Technical Note 10

Treated timber vineyard posts

Acknowledgement

This technical note is based on a 'Fact Sheet' produced by Dr Harry Greaves for the South Australian Wine Industry Association and the National Timber Product Stewardship Group.

Introduction

It is estimated that there are between 60 and 120 million vineyard posts currently in service across Australia. The vast majority of these posts are produced from radiata pine and about 75% of them are preservative treated with copper chromium arsenic (CCA). The posts are manufactured from sustainably managed plantation thinnings which are harvested to allow the remaining trees to grow to maturity. Around 15% of vineyard posts are treated with creosote, with other preservatives making up the remainder.

Treated posts have a service life of 25 – 40 years and combine strength and durability with lightness and ease of installation. They may be taken out of service for a number of reasons, including breakage, rot, and cessation of vineyard operations. In any of these cases, the posts must be dealt with in an environmentally appropriate and cost-effective way.

The main timber treatment chemical: CCA

CCA is added to timber under pressure to provide long term protection against a wide range of biological and environmental agents of deterioration and degradation, including decay fungi, wood boring insects and termites. CCA preservative was invented in 1933 and is used in many countries around the world.

There are many variations of CCA preservative formulation in which the three active elements, copper (Cu), chromium (Cr), and arsenic (As) are formulated in various ratios from either salt or oxide compounds. In Australia, preservation of wood with CCA preservative must conform to the Australian Standard AS1604.1 *Specification for preservative treatment. Part 1: Sawn and round timber.*

When these elements are introduced into timber in combination with water, the elements react with each other and with the wood structure to become fixed or bound together as substantially insoluble compounds. In other words, the levels of unfixed chemicals in or on the surface of treated timber is minimised, and therefore, leaching of elements into the environment from the timber is also minimised. This characteristic of CCA preservative is critical to its performance as it ensures that the majority of the chemicals remain within the timber to perform their preservative role rather than being lost to the environment.

CCA leaching and vineyard posts

There are few studies on this aspect of CCA timber use in vineyards and the results from some of them are confounded by lack of information on natural background levels of chromium, copper and arsenic in soils and grapevines. Arsenic appears to be the most leachable of the CCA elements.

Studies with a range of soil types show that arsenic may slowly leach from CCA-treated posts into the soil[2,3] . The amount and rate at which arsenic leaches, however, depends on factors including local climate, acidity of rain and soil, contact with groundwater and age of the posts. The most rapid losses occur when the treated post initially enters service. A limited study of grapevine tissues from vines adjacent to CCA treated posts shows little evidence of elevated arsenic uptake by fruit, leaf and stem tissues[2, 4].

Health and safety aspects of CCA-treated posts

Most of the toxicity concerns about using CCA treated timbers are focused on the arsenic and, to a lesser extent, the chromium content of the treatment. The CCA-treated timber posts are considered to pose a low risk to health because Cr and As are present in chemically reacted forms[5]. Nevertheless, as for all timber products, appropriate safety procedures should be followed when handling, cutting and installing treated timber posts.

Reuse, recycling and disposal to landfill

Redundant treated timber posts must be dealt with in environmentally appropriate and cost-effective ways. On-site storage (‘stockpiling’) before reuse and/or disposal is often employed and requires attention to minimize potential fire risks. Fire is a particular risk because toxic gases can be released during incineration and ash from burnt CCA-treated timber contains levels of Cr, As and Cu which are generally higher than that of surrounding soils.

CCA-treated posts can effectively be reused or recycled in the form of farm fence posts, garden edging and the like. Proprietary repair systems for broken posts are also available.

Treated posts that are not suitable for reuse or cannot be transported to another location, e.g. due to restrictions on movements of attached soil, need to be disposed of. The most common practice of disposal of large volumes of redundant CCA-treated posts is disposal to licensed landfills. Leaching of the chemicals from CCA-treated timber in appropriately constructed landfill is not known to be a problem. In the absence of alternatives that are more socially, environmentally or economically acceptable, this may be the preferred method.

Treated timber should not be chipped, shredded or recycled into landscape mulch or animal bedding, nor should it be burnt in the open, in domestic fireplaces or used to cook food.

Possible future options for recycling and use as renewable energy source

Using treated posts for their inherent energy value may be an option in the future. Treated timber waste can be used to generate renewable energy and/or process heat by combustion in place of fossil fuels. Specialised pollution control equipment would be required and there would be a need for approval by regulatory authorities.

CCA-treated timber wastes can be burned by controlled incineration using high temperatures, i.e. 800-1100°C, for the recovery of the preservative component elements from the ash. A smelting process could be used to recycle the elements in CCA-treated posts with the recovered elements from the waste stream being recycled into other processes – including CCA preservative [6, 7]. There are a number of barriers to combusting CCA-treated timber waste, including costs of collection, transport, grinding, and disposal and/or removal of preservative elements in the resultant ash, as well as the current lack of a facility.

