarat* (Camarines).

The different species of *Pothos* are vines which climb up the trunks of trees and produce numerous, long, tough, aërial roots which are uniform in diameter and frequently straight. The central cylinders of these aërial roots are extensively used in the Philippines in making coiled baskets. The color varies from white to brown or even black, depending on the species.

This genus is characterized by its peculiar leaves; the petioles being, for the most part, leaf-like. In some species they are broader and longer than the blades and in others smaller than the blades. The joint between the blade and petiole is, however, always very evident.

Pothos is distributed in forests throughout the Philippines.

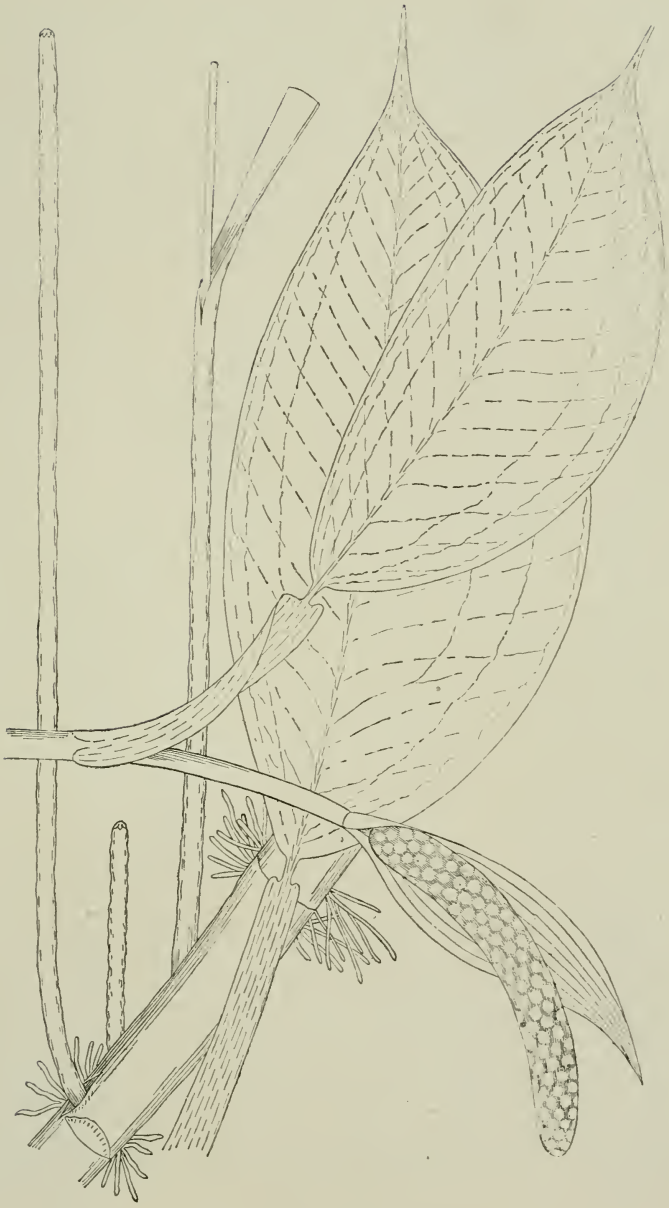

PLATE XVI. POTHOS RUMPHII.

Genus RAPHIDOPHORA

RAPHIDOPHORA spp. (Plates XVII, XVIII).

The central cylinders of the long aërial roots of *Raphidophora* are used in making coiled baskets. They are also utilized in some places for making hammocks, cradles, and for tying purposes.

The species of the genus *Raphidophora* are stout, fleshy vines, which climb by means of numerous aërial roots. The leaves of old plants are very large and pinnately lobed. The inflorescence is a stout, club-shaped structure.

Genus SCINDAPSUS

SCINDAPSUS spp.

Local names: *Loomoi* (Tayabas); *maragayáman* (Pangasinan); *puto-putóhan* (Laguna).

These plants produce air-roots like those of *Raphidophora* and *Pothos*. They are used in making baskets.

Family FLAGELLARIACEAE

Genus FLAGELLARIA

FLAGELLARIA INDICA Linn. (Plate XIX). BALING-UÁI.

Local names: *Annuad* (Union); *auai* (Batanes Islands); *auái si gayáng* (Isinai in Nueva Vizcaya); *baliñguái* (Laguna, Pampanga, Bataan, Nueva Ecija, Rizal, Tayabas, Polillo, Batangas, Mindoro, Basilan); *boboáya* (Agusan); *bulakáui* (Mindoro, Cebu); *hoág* (Camarines, Albay, Sorsogon, Iloilo, Capiz, Antique, Cebu, Agusan); *hoag-uái* (Sorsogon); *inuád, inuál* (Pangasinan); *kaliuáuai, tewung* (Ibanag in Isabela); *kaluuáiuai* (Cagayan); *uái ti uák* (Iloko in Isabela); *paua, tauá* (Negros Occidental); *sagakap* (Capiz); *ué na gayáng, anuad* (Iloko in Nueva Vizcaya); *uág* (Camarines, Butuan, Zamboanga); *uóg* (Culion).

The split stems of this vine are used for tying purposes, as in sewing nipa shingles and tying them in place, or for tying fences. They are also used for baskets where better material is not available.

Flagellaria indica is a slender vine with alternate leaves, the bases of which surround the stem. The leaves are slender and terminate in a curled tendril. The flowers are borne in rather large clusters at the ends of branches. The fruits are rounded, white, and about 5 millimeters in diameter.

This species is very common and widely distributed in the Philippines.

Family BROMELIACEAE

Genus ANANAS

ANANAS COMOSUS (Linn.) Merr. PINEAPPLE.

The pineapple was introduced into the Philippines by the Spaniards at an early date, and is now widely cultivated

PLATE XVII. RAPHIDOPHORA MERRILLII.

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PLATE XVIII. RAPHIDOPHORA MERRILLII.

PLATE XIX. FLAGELLARIA INDICA (BALING-UÁI).

throughout the Archipelago. In some islands, particularly in parts of Palawan, it has become thoroughly naturalized. In the Philippines a very fine and highly prized cloth, known as piña, is made from the fibers of the pineapple leaves. The production of the fiber and the manufacture of the cloth is chiefly confined to the island of Panay, the center of the industry being the towns in the vicinity of Iloilo. When grown for fibers, pineapples are closely crowded in planting, the object being the production of long leaves. Piña cloth, either plain or embroidered, is exported in considerable quantities.

Family JUNCACEAE

Genus JUNCUS

JUNCUS EFFUSUS L. (Plate XX). PINGGÓT or MATTING RUSH.

Local name: *Pinggót* (Bontoc).

According to Muller *, experiments conducted at Baguio showed that a fine straw could be prepared from the coarse stalks. This is done by splitting them, removing the pulp, and drying the straws quickly in the sun so as to make them curl up. Flat straws can be prepared by removing the pulp, flattening the stalks, and drawing them between the thumb and a piece of wood.

Juncus effusus has round stalks a meter or more in length. The base of the stalk is surrounded by short sheathing leaves. The seeds are small and yellow and occur in brownish capsules, which ultimately divide into three parts.

This species is found growing in marshes on the mountains from Luzon to Mindanao.

Family LILIACEÆ

Genus SANSEVIERIA

SANSEVIERIA ZEYLANICA (L.) Willd. SINAWÁ.

Local names: *Aspe-áspe* (Pampanga); *banyát, kaliót, sígre* (Nueva Vizcaya); *buntút-palos* (Tayabas); *kakarohai, pakarohai, tigi* (Isabela); *lengua de león* (Sorsogon); *rabo de león* (Ilocos Norte, Union); *rabo de tigre* (Antique); *sabilá* (Iloilo); *sinawá* (Nueva Ecija); *tigre* (Laguna, Bohol).

The fiber of this plant is used only occasionally in the Philippines. It is sometimes mixed with piña in weaving fabrics. The fiber is very strong and, according to Dodge †, is used by

* Muller, T., Industrial fiber plants of the Philippines. Bureau of Education Bulletin Number 49 (1913), page 60.

† Dodge, C. R., A descriptive catalogue of useful fiber plants of the world. U. S. Department of Agriculture. Fiber investigations. Report No. 9 (1897), page 290.

PLATE XX. JUNCUS EFFUSUS (PINGGÓT).

the Singhalese for making string, rope, mats, and a coarse kind of cloth. It is generally prepared by retting, or by simply beating and washing.

Sansevieria zeylanica is an herb with erect, fleshy, flat, pointed leaves which are mottled with gray, and are .4 to 1.5 meters in height. The flowering shoot is up to 80 centimeters in height. It bears numerous, pale, straw-colored flowers which are usually tinged with green, and are from 2.5 to 3 centimeters in length.

This species is widely distributed in the Philippines. It is frequently cultivated for ornamental purposes, and is occasionally half wild.

Family AMARYLLIDACEAE

Genus AGAVE

AGAVE CANTALA Roxb. MAGUEY.

This species was introduced into the Philippines by the Spaniards at an early date. In the Philippines, maguey is most extensively grown in the Ilocano provinces, Luzon, and the island of Cebu. Most of the plantations are on a small scale, and modern methods of cultivation are scarcely used. The fiber is, for the most part, extracted by retting the leaves, usually in salt water, which unfortunately detracts from its value. A considerable amount is, however, exported. The chief use of the fiber is in the manufacture of binder twine, rope, etc. In the Philippines it is used locally for textiles, cordage, for making fish nets, hammocks, slippers, and some types of baskets.

AGAVE SISALANA Perrine. SISAL.

This species is very similar to the maguey plant and in the Philippines is usually confused with it. It was not introduced into the Philippines until about 1905, but is now widely distributed. Its culture, treatment, and fiber are generally similar to *Agave cantala.* The fiber is, however, much more valuable than that of *Agave cantala.*

Genus CURCULIGO

CURCULIGO RECURVATA Dryand. ABANG-ÁBANG.

The hill people of Camarines use the fiber of this species for making false hair. According to Heyne * several species of this genus are reported to give a tough fiber which is used by Dyaks for cordage, and in Borneo for sacking and clothing.

* Heyne, K., De Nuttige Planten van Nederlandsch-Indië, Volume 1, page 187.

PLATE XXI. MUSA TEXTILIS (MANILA HEMP OR ABAKÁ).

Curculigo recurvata is an herb with a few, rather narrow, long, longitudinally folded, boat-shaped leaves growing from the base of the plant. The flowers are yellow and in dense heads.

This species is distributed from the Batanes Islands to Mindanao. It is common in the Mountain Province of Luzon.

Family MUSACEAE

Genus MUSA

MUSA PARADISIACA L. BANANA.

Fibers from the sheathing leaf-stalks of the banana are employed in the manufacture of a light, transparent cloth known locally as sinamay. In a few regions, this is the principal material from which are made the waists of the native dress of the Filipino women. It is also used extensively in making shirts for men. But wherever abaka is abundant it takes the place of banana fiber for the above purposes, the finer and coarser fibers being sorted by hand into as many as five grades for different textiles.

MUSA TEXTILIS Née. (Plate XXI). MANILA HEMP OR ABAKÁ.

Musa textilis is probably the most important cultivated plant endemic in the Philippines. It produces the premier cordage fiber of the world. In appearance it is almost identical with the banana, to which it is closely related. The fiber was known to the Filipinos long before the Spanish occupation. When Magellan arrived at Cebu the weaving of the fiber was widespread in the Islands, and the plant is reported to have been wild in much the same places as those in which it is now cultivated. At the present time, cultivation is carried on to such an extent that it is questionable as to whether there are any wild plants. Miller * has given a concise history of the abaká industry.

The commercial fibers are the fibro-vascular strands of the sheathing leaf-stalks that make up the so-called trunk of the abaká plant. In stripping the fiber the trunk is cut down, the leaves removed, and the fiber-producing portion slit into strips. These are pulled under a knife applied to a piece of smooth hard wood. The extracted fibers are then hung up and dried. The chief uses of abaká are for the manufacture of ropes, binder twines, the so-called tagal braids, and textiles. Locally abaká is used for manufacturing textiles, baskets, hats, trays, bags, laces, lamp shades, belts, matting, and furniture. The

* Miller, H. H., Abaca. Philippine Craftsman, Volume 1 (1912), pages 120 to 140.

waste left after the fiber is stripped is a promising source of paper pulp.

Abaká has been introduced into other tropical countries, but up to the present time practically the entire supply of the fiber has come from the Philippine Islands. In 1918 the exports amounted to 169,260,377 kilos, valued at 116,383,100 pesos.

Family ZINGIBERACEAE

Genus AMOMUM

AMOMUM sp.

The leaf stalks of this plant are split and made into a light rope. King found this rope, when wet, to have a tensile strength of 325 kilos per square centimeter.

Family MARANTACEAE

Genus DONAX

DONAX CANNAEFORMIS (Forst.) K. Sch. (Plate XXII). BAMBÁN.

Local names: *Aratan* (Gaddanes in Nueva Vizcaya); *bambán* or *banbán* (Cagayan, Pampanga, Bataan, Tarlac, Cavite, Laguna, Tayabas, Mindoro, Camarines, Sorsogon, Albay, Iloilo, Capiz, Antique, Cebu, Occidental Negros, Oriental Negros, Bohol, Palawan); *barasbarásan* (Iloko in Tarlac); *bonbón*, (Cavite, Mindoro); *darumaka* (Union, Iloko in Nueva Vizcaya, Zambales, Tarlac, Camiguin Island); *garomaka* (Union, Pangasinan); *langkuás* (Iloko); *manban* (Tayabas, Leyte); *matalbák* (Bataan, Bulacan); *mattapal* (Isinai in Nueva Vizcaya); *mini* (Benguet).

The split stems of this herb are used to weave baskets, usually in combination with other materials. The stems are occasionally used to make fish traps, hats, and for sewing nipa shingles.

Donax cannaeformis is a half-woody herb reaching a height of 1 to 3 meters. The bases of the branches are somewhat swollen. The leaves are usually rounded at the base and pointed at the tip. The leaf bases are very long and sheathe the stem. The flowers are white. The fruits are rounded and about a centimeter in diameter. This plant is common and widely distributed in the Philippines and also occurs in Java, Celebes, and New Guinea.

Family ORCHIDACEAE

Genus DENDROBIUM

DENDROBIUM CRUMENATUM Sw. (Plate XXII). IRÁU.

