Tree Bark-An Aid to Tree Identification

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INTRODUCTION

In the commercial forests of the Philippines are found a great variety of towering tropical hardwoods. Virgin in nature, foresters and botanists alike encounter great difficulties in the identification of a vast number of gigantic trees. Scientific methods involving the use of floral and leafy features are impractical especially when speed and relative accuracy is required under time pressure. The standing trees are too tall and large that the risk of collecting these materials for identification is great. To cut down the whole tree is very destructive if the only object is to be able to identify it. To partly solve the problem on hand, this paper recommends the use of the bark characters in tree identification.

In the timber trade the bark is loosely designated as the outer covering of the stem including all tissues outside the vascular cambium. Largely dependent on the species concerned, the formation of the different layers is attributed to the development of the cork that cuts off the exterior phloem tissue. In most tropical trees, the increase in the girth would stretch or tear the dead sheets of phloem and cork cells resulting in various bark patterns.

Anatomically, the bark consists of three distinct layers, namely the *phellem* or cork, *phellogen*, or cork cambium, and the *phelloderm*. The cork is the most external portion of the bark and is made up of dead cells that provides protection to the inner tissues against mechanical injury. The cork cambium is a layer of actively dividing cells that give rise to the cork and the inner tissues known as *phelloderm* (3). Record (6) suggested a more practical designation to the distinct layers of the bark by dividing them into the *outer* or dead portion and the *inner* or living portion. The latter is sustained in the description of the individual species.

Tamesis and Aguilar (8) used the bark as a supplement in the description of the members of the "Philippine mahogany" species. Tamolang (9) in his work described the occurrence of an included bark in Kulis, *Memecylon ovatum* Sm., although he reported it under *Syzygium sp.*, which distinguishes it from the rest of the species. Brockway (1) in his study of the *Eucalyptus*, used the bark color to segregate the seven tan bark eucalypts of South Western Australia.

So far literature shows that very little attempt has been made to make use of the bark as an aid in the identification of standing trees; hence, the object of this study.

MATERIALS AND METHODS

Thirty-two species available in the Makiling Forests are considered in this study. These are Lumbang, *Aleurites moluccana* (L.) Willd.; Vidal's lanutan, *Bombycidendron vidalianum* (Naves) Merr. & Rolfe; Duguan, *Myristica philippensis* Lam.; Malak-malak, *Palaqium philippense* (Pers.) C.B. Rob.; Talisay, *Terminalia catappa* L.; Tuai, *Bischofia javanica* Blume; Molave, *Vitex parviflora* Juss.; Narra, *Pterocarpus indicus* Willd;

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Kusibeng, *Sapindus saponaria* L. forma *microcarpa* Radlk.; Malaipil, *Intsia acuminata* Merr.; Duñgon late, *Heritiera littoralis* Ait.; Bitaog, *Calophyllum inophyllum* L.; Banaba, *Lagerstroemia speciosa* (L.) Pers.; Banuyo, *Wallaceodendron celebicum* Koord.; Rain tree, *Samanea saman* (Jacq.) Merr.; Ipil, *Intsia bijuga* (Colebr.) O. Ktze.; Taluto, *Pterocymbium tinctorium* (Blco.) Merr.; Malapapaya, *Polyscias nodosa* (Blume) Seem.; Ilang-ilang, *Cananga odorata* (Lam.) Hook.f. & Thoms.; Para rubber, *Hevea brasiliensis* (HBK) Muell.-Arg; Dita, *Alstonia scholaris* (L.) R. Br.; Dao, *Dracontomelum dao* (Blco.) Merr. & Rolfe; Malabuho, *Sterculia oblongata* R. Br.; Igio, *Dysoxylum decandrum* (Blco.) Merr.; Bagras, *Eucalyptus deglupta* Blume; Antipolo, *Artocarpus blancoi* (Elm.) Merr.; Tañgile, *Shorea polysperma* (Blco.) Merr.; Tamayuan, *Strombosia philippinensis* (Baill.) Rolfe; Paguriñgon, *Cratoxylum celebicum* Blume; Sakat, *Terminalia nitens* Presl; Rarang, *Erythrina subumbrans* (Hassk.) Merr.; and Earpod, *Enterolobium cyclocarpum* Griseb.

The barks of these species were studied in nature. Only matured trees were investigated The outer bark was first observed and the characters recorded. To study the inner bark a chop was made on the outer bark. An additional chop showed the inner extreme. Chopping was made in such a way that the cut was almost parallel to the axis of the stem. Using this method, the true characters of the inner bark were exposed.

Specimens of bark ranging from 6" x 8" to 8" x 10" were collected from each tree with the use of a sharp bolo and a wooden club. These were taken at about one and a half meters above the ground or at least above the buttress where the best representative portion of the bark is shown. Care was taken so as not to inflict too much injury to the cambium layer. This would enable the tree to callus as early as possible.

