

Update on redlegged earth mite resistance in WA

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Key Messages

- To date there have been 49 farming properties identified with populations of redlegged earth mites (RLEM) that are resistant to frequently used synthetic pyrethroids such as bifenthrin
- One property has been confirmed with RLEM resistant to omethoate
- Resistance to synthetic pyrethroids has been confirmed to be heritable and persistent over time. The newly found omethoate resistance is also suspected to be heritable and persistent but this is yet to be confirmed
- Managing insecticide resistance in RLEM populations is a long term problem and requires an integrated management approach

Aims

- To determine the extent of RLEM insecticide resistance in the Western Australia grainbelt.

Method

Mite collection

Growers, consultants and agronomists were contacted to participate in a survey to determine the extent of RLEM resistance. Paddocks that were previously known or suspected of having a chemical failure or farms with known high levels of pesticide usage were selected to participate in the survey.

RLEM were collected either by using a suction sampler or by collecting weeds with mites on them from along fencelines. At least 100 mites were collected and placed into air tight containers with moistened paper towel and plant material.

At each collection site the following was recorded:

1. GPS coordinates
2. Location of paddock and farmer's name
3. Property name

Mites were stored below 15°C until testing for resistance could commence.

Treatments for RLEM resistance screenings

The inside of 5 mL vials were coated with either:

- Bifenthrin at 0.1 g ai/L (10 g ai/ha) (equivalent to field rate)
- Bifenthrin at 0.00006 g ai/L (equivalent to LD₉₀X2)
- Omethoate at 0.0018 g ai/L (equivalent to LD₉₀X2)
- Control (water)

Mites from a known susceptible source were also used to compare results with the test populations of mites.

Treatments for RLEM resistance to omethoate and other OP's

- Chlorpyrifos at 0.7, 0.35, 0.0875 g ai/L
- Dimethoate at 0.34, 0.17, 0.02125 g ai/L
- Omethoate at 0.000029, 0.000087, 0.00029, 0.00087, 0.0029, 0.0087, 0.029, 0.087, 0.29, 0.435, 0.87 g ai/L
- Control (water)

Testing for resistance

Vials were coated with the required insecticide concentration then left upside down at room temperature until all inner surfaces were completely dry. Once dry, a fresh vetch leaf

was placed at the bottom of each vial.

Then for each collection site, 8 healthy RLEM

were placed on top of the vetch in the vial. For each

treatment there were 6 replicates.

Scoring for resistance

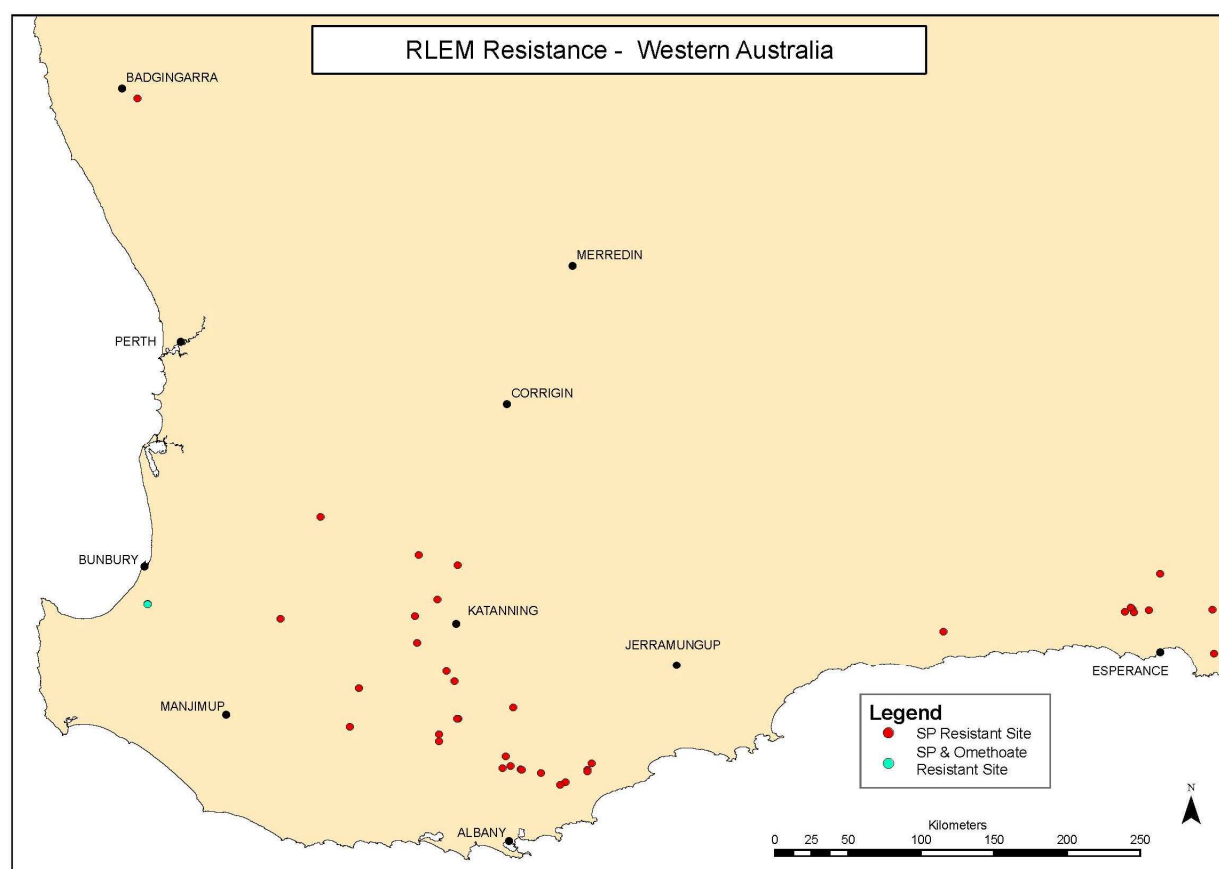
After 24 hours mites were assessed. Mites that were alive receive a score of 1, mites that were incapacitated or dead received a score of 0.

