INFORMATION LEAFLET
FOREIGN WOODS

Forest Products Laboratory,[1] Forest Service
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LIMBA

(Afara, Frakè, Korina[2])
Terminalia superba Engl. et Diels
Family: Combretaceae

By

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Terminalia superba Engl. et Diels is a West African species which is known by various common names. The specific name superba suggests the handsome appearance of the tree which is widely distributed from French Guinea to the Cameroons, the Belgian Congo and Angola (15, 19).[3] It prefers the humid forests without a dry season. The name Terminalia refers to the leaves, which occur in tufts at the ends of the branches (19).

Some of the common or trade names are (15):

White afara	(United Kingdom and Nigeria)
Limba clair or light limba	(Belgium, Belgian Congo and Angola)
Limba noir or dark limba[4]	
Limbo	(France and French West Africa)
Chêne limbo	
Frakè	
Noyer du Mayombe	
Ofram = Gold Coast	
Korina[2]	

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[1] Maintained at Madison, Wis., in cooperation with the University of Wisconsin.

[2] Trademarked name. (See Veneers and Plywood 43(3):26-27, Mar. 1949.

[3] Underlined numbers in parentheses refer to the list of numbered references at the end of this leaflet.

[4] Black or dark afara is a name generally applied to Idigbo (Terminalia ivorensis) because of its dark bark, its wood being pale yellow (15).

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THE TREE

Limba grows rapidly but is not very long lived (19). It may attain a height of 150 feet or more and usually has an extremely straight clear, cylindrical stem, with a buttressed base which often extends 8 feet or more above the ground. Diameters, above the buttresses, may range from 3 to 5 feet. The tree may occur in nearly pure stands.

Branches are produced in whorls; the tops of the trees may be flattish. The bark is ashy gray, scaly and fissured in older trees. Plantations made in West Africa appear to be succeeding and yields from managed forests are promising (6, 15, 19). At 20 years trees may have clean, straight boles 50 to 60 feet in height with a girth of about 5 feet. The trees coppice from stumps, are adaptable and reproduce naturally (20). They prefer good light for best growth (heliophile) and tend to be shallow rooted (5, 19).

The numerous small yellowish or whitish green flowers are in simple, axillary racemes. The fruits are abundant and in the form of samaras, each about 3/4-inch long, with a lateral spread of wing of 1-1/2 to 2 inches (20).

THE WOOD

Color

Usually both heartwood and sapwood are light gray-white to pale creamy-brown in color, similar to light oak. Sometimes, however, the heartwood contains irregular grayish markings, with streaks that may be almost black; this wood may bring an extra price. The cause of these markings is not fully understood (19, 22). For some purposes, the varied dark wood has been specially valued, and for others the light color is its chief asset (4).

The name limba clair (or limba blanc) is given to logs in which about two-thirds or more of the diameter is light in color, with heart color less than 10 centimeters in diameter (19). Limba noir (limba-bariole, or walnut of Mayombe) is the name applied to timbers in which the dark heartwood is large enough to show on the sides of the squared logs (15, 19). The name limbo demi-noir is given to irregularly veined material, with color on two-thirds of the diameter of the log (19).

Weight

Limba is reported to weigh about 35 pounds per cubic foot at 15 percent moisture content (15). Reports list specific gravity (oven dry weight and green volume) as 0.40 to 0.51 (6, 8), optimum 0.50-0.60 (18), green, 0.75 (12).

Grain, Texture and Figure

Limba is rated as generally straight-grained, although wavy grain may occur, producing a desired figure (15). The texture varies from close to rather coarse but even (6).

Mechanical Properties

In large logs the heartwood may be brittle, and as a rule the dark colored wood tends to be more brittle than the light.

Complete strength tests have not been carried out[5] but the timber rates as not very strong, not as strong as oak (7, 15, 19). One plank from Nigeria was tested in England (1) with the results given in the accompanying table.

A very small number of tests on a few boards were made at the U. S. Forest Products Laboratory in 1948. Wood with specific gravities of 0.515 to 0.645 gave values corresponding roughly with those for black cherry, black tupelo, red maple, and American elm.

Seasoning

Kiln drying is reported to be easily accomplished with little tendency for the development of defects. A schedule about like that for ash can be used[6]. The wood shows stability when manufactured. Care is required if the wood is air seasoned to prevent decay and discoloration (15). Shrinkage is reported to be rather small (19) but greater in the dark colored portions.

Durability

Limba is not resistant to decay, insects, or termites (19) and the heartwood of large trees is frequently found to be unsound, or even hollow, when felled (14). The sapwood stains readily in a manner similar to the bluing of softwoods. Logs are attacked by pinhole borers in both sapwood and heartwood. Powder-post beetles may attack sapwood (15). Preservative treatments are reported to prevent damage by fungi and insects (6).