The bark has certain inherent characteristics that offer it a good basis for identification. In the description of the species, the following features are used namely, *texture, color, odor, taste, liquid, exudations,* and *thickness.* The mere use of any character or a combination of these characters may lead to correct tree identification.

Texture may be referred to as the physical appearance of the bark. It is classified as *rough,* when the bark has protuberances of no definite form as in Narra, Tamayuan, and Kusibeng; *smooth,* when the bark appears to be plain and solid without any cracks, scales, or ridges as in Taluto, Ilang-ilang, and Lumbang; *flaky,* when it appears to be scratched so as to present a curling or rolling paper-like fragments as in Tuai and Bagras; *ridged,* when it is fissured or furrowed or divided into partitions with depressions between them as in Paguriñgon, Tañgile, and Vidal's lanutan; *Spiny,* when it is possessed with pointed protuberances as in Rarang; and *scaly,* when it is broken into sections of similar forms and are almost peeling out from the trunk as in Rain tree, Talisay and Sakat. Other classification of texture may be *woody,* as in Molave; *fibrous,* as in Malabuho; *fleshy,* as in Dao; *stringy,* as in Duñgon late; and *brittle,* as in Dita.

Color is referred to as the pigment, hue, tone or shading. It may be *blackish,* as in the outer bark of Duguan and of the Ebenaceae group; *brownish,* as in Narra; *grayish,* as in Malapapaya; *greenish,* as in the inner barks of almost all the species; *whitish* as in Igio and Malapapaya; *yellowish,* as in the saps of Bitaog and Paguriñgon; or a *combination of hues,* as in the inner barks of Taluto and Malabuho.

Odor refers to the scent or the reaction of the sense of smell. It is *aromatic,* when it gives off a fragrant, sweet or pungent odor as in Anonggo, Para rubber, Yabnob, and Kaliñgag; *fishy,* when it smells like fresh fish or fresh beans as in Ipil, Igio and Kusibeng; *disagreeable,* when it gives off an of-

fensive odor as in Spanish Cedar, Rain tree. Hairy-leaved Himamao and Lago; and *odorless,* when it does not fall under the category of the first three.

Taste refers to the reaction of the tongue and palate with reference to flavor, savor, and tang. It is *bitter,* when it is sharp, disagreeable and galling as in Dita; *puckery,* when it produces a contracting effect in the mouth or the taste of immature bananas as in Talisay, Narra and Malak-malak; *pungent,* when it produces a biting effect as in Kaliñgag and Kayumanis; and *tasteless,* when it is indefinite.

Liquid exudations may be referred to as the wet or flowing substances contained in the bark or in the cambium layer such as sap, resin, or tannin. *Sap* is a liquid or sticky substance that exudes from the barks in red. white, or yellow colors. *Resin* is a solid or semisolid substance formed usually after the spontaneous evaporation of resinous juices which exude naturally from the trunk through the injured bark. *Tannin* is a yellowish-brown matter obtained from the bark which is used for tanning leather.

Thickness refers to the horizontal depth of the bark from the periphery inwards to the cambium. *Very thin,* when it is 5 mm. or less in depth; *thin,* when it is between 5 mm. and 10 mm.; *thick,* when it is between 10 mm. and 15.; and very *thick,* when it is more than 15 mm.

OBSERVATION AND RESULTS

Field observation of the thirty-two species considered in this study showed that no two species have the same bark characteristics. In many instances however, similarities occur in the outer bark especially in texture and color, yet they vary greatly in some aspects, such as odor, taste, liquid exudations, and thickness.

Typical of those found in the Makiling Forests, hereunder in alphabetical order are the species observed with their respective characteristics.

Antipolo. — Outer bark slightly ridged, corky postules slit-like, horizontal; grayish-brown; inner bark fleshy, reddish with 5 mm. wide light brown streaks in longitudinal lines; odorless; taste puckery; white sap very profuse; thick, 9-11 mm.

Bagras. — Outer bark flaky, rolls like paper, very thin, leaving large irregular scars which become bluish with age, grayish-blue; inner bark fleshy, reddish with numerous thread-like dark red streaks in longitudinal lines; odorless; taste puckery; very thin, 4-5 mm.

Banaba. — Outer bark smooth, thin flakes decaying with age, light brown with occasional whitish or moss-green spots; inner bark fleshy, light red turning pale brown upon exposure; odorless; taste puckery; very thin, 3-4 mm.

Banuyo. — Outer bark smooth with occasional cracks in some parts, basal portion flakes in large squares, brownish-gray; inner bark fleshy ultimately stringy, light red with yellowish-brown streaks; odorless; taste puckery; thick, 12 mm.