Results

Location of resistant RLEM

Since the first known resistant RLEM were found near Esperance in 2006, resistant RLEM have since been found to occur from Esperance to the South Stirlings and north to Dandaragan. There are now 49 properties in Western Australia with RLEM resistant to synthetic pyrethroids (see Map 1). All of these properties have a history of repeated applications of synthetic pyrethroids for pests other than RLEM.

In 2014 a property near Capel was discovered with resistance to both synthetic pyrethroid and organophosphate chemical. 90% of the tested RLEM survived both the screening rate of omethoate (2XLD₉₀) and the field rate of bifenthrin (0.1 g ai/L) (see Map 1).



Map 1: Locations of RLEM resistant to synthetic pyrethroids and omethoate from 2007-2014.

Testing of omethoate resistant mites

Mites from Capel that survived the screening rate were retested at labs at the Department of Agriculture and Food, WA (DAFWA) and sent to Cesar in Victoria for further testing. These mites were found to be 30 times more resistant to omethoate than a susceptible population. The Capel populations were found to be susceptible to chlorpyrifos and other chemicals in the organophosphate group. Further testing will be done in 2015.

Heritability of resistant traits?

Resistance in RLEM to synthetic pyrethroids is heritable and persists in populations. Repeated testing of the first known site where SP resistant mites were found near Esperance has shown that the high level resistance has been passed on through generations to the last tested population in 2013.

It is currently unknown if omethoate resistance is heritable. Interestingly, in the past five years paddock spray histories show that dimethoate was used for the control of RLEM. Spray failures were only noticed in 2014 when mites survived high rates of omethoate applications.

Managing resistance

Paddock insecticide spray records for the past five years were collected for each of the paddocks where mites were collected for testing. They showed that the most common management option for insect pests was the application of synthetic pyrethroid insecticides.

To date, growers with resistant RLEM have been able to control these mites using insecticides from the organophosphate (OP) group (Group 1B), e.g. dimethoate and omethoate. The combined omethoate and SP resistance found at Capel is indicating that the current insecticide dependence is beginning to break down and that growers will need to consider combining integrated pest management tools, such as:

- Crop rotations that fit with the farming system e.g. growing crops susceptible to RLEM e.g. canola following crops that do not support large RLEM populations, e.g. cereals
- Heavily grazing pasture paddocks through spring in the year prior to sowing crops susceptible to RLEM e.g. canola.
- Decreasing weeds that will host mite populations within the crop phase and around fencelines
- Use insecticidal seed dressings
- If sprays need to be applied, rotate chemical groups within the season and between years

Conclusion

A total of 49 properties have been identified from 2006-2014 with RLEM resistant to frequently used synthetic pyrethroid insecticides such as bifenthrin. In 2014, one property has been confirmed with RLEM resistant to both synthetic pyrethroids and omethoate. There are likely to be further properties identified with RLEM resistance issues. More resistance testing will be undertaken throughout 2015.

Get your paddocks tested in 2015

If you suspect RLEM have survived registered rates of insecticide applications contact Svetlana at Department of Agriculture and Food on 9892 8591, mobile 0427 772 051 or email Svetlana.micic@agric.wa.gov.au, arrangements can be made to have samples of mites tested for their level of resistance.

Key words

Redlegged earth mite, resistance

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