Local names: *Dápo* (Tayabas); *iráu* (Camarines, Albay, Sorsogon); *karamosi* (Ilocos Norte); *karausi* (Cagayan); *karulai* (Isabela); *magimpál*, *magimapau* (Bohol); *manau* (Leyte); *sanggúmai* (Laguna).

Fibers from the stems of this orchid are used as decorative material on baskets and other articles. This use is very an-

cient; Fray Marcos de Lisboa, author of "Vocabulario de la Lengua Bicol" written about 1590–1620, says: "YRAO. A plant that grows on trees and sends out a sort of cord, which is yellow and is used for tying and for making straw hats." The stalks are cut when they are very old and partially yellow.

The stalk of *Dendrobium crumenatum* is 60 centimeters or more in length and, for a distance of about 20 centimeters from the base, is bulbous and fluted. The flowers are white with yellow markings and are very fragrant.

This orchid is common and widely distributed in the Philippines, and is frequently cultivated for ornamental purposes.

Genus VANILLA

VANILLA OVALIS Blanco.

Vanilla ovalis is a vine reaching a great height, and is locally abundant in some parts of central Luzon. The stems give some promise of yielding fibrous products of value in making baskets and similar articles.

Family ULMACEAE

Genus TREMA

TREMA ORIENTALIS Blume. ANABIÓNG.

Local names: *Agandúng* (Cagayan); *alindagón* (Moro); *anabióng* (Tagalog and Bisaya); *anagdúng, hanagdúng, tatagtág* (Guimaras Island); *anagúm* (Bikol); *anarióng* (Batanes Islands); *anaróng* (Zambales); *arandón, lamai* (Abra); *balibágo, lagod, dalúnot, hanadióng* (Tagalog); *dalúnit, malasikongdóron, hinlaláong* (Pampanga); *hagod* (Laguna, Tayabas); *hanadgóng* (Samar, Camarines); *hanagdóng* (Tayabas); *hinagdúng* (Bisaya); *hubulos* (Bontoc); *inangdón* (Mindoro); *indai luging* (Lanao); *malarúrung* (Igorot and Tagalog); *nagdón* (Occidental Negros); *malarúrang* (Bataan); *pañgarandóñgen* (Benguet, Pangasinan).

The dry rope made from the bast of *Trema orientalis* was the weakest of all the ropes tested by King. However, when wet its resistance was nearly doubled. The tensile strength of dry rope was only 134 kilos per square centimeter. Owing to its poor qualities it is seldom used. This species furnishes a soft, light-colored wood, in great demand for the manufacture of wooden shoes (zuecos).

Trema orientalis is a small tree, 5 to 8 meters in height, with a very open crown. The leaves are 5 to 8 centimeters long, alternate, hairy, the base heart-shaped, the apex rounded, the margins toothed. The flowers are numerous in the axils of the leaves, white, and about 3 millimeters long. The fruits are ovoid drupes about 3.5 millimeters long.

This tree is a very frequent invader of open ground and in some places, where the virgin forest has been removed, forms

Fig. 1. Dendrobium crumenatum (iráu).

Fig. 2. Donax cannaeformis (bambán).

PLATE XXII.

almost pure stands over large areas. It is a common second-growth tree at low altitudes throughout the Philippines.

Family MORACEAE

Genus ALLAEANTHUS

ALLAEANTHUS GLABER Warb. MALAMBIÑGAN.

Local names: *Alokón, buñgon* (Benguet, Ilocos Norte, Ilocos Sur, Abra); *alibabág* (Cagayan, Itneg); *alibabái* (Cagayan); *alitagtág, balitagtág* (Camarines); *alokón, baeg, boñgon* (Pangasinan); *babayan, imkabaó* (Nueva Ecija); *kabág* (Mindoro, Misamis); *karúd* (Misamis); *liba* (Davao); *malakadiós* (Masbate); *malambiñgan* (Basilan).

The crude bast of this tree shows great variations in color and size. Rope made from it is very weak. King found it to have a tensile strength of 231 kilos per square centimeter. Wetting increased the strength 10 per cent. This rope is said to be more durable than the average during the wet season.

Young leaves and flowers of this species are cooked for food.

Allaeanthus glaber is a medium-sized tree reaching a height of 30 meters and a diameter of 60 centimeters. The leaves are alternate, 5 to 15 centimeters long, the apex pointed, the base somewhat rounded.

This species is distributed from northern Luzon to Basilan.

Genus ANTIARIS

ANTIARIS TOXICARIA Lesch. LATÁ or UPAS-TREE.

Local names: *Dalít* (Tagalog in Mindoro); *ditá* (Cagayan, Apayao); *latá* (Cagayan); *salogon* (Bisaya in Mindoro).

Concerning the fiber Watt * says:

The natives strip the bark of this tree into large pieces, soak them in water, and beat them well, when a good white fibre is obtained—a natural cloth worn by the natives. It is in Western India well known as the *sacking tree*, on acount of the tough, inner, fibrous, felted bark, being removed entire, thus forming natural sacks. Small branches are made into legs of trousers and arms of coats, the larger ones forming the bodies of the garments. In this way felt costumes are made which require no more sewing than is necessary to connect the parts together. If passed through rollers, and at the same time dyed and tanned, these natural cloths or felts are very interesting. The samples exhibited at the late Calcutta International Exhibition (contributed by the Bombay Committee) were very much admired, and proved very attractive. In making sacks sometimes a disk of the wood is left attached to the fibre so as to form the bottom of the sack. At other times a vertical incision is made on the tree and a transverse cut around the stem at the top and bottom of this vertical one. The bark is then peeled off, and after being beaten in water and dried, the top and bottom are sewed up (forming the sides of the sack). These sacks are extensively used for storing rice.

* Watt, Dictionary of the economic products of India, Volume I, page 268.

In Ceylon ropes are made of the bark. "The bark yields strong fibre suited for cordage, matting, and sacking. In making sacks a branch or trunk is cut to the required length, soaked in water, and beaten till the fibre separates from the wood. It is then turned inside out and the wood sawn off, except a small piece at the bottom." (*Bombay Gazetteer, XV, Part I., 62, Konkan District.*) There seems every likelihood that the bark of this tree may come into use as a paper fibre.

The sap of this tree is used as an arrow poison.

Antiaris toxicaria is a tree reaching a height of about 15 meters and a diameter of 30 centimeters or more. The leaves are opposite, pointed at the tip, rounded or heart-shaped at the base, and from 8 to 15 centimeters in length.

This species is apparently widely distributed in the Philippines, but is not common.

Genus ARTOCARPUS

ARTOCARPUS COMMUNIS Forst. (Plate XXIII). ANTIPÓLO.

Local names: *Antipólo* (Bataan, Manila, Rizal, Laguna, Mindoro, Basilan, Palawan); *antipólong laláki* (Rizal); *chipúhu* (Batanes); *pakák* (Cagayan, Ilocos Sur, Abra, Union, Zambales); *kamansí* (Leyte); *tipólo* (Camarines, Negros).

A rather weak rope is made from the bast of this tree. Rope made from the bast of old trees is stiff; from the bast of young trees much more pliable. King found rope made of the bast of old trees to have a tensile strength of 367 kilos per square centimeter; and rope made from young trees, 356 kilos per square centimeter. Wetting decreased the strength only 2 per cent. Rope made of the bast of old trees is said to be very durable. It stands long wetting or alternate wetting and drying. It is used in the form of traces, to yoke carabaos for field work. The Ilokos of Sappar, according to King, believe it to be more durable than rawhide.

Artocarpus communis is a tree reaching a diameter of 90 centimeters. It has an abundant milky juice. The leaves are very large and pinnately lobed. The fruits are rounded and very rough. The wood is soft to moderately hard.

This species is common and widely distributed both cultivated and wild in the Philippines.

ARTOCARPUS ELASTICA Reinw. GUMÍHAN.

Local names: *Antipólo* (Tayabas, Samar); *gumíhan* (Camarines, Albay, Sorsogon); *tugúp* (Surigao, Davao).

Heyne * gives quite a discussion of the bast of this species, which has been exported from Java to Europe. In 1902 it was

* Heyne, K., De Nuttige Planten van Nederlandsch-Indië, Volume 2, page 48.

worth 60 to 70 cents per kilo in Holland; in 1904 a lot of a thousand kilos was sold in Rotterdam. Heyne says that old bast is much harder than young bast.

Artocarpus clastica is a stately tree with a trunk 60 to 90 centimeters in diameter. The leaves are alternate, crowded, obtuse at both ends, occasionally lobed towards the apex, the larger ones 20 to 30 centimeters wide, and 60 to 90 centimeters long. The male spikes are cylindrical, oblong, soft or spongy, and yellowish. The female heads are somewhat rounded or elliptical. The fruit is heavy, at least 10 centimeters long, and covered with brownish, hairy appendages. The seeds are embedded in a whitish, more or less gummy pulp of a delicious, tart flavor. They are about the size of peanuts, are eaten roasted, and in flavor also resemble peanuts.

ARTOCARPUS INTEGRA (Thb.) Merr. NANGKÁ.

Local names: *Langká* (Bontoc, Bataan, Mindoro, Iloilo, Leyte); *nangká* (Cagayan, Bontoc, Laguna, Pampanga, Tayabas, Mindoro, Surigao).

Heyne † reports that the bast of this species is used for the same purposes as that of other species of *Artocarpus;* that is, for rope, bark clothing, etc.

Artocarpus integra is a tree reaching a height of from 8 to 15 meters. The leaves are alternate, leathery, broadest near the tip, with a pointed base, entire or sometimes three-lobed, shiny, and 7 to 15 centimeters long. The fruits are green, fleshy, edible, 25 to 60 centimeters long, covered with pyramidal projections, and grow on the trunk or large branches.

This species is distributed throughout the Philippines both cultivated and wild.

ARTOCARPUS RUBROVENIA Warb. KALULÓT.

Local names: *Anablíng* (Camarines); *anubíng* (Laguna, Bataan, Tayabas); *anublíng* (Rizal); *bayukó* (Negros); *buñgá* (Cagayan); *hamugí, kalulót* (Mindoro); *kili-kili* (Samar); *kúbi* (Tayabas, Mindoro, Sorsogon, Samar); *tagap* (Baler); *tumolúbo* (Isabela); *ubién* (Benguet, Pangasinan).

The bark of this tree was formerly used in making cloth.

Artocarpus rubrovenia is a tree reaching a height of about 30 meters and a diameter of about 40 centimeters. The leaves are alternate, smooth, oval, pointed at the apex, and rounded or pointed at the base.

This species is distributed from the northern to the southern limits of the Archipelago.

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† Heyne, K., De Nuttige Planten van Nederlandsch-Indië, Volume 2, page 53.

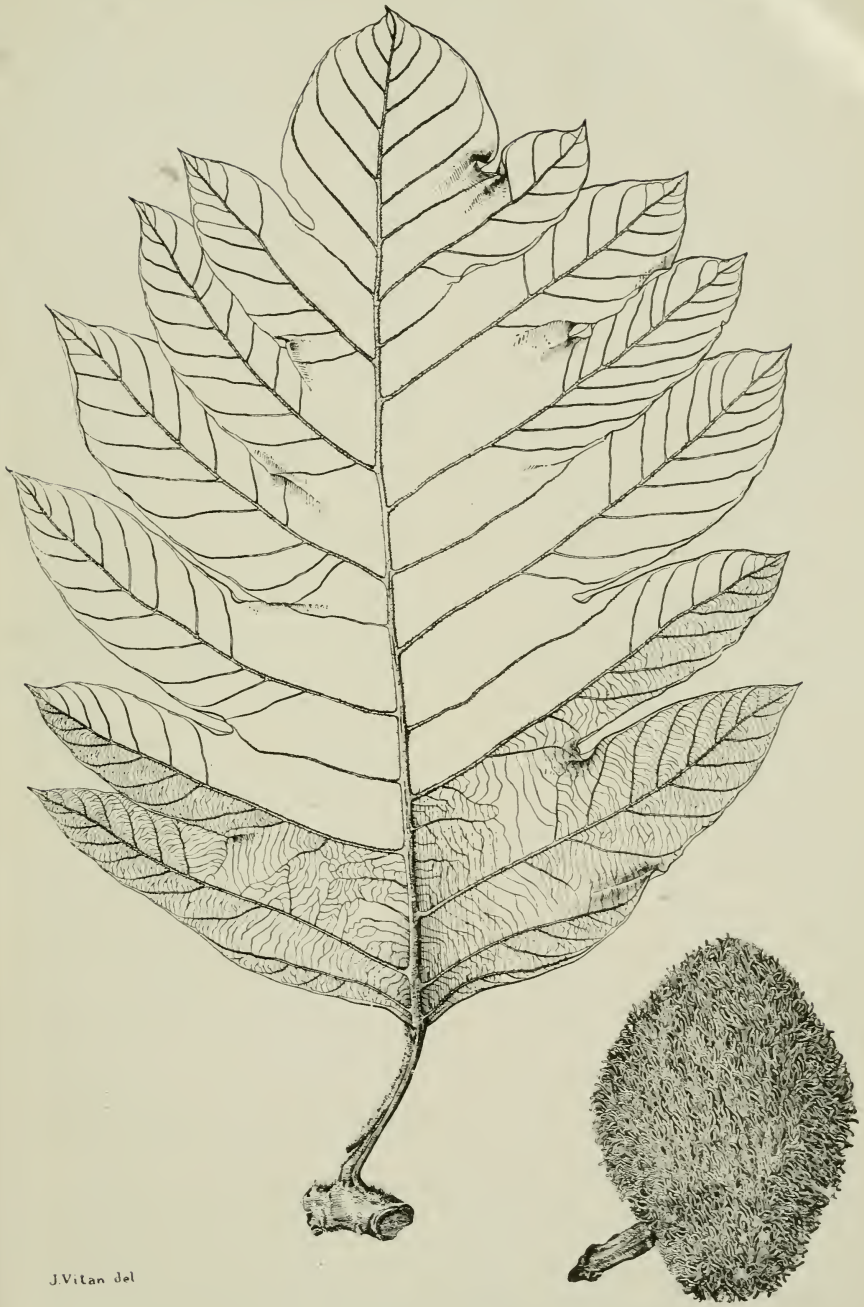

PLATE XXIII. ARTOCARPUS COMMUNIS (ANTIPÓLO).

