

Common wood stains and ways to prevent their occurrences

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Introduction

Colour is an important aspect of living and when well coordinated it enhances the ambience of tranquility or in harmony with the environment. Natural products provide an endless choice of shades and hues that create environment that are pleasing to both the senses and mind. In Malaysia, the wide colour spectrum of timbers provides many options that will suit the need of any consumer.

The presence of extraneous chemicals (constituents) associated with different growth features affect the absorption and reflection of different wavelengths of light from its surface, giving timber a characteristic colour. Timber in general is not monochromatic; it is a complex blend of shades of colour that are difficult to describe precisely. However, one can generally categorize them based on broad colour range for easy selection (Table 1). Timber users may have preference on the colour of the wood for specific end-uses and these grouping may be useful.

The natural appearance of timber may be blemished by stain or discolouration that is not deliberately introduced into the timber either chemically or biologically while undergoing processing. Biological stains are caused by living organism such as moulds and fungi. Chemical stains include sticker marks, water marks and iron stains. The presence of stain on timber may reduce the economic value of the timber.

Table 1 Grouping of timber by colour

Colour	Popular timbers
Brown or shade of brown	Balau, bintangor, bitis, chengal, damar minyak, dark red meranti, durian, gerutu, kapur, kekatong, kelat, keledang, keranji, keruing, kulim, kungkur, machang, mata ulat, medang, melunak, mengkulang, meranti bakau, merawan, merbau, merpauh, nyatoh, penarahan, punah, resak, sepetir, simpoh
Red or shade of red	Bintangor, bitis, dark red meranti, geronggang, kasai, kedongdong, kempas, light red meranti, melantai, red balau, rengas, tualang
Yellow or shade of yellow	Balau, chengal, giam, kedondong, mempisang, mersawa, pulai, rubberwood, sesendok, tembusu, terap, yellow meranti
White to grey	Jelutong, ramin, terentang, white meranti, perupok

For Malaysian timbers, the common stains that occur in the industry which cost millions of Ringgit Malaysia losses in value are sap-stain or blue stain, water marks and sticker marks. Generally, these stains do not affect the material integrity except for the timber appearance. As such, this does not mean that the stained timber cannot be used, but could possibly be used in products where the surfaces are coated with paint or dark-colour varnishes where the natural colour and appearance of the timber are not capitalized.

This article describes the various types of stains commonly encountered and ways to minimize their occurrences.

Iron stain

Iron stain occurs when timber is in contact with iron in the presence of water. Chemical reaction of iron and water results in formation of dark-coloured iron compounds which stain the timber surface. Some Malaysian timbers which have been tested against its susceptibility to iron stains are presented in Table 2 (Ser 1983).

Table 2 Susceptibility of iron stains of some Malaysian timbers

Not susceptible	Slightly susceptible	Moderately susceptible	Very susceptible
Teak (locally grown)	Mengkulang White meranti Rubberwood	Bintangor Jelutong Kapur Kempas Melunak Dark red meranti Merbau Tualang	Chengal Damar minyak Kekatong Keruing Light red meranti Meranti bakau Merbau Mersawa Resak Sesendok Terap

To control this stain is to eliminate the source of iron. Typical sources of iron are corroded metal straps on green timber and rusty metal in the dryer or drying chamber such as roof vents and metal false ceiling. Water condenses on rusty kiln components and then drips on the timber stack.

The extent of occurrence of iron stains varies according to wood species. Generally, light colour acidic timbers are more susceptible and conspicuous to iron stain. Figure 1 shows the introduction of iron stain from metal strapping used. The stain may not be removed by light planing.

Iron stain can be removed by treating the affected surface with oxalic acid. However, the treated surface darkens again when exposed to light. To prevent darkening, sodium dihydrogenphosphate solution may be added to sustain the treated surface.



