

FOREIGN WOOD SERIES

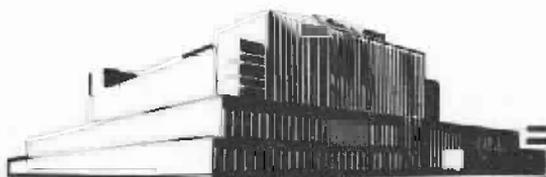


SPANISH CEDAR

(Report)

No. 1948

Revised March 1957



FOREST PRODUCTS LABORATORY
MADISON 5, WISCONSIN

UNITED STATES DEPARTMENT OF AGRICULTURE
FOREST SERVICE

In Cooperation with the University of Wisconsin

SPANISH CEDAR
Cedrela spp.
Family: Meliaceae

By

JEANNETTE M. KRYN, Botanist

Forest Products Laboratory,¹ Forest Service
U. S. Department of Agriculture

Distribution and Habitat

Numerous species of Cedrela occur in every country south of the United States except Chile. The natural range includes moist lowlands along streams, upland rain forests, well-drained hillsides, and drier areas. Variation in the properties and appearance of the woods of the Cedrela species probably depends upon differences in growth conditions, not upon inherent differences between the species.

The principal species of Cedrela are: Cedrela fissilis Vell., C. odorata L., and C. mexicana Roem. The name "cedro," with or without a modifying adjective, is commonly used for all species of Cedrela in the Spanish-speaking countries of South and Central America.

The Tree

Although Spanish cedar or cedro bears the common name and has the cedary fragrance of several North American coniferous trees with needle-like leaves, it is a hardwood belonging to the mahogany family (Meliaceae).

Under favorable conditions of growth in the forest, Spanish cedar may reach a height of 90 to 130 feet and have a trunk diameter of 2 to 4 feet. Prominent buttresses often extend from 4 to 12 feet up the trunk. Clear boles may extend 50 to 80 feet above the buttresses (4, 8).²

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

²Underlined numbers in parentheses refer to Literature Cited at the end of text.

The Wood

Freshly cut heartwood is pinkish to reddish brown, but upon exposure it becomes red or dark reddish brown, sometimes with a purplish tinge. It is reported to be darkest when grown in the drier regions. The sapwood is whitish, gray, or pinkish.

The cell structure of Spanish cedar ranges from virtually diffuse-porous to decidedly ring-porous. The texture of the wood is medium, but the darker colored woods frequently are coarser than the lighter colored woods. The grain is commonly straight, sometimes interlocked. A characteristic growth-ring pattern is visible on the tangential surface. The wood has a medium to high luster that is generally lowest in the lighter colored timbers. A cedary odor similar to that of the coniferous "cedars" is usually present. Some specimens taste bitter, others neutral.

Mechanical Properties

Averages of the values obtained for the mechanical properties of several species of Spanish cedar and mahogany are presented in table 1. The average specific gravity of Spanish cedar as determined by various investigators, ranges from 0.36 to 0.41 based on the oven-dry weight and the volume of the green wood.

Seasoning and Shrinkage

Spanish cedar is considered easy to season by either air or kiln drying. Surface checking is slight. Shrinkage data for species of Cedrela and mahogany are given in table 2. The British Forest Products Research Laboratory recommends its kiln schedule H (1). The U. S. Forest Products Laboratory schedule that appears most appropriate for 4/4 stock is T10-D4 (12). Some Spanish cedar has been reported to have a tendency to collapse during drying. If stock of this type is encountered, lower temperatures should be used.

A gum-like substance containing a volatile aromatic oil exudes from Spanish cedar. The oil often stains the paper lining in cigar boxes made of this wood, and when it evaporates it leaves a sticky residue that causes boards to adhere. The following curing procedure is suggested (3):

Kiln dry the unsurfaced stock to a moisture content of 6 to 8 percent and then heat it at 200° F. for 8 to 17 hours at a relative humidity of 60 percent. The oils and gums will exude to the rough surfaces, which are then smoothed in the dressing process.

Since the fragrance of cedar is desired in many products made from the wood, any treatment or process that volatilizes the oil and sets the gum must be used with care to prevent excessive volatilization and loss of the fragrance.

For Spanish cedar the treatment may have to be shortened to keep enough oil in the wood to produce the desired aromatic odor.

Spanish cedar tested at Yale University showed excellent weathering characteristics, comparable to those of mahogany (Swietenia macrophylla King) (13).

Durability

Spanish cedar timbers vary in decay resistance. In recent tests, the heartwood of several species of Cedrela was rated from "durable" to "nondurable" in resistance to a white-rot fungus, Polyporus versicolor (L.) Fr. and "durable" to "moderately durable" when exposed to the brown-rot fungus, Poria monticola Murr, (13). Damage by ambrosia beetles is reported to occur, but the wood is said to resist attack by termites (1).

Working Characteristics

Spanish cedar is easy to work with both hand and machine tools and takes a smooth finish. It has good gluing, nailholding, and screwholding characteristics and is readily sliced into veneer. The gum in some logs often causes trouble in planing and finishing. Exudations of gum from the wood, even after seasoning, often constitute a serious defect (1, 8).

Uses

Spanish cedar is used locally throughout the tropics for exterior and interior construction, furniture and cabinet work, millwork, boat parts, canoes, shingles, sugar casks, and clothing chests. It is adapted for purposes requiring wood that is soft and lightweight, yet strong, straight grained, and easily worked. At one time it was exported to the United States for use in cigar boxes. Its many good qualities make it suitable for patterns, wood novelties, drawing boards, musical instruments, venetian blind slats, decking and planking for small water craft, and rotary veneer for both decorative and utility grades of plywood (4, 8).

