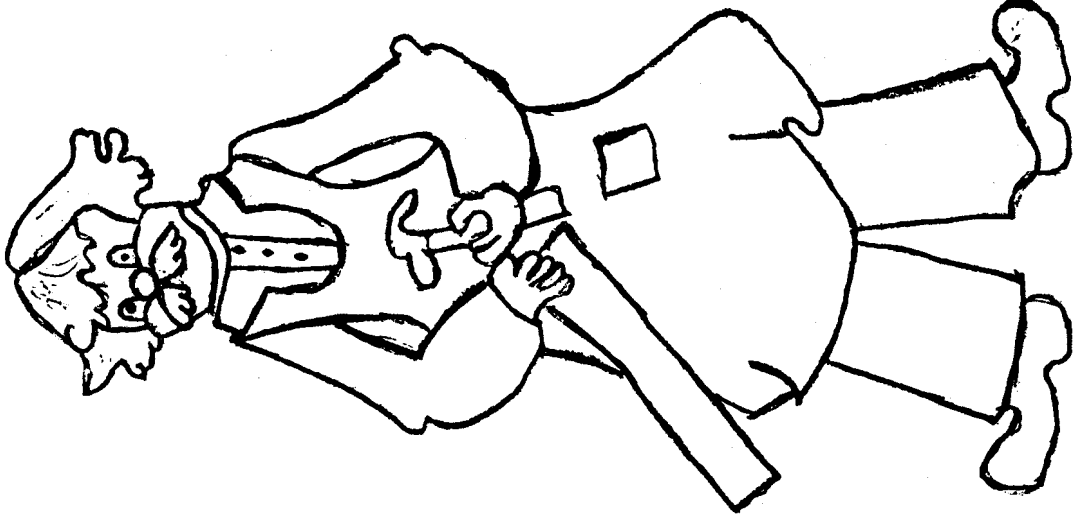


CHOOSING THE RIGHT WOOD



By Erik Jensen

1984 Emerald Star

UNIVERSITY OF CALIFORNIA

COOPERATIVE EXTENSION

FRESNO COUNTY

4-H OFFICE - 1720 S. MAPLE - FRESNO, CA 93702
(209) 488-3285

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INTRODUCTION

This pamphlet has been prepared as an aid in understanding the characteristics of wood; therefore, helping the 4-H wood science leaders and project members to know which type of woods would be best for their planned projects.

This pamphlet is part of my Emerald Star Project.

Erik Jensen
Mt. Valley 4-H Club
Fresno County
1984 Emerald Star



Springwood - The portion of the annual growth ring that is formed during the early part of the season's growth. It is usually less dense and weaker mechanically than summerwood.

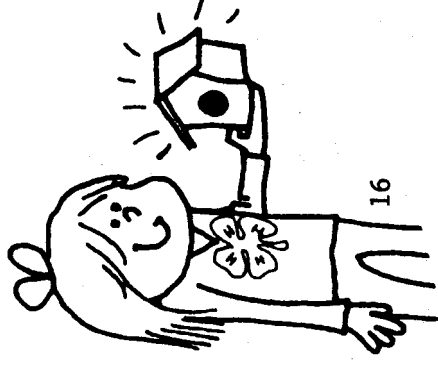
Steam bending - The process of forming curved wood members by steaming or boiling the wood and bending it to form.

Summerwood - The portion of the annual growth ring that is formed after the Springwood formation has ceased. It is usually denser and stronger mechanically than Springwood.

Texture - A term often used interchangeably with grain. Texture refers to the finer structures of the wood rather than the annual rings.

Veneer - A thin layer or sheet of wood cut on a veneer machine.

Workability - The degree of ease and smoothness of cut obtainable with hand or machine tools.



Heartwood - The wood extending from the pith to the sapwood, the cells of which no longer participate in the life processes of the tree. Heartwood may be infiltrated with gums, resin, and other materials that usually make it darker and more decay resistant than sapwood.

Kiln dried - Dried in a kiln with use of artificial heat.

Lumber - The product of the saw and planing mill, not further manufactured than by sawing, resawing, passing lengthwise through a standard planing machine, crosscutting to length and matching.