Thermal conversion methods such as pyrolysis and gasification also show promise[8]. However, the economics of industrial scale facilities are yet to be demonstrated and they would also experience the same barriers as simple combustion.

Bioremediation or microbiological extraction of heavy metals from treated wood wastes has been demonstrated in laboratory research overseas, and there have been some encouraging results using both fungi and bacteria to remove Cu, Cr, and As from treated wood samples. The resulting wood wastes, which would be relatively free of heavy metals after the treatment, could then be disposed of by composting or incineration[9].

Recycling treated timber into reconstituted composites such as particleboard and wood-cement board has been shown to be a technically feasible option, but it is not currently accepted by Australian manufacturers as feedstock for these products.

Alternative preservative treatments to CCA

Alternative preservatives for the treatment of vineyard posts which contain no arsenic or chromium are registered and approved for use, and are already incorporated into the relevant Australian Standards. The alternatives are effective, although at present more expensive than CCA. They include Alkaline Copper Quaternary formulations (ACQ and micronised ACQ) and Copper Azole, and are sold under various trade names. Creosote continues to be a choice of some vineyards and one of its advantages is its fire retardant properties.

The environmental advantages of treated timber posts

Preservative treatments are used to extend the service life of otherwise non-durable timbers such as radiata pine. Treated timber will outperform untreated material and since it is derived mainly from well managed renewable forests it has clear environmental advantages over non-renewable and non-sustainably managed alternative materials.

Treated timber posts also take less fossil fuel energy and emit less greenhouse gases during their manufacture than the production of concrete, steel or plastic alternatives[10].

The carbon which has been absorbed by the growing tree remains stored in the timber posts, keeping the carbon dioxide out of the atmosphere. The storage of the carbon in harvested wood products such as treated posts is recognised in Australia's National Greenhouse Accounts. Recent international and Australian research also suggests that the storage of carbon extends beyond service life into long-term storage when redundant timber is placed in landfills

Need to know more?

Further information, including guidelines for handling CCA-treated timber and consumer information sheets, may be obtained from the Timber Preservers Association of Australia (TPAA) website (www.tpaa.com.au), manufacturers of treated vineyard posts, and/or the chemical suppliers of the preservatives.

Information about end-of-life options for treated and untreated timber is available at the National Timber Product Stewardship Group (NTPSG) (www.timbetstewardship.org.au) and on the South Australian Wine Industry Association (SAWIA) website (www.winesa.asn.au)

References

1. Mayes, P (2008) *Report on CCA treated timber in South Australia.* Environmental Protection Agency SA, ISBN 978-1-921125-75-1.

[2.] Australian Pesticides and Veterinary Medicines Authority (2005*) The Reconsideration of Registrations of Arsenic Timber Treatment Products (CCA and arsenic trioxide) and Their Associated Labels.* Report of review findings and regulatory outcomes summary report. APVMA Review Series 3, March 2005

[3.] Robinson, B; Greven, M; Green, S; Sivakumaran, S; Davidson, P; Clothier, B (2006) *Leaching of copper, chromium and arsenic from treated vineyard posts in Marlborough, New Zealand.* Sci. Total Environ. 364 (1-3), 113-123

[4.] Levi M. P., D. Huisingh and D. Nesbitt (1974). *Uptake by grape plants of preservatives from pressure-treated posts not detected.* Forest Products Journal 24 (9), 97-98.

[5.] Greaves, H. (1985). *CCA-treated timber. Facts, figures and comments on health and safety in use.* For. Prod. Newsletter, New Series No. 1, 2-4.

[6.] Nurmi A.J. and L. Lindroos (1994). *Recycling of treated timber by copper smelter.* Internat. Res. Group Wood Pres. IRG/WP/ 94-50030.

[7.] Stewart M, J. Rogers, B. Haynes and J. Petrie (2004). *Thermal Processing of CCA Treated Timbers for Energy Recovery and Environmental Protection: A focus on Metals Deportment and Management of Metals containing By-products.* FWPRDC PN02.1911 2004.

8. Taylor J., R. Mann, M. Reilly, M. Warnken, D. Pincic and D. Death (2005). *Recycling and End-of-Life Disposal of Timber Products.* FWPRDC PN05.1017 2005.

[9.] Clausen C.A. (2003). *Reusing remediated CCA-treated wood.* Proc. American Wood Pres Assoc. TX 49-56.

[10.] Greaves (1997). *Treated timber and the environment.* Proc. Timber Design Conf., NSW TDA Sydney July 1997

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