

# New decision tool manages mouse plagues

CSIRO Sustainable Ecosystems scientist Peter Brown discusses the development of a new computer software package to help farmers better control mice and predict potential mouse plagues.

A new computer software package is helping grain growers to better manage and monitor mice on farms.

CSIRO researchers have developed a user-friendly compact disk called *Mouser* which combines video footage, photos, graphics and text to provide information and advice on mouse control methods and monitoring.

Plagues of the house mouse (*Mus domesticus*) occur irregularly in the eastern Australian grain belt. Traditional farming systems have changed radically during the past 10 years with increased cropping frequency, a more diverse range of crops and the introduction of stubble retention and direct drilling.

These factors present favourable conditions for mice by providing high quality food for longer periods and causing less disturbance of nesting sites. Researchers believe it is likely that high mouse numbers will occur more often.

## Impact of mouse plagues

The impact of mice in plague proportions can be devastating. They can destroy newly emerging crops, cause severe losses at harvest, increase chemical usage, cause damage to buildings and machinery and infest grain storages. They can also cause stress to livestock and reduce production in intensive farming systems.

The mouse plague which affected Victoria and South Australia during 1993–1994 caused more than \$100 million in damage.

The key to minimising mice is to reduce their food supply, harbour and shelter and monitor mouse activity regularly.



CSIRO researchers have developed a new decision support tool to help grain growers better manage and monitor mice.

## Decision support tool

CSIRO Sustainable Ecosystems researchers have developed *Mouser* to enable farmers to make informed decisions about mouse control using the best and most up-to-date research results and information available. Although it is based on research carried out in Victoria and New South Wales, the principles are applicable to other areas. The software package is designed to run from a CD-ROM on personal computers.

Some of the topics covered in *Mouser* include:

- The biology and ecology of the house mouse in Australia, such as breeding, food and nesting requirements, home range size, movements, behaviour and population dynamics.

- Mouse control such as where, when and what type of control methods should be used (chemical versus non-chemical).
- The impact of mouse plagues, why they occur and the type of damage caused.
- Methods for monitoring mouse populations both directly (trapping, census cards) and indirectly (faecal pellets, number of burrows).
- The type of damage caused by mice in buildings and crops and how to assess it (electrical wires, gnawing).
- A decision key which steps the user through a series of questions to provide possible management options. Information is provided for the Central Mallee of Victoria and the Murrumbidgee Irrigation Area, NSW, but is applicable to other grain-growing areas.
- It answers some of the frequently asked questions about mouse plagues.

## Mouse control simulator

A feature of the package is an economics model (Mouse Control Simulator) which can be used to compare the relative costs and benefits of different control methods.

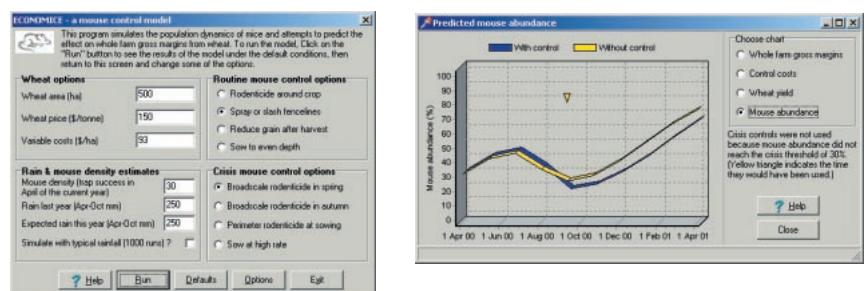
Options for managing mouse populations are split into two categories, routine actions and preventative actions carried out only when mouse numbers are increasing.

Information is also available on the cost per hectare or kilometre for each mouse control option, the effectiveness (percentage reduction) of each action and the effect on the available food supply (for example, grain remaining on the ground after harvest).

## At a glance

- Due to changes in farming practices such as increased cropping, stubble retention and minimum tillage, researchers believe it is likely high mouse numbers will occur more often.
- CSIRO has developed a computer software package called *Mouser* to assist grain growers with the management of mouse plagues.
- *Mouser* provides a wide range of information on mouse control and on-farm monitoring methods as well as costs for controlling plagues.

FIGURE 1 An example of the Mouse Control Simulator from *Mouser*



Note: On the left is the main screen of the mouse control simulator. On the right is an example of the output screen showing the response of the mouse population with and without control over the 12-month period that the economics model was run in *Mouser*.

Source: CSIRO Sustainable Ecosystems.

The model is based on a gross margin for wheat and mouse population numbers in the Victorian Mallee but can be used in other areas. The results of the simulations provide a comparison of mouse control with no control over a 12-month period (see Figure 1). Graphs are used to show the effect on the response of the mouse population, gross margins, cost of control and wheat yields.