Millwork - Generally, all building materials made of finished wood and manufactured in millwork plants and planing mills. Includes such items as inside and outside doors, window and door frames, blinds, porchwork, mantels, panelwork, stairways, molding and interior trim. Does not include flooring, ceiling or siding.

Sapwood - The living wood of pale color near the outside of the log. Under most conditions the sapwood is more susceptible to decay than heartwood.

Seasoning - Removing moisture from green wood in order to improve its service ability.

Shock resistance - The resistance to shock.

Shrinkage - How much the wood shrinks.

Softwoods - Generally one of the botanical groups of trees that in most cases have needlelike or scalelike leaves; the conifers; also the wood produced by such trees. The term has no reference to the actual hardness of the wood.

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AMERICAN BEECH

(*Fagus Grandifolia*)

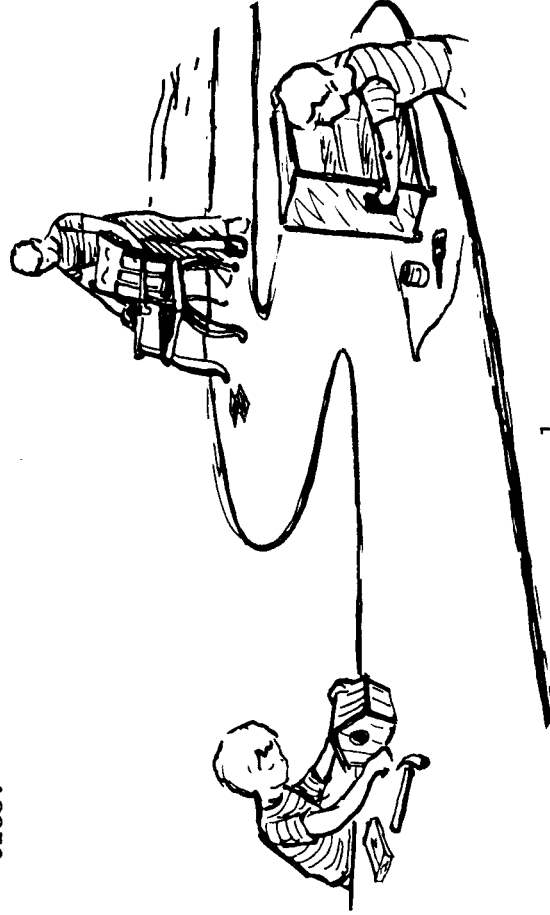
American Beech is native to the United States.

Beech grows in the eastern part of the United States and close Canadian provinces. Beech is produced the most in the central and middle Atlantic States.

Beech wood varies in color from almost white sapwood to reddish-brown heartwood in some trees. At times there is not a clear line between where the heartwood and sapwood meet. The wood does not have much of a figure and has uniform texture. It does not have any taste or odor to tell that it is Beech. Because Beech is odorless and tasteless, it is used for kitchen utensils.

Beech wood is heavy, hard, strong, high in resistance to shock and can be used for steam bending. Beech has large shrinkage and must have careful drying.

Beech cuts smoothly and wears well. Most Beech goes into flooring, furniture, handles, veneer, woodware, containers, cooperage and laundry appliances. When treated for rot and termites, it is used for railway ties.



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GLOSSARY

Air dried - Dried by exposure to air, usually in a yard, without artificial heat.

Annual growth ring - The growth layer put on in a single growth year including springwood and summerwood.

Check - A lengthwise separation of the wood that usually extends across the rings of annual growth and commonly results from stresses set up in wood during seasoning.

Close grain - Wood with narrow inconspicuous annual rings. The term is sometimes used to designate wood having small and closely spaced pores, but in this sense the term "fine textured" is more often used.

Coarse grain - Wood with wide conspicuous annual rings in which there is considerable difference between springwood and summerwood. The term is sometimes used to designate wood with large pores such as oak, ash, chestnut, and walnut, but in this sense the term "coarse textured" is more often used.

Figure - The pattern produced in a wood surface by annual growth rings, rays, knots, deviations from regular grain such as interlock and wavy grain and irregular coloration.

Fine grain - See close grain

Hardwood - Generally one of the botanical groups of trees that have broad leaves in contrast to the conifers or softwoods. The term has no references to the actual hardness of the wood.

