INFORMATION LEAFLET
FOREIGN WOODS

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ESPAVÉ, ESPAVEL CARACOLI, QUINA

Anacardium excelsum (Bert. & Balb) Skeels
(= Rhinocarpus excelsa Bert. & Balb. = Anacardium Rhinocarpus D.C.
Family: Anacardiaceae

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The genus Anacardium includes several species with small to large trees and grows throughout tropical America. One of the best-known species is Anacardium occidentale L. which yields cashew nuts, gum arabic, and other products of more importance than its wood (1, 11, 12, 13).[2] The woods of the genus are known by a wide variety of local names (11). Anacardium excelsum is one of the species that produces large trees.

Distribution and Habitat

Espavé or espavel[3] is found from Panama and Costa Rica to Ecuador and Venezuela. It is reported to occur in regions having distinct dry seasons and not to occur at the higher elevations (at least in Panama). Four to 5 trees per acre with a maximum of 10 or 12, as well as some almost pure stands, are reported (2).

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

[2] Underlined numbers in parentheses refer to the list of numbered references at the end of the article.

[3] Other vernacular names include maranón, mijao, wild cashew.

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The Tree

Trees 75 to 150 feet tall are known. The trunks are unbuttressed but are swollen for 3 to 8 feet above the ground. They may be 4 to 6 feet in diameter above the basal swelling and free of limbs for 32 to 60 or more feet. Some branches are large enough for small sawlogs. When grown in the open, however, the trunk is short (7, 11).

The gray bark varies from fairly smooth in the upper parts of the tree to scaly or covered with coarse plates near the base (11). It is sometimes used for medicinal purposes.

The Wood

Color

Sapwood may be 6 to 10 inches thick and has a dingy gray color with a more or less pronounced pinkish tinge and streaks of yellow or purple. It is distinct from the heartwood, which is light yellowish brown to light reddish brown, often with a greenish cast and with purplish red streaks. The heartwood may show variable wide bands within parts of the same log. When exposed to light and air, it takes on a rich golden-brown color, or may be striped with reddish brown. The rays are distinct, because of dark color, on quarter-sawn material (7, 11).

Grain, Texture, and Figure

The grain is interlocked in layers generally 1 to 2-1/2 inches thick, and the texture is medium. A medium to coarse ribbon stripe figure is produced on the radial surface, but the tangential surface figure is limited to that produced by the growth-ring pattern and the conspicuous vessel lines (7).

Luster

The luster is rated as fairly high in both sapwood and heartwood (7).

Odor and Taste

The wood is odorless and tasteless when dry, but freshly felled logs have a resinous or pungent scent probably imparted by the bark (2, 7).

Weight

Espavé is of moderately light weight, comparable to yellow-poplar. Specific gravities are recorded of 0.37 to 0.47 (average 0.41) based on oven-dry weight and green volume. The weight is reported as 54 pounds per cubic foot in the green condition and 30 to 35 pounds when air dry (2, 7, 11, 12).

Mechanical Properties

The strength values of espavé (table 1) are presented in comparison with Central American mahogany and yellow-poplar. Although the three woods have similar specific gravities, it will be noted that the mechanical properties of espavé are somewhat below the average for both mahogany and yellow-poplar (7).

Results of other limited tests made on material at varying moisture contents confirm this trend (2, 3, 7).

Seasoning and Shrinkage

Espavé was found to be moderately difficult to air season (15). It is thought that the moderate amount of warping and checking noted could be minimized by slower drying (7, 15).

Shrinkage data are given in table 2 (7).

Durability

Espavé is not durable in contact with the ground (11). The heartwood of espavé is rated moderately durable to durable with respect to deterioration by a white rot, nondurable to durable with respect to a brown rot. Variation in durability might be accounted for by absence of well-defined heartwood in some of the Venezuelan material. The wood is susceptible to damage by termites (7).

Working Characteristics

The wood is fairly easy to work, but radial surfaces tend to be fuzzy or to show chipped grain when planed, because of cross banding. The wood sometimes contains pin knots which may lose their pith during working, but espavé can be finished successfully, stains readily, nails without splitting, and holds shape well if kept dry. Moisture absorption is rated as high (7).

Specific tests of the machining properties of espavé rated the wood as relatively poor in planing and sanding properties, good in shaping and mortising, and fair in turning and boring (4).

Uses

Locally, the wood is used for kitchen utensils and dishes that are light and wear resistant; it is also used in general carpentry and construction and for inexpensive furniture. Large trunks are used for dugout canoes (7, 11, 12). This wood is thought to have a possible future as a veneer wood because of its size and figure, and it is attractive enough for interior trim and millwork where strength is not an important consideration (7, 13).

Importation

Efforts to introduce espavé into the United States market have not been very successful. The wood is not considered sufficiently high grade to find ready acceptance (1943), but it is potentially a useful timber and available in good supply (11).

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Table 1.--Mechanical properties of espavé compared with similar woods

Tests on espavé made by Yale School of Forestry in cooperation with the Office of Naval Research and the Bureau of Ships, U. S. Navy Department (15).

