bleeding trees

Trees really are amazing things, quite apart from the aesthetic and environmental largesse they bestow on us.

Their engineering prowess is obvious, being able to pull off such feats as raising and maintaining a column of water over 110 metres high and being able to support horizontal branches, weighing hundreds of kilograms and metres long, without any need for bracing. It is, however, their prowess in the areas of chemical manufacture that I choose to marvel at – and curse!

Trees are adept at chemical warfare using both chemical reserves and 'on demand' chemical manufacture in their battle for survival. Although they are all 'at it', conifers provide a good example. When the pine tree is attacked, generally by insects, bacteria or fungi, it fights back by producing its own brand of insecticide and fungicide (which we commercialise as pine oil). Should the damage to the tree be greater, conifers produce their own wound dressing in the form of gum rosin – but more on this later.

Another area of chemistry that trees become involved in is the area of wood preservatives. Wood in wet environments tends to rot and the tree needs to be able to protect itself from its, naturally, wet environment. Many species of trees manufacture a range of preservatives and antioxidants, primarily based around phenol chemistry. Some of the more durable timbers produce a complex array of such preservatives; over 70 separate compounds have been identified in one species of teak.

All of the above mentioned chemicals are of a low molecular weight and are relatively easily extracted from milled timber, either by water or by solvents. Many of the water (or especially, aqueous alkali) soluble phenolic compounds are quite strongly coloured, which can be aesthetically pleasing – or a pain in the butt!

The inherent colour of Kwila is due to the presence of such compounds. Pleasant as this colour is within the timber, it is not quite so attractive when, flushed out by rain, it ends up as a stain on one's concrete patio.

For a good, solventborne primer/sealer, holding back these water soluble stains is no great problem but, trying to do it with a fully waterborne system is quite a different story. Attempting to paint such timbers anything other than shades of brown is problematical.

In order to achieve stability, the majority of waterborne paints are based on slightly acidic polymers neutralised to a pH of about 8.5, i.e. slightly alkaline. This pH is also perfect for dissolving the slightly acidic phenolic entractives and so they are rapidly pulled into the drying paint film. A white paint very rapidly loses its virginal purity. A second coat simply re-dissolves these dyes concentrated at the surface and re-deposits them on the surface of the second coat.

We can be considered fortunate that our most used timber, pinus radiata, is generally non-staining but there are sufficient staining species in use to make this a real problem.

The point at which the problem is attacked is via the fact that, as mentioned above, the staining species are slightly acid. Theoretically, the use of a bulky, insoluble alkaline material should be able to 'capture' and immobilise these dyes. Traditionally, this has been done by the use of alkaline pigments, especially zinc oxide. This approach is fraught, because such pigments can also negatively interact with the slightly acidic polymers that the paint is based on and many compromises are necessary.

Another approach is to use a totally different class of paint binder which, instead of being acid in nature, are alkaline. Such an approach means that one has to stand all of one's traditional paint formulating principles on their heads but the benefits of having the total paint film engaged in the battle is a powerful incentive.

Such an approach, like Resene StainLock, does lock the stain into the film and the priming coat, in itself, can look as if it has failed in its purpose. However, the difference is that the stain is now 'locked in' and will not migrate into subsequent coats. It may seem an act of faith but trust me – I know what I'm bleeding talking about!