Bitaog. — Outer bark ridged out with flat surface, flaking in large squares in the basal portion, partly woody, yellowish-brown; inner bark fleshy, reddish; odorless; tasteless; yellow sap flows very slowly, sticky; thin at the depressed portion, thick to very thick at the elevated portion, 6-16 mm.

Dao. — Outer bark smooth with characteristic blotches of brown and white, grayish to light brown; inner bark brittle to fleshy near the cambium, light red throughout; odorless; taste puckery; thin, 7-10 mm.

Dita. — Outer bark roughened by the presence of numerous corky postules in short horizontal bands, light brown to grayish; inner bark very brittle with yellowish-brown areas; odorless; taste very bitter; white sap flows very profusely immediately after cutting, very sticky when exposed; thin, 8-10 mm.

Duguan. — Outer bark rough, dark brown to almost black with scattered whitish patches; inner bark fleshy, reddish turning pale brown upon exposure; odorless; taste puckery; red sap very profuse; thin, 6 mm.

Duñgon late. — Outer bark scaly, pale brown with isolated brown areas; inner bark fleshy, ultimately stringy, light reddish or reddish-brown with numerous pore-like structures; odorless; tasteless; thin, 5-8 mm.

Earpod. — Outer bark ridged with leaf scars in horizontal bands, light brown with occasional whitish spots; inner bark brittle, ultimately stringy, light brown with whitish veins; odorless; taste puckery; thin, 6-8 mm.

Igio. — Outer bark smooth to ridged near the base, grayish; inner bark fleshy, whitish, light brown with yellowish streaks immediately after the outer bark; odor fishy, tasteless; thin, 7-10 mm.

Ilang-ilang. — Outer bark smooth turning rough with age, dark brownish green; inner bark fibrous, light brown; odorless; tasteless; thick, 10-15 mm.

Ipil. — Outer bark smooth with numerous small, solitary corky postules which are easily rubbed off, grayish-green with occasional whitish patches; inner bark brittle becoming stringy near the cambium, yellowish-brown with numerous vein-like structures; odor fishy; tasteless; very thin, 4-5 mm.

Kusibeng. — Outer bark rough, grayish-brown with moss-green or whitish patches; inner bark brittle, yellowish-brown with horizontal narrow bands which are darker than the background; odor fishy; tasteless; very thin, 5 mm.

Lumbang. — Outer bark smooth with corky postules in vertical lines appearing as ridges, light brown to grayish with occasional whitish patches; inner bark brittle to ultimately stringy near the cambium, reddish-brown with dark brown dots, greenish-white streaks appear immediately after the outer bark; odorless; tasteless; very thin, 5 mm.

Malabuho. — Outer bark smooth becoming rough with age, light brown or grayish; inner bark fibrous, light brown with reddish streaks and numerous light brown dots; odorless; tasteless; thick, 10-12 mm.

Malaipil. — Outer bark with minute, solitary corky postules scattered, hard, becoming rough with age, light brown or grayish-green; inner bark brittle to stringy near the cambium, light brown, yellowish-green immediately after the outer bark; odor fishy; taste puckery; very thin, 4-5 mm.

Malak-malak. — Outer bark smooth with numerous solitary corky postules scattered over the surface, brownish with whitish patches; inner bark brittle, reddish with yellowish immediately after the outer bark; odorless; taste puckery; white sap flows very slowly after cutting; thin, 6 mm.

Malapapaya. — Outer bark slightly ridged, grayish to light brown; inner bark fleshy, whitish with brownish streaks; odorless; tasteless; very thin, 3-5 mm.

Molave. — Outer bark smooth, thin flakes decaying with age, light brown to grayish, turning mossy-green with age; inner bark woody, light brown throughout; odorless; tasteless; very thin, 2-5 mm.

Narra. — Outer bark rough and decaying with age, brownish to grayish-brown; inner bark fleshy to brittle and stringy near the cambium, reddish with dark red or blackish streaks; odorless; taste puckery; red sap flows slowly; thin, 5-7 mm.

Paguriñgon. — Outer bark ridged, depressions about 10 mm. apart, brownish with occasional whitish spots on the exposed portions; inner bark very brittle and hard to debark, yellowish-brown; odorless; tasteless; sap, yellowish-brown, flows very slowly appearing as reddish dots; very thin, 4-5 mm.

Para rubber. — Outer bark smooth, brownish with grayish patches; inner bark brittle, light brown with numerous dark brown dots;

odor aromatic; tasteless; white sap very profuse and dries almost instantly upon exposure; thin, 7-10 mm.

Rain tree. — Outer bark ridged when young becoming scaly with age, old bark dark brown or blackish, young bark light brown; inner bark at first reddish becoming yellowish near the cambium; odor somewhat disagreeable; taste sweetish flavor; watery substance evident in the cambium; thick, 10-15 mm.

