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Introduction

Walnut blight, caused by the bacterial pathogen *Xanthomonas arboricola* pv. *juglandis* (*Xaj*), is present in all walnut growing regions in Australia. The pathogen attacks flowers, shoots, leaves, buds and fruit of all commercial cultivars grown in Australia.



Fruit infections can cause great economic loss through kernel rot (left) and shell staining (right)

Spread of bacterium

Xaj primarily overwinters in the outermost portion of walnut buds and catkins. Colonisation patterns occurring during bud and shoot development in spring, suggest that resident *Xaj* can invade and infest developing fruits.

Wind driven rain-splash may be important in the movement of *Xaj* onto developing fruits, given that bacteria are easily suspended into rain-splash and transported onto host tissue.

Protective spray programme

Active ingredients

The current management strategy is based on multiple copper-based sprays for protecting susceptible plant tissue.

Copper-based products are more effective than non copper products; the addition of mancozeb to copper increases control in comparison to applications of copper alone.

Copper rates

Copper-mancozeb sprays applied at label rates provide the most effective control of walnut blight. Sprays applied at rates lower than label rates may provide effective control in low disease years.

Spray volume

Spray volumes differ between, and are dependent upon leaf age, surfaces and cultivars. Increasing spray



volumes increases copper deposition; however, deposition and efficacy reduce after the point of run-off.

Spray timing

Sprays applied at 7 day intervals from budburst to three weeks after budburst may reduce pathogen inoculum, protect primary infection courts and reduce disease incidence.



Blight sprays commence when 5% of terminal buds are at Cf2 i.e., when the leaves begin to separate

Reducing the initial inoculum from budburst is a suitable strategy for control of walnut blight in low disease years.

In high disease years, inoculum can be multiplied many times during the growing season, thus requiring further sprays during the growing season. In years with high disease incidence, multiple copper-mancozeb sprays may be required to provide adequate control.

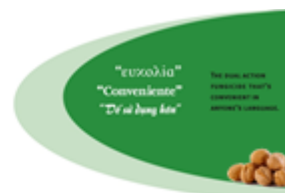
Sprays may be required from bud-burst to when nuts are half-grown to control the disease. Use half full-size diameter fruit size as an indicator for when nuts are half-grown.

Mixing sprays

It is critical when preparing spray mixtures to follow the correct mixing sequence (while keeping the mixture fully agitated according to the formulation type) .See mixing order diagram prepared by DuPont.



Mixing Order



It is important that products used in tank mixes are added in the correct sequence according to their formulation type.

When preparing spray mixtures, follow the correct mixing sequence (while keeping it fully agitated), according to the formulation type:

1. Water soluble bags
2. Dry flowable water dispersible granules (Kocide®Blue Xtra™, ManKocide®DF®)
3. Wettable powders
4. Water based suspension concentrates (Coragen®)
5. Water soluble concentrates
6. Oil based suspension concentrates
7. Emulsifiable concentrates
8. Adjuvants, surfactants
9. Soluble fertilisers (e.g. calcium nitrate)

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Concluding remarks

The incidence of walnut blight can vary markedly between cultivars, locations and years in Australia, with the development of damaging epidemics when weather conditions are favourable.

Walnut blight has the potential to seriously reduce yield and under conditions conducive to disease development and a conservative protective spray approach is warranted.

The lack of viable control strategies, other than copper-based sprays, for managing the disease has focused research on optimising the timing of copper sprays. Sprays, timed according to pathogen activity, may adequately control walnut blight and limit unnecessary applications of copper.

Chemical Safety

Users of agricultural (or veterinary) chemical products must always read the label and any Permit before using the product, and strictly comply with the directions on the label and the conditions of any permit. Users are not absolved from compliance with the directions on the label or the conditions of the Permit by reason of any statement made or not made in this publication.

Material Safety Data Sheets (MSDS) which supplement product label information must always be accessible where orchard chemicals are stored. They are available from rural merchandisers and on manufacturer's websites and provide important information to help guard users against poisoning and crop damage.

Pesticide residues may occur in animals treated with pesticides, or fed any crop product, including crop waste that has been sprayed with pesticides. It is the responsibility of the person applying a pesticide to



do all things necessary to avoid spray drift onto adjoining land or waterways.

Recording of chemical treatments is important as it ensures market access through demonstrating that you are assessing the risk; you can evaluate how well or poorly a chemical worked and you may save time and money through working out exactly what amount of chemical is required for each spraying.

For further information visit the Australian Walnut Industry website www.walnut.net.au

Disclaimer

The information contained in this publication is based on knowledge and understanding at the time of writing (September 2013). However, because of advances in knowledge, users are reminded of the need to ensure that information upon which they rely is up to date and to check currency of the information with the appropriate officer from a Department of Primary Industries or the user's independent adviser.

Acknowledgements

This project was facilitated by Horticulture Australia Limited (HAL) in partnership with the Australian Walnut Industry Association. The Australian Government provides matched funding for all HAL's research and development activities.