The foreign woods imported into the United States are chiefly hardwoods. The few softwoods imported are mainly pines from Mexico, Central America, and the Caribbean Islands, which do not differ essentially from native pines, and considerable Brazilian araucaria, commonly called Parana pine.

Descriptions of Brazilian araucaria and a selected number of foreign hardwoods are given in this section. Only the most generally used names are listed, but each wood may be known by a number of trade or vernacular names. More comprehensive information about these and other foreign woods may be obtained in references (1) to (23).\[1\]

Tables 1 and 2 list strength, specific gravity, weight, and shrinkage data for most of the foreign woods described. It must be recognized, however, that in most cases these data are based on a very limited number of tests and may not be true averages for the clear wood of the species. Any commercial shipment may differ markedly from an average for the species as a whole, and the strength and other properties will also be influenced by defects and natural characteristics, such as knots.

The listed values may, however, give some indication of the general characteristics of the woods and offer a means of comparison with the properties of woods grown in the United States. In making such comparisons it should be noted that, for the foreign woods, strength properties in the air-dry condition are not all given at 12 percent moisture content, and allowance should be made for that fact.

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

\[2\] Underlined numbers in parentheses refer to Literature Cited at end of report.
Araucaria, Brazilian

The softwood Brazilian araucaria (Araucaria angustifolia (Bert.) O. Kuntze), which is commonly called Parana pine (although it is not a true pine), comes from southern Brazil and adjacent parts of Paraguay and Argentina. Good supplies in large, clear sizes are generally available.

The sapwood is yellowish and the heartwood light brown, often with bright red streaks. The growth rings are distinct, and small pin knots may be present. The wood does not normally contain resin ducts or pitch. It is fairly straight-grained and has typical uniform softwood texture without pores that would require a filler.

Parana pine requires careful handling during seasoning and use to prevent warping and splitting. Compression wood, if present, causes some difficulties in drying, resawing, and use, and should be excluded from exacting uses.

The strength properties of Parana pine approximate those of coast-type Douglas-fir. The wood is easy to work; it takes and holds paint and glues well. It is low in natural resistance to decay but is easily treated with wood preservatives.

The principal uses of Parana pine include framing lumber, inside finish, trim, sash and door stock, slack cooperage, matches, turned products, cheaper grades of furniture, pulp, split shingles, shipping containers, and veneer.

Andiroba (Crabwood)

Andiroba, crabwood, and cedro macho are among the trade names applied to Carapa guianensis Aubl. and other species of the genus Carapa from Central and South America and the Caribbean Islands. Logs 10 to 30 feet long, squaring to 15 to 20 inches, are reported to be available in considerable quantity.

The 1- to 2-inch-thick sapwood is white or pale, shading into the pinkish-brown heartwood, which may vary from light sepia to dark reddish brown. The grain is usually interlocked. A mild striped figure, due to dark material in the rays, may appear on quartered material, and a more marked figure, such as "fiddle-back" and "mottle," sometimes occurs. In size and distribution the pores are similar to those in mahogany.

Andiroba is rated as easy to work, paint, and glue. It is said to be fairly resistant to decay and insects. In mechanical properties, it compares well with mahogany. Andiroba is used for furniture, interior finish, split staves and shingles, shoe heels, spars and masts for boats, and veneer.

Rept. No. 1940
Angelique

Angelique, or basra locus (Dicorynia paraensis Bth.) from South America, has two recognized forms, angelique gris and angelique rouge. Angelique rouge is more abundant and tends to be denser, darker, and stronger than angelique gris and to contain less silica. Records of 0.28 to 1.2 percent of silica are reported for angelique gris. The narrow sapwood of angelique is white or light brown, and the heartwood varies from rose or russet to dark gray or purplish brown, somewhat resembling black walnut. The wood may contain dark streaks that are valued for their appearance. The grain is usually straight and the texture medium. A pattern may be produced on flat-sawn surfaces by varied cell types (parenchyma layers). Ripple marks, as found in mahogany, are present.

In most of its mechanical properties angelique compares favorably with teak and white oak. Care is required in seasoning to prevent checking, splitting, and case-hardening (especially in thick stock); its shrinkage is comparable with that of red oak and hard maple. Angelique is rated as resistant to decay, insects, and marine borers. Silica, when present, tends to reduce marine-borer damage.

The wood varies in workability according to its density and silica content, but it is said to split readily and finish smoothly. The uses of the wood are of general utility rather than show and include joinery, furniture, vehicles, cooperage, construction, piling, and railway ties. It is thought to show promise for decking, planking, boats, and flooring.

Apitong

Apitong, bagan, eng, gurjun, keruing, and yang are some of the names commonly applied to the woods of not less than 15 species of the genus Dipterocarpus that are abundant in the Philippine Islands, Indo-Malaya, and New Guinea. The woods of the different species are so similar that they are difficult to distinguish.

The sapwood of these woods may be 3/4 to 3 or more inches thick and ranges in color through creamy-yellow, gray, or reddish white, shading into the reddish-purple or brown heartwood. The grain is notably straight but may sometimes be shallowly interlocked or crossed. The even texture varies from fine to rather coarse.

Apitong has been considered to be slow to dry and somewhat refractory, but with preliminary air-drying and modern mild seasoning methods, it is believed that it can be handled successfully. The wood is rated as moderately durable but should be treated with preservatives for use in positions where it is exposed to decay. The heartwood is considered resistant to dry-wood termites and powderpost beetles.
Apitong is considered moderately difficult to work but variable. Both silica and gum or resin may give some trouble in working and finishing, and staining may develop in contact with iron. Uses of apitong include poles, posts, beams, joists, rafters, flooring, mine props, bridge and wharf construction, railway ties, boat construction, carts, boxes, and medium-grade furniture.

**Avodire**

Avodire (*Turracanthus* spp.), which is of limited occurrence in tropical West Africa, produces wood that, when stained and finished, is difficult to distinguish from khaya. Avodire is sold under such names as "African mahogany," "white mahogany," and "African satinwood."

The wood is naturally creamy white or pale yellow in color without a distinctly colored heartwood. It has a high satiny luster, however, and may have straight, wavy, or interlocked grain with fine uniform texture. Figured wood showing considerable variety occurs.

Avodire is not so hard as many cabinet woods; it rates as 68 percent when compared with black walnut as 100, whereas mahogany rates as 83 percent. In mechanical properties it is similar to limba. Its shrinkage has been found to be greater than that of mahogany but less than that of khaya. With ordinary care, avodire is said to season well. The wood is low in natural durability, however, and subject to stain, decay, and insect attack.

