

- Sapstain is caused by the presence of fungi in the timber
- By the time the customer receives the timber the fungus will not reoccur when used indoors because the timber moisture content of kiln-dried timber is too low to support the growth of sapstain fungi
- Sapstain is an appearance rather than a structural feature as it does not cause a loss in strength of the timber
- The presence of sapstain in timber does not negatively influence the uptake and adherence of paints and stains on the timber



The effect of coatings and stains on wood affected by sapstain.

Top left: No Stain, highlighting sapstain

Top right: Stained with Cabot Woodcraft New Rosewood

Bottom left: Stained with Feast Watson Black Japan

Bottom right: Stained with Cabot Interior Chestnut

What is it?

Sapstain, also called bluestain, is a fungal stain in timber caused by the presence of pigmented fungal hyphae in the wood. Sapstain is commonly associated with softwood timbers, particularly pine, but also occurs in hardwoods. Some timbers, like ash eucalypts, are light in colour. When the dark strands of fungal hyphae grow in the wood they appear as dark coloured 'stains' on the light coloured timber.

What causes it?

Fungi exist all around us. Sapstain fungi, in particular, are found in the forest, forest landings, log storage facilities at the sawmill and in the drying yards and kilns. The various fungi that cause stain in timber are easily spread in the environment by:

- spores carried by air, water and insects
- spores in soil and other infected logs.

There are a number of different fungi that can cause sapstain—internationally the number may be up to 250 different species.

Sapstain in eucalypt timbers



Sapstain in sawn eucalypt timber.

In Victoria, fungi capable of causing sapstain range from the surface moulds such as *Trichoderma* and *Penicillium*, to fungi that penetrate deeply in the wood such as *Ophiostoma*, *Graphium*, *Aureobasidium* and *Alternaria*.

When the fungus grows in the timber the fungal hyphae (long, branching filaments or threads) divide and grow. Collectively, many fungal hyphae are called mycelia. As the mycelia grow, they begin as clear or transparent threads. As they develop in the wood they form dark pigments (melanin). Melanins are also found in humans and are responsible for our skin and hair colour. It is the presence of the melanin in the fungal mycelia that makes the fungus visible in the light-coloured timbers.

Fungi require certain environments to grow well, including availability of moisture and the right temperatures. When these conditions are right, in the forest, forest landings, log storage facilities or in the drying yards at the sawmill, the fungus can grow.

Wood is a renewable material and, as such, is a natural product. Although current practices are in place to limit the spread of sapstain in the wood during harvest, transport and processing, sometimes it is impossible to stop even with the best preventative management.

What can I do with sapstained timber?

Sapstained timber can be used in the same way as timber without sapstain. The timber is still as durable and as strong as timber without sapstain. The fungi responsible for the sapstain are unlikely to spread in kiln-dried timber, as the timber is too dry for it to grow. You can also still paint or stain the timber. In fact, some people appreciate the added character brought about by the colours and patterns in the wood as an added benefit of using sapstained timber for appearance-grade products.

How does it affect the wood?

When sapstain fungi grow in wood, the fungus does not invade the cell walls but survives by growing in the ray cells (of hardwood) where free sugars and starch are readily available as food sources. There is more free sugar and starch in the sapwood so the fungus will first grow in the sapwood before moving into the heartwood. This results in the common pattern of bluish-black streaks in a radial direction in the timber and a round band of black discoloration when looking at the end of the log. Sapstain fungi may also cause yellow or pinkish discoloration of timber if caused by the surface moulds.

Sapstain is therefore an appearance rather than a structural feature of the timber. Research suggests that there is no loss in strength of the timber infected with sapstain fungi.

Once the timber has been processed at the mill, the fungus will not reoccur when used indoors. This is because the fungus cannot survive the temperatures they are exposed to in the kiln-drying process. After the timber has been kiln-dried, it is too dry to allow the growth of any of the sapstain fungi. In essence, the 'right environment' is eliminated and the fungus cannot grow.

Additionally, even though the fungus may still appear in the timber as a bluish-black colour, its presence does not adversely influence the uptake and adherence of paints and stains to the timber, although you will still see the fungal stain through light-coloured varnish. Dark-coloured stains may hide the presence of sapstain when applied to the surface of the timber.

Further information is available in the brochure 'Sapstain in eucalypt timbers' and other sources:

International Research Group on Wood Protection website 2011. Accessed 22 Aug. 2011. <<http://www.irg-wp.org/>>

Forintek website 2011. Accessed on 24 Aug. 2011. <http://www.forintek.ca/public/pdf/Public_Information/fact%20sheets/dicolor_eng.1oct02.pdf>

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