Genus **FICUS**

FICUS BENJAMINA Linn. BALÉTE.*

Local names: *Anuñga* (Isabela); *baléte* (Ilocos Norte, Abra, Pangasinan, Nueva Ecija, Pampanga, Bataan, Manila, Cavite, Laguna Camarines); *baletéon* (Nueva Vizcaya); *baléte-pulá* (Tagalog); *balíting-íbon* (Batangas); *gisi* (Ibanag and Sub-province of Apayao); *kolis* (Bataan); *kuliamot* (Negrito, Bataan); *salísi* (Nueva Vizcaya); *tibi* (Camarines); *sirisíu* (Cagayan).

The strips of bast of this species are salmon-buff; some are soft and pliable, others hard and stiff. Rope made from the bast possesses a fair degree of tenacity. King found it to have a tensile strength of 480 kilos per square centimeter. Wetting reduced the strength only 2 per cent.

Ficus benjamina is a strangling fig with smooth, leathery leaves. The leaves are alternate, somewhat oval, 8 to 15 centimeters long, pointed at the tip, and rounded at the base. The figs occur singly in the axils of the leaves, are dark purple, and about 1 to 2 centimeters in diameter.

This species is common and widely distibuted at low altitudes, from northern Luzon to southern Mindanao.

FICUS FORSTENII Miq. BALÉTE.

Local names: *Baléte* (Zambales, Bataan, Rizal, Mindoro, Moro); *basaklá* (Iloko, Abra); *dalákit* (Negros); *lañgaban* (Moro, Cotabato); *puos* (Itneg) *puspús* (Iloko, Abra).

The bast is ochraceous salmon. A very weak rope is made from it. King found the rope to have a tensile strength of only 154 kilos per square centimeter. Immersion in water for twenty-four hours increased the strength 44 per cent.

Ficus forstenii is a strangling fig with leathery leaves. It reaches a height of about 30 meters. The leaves are alternate, smooth, pointed at the apex, rounded at the base, wider near the apex than near the base, and from 7 to 17 centimeters in length. The figs are yellow and about 2 centimeters in diameter.

This species is distributed from northern Luzon to southern Mindanao.

FICUS PACHYPHYLLA Merr. BALÉTE.

Local names: *Balíte* (Laguna); *lunúg* (Occidental Negros); *pasaklá* (Abra, Itneg).

Strips of bast of this fig are colored a uniform pecan brown. Rope made from it is said to be very durable and is fairly strong.

* Balete or baliti is a broadly generic term used in a number of the Philippine languages for all the "strangling figs" of the genus *Ficus* and very rarely, if ever, used for any other epiphytic or climbing plants.

King found it to have a tensile strength of 464 kilos per square centimeter. Immersion in water for twenty-four hours increased the strength 17 per cent.

Ficus pachyphylla is a strangling fig with alternate, very leathery, smooth, somewhat elliptical leaves, which are 9 to 15 centimeters in length. The figs are red with yellow scales at the base, and are about 1.5 centimeters in diameter.

This species is widely distributed at low altitudes from northern Luzon to southern Mindanao.

FICUS PALAWANENSIS Merr. BALÉTE.

Local names: *Agamid* (Itneg); *agamit* (Abra); *baléte* (Cavite, Laguna, Tayabas, Lanao).

The bast from this species is stronger than that of any of the other species of *Ficus* tested by King. The rope made from it is very strong. On account of its great strength, toughness, and durability the fiber is used for making wild-hog traps. King found the rope to have a tensile strength of 752 kilos per square centimeter. Wetting increased the strength.

Ficus palawanensis is a large, strangling fig with alternate, smooth, leathery, elliptical leaves, pointed at the apex, usually rounded at the base, and 15 to 22 centimeters in length. The fig is red, oval, and about 1.5 centimeters in diameter.

This species is found throughout the Philippines at low altitudes.

Genus MALAISIA

MALAISIA SCANDENS (Lour.) Planch. MALAISÍS.

Local names: *Hinggíu* (Mindoro); *sádak* (Abra); *sigíd* (Negros); *malaisís* (Tagalog).

This vine is used for tying purposes, as in the construction of fish corrals.

The leaves of *Malaisia scandens* are alternate, smooth, somewhat oval, pointed at the tip, and from 5 to 12 centimeters in length. The flowers are small and greenish white. The fruits are oval, red, and about 7 millimeters long.

This species is common and widely distributed in the Philippine forests.

Family URTICACEAE

Genus BOEHMERIA

BOEHMERIA NIVEA Gaudich. RAMIE OR CHINA GRASS.

Local name: *Lípang-áso* (Manila).

Ramie is a well-known fiber. It is extensively cultivated in China, and has also been grown in other countries. The fiber

is white, lustrous, and very strong and durable. It is woven into very fine and beautiful fabrics. The fiber lacks the elasticity of wool and silk and the flexibility of cotton. Cloth made from it is therefore rather harsh. The chief objections to a more extensive use of ramie are that it is very difficult to separate the fiber from the tissue in which it is embedded, and that the process requires considerable manual labor. In the Philippines the fiber is used in making strings, blankets, and cloth.

Watt * gives an extensive account of ramie. He says that *Boehmeria* demands the best soil, and that the fields have to be manured and carefully tended.

Ramie has been the subject of very extensive investigations, and the literature concerning it is voluminous. The yield of fiber is apparently very much greater in temperate and subtropical countries than in tropical ones. Owing to this fact and to the greater cost of labor in the Philippines than in China, it would appear that the growing of ramie on a commercial scale in the Philippines is impracticable.

Boehmeria nivea is a hairy shrub reaching a height of about 2 meters. The leaves are alternate, pointed at the tip, abruptly pointed at the base, have toothed margins, and are from 7 to 16 centimeters in length. The flowers are small.

This species is quite extensively cultivated in the mountain region of northern Luzon, particularly by the non-christian tribes. In Ifugao and neighboring subprovinces nearly every family cultivates a small amount. It is occasionally cultivated in central Luzon, where its value as a fiber plant is not appreciated, and it also occurs in the Batanes Islands.

Genus LEUCOSYKE

LEUCOSYKE CAPITELLATA (Poir.) Wedd. — ALAGÁSI.

Local names: *Alagási, hanlagási, hilagási* (Mindoro); *alañgási, isísmáya* (Rizal); *anagási, hinagási, layásin, li-á-sin* (Tayabas); *anugau* (Sorsogon); *aragási, tinagási* (Camarines); *isis-ñgipin* (Laguna); *karikasin* (Nueva Ecija); *lagási* (Laguna, Mindoro).

This species produces strong bast fibers.

Leucosyke capitellata is a tree reaching a height of 8 to 10 meters. The leaves are alternate, pointed at the apex, abruptly pointed at the base, hairy, the lower surface whitish, the margins toothed. The flowers are small and whitish, and borne in compact heads.

This species is distributed from Luzon to Palawan.

* Watt, Commercial products of India.

Family MENISPERMACEAE

Genus ANAMIRTA

ANAMIRTA COCCULUS W. & A. LIGTÁNG.

Local names: *Bay-yatíng* (Abra); *labtáng* (Abra, Ilocos Sur); *lagtáng* (Masbate); *ligtáng* (Tagalog).

The bark of this vine is made into rope used for tying animals and for hauling. It is used particularly during the rainy season. The entire stems are also twisted into rope. The fruit is used as a fish poison and is also poisonous to other animals.

Anamirta cocculus is a vine with smooth, alternate, heart-shaped leaves which are from 12 to 24 centimeters in length. The flowers are small, yellowish white, very fragrant, and borne on compound inflorescences. The fruits are round, and about 1 centimeter in diameter.

This species is common and widely distributed in the Philippines.

Genus PERICAMPYLUS

PERICAMPYLUS GLAUCUS Merr. (Plate XXIV). PAMÁGO.

Local names: *Hahun* (Basilan); *pamágo* (Camarines, Albay, Sorsogon); *silong-púgo* (Batangas); *tugi-tugían* (Mindoro).

The central cylinders of the stems of this vine are used for weavers of baskets. According to Heyne † this species is used for rope in Java.

Pericampylus glaucus is a vine occurring in thickets, waste places, or along the banks of streams throughout the Philippines. The leaves and young stems are very hairy. The leaves are heart-shaped and 5 to 10 centimeters in length. The flowers are small, greenish, and occur in small, compound, axillary inflorescences. The fruits are flattened and about 5 millimeters in diameter.

Family ANNONACEAE

Genus GONIOTHALAMUS

GONIOTHALAMUS AMUYON (Blco.) Merr. AMÚYONG.

Local names: *Amúyong* (Batangas); *lanútan* (Negros); *sagiát* (Iloko, Union).

The bast of this tree has an attractive apricot-buff color. Rope made from it is weak. King found the rope to have a tensile strength of 345 kilos per square centimeter. Wetting reduced the tensile strength 15 per cent.

Goniothalamus amuyon is a tree reaching a height of 15 meters

† Heyne, K., De Nuttige Planten van Nederlandsch-Indië, Volume 2, page 1.

and a diameter of 20 centimeters. The leaves are alternate, smooth, rather narrow, pointed at both ends, and from 18 to 25 centimeters in length. The flowers are greenish yellow, about 5 centimeters long, and have long narrow petals. The fruits are cylindrical, aromatic, and about 3 centimeters in length. They contain 1 to 3 seeds.

This species is of local occurrence and widely distributed at low altitudes in the Philippines.

Genus **PHAEANTHUS**

PHAEANTHUS EBRACTEOLATUS (Presl) Merr. KALIMATÁS.

Local names: *Amúyong* (Polillo Island); *dalinas* (Bataan); *kalimatás* (Laguna, Bataan); *langlangás* (Ilocos Norte); *lanútan* (Bataan, Mindoro, Cotabato); *manggasinóro* (Tayabas); *puropagai* (Nueva Ecija); *takúlau* (Ilocos Norte); *yambán* (Zambales).

The bark of this vine is used for tying purposes and also medicinally.

The leaves of *Phaeanthus ebracteolatus* are alternate, oval, pointed at both ends, and 10 to 15 centimeters in length. The flowers are yellow and about 2 centimeters long. The fruits are oval, red, and are borne in rounded clusters.

This species is common and widely distributed in the Philippines.

Genus **POLYALTHIA**

POLYALTHIA FLAVA Merr. YELLOW LANUTAN.

Local name: *Lanutan* (Tayabas, Bataan).

The bast fiber of this tree is used for making rope.

Polyalthia flava is a tree which reaches a height of about 20 meters and a diameter of about 40 centimeters. The leaves are alternate, smooth, pointed at both ends, and from 6 to 16 centimeters long. The flowers are yellowish green with petals about 2.5 centimeters long. The fruits are oval and occur in rounded clusters.

This species is distributed from Luzon to Mindanao.

Family CONNARACEAE

Genus **AGELAEA**

AGELAEA EVERETTII Merr. OÑGÁLI.

Local names: *Oñgáli* (Negros); *kamagsá* (Polillo); *kamaksá* (Laguna).

This vine is used for tying purposes.

Agelaea everettii is a woody vine. The leaves are alternate, pinnate, and have three leaflets, which are 2.5 to 15 centimeters long. The flowers are white and fragrant, the petals about 5 millimeters long. The flowers occur in short racemes. The

PLATE XXIV. PERICAMPYLUS GLAUCUS (PAMÁGO).

fruits are very rough and 1.5 to 2 centimeters long; the seeds about 1 centimeter long.

This species is fairly common in the forests, and is distributed from northern Luzon to Basilan.

Genus ROUREA

ROUREA VOLUBILIS (Blanco) Merr. KAMAKSÁ.

Local names: *Baralang* (Cagayan); *bitog* (Benguet); *kamaksá* (Rizal, Laguna); *pálosánto* (Pangasinan).

This vine is used for tying fish corrals. The fruits are also used for poisoning dogs.

Rourea volubilis is a vine common and widely distributed in the Philippine forests. The leaves are alternate, smooth, somewhat oval in shape, rounded at the base, and have prominent projections at the tips. The flowers are small, white, fragrant, and occur in large numbers on compound inflorescences.

Family LEGUMINOSAE

Genus ABRUS

ABRUS PRECATORIUS L. KANSASÁGA or PRAYER-BEAN.

Local names: *Aguñañáng, agunyanyáng* (Zamboanga); *báhai* (Ticao); *bugayóng* or *bugayúng* (Camiguin Is., Cagayan, Ilocos Sur, Abra, Tarlac, Pangasinan, Zambales); *bugbugayóng* (Union); *kansasága* (Pampanga, Tarlac, Camarines); *kasasága* (Pampanga, Bataan); *lago* (Culion Is.); *lása* (Batanes Islands); *matang-uláng* (Pampanga); *sága* (Laguna, Batangas, Tayabas); *sagambáging* (Polillo Is.); *sagasága* (Bulacan, Bataan, Rizal, Manila, Batangas, Tayabas); *ulañgiá* (Cuyo Islands).

According to Watt,* this plant yields beautiful bast fibers. These fibers are said to be suitable for cordage.

Abrus precatorius is a slender, branched, annual vine which reaches a length of 9 meters or less. The leaves are alternate, 5 to 10 centimeters in length, and compound with twenty to forty leaflets, which are 1 to 3 centimeters long. The flowers are borne in axillary racemes which are usually shorter than the leaves. The flowers are numerous, often crowded, pink to pale purple or salmon, and about 1 centimeter long. The pod is oblong, 2.5 to 5 centimeters long, about 1.5 centimeters broad, and contains three to five seeds which are shiny, 6 millimeters long, and partly black and partly scarlet.

This species is common and widely distributed in Philippine thickets.

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* Watt, Commercial products of India.

Genus **BAUHINIA**

BAUHINIA CUMINGIANA (Benth) F. Vill. AGPÓI.

Local names: *Agkúi* (Pampanga); *agpói* (Bataan, Camarines); *agpór, ugpói* (Bataan); *banot* or *banut* (Rizal, Laguna, Tayabas); *impíd, impíg* (Camarines); *libang-báng* (Masbate); *lupíg* (Nueva Ecija); *niogniógan* (Cotabato); *oplíg* (Abra); *salibangbáng* (Negros, Leyte); *umpíg, umpík* (Cagayan); *uplíng* (Union).

This vine is used for tying purposes, especially for hanging tobacco sticks and hauling logs. It is very durable. The bast is very strong and is used by the Negritos of Bataan Province for making bowstrings. It is also used for making rope.