Straight-grained wood is reported as easy to work and can be cut into excellent sliced veneer. It rates as fairly good in nailing, screw-holding, and gluing. Avodire is used for decorative cabinet work, paneling, lighter types of furniture, plywood, and joinery, and has been converted into pulp.

**Azobe**

Azobe, bongossi, or ekki (*Lophira* spp.) is available from tropical West Africa. It has pinkish sapwood, 2 to 4 inches wide; that is distinct, when fresh, from the dark-red to purplish-brown heartwood. The heartwood may be speckled with light-colored siliceous deposits in the pores. The grain is typically interlocked and the texture medium to rather coarse and uneven.

Azobe is considered hard to season and gives up its moisture slowly, often with severe checking and splitting. Preliminary air seasoning is recommended before kiln drying. Once manufactured, however, azobe is reported to hold its shape well and to absorb moisture very slowly. The wood is rated as one of the most durable timbers in West Africa -- resistant to insects, teredo, white ants, and decay. Azobe piling has been found sound after 20 years' service. Azobe rates as a hard, strong wood with higher mechanical properties, for the most part, than teak or oak and shock.
resistance nearly the same as that of greenheart. The wood is about twice as hard as Burma teak and is difficult to saw and work. It is necessary to bore holes in azobe for nailing or bolting. The wood can be glued satisfactorily and stained, but a filler is required in finishing.

Although too hard for many purposes, azobe is suitable for heavy construction, especially for wharves, piles, dock gates, deckings, and bridges, and for truck floors and bodies, billiard tables, switchboards, tanks, stair treads, engraver's blocks, handles, special furniture, and novelties. It is also suitable for charcoal production.

**Balsa**

Balsa (Ochroma spp.), which produces the lightest in weight of the commercial woods, is widely distributed in tropical America from the West Indies to Bolivia. The sapwood, comprising most of the commercial timber, is whitish, oatmeal-colored, yellowish, or pinkish; the heartwood is brown or slightly tinged with red. The texture is uniform with a curious velvety "feel." The extreme lightness and softness of the wood is due to its thin cell walls and relatively large cell cavities.

Balsa varies considerably in weight, and its strength varies directly with its density (table 1). Slow-growing trees and the inner portion of old trees tend to have denser wood; they approximate white pine in density. Balsa is not decay-resistant and is subject to sap stain. For many uses it must be surface-treated to prevent moisture absorption.

The principal uses of balsa are for life-saving equipment, floats, rafts, aquaplanes, core stock, insulation, shipping containers, cushioning to prevent transmission of shocks and vibrations, sound modifiers, airplane models, and novelties.

**Bubinga**

Bubinga, essingang, or kevazingo (Guibourtea, formerly Copaifera) comes from tropical West Africa. The heartwood is light red-brown, attractively veined with pink or red stripes; the sapwood is paler. This fine-textured wood is used almost exclusively for veneer; when sliced it is called bubinga and when rotary cut, kevazingo. Before World War II ample supplies were said to be available.

**Cativo**

Cativo (Prioria copaifera Gris.), which is abundant in tropical America, has medium-brown heartwood, often attractively streaked and sometimes with an almost black core. The thick sapwood is light cream, buff, or pinkish, and darkens on exposure. The grain is generally straight, but sometimes spiral; the texture is fine to somewhat coarse.
Cativo is described as having the consistency of cedrela and the hardness of basswood. The wood is relatively strong but perishable. It is not resistant to decay, termites, or other destructive agencies. It requires careful seasoning to prevent collapse, especially in the dark-colored material.

Cativo is comparatively soft, but sharp tools are needed to cut it because the fibers tend to pull out and produce a woolly surface. A considerable amount of deep-brown gum is present in the wood and may give trouble in finishing or in service when the wood is subjected to heat. Cativo has been used locally for scaffolding, rough furniture, boxes, and crates. It has been imported in considerable quantities recently and among its possible uses are veneer, pulpwood, excelsior, interior finish, and cabinet work.

Cedrela (Spanish Cedar)

The more than 30 species of cedrelas (Cedrela spp.), or cigar-box cedars, are widely distributed in tropical America. These species have pinkish-white sapwood that blends into reddish-brown, sometimes purplish-tinged heartwood. The wood has a characteristic odor, and some pieces show gum streaks. The texture ranges from fine to coarse, and the grain may vary, though it is usually straight.

Cedrela seasons readily. It is not high in strength, but is roughly rated to have about a third or more of the strength of mahogany (Swietenia). It is considered as decay-resistant and works and glues well, although it may show greasy streaks due to gum exudations. Cedrela is used for boatbuilding, furniture (although softer than mahogany), wardrobes, and interior fittings.

Chenchen

Chenchen (Antiaris spp.) from West Africa has white to yellowish-gray wood with little difference between sapwood and heartwood.

Chenchen is soft and light in weight. It is neither durable nor strong and needs to be seasoned as soon as possible after cutting to prevent staining. The root wood sometimes is used as a substitute for cork.

In Africa the wood is used for ordinary joinery, doors, benches, and machete handles. It is used as plywood core stock.

Dao

Dao (Dracontomelum dao (Blanco) Merr. and Rolfe), or New Guinea wood of the Philippines and the East Indian Archipelago, is one of a number of species in the genus. The heartwood of dao somewhat resembles black
walnut and orientalwood in color, but varies from gray to medium brown with distinct chocolate-brown or black streaks. The sapwood is thick and light brown, sometimes with a pinkish tinge. The grain may be decidedly interlocked, the texture medium and uniform. Some stripe and "cross-fire" figure may develop on quarter-sawed material.

Care must be taken in seasoning dao to prevent undue checking, twist, and warp. The wood is rather hard and may contain knots. It is said to be not difficult to moderately difficult to work up, but to be easier in that respect than orientalwood.

Dao, if treated with preservatives, is considered suitable for posts, mine timbers, and paving blocks. It has been used in house construction for beams, joists, rafters, sheathing, ceiling, flooring, door panels, and interior finish and in cabinet work and furniture. In the United States, rotary and sliced veneer have been made into furniture, some stained to resemble walnut or mahogany.

Goncalo Alves

Goncalo Alves (Astronium spp.) occurs widely in tropical America. The wood varies in color from yellowish to dark brown or reddish and has more or less conspicuous blackish stripes, which may appear oily but produce a striking figure. The sapwood is grayish. The grain is straight to variable and the texture is rather fine and uniform. The wood may be compared to golden ebony, or coromandel, and some forms resemble Brazilian rosewood.

