

Southern Yellow Pine Stain

Drying Thick Southern Yellow Pine Export Lumber to Minimize Brown Stain

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Southern yellow pine fitches and joinery exported to Europe are remanufactured and sometimes finished with clear coatings. Brown stain may detract from the desired appearance. Thus, presence of brown stain in export stock may decrease its value and be reason for a claim against the exporting company.

What is Brown Stain?

Brown stain is a chemical discoloration within the wood that ranges from light brown to deep chocolate color. This stain is not caused by fungus. It should not be confused with the so-called "kiln burn" that often shows as a charred discoloration on the board surface after high-temperature kiln drying. The stain may develop on the surface, slightly under the surface or throughout the piece. More typically the stain concentrates directly under the surface. Areas under the sticker are generally not stained. Sometimes it is very difficult to detect the stain as the normal latewood (summerwood) color blends with the brown stain colors. Heartwood is generally not affected.

Causes

Important facts are: (1) the stain is caused by the precipitation of water soluble extractives; (2) these extractives are carried along with the free water within the wood as it dries; (3) the extractives precipitate at the location in the wood where liquid water turns to vapor. This is usually at or just beneath the surface. Water in the wood directly under the sticker moves laterally and/or into the sticker. Thus the stain is not generally found directly under the sticker; and (4) the solubility of the extractives increases with higher temperatures. Any drying practice that increases solubility of the extractives (e.g. higher temperatures) usually increases the depth and color of the stain.

Control

Literature from the 1930's to the present has discussed brown stain in the white pines (both east and west) but not in Southern yellow pine. No foolproof solutions have been developed but several processing variables that can be controlled at the mill and some dip solutions have shown promise in reducing the intensity of brown stain in the white pines. Processing variables discussed in the literature include:

Processing For Improved Results

Length of log storage Quick turnover

Time between sawing and stacking Stacking immediately

Time between sawing and kiln drying Kiln drying within 1-2 days

Kiln temperatures Lower dry bulb temperature and lower humidity

Pre-dipping Mixed results

Brown Stain Control Study

North Carolina State University Wood Products Extension personnel conducted a study to develop processing recommendations for the Southern pine industry that would minimize and/or eliminate the development of brown stain. The study included two phases. The first phase consisted of studying processing variables and their effect on brown stain at several mills. The second phase was testing kiln pretreatments and schedules at the Wood Products Laboratory, North Carolina State University and at cooperating mills.

Results from Phase I – Visitations

Six Southern pine mills producing export material were visited by North Carolina State University Wood Products Extension personnel during the spring of 1985. The following observations were noted during the visits.

Length of Log Storage

The length of log yard storage varied from zero to two years. Mill personnel interviewed believed that logs stored under water sprinklers for several months exhibited more brown stain than fresh logs.

Time between Sawing and Kiln Drying

The time between sawing and kiln drying varied greatly. Practices ranged from dead piling at the green chain for several days and then stickering the material for either air or kiln drying to immediate stickering after sawing followed by kiln drying within one to three days. The effect of the length of time between sawing and drying was not clear.

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Kiln Drying Schedules