Bauhinia cumingiana is a huge, woody vine growing in virgin forests. The leaves are alternate, smooth, heart-shaped, divided at the apex, and 8 to 12 centimeters in length. It has brownish-yellow flowers in large clusters and large, flat seed pods.

This species is widely distributed from northern Luzon to southern Mindanao.

Genus **PONGAMIA**

PONGAMIA PINNATA (L.) Merr. BÁNI.

Local names: *Balikbalík* (Tagalog); *balobaló* (Zamboanga, Basilan); *balukbalúk, balutbalút, magít* (Cotabato); *baobao* (Agusan); *báni* (Pangasinan, Zambales, Pampanga, Bataan, Cotabato); *kadél* (Tayabas); *marokbarók* (Camarines); *salingkúgi* (Zamboanga).

The bark of this tree is used for making strings and ropes.

Pongamia pinnata is a tree reaching a height of 15 meters and a diameter of about 45 centimeters. The leaves are alternate and compound with three to seven leaflets, which are smooth, pointed at the apex, usually rounded at the base, and 7 to 10 centimeters in length. The flowers are purplish, about 1.5 centimeters in length, and borne in racemes. The pods are somewhat flattened, somewhat oval in outline, and with a single seed.

This species is distributed from northern Luzon to southern Mindanao.

Family VITACEAE

Genus **CISSUS**

CISSUS REPENS Lam. KALITKALÍT.

Local names: *Ayo* (Batangas); *kalitkalít* (Rizal, Balabac Island); *riginí* (Ticao Island).

This species is used for tying carabaos.

Cissus repens is a smooth vine reaching a length of 10 meters or less. The leaves are 7 to 12 centimeters long, the apex pointed, the base frequently heart-shaped. The flowers are

small and greenish, and borne on inflorescences which are opposite the leaves or terminate the branches. The fruit is fleshy, purple, about 6 millimeters long, and with a single seed.

This species is distributed from the Mountain Province of Luzon to southern Mindanao.

Family SAPINDACEAE

Genus SAPINDUS

SAPINDUS SAPONARIA L. TIKASTÍKAS.

Local names: *Amugáuen* (Union); *kasibai, kasiboen* (Ilocos Norte); *katikis* (Bataan); *teka-téka* (Pangasinan, Laguna, Batangas, Tayabas); *tekistékis* (Rizal); *tikas-tíkas* (Laguna); *kusibéng* (Cagayan, Ilocos Sur, Abra, Union); *mamalis* (Pampanga); *malahito* (Nueva Ecija); *palikpíkhíto* (Nueva Ecija, Pampanga).

According to Dodge:* "The bast of this species yields a coarse fiber, suitable for native cordage."

The bark is used for washing the hair. Tobacco workers in Abra use the crushed leaves for removing the stain of tobacco leaves from their hands.

Sapindus saponaria is a tree reaching a height of about 20 meters and a diameter of about 60 centimeters. The leaves are alternate, smooth, and compound, the main stalk is expanded and leaf-like. The flowers are small, white, and are borne in considerable numbers on compound inflorescences. The fruits are rounded and about 1.5 centimeters in length.

This species is distributed from northern Luzon to Mindanao.

Family RHAMNACEAE

Genus ALPHITONIA

ALPHITONIA EXCELSA Reiss.

Local names: *Aniláu* (Guimaras Island); *dunglú* (Mindoro); *tangguláí* (Mindoro); *tulo* (Samar); *uakátan* (Surigao).

The bark of this tree is used for making rope.

Alphitonia excelsa is a tree which reaches a height of 20 meters. It has alternate, hairy, narrow leaves which are pointed at the apex, rounded at the base, about 9 centimeters long, and 5 centimeters broad. The flowers are small and borne on compound, axillary or terminal inflorescences. The fruits are somewhat rounded, black, and over a centimeter in diameter.

This species is distributed in forests from northern Luzon to Mindanao.

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* Dodge, C. R., A descriptive catalogue of useful fiber plants of the world. U. S. Department of Agriculture. Fiber investigations. Report No. 9, page 290.

Family ELAEOCARPACEAE

Genus ELAEOCARPUS

ELAEOCARPUS CALOMALA (Blanco) Merr. KALOMÁLA.

Local names: *Bunsílak, maglumbói* (Mindoro); *huñgó, uñgó* (Tayabas, Mindoro); *kunákun* (Surigao); *malanopit* (Rizal); *kalomála* (Batangas, *fide* Blanco).

The inner bark is used for making rope. The fruit is edible.

Elaeocarpus calomala is a tree reaching a height of about 25 meters and a diameter of about 60 centimeters. The leaves are alternate, smooth, oval, pointed at both ends, 6 to 15 centimeters in length, and with toothed margins. The flowers are white, fragrant, about a centimeter in diameter, and borne in axillary racemes. The fruit is red, oval, and contains a single, rough, hard stone.

This species is distributed from the Mountain Province, Luzon, to southern Mindanao.

Family TILIACEAE

Genus COLUMBIA

COLUMBIA BLANCOI Rolfe. MAMAUÉD.

Local names: *Aniláu, mamadlíng, mamauéd, mamued* (Rizal); *keddéng* (Iloko, Benguet).

A weak rope is made from the bast of this tree. It is a good rope during the rainy season on account of its durability when wet. King found it to have a tensile strength of 302 kilos per square centimeter. Wetting increased the strength about 1 per cent.

Columbia blancoi is a small tree attaining a height of about 10 meters. The leaves are hairy, pointed at the apex, rounded or heart-shaped at the base, from 12 to 30 centimeters long, and with toothed margins. The flowers are pink or yellow and are in large terminal panicles. The fruits are ovoid capsules about 1 centimeter long and with two to four wings.

This species has been reported only from Luzon.

COLUMBIA LANCEOLATA Warb. KADIÍN.

Local names: *Aniláu* (Zambales); *baliuán* (Pangasinan); *kadiín, lapnít* (Pangasinan).

The bark of this tree is used for making rope.

Columbia lanceolata is a tree reaching a height of 25 meters and a diameter of 40 centimeters. The leaves have toothed margins, a conspicuous pointed tip, and an oblique base. They

are hairy, and from 8 to 15 centimeters in length. The fruits have five wings.

This species is found in second-growth forests in Luzon.

COLUMBIA MOLLIS Warb. KEDDÉNG.

Local name: *Keddéng* (Ilocos Sur, Abra, Nueva Vizcaya).

The bark of this tree is used for making rope.

Columbia mollis is a tree reaching a height of about 18 meters and a diameter of about 40 centimeters. The leaves are alternate, hairy, rounded and somewhat oblique at the base, prominently pointed at the tip, from 8 to 20 centimeters in length, and with toothed margins. The fruits have two or three wings.

This species occurs in Luzon.

COLUMBIA SERRATIFOLIA (Cav.) Pers. ANILÁU.

Local names: *Alináu* (Camarines); *aniláu* (Bataan, Laguna, Tayabas, Camarines, Sorsogon, Mindoro, Masbate, Iloilo, Leyte, Surigao, Butuan, Cotabato, Zamboanga); *bagariláu* (Bataan); *banílad* (Laguna); *banlót* (Iloilo); *bainúd* (Mindoro); *hanagdóng* (Palawan); *láho* (Cagayan); *laiásin* (Marinduque); *mamauéd* (Rizal).

Judging from Mendiola's figures, the bast is very weak. A red dye is obtained from the bark.

Columbia serratifolia is a small tree, 3 to 10 meters high. The branches and leaves are hairy. The leaves are 10 to 20 centimeters in length, pointed, with a very oblique base, and toothed margins. The flowers are 6 to 7 millimeters long, with pink and yellowish or reddish petals, and borne in panicles. The fruits are about 1 centimeter long and with three or four wings.

This species is common in second-growth forests throughout the Philippines.

Genus CORCHORUS

CORCHORUS CAPSULARIS L. PÁSAU NA BÍLOG.

Local names: *Panigbin, sumpa* (Samar); *pásau na bílog* (Tag.).

For a discussion of the fiber of this plant see *Corchorus olitorius.*

Corchorus capsularis is an erect, branched, annual herb 1 to 2 meters in height. The stems are usually purplish. The leaves are alternate, the apex pointed, the base rounded with a tail-like projection on each side of the midrib, the margins toothed. The flowers occur in small groups in the axils of the leaves and are about 4 millimeters long. The petals are yellow and the sepals often purplish. The fruit is a somewhat rounded capsule, about a centimeter in diameter and with longitudinal ridges.

This species is widely distributed in the Philippines in open, low grasslands and waste places.

CORCHORUS OLITORIUS L. PÁSAU or JUTE.

Local names: *Pásau* (Zambales, Tagalog); *salúyot, salúyut* or *salóyot* (Ilocos Sur, Union, Pangasinan); *tagabang* (Manila, Bisaya); *taka magindánau, yaka* (Cotabato).

Corchorus olitorius and *Corchorus capsularis* are grown in India on a large scale to furnish most of the jute of commerce. *Corchorus olitorius* is found in all tropical countries, but it is only in India that the fibers are extracted in commercial quantities. King tested rope made from the crude bast of wild Philippine plants and found it to have a tensile strength of 503 kilos per square centimeter. Wetting decreased the strength 28 per cent.

In the Philippines the plant is better known as a vegetable, the leaves being edible, than on account of its fibers.

Corchorus olitorius is a smooth, erect, half-woody shrub, 1 to 1.5 meters in height. The leaves are pointed at the tip and have tail-like projections at the base. The flowers are small and yellow. The fruit is a rather slender pod about 3 to 3.5 centimeters long.

Corchorus olitorius is a weed found in wet places in the settled areas of the Philippines.

Genus **DIPLODISCUS**

DIPLODISCUS PANICULATUS Turcz. BALOBÓ.

Local names: *Balobó* (Rizal, Laguna, Batangas, Tayabas, Camarines, Agusan, Cotabato, Basilan, Zamboanga); *barobó* (Camarines); *barubó, kidéng* (Cagayan); *bulugai* (Cotabato); *buru, bukad* (Lanao); *maobó* (Cebu); *maramaní, manaring* (Isabela); *marubó* (Samar, Leyte, Albay, Ticao Island, Masbate, Iling Island); *mayubó* (Antique); *muling-mulíng* (Tayabas); *puyús* (Laguna); *talu-talu, mangalri, tagpán, dupdupan* (Zamboanga).

The bast of this species is sometimes used for making rope. The bast is, however, small in amount and difficult to extract, and so is seldom employed.

Diplodiscus paniculatus is a tree reaching a height of about 20 meters and a diameter of about 80 centimeters. The leaves are alternate, smooth, pointed at both ends, and from about 12 to 25 centimeters in length. The flowers are rather small, whitish or yellowish, and borne on large compound inflorescences. The fruit is edible.

This species is very common and widely distributed in the forests from northern Luzon to southern Mindanao. In some places it is the most numerous under-story tree in the forest. It is not cultivated except at the Lamao Experiment Station.

Genus **GREWIA**

GREWIA ACUMINATA Juss. AMBOI-UÁN.

Local names: *Allágat, alínau* (Union); *alagosí* (Negros); *bagun, balagan* (Palawan); *baloñgo dílang-áhas* (Zamboanga); *amboi-uán* (Union).

Bast fibers are extracted from the bark of this tree and made into ropes and strings.

Grewia acuminata is a tree reaching a height of about 10 meters and a diameter of about 15 centimeters. The leaves are alternate, somewhat hairy, pointed at the apex, rounded at the base, with toothed margins, and 8 to 15 centimeters long. The flowers have whitish petals and prominent yellow stamens, and are borne on compound inflorescences. The fruit is green, about 2 centimeters in diameter, frequently somewhat four-lobed, four-seeded, and very hairy.

This species is distributed from La Union Province in Luzon to southern Mindanao.

GREWIA BILAMELLATA Gagnep. BENGLARÉNG.

Local names: *Benglaréng* (Iloko, Itneg); *dongraréng* (Iloko); *duraréng* (Abra).

The bark is used for making a rope of slight strength. King found the tensile strength to be 320 kilos per square centimeter; wetting decreasing it 44 per cent. The rope is said to be durable during the dry season, but to deteriorate rapidly during wet weather.

GREWIA ERIOCARPA Juss. (*G. negrosensis*). BARIU-ÁN.

Local names: *Aniláu* (Cebu); *balibágo, kanas-kanás* (Batangas); *balilíuan* (Zambales); *balitnóng* (Ilocos Norte, Capiz); *baria-an* (Union); *bariu-án* (Iloko, Itneg, Abra, Union, Pangasinan, Nueva Ecija); *baruan* (Lepanto); *danlí* (Tayabas); *dirán* (Union); *durán* (Pangasinan); *keddéng* (Ilocos Sur, Abra, Union); *lapí, lapní, lapnít* (Cagayan); *masaplák* (Pampanga).

A rope of average strength is made from the bark of this tree. The fiber is extracted from the bark as soon as it is removed from the tree. The rope is used for hauling, tying cattle, and binding rice bundles. In Abra the fiber is used to some extent in making hat braids. King found rope made from the bast to have a tensile strength of 394 kilos per square centimeter. Wetting weakened it about 3 per cent.

Grewia eriocarpa is a shrub or small tree. The leaves are alternate, densely hairy, pointed at the tip, oblique at the base, from 5 to 15 centimeters in length, and with the lower surface white or nearly so. The flowers are small and yellow. The fruit is small, round, bluish, and edible.

GREWIA MULTIFLORA Juss. DANGLÍN.

Local names: *Al-alínau* (Union); *alínau* (Amburayan, Ilocos Sur, Pangasinan, Union, Zambales, Laguna, Sorsogon); *aniláu* (Benguet, Ilocos Norte, Ilocos Sur, Union, Abra, Pangasinan); *aplít* (Pampanga); *bagohon* (Mindoro, Guimaras Island); *benglalíng* (Abra); *bulubukhón* (Guimaras Island); *dallág* (Gaddan in Nueva Vizcaya); *danglí, kalit-kalít* (Laguna, Tayabas); *danglín* (Pangasinan, Tagalog, Guimaras, Nueva Ecija, Bataan, Rizal, Pampanga); *danglóg* (Cagayan); *duraróng* (Ilocos Sur); *imbubuiúkan* (Palawan); *kanaroset* (Palawan); *lañgósig* (Bohol); *lánut* (Negrito in Pampanga); *lapnís* (Batangas, Cavite); *ligaá* (Mindoro); *siapó* (Mindoro); *tarói* (Camarines, Albay).

