

FOREIGN WOOD SERIES



**AVODIRE**

**Turraeanthus africanus**

**(Welw. ex C. DC.) Pellegr.**

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In Cooperation with the University of Wisconsin

AVODIRE  
Turraeanthus africanus (Welw. ex C. DC.) Pellegr.  
Meliaceae

By

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Introduction

Avodire is a tropical West African species belonging to the mahogany family. The wood, however, is not generally associated with this group because of its light yellow color; but rather, in this respect, resembles primavera, limba, or one of the satinwoods. It has been utilized quite extensively in France and other parts of Europe for a considerable time, but as yet has not found the measure of acceptance on the American market that its fine qualities warrant. Avodire is an attractive blond-colored wood that is fairly easily machined, can be finished quite well, has good dimensional stability, and is readily available. It is well suited for paneling and cabinet work and should fit easily into the current popular trend toward the use of foreign woods in the modern home.

Nomenclature

The trade name avodire applies only to the botanical species, Turraeanthus africanus (Welw. ex C. DC.) Pellegr. Avodire has been the most commonly accepted name for this wood since it appeared on the American market in the early part of the 20th century. The tree itself is known by a variety of local names, some of which have been occasionally applied to the wood as well. Nevertheless, avodire is preferred, because it is a well established name and is widely used in both American and European markets. Furthermore, its use avoids confusion, since it does not conflict with any other wood name on the world market today.

Distribution and Habitat

Avodire is essentially a West African species. It grows in an area ranging roughly from Sierra Leone in the north to Angola in the south (7), with the Ivory Coast being the principal source of export logs. The trees occur in a rather narrow semicoastal belt 50 to 100 miles inland, among the foothills, just above the dense tropical jungle but below the drier highland forest type. They are usually found growing in localized groups that often form almost pure stands in the rich, moist soil on the borders of streams and the margins of meadows, swamps, and lakes.

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<sup>1</sup>Maintained at Madison, Wis., in cooperation with the University of Wisconsin.

## The Tree

Avodire is a medium sized tree, attaining heights of 90 to 115 feet with diameters of 2 or 3 feet and occasionally up to 5. Normally the trees are of a rather poor growth form for lumbering purposes. The trunks are usually irregular or crooked with fluted bases, but without large buttresses (3). The rather low-branching growth habit of this tree results in a length of only between 25 to 50 feet for the exportable portion of most logs.

## The Wood

The freshly sawn lumber is a pale cream-white color that later often darkens to a golden yellow shade. The color is uniform throughout with no distinction between the sapwood and heartwood. Growth rings are not evident, and the texture (size of pores) is uniform and quite similar to primavera (Cybistax donnell-smithii). The grain may be straight, but it is more often wavy, interlocked, or with other irregularities that produce a variety of highly attractive figures. Such figured material favorably compares with Ceylon satinwood (Chloroxylon swietenia), though avodire is not so finely textured. The figure patterns mostly take the form of finger-roll, broken stripe, mottled, and curled. These figures are greatly enhanced by the high degree of natural, satiny luster exhibited by this wood. Avodire is without odor or taste.

## Specific Gravity

The specific gravity of avodire based on the green volume - oven-dry weight, converted from the value given by the British (1), is .53 and the average of the values reported by the French (8) is .51. Although the weight of this wood is often compared to mahogany (Swietenia macrophylla), these figures indicate that it is somewhat heavier and is more similar in this property to black cherry (Prunus serotina).

## Shrinkage Characteristics

The values reported by the Belgian (5) and French (8) laboratories, converted to a green dimension basis, are as follows: Belgian 4.0 percent radial, 7.9 percent tangential; French, 3.4 percent radial, 5.9 percent tangential. These are within reasonable agreement with the values given by Harrar (6) as 4.0 percent radial and 6.2 percent tangential. The amount of shrinkage from green to 12 percent moisture content is 2.0 percent radially and 3.5 percent tangentially, according to the British laboratory (2). A more useful picture of the stability of this wood when in actual use, however, is gained from the British laboratories' percentage of movement figures between 90 and 60 percent relative humidity: radial movement 1.0 percent and tangential movement 1.8 percent. For purposes of comparison under the same moisture conditions, Central American mahogany (Swietenia macrophylla) moves 1.0 percent radially and 1.3 percent tangentially.

## Seasoning

The lumber of avodire can be seasoned fairly rapidly, but has a tendency to undergo a certain amount of degrade from warping (2). Shakes are rather common and are apt to be extended while drying and also some splitting may occur in and around knots. The British report that their kiln schedule E, given in table 1, has proved satisfactory. This schedule is roughly comparable to T6-D2 of the U.S. Forest Products Laboratory report D1791 (9).