Seasoning of Goncalo Alves should be conducted at a moderate to slow rate. Shrinkage is moderately low; but tends to be nonuniform. The mechanical properties are relatively high. The working characteristics are variable, but the wood turns well and finishes smoothly.

Goncalo Alves is used locally for house posts, railway ties, piles, and bridge timbers because of its natural durability. It appears to be suited to veneer production and is used for knife handles and fine furniture.

Greenheart

Greenheart (Ocotea rodii (Schomb.) Mazz) comes from a small area in northern South America, especially British Guiana. The heartwood varies in color from light to dark olive green or nearly black with light and dark areas often intermingled. The thick sapwood is pale yellow to greenish. The texture of greenheart is fine and uniform.

Greenheart is stronger and stiffer than white oak and harder to work with tools, but it planes well, although it is reported to polish and take nails poorly. The heartwood is rated as very resistant to decay.
and termites. It also is very resistant to marine borers in temperate waters, but is much less so in warm tropical waters.

The principal uses of greenheart include marine construction, such as ship and dock building, lock gates, wharves, piers, and jetties; engine bearers; planking; flooring; bridges; and trestles -- uses where strength and resistance to wear are required.

Guanacaste (Jenisero)

Guanacaste (Enterolobium cyclocarpum (Jacq.) Gris.), or jeniser, genizero, or kelobra, is a generally available Middle American species. The heartwood is about the color of walnut but shows various shadings, sometimes with a reddish tinge. The pores are open and rather large. The wood may be cross-grained and contain gelatinous fibers that cause it to "rough up" and burn the saw in cutting. Figured wood used for paneling is obtained from crock material.

The wood is rated as only fairly durable and is best suited for interior use. It may vary from light, soft, and spongy to rather hard and heavy and is comparatively easy to work, though some workmen are allergic to the pungent dust produced when it is being sawed. When finished, guanacaste is said to stay in place well and is employed for interior paneling, trim, cheaper grades of furniture, and cabinet work. It has been suggested as a substitute for yellow-poplar in plywood core stock.

Iroko

Iroko (Chlorophora excelsa B. and H.f.) comes from tropical Africa, and considerable quantities from large trees are said to be available. The freshly cut heartwood varies in color from light to greenish yellow, with occasional darker streaks; upon exposure it darkens to shades of brown. The sapwood is 2 to 4 or more inches wide and is pale yellow. The grain is interlocked, producing a striped figure on the quarter-sawed surface. The surface of the wood feels slightly oily or waxy, and the texture is rather coarse, the pores being visible without magnification.

Iroko resembles teak in a number of properties, but its strength values are somewhat lower (table 1). The shrinkage of iroko is low, and the wood can be air dried at a moderate rate without excessive checking or warping, and can be satisfactorily kiln dried. It is resistant to decay, but not to insect damage, and is difficult to impregnate with preservatives. It nails, glues, and polishes well, but requires a filler.

The principal uses of iroko are heavy construction for buildings, bridges, wharves, ties, and boats. Locally it is used for houses, furniture, implements, and carving.
Kaneelhart

Kaneelhart, or wabaima (*Licaria* spp.), is obtained particularly from the Guianas, although the genus *Licaria* contains some 40 species that are distributed throughout tropical America. The material has not been available in any considerable quantity.

The heartwood of kaneelhart is dark brown with a tinge of red, violet, or green. The sapwood is lighter in color. The wood is often cross-grained and has a rather fine texture. It splits easily but is rated hard and much stronger than oak. The wood is dense and is noted for its resistance to decay, high wear resistance, and ability to acquire a high, mirror-like polish. It competes with greenheart in general construction and is suggested for such uses as thresholds, tool handles, textile-mill equipment, and turned products.

Khaya

Khaya (*Khaya* spp.) is widely known commercially as "African mahogany." It includes several species that are native to the tropical forests of West Africa.

The heartwood of khaya varies from pale rosy red to dark reddish brown, often with a purplish cast. The sapwood, ranging from 1/2 to 2-1/2 inches thick in mature trees, varies from grayish white through pale pinkish or brownish red. The wood darkens somewhat on exposure. Khaya usually has interlocked grain, giving a ribbon figure on quartered surfaces. It also at times shows the other types of figure familiar in mahogany. In texture, khaya tends to be somewhat coarser than mahogany; the two woods can be distinguished positively by various minute structural features.

Hardness and strength are variable among the different species of khaya. The wood requires more careful seasoning than mahogany to prevent warping, but shrinkage values are low, though greater than the average for mahogany, especially in the tangential direction. The wood is easily worked with tools and glues and finishes well.

Principal uses include furniture, caskets, fixtures, interior finish, and veneer.

Lauan

The name "Philippine mahogany" applied commercially to a number of woods, chiefly members of the Dipterocarp, or lauan, family. These include: tangle, red lauan, tiaong, almon, mayapis, kalunti, manggasinoro.

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2 The Forest Service of the U. S. Department of Agriculture restricts the name "mahogany" to species of the genus *Swietenia*, family Meliaceae, native to tropical America.
and malaanonang of the genus Shorea; white lauan and Meindanao lauan of
the genus Pentacme; and bagtikan (Parashorea mindanensis). Lumbayau
(Tarrietia javanica) is sometimes classed as one of the lauans in trade,
but is a member of the Sterculia or cocoa family. The names given here
for these species are the names that have been adopted by the Philippine
Bureau of Forestry and in most cases are derived from native names. The
natural growth range of the lauans, if a number of unimportant species
are included, covers practically the entire area of the Philippine
Islands.

The individual lauan species closely resemble each other in physical
and mechanical properties. The color of the heartwood varies from
dark red or reddish brown in tangile and red lauan to light reddish
grey in the white lauans, the reddish color usually becoming paler on
exposure to light. Due to interlocked grain, these woods generally show
on a quartered surface a ribbon figure consisting of alternate light and
dark stripes. This striped figure is usually much more pronounced than
in mahogany. The pores in the lauans are also larger than those in
mahogany, giving the wood a coarser appearance.

With the exception of bagtikan, which generally has higher values,
strength values obtained for a number of lauans, including static
bending, compression parallel and perpendicular to grain, shear, and
hardness, do not differ greatly from those obtained from tests on
mahogany grown in different parts of tropical America. The shrinkage
and swelling of the lauans with changes in moisture content, however,
is considerably greater than that of mahogany. The lauans have a
tendency to warp in seasoning on account of their interlocked
grain but can be dried satisfactorily with proper methods.

