



## NOVA IMPORTED CEDAR: Species and Product Information

Chinese fir lumber products are appearing in US markets and are marketed as Chinese Cedar. The Chinese Cedar products seen in the market include fencing and lumber for other applications such as decking, paneling, floor panels and outdoor components. Chinese Cedar is not approved for use in wood construction in the US as structural lumber.

### Species Information

Chinese fir (*Cunninghamia Lanceolata* (Lambert) Hooker) is one of the major plantation species in the southwest of China. There are about 6 to 8 million hectares of Chinese fir plantations in subtropical China. Most of the harvest of Chinese fir comes from plantations. Plantation Chinese fir timber production in 2005 was 17850 cubic meters. Extensive scientific information on this species is published in Chinese language references.

Sapwood of the Chinese fir is light yellow to grayish brown with a reddish tinge, and is distinctive from the heartwood. Heartwood is light yellowish brown to light reddish brown. Lumber of this species is bright and has distinct resinous odor, straight and even grain, fine to medium texture, is light and soft to very soft, shrinkage usually small, strength low to medium-low, impact toughness low to medium, easy to saw or slice, good natural durability, resistant to termite attacks, difficult to treat with preservative treating chemicals. Brown dots to the naked eye on the cross-section are the axial parenchyma wood cells. There are short vertical lines on the radial and tangential surfaces.

### Product Information

Chinese cedar lumber is imported in a variety of products, from fencing, decking and paneling to end-/edge-glued boards and floor panels.

### Properties

Decay resistance- In the May 2006 edition, the Forest Products Journal published an Oregon State University study entitled "Decay Resistance of Chinese Fir (*Cunninghamia lanceolata* (Lambert) Hooker). The study reported that Chinese fir heartwood

was found to be similar in decay resistance to Western red cedar and should be classified as highly decay resistant.

China fir grows at higher elevations in many areas of Southeast Asia, particularly in Southern China, Laos and Vietnam. This species has a reputation for producing naturally durable heartwood and has been extensively planted in China.

Many of these plantations are reaching harvestable ages and a number of importers have begun to bring this material to the US for use as decking and other decorative exterior applications where durability is desired. While China fir has a reputation for durability, there are concerns among potential users that this second-growth material may lack the durability of lumber from old-growth trees since there is evidence of this effect in other wood species. In order to assess the potential decay resistance of this material, the following study was undertaken.

China fir lumber was evaluated in three separate tests over a 3-year period. Boards were randomly selected from shipments onto the IS and 19-mm cubes were cut from the heartwood in each board. In all, 15 boards were evaluated in the three tests and 12 blocks were cut from each board. In addition, 19-mm cubes were cut from ponderosa pine sapwood and western red cedar heartwood. The pine blocks served as decay-susceptible controls, while the western red cedar served as positive decay-resistant comparator.

The blocks were oven dried (103 degrees C) and weighed prior to being briefly soaked, and then sterilized by exposure to 2.5 mrad of ionizing radiation from a cobalt 60 source. The blocks were then exposed to either *Gloeophyllum trabeum* Murr or *Trametes versicolor* Pilat in a soil-block test according to procedures described in American Wood-Preservers Association standard E10. Briefly, 454-mL glass French squares were half-filled with soil and a wood feeder was placed on the surface. The moisture content was adjusted, and then the jars were loosely capped and sterilized (121 C for 45 min.), allowed to cool overnight, and heated again for 15 minutes at 121C. After cooling, a small plug cut from the edge of an actively

growing culture of the respective fungus was placed on the edge of the wood feeder and the jars were incubated for 12 weeks for the brown-rot fungus and 16 weeks for the white-rot fungus. Six blocks were tested per fungus per board.

At the end of the test, the blocks were removed, scraped clean of adhering soil and fungal mycelium, weighed, oven-dried and weighed. The results were compared with those from the pine sapwood and the western red cedar heartwood. Decay resistance was classified using the scale described in ASTM Standard D 2017 where highly resistant heartwood experiences 0-10% weight loss, resistant woods 11-24 % weight loss, moderately resistant woods 25-44% weight loss, and non-resistant woods experience weight loss greater than 45%. Our method differed slightly because we used an arbitrary 12-week test, while the ASTM method is based upon the weight loss of pine sapwood controls.

### Results and Discussion

Weight losses for ponderosa pine controls exposed to *G. trabeum* ranged from 7.2 to 44.5 percent. In several instances, weight loss for the pine blocks were somewhat lower than would normally be found in a decay test, particularly for the *G. Trabeum* exposures; however, weight losses were generally high enough to delineate differences in decay resistance. The lowest weight losses for this fungus occurred in Test 2 and appeared to reflect excess moisture in the pine blocks, which may have inhibited fungal attack. Moisture levels in the China fir blocks were not excessive, leading us to include these results in our study.

Weight losses for Western red cedar heartwood averaged -0.35 and .32 percent for *G. Trabeum* and *T. Versicolor*, respectively, illustrating the excellent decay resistance of this species. Mean weight losses for China fir blocks exposed to *G. Trabeum* ranged from -1.36 to 1.71 percent, and the blocks were largely free of fungal attack at the end of the test period.

Weight losses for blocks exposed to *T. Versicolor* varied more widely, from a low of -0.49 to 11.49 percent. In general, samples exposed to white-rot fungus experienced low weight losses, but blocks from three boards experienced weight losses ranging from 7.28 to 11.49 percent. It is unclear why these boards were so much more susceptible to fungal attack, especially to a white-rot fungus, although it is possible that some sapwood was inadvertently included in these samples or that these boards were cut from zones of the heartwood that were less durable (blocks were only cut from zones free of visible sapwood). White-rot fungi typically cause lower weight losses on coniferous woods than brown rotters in this test. This variation may reflect the natural range of decay resistance of wood of this species. Based upon the weight losses obtained, the material would be classified as highly decay resistant according to the ASTM Standard classification.

### Conclusion

Although there was some variation in the durability of individual boards, the China fir evaluated in these studies was classified as highly resistant to fungal attack, a classification that is similar to that given to western red cedar.

Clear Wood Strength Properties (psi)				
	Specific Gravity	Bending Strength	MOE (x1000)	Compression Strength - Para
Chinese fir	0.37 (0.32-0.42)	9.3 (7.2-10.9)	1.32 (0.95-1.48)	5.2 (4.3-6.0)
Yellow Cedar	0.44	11.2	1.42	6.3
Incense Cedar	0.37	8	1.04	5.2
Port Orford Cedar	0.43	12.8	1.7	6.3
Western Red Cedar	0.32	7.5	1.12	4.6
Lodgepole Pine	0.41	9.4	1.33	5.4
Douglas fir (Coast)	0.48	12.3	1.94	7.2