The bast is pale yellow-orange and is a non-staining fiber. Rope made from it is rather weak, but is said to be very durable for dry-weather use. It is a very commonly used rope. King found it to have a tensile strength of 376 kilos per square centimeter. Immersion in water for twenty-four hours caused a decrease in strength of 12 per cent.

Grewia multiflora is a shrub or small tree. The leaves and branches are nearly smooth. The leaves are alternate, 4 to 14 centimeters in length, pointed at the tip, rounded or pointed at the base, and with toothed margins. The flowers are yellowish green and about a centimeter in diameter. The fruits are ovoid and about 6 millimeters long.

This species is common and widely distributed throughout the Philippines.

Genus MUNTINGIA

MUNTINGIA CALABURA L. DÁTILES.

Local names: *Ceréza* (Spanish, "cherry," in Tarlac, Nueva Ecija, Pampanga, Pangasinan, Bulacan, Zambales, Cuyo Islands); *dátiles* (Spanish, "dates," in Tarlac, Pangasinan, Camarines, Albay, Capiz); *látris* (Laguna); *manzanítas* (dim. of Spanish manzana, "apple," in Ilocos Norte and Sur, Abra, Cagayan, Union); *rátiles* (Bataan, Manila, Rizal, Batangas, Tayabas, Camarines, Albay, Marinduque, Zamboanga, Cuyo Islands).

The bark of this tree is used for making rope.

Concerning the fiber Dodge * says:

> Its bast is very soft and pliable, twists easily, and if used in this manner, without attempting to separate or clean the fibers, is possessed of ordinary strength. The fibrils are exceedingly fine and silky, so much so that the bast, when broken, exhibits at the point of rupture the flossy appearance always seen at the raw ends of skein or embroidery silk. Separating the fiber would undoubtedly diminish its strength. It is employed slightly in Santo Domingo for cordage.

* Dodge, C. R., A descriptive catalogue of useful fiber plants of the world. U. S. Department of Agriculture. Fiber investigations. Report No. 9, page 244.

Muntingia calabura is a tree from 5 to 10 meters in height. The leaves are 8 to 13 centimeters long, hairy, sticky, the base oblique, the apex pointed, and the margins toothed. The flowers are white and about 2 centimeters in diameter. The fruit is a rounded, red, smooth, fleshy, sweet, edible berry about 1.5 centimeters in diameter and contains numerous small seeds.

This species is a native of tropical America, but is naturalized in the Philippines.

Genus **TRIUMFETTA**

TRIUMFETTA BARTRAMIA L. KULOT-KULÓTAN.

Local names: *Balanggót* (Camarines); *bulagun* (Basilan); *kolo-kolót* (Ilocos Norte, Bataan); *kulot-kulótan* (Bataan, Palawan); *moropoto* (Leyte); *pallopallót* (Itneg, Iloko); *sauag-caballo* (Mindoro).

The bast of this species is fairly strong.

Triumfetta bartramia is an erect, more or less hairy annual, which reaches a height of from 0.5 to 1.5 meters. The leaves are alternate, hairy, entire or three-lobed, and with toothed margins. The flowers are yellow and about 6 millimeters long. The fruits are small, rounded, and covered with smooth, hooked spines.

This species is not a native of the Philippines, but it is thoroughly naturalized and is widely distributed in the Archipelago. It is found in tropical Asia, Africa, and Malaya.

Family MALVACEAE

Genus **ABELMOSCHUS**

ABELMOSCHUS MULTILOBATUS Merr.

Local name: *Annabó á dadakkél* (Union).

White fibers used for making rope are extracted from the bark of this plant.

Abelmoschus multilobatus is a shrub reaching a height of 2 to 3 meters. It is usually covered with long, stiff, irritating hairs. The leaves are alternate, about 8 to 12 centimeters long, and divided into five or seven lobes which are in turn divided into a number of lobes. The flowers are very large and yellow.

This species has been reported from Ilocos Norte, La Union, and Bataan.

Genus **BOMBYCIDENDRON**

BOMBYCIDENDRON VIDALIANIUM Merr. and Rolfe. LANÚTAN.

Local names: *Lanútan* (northern Luzon to Bulacan and Bataan); *losúban* (Iloko, Itneg, Abra); *pañgardísen* (Cagayan, Ilocos Sur); *tákúlau blanco* (Ilocos Norte).

Rope made from the bast possesses considerable strength and is considered as pliable, durable, and fitted for service throughout the year. King found it to possess a tensile strength of 630 kilos per square centimeter. Immersion in water reduced the strength by about 26 per cent.

The bark is also woven into hats.

Bombycidendron vidalianum is a medium-sized tree reaching a diameter of 50 centimeters or more. The leaves are alternate, somewhat oval, pointed at the tip and rounded at the base, and 8 to 15 centimeters long. The flowers are white and about 8 centimeters in length. The fruits are oval, pointed, red, and about 4 centimeters long. The trunk is short and often crooked. The wood is rarely sawn. Its chief uses are for vehicle shafts and musical instruments.

This species has been reported from Luzon, Mindoro, and Palawan, and is common and widely distributed in Luzon.

Genus HIBISCUS

HIBISCUS TILIACEUS Linn. (Plate XXV). MALUBÁGO.

Local names: *Álum* (Zambales); *bágo* (Ilocos Norte, Abra); *balibágo* (Bontoc, Zambales, Tarlac, Bulacan, Manila, Tayabas, Polillo, Tarlac, Leyte); *balobágo* (Leyte); *danglíw* (Bulacan); *danglóg* (Balabac Island); *hánot* (Batanes Islands); *malabágo* (Pangasinan, Sorsogon, Masbate, Camarines, Albay, Iloilo, Capiz, Mindoro, Lanao); *malibágo* (Marinduque, Bataan, Tayabas, Davao); *malubágo* (Camarines, Albay, Sorsogon); *mapolá* (Batangas); *mayambágo* (Camarines, Surigao); *mulabágo* (Cotabato).

The bast fibers make a fairly strong rope. The fiber is used for string, for tying cattle, and for making hog traps.

Hibiscus tiliaceus is a much-branched tree 4 to 12 meters in height. The leaves are 10 to 15 centimeters long, alternate, hairy, somewhat rounded, the apex pointed, the base heart-shaped. The flowers are yellow with a purple center. The petals are about 5 centimeters long and wide.

This species is common throughout the Philippines. It is very easily propagated by means of cuttings.

Genus MALACHRA

MALACHRA CAPITATA Jacq. BAKEMBÁKES.

Local names: *Annabo* (Union); *bakembákes* (Abra, Ilocos Sur, Union); *bulbúlin* (Pampanga); *bulúhan, bulubulúhan* (Cavite); *labug-labug* (Iloilo, Occidental Negros); *sípit-uláng* (Bulacan); *páang-balíwis* (Manila, Rizal).

The bast is strong and is used in the manufacture of rope.

Watt * says that the fiber is excellent, 8 to 9 feet long, and that experts have declared it little, if at all, inferior to jute.

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* Watt, G., Commercial products of India.

Malachra capitata is a coarse, erect annual 0.5 to 2 meters in height and is covered with very coarse hair. The leaves are alternate, from 5 to 15 centimeters in diameter, somewhat rounded, and slightly lobed. The base is heart-shaped. The petals are yellow and about 1 centimeter long.

This species is common in waste places throughout the Philippines. It is a native of tropical America.

MALACHRA FASCIATA Turcz. PAANG-BALÍWIS.

Local names: *Annábo* (Union); *bakembákes* (Itneg, Ilocano); *malabitís-pápa* (Bataan); *páang-balíwis* (Tagalog).

The bast of this species is colored olive buff. A strong rope used for clotheslines and general purposes is made from it. The bast is prepared by retting. The entire plant is cut and kept in fresh water for about ten days, after which the bast is easily stripped and the fiber largely freed from extraneous matter by washing. King found the rope to have a tensile strength of 637 kilos per square centimeter, which wetting decreased 15 per cent.

Malachra fasciata is a coarse, half-woody herb reaching a height of 0.5 to 1 meter. The leaves are 10 to 15 centimeters long, very hairy, have a rounded base, and are cut nearly to the base into five narrow lobes which have toothed margins. The corolla is pink and about 1 centimeter long.

The species is a native of tropical America, but is now thoroughly naturalized and widely distributed in the Philippines at low altitudes, and is locally very abundant in wet places.

Genus MALVASTRUM

MALVASTRUM COROMANDELINUM Garke. SALSALÚYUT.

Local names: *Babara* (Pangasinan); *gagabúten* (Union); *sal-salúyut* (Union); *tachin-kabayo* (Batanes Islands); *tákim-báka* (Ilocos Norte).

The stems of this plant are used in making brooms.

Malvastrum coromandelinum is an erect, somewhat hairy, branched, half-woody perennial, 1 meter or less in height. The leaves are 2 to 5 centimeters long, the apex pointed, the base usually rounded, the margins irregularly toothed. The flowers are yellow with petals about 8 millimeters long. The fruit consists of eight to twelve kidney-shaped divisions, 2 to 3 millimeters long, and has three short, straight projections.

This species is a native of tropical America, but is now widely distributed in the tropics of both hemispheres. It is common in waste places throughout the Philippines.

PLATE XXV. HIBISCUS TILIACEUS (MALUBÁGO).

Genus **SIDA**

SIDA ACUTA Burm. f. TAKLING-BÁKA.

Local names: *Attái-na-báka* (Ibanak); *basbásot* (Bontoc); *escobílla* (Laguna, Bisaya); *herbara* (Ilocos Sur); *kastúle* (Bulacan); *maratakkimbáka* (Iloko in Tarlac); *salík* (Basilan); *surusighíd* (Camarines); *takkimbáka* (Ilocos Norte, Abra, Isabela, Pangasinan, Union); *taking-báka* (Tarlac); *takling-báka* (Pangasinan); *uaualísin* (Bulacan); *ualis-ualísan* (Tarlac, Nueva Ecija, Bulacan).

The fiber of *Sida acuta* is very pretty; its color marguerite yellow. It is fine, filamentous, soft, and very lustrous, having an appearance like silk. It possesses only medium strength, but makes a handsome rope. Ilokos consider this rope a superior product on account of its durability, its pleasing color, and its gloss. It is used for general purposes and particularly where nonstaining fiber is desired. King tested rope made from fiber which had been retted about ten days in fresh water and subsequently cleaned. He found it to have a tensile strength of 475 kilos per square centimeter, which wetting increased about 6 per cent.

The stems are used for making brooms and baskets.

Sida acuta is a slender shrub reaching a meter in height. It has elongated, slender branches. The leaves are alternate, 3 to 5 centimeters long, and with toothed margins. The flowers are yellow and about 1.3 centimeters in diameter.

This species is abundant in wet places throughout the Philippines.

SIDA CORDIFOLIA L.

Local name: *Albaháca* (Spanish in Surigao).

According to Watt,* this plant yields a fine, white fiber.

Sida cordifolia is an erect, half-woody shrub, 0.4 to 1 meter in height. It is covered with soft, velvety hairs mixed with which are numerous longer hairs. The leaves are alternate, heart-shaped at the base, somewhat rounded at the apex, with toothed margins, and from 1.5 to 4.5 centimeters in length. The flowers are yellow and occur in the axils of the leaves.

This species occurs in open waste places and is common and widely distributed in the Philippines.

SIDA MYSORENSIS W. & A. LAGKÍTAN.

Local names: *Damong-mabáho, lagkítan, márbas* (Rizal); *márabas* (Bataan); the last two corruptions of Span. "malvas".

The bast fiber from this species is used for making rope.

Sida mysorensis is a hairy shrub about a meter in height.

* Watt, Commercial products of India.

The leaves are alternate, 5 to 8 centimeters long, somewhat heart-shaped, and with notched margins. The flowers are yellow and about 1 centimeter in diameter.

SIDA RHOMBIFOLIA L. UALIS-UALÍSAN.

Local names: *Basbásot* (Bontoc); *singítan, takkit-váca, nangnangisit* (Union); *sinutan* (Cagayan); *takim-váca* (Pangasinan); *takling-váca* (Pangasinan, Batanes Islands); *ualis-ualísan* (Bataan).

This species yields a good fiber to which considerable attention has been paid in India and other countries. It is claimed that the fiber is too good to be used as a substitute for jute. For the literature on this subject see Watt's "Commercial products of India" and the bulletins of the Imperial Institute.

Sida rhombifolia is an erect, branched shrub 0.5 to 1.3 meters in height. The leaves are alternate, 1 to 4 centimeters long, the apex pointed or rounded, the lower surface covered with very short, pale hairs, the margins toothed. The flowers occur singly in the axils of the leaves; the corolla is yellow and 1.5 to 1.8 centimeters in diameter.

This species is common in open waste places throughout the Philippines.

Genus **THESPESIA**

THESPESIA LAMPAS Cav. MARAKÁPAS.

Local names: *Amagóng* (Nueva Ecija); *bulak-bulákan* (Tagalog); *dal-dallupang, marataróng* (Iloko, Abra, Itneg); *kapas-kápas* (Union); *kastúle* (Tagalog); *marakápas* (Amburayan, Abra, Zambales).

Rope made from the bast of this species is very weak. King says that it moulds readily. He found it to have a tensile strength of 268 kilos per square centimeter, which wetting increased about 8 per cent.

Thespesia lampas is an erect, slightly branched shrub, 2 or 3 meters in height. The leaves are alternate, somewhat three-lobed or nearly entire, 10 to 20 centimeters long, and somewhat hairy. The flowers are large, 6 to 8 centimeters long, and yellow with a purple center. The fruit is an ovoid capsule about 3 centimeters long.

This species is widely distributed in Luzon and the Visayan Islands.

Genus **URENA**

URENA LOBATA Linn. (Plate XXVI). KOLLOKOLLÓT.

Local names: *Afulut* (Gaddan in Nueva Vizcaya); *anononggkót, barang-gót* (Bikol); *dalupan, kalut-kalútan, kolot-kolótan, kulutkulútan* (Bataan, Tagalog, Bisaya, Culion Island); *kollokollót* (Amburayan, Ilocos Sur, Pangasinan, Nueva Vizcaya, Tarlac); *kollolót* (Abra); *kulát, kulét* (Pangasinan); *kullukullúk* (Iloko in Isabela); *mangkít* (Tayabas); *poot-si-nuang* (Isinai in Nueva Vizcaya); *puriket* (Abra).