AMERICAN SYCAMORE

(Plantanus Occidentalis)

American Sycamore is also known as sycamore, and sometimes as buttonwood, buttonball tree and plane tree. Sycamore grows from Maine to Nebraska, Texas and northern Florida.

The heartwood is reddish-brown and the sapwood is lighter in color. The wood has a fine texture and it has an interlocked grain. It shrinks moderately when drying. Sycamore is heavy, fairly hard, fairly stiff, fairly strong and has good shock resistance.

Sycamore is used mainly for lumber, veneer, railroad ties, cooperage, fence posts and fuel. Sycamore lumber is used for boxes, furniture, handles, flooring and butcher blocks. Veneer is used for fruit and vegetable baskets.

Sycamore is an excellent wood for food containers because it doesn't have any flavor or stain from the wood. It also makes steam bent furniture.

ASH

(Froxinus Americana)

Ash grows in the eastern half of the United States and along the Pacific coast.

The heartwood is brown and the sapwood is light colored or almost white. Ash is heavy, strong, hard, stiff, and has high shock resistance.

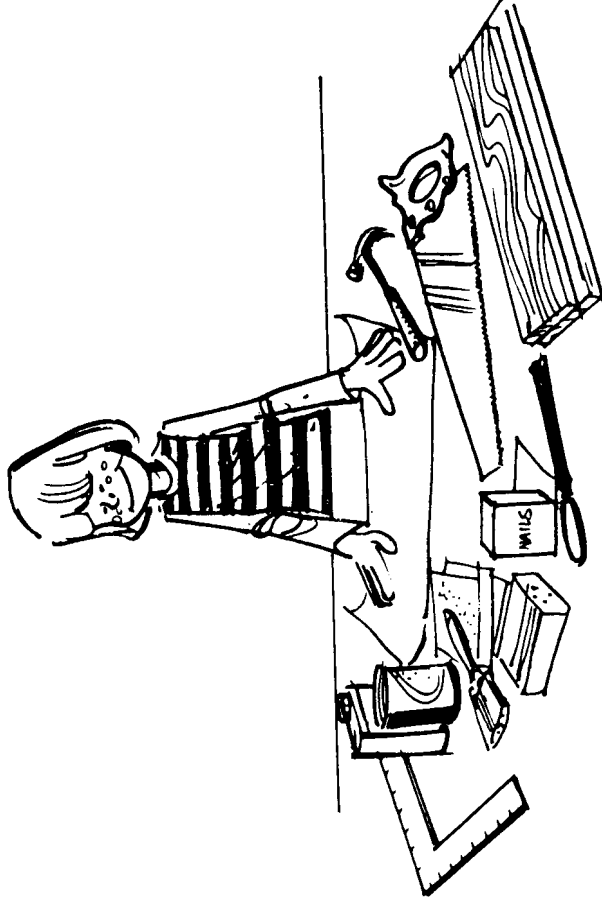
Ash is used for handles, oars, sporting goods and vehicle parts. Ash that is fairly light is used for cooperage, furniture and shipping containers. Some ash is cut into veneer. Ash can also be steam bent very easily for use in a variety of things such as toboggans.

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BIRCH

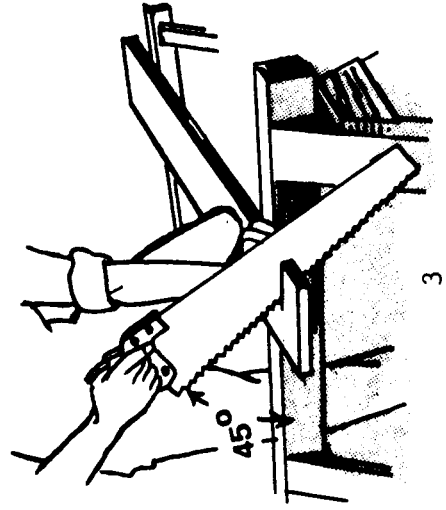
(Betula sp)

The important kinds of birch are yellow birch, sweet birch, and paper birch. Other birch's that are used for commercial use are river birch, gray birch, and western paper birch.