Figure 1 Iron stain caused by rusting metal strap

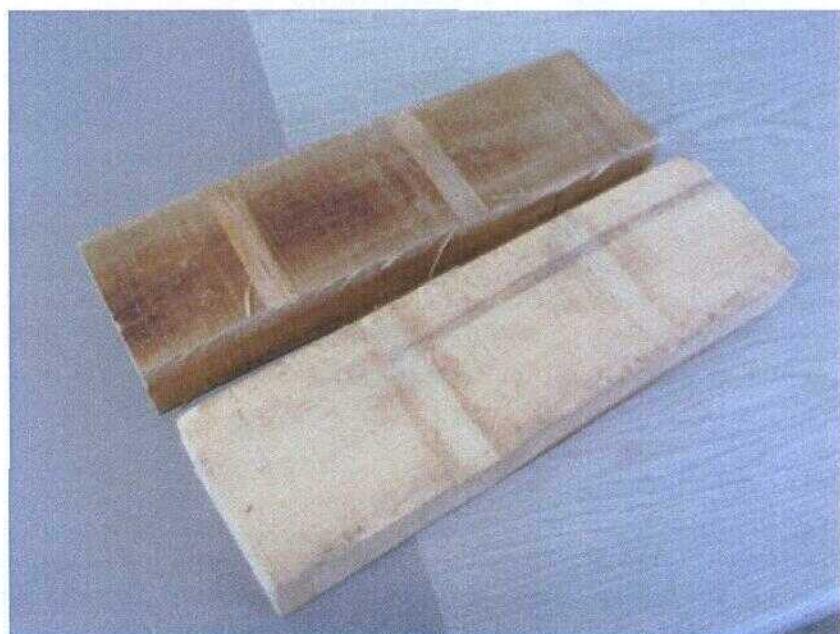


Figure 2 Superficial sticker marks on rubberwood that may be removed by light planing

Sticker marks

Sticker marks are discoloured or stained area that runs across the width of a plank/board where the stickers were located during drying. The marks could be seen in rough sawn plank/board after drying (Figure 2). These marks could be light or superficial and may be easily removed by light planing. However, deep sticker marks cannot be removed and thus prohibit the timber to be used for products which require clear natural finished appearance or light-colour varnished products (Figure 3).

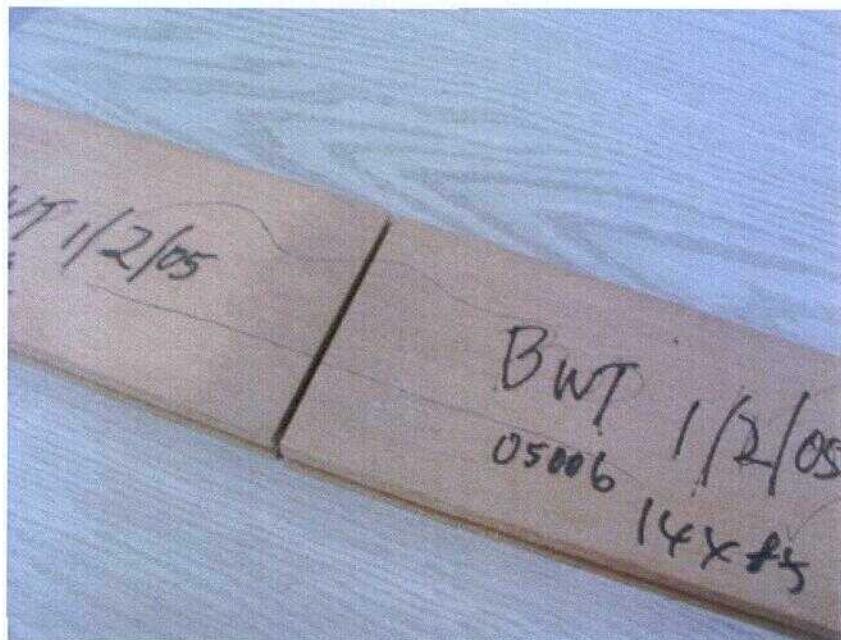


Figure 3 Deep sticker mark on moulded simpoh strips

There have been incidences of sticker marks in the industry every now and then, and some operators took great pain to overcome this problem. Occurrences of sticker marks in the industry are more rampant in the processing of light-colour timber species such as rubberwood, ramin, kembang semangkok, etc.

Sticker marks occurred when there is a clear differential in drying rate within a piece of timber—between the timber immediately beneath the stickers and those away from the stickers. Most cases of sticker marks that occur locally are due to the use of wet or green stickers. Another possible cause is the use of wide stickers; it will take a longer period of time for the timber beneath the stickers to dry out. Another serious cause of sticker marks is the practice of stickering of timber prior to chemical treatment. This practice invariably caused the stickers to gain higher moisture content that prolonged their drying out thus creating differential drying rates at the interfaces of stickers and planks that resulted in sticker marks.

Sticker marks can be prevented by:

- Using only dry stickers
- Using narrow stickers (25×25 mm)—some may use moulded or grooved stickers where the surface contact areas between the stickers and planks are minimized
- Storing dry stickers under-shed and avoid wetting the stickers
- Keep/store stickered timber stacks in an airy shed away from any possible direct contact with water or rain

Water marks

Water marks are stains or discolourations resulted from water accumulated on the surface of timber that eventually dried out (Figure 4). Depending on duration of water accumulation, the re-adsorption of water into the timber may be deep and results in deep water marks that may not be possible to be removed by light planing.