Rarang. — Outer bark spiny with corky postules in longitudinal lines, grayish or pale brown with numerous whitish blotches; inner bark brittle, ultimately stringy, yellowish-brown with greenish-brown streaks; odor disagreeable; tasteless; thick, 10-12 mm.

Sakat. — Outer bark scaly but slightly ridged when young, dark brown to almost blackish, partly woody; inner bark stringy, coffee brown, light brown near the cambium turning pale brown upon exposure; odorless; taste puckery; tannin color evident; thin; 5-8 mm.

Talisay. — Outer bark scaly, dark brown to almost blackish; inner bark fleshy to stringy near the cambium, reddish with numerous whitish dots; odorless; taste puckery; very thin, 5 mm.

Taluto. — Outer bark smooth with enlarged leaf scars in horizontal bands, aliform shaped, grayish; inner bark fleshy to fibrous, greenish immediately after the outer bark, reddish with whitish streaks near the cambium; odorless; taste puckery; thin, 8-10 mm.

Tamayuan. — Outer bark rough, reddish-brown with occasional whitish spots on the exposed portions; inner bark brittle, yellowish-brown; odorless; taste puckery; thin, 5-7 mm.

Tañgile. — Outer bark slightly ridged becoming smooth with age or after shedding of irregular flakes, light reddish-brown; inner bark brittle to ultimately stringy, reddish with lighter colored streaks about 10 mm. apart; odorless; taste puckery; resin not evident; thin 6-10 mm.

Tuai. — Outer bark flaky, dark brown; inner bark very brittle, composed of several thin layers, dark red; odorless; taste very puckery; red sap evident but flows very slowly; thick, 10-12 mm.

Vidal's lanutan. — Outer bark slightly ridged becoming decayed with age, light brown; inner bark fibrous or stringy, yellowish-brown turning pale brown upon exposure; odorless; tasteless; thin, 7-10 mm.

As an aid to tree identification, the following dichotomous key shows that it is possible to segregate the different species with the use of the bark characters.

1.	Outer bark smooth	2
1.	Outer bark rough	15
2.	Old bark with corky postules	3
2.	Old bark without corky postules	6
3.	Corky postules, ridge-like	Lumbang
3.	Corky postules, solitary, scattered	4
4.	Milky sap present	Malak-malak
4.	Milky sap absent	5
5.	Inner bark yellowish-brown with vein-like structures	Ipil
5.	Inner bark light brown without vein-like structures	Malaipil
6.	Bark flaking	7
6.	Bark not flaking	9
7.	Flakes, paper-like	Bagras
7.	Flakes, decayed	8
8.	Inner bark fleshy	Banaba

	8. Inner bark woody	Molave
9.	Inner bark fibrous	10
9.	Inner bark not fibrous	12
	10. Streaks present	11
	10. Streaks absent	Ilang-ilang
11.	Light brown with reddish streaks	Malabuho
11.	Whitish with reddish streaks	Taluto
	12. Inner bark fleshy	13
	12. Inner bark brittle	14
13.	Color, light red	Banuyo
13.	Color, whitish	Igio
	14. Milky sap present	Para rubber
	14. Milky sap absent	Dao
15.	Bark ridged or furrowed	16
15.	Bark not ridged or furrowed	23
	16. Surface of ridges, flat, smooth	17
	16. Surfaces of ridges, sharp or nearly so	19
17.	White or yellow sap present	18
17.	White or yellow sap absent	Malapapaya
	18. White sap	Antipolo
	18. Yellow sap	Bitaog
19.	Inner bark fibrous or stringy	Vidal's lanutan
19.	Inner bark not as above	20
	20. Sap, present, yellow	Paguriñgon
	20. Sap, absent	21
21.	Bark scaly when matured	Rain tree
21.	Bark not as above	22
	22. Leaf scars in horizontal lines	Earpod
	22. Leaf scars absent, smooth with age	Tañgile
23.	Sap, present	24
23.	Sap, absent	27
	24. Color, white	Dita
	24. Color, red	25
25.	Bark flaking, composed of several layers	Tuai
25.	Bark not flaking	26
	26. Inner bark with reddish or blackish streaks	Narra
	26. Inner bark reddish turning pale brown upon exposure	Duguan
27.	Bark scaly	28
27.	Bark not as above	30
	28. Inner bark, coffee brown	Sakat
	28. Inner bark, reddish	29
29.	With pore-like structures	Duñgon late
29.	With numerous whitish dots	Talisay
	30. Bark, spiny	Rarang
	30. Bark, not as above	31
31.	Inner bark with horizontal narrow bands	Kusibeng
31.	Inner bark not as above	Tamayuan

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