Lauan wood is easily worked with tools, glues well, and takes stains
and other finishes satisfactorily. In service the heartwood of the
lauans is rated as only moderately durable.

The most important use of the lauans in the United States is for
cabinet work, including household furniture of all kinds, radio cabinets,
caskets, cases for pianos and other musical instruments and for scientific
instruments. They are used principally in the form of lumber for this
purpose, but some veneer is also employed. Some of the "blond" tones
now in vogue are well liked in this wood. The lauans are also used for
the fixtures and interior trim of residences, stores, banks, office
buildings, hotels, and clubs -- including paneling, show windows, doors,
and flooring. Figured veneer is commonly used for wall and door panels.

The use of the lauans for boat building in the United States, particularly
for motor boats and sailing craft, exceeds in quantity that of any other
foreign wood. Lauan wood is used for practically all parts of small
boats but is in special demand for the outside planking because it can
be obtained in large sizes. It is also well liked for decking. Con-
siderable quantities of lauan wood are sawed into thin stock for cigar
boxes.
Lignumvitae

Lignumvitae (Guaiacum spp.) comes from tropical America, especially from the West Indies. The heartwood varies in color from olive brown or blue to dark brown or nearly black and has an oily or waxy appearance and feel. It is distinct from the light-yellow or cream-colored sapwood.

Lignumvitae is one of the hardest and heaviest woods known. It is difficult to season and to work with tools, but the heartwood is very decay-resistant. The wood has a fine, uniform texture, a much interwoven grain, and is naturally impregnated with an oily gum-resin. Its gum-resin content may constitute about one-fourth of its air-dry weight.

Lignumvitae is preferred above all other woods for bearings or bushing blocks because of its high wear resistance and self-lubricating properties. Its most exacting use is for the propeller-shaft bearings of steamships. Other important uses are mallets, caster wheels, pulley blocks, and many other manufactured articles for which a very hard wood, uniform in texture and difficult to split, is required.

Limba

Limba (Terminalia superba Engl. and Diels), which is often sold under the trade name korina, is abundant in West Africa. Both the heartwood and sapwood of limba are light gray-white to creamy brown in color, similar to light oak. The heartwood may contain dark markings or streaks causing figures valued for special uses (limba noir), but the general light color of the wood (limba clair or blanc) is considered an important asset for the manufacture of blond furniture. The wood is generally straight-grained, although wavy grain may occur; the texture varies from close to rather coarse but is even.

Mechanical tests indicate that heartwood of limba, especially if dark-colored, may be brittle, and that in general the wood is not so strong as oak but corresponds roughly in strength with black cherry, black tupelo, red maple, and American elm.

Limba is reported to kiln dry satisfactorily under conditions about like those used for ash and to show good dimensional stability. Decay and discoloration may occur, where conditions are favorable, during prolonged air seasoning. Shrinkage is reported to be rather small, but greater in the dark-colored material. Limba is not resistant to decay, insects, or termites. The wood works easily with hand and machine tools, turns well, and is cut into veneer without trouble, but care is required in nailing and screwing because the wood shows a tendency to split.

The principal uses of limba include furniture, school and shop fittings, cabinets for radios and television sets, parquetry, and joinery. It has been used for propellers and patterns and is being tested for pulp production.
Mahogany

Mahogany (Swietenia spp.) is the name that the Forest Service of the U.S. Department of Agriculture reserves for species of the genus Swietenia, family Meliaceae. For other woods often called mahogany, such as khaya from Africa and the lauan from the Philippines, the original or native name is used.

Mahogany grows naturally in the West Indies, Mexico, Central America, northern South America, and to a small extent in southern Florida. It has been planted in other parts of the world with some success. Although the most accessible stands have been heavily cut, mahogany is still imported in considerable quantities.

The color of the heartwood varies from pale to dark reddish-brown; it grows richer and darker with age. The sapwood is pale yellow or nearly colorless. The texture of the wood is uniform, and the grain is usually interlocked, causing a ribbon or striped figure in quarter-sawed wood. Some material shows "mottle," "fiddle-back," "crotch," curly, or other unusual figure.

Mahogany is highly variable in weight, and its hardness and strength are also variable, heavier wood having higher strength values. Black walnut is about intermediate between the lighter and heavier grades of mahogany in respect to hardness, but other strength values for black walnut are somewhat higher than for mahogany. Mahogany is rated as moderately decay-resistant. Little difficulty is met with in seasoning mahogany; both the radial and tangential shrinkage are low -- less than that of any other cabinet wood used in the United States in large quantities.

Mahogany is often referred to as "the premier cabinet wood of the world." The excellent reputation that it has attained through centuries of use is based on the fortunate combination of properties essential to a first-class cabinet wood. Chief among these properties, which mahogany possesses to a high degree, are ability to hold shape and stay in place, attractive appearance, fine finishing qualities, and ease in working with tools and gluing.

As a cabinet wood, the principal use of mahogany is for the more expensive types of furniture and fixtures, both in the form of lumber and veneer. High-quality interior woodwork, including doors and wall paneling, is also provided by mahogany in public buildings, private homes, railway cars, and ships. It is employed for musical instruments, particularly pianos, burial caskets, patterns used in making molds and dies in metal working, and cases for clocks and scientific instruments.
Maria

Maria, or Santa Maria (Calophyllum spp.), occurs frequently in tropical America. Its heartwood is variable in color, ranging from pink or yellowish pink to brick red or rich reddish brown. The sapwood is lighter in color and 1-1/2 to 2-1/2 inches wide. The grain is often interlocked, producing a ribbon figure, and the texture is medium and fairly uniform.

The wood is moderately durable, generally easy to work, but shows some tendency to "pick up" or show rough patches. It holds nails and screws firmly, can be glued, stained, and painted without special difficulty, and takes a good polish. It is used locally for general construction, bridges, railway ties, wheelwright's work, dugout canoes, dories, and other boat- and shipbuilding, shingles, flooring, indoor trim, furniture, and rotary-cut veneer.

Okoume

Okoume (Aucoumea klaineana Pierre), available in large supply from West Africa, produces large clear logs. The color of its heartwood is salmon pink or pale pinkish brown, sometimes with a decidedly reddish tinge. The sapwood is lighter in color, often grayish, and is usually from 1 to 3 inches thick in mature trees. The wood has no distinctive odor or taste. Planed surfaces are lustrous and often show a slightly wavy grain. The pores of the wood are plainly visible without magnification on smoothly cut end-grain surfaces and are about the same size as those in mahogany (Swietenia). The wood is usually straight-grained and uniform in structure.