There have been frequent occurrences of water marks in drying chambers where water is introduced into the chamber to increase the relative humidity for conditioning or equalization of a charge towards the end of a drying cycle. The use of water and most of

the time spraying directly above the timber stacks should be avoided. When coupled with poor control of spray, excessive amount of water accumulated on the timber will result in severe water marks problem.

The occurrence of water marks in conventional steam heated kiln is mainly due to condensate in the drying chamber dripping and accumulated on the timber stack. With proper design, condensate especially on the ceiling and vent housing at the top of the chamber could be drained off without much problem. It was observed that water marks were more likely to occur when timber below 25% moisture content is wetted.

Water marks could also occur when dried timbers are wetted during storage. Thus, care should be taken at all time not to re-wet dried timber whether in storage or on transit.

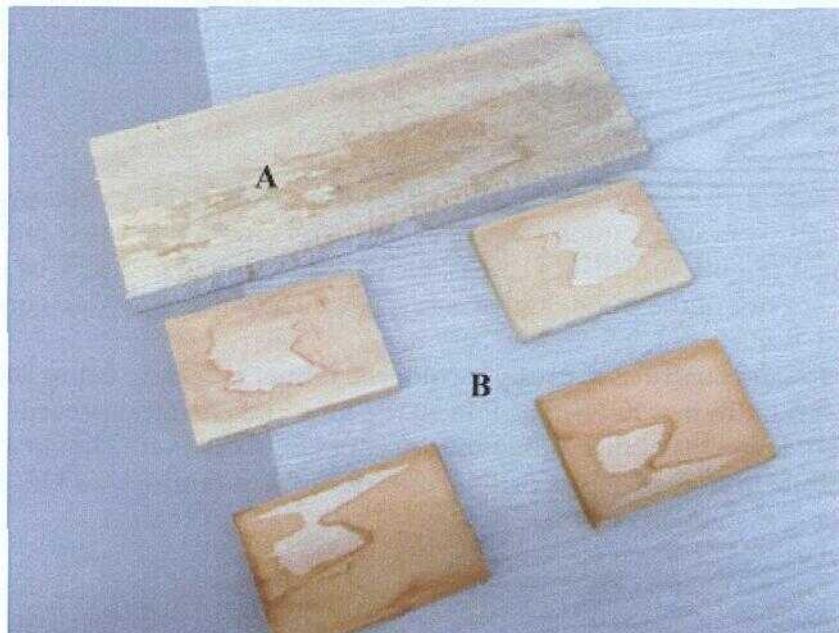


Figure 4 Deep water stain (A) on rengas and superficial water stain on semi-finished pieces of sentang wetted during storage (B)

Water marks can be prevented by:

- Avoid spraying water directly onto the timber stack during drying
- Making sure that condensate in the drying chamber is drained off and not dripping on the timber stack
- Storing timber under-shed and avoid rewetting of dried timber in storage and on transit
- Timber undergoing air drying should be properly stickered and stacked, and placed in well ventilated shed

Biological discoloration

Two common types of biological discolourations on timber in the local industry are: a) surface moulds, and b) sap-staining fungi. In warm and moist weather conditions fungi/moulds will propagate very rapidly. They can appear within 24 hours at log ends, and/or on surface of freshly sawn timber or sapwood of some timber species which has been block stacked or too closely stacked and remain green for a prolonged period. Under any circumstances, susceptible sawn timber should be effectively stickered and placed in airy shed, so as to dry off the surface moisture immediately after sawing to prevent or impede

the attack. Sap-staining fungi do not develop in seasoned timber with moisture content below 20%. Other fungal stains such as brown or grey stains are not commonly reported.

a) Surface moulds—commonly found as cottony or fluffy growths on the surface of the timber, they do not penetrate far into the timber or cause any breakdown of cell structure but result in superficial stain. This can be planed off without much loss. It was noticed that some stickered timber of susceptible timber species, if placed in unventilated storage area or damp situations could promote the growth of these moulds which will eventually impede air passage through the timber stack during drying and further aggravate the problem and prolong drying.

b) Sap-stains—usually known as “blue-stain”. Sap-staining fungi invade the living cells of the sapwood and penetrate much more deeply into the timber than do the surface moulds, and the stains which they cause cannot be planed off easily. The timber itself is not materially affected other than by the unsightly stain where natural colour is required. However, if the timber is painted the stain will be of no disadvantage.

