New mouse plague research

AUSTRALIA is likely to experience the worst mouse plague in living memory by late spring-summer 2011-12 based on state government reports. The expected decline in mouse populations this winter has not eventuated; it is principally thought due to the significant food supply of rain damaged crops from the 2010 harvest.

Earlier this year, the Grains Research and Development Corporation (GRDC) contracted the Invasive Animals Cooperative Research Centre (IA CRC) to deliver new R&D on improved application of the current registered zinc phosphide bait. This R&D includes: review of application rate; timing of repeat applications; paddock perimeter application options; and the development and communication of management practices that could influence mice populations.

This will improve grower application of cost effective baiting with zinc phosphide and results have already been incorporated into a revised GRDC fact sheet sent out to industry in September 2011.

The GRDC has also contracted the IA CRC to conduct surveillance trapping in combination with existing mouse plague models to determine potential mouse numbers in the 2012 season.

There has been unprecedented demand for zinc phosphide bait which has resulted in the Australian Pesticides and Veterinary Medicines Authority (APVMA) approving a number of emergency permits in 2011, including permits for regional manufacture of zinc phosphide bait.

The APVMA have indicated to the GRDC that full label registration of current zinc phosphide bait batching permits will require submission of a full OH&S package.

Manager Crop Protection with the GRDC, Dr Rohan Rainbow, said a joint research project to develop an occupational health and safety package to potentially support future on-farm batching of mouse baits has been approved for investment by the GRDC.

The research project will be majority funded by GRDC, with a co-investment by the South Australian State Government, and will be led by Associate Professor Tony Lower of the University of Sydney School of Public Health Australian Centre for Agricultural Health & Safety.

Rohan said GRDC is responding to a significant knowledge gap.

"The project has come as a result of recommendations from the SA Ministerial mouse task force and extensive discussion and endorsement by the National Mouse Management Working Group, a coalition of state and federal governments, the Invasive Animals CRC, the APVMA, GRDC and Grain Producers Australia (GPA).

"The research will take up to 12 months to complete, and the outcome will be subject to APVMA review.

"However, if it is successful, the outcomes of the project will be put into the public domain and will significantly benefit the entire industry," Rohan said.

Breakthrough for farmers

R&D spokesperson with the GPA, Andrew Weidemann, believes this is a significant breakthrough for farmers.

"While this project will not assist the industry during the plague this season, it will support future label registrations for regional

In the right conditions, mouse numbers can increase rapidly. Early detection of changes in mouse populations is essential so that appropriate control can be put in place.

manufacture of bait and potentially provide scope for a registration to safely mix bait on farm, which is something growers across Australia's grain growing regions have been calling for.

"We need to develop a greater range of cost effective control solutions for the future," Andrew said.

The GRDC has also signed agreements as an investment partner in the Invasive Animals CRC currently being considered in a rebid. This is a tied investment to develop an alternative rodenticide product which has a lower toxicity rating and risk to human health, and potential for grower batching of bait which would potentially resolve a number of manufacturing and supply bottlenecks.

Mice are impacting an estimated three million hectares in Australia's southern grain growing region, with early season losses to date of over $200 million and this is now escalating significantly with spring and expected harvest damage.

A mouse control fact sheet can be downloaded from www.grdc.com.au/pestlinks ■

UPDATED MANAGEMENT AND CONTROL

Mouse plagues cannot be stopped by farm management but their impact can be lessened by good hygiene, especially at harvest (Table 1) and other practices, such as weed control, that limit available food supply.

No rodenticides are registered for use in native vegetation or in other noncropping areas such as roadsides or on Crown land. A wide range of baits are registered for use around farm storages. Zinc phosphide cannot be used in towns or residential areas but an emergency permit is approved until 30 June 2012 for zinc phosphide use around agricultural storages outside of residential areas (www.apvma.gov.au – look for search permits icon, bottom right).

Bromadiolone is an anticoagulant poison. Registration for use varies between states. In New South Wales, it is available as a grain-based bait and registered for use only as a crop perimeter bait, that is, it can only be used on fencelines but not within the crop.

Growers should consult product labels for use instructions.

TABLE 1: How much mouse food is your harvester leaving? An acceptable level of harvester grain loss is 10 to 30 kg/tonne harvested.

Grain type	100 grain weight	Grain count in 0.01m² for a loss of 30 kg/ha
Wheat, oats	3 to 4	10 to 7.5
Kabuli chickpeas, faba beans	25 to 36	1.2 to 0.8
Desi chickpeas, field peas, lupins	17 to 25	1.7 to 1.2
Lentils	3 to 6	10 to 5
Barley	4 to 5	7.5 to 6
Canola	0.3 to 0.4	100 to 75

A mouse can eat 3.5 g/day, so 30 kg/ha loss at harvest (that is for a yield of 1 t/ha) is equivalent to 8570 mouse grazing days per hectare. A 10 cm by 10 cm quadrant = 0.01m².

Baiting mice in-crop

Baiting is the only control method available in-crop.

Zinc phosphide wheat grain baits 'Mouseoff' and 'Surefire' or imported 'ZP Mouse' pelleted baits are the only baits currently registered for in-crop use in Australia. 4 Farmers zinc phosphide mouse baits are also currently available under emergency permits for in-crop use. They can be used at all growth stages and between crops in pasture, stubble or a vegetative fallow but not on bare ground.

Zinc phosphide is stable in air but reacts with stomach acids to release phosphine gas which kills the mice. Ideally, mouse bait should be used in dry conditions to achieve maximum ingestion of the active ingredients.

Bait can be applied to crops by S7-Chemcert registered landholders or commercial operators, from the ground or by air.

After baiting, mouse activity should continue to be monitored and rebaiting should not occur for 14 days. Baiting must not occur within two weeks of harvest, including windrowing, due to the withholding period.

Kill rates

When bait is spread before or after sowing to control damage to seed and emerging crops, control rates have been high, typically 90 per cent.

But low kill rates have recently been recorded in maturing crops of wheat and sorghum, with efficacy between 40 and 52 per cent. This was with a rate of 1 kg bait per hectare applied at milky dough with mouse densities equivalent to 266 to 1066 per hectare. Kill rates did not vary with mouse density.

It was noted that only 30 per cent of bait remained on the ground one hour after baiting and ants were found to be removing many of the baits. Effectiveness of baiting in maturing crops may be improved if bait is spread at dusk or night.

Economic threshold

In a cereal crop estimated to average 1.2 tonne per hectare, five per cent damage will cause an income reduction of approximately $15 per hectare. Ground application of zinc phosphide bait at 1 kg per hectare costs less than that amount but varies depending on retail bait prices and application method. Ground application costs vary from less than $1 to about $2 per hectare. Bait costs from about $2.80 to $10 per kg. Aerial application costs $5 to $10 per hectare.

Baiting may reduce mouse damage by five per cent, depending on the efficacy of the bait and crop growth stage.