The bast fiber of *Urena lobata* is of the jute type and is said to be more easily extracted than the latter. It has been repeatedly recommended as a substitute and has been sold in London at prices equal to those paid for jute. A large mill for the treatment of this fiber was put up in Brazil. In this case the wild supply proved to be wholly insufficient, and it is said that under cultivation the plant lost a great part of its fibrous nature.

In India considerable attention has been paid to the fiber of *Urena lobata*, and various writers have expressed the opinion that when as much care has been spent on it as on jute, *Urena* may be equally as valuable or more valuable than jute.

References to the literature on this subject are given by King.* The bulletins of the Imperial Institute should also be consulted.

Rope made from the fibers of *Urena lobata* is fairly strong. In India and other countries the product is used as a cordage material. In the manufacture of coffee bags it is said to be an excellent substitute for jute, because the fiber has no influence on the aroma of the coffee. *Urena lobata* fibers can be made into exceedingly strong paper, said to be almost twice as strong as Bank of England note pulp.

Urena lobata is an erect, branched, somewhat hairy shrub 0.6 to 2.5 meters in height. The leaves are alternate, pale beneath, 3 to 9 centimeters long, heart-shaped at the base, usually lobed, and with toothed margins. The flowers are pink or purplish and about 1.7 centimeters in diameter. The fruits are about 7 millimeters in diameter and are covered with short, barbed spines.

This species is common in waste places throughout the Philippines, and thrives under adverse conditions.

Family BOMBACACEAE

Genus BOMBAX

BOMBAX CEIBA Linn. MALABÚLAK.

Local names: *Bobór, taroktók* (Iloko); *búbui-gúbat* (Rizal, Mindoro); *malabúlak* (Nueva Ecija, Bataan, Manila, Rizal, Laguna).

The bast of this tree is colored orange buff and is used for making ropes. It has a fair degree of tenacity, but is too scarce to be commonly used for rope making. Ropes made from it are said to be suitable for use in the dry season. King found the rope to have a tensile strength of 405 kilos per square centimeter, which was decreased 13 per cent by wetting.

* King, A. E. W., Mechanical properties of Philippine bast fiber rope. Philippine Journal of Science, Volume XIV (1919).

PLATE XXVI. URENA LOBATA (KOLLOKOLLóT).

The seeds are surrounded by silky hairs which are similar to kapok from *Ceiba pentandra*, but whiter. The fiber is often confused with kapok and has been shipped from Indo-China to France under that name. A very detailed account of this fiber is given by Crevost and Lemarié.* They say that it is less waxy than that of *Ceiba pentandra* and so does not behave in the same way in the presence of water.

Dodge † also mentions the use of the hairs for stuffing pillows.

Bombax Ceiba is a very large tree, leafless in the dry season. The trunk is covered with large pyramidal spines. The leaves are palmately compound with five to seven leaflets, which are smooth, oval, pointed at both ends, and from 10 to 20 centimeters in length. The flowers are 8 to 10 centimeters long, red, and appear while the tree is leafless. The capsules are about 15 centimeters long.

This species is found at low altitudes throughout the Philippines.

Genus **CEIBA**

CEIBA PENTANDRA (L.) Gaertn. KÁPOK OR SILK COTTON TREE.

Local names: *Balios* (Bulacan); *basanglái* (Ilocos Sur, Abra); *bobói, bubúi* (Bulacan, Bataan, Cavite, Batangas, Rizal, Laguna, Tayabas, Mindoro); *boibói* (Capiz); *búlak* (Abra, Zambales, Pampanga, Bulacan, Cavite, Batangas, Rizal, Manila, Laguna, Tayabas, Mindoro); *búlak-dondól* (Cebu); *búlak-kastíla* (Pampanga); *búlak-síno* (Bulacan, Bataan, Cavite, Batangas, Rizal, Laguna, Tayabas, Mindoro); *dogdól* (Cebu); *doldól* (Leyte, Samar, Iloilo, Antique, Capiz, Bohol, Cebu, Cuyo Islands); *dondól* (Cebu); *gápas* (Misamis); *kápah* (Zambales); *kápak* (Bulacan, Rizal, Bohol); *kápas* (Ilocos Norte and Sur, Zambales); *kápas-sanglái* (Ilocos Norte and Sur, Abra); *kápok* or *kapók* (Tarlac, Sorsogon, Masbate, Davao and other parts of Mindanao, Basilan, Sulu group); *kapös, kasanglái* (Pangasinan); *káyo* (Camarines, Albay, Sorsogon, Samar, Leyte, Capiz, Antique, Iloilo, Cebu, Bohol); *sanglái* (Abra).

The fibers from the seed pod of this tree are very extensively used for stuffing pillows and mattresses, and are excellent for these purposes. They are also employed in making life preservers. During the past three years, 56,632 kilos of this material, valued at 20,194 pesos, have been exported from the Philippines.

Ceiba pentandra is a slender, erect tree, 15 meters or less in height. The trunk is usually armed with scattered, large spines.

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* Crevost, Ch. and Lemarié, Ch., Plantes et Produits filamentaux et textiles de L'Indochine. Bulletin Economique de L'Indochine, No. 137, New Series, July–August, 1919.

† Dodge, C. R., A descriptive catalogue of useful fiber plants of the world. U. S. Department of Agriculture. Fiber investigations. Report No. 9.

The branches are in distinct whorls and spread out horizontally. The leaves are compound with five to eight leaflets which are borne at the end of the petiole. The leaflets are 6 to 15 centimeters long and pointed at both ends. The flowers are numerous, whitish, and about 3 centimeters long. The capsule is pendant, about 15 centimeters long, 5 centimeters thick, and contains very abundant fiber surrounding the seeds.

This species is distributed at low altitudes throughout the settled areas of the Philippines. It is probably a native of tropical America.

Family STERCULIACEAE

Genus ABROMA

ABROMA FASTUOSA Jacq. (*A. augusta* L.) ANABÓ.

Common names: *Abroma, devil's cotton* (English); *abrome* (French); *kakaomalve, abrome* (German).

Local names: *An-nabó, anabó* (Apayao, Ilocos Norte, Ilocos Sur, Benguet, Abra, Union, Tarlac, Zambales, Bataan, Manila, Rizal, Laguna, Tayabas, Negros); *anabú* (Pampanga); *anafú* (Nueva Vizcaya); *anabong* (Rizal, Oriental Negros, Bohol); *labon* (Oriental Negros, Bohol); *sayapó* (Cotabato); *ambóng* (Bulacan, Batangas, Cavite, Bataan, Laguna, Rizal, Tayabas); *bágo* (Sorsogon); *bodobodó* (Ilocos Norte); *nabó* (Cagayan, Negros, Bohol); *negegan* (Batanes Islands); *pakalkál* (Pampanga); *sayapú* (Moro).

The bast fiber of *Abroma fastuosa* is silky and very strong. It is used in the Philippines for making rope, twine, fish lines, pouches, etc. The rope is valued on account of its strength, and is used for clotheslines because it does not stain.

King tested rope made from crude strips of bast and also from fibers that had been retted in water for about 10 days. In the first case the tensile strength was 545 kilos per square centimeter and in the second, 643 kilos. Wetting lowered the strength of the rope made from crude strips nearly 50 per cent.

A number of writers have believed that this plant offers considerable possibilities in agricultural and industrial enterprises.* It grows vigorously under adverse conditions. Mendiola found that a plant one year old yielded 67 grams of fiber. He believed that *Abroma* should be planted as close as 2 meters and that on this basis one hectare should produce 115 kilos of fiber. The fiber is sold in considerable quantities in Cotabato, Mindanao, at from three to ten pesos a picul. In Cebu it is quoted at from 6.50 to 10.00 pesos a picul. However, extensive

* See Watt, G., The commercial products of India. John Murray, London, 1908.

attempts in India to make this fiber a commercial success have not succeeded.

Abroma fastuosa is a shrub or small tree. The leaves and stems are covered with stiff, irritating hairs. The leaves are alternate, heart-shaped, 10 to 30 centimeters in length, and with toothed margins. The flowers are yellow and about 5 centimeters in diameter. The fruits are thin-walled, five-angled capsules.

This species is widely distributed at low and medium altitudes in the settled areas and brush lands of the Philippines. It is sometimes cultivated.

Genus COMMERSONIA

COMMERSONIA BARTRAMIA (L.) Merr. KAKAÁG.

Local names: *Anitap* (Itneg); *kakaág* (Iloko).

The crude bast strips examined by King "varied from light ochraceous salmon to a warm buff." Rope made from this plant is said to be used considerably for general purposes. King found the dry rope to have a mean tensile strength of 392 kilos per square centimeter. Wetting the rope decreased its strength 32 per cent. However, King says that the residents of Benguet state that this rope is more durable during the rainy season than any of the other bast ropes which are commonly used.

Commersonia bartramia is a small tree. The leaves are alternate, hairy, heart-shaped at the base, pointed at the tip, 12 to 18 centimeters long, and with toothed margins. The flowers are small, white, and are borne on compound inflorescences. The fruits are rounded capsules which are densely covered with slender, soft, hairy processes.

This species occurs at low altitudes throughout the Philippines.

Genus HELICTERES

HELICTERES HIRSUTA Lour. TONGTONGKÍNG.

Local names: *Balibágo, bulbúlin* (Pampanga); *buntot-usá* (Rizal); *danglin-áso* (Bisaya); *danglin-kalabáu* (Abra, Nueva Ecija); *kakaáb, kakaág* (Union, Abra, Pangasinan); *kollokollót ti baó* (Benguet); *lailaiginan* (Rizal); *malamansaníta* (Ilocos Norte, Tagalog); *malatakón* (Abra); *pakin-bákir* (Iloko); *sagingsagíngan* (Tagalog); *sarnugár á dadakkél* (Ilocos Sur); *talakau* (Negrito in Pampanga); *talósan* (Tayabas); *tolósan* (Iloko); *tongtongkíng* (Amburayan).

The crude strips of this fiber are light buff, and harsh and stiff. King found that the tensile strength of rope made from them averaged 438 kilos per square centimeter. Immersion in water for twenty-four hours decreased the strength about 10 per cent. The rope appears to be durable during the rainy season.

Helicteres hirsuta is a shrub with alternate, pointed, hairy leaves, 10 to 15 centimeters in length, the bases of which are obliquely heart-shaped and the margins toothed. The flowers are pink or purplish, slender, and about 2 centimeters long. The fruits are cylindrical, pointed, 3 to 4 centimeters long, and covered with numerous hairy protuberances.

This species occurs at low altitudes throughout the Philippines and is locally very abundant.

Genus KLEINHOVIA

KLEINHOVIA HOSPITA L. TAN-ÁG.

Local names: *Apung-ápung* (Basilan); *bafé ñga bunsúng* (Nueva Vizcaya); *biknóng* (Union, Zambales); *biluáng* (Negros); *bi'nóng* (Nueva Ecija, Abra, Pangasinan); *bitanág* (Agusan, Surigao, Basilan); *bitnóng* (Cagayan, Benguet, Ilocos Norte, Ilocos Sur, Abra, Nueva Vizcaya, Tarlac); *bitonog* (Lanao); *butnóng* (Ilocos Norte); *hamitanágo* (Albay, Samar, Leyte, Cebu, Iloilo, Antique, Capiz, Occ. and Or. Negros, Bohol); *hunung* (Cagayan); *malibágo* (Palawan); *malobágo, lapnís* (Negros); *marakápas* (Ilocos Sur); *palong-manók* (Culion); *pampár, panampát* (Pampanga); *taág, tang-ág* (Rizal); *tagnág* (Zamboanga); *tamanág* (Cotabato, Davao); *taloktók* (Ilocos Norte); *tan'ág* or *tan-ág* (Nueva Ecija, Bulacan, Bataan, Tarlac, Rizal, Laguna, Tayabas, Camarines, Albay, Sorsogon, Capiz, Iloilo); *tanák* (Tayabas).

The bast fiber is widely used for tying bundles. It is also made into rope which is used for tethering carabaos and horses, and for making halters. King found it to have a tensile strength of only 309 kilos per square centimeter. However, immersion in water for twenty-four hours decreased the strength only 7 per cent. The rope is said to be durable during rainy weather.

Kleinhovia hospita is a small or medium-sized tree with large, alternate, heart-shaped leaves which have toothed margins. The flowers are small, pink, and are borne in panicles terminating the branches. The fruit is a thin-walled, inflated capsule about 2 centimeters long. The young leaves are eaten as greens.

This species is found at low altitudes throughout the Philippines and is locally very abundant.

Genus MELOCHIA

MELOCHIA UMBELLATA (Houtt) Stapf. LABÁYO.

Local names: *Anabióng* (Rizal); *anabó* (Nueva Ecija); *baliknóng, bunot-bunót, siapó* (Mindoro); *bignon* (Pangasinan); *binúnga* (Cagayan, Negros Occidental); *biñgábing, lapnís* (Laguna); *labáyo* (Laguna); *malaachuéte* (Bataan).

The bark of this tree is used for making string or rope.

Melochia umbellata is a small tree, and is one of the most rapidly-growing species in the Archipelago. The leaves are 12

to 20 centimeters long, heart-shaped, and have toothed margins. The flowers and fruits occur in dense clusters.

This species is very abundant in second-growth forests throughout the Philippines.

Genus PTEROCYMBIUM

PTEROCYMBIUM TINCTORIUM (Blanco) Merr. (Plate XXVII). TALÚTO.

Local names: *Abigón, taóto, taútu* (Bataan, Leyte); *bañgát* (Zambales); *bayaó, takung* (Surigao); *balulau* (Agusan); *duidúi* (Tayabas); *huligáno* (Nueva Ecija); *libtúk* (Cagayan); *malasapsáp* (Pampanga); *marakápas* (Calayan Island, Ilocos Sur, Benguet); *mayuo* (Manobo); *talóto* or *talúto* (Nueva Ecija, Bataan, Laguna, Tayabas, Camarines, Mindoro, Negros, Palawan, Cotabato); *tagungtúngan* (Cebu); *takung* (Surigao).

The bast of this tree is pale orange-yellow. King found that rope made from it had a tensile strength of 381 kilos per square centimeter. Immersion in water for twenty-four hours increased the strength about 7 per cent.