Certain species of light-coloured Malaysian timbers, such as rubberwood, ramin, jelutong, sesendok, nyatoh kuning (Figure 5), etc., and sapwood of some timber species, such as chengal (Figure 6), balau, kempas, etc., are susceptible to attack by sap-staining fungi, which are not of the wood-destroying type, which under favorable conditions can badly stain the timber.

A step to sap-stain control is to dry light-coloured timber quickly to below 20% moisture content. However, this may not be possible all the time and chemical preventive measure could be taken. Log ends of susceptible species could be coated with chemical to prevent fungi attack while in storage before cutting and freshly sawn timber could be dipped with anti-stain chemical solution or fungicides.

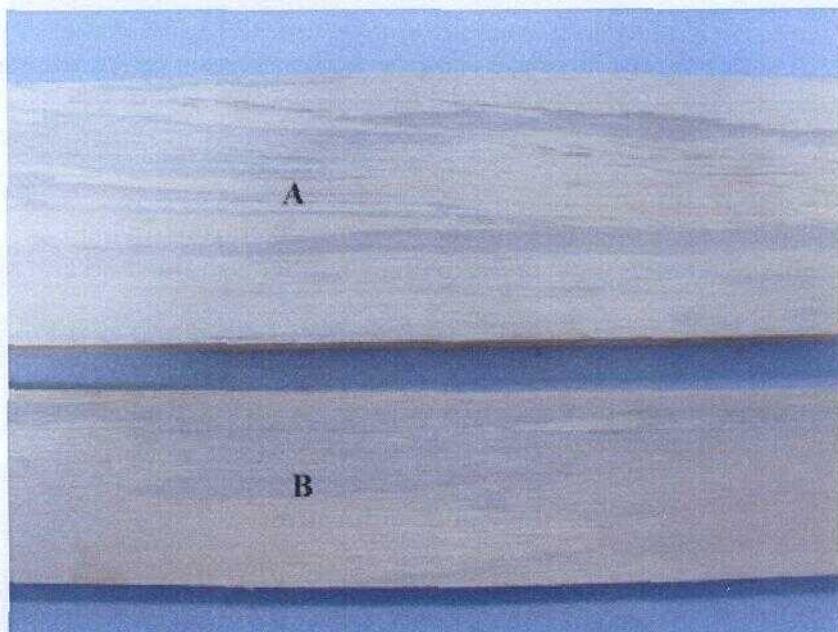


Figure 5 Blue-stain on light colour timbers—Nyatoh kuning (A) and Ramin (B)

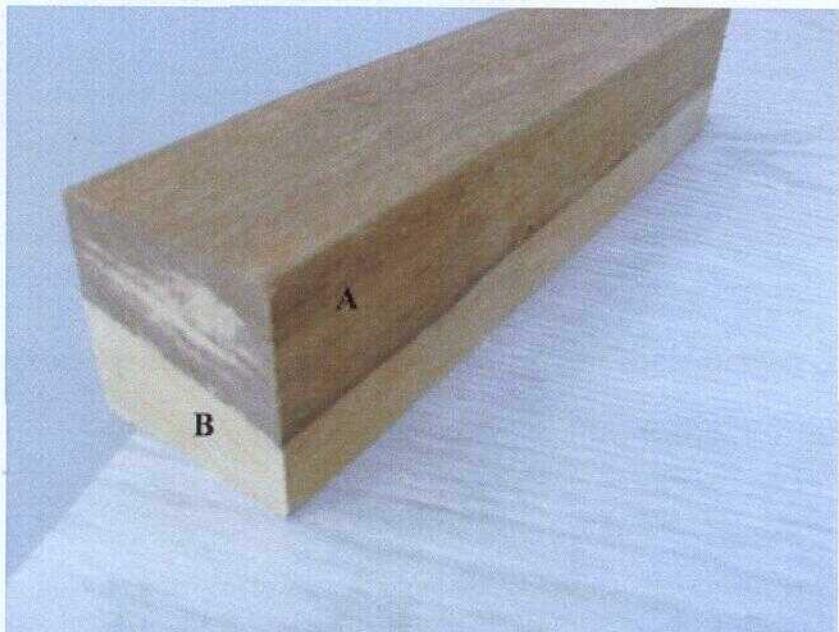


Figure 6 Sapwood (A) of chengal with blue-stain, heartwood (B)

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