

NOW that we've looked at general considerations for selecting woods, let's identify the significant general characteristics of species used for timber framing in the US. The table shows comparative densities at 20 percent moisture content (about the state of air-dried timber), total volumetric shrinkage and decay resistance (Fig. 4).

Common name	Shrinkage rate ¹	Density (lbs./cu.ft. @ 20% moisture content)	Heartwood decay resistance
SOFTWOODS			
<i>Eastern white pine</i>	8.2	25	Medium
<i>Eastern hemlock</i>	9.7	28	Low
<i>Douglas fir</i>	11.8	33	Medium
Cedars			
<i>Western red</i>	6.8	23	High
<i>Northern white</i>	7.2	22	High
<i>Atlantic white</i>	8.8	23	High
<i>Port Orford</i>	10.1	31	High
<i>Alaskan yellow</i>	9.2	31	High
Southern pines			
<i>Slash</i>	12.1	43	Medium
<i>Longleaf</i>	12.2	40	Medium
<i>Shortleaf</i>	12.3	35	Low
<i>Loblolly</i>	12.3	35	Low
<i>Ponderosa pine</i>	9.7	28	Low
<i>Sugar pine</i>	7.9	25	Low
<i>Lodgepole pine</i>	11.1	29	Low
<i>Western white pine</i>	11.8	26	Low
<i>Red pine</i>	11.3	31	Low
Spruces			
<i>Red</i>	11.8	28	Low
<i>White</i>	13.7	28	Low
<i>Black</i>	11.3	28	Low
<i>Englemann</i>	11	23	Low
<i>Norway</i>	12.1	24	Low
<i>Sitka</i>	11.5	28	Low
<i>Tamarack</i>	13.6	37	Medium
<i>Western Larch</i>	14	37	Medium
<i>Cypress</i>	10.5	32	High
HARDWOODS			
<i>Northern Red Oak</i>	13.7	42	Low
<i>White Oak</i>	16.3	47	High
<i>Black Locust</i>	10.2	48	High
<i>Tulip (Yellow poplar)</i>	12.7	28	Low
<i>Quaking aspen</i>	11.5	26	Low
<i>Bigtooth aspen</i>	11.8	27	Low
<i>American Beech</i>	17.2	45	Low
<i>Yellow Birch</i>	16.8	41	Low
<i>White Ash</i>	13.3	41	Low
<i>Hickory (shagbark)</i>	16.7	48	Low
<i>Sugar maple</i>	14.7	42	Low
<i>Red Maple</i>	12.6	38	Low
<i>Black Cherry</i>	11.5	35	High
<i>Black Walnut</i>	12.8	38	High

1. Shrinkage rate is expressed as a percent of volume from green to oven-dry moisture content.

Will Beemer

4 Comparative table of shrinkage, density and decay resistance.

SOFTWOODS

Eastern white pine (*Pinus strobus*). Northeastern US. Very stable, lightweight, abundant, very easy to work and available in large sizes and lengths. Moderately low in strength. Pitch can ooze from sapwood if cut during growing season and blue-stained sapwood a problem in certain conditions. Widely used for historic and modern timber framing.

Eastern hemlock (*Tsuga canadensis*). Eastern US. Moderately strong, lightweight when dry, works easily, available in large sizes and lengths. Prone to ring shake, sheds splinters, heavy when green, very low rot resistance. Western hemlock (*Tsuga heterophylla*) fine-grained, moderately dense, runs clear (back cover).

Douglas fir (*Pseudotsuga menziesii* and var. *glauca*). Western US. Very strong and stiff in bending and compression, though weak in tension perpendicular to the grain. Moderately lightweight, rich in color, readily available in large sizes and lengths, also as salvaged timber. Brash to work with hand tools, splintery when dry, tends to bleed pitch. Widely used for modern timber framing.

Cedars. Western red (*Thuja plicata*), Northern white (*T. occidentalis*), Atlantic white (*Chamaecyparis thyodes*). Available in many related species throughout the US. Highly rot resistant, low in shrinkage, low in strength, lightweight. Wide variation in availability of large sizes or lengths of clear wood. Two specialty cedars, Port Orford (*C. lawsoniana*) and Alaskan yellow (*C. [now Callitropsis] nootkatensis*), botanically cypresses, are denser, higher in strength, much finer textured, straight grained and highly valued (cover photos and Fig. 2).

Southern pines. Longleaf (*Pinus palustris*), shortleaf (*P. echinata*), loblolly (*P. taeda*), slash (*P. Elliottii*). Southeast US. Strong and stiff. High shrinkage, heavy. Old-growth from salvage much prized.

Ponderosa pine (*Pinus Ponderosa*) and sugar pine (*P. lambertiana*). Western US. Lightweight, low shrinkage, straight-grained, grows to be the largest of all the pines. Moderately low in strength.

Lodgepole pine (*Pinus contorta*), Western white pine (*P. monticola*). Western US. Lightweight, easy to work. Moderately high shrinkage, low strength.

Red pine (*Pinus resinosa*). Northeast US. Moderately strong, straight grained. Moderately high shrinkage, low rot resistance.

Spruces. Red (*Picea rubens*), white (*P. glauca*), black (*P. mariana*), Engelmann (*P. engelmannii*), Norway (*P. abies*), Sitka (*P. sitchensis*). Many related species throughout the US. Generally lightweight, moderately strong (Sitka the strongest) and easy to work. Moderate shrinkage, low rot resistance. Knots small but famously hard.

Larches. Tamarack (*Larix laricina*) in the eastern US, Western larch (*L. occidentalis*) in the West. Moderately strong, moderate rot resistance, straight grained, easy to work. Moderately high shrinkage rate. Lose their foliage in the fall.

Cypress (*Taxodium distichum*). Southeast US. As baldcypress, not readily available green but common as a salvaged wood from docks, vats and heavy construction. Heartwood of old-growth highly rot-resistant. Like the larches, loses its foliage in the fall.

HARDWOODS

Red oak. Northern (*Quercus rubra*), Southern (*Q. falcata*) and many related species. Eastern US. Strong, rich red color, good workability. High shrinkage, low rot resistance, heavy. Widely used for timber framing and peg stock (Fig. 5).

White oak (*Quercus alba*). Many related species. Eastern US. High rot resistance, strong. High shrinkage, heavy.

Black locust (*Robinia pseudoacacia*). Eastern US. Strong, high rot resistance, moderately low shrinkage. Difficult to work when dry. Not usually available in long straight pieces. Good peg stock.

Tuliptree (*Liriodendron tulipifera*). Eastern US. Easy to work, straight grained, moderately low strength, moderately high shrinkage. Also known as tulip poplar and yellow poplar.

Quaking aspen (*Populus tremuloides*) and bigtooth aspen (*P. grandidentata*). From Rocky Mountains eastward in US. Lightweight and easy to work. Moderately low strength, moderately high shrinkage, no rot resistance. Often called popple.

American beech (*Fagus grandifolia*). Eastern US. Heavy, dense, strong, rich color. Very high shrinkage, susceptible to powderpost beetle and carpenter ants in damp locations.