Yellow, sweet and paper birch grow mostly in the northeastern and lake states. Yellow and sweet birch also grow along the Appalachian Mountains to northern Georgia. Yellow and sweet birch are the source of most birch lumber and veneer.

Yellow birch has white sapwood and light reddish-brown heartwoods. Sweet birch has light colored sapwood and dark-brown heartwood with a little bit of red. The wood is heavy, hard, strong and has good shock resistance. The wood is fine and has a uniform texture. Paper birch is lighter in weight, softer, and does not have the strength that yellow and sweet birch has. Birch shrinks a lot when drying.

Yellow and sweet birch lumber and veneer goes into furniture, boxes, baskets, crates, woodware, cooperage, interior finish and doors. Birch veneer goes into plywood used for flush doors, furniture, cabinets, aircraft and other special uses. Paper birch is used for turned products such as spools, bobbins and toys.



Split Resistance	Grain	Color of Heartwood	1983 Cost Per Board Foot
high	moderate	white	N.A.
N.A.			
good	moderately open	Greywhite	\$3.75
high	moderate close	Reddish/brown	\$2.50
good	moderate to outstanding	Reddish/Brown	\$4.95
fair	wide	orange/red	\$3.60
low	faint	reddish/brown	\$1.00
high	moderate/close	creamy	\$2.00
low	distinct	reddish/brown	\$2.00
good	unobtrusive	pink to brown	\$2.50
good	pronounced	grey-brown pattern	\$1.90
low	pronounced close	reddish/brown	\$1.50
low	moderate close	white to yellow	\$2.25
good	moderate	brown	N/A
N.A.	Distinct growth ring	reddish/brown	.95¢
low	prominent/close	pinkish/brown	\$2.00
low	moderate/close	creamy-white	\$2.40
good	Pronounced Pattern	grey	\$1.90



BLACK WALNUT

(*Juglans Nigra*)

Black Walnut is also known as American Black Walnut. It's natural range extends from Vermont to the Great Plains and southward to Louisiana and Texas. Most of the walnut timber is produced in the central states.

The heartwood varies from light to dark brown and the Sapwood is nearly white. Black Walnut is straight grained, easily worked with tools and stays in place well. It is heavy, hard, strong, stiff and has good shock resistance. Black Walnut is suited for natural finishes.

It is used as plywood or solidwood. Black Walnut is used for furniture, gunstocks, cabinets, interior finish and is an excellent wood for carving.

DOUGLAS FIR

(*Pseudotsuga Menziesii*)

Douglas Fir is also known locally as Red Fir, Douglas Spruce and Yellow Fir.

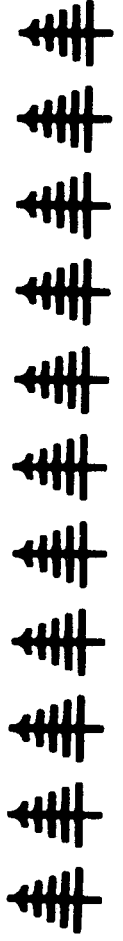
Douglas Fir is found in the Rocky Mountains to the Pacific coast and from Mexico to central British Columbia. Most of the Douglas Fir lumber comes from Oregon, Washington, California, Idaho and Montana.

The Sapwood is yellowish-brown and the heartwood is reddish. The wood varies in weight and strength.

Douglas Fir is used mainly for building and construction purposes in the form of timbers, lumber, piling and plywood and is available at most lumber yards. Much of the Douglas Fir goes into fuel, railroad ties, cooperage stock, fencing, and mine timbers. Douglas Fir lumber is used for sash, doors, general millwork, railroad construction, boxes and crates. Very small amounts of Douglas Fir are used for flooring, furniture, ship and boat building, wood-pipe and tanks.