Okoume wood is moderately light in weight, but is rated as fairly strong for its weight, although it is not often used where strength is the main consideration.

The wood is said to season well without excessive warping and checking, although the logs have a tendency to develop large splits at the ends in drying. It is also reported to be low in resistance to decay. The wood is somewhat difficult to saw and requires special saw teeth that must be kept sharp. Planing also requires some care due to cross grain. Okoume is well adapted to both rotary-cut and sliced veneer, because of the large size of the logs and their freedom from defects.

Uses of okoume in the United States have been confined largely to paneling in houses and stores and to interior hidden parts of furniture. In Europe, however, it is also much used for interior woodwork in houses; door panels; store fixtures; inexpensive furniture; construction of portable houses as panels, interior woodwork, and outside trim; small boats and canoes; partitions and interior woodwork in ships; planking for small wartime craft, such as landing boats and rescue boats; boxes, light packing cases, light trunks, and wood suitcases; stage scenery;
incubators, tubes and dye vats; and many other products for which light-
weight wood, either as plywood or lumber, is desired.

**Orientalwood**

Orientalwood is the name now used for *Endiandra palmerstoni* C. T. White, which formerly was misleadingly marketed as Queensland walnut or walnut bean. It grows abundantly in North Queensland, Australia. The wood is variegated in color; the 3- to 4-inch-thick sapwood is lighter than the heartwood, which shows a mixture of black, gray-brown, chocolate, and even pink shades or streaks imposed on a walnut-brown background. The wood has interlocked grain; stripe, ribbon, or wavy figure; and medium texture.

The wood turns and polishes well but contains considerable silica. Seasoning requires care, but orientalwood can be successfully air or kiln dried, although there is a pronounced tendency to warping and end splitting. When green, this wood has an objectionable odor that disappears when the wood is dry.

The chief uses of orientalwood include interior decoration, furniture, pianos, switchboards, and veneer.

**Padauk, Andaman**

Padauk (*Pterocarpus dalbergioides* Roxb.) is available from the Andaman Islands east of India. Its sapwood is gray and narrow; the heartwood is variable in color from light yellowish pink with slightly darker, long red lines to brick red, purplish red, or deep purple with darker purple lines. The wood darkens rapidly on exposure. The grain is broadly interlocked and the texture coarse.

The wood rates as very strong and hard, equal to Burma teak. It air dries and kiln dries well without undue warping or splitting and is very decay-resistant. It is not refractory under tools and veneers well.

Padauk rates as a valuable ornamental wood of the first class. It is used for paneling, furniture and cabinet work, boat fittings, and pianos.

**Peroba Do Campo**

Peroba do campo, or ipe peroba (*Paratecoma peroba* (Record) Kuhlm.), comes from Brazil. The sapwood is pale yellowish gray and the heartwood pale olive with yellow, green, red, or brown shading. The wood compares with greenheart in color. It has medium texture, variable grain, and may show a striped, wavy, or curly figure. A sulfur-yellow deposit is sometimes found in the pores.
The wood is rated as strong and tough (stronger than teak) and highly durable. Some difficulty is encountered in seasoning because of the irregular grain. Shrinkage is greater than that of mahogany but less than that of teak. The wood is not difficult to work, stain, and finish, but tends to dull tools when much of the yellow deposit is present.

Peroba do campo is used for interior fittings, high-grade furniture, ship timbers, boat decking, veneer, and decorative work.

**Primavera**

Primavera (Cybistax (= Tabebuia) donnell-smithii (Rose) Seibert) occurs in tropical America. The sapwood is not sharply defined; the general color of the wood is creamy or yellowish white to light yellowish brown, with occasional rose-pink streaks. The color has led to the use of such trade names as palo blanco and "white mahogany." The texture of primavera is medium to rather coarse but uniform; the grain commonly is interlocked; figured material occurs, and ripple marks are present as in mahogany.

Primavera is moderately light in weight, comparable with yellow-poplar. In mechanical properties, the values are in general lower than those for mahogany. The wood is easily air seasoned, dries rapidly without checking, and shows only slight crock and twist. It has low shrinkage, comparable with that of mahogany. It is rated as moderately durable to durable. The heartwood resists moisture absorption (position intermediate between oak and mahogany). Primavera is considered easy to work and glue and dimensionally stable.

The chief uses include furniture, interior trim, flooring (though soft for this purpose), railroad ties, boxes, veneer, patterns, boat planking, and millwork.

**Quaruba (Emeri)**

Quaruba (Vochysia spp.), also called emeri, San Juan, and numerous other names, comes from tropical America. The fresh heartwood varies from light brown to pinkish yellow, darkening on exposure; the 1-1/2- to 3-inch-thick sapwood is whitish, gray, or buff. The grain is straight or interlocked, causing mild striped figure. The texture is coarse to medium.

Quaruba is similar in mechanical properties to yellow-poplar. The wood gives some trouble in seasoning through warp, twist, and collapse. It also tends to blunt saws and requires considerable filler but takes glues and stains well.
The wood varies in decay and insect resistance with respect to different organisms from low to high. It is used locally for dugout canoes and to a limited extent as lumber for interior construction and siding. It is considered as promising for use in boxes, crates, inexpensive furniture, and general-utility purposes.

Rosewood, Brazilian

Rosewood from Brazil (chiefly *Dalbergia nigra* Fr. Allem.) is also called palissandre and jacaranda.

The wide sapwood is nearly white and sharply demarcated from the heartwood of older trees, which varies in color from chocolate or violet brown to a rich purplish black, irregularly and conspicuously streaked with black. The wood has a somewhat oily appearance and when worked gives forth a distinct, mild fragrance, which has given the wood its name. The grain is usually straight, and the texture is medium. The wood seasons well, keeps its shape, and is decay-resistant and easy to work.

Brazilian rosewood has been used for some 300 years for furniture, cabinet making, piano cases, knife handles, and veneer.

Rosewood, East Indian

Rosewood (chiefly from *Dalbergia latifolia* Roxb.) is also available from India, but the trees are scattered and nowhere very common. The narrow sapwood of East Indian rosewood is pale yellowish white often tinged with purple; the heartwood ranges in color from light, nearly golden brown through shades of light rose purple with darker streaks, to deep purple with rather widely separated, nearly black lines. The grain is narrowly interlocked and the texture medium coarse. The wood darkens with age and is fragrant when freshly cut.

The wood is said to season well in the log, in spite of being somewhat slowed by its gum content, and is readily kiln dried. It is very decay-resistant and strong, hard and difficult to saw, but machines well. It sometimes contains mineral matter.