### Mouse numbers

Mouse populations respond rapidly to changes in environmental conditions. Abundant rainfall during autumn and winter provides high quality food for mice during the following spring. Mice are stimulated to breed by early seed set of plants, particularly grasses.

Mice can breed from September to June if seasons are favourable. They breed for shorter periods when food supply is restricted. The rate at which mice breed (litter size and whether all female mice are breeding) is determined by the availability of high quality food and suitable burrowing conditions.

Mice can start breeding at six weeks of age and females may re-mate within three days of giving birth to produce litters of up to 9–10 young. A mouse has a gestation period of just three weeks so populations can explode into plague proportions within a short time. Theoretically, one pair of mice can give rise to a population of more than 500 mice in only 21 weeks.

### Monitoring mice on farms

Monitoring mouse activity can allow farmers to prepare for population build-up rather than discovering the activity once crop damage has occurred.

Census cards provide an effective indication of population density when little preferred food is available to mice. Therefore the cards are more effective during autumn than spring or summer. During spring and summer the census cards indicate whether mice are present rather than population size.

Census cards can be made from cards or paper cut to 100 millimetre by 100mm squares and then soaked in vegetable oil. In lots of 20, peg the squares to the ground about 10 metres apart along each fenceline being monitored. They can also be used for paddock monitoring. Make a written record of the amount of each square eaten on two consecutive nights.

As a guide during autumn, if more than 20 per cent is eaten in the first night, active control measures are required to minimise damage to the newly sown crop. If 5–20% is eaten over two nights, the population is high and could be a problem at sowing. If an average of 0–5% is eaten over two nights, little damage can be expected.



*Census cards can provide an effective indication of mouse numbers. If the average consumption of cards is more than 10 per cent there could be a mouse problem.*

During winter and spring, monitor fencelines, channels and roadside verges for activity such as diggings, tracks and plant damage. Monitor maturing crops, particularly canola, cereals and lupins for pod damage and head lopping. During summer, monitor stubbles for mouse activity such as burrows and worn tracks.

### Autumn mouse management

To protect crops from mouse damage at sowing, carry out several routine actions. This includes sowing to even depth, sowing as early as possible to get plants established quickly, keeping paddocks free of seed spillages and monitoring signs of mouse activity.

If mouse numbers are moderate carry out preventative actions such as sowing deeply and possibly sowing at a higher rate.

Do not sow dry and do not direct drill into heavy stubble if there are mice present. If slashing and grazing do not reduce food quality and shelter it may be necessary to burn stubbles. Cross harrow or roll after sowing to ensure the seed is well covered.

If mouse numbers are high, monitor their densities and then consult the Department of Agriculture or Rural Lands Protection Board to see if baiting is warranted.

### Winter and spring control

Routinely control weeds and grasses along fencelines, channel banks and crop margins before seed set by spraying or slashing.

It is important to remove or reduce cover around buildings, silos, fodder rolls and stored hay and ensure houses and grain and stock feed storages are mouse-proof. Regularly check fodder rolls for mouse activity particularly if the rolls consist of oats,

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CSIRO and the Kondinin Group are offering members the chance to win one of 10 copies of the Mouser CD-ROM. Be one of the first 10 members to call Andrea Candy on 1800 677 761, mention you have read this article and we'll send you a free copy of the CD.

peas or vetch which contained mature or maturing grain when cut. Feed these to stock first.

If high mouse numbers are forecast, baiting may be necessary. To minimise seed set of grasses and weeds, spray-top or graze pastures heavily.

### Reduce stubble residues

The grain lost during harvest provides mice with a valuable food source. One mouse can eat on average 3.5 grams per day. Set machinery to harvest as cleanly as possible. All harvesters operate with some degree of grain loss. Acceptable levels of harvest losses are up to 3% of total yield or 10–30 kilograms per tonne harvested.

Harvest at the best time of the day to minimise grain loss, for example, ensuring canola is windrowed at the appropriate time and crops are not over ripe at harvest, particularly pulses and barley. Clean up any concentrated spills of grain around field bins, augers and silos.

If high mouse numbers are forecast for autumn, monitor mouse activity regularly, particularly in vulnerable paddocks such as barley, canola or lentil stubbles which may have sustained heavy grain loss through wind or hail damage. Graze stubbles or work paddocks to remove the food source.

### Ongoing research

The CSIRO Rodent Research Group regularly monitors mouse populations at sites in the Victorian Mallee and the Murrumbidgee Irrigation Area, NSW.

This will enable future predictions of mouse plagues to be made up to 18 months in advance.

In collaboration with NSW Agriculture and the Irrigation Research and Extension Committee, CSIRO is field-testing a range of farm management practices for controlling mice in irrigated summer cropping systems in southern NSW.

The potential for fertility control of mice is also being investigated at the Pest Animal Control Co-operative Research Centre.

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