Working Characteristics

The timber has been found to work easily with hand and machine tools; it turns well. If the grain is uneven it may "pick up" in planing, but this is said to be overcome by using a low cutting angle (15). Limba veneers without trouble. The wood finishes well when a filler is used. It glues readily and does not "bleed" (5) but care is required in nailing and screwing, for the wood has a tendency to split (15).

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[5] Tests by the Forest Products Research Laboratories in England were made on a related species, Terminalia ivorensis (Idigbo), and are published in the periodical "Wood" (British) for July 1938 for purposes of comparison with other Gold Coast woods.

[6] A suggested schedule would be similar to No. 3 given in Technical Note 175, U. S. Forest Products Laboratory, Madison, Wis.

Summary of Results of the Mechanical Tests on Afara Wood (*Terminalia superba*) from Nigeria (1)

		Maximum	Minimum	Mean
A.--Transverse bending test (central loading):				
Maximum calculated longitudinal shear	Lb./sq. in.	367.5	187.5	286.5
Modulus of rupture	Lb./sq. in.	10,230	5,225	7,968
Fibre stress at elastic limit	Lb./sq. in.	7,850	4,138	6,229
Modulus of elasticity	Lb./sq. in.	1,345,000	1,192,000	1,272,000
Elastic resilience	Inch-lb./cu. in.	22.34	0.679	1.70
B.--Compression test along the grain (24 in. length specimen):				
Crushing strength	Lb./sq. in.	6,000	5,260	5,620
Fibre strength at elastic limit	Lb./sq. in.	5,475	4,125	4,610
Modulus of elasticity	Lb./sq. in.	1,233,000	1,213,000	1,223,000
Elastic resilience	Inch-lb./cu. in.	10·28	5·94	7·46
C.--Compression test along the grain (8 in. length specimen):				
Crushing strength	Lb./sq. in.	5,888	5,475	5,738
Fibre strength at elastic limit	Lb./sq. in.	4,625	4,500	4,567
Modulus of elasticity	Lb./sq. in.	1,285,000	1,100,000	1,198,000
Elastic resilience	Inch-lb./cu. in.	7·45	6·49	6·87
D.--Compression test across the grain:				
Load at elastic limit	Lb.	4,700	4,200	4,400
Fibre stress at elastic limit	Lb./sq. in.	1,175	1,050	1,098
E.--Shearing tests along the grain:				
Radial--				
Maximum load supported	Lb.	4,710	4,540	4,640
Shearing strength	Lb./sq. in.	1,178	1,135	1,160
Tangential--				
Maximum load supported	Lb.	6,140	6,050	6,100
Shearing strength	Lb./sq. in.	1,535	1,513	1,525
Specific gravity		0·515	0·454	0·486
Weight per cubic foot	Lb.	32·2	28·4	30.4
Moisture	Percent	11·37	9·85	10·29

Uses

The use of limba is increasing. It is used as solid wood and also as veneer and plywood, and is especially popular for blond furniture, school and shop fittings, radio and television cabinets, parquetry, and joinery. It has been used in construction but is too useful in other fields at present to be so used (4, 15). Limba is said to have been used in South Africa and in Germany for propellers and patterns, and has been given preliminary tests for pulp making (16) where rather high chemical consumption and dark stock were noted. However, this use is considered possible in the future, for it has been found to yield sufficiently strong kraft pulp (19).

Supplies

Supplies are normally abundant. The wood is imported in logs up to 30 inches in diameter or planks up to 30 inches wide and lengths up to 20 feet (4, 15). Ports of export include Boma, Kouilou, Matadi, and Landana.

Minute Structure

Growth rings are usually distinct and often conspicuous on the end surface; they are usually undulating. The boundaries are marked by a band of darker tissue at the end of the growth zone. Sometimes a narrow, discontinuous band of soft tissue is present, visible under a magnifying glass.

The pores are rather large, individually distinct to the naked eye. They are very few to few in number and rather evenly distributed, usually much smaller at the end of the growth ring. They tend to show as oblique lines; although mostly solitary, occasionally they appear in radial groups of 2, 3, or even 4. On longitudinal surfaces the pores or vessels are conspicuous as deep scratches, occasionally sparkling.

Tyloses.---Bright, iridescent tyloses are sometimes abundant.

Parenchyma is moderately abundant, not very distinct to the naked eye. It is discontinuous but borders the pores and extends laterally, often linking them in wavy lines. Crystals are often present in the vertical parenchyma (19).

Rays are very fine, not visible to the naked eye and inconspicuous even on radial surfaces. They are usually uniseriate (19).

Fiber length is reported as 1.20 millimeters (average), and diameter 27.5 microns (16).

Ash

Although rich in ash, the proportion of silica is small (19).

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