East Indian rosewood is used for construction, vehicles, wheels, furniture, doors, floors, boats, and ornamental veneers.

Teak

*Teak* (*Tectona grandis* L.f.) grows naturally in commercial quantities in parts of India, Burma, Thailand, Indo-China, and the East Indies. Plantations are also being developed outside its natural habitat.
The sapwood of teak is white to pale yellowish brown and of narrow to medium width. The heartwood is dark golden yellow, golden brown, or grayish brown when first cut, growing dark brown with age and finally becoming almost black. The wood is coarse and uneven in texture. It has a rough, oily feel and a strong and characteristic odor when freshly cut.

The best forest-grown structural teak is characterized by a uniformly golden-brown color free from dark streaks, by straight grain, and by uniform rate of growth. Another type of forest-grown timber is darker in color, somewhat harder, and not so straight-grained. The "dry zone" teak from the hotter areas of India is of this type, as is a large part of that from Java, which is often wavy-grained with dark markings. There is a distinct difference in appearance between plantation- and forest-grown wood; plantation-grown material is characteristically straight-grained, uniform in color, and often much lighter and yellower than forest-grown material.

Teak is heavy, hard, and strong and approaches white oak closely in most strength values. There has been prejudice against the use of plantation teak because of its reputed lack of strength, but authoritative tests appear to show no essential differences in strength properties between plantation-grown material and that grown in natural forests.

Teak is one of the most durable timbers in the world. It is nearly immune to decay, very strongly resistant to termite attack and also resistant to marine borers. The shrinkage of teak in drying is very small -- close to that for mahogany (Swietenia) and our native white pines. The wood is generally moderately easy to work either by hand or by machine tools. It is somewhat variable in this regard, however, and its dulling effect on cutting edges is sometimes considerable, requiring the use of specially resistant steel to obtain economical operation.

Outside of India and the Far East, teak is used only for special purposes because of its high cost. In the United States it is used principally for the decking of large vessels; cabin interiors and rails of small pleasure boats, ships, and yachts; interior finish (especially parquetry flooring) in fine residences, club rooms, and bank buildings; and Venetian blinds. In countries where teak grows it is used for all types of wood structures, including houses, railway cars, bridges, wharves, and boats; and for furniture and fine cabinetwork, including carvings.
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Forest Products Laboratory Rept. No. 1511, 9 pp., illus.
<table>
<thead>
<tr>
<th>Common and botanical names of species</th>
<th>Moisture: content</th>
<th>Static bending: Modulus of grain parallel to perpendicular parallel to at test</th>
<th>Shear: load required to embed 0.144-in. ball</th>
<th>Hardness: : Fiber stress maximum : Shearing: maximum : inch ball to 1/2 its diameter :</th>
</tr>
</thead>
<tbody>
<tr>
<td>Araucaria, Brazilian (Parana pine) (Araucaria angustifolia (Berth.) G. Kuntze) (2, 1)</td>
<td>12.8</td>
<td>12,400</td>
<td>1,650</td>
<td>12.8</td>
</tr>
<tr>
<td>Andiroba (Crapo) (Carapa spp.) (2, 10, 20)</td>
<td>12</td>
<td>15,500</td>
<td>2,000</td>
<td>14.0</td>
</tr>
<tr>
<td>Angelique (Dipteryx paraensis Bth.) (2, 22)</td>
<td>79</td>
<td>11,400</td>
<td>1,840</td>
<td>12.0</td>
</tr>
<tr>
<td>Aiptong (Dipteryx spp.) (4, 12)</td>
<td>13</td>
<td>12,400</td>
<td>1,480</td>
<td>7.7</td>
</tr>
<tr>
<td>Avodire (Dipteryx spp.) (7, 20)</td>
<td>15.0</td>
<td>12,800</td>
<td>5,840</td>
<td></td>
</tr>
<tr>
<td>Atobe (Lophira spp.) (6, 12)</td>
<td>17.3</td>
<td>28,900</td>
<td>2,730</td>
<td>14.5</td>
</tr>
<tr>
<td>Bales (Obonema spp.) (31)</td>
<td>12</td>
<td>2,100</td>
<td>430</td>
<td>90</td>
</tr>
<tr>
<td>Cativo (Prioria copefera Gris.) (2, 22)</td>
<td>61</td>
<td>6,600</td>
<td>1,110</td>
<td>7.2</td>
</tr>
<tr>
<td>Cedrela (Cedrela spp.) (8)</td>
<td>12</td>
<td>7,500</td>
<td>1,010</td>
<td>5.6</td>
</tr>
<tr>
<td>Chenchen (Achilaria spp.) (16)</td>
<td>15.0</td>
<td>7,500</td>
<td>4,160</td>
<td></td>
</tr>
</tbody>
</table>

Rept. No. 1980

(Sheet 1 of 3)
Table 1.—Approximate strength and related properties of some foreign species commonly used in the United States (Continued)