Pterocymbium tinctorium is a tall tree reaching a height of from 45 to 50 meters and a diameter of 90 centimeters. It has a straight, regular trunk from 25 to 30 meters in length. It occurs in the virgin forests and usually on the dryer soils. For a short period during the dry season it is leafless. Typical leaves are heart-shaped. The fruits are oval, over a centimeter long, and with prominent wings 7 to 10 centimeters in length. The wood is white, light, and very soft.

Genus PTEROSPERMUM

PTEROSPERMUM DIVERSIFOLIUM Bl. BAYÓK.

Local names: *Báloi, bároi* (Ilocos Sur, Pangasinan, Benguet, Itneg); *bayóg, bayók* or *bayúk* (Nueva Ecija, Pampanga, Zambales, Bataan, Rizal, Cavite, Laguna, Batangas, Tayabas, Camarines, Catanduanes Island, Mindoro, Masbate, Ticao, Negros, Cotabato, Zamboanga, Palawan); *bayóg-bayóg* (Zamboanga); *bayóng, biyúg* (Tayabas); *dibuál* (Basilan); *kabislák* (Davao); *taliñgá'an* (Ilocos Norte).

The bast of this species has very little tensile strength and is not commonly used for rope making. The color of the bast is pinkish cinnamon. King found rope made from it to have a tensile strength of 263 kilos per square centimeter, which wetting did not affect. The bark is also used for dyeing purposes.

Pterospermum diversifolium is a tree reaching a diameter of 50 centimeters. The leaves are alternate, hairy, oblong, heart-shaped at the base, abruptly pointed at the tip, and 11 to 25 centimeters in length. The flowers are white, 12 to 14 centimeters long, and occur either singly or in pairs in the axils of the leaves. The fruit is a woody, five-angled capsule about 15 centimeters long.

PLATE XXVII. PTEROCYMBIUM TINCTORIUM (TALÚTO).

This species is common and widely distributed in the Philippines.

PTEROSPERMUM NIVEUM Vid. BAYÓK-BAYÓKAN.

Local names: *Bároi* (Abra, Pangasinan, Tarlac); *bayóg* (Zambales, Bataan, Rizal, Laguna, Camarines, Mindoro); *bayók* (Nueva Ecija, Pampanga, Bataan, Laguna); *bayok-bayókan* (Camarines); *bayugtín* (Tayabas); *kantíñgan* (Mindoro); *tamók* (Bataan); *tiñgantíñgan* (Tayabas).

The bark of this species is used for making rope and for tying purposes.

Pterospermum niveum is a tree reaching a diameter of 60 centimeters. The leaves are alternate, hairy, oblique at the base, pointed at the tip, and 7 to 17 centimeters in length. The flowers are large, white, and fragrant. The fruit is oval, pointed, 6 to 8 centimeters long, splits into four or five segments, and contains winged seeds.

This species is widely distributed in the forests of the Philippines.

Genus STERCULIA

STERCULIA CRASSIRAMEA Merr. TAPINÁG.

Local names: *Adupong* (Benguet); *balínad* (Ticao, Palawan); *baníkad* (Mindoro); *banílad* (Rizal, Mindoro, Guimaras Island); *baniakalau* or *bannakalau* (Benguet, Ilocos Norte, Ilocos Sur, Abra); *kalukalumpángan* (Rizal); *palak-pálak* (Bulacan); *malakapái, malapapáya, tapinág* (Bataan).

Rope made from the bast of this tree is fairly strong. King found the tensile strength to be 398 kilos per square centimeter. Wetting decreased it about 23 per cent.

Sterculia crassiramea is a large tree reaching a diameter of 60 centimeters. The smallest branches are much thickened. The leaves are very large, usually more than 35 centimeters long, heart-shaped at the base, and very hairy. The flowers are yellow and 4 millimeters long. The fruits are large, red, and inflated.

This species is widely distributed in forest areas of Luzon.

STERCULIA CUNEATA R. Br. MALABONÓT.

Local names: *Balínad* (Palawan); *bayáyat, tambobonót* (Isabela); *bulákan, malakakáo* (Laguna); *kakao-kakáo, sulimbubú* (Mindoro); *kalukalumpángan* (Rizal); *kalumpáng, úpak* (Pampanga); *malabonót* (Nueva Ecija, Rizal, Manila); *maratarón*g (Ilocos Sur); *opong-ópong* (Camarines).

The bark of this tree is used for making rope.

Sterculia cuneata is a tree reaching a height of 15 meters and a diameter of 35 centimeters. The leaves are alternate, very hairy, heart-shaped at the base, pointed at the tip, and from 12 to 28 centimeters long.

This species is widely distributed in the Philippines.

STERCULIA FOETIDA Linn. KALUMPÁNG.

Local names: *Bangár* (Iloko and Itneg); *bóbo, bóbog, bó-bog, búbog* (Panay, Balabac Island, Palawan, Negros); *bóbor, búbur* (Ilocos Sur); *bongóg* (Cagayan); *kalumpáng* (Pampanga, Nueva Ecija, Bataan, Manila, Rizal, Laguna, Tayabas, Polillo, Camarines, Mindoro, Iloilo, Palawan, Cotabato, Apo Island); *kurumpáng* (Davao).

The bast of this species is made into a weak rope which King found to have a tensile strength of only 200 kilos per square centimeter. Immersion in water for twenty-four hours did not affect the strength. The bast is light salmon-orange.

The seeds are edible, but are purgative if eaten raw. They yield an oil used locally for illuminating, and which could be used for culinary purposes.

Sterculia foetida is a large tree reaching a diameter of 100 centimeters. The leaves are palmately compound with seven to nine leaflets, which are smooth, sharply pointed at the apex, and 12 to 18 centimeters long. The flowers are dull yellowish or purplish, 2 to 2.5 centimeters in diameter, and have a very fetid odor. The seeds are borne in very large, red capsules. They are edible and yield a valuable oil for which the tree is sometimes cultivated. The wood is gray, soft, and little used.

This species is widely distributed in the Philippines.

STERCULIA LUZONICA Warb. MALAKALUMPÁNG.

Local names: *Anagás* (Masbate); *balínad, kadlíhan* (Ticao Island); *bóboi-gúbat* (Mindoro); *kalupáng* (Negros); *lapnít* (Cagayan); *malakalumpáng* (Camarines); *talúto* (Guimaras Island); *lontóng* (Zamboanga).

The inner bark of this species is used for making rope.

Sterculia luzonica is a tree reaching a diameter of 60 centimeters and a height of about 30 meters. Its leaves are somewhat heart-shaped at the base, pointed at the apex, and 10 to 20 centimeters in length. The flowers are small, greenish, and are borne on compound inflorescences. The fruits are red and usually occur in groups of from three to five.

This species is widely distributed in the Philippines.

STERCULIA OBLONGATA R. Br. MALABÓHO.

Local names: *Bakán* (Mindoro); *balínad* (Camarines); *banílad* (Rizal, Mindoro); *búnga, malabúnga* (Tayabas); *hanták* (Batanes Islands); *malakakáo* (Bataan, Laguna); *malabanílad* (Samar); *lapnít* (Calayan Island, Babuyanes Islands); *malabóho* (Bataan); *saripongpóng* (Camarines); *sinalígan* (Benguet, Abra); *óos* or *úos* (Camarines).

Most of the strips of bast of *Sterculia oblongata* are salmon-buff in color, some are tawny and others are light salmon orange. Rope made from this fiber is of medium strength. King found it to have a tensile strength of 398 kilos per square centimeter.

Wetting decreased the strength 27 per cent. However, according to King, the residents of Disdis, Benguet state that the rope is preferably used during the rainy season.

Sterculia oblongata is a small or medium-sized tree reaching a diameter of 70 centimeters. The leaves are alternate, smooth, oval, 12 to 30 centimeters long, rounded at the base, and pointed at the tip. The flowers are yellowish white, 5 to 6 millimeters long, and are borne on compound inflorescences. The fruits are inflated, hairy, about 5 centimeters long, 3.5 centimeters wide, with a leathery covering, and contain four to six seeds which are about 1.5 centimeters long.

This species is widely distributed at low altitudes in the Philippines.

STERCULIA PHILIPPINENSIS Merr. BANÍLAD.

Local names: *Bannakálau* (Ilocos Sur); *banílad, banikad,* (Mindoro, Guimaras); *malagasáha* (Laguna).

The bark of this tree is used for making rope.

Sterculia philippinensis is a tree reaching a height of 30 meters and a diameter of 65 centimeters. It has very large, heart-shaped leaves up to 35 centimeters in length. The flowers are small, pink or red, and are borne in considerable numbers on compound inflorescences. The fruits are large and red.

This species is widely distributed in Luzon and the Bisaya Islands.

STERCULIA STIPULARIS R. Br. BONÓTAN.

Local names: *Bisóng* (Nueva Vizcaya); *bonótan, rapók* (Ilocos Norte); *bungát* (Cagayan); *labnái* (Itneg, Abra); *malagasáha* (Tayabas).

The strips of bast of this species are perforated with small holes so that they have a sieve-like appearance. The color is uniform ochraceous-buff. Rope made from it has very little strength, but is used considerably. It is said to be durable during the wet season and is employed particularly for making hog traps. King found the rope to have a tensile strength of 268 kilos per square centimeter, increased 37 per cent by wetting.

Sterculia stipularis is a medium-sized tree. The leaves are alternate, hairy, pointed at the tip, rounded at the base, wider near the apex than near the base, and 10 to 30 centimeters long. The flowers are white and purple, and are borne on compound inflorescences. The fruit capsules are large, red, and inflated.

This species is widely distributed at low altitudes in the Philippines.

Family THYMELAEACEAE

Genus AQUILARIA

AQUILARIA MALACCENSIS Lam.

According to Heyne * this tree furnishes a beautiful, silvery bast used for making rope and cloth. The bast is highly prized for its strength and durability.

Aquilaria malaccensis has been collected once, and then in Camarines.

Genus PHALERIA

PHALERIA CUMINGII F.-Vill. SALÁGONG-GÚBAT.

Local names: *Bari* (Mindoro); *butígan* (Masbate); *malakakáo, salágong-babáe, salágong-gúbat* (Rizal); *salágo* (Camarines); *tuka* (Cagayan).

The bark of this tree is very strong, and is used as twine or for making rope.

Phaleria cumingii is a tree reaching a height of 8 meters. The leaves are opposite, smooth, pointed at the tip, rounded or pointed at the base, and 8 to 25 centimeters long. The flowers are white, about 3.5 to 4.5 centimeters long, and occur in small clusters. The fruits are red.

This species is widely distributed in Luzon and the Bisaya Islands.

PHALERIA PERROTTETIANA F.-Vill. TUKA.

Local names: *Aligpagi* (Davao); *bágo* (Bataan); *tuka* (Cagayan).

The bark is used as a tying material.

Phaleria perrottetiana is a small tree usually about 2 or 3 meters in height. The leaves are opposite, smooth, oval, pointed at the tip, rounded or pointed at the base, and from 10 to 24 centimeters in length. The fruits are bright red and about 1.5 centimeters long.

This species is distributed from northern Luzon to southern Mindanao.

Genus WIKSTROEMIA

WIKSTROEMIA spp. SALÁGO.

The different species of *Wikstroemia* are shrubs which are found scattered in thickets throughout the Philippines. The common species are *Wikstroemia indica, W. lanceolata, W. meyeniana,* and *W. ovata.*

The bark is collected in considerable quantities and exported to Japan, where it is said to be used in the manufacture of

* Heyne, K., De Nuttige Planten van Nederlandsch-Indië, Volume 3, page 332.

bank notes and other strong paper. Most of the bark collected comes from the vicinity of Mount Mayon and from Mindanao. The bast is light colored and has a somewhat silky appearance. The bark is used for tying purposes and for making rope.

WIKSTROEMIA INDICA (L.) C. E. Mey. SMALL-LEAF SALÁGO.

Local names: *Baleo* (Ilocos Norte); *salágo* or *tálo* (Albay); *titipúho* or *palúpo* (Batanes Islands).

Wikstroemia indica is a shrub 1 to 3 meters in height. The leaves are opposite, somewhat leathery, widest near the middle, somewhat rounded at the tip, pointed at the base, and 1.5 to 7 centimeters long. The flowers are small and yellow; the fruits small and red.

This species is distributed from northern Luzon to southern Mindanao.

WIKSTROEMIA LANCEOLATA Merr. LANCE-LEAF SALÁGO.

Local names: *Salagip* (Batangas); *salágo* (Abra, Tayabas); *tuka* (Ilocos Sur).

Wikstroemia lanceolata is a shrub 1 to 2 meters in height. The leaves are opposite, smooth, pointed at both ends, and 4 to 8 centimeters in length. The flowers are small, light colored, and borne in small clusters. The fruits are red and less than a centimeter long.

This species is found in northern and central Luzon.

WIKSTROEMIA MEYENIANA Warb. (Plate XXVIII). LARGE-LEAF SALÁGO.

Local names: *Ságu* (Laguna); *salágo* (Albay).

Wikstroemia meyeniana is a shrub 1 to 2 meters in height. The leaves are opposite, pointed at the tip, rounded at the base, and 6 to 12 centimeters in length. The flowers are greenish yellow, about 1.5 to 2 centimeters in length, and borne in small clusters. The fruits are red and about a centimeter in length.

This species is common and widely distributed from northern Luzon to southern Mindanao.

WIKSTROEMIA OVATA C. E. Mey. ROUND-LEAF SALÁGO.

Local names: *Dapnít* (Iloko, Bontoc); *salágo* (Bulacan, Laguna).

Wikstroemia ovata is a shrub 1 to 3 meters in height. The leaves are opposite, smooth, rounded at the base, pointed at the apex, and from 5 to 10 centimeters long. The flowers are yellow, about 1.5 centimeters long, and borne in small clusters. The fruits are red and about 1 centimeter long.

This species is distributed from Luzon to Mindanao.

PLATE XXVIII. WIKSTROEMIA MEYENIANA (LARGE-LEAF SALÁGO).

Family MYRSINACEAE

Genus MAESA

MAESA CUMINGII Mez. KATIPUT.

Local names: *Hanópol* (Tayabas); *katiput* (Rizal); *malalapí* (Zambales); *suliman* (Bulacan).

This vine is used for tying purposes.

The leaves of *Maesa cumingii* are alternate, smooth, rounded at the base, pointed at the tip, and from 6 to 12 centimeters long. The flowers occur in considerable numbers on long flowering shoots. The fruits are small and rounded.

This species is widely distributed in the Philippines.