### Working and Machining Characteristics

According to the British Forest Products Research Laboratory (2), this wood is worked fairly easily by hand and machine tools with a relatively small dulling effect on the cutting edges. Planing tends to produce chip grain on the surface of figured material, but by reducing the cutting angle of the knives to 20° or less and keeping them sharp, a smooth surface is readily attained. Avodire can be satisfactorily glued but tends to split when nailed, and preboring is therefore advisable. Aside from taking stain somewhat unevenly on the quarter sawed surfaces, it will usually finish without difficulty.

### Bending Properties

The bending properties of avodire are very poor for all thicknesses, whether steamed or not. The results obtained from bending tests at the British laboratory (2) were reported to vary considerably from piece to piece but, in general, solid specimens 1 inch thick that were steamed for at least 45 minutes could not be bent to a radius greater than 30 inches without breakages exceeding 5 percent. Thin laminae subjected to cold bending also broke at a relatively small radius.

### Veneer Characteristics

Avodire is utilized chiefly as decorative veneer. The wood is easily cut into veneer which then dries flat, glues well, and produces a tight, smooth surface.

### Natural Durability

Avodire is classified as a nondurable wood (2). Special attention must be given the trees soon after felling or the wood will be stained by fungi. For this reason the bark is usually removed promptly to hasten drying of the logs.

The heartwood is extremely resistant to treatment with preservatives (2).

### Mechanical Properties

The mechanical properties of avodire are given in table 2. The values are similar to those of black cherry (Prunus serotina), except for shearing strength and hardness, in which avodire is approximately 15 percent higher.

### Identification

Avodire is characterized by its cream or yellow color with a high natural luster and a homogeneous texture. On the cross section, a smooth cut surface has a rather pinkish hue, the pores are just barely visible as tiny holes, and the rays appear only as very thin, light yellow lines. The use of a hand lens on this surface reveals avodire is distinctive by its nearly total lack of evident parenchyma and the frequent arrangement of the pores into radial groups of two or three.

Of the woods commonly sold on the American market, limba (Terminalia superba) and primavera (Cybistax donnell-smithii) most nearly resemble avodire. Limba, however, has larger pores (that is, coarser textured) and both woods show growth rings that are evident as darker colored bands on both the cross and side surfaces. In addition, light colored lines of parenchyma are seen on the wetted, smoothly cut cross sections of limba and primavera.

### Uses

Avodire can be utilized wherever an attractive, light-colored, dimensionally stable wood is required. It is known primarily as a veneer wood, and the figured material especially is used in the home and office for paneling and cabinet work. The lumber is used to some extent for furniture and is reported to be a superior joinery stock (2).

### Availability

Though avodire grows throughout a considerable portion of West Africa, the world supply of this timber apparently comes only from the Ivory Coast. The annual export figures given by Bois et Forets des Tropiques (4) show that an average of only 740,000 board feet entered world commerce during the last five years. The figures for the first quarter of 1960, however, indicate that this amount may be increasing and the wood, especially the veneer, is readily available.

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Table 1.--British kiln schedule E (2).  
For 4/4, 5/4, and 6/4 stock.

Moisture content: Dry-bulb : Wet-bulb				
: temperature: temperature				
<u>Percent</u>	:	<u>°F.</u>	:	<u>°F.</u>
Green	:	120	:	115
60	:	120	:	113
40	:	125	:	116
30	:	130	:	117
25	:	140	:	120
20	:	155	:	127
15	:	170	:	136

Table 2.--Mechanical properties of avodire (*Turraeanthus africanus*) at a moisture content of 12 per- cent.<sup>1</sup>

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Weight per cubic foot.....	lb.:	36
Static bending :		
Modulus of rupture.....	p.s.i.:	12,700
Modulus of elasticity.....	1,000 lb. p.s.i.:	1,480
Work to maximum load.....	in.-lb./cu. in.:	9.4
Work to total fracture.....	in.-lb./cu. in.:	13.1
Impact :		
Height of drop causing complete failure (50 lb. hammer).....	in.:	24
Compression parallel to grain :		
Maximum crushing strength.....	p.s.i.:	7,180
Shear parallel to grain :		
Maximum shearing strength.....	p.s.i.:	2,040
Hardness :		
End.....	lb.:	1,440
Side.....	lb.:	1,080

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<sup>1</sup>Data originally published in The Strength Properties of Timber. Bulletin No. 28, Dept. of Sci. and Indus. Research, British Forest Products Research Laboratory. 1953.