Availability

Spanish cedar is available, but it is expensive because the trees are widely scattered through forests and there is strong local demand for the timber.

Identifying Features

The growth rings are distinct in Spanish cedar because of the distribution of the pores and the presence of concentric bands of marginal parenchyma. The wood may be decidedly ring-porous, with one or several rows of early wood

pores, semiring-porous, or virtually diffuse-porous, depending upon conditions of growth. The larger pores are readily visible without magnification and are often plugged with dark, gummy deposits. Pores of the late wood are sparse, scattered, solitary, or in short multiples. Marginal parenchyma occurs in narrow, concentric bands and is distinct without magnification. Parenchyma surrounding pores is not abundant. The rays are readily visible with a lens on cross section and form a distinct fleck on radial section. Normal gum ducts are absent, but traumatic vertical ducts may occur in tangential rows.

Literature Cited

- (1) British Forest Products Research Laboratory
1956. A Handbook of Hardwoods. Pp. 68-70, Appendix 3. Dept. of Scientific and Industrial Research, Forest Products Research, Her Majesty's Stationery Office, London.
- (2) _____
1953. The Strength Properties of Timber. Dept. of Scientific and Industrial Research, Forest Products Research Bull. No. 28, p. 37. Her Majesty's Stationery Office, London.
- (3) Browne, F. L., and Rietz, R. C.
1953. Exudation of Pitch and Oils in Wood. U. S. Forest Products Laboratory Report No. 1735, p. 8. Madison, Wis.
- (4) Dickinson, Fred E., Hess, Robert W., and Wangaard, Frederick F.
1949. Properties and Uses of Tropical Woods -- I. Trop. Woods No. 95, pp. 57-60. Yale Univ., New Haven, Conn.
- (5) Harrar, Ellwood S.
1941. Some Physical Properties of Modern Cabinet Woods -- I. Hardness. Trop. Woods No. 68, pp. 1-11. Yale Univ., New Haven, Conn.
- (6) _____
1942. Some Physical Properties of Modern Cabinet Woods -- III. Directional and Volume Shrinkage. Trop. Woods No. 71, pp. 26-32. Yale Univ., New Haven, Conn.
- (7) Heck, G. E.
1937. Average Strength and Related Properties of Five Foreign Woods Tested at the Forest Products Laboratory. U. S. Forest Products Laboratory Report No. 1139, 3 pp. Madison, Wis.
- (8) Hess, Robert W., Wangaard, F. F., and Dickinson, Fred E.
1950. Properties and Uses of Tropical Woods -- II. Trop. Woods No. 97, pp. 52-56. Yale Univ., New Haven, Conn.
- (9) Koehler, Arthur
1928. Tests on Six Argentine Woods.
Trop. Woods No. 14, pp. 15-20. Yale Univ., New Haven, Conn.
- (10) Kynoch, William, and Norton, Newell A.
1938. Mechanical Properties of Certain Tropical Woods, Chiefly from South America. Bull. No. 7, 87 pp. Univ. of Michigan School of Forestry and Conservation, Ann Arbor, Mich.

- (11) Sallenave, P.
1955. Propriétés Physique et Mécaniques Des Bois Tropicaux de
L'Union Française. Pp. 95-96. Centre Technique Forestier
Tropical, Nogent-sur-Marne (Seine), France.
- (12) Torgeson, O. W.
1951. Schedules for the Kiln Drying of Wood. U. S. Forest Products
Lab. Rept. No. D1791, 9 pp. Madison, Wis.
- (13) Wangaard, Fred F., and Muschler, Arthur F.
1952. Properties and Uses of Tropical Woods,-- III. Trop. Woods
No. 98, pp. 73-80. Yale Univ., New Haven, Conn.

Table 1.--Mechanical properties of Spanish cedar (Cedrela spp.)¹
and mahogany (Swietenia macrophylla)¹

Property	Species	
	Spanish cedar (<u>Cedrela spp.</u>)	Mahogany (<u>Swietenia macrophylla</u>)
Moisture content		
Air dry.....percent:	12	12
Specific gravity		
Based on volume when green and weight when: ovendry.....	0.38	0.45
Static bending		
Fiber stress at proportional limit		
Air dry.....p.s.i.:	7,390	7,830
Modulus of rupture		
Air dry.....p.s.i.:	10,230	11,410
Modulus of elasticity		
Air dry.....1,000 p.s.i.:	1,360	1,430
Work to maximum load		
Air dry.....in.-lb. per cu. in.:	9.8	8.0
Maximum crushing strength		
Air dry.....p.s.i.:	5,600	6,550
Hardness		
Air dry		
End.....lb.:	830	1,030
Side.....lb.:	570	840
Compression perpendicular to grain -- Stress at proportional limit		
Air dry.....p.s.i.:	690	1,040
Shear		
Air dry.....p.s.i.:	1,140	1,330

¹The values for physical and mechanical properties are weighted averages of the average values for the species given by the following sources: Spanish cedar (7, 11, 13); mahogany (2, 5, 7, 10, 13).

Table 2.--Shrinkage values for Spanish cedar (Cedrela spp.¹ and mahogany (Swietenia macrophylla)¹

Species	Shrinkage ²		
	Radial	Tangential	Volumetric
	Percent	Percent	Percent
Spanish cedar (<u>Cedrela</u> spp.)	4.0	6.0	9.7
Mahogany (<u>Swietenia macrophylla</u>)	3.2	4.6	7.9

¹The shrinkage values are weighted averages of the average values for the various species given by the following sources: Spanish cedar (7, 9, 11, 13); mahogany (2, 6, 7, 10, 13).

²Shrinkage values represent shrinkage from the green to the oven-dry condition expressed as a percentage of the green dimension.