Family LOGANIACEAE

Genus STRYCHNOS

STRYCHNOS MULTIFLORA Benth. BUKÚAN.

Local names: *Abukobukó* (Apayao); *bukúan* (Cagayan); *tibanglán* (Laguna).

This vine is used for tying purposes.

The leaves of *Strychnos multiflora* are opposite, smooth, rounded at the base, pointed at the tip, and from 10 to 18 centimeters long. The flowers are small, white, and borne on compound inflorescences. The fruit is round, bright orange-red, and contains one flat seed.

This species is distributed from Luzon to Mindanao.

Family APOCYNACEAE

Genus ICHNOCARPUS

ICHNOCARPUS OVATIFOLIUS A. DC. SIGÍD.

Local names: *Hinggíu* (Cavite, Pangasinan, Rizal, Laguna, Mindoro); *sadák* (Pangasinan, Ilocos Sur); *sig-íd* (Zambales, Mindoro); *uakák* (Cagayan).

This species is used for tying purposes, especially in making fences, and also for ropes.

Ichnocarpus ovatifolius is a woody vine, 4 meters or more in length. The leaves are opposite, smooth, rounded or pointed at the base, pointed at the tip, and from 5 to 14 centimeters long. The flowers are white, fragrant, about 6 millimeters long, and borne on compound inflorescences. The fruits are cylindrical, 5 to 18 centimeters long, about 3 millimeters in diameter, and densely covered with brown hairs when young.

This species is common and widely distributed in the Philippines.

Genus **PARAMERIA**

PARAMERIA PHILIPPINENSIS Radlk. DUGTONG-ÁHAS.

Local names: *Dugtong-áhas* (Rizal); *ikdíng-ñga-puráu* (Igorot); *inggíu-na-putí* (Bataan); *karkarsáng* (Benguet); *kuni-na-putí* (Pampanga); *lupí-it* (Ilocos Sur); *parugtong-áhas* (Bulacan, Zambales, Rizal); *partían* (Ilocos Sur); *pulang-pulang* (Zambales); *sadák* (Benguet); *taguláuai* (Rizal).

The bark of this vine is used for making rope and for tying rice bundles.

Parameria philippinensis is a large, woody vine. The leaves are from 7 to 10 centimeters in length, somewhat oval in outline, and pointed at both ends. The flowers are fairly small, white, and occur in clusters. The fruits are very long and slender; the parts containing the seeds are swollen, while the parts between the seeds are very narrow. The seeds are crowned with long, hair-like projections.

This species is common and widely distributed in the Philippines, and is one of the rubber-producing plants in the Archipelago.

Genus **URCEOLA**

URCEOLA IMBERBIS (Elm.) Merr. HINGGÍU-KALABÁU.

Local name: *Hinggíu-kalabáu* (Laguna).

This vine is used for tying purposes.

Urceola imberbis is a woody vine. The leaves are opposite, smooth, rounded at the base, pointed at the tip, and 8 to 14 centimeters long. The flowers are pale, yellowish green and borne in considerable numbers on compound inflorescences. The fruits are cylindrical, long, and slender.

This species is found in Luzon.

Family ASCLEPIADACEAE

Genus **ASCLEPIAS**

ASCLEPIAS CURASSAVICA L. BÚLAK-DAMÓ.

Local names: *Anibong, pasanglái* (Bontoc); *bu-buyan, búlak-damó* (Tayabas); *búlak-kastíla, kalalauán* (Bataan); *chile-manúk* (Bataan); *coronitas* (Span., Camarines); *daldál* (Batanes Islands); *kamantíging-lináu* (Batangas); *kápas de Francia* (Pangasinan); *maismaísan* (Rizal).

The silky hairs of the seed are sometimes used for stuffing pillows.

Asclepias curassavica is an erect, simple or slightly branched, smooth, perennial herb 40 to 60 centimeters in height. The leaves are opposite, narrow, pointed at both ends, and 7 to 13 centimeters in length. The inflorescences are umbrella-shaped, and occur in the axils of the leaves or terminate the branches.

The flowers are red and yellow, 1.2 to 1.4 centimeters in length. The fruits are somewhat pointed at both ends, 6 to 8 centimeters in length, and 1 to 1.3 centimeters in diameter at the middle. They contain numerous, flat seeds to which are attached numerous, long, silky hairs.

This species is very common and widely distributed in open places in the Philippines. It is a native of tropical America, but is now a weed in most tropical countries.

Genus STREPTOCAULON

STREPTOCAULON BAUMII Decne. HINGGÍU-NA-PUTÍ.

Local names: *Duktung-áhas* (Rizal); *hinggíu-kalabáu* (Bulacan); *hinggiu-na-putí* (Manila); *mara-ipus* (Union); *sibut-sibútan* (Rizal).

This vine is used for tying purposes.

Streptocaulon baumii is a woody vine. The leaves are opposite, round or heart-shaped at the base, pointed at the tip, and from 7 to 13 centimeters long. The flowers are numerous and very small. The fruit is about 6 centimeters long and 5 millimeters in diameter, cylindrical, and pointed at the tip. It contains numerous black seeds crowned with silky hairs.

This species is widely distributed in the Philippines.

Family CONVOLVULACEAE

Genus MERREMIA

MERREMIA NYMPHAEIFOLIA Hall. f. BULÁKAN.

Local names: *Bulak-bulákan* (Camarines); *bulákan* (Tayabas, Laguna, Mindoro); *burákan* (Camarines); *tampinita* (Misamis).

This vine is sometimes used for tying purposes.

Merremia nymphaeifolia has alternate, heart-shaped leaves, which are from 8 to 25 centimeters in length. The flowers are large and yellow.

This species is distributed throughout the Philippines.

Genus OPERCULINA

OPERCULINA TURPETHUM (L.) Manso.

Local names: *Burákan* (Ticao); *kamokamotéhan* (Rizal).

This vine is used for tying purposes.

Operculina turpethum is a pubescent vine reaching a length of 5 meters or more. The stems are often purplish, prominently 2- to 4-angled, and narrowly winged. The leaves are alternate, 5 to 15 centimeters long, the apex pointed, the base somewhat heart-shaped or straight. The corolla is white and 4 centimeters long and wide. The capsule is rounded and 1 to 1.5 centimeters in diameter.

This species is found throughout the Philippine Islands.

Family BORAGINACEAE

Genus CORDIA

CORDIA CUMINGIANA Vid. ANÓNANG-LALÁKI.

Local names: *Anónang-laláki* (Mindoro); *marataróng* (Iloko).

The strands of bast fibers vary considerably in size and color. Rope made from it possesses only a medium degree of tenacity.

Cordia cumingiana is a small tree reaching a height of about 7 meters. The leaves are alternate, hairy, heart-shaped, and 8 to 16 centimeters long. The flowers are white, about 4 millimeters long, and borne on compound inflorescences. The fruits are about 1 centimeter long.

This species is of local occurrence at low altitudes in Luzon.

CORDIA MYXA Linn. ANÓNANG.

Local names: *Anónang, anúnang, anúnong* (Ilocos Sur, Benguet, Union, Pangasinan, Zambales, Pampanga, Bataan, Manila, Rizal, Laguna, Nueva Ecija, Cavite, Tayabas, Batangas, Camarines, Albay, Sorsogon, Mindoro, Masbate, Leyte, Guimaras Island, Palawan, Surigao, Cotabato, Misamis); *anónang-bákir, sinalígan* (Ilocos Sur); *guma* (Balabac Island); *salúyong* (Tagalog).

Rope is made from the bast of this tree. This rope is relatively weak and is said to be unsuited for use in a wet condition. The bast is brown. King found the tensile strength of the rope to be 324 kilos per square centimeter. Wetting decreased the strength 19 per cent.

A white, gelatinous substance obtained from the fruits is used as glue.

Cordia myxa is a tree usually 5 to 10 meters in height. The leaves are alternate, smooth or nearly so, pointed at both ends, and 6 to 15 centimeters long. The flowers are white or yellowish white, about 7 millimeters long, and borne on compound inflorescences. The fruits are yellowish white, 10 to 13 millimeters long, and soft, with a hard stone in the center.

This species is very common and widely distributed in second-growth forests and open places at low altitudes in the Philippines.

Family CAPRIFOLIACEAE

Genus LONICERA

LONICERA PHILIPPINENSIS Merr. BUALTÍK.

Local name: *Bualtík* (Benguet).

This vine is used entire in Benguet for tying fences.

The leaves are opposite, pointed at the tip, rounded at the base, and from 3.5 to 5 centimeters in length. The flowers are

white, occur in axillary or terminal clusters, and are about 2 centimeters in length. The fruit is a small, black, fleshy berry.

This species has been reported only from Benguet.

LIST OF SPECIES USED FOR VARIOUS PURPOSES

The following list gives the principal wild species which are employed in making different articles. No attempt has been made to include ordinary uses of the cultivated species. The bulletins on bamboos and palms should also be consulted, as fibers from these plants are not included in the present bulletin.

BAGS

Musa textilis
Pandanus radicans
Pandanus simplex
Scirpus grossus
Typha angustifolia

BASKETS

Agave cantala
Dendrobium crumenatum
Donax cannaeformis
Dryopteris pteroides
Epipremnum spp.
Flagellaria indica
Gleichenia linearis
Lygodium spp.
Musa textilis
Nephrolepis hirsutula
Pandanus copelandii
Pandanus luzonensis
Pandanus radicans
Pandanus simplex
Pandanus tectorius
Pericampylus glaucus
Pothos spp.
Raphidophora spp.
Rhynchospora corymbosa
Scirpus grossus
Stenochlaena palustris
Typha angustifolia

BELTS

Gleichenia linearis
Musa textilis

BOXES

Lygodium spp.

BROOMS

Andropogon zizanioides
Malvastrum coromandelinum
Oryza sativa
Phragmites karka
Phragmites vulgaris
Saccharum spontaneum
Thysanolaena maxima

CORDAGE

Abroma fastuosa
Abrus precatorius
Agelaea everettii
Allaeanthus glaber
Alphitonia excelsa
Amomum sp.
Anamirta cocculus
Artocarpus communis
Artocarpus integra
Artocarpus rubrovenia
Bauhinia cumingiana
Boehmeria nivea
Bombax ceiba
Bombycidendron vidalianum
Columbia blancoi
Columbia lanceolata
Columbia mollis
Commersonia bartramia
Corchorus capsularis
Corchorus olitorius
Cordia cumingiana
Cordia myxa
Cyperus malaccensis
Donax cannaeformis
Elaeocarpus calomala
Ficus benjamina
Ficus forstenii
Ficus pachyphylla
Ficus palawanensis
Flagellaria indica
Gnetum gnemon
Gnetum indicum
Gnetum sp.

Goniothalamus amuyon
Grewia acuminata
Grewia bilamellata
Grewia eriocarpa
Grewia multiflora
Helicteres hirsuta
Hibiscus tiliaceus
Ichnocarpus ovatifolius
Ischaemum angustifolium
Kleinhovia hospita
Lonicera philippinensis
Maesa cumingii
Malachra capitata
Malachra fasciata
Malaisia scandens
Melochia umbellata
Muntingia calabura
Parameria philippinensis
Phaeanthus ebracteolatus
Phaleria cumingii
Phaleria perrottetiana
Polyalthia flava
Pongamia pinnata
Pterocymbium tinctorium
Pterospermum diversifolium
Pterospermum niveum
Raphidophora spp.
Rourea volubilis
Sapindus saponaria
Sida acuta
Sida cordifolia
Sida mysorensis
Sida rhombifolia
Stenochlaena palustris
Sterculia crassiramea
Sterculia cuneata
Sterculia foetida
Sterculia luzonica
Sterculia oblongata
Sterculia philippinensis
Sterculia stipularis
Streptocaulon baumii
Strychnos multiflora
Thespesia lampas
Trema orientalis
Triumfetta bartramia
Typha angustifolia
Urceola imberbis
Urena lobata
Wikstroemia spp.

CRADLES

Rhaphidophora spp.

FABRICS

Agave cantala
Ananas comosus
Boehmeria nivea
Corchorus capsularis
Corchorus olitorius
Malachra capitata
Musa textilis
Musa sp. (a wild banana)
Sida rhombifolia
Urena lobata

FANS

Andropogon zizanioides

FANCY ARTICLES

Abroma fastuosa
Fimbristylis diphylla
Fimbristylis globulosa
Lygodium spp.
Musa textilis
Pandanus simplex
Saccharum spontaneum

HAMMOCKS

Rhaphidophora spp.

HATS

Andropogon halepensis
Andropogon zizanioides
Cyperus malaccensis
Donax cannaeformis
Fimbristylis globulosa
Imperata exaltata
Lygodium spp.
Musa textilis
Nephrolepis hirsutula
Oryza sativa
Pandanus radicans
Pandanus sabotan
Pandanus simplex
Pandanus tectorius
Phragmites vulgaris
Saccharum spontaneum
Scirpiodendron ghaeri
Sporobolus elongatus

MATS

Cyperus malaccensis
Cyperus radiatus
Imperata exaltata
Musa textilis
Nephrolepis hirsutula
Pandanus copelandii

Pandanus dubius
Pandanus luzonensis
Pandanus radicans
Pandanus sabotan
Pandanus simplex
Pandanus tectorius
Rhynchospora corymbosa
Scirpus grossus
Scirpus lacustris

PAPER PULP

Imperata exaltata
Saccharum spontaneum
Wikstroemia spp.

PICTURE FRAMES

Saccharum officinarum
Saccharum spontaneum

PILLOWS

Asclepias curassavica
Bombax ceiba
Ceiba pentandra
Typha angustifolia

SCREENS

Cyperus radiatus
Miscanthus sinensis
Rhynchospora corymbosa
Saccharum spontaneum

SLIPPERS

Agave cantala
Cyperus malaccensis
Fimbristylis diphylla
Fimbristylis globulosa
Ischaemum angustifolium
Oryza sativa
Pandanus simplex
Rhynchospora corymbosa
Typha angustifolia

THATCHING

Andropogon zizanioides
Imperata exaltata

TYING FISH TRAPS

Malaisia scandens
Pothoidium lobbianum
Rourea volubilis
Stenochlaena palustris

WINDOW SHADES

Miscanthus sinensis

INDEX

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MANILA, PHILIPPINE ISLANDS

Bulletin No. 1 (1903).—Report on investigations made in Java in the year 1902. By Elmer D. Merrill. *Out of print.*

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