	<u>Approximate Hardness</u>	<u>Workability</u>	<u>4-H'er Level of Experience</u>	<u>Pounds Per Cubic Foot</u>
American Beech	hard	hard	Adv.	45
American Sycamore	med. hard	med.	adv.	34
Ash	hard	hard	adv.	42
Birch	hard	med.	Int.	43
Black Walnut	hard	med.	Int.	38
Douglas Fir	med. hard	hard	Int.	33
Incense Cedar	soft	easy	Beg./Int.	26
Maple	med. hard to hard	hard	adv.	33-34
Ponderosa Pine	soft	easy	Beg./Int.	29
Red Alder	med.	easy	Beg./Int.	28
Red Oak	hard	hard	adv.	44
Redwood	med.	med.	Int.	28
Sitka Spruce	med.	med.	Int.	28
True Hickory	hard	hard	adv.	52
Western Hemlock	med.	med.	Int.	29
Western Red Cedar	soft	easy	Beg.	29
Western White Pine	soft	easy	beg.	27
White Oak	hard	hard	adv.	47

1 Workability of wood according to ease of working with hand tools.



INCENSE CEDAR

(Libocedrus Decurrens)

Incense Cedar grows in California, south western Oregon and a small part from Nevada. Most of the Incense Cedar lumber comes from California and Oregon.

The sapwood is white or cream colored and the heartwood is light brown, often with a little red. It has a uniform texture and a spicy odor. Incense Cedar is light, not too strong, soft, and has low shock resistance, it is also very stiff. It has small shrinkage and is easy to season with little checking or warping.

Incense Cedar is mainly used for lumber, fence posts and ties. The lumber is used for pencils, venetian blinds, chests, closets and toys. Because of its resistance to decay, Incense Cedar is well suited for fence posts, railroad ties, poles, and split shingles.

MAPLE

(Acer Saccharum)

Maple grows all over the United States. Most of the Maple lumber comes from the middle Atlantic and the lake states.

The sapwood is commonly white and the heartwood is light reddishbrown, but is darker at times. Maple has a fine uniform texture. It is heavy, strong, stiff, hard, has resistance to shock, and has large shrinkage when drying.

Maple is mainly used for lumber, veneer, crossties, distillation wood, and pulpwood. A lot of lumber is made into flooring, furniture, boxes, crates, shoe-lasts, handles, woodware, novelties, motor vehicle parts, spools and bobbins.

Maple can also be used for butcher blocks and jobs where hard use is intended.

WESTERN WHITE PINE

(Pinus Monticola)

Western White Pine is grown in Montana, Idaho, Washington, Oregon, California, along the Cascade Mountains and the Sierra Nevada. Most of the wood comes from Idaho and Washington.

The heartwood is a cream color to a light reddish brown and darkens on exposure. The sapwood is yellowish white. The wood is straight grained, easy to work with and stays in place well after seasoning.

Western White Pine is fairly light, does not have much strength, fairly soft, fairly stiff, is not good in shock resistance, and it has a large shrinkage.

Almost all Western White Pine is made into lumber and is used for building construction, matches, boxes, patters and millwork. High grade is used for trim and carving.

WHITE OAK

(Quercus Alba)

White Oak is grown in the north and south eastern United States, and in eastern Canada. White Oak lumber comes mainly from the south, south Atlantic and the central states, also the southern area of the Appalachian Mountains.

The heartwood is grayish brown and the sapwood is almost white. White Oak is heavy and tough.

White Oak is used for lumber, railroad ties, cooperage, mine timbers, fence posts, veneer, firewood and many other things. The lumber is used for ship timbers, flooring, agricultural implements, railroad cars, furniture, door millwork and it is easy for carving.

WESTERN HEMLOCK

(*Tsuga heterophylla*)

Western Hemlock grows along the Pacific coast of Oregon and Washington, in the northern parts of the Rocky Mountains, and north to Canada and Alaska.

The heartwood and sapwood is almost white with a purple tinge. It is fairly light, fairly hard, fairly stiff, and is fairly good at resisting shock. It has large shrinkage when drying.

Western Hemlock is mainly used for pulpwood and lumber. The lumber goes into building material. A small amount is used for boxes, crated flooring, refrigerators, furniture and ladders.

WESTERN RED CEDAR

(*Thuja plicata*)

Western Red Cedar grows in California, Oregon, Washington, Idaho and Montana. It also grows along the Pacific coast northward to Alaska. Western Red Cedar lumber is produced mainly in Washington.

The heartwood is reddish brown and the sapwood is almost white. The wood is straight grained and has a coarse but uniform texture. It has small amount of shrinkage. It is light, soft, hardly any strength when used as beams or posts, and it is low in shock resistance.