Species	Espavé (Anacardium excelsum)	Mahogany[1] (Swietenia macrophylla)	Yellow-poplar[2] (Liriodendron tulipifera)
Source and number of logs.	Panama, 3 Venezuela, 3	Central America	United States, 11
Moisture content (av.)			
Green	109.0	79.6	64
Air dry[3]	11.0	11.4	12
Specific gravity			
Oven-dry volume	0.44	0.51	0.43
Green volume	0.41	0.45	0.38
Static bending			
Fiber stress at proportional limit.....lb. per sq. in.			
Green	3,250	5,500	3,400
Air dry[3]	5,640	7,960	6,100
Modulus of rupture.....lb. per sq. in.			
Green	5,320	8,960	5,400
Air dry[3]	7,960	11,460	9,200
Modulus of elasticity....1,000 lb. per sq. in.			
Green	1,060	1,340	1,090
Air dry[3]	1,280	1,500	1,500
Work to proportional limit....in.-lb. per cu. in.			
Green	0.62	1.13	0.62
Air dry[3]	1.44	2.08	1.43
Work to maximum load.....in.-lb. per cu. in.			
Green	4.1	9.1	5.4
Air dry[3]	5.6	7.5	6.8

Table 1.--Mechanical properties of espavé compared with similar woods (continued)

Species	Espavé (Anacardium excelsum)	Mahogany[1] (Swietenia macrophylla)	Yellow-poplar[2] (Liriodendron tulipifera)
Compression parallel to grain			
Fiber stress at proportional limit, lb. per sq. in.			
Green	1,710	3,080	1,930
Air dry[3]	3,580	5,080	3,550
Maximum crushing strength, lb. per sq. in.			
Green	2,460	4,340	2,420
Air dry[3]	4,530	6,780	5,290
Modulus of elasticity, 1,000 lb. per sq. in.			
Green	1,200	1,520	.....
Air dry[3]	1,370	1,500*	.....
Hardness[4]			
Green - end, lb.	410	820	390
Green - side, lb.	400	740	340
Air dry[3] - end, lb.	600	970	560
Air dry[3] - side, lb.	470	800	450
Compression perpendicular to grain			
Stress at proportional limit, lb. per sq. in.			
Green	360	680	330
Air dry[3]	510	1,090	580
Tension perpendicular to grain, lb. per sq. in.			
Green	370	740	450
Air dry[3]	320*	740	520
Shear, lb. per sq. in.			
Green	740	1,240	740
Air dry[3]	900	1,230	1,100

Table 1.--Mechanical properties of espavé compared with similar woods (continued)

Species	Espavé (Anacardium excelsum)	Mahogany[1] (Swietenia macrophylla)	Yellow-poplar[2] (Liriodendron tulipifera)
Cleavage:			
.....lb. per in. of width:			
Green	190	330	220
Air dry[3]	160*	340	280
Toughness[5]			
.....in.-lb. per specimen:	57.3	88.2	.....

[1] Heck (6); Kynoch and Norton (9); unpublished Yale results for plank material received from the New York Naval shipyard (15).

[2] Forest Products Laboratory, Madison, Wis. (10).

[3] Air-dry values adjusted to 12 percent moisture content except where designated (*), in which case the actual moisture content at time of testing (see Moisture Content in table) applies.

[4] Load required to embed a 0.444-inch steel ball to one-half its diameter.

[5] Toughness values are the average of tests of green and air-dry specimens 5/8 by 5/8 by 10 inches loaded on the tangential face over an 8-inch span.

Table 2.--Relative shrinkage[1] characteristics of espavé

Tests on espavé made by the Yale School of Forestry in cooperation with the Office of Naval Research and the Bureau of Ships, U. S. Navy Department (7).

Species	Source	No. of logs[2]	Specific gravity, green volume basis	Shrinkage			
				Radial	Tangential	Longitudinal	Volumetric
				Percent	Percent	Percent	Percent
Espavé (Anacardium excelsum)	Panama (7)	3	0.43	2.8	5.3	0.38	8.9
	Venezuela (7)	3	.39	2.8	5.2	.35	7.9
	Colombia (3)	[3]	.43	4.3	4.4	.....	8.7
Mahogany (Swietenia macrophylla)							
Forest-grown	Central America[4]	(5)	.45	3.5	4.8	.....	7.7
Plantation-grown	Honduras[6]	3	.42	2.4	4.2	.42	6.6
Spanish cedar[4] (Cedrela sp.)	Nicaragua	(5)	.34	4.1	4.9	.....	8.9
Yellow-poplar[7] (Liriodendron tulipifera)	United States	[7]11	.38	4.0	7.1	.....	12.3

[1] Shrinkage values represent shrinkage from green to oven-dry conditions expressed as a percentage of the green dimension (except -- see footnote 3).

[2] Represents only logs used in shrinkage determinations.

[3] Material somewhat deteriorated; data on soaked to oven-dry condition (3, page 35).

[4] Heck (6).

[5] The test material was obtained on other than log form, and the exact number of trees is unknown.

[6] Trop. Woods 95:103 (5).

[7] Markwardt and Wilson (10) and Wood Handbook.