Yellow Pine

Pinus echinata Mill. Syn. - *P. mitis* Michaux., *Pinus eliottii* Engelm., *Pinus palustris* Mill. , *Pinus taeda* L.

Note: This commercial name is applied to the group of species presented below, all of which display a very similar anatomic structure and are difficult to differentiate one from the other.

Commercial names:

English:	Southern pine, Southern yellow pine.
Spanish:	Pino amarillo del Sur, Pino del Sur, Pino melis, Pino tea, Pino mobila.
French:	Pins jaunes.
Italian:	Pino palustre, Pino pece, Pino grasso, Pino giallo.
German:	Sumpkiefer, Amerikanische terpentinkiefer.

Note: There exist numerous names referring to this group of species which have caused great confusion and lack of definition.

Common names:

U.S.A.:	Longleaf pine (P. palustris), Slash pine (P. eliottii), Shortleaf pine (P. echinata), Loblolly pine (P. taeda).

Note: The denominations given above correspond to the following terms in Spanish: pino palustre, pino pantano, pino tea (P. Palustris), pino tea (P. Elliottii), pino tea americano (P. echinata), pino de incienso (P. taeda).

Physical properties:

Density:	400-450-500 Kg/m^3	
Shrinkage:	Moderately unstable	
Shrinkage values:	Total	Unitary
Volumetric:	12%	(-)
Tangential:	7.4-7.7%	(0.29-0.33)
Radial:	4.6-5.1%	(0.18-0.25)
Hardness:	Semi-hard	Hard

Mechanical properties (Wood free of defects)

Static bending:	74-105 N/mm^2
Modulus of elasticity:	11,100-14,500 N/mm^2
Compression parallel to grain:	41-58 N/mm^2
Compression perpendicular to grain:	2.7-3.3 N/mm^2 (ASTM)
Shear:	7-12.5 N/mm^2
Toughness:	6-7 J/cm^2

Structural lumber:

Grades J&P Sel and J&P Number 1 and Number 2 from the NGRDL 1975 standard correspond respectively to strength grades C30 and C22. Grades SS and GS from the BS 4978-1988 standard correspond to strength grades C22 and C 18 respectively.

Origin and availability:

This wood comes from the southeast of the United States, from Virginia to Texas. The forested area, production and export are important.

Wood description:

The sapwood has a color that varies from white to pale yellow to pale orange. The heartwood is fairly well differentiated, since it has a color that varies from orange-red to reddish brown to light brown. The growth rings are visible. The latewood forms very dark bands and the transition from earlywood to latewood is abrupt and sharply contrasted. The wood rays are very fine, not immediately noticeable except when they are included in a transversal pitch streak, forming a patterned surface. The texture of the grain is open (coarse). There are numerous pitch streaks, although other sources state that there are few, and the wood contains numerous tannins. The wood can produce skin irritations. It has a strong resinous odor which remains after drying.

Drying:

The drying process is easy and it hardly causes defects, although it is said that Pinus taeda has a tendency to warp and check The recommended drying schedules for normal quality wood are T13-C6 (4/4) and T12-C5 (8/4) from the FPLM and the L schedule (4/4) from the PRL.

Natural durability and ease of penetration:

The wood is rated as moderately to slightly durable against the decaying action of fungi, susceptible to cerambycids and anobiids, and moderately durable or susceptible to termites. The sapwood is penetrable and the heartwood is slightly penetrable or impenetrable.

Technological properties:

The wood is fairly easy to saw although the high resin content can blunt the tools, in which case the customary precautions for resinous wood should be taken. Long saw teeth reduce the effect of resin. The wood possesses good qualities for rotary-cut veneer.

The wood machines easily and tools dull at a normal rate. It is suitable for moulding, turning and drilling. Planing and moulding can produce raised (woolly) grain in the vicinity of the knots when working with an elevated feed speed and tools that are not very sharp. Resin can cause problems when machining dry wood due to the blunting of tools. This wood does not possess good properties for steam bending because of its high resin content. Gluing is done with reasonable ease with adhesives whose wetting qualities are not affected by the presence of resin, such as alkaline glues (casein glues, phenolic glues at medium temperature) or even glues that contain a solvent (resorcinol glues, for example). On the other hand, adhesives which set hard in an acid medium, such as urea formaldehyde glues, should not be used on very resinous woods. Gluing on fresh recently planed surfaces is recommended. The wood takes nails and screws well.

When finishing there may be holding problems with film-forming finishes if the wood possesses an elevated resin content. In addition, exposure to the sun or to heat sources can result in resin exudates.

Applications:

Decorative veneer./ Plywood./ Interior carpentry: paneling, doors, stairs, flooring./ Structural framing./ Naval construction: masts./ Posts./ Railroad ties./ Crates (low quality)./ Paper pulp./ Kraft paper.