Western Red Cedar is used mainly for shingles, lumber, poles, and posts. The lumber is used for siding, finish, ship and boat building, boxes, crates, sash, doors, and millwork.

PONDEROSA PINE

(*Pinus ponderosa*)

Ponderosa Pine is grown from Arizona and New Mexico to South Dakota and west to the mountains of the Pacific Coastal States.

Oregon, Washington, California and Nevada are the major producers of Ponderosa Pine wood.

The heartwood is light, not too strong, fairly soft, fairly stiff and does not have good shock resistance. It is straight grained, small shrinkage, and has a uniform texture.

Ponderosa Pine is used mainly for lumber, poles, posts, mine timbers, veneer and ties. The clear wood is used for sash, doors, blinds, moldings, paneling, mantels, trim and cabinets. Lower grade lumber is used for boxes, crates, sheathing, sub-flooring and roof boards. Knotty wood is used for interior finish.

Ponderosa Pine or Yellow Pine is available at most lumber yards.

RED ALDER

(*Alnus Rubra*)

Red Alder grows along the Pacific coast between Alaska and California. It is used commercially along the coast of Oregon and Washington. It is the most abundant commercial hardwood in these states.

There is no boundry between the heartwood and sapwood. It is light weight in the middle as most strength properties, but it is low in shock resistance and shrinkage.

Red Alder is mainly used for furniture, but it is used for sash, doors and millwork. It can also be finished to look like other woods.

RED OAK
(*Quercus Rubra*)

Red Oak is found in the eastern part of the United States. Most Red Oak lumber comes from the southern states, the southern mountain regions and the Atlantic Coastal plain.

The sapwood is almost white and the heartwood brown with a little bit of red. It is heavy, hard, and tough. Red Oak has large shrinkage when drying.

Red Oak is used mainly for lumber, railroad ties, veneer, fence posts and firewood. Red Oak lumber is used for flooring, furniture, general mill work, crates, boxes, agricultural implements, coffins and caskets, woodenware and handles. It is also used in railroad cars and boats.

Red Oak is usually straight grained and is relatively easy to work with.

REDWOOD
(*Sequoia Sempervirens*)

The Redwoods grow on the coast of California and in the Sierra Nevada mountain range. The production is limited to California.

The heartwood varies from a light cherry to a dark mahogany color. The heartwood is also decay resistant. The sapwood is almost white. Old redwood is light in weight, fairly strong, stiff and fairly hard. The wood is easy to work and it shrinks and swells a little.

Most Redwood lumber is used for siding, decks, sash, doors, blinds, finish casket stock and plant holders.

Because it is durable it can be used for tanks, silos, woodstove pipe, outdoor furniture and indoor furniture. Redwood splits easily, and the manufacture of split products such as posts and fence material, is an important business where Redwood is grown.

SITKA SPRUCE
(*Picea Sitchensis*)

Sitka Spruce grows along the coast from California to Alaska. It's name is Sitka Spruce but it is also called Yellow Spruce, Tideland Spruce, Western Spruce, Silver Spruce, and West Coast Spruce.

Almost all of the Sitka Spruce is from Washington and Oregon, but a small part is from California.

The heartwood is a light pinkish brown and the sapwood is creamy white. The wood has a fine uniform texture and has no distinct taste or odor. It is light in weight, low in bending, moderately stiff, moderately soft, and low in resistance to shock. It also has small shrinkage. On the basis of weight it rates high in strength properties.

Sitka Spruce is used for lumber, pulpwood, cooperage, furniture, planing mill products, sash, doors, millwork and boats. Boxes and crates account for a lot of the wood. Sitka Spruce has been by far the most important wood for aircraft construction, ladder rails and sounding boards for pianos.

TRUE HICKORY
(*Carya sp.*)

True Hickory is found throughout most of the eastern half of the United States.

The sapwood is white and usually quite thick. The heartwood is reddish. In terms of strength no distinction should be made between sapwood and heartwood having the same weight.

The wood of True Hickory is tough, heavy, hard, and strong. Hickory shrinks a lot in drying.

Hickory is used for tool handles, ladder rungs, athletic goods, agricultural implements, dowels, gym apparatus, poles, and furniture. Lower grade Hickory is not suitable because of knots. It is used for pallets, blocking and similar items.