| Common and botanical names \(\text{of species}^4\) | Moisture content | Static bending | :parallel to:perpendicular\(\text{ to:load required to embed 0.5\text{ in}}\)\(\text{ test}\) | :rupture:Kleasticity\(:\text{crushing at proportional limit}\) | Shear strength | Hardness -- | End Side |
|-------------------------------------------------|-----------------|-----------------|-------------------------------------------|----------------------|-----------------|-----------------|
|                                                  | Percent | P.s.i. | 1,000 | P.s.i. | P.s.i. | P.s.i. | lb. | lb. |
| Goncalo Alves \(\text{Anacardium spp.}\) \(2, 22\) | 46      | 12,100 | 1,980 | 6.7 | 6,580 | 1,840 | 1,760 | 1,640 | 1,910 |
|                                                 | 12      | 16,600 | 2,250 | 10.4 | 10,200 | 2,110 | 1,960 | 1,820 | 2,160 |
| Greenheart \(\text{Guarea rodiei} \text{Schw.). Mez} \(2\) | 41      | 19,500 | 2,970 | 10,500 | 2,850 | 2,160 | 2,110 |
|                                                 | 12      | 50,500 | 5,600 | 18,900 | 3,360 | 2,850 | 2,160 |
| Iroko \(\text{Chlorophora excelsa B. and F.f.}\) \(2\) | 91      | 10,200 | 1,680 | 4,950 | 2,160 | 2,700 | 2,110 |
|                                                 | 12      | 11,900 | 1,960 | 6,790 | 2,160 | 2,110 |
| Xaxaihart \(\text{Linaria spp.}\) \(27\) | 13.2    | 24,600 | 2,950 | 17,100 | 3,800 | 2,560 | 2,060 |
| Khaya \(\text{Khaya spp.}\) \(8\) | 55      | 7,600  | 1,180 | 3,670 | 650 | 1,270 | 570 | 510 |
|                                                 | 12      | 10,700 | 1,440 | 7.8 | 5,680 | 980 | 1,340 | 1,080 | 790 |
| Leuca:                                         |         |        |       |       |       |       |     |     |
| White lauan \(\text{Pentacme contorta}\) \(4, 19\) | 12      | 11,700 | 1,810 | 12.4 | 6,050 | 850 | 1,200 | 950 | 710 |
| Red lauan \(\text{Squere acraecosa}\) \(4, 7\) | 48      | 7,300  | 1,280 | 11.0 | 3,680 | 480 | 480 | 510 |
|                                                 | 12      | 11,600 | 1,820 | 11.0 | 6,500 | 980 | 790 | 710 |
| Tanganie \(\text{Tansre polyacrum}\) \(4, 19\) | 37      | 6,600  | 1,480 | 8.2 | 4,240 | 600 | 1,000 | 670 | 680 |
|                                                 | 12      | 11,000 | 1,790 | 10.6 | 5,940 | 890 | 1,120 | 670 | 640 |
| Lignum vitae \(\text{Guasum spp.}\) \(2\) | 12      |        |       |       |       |       |     |     |
| Limba \(\text{Lorina}\) \(\text{Toranzalei surne}\) \(12\) | 10.3    | 8,000  | 1,270 | 5,740 | 1,100 | 1,240 |
| Mahogany \(\text{Swietianza macrophylla}\) \(8\) | 38      | 9,200  | 1,290 | 10.2 | 4,240 | 710 | 1,210 | 750 | 690 |
|                                                 | 12      | 11,100 | 1,450 | 6.8 | 6,450 | 1,210 | 1,090 | 880 | 760 |
| Maria \(\text{Sexta Maria}\) \(\text{Calophyllum spp.}\) \(21\) | 46      | 9,900  | 1,540 | 3,160 | 640 | 1,200 | 990 | 860 |
|                                                 | 12      | 12,600 | 1,700 | 6,670 | 1,210 | 1,480 | 1,570 | 870 |

(Imp: No. 1940)

2M 90250 F

(Sheet 2 of 3)
Table 1.—Approximate strength and related properties of the clear wood of some foreign species commonly used in the United States  (Continued)

<table>
<thead>
<tr>
<th>Common and botanical names of species</th>
<th>:Moisture:</th>
<th>Static bending</th>
<th>:Compression:</th>
<th>:Shear:</th>
<th>Hardness</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>percent</td>
<td>at test</td>
<td>parallel to grain --: parallel to perpendicular: parallel to grain --: to embed 0.444 inch ball to shearing: 1/2 its diameter</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>in.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Okoume (Aucoumea klaineana Pierre) (16)</td>
<td>12</td>
<td>7,600</td>
<td>1,300</td>
<td>4.9</td>
<td>1,230</td>
</tr>
<tr>
<td>Orientalwood (Formerly Queensland walnut) (Endiandra palmerstoni C. T. White) (2)</td>
<td>12</td>
<td>13,900</td>
<td>1,780</td>
<td>9,020</td>
<td>2,140</td>
</tr>
<tr>
<td>Padouk, Andaman (Pterocarpus dalbergioides Roxb.) (2)</td>
<td>35</td>
<td>12,200</td>
<td>1,600</td>
<td>6,820</td>
<td>1,310</td>
</tr>
<tr>
<td>Paroba do Campo (Ipe peruvi) (Paratecoma paroba (Record) (Kuhl) (2)</td>
<td>15</td>
<td>14,100</td>
<td>1,500</td>
<td>6,520</td>
<td>1,520</td>
</tr>
<tr>
<td>Primavera (Cybistax = Gluebula) donnell-smithii (Roose) Sendirt) (2)</td>
<td>66</td>
<td>9,900</td>
<td>1,200</td>
<td>13.0</td>
<td>6,450</td>
</tr>
<tr>
<td>Quaruba (Bermia) (Vochysia spp.) (20, 22)</td>
<td>12</td>
<td>11,100</td>
<td>1,380</td>
<td>9.2</td>
<td>1,520</td>
</tr>
<tr>
<td>Rosewood, East Indian (Dalbergia latifolia Roxb.) (2)</td>
<td>12</td>
<td>6,100</td>
<td>1,290</td>
<td>5.2</td>
<td>2,760</td>
</tr>
<tr>
<td>Teak (Tectona grandis L.f.) (2, 22)</td>
<td>12</td>
<td>11,400</td>
<td>1,580</td>
<td>10.0</td>
<td>5,490</td>
</tr>
<tr>
<td></td>
<td>13,800</td>
<td>1,670</td>
<td>9.3</td>
<td>7,520</td>
<td>1,190</td>
</tr>
</tbody>
</table>

1 Underlined numbers in parentheses refer to Literature Cited at end of report.
2 Because of the wide range in density of bales estimated values are shown for bales for densities of 5, 9, and 14 pounds per cubic foot, in that order. It is not known what proportion of any particular shipment will fall in these classes.

Rept. No. 1940

Z M 91772 F
<table>
<thead>
<tr>
<th>Species1</th>
<th>Moisture content</th>
<th>Specific gravity2</th>
<th>Weight at test</th>
<th>Percent</th>
<th>Lb. per. cu.ft.</th>
<th>Percent</th>
<th>Percent</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Araucaria, Brazilian (Parana pine) (2, 3)</td>
<td>Green</td>
<td>0.44</td>
<td>12.8</td>
<td>.50</td>
<td>35</td>
<td>13.3</td>
<td>4.0</td>
<td>7.9</td>
</tr>
<tr>
<td>Andiroba (Crabwood) (5, 10, 22)</td>
<td>65</td>
<td>.54</td>
<td>56</td>
<td>12.1</td>
<td>3.9</td>
<td>8.0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Angelique (2, 22)</td>
<td>79</td>
<td>.60</td>
<td>67</td>
<td>14.0</td>
<td>4.6</td>
<td>8.2</td>
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<tr>
<td>Apitong (4, 19)</td>
<td>39</td>
<td>.58</td>
<td>50</td>
<td>16.0</td>
<td>4.9</td>
<td>11.6</td>
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<tr>
<td>Avodire (7, 20)</td>
<td>15.0</td>
<td>.55</td>
<td>10.6</td>
<td>4.0</td>
<td>6.2</td>
<td></td>
<td></td>
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<tr>
<td>Azôbe (6, 12)</td>
<td>17.3</td>
<td>.93</td>
<td>68</td>
<td>4.5</td>
<td>5.5</td>
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<tr>
<td>Balsa (23)</td>
<td>12</td>
<td>.072</td>
<td>5</td>
<td>29</td>
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<tr>
<td></td>
<td>12</td>
<td>.129</td>
<td>9</td>
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<td></td>
<td>12</td>
<td>.200</td>
<td>14</td>
<td>25</td>
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<td></td>
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<td></td>
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<tr>
<td>Bubinga (14)</td>
<td>Air dry</td>
<td>57</td>
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<td></td>
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<tr>
<td>Cativo (2, 22)</td>
<td>81</td>
<td>.40</td>
<td>45</td>
<td>8.9</td>
<td>2.4</td>
<td>5.3</td>
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<tr>
<td>Cedrela (3)</td>
<td>73</td>
<td>.34</td>
<td>37</td>
<td>8.9</td>
<td>4.1</td>
<td>4.9</td>
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<tr>
<td></td>
<td>12</td>
<td>.36</td>
<td>25</td>
<td>29</td>
<td></td>
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<tr>
<td>Chenchon (16)</td>
<td>15.0</td>
<td>.43</td>
<td>12.5</td>
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<tr>
<td>Dao (19)</td>
<td>15-17</td>
<td>.74</td>
<td>46</td>
<td>12.7</td>
<td>4.0</td>
<td>8.7</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Goncalo Alves (2, 22)</td>
<td>46</td>
<td>.84</td>
<td>76</td>
<td>10.0</td>
<td>4.0</td>
<td>7.6</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>12</td>
<td>.84</td>
<td>63</td>
<td>25</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Greenheart (2)</td>
<td>41</td>
<td>.81</td>
<td>71</td>
<td>5.4</td>
<td>7.4</td>
<td></td>
<td></td>
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</tr>
<tr>
<td></td>
<td>12</td>
<td>.89</td>
<td>62</td>
<td>25</td>
<td></td>
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<tr>
<td>Guanacaste (18)</td>
<td>Air dry</td>
<td>35-60:22-37</td>
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<td></td>
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</tr>
</tbody>
</table>

Rept. No. 1940

(Sheet 1 of 3)
Table 2.—Specific gravity, weight, and shrinkage data for the clear wood of some foreign species commonly used in the United States

<table>
<thead>
<tr>
<th>Species</th>
<th>Moisture content</th>
<th>Specific gravity</th>
<th>Weight at test</th>
<th>Shrinkage from green to oven-dry condition</th>
<th>Volumetric: Radial: Tangential</th>
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</thead>
<tbody>
<tr>
<td>Iroko (5)</td>
<td>91</td>
<td>.55</td>
<td>.65</td>
<td>2.0</td>
<td>3.0</td>
</tr>
<tr>
<td>Kanelhart (17)</td>
<td>13.2</td>
<td>1.15</td>
<td>.81</td>
<td>16.8</td>
<td>7.4</td>
</tr>
<tr>
<td>Khaya (8)</td>
<td>55</td>
<td>.43</td>
<td>.42</td>
<td>8.8</td>
<td>4.1</td>
</tr>
<tr>
<td>Lauans:</td>
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<td>White lauan (4, 19)</td>
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<td>.36</td>
<td>10.6</td>
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<td>Red lauan (4, 1)</td>
<td>48</td>
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<td>.37</td>
<td>11.9</td>
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<td>Tangile (4, 19)</td>
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<td>.45</td>
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<td>Lignumvitae (5)</td>
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<td>.76</td>
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<td>.30</td>
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<td>Mahogany (8)</td>
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<td>.45</td>
<td>.44</td>
<td>7.7</td>
<td>3.5</td>
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<td>Maria (Santa Maria) (21)</td>
<td>Green</td>
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<td>Okoume (16)</td>
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<td>.37</td>
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<td>10.9</td>
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<tr>
<td>Orientalwood (5)</td>
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<td>.63</td>
<td>.44</td>
<td>4.2</td>
<td>9.4</td>
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<tr>
<td>Padauk, Andaman (2)</td>
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<td>.62</td>
<td>.52</td>
<td>3.4</td>
<td>4.6</td>
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<tr>
<td>Peroba do campo (Ipe, paroba) (2, 7)</td>
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<td>.73</td>
<td>.52</td>
<td>9.8</td>
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<td>Primavera (8)</td>
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<td>.41</td>
<td>9.1</td>
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<td>Quaruba (Emeri) (10, 22)</td>
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<td>.67</td>
<td>15.4</td>
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</table>

Rept. No. 1940 (Sheet 2 of 3)
Table 2.—Specific gravity, weight, and shrinkage data for the clear wood of some foreign species commonly used in the United States

<table>
<thead>
<tr>
<th>Species</th>
<th>Moisture content</th>
<th>Specific gravity&lt;sup&gt;1&lt;/sup&gt;</th>
<th>Weight: Lb. per cu. ft.</th>
<th>Shrinkage from green to oven-dry condition&lt;sup&gt;2&lt;/sup&gt;</th>
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<tbody>
<tr>
<td></td>
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<td></td>
<td></td>
<td>Volumetric: Radial: Tangential</td>
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<tr>
<td></td>
<td>Percent</td>
<td></td>
<td>Percent: Percent: Percent</td>
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<tr>
<td>Rosewood, Brazilian (18)</td>
<td>Air dry: .75-.90</td>
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<tr>
<td>Rosewood, East Indian (5)</td>
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<td>64</td>
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<td>12</td>
<td>.79</td>
<td>55</td>
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<td>Teak (5, 22)</td>
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<td>.58</td>
<td>56</td>
<td>2.3: 4.2</td>
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</tr>
</tbody>
</table>

<sup>1</sup> Underlined numbers in parentheses refer to Literature Cited at end of report.

<sup>2</sup> Based on weight when oven dry and volume at test.

Based on dimensions when green. In some cases, the shrinkage values given were obtained by adding reported shrinkage from green to air dry and from air dry to oven dry or by estimating total shrinkage as equal to twice the reported shrinkage from green to air dry.

It is not clear from the published data whether these specific gravity values are based on weight and volume at the moisture content given or weight when oven dry and volume at the moisture content given.

Because of the wide range in density of balsa, estimated values are shown for balsa over a range of densities. It is not known what proportion of any particular shipment will fall in these classes.

Rept. No. 1940 (Sheet 3 of 3)