

Rat management in sugarcane

Introduction

Two species of rat cause the most damage to sugarcane in central and northern cane districts, resulting in significant loss to both sugar content and tonnes of cane if they are not managed. Both species are native grassland animals and are protected under the *Nature Conservation Act 1992*.

Species description, biology and damage

Canefield or ground rat (*Rattus sordidus*)

The canefield or ground rat is found mainly on the east coast of Australia from Cape York to northern New South Wales. It is a severe pest in sugarcane areas from Mackay to Mossman, with the exception of the Burdekin district. It occurs less commonly in the southern cane growing areas.

The ground rat can measure up to 200 mm in length and weigh up to 250 gm. It is a dark coloured rodent with a coarse, spiny coat, dark-brown to black in colour with grey streaks (Photo 1). Black hairs as long as 45 mm are present on the rump. The belly fur is light greyish-yellow. The tail is dark brown to black, is usually shorter than the head and body, and has pronounced scale rings. The ears are a light grey colour and females have five pairs of teats.

Ground rats dig many burrows with tunnels 5-10 cm in diameter (Photo 2). The tunnels often slope downwards to a nesting chamber about 15 cm in diameter which contains a bed of dry grass. Burrow systems are usually no more than 40 cm deep. Rats are using the burrows if 'fresh' soil is found around the entrance holes. The burrows often follow cane rows, while in non-crop areas holes are found near grass clumps, stumps, fence posts and large stones. As many as 23 rats may occupy a single nest.



Photo 2: Burrow of ground rat.



Photo 1: Ground or canefields rat.

The population cycle of the ground rat closely follows the sugarcane crop cycle (Figure 1):

- Mature, non-breeding individuals leave adjacent non-crop harbourage areas and colonise developing crops during November–January.
- Following colonisation, an annual breeding period from November to March is associated with the first appearance of summer grasses in and around crops as a result of rainfall. The main diet during the peak breeding is seed of summer grasses. Breeding declines as seed becomes less available and their diet switches to include more sugarcane.
- Ground rat populations disperse back to non-crop harbourages as sugarcane crops are harvested. Re-colonisation occurs in the following season between November–January.

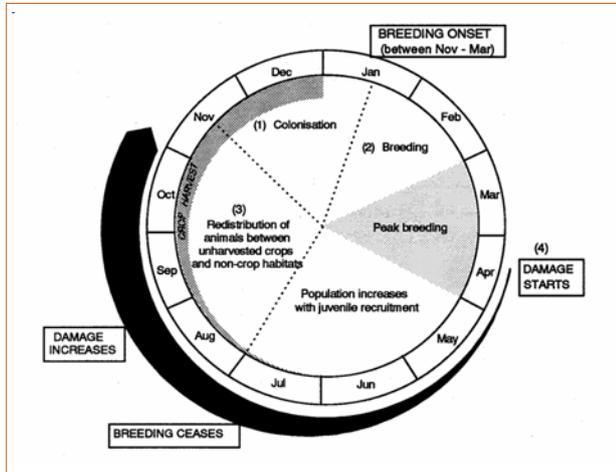


Figure 1: Breeding and damage cycle of ground rat.

Rat populations and subsequent damage to sugarcane, are highly correlated to the amount of weed cover in cane fields and the proximity of favourable non-crop harbourage. **Rats do not breed when only sugarcane is available for food.**

Ground rat damage (Photos 3 and 4) affects yield in two ways:

- Bitten stalks – reduces the tonnes of cane/ha.
- Secondary attack by other pests – rat-bitten cane is prone to attack by bacteria and fungi, and by insects such as sugarcane weevil borer. This can result in a 15-20 per cent loss of CCS.

Losses of 10-30 per cent can result from a combination of lost tonnes and reduced CCS. Ground rats usually damage the lower 20 cm of the cane. If cane is lodged ground rats are capable of damaging the whole stalk.



Photo 3: Ground rat damage to cane stalks at ground level.



Photo 4: Severe ground rat damage.

Climbing rat (*Melomys burtoni*)

The climbing rat is also found along the coast from Cape York to northern New South Wales, and also extends into the Northern Territory and north eastern Western Australia. The most severe and widespread damage from climbing rats occurs in the valleys growing cane within the wet tropics (Tully to Mossman), however they may also cause damage to sugarcane in parts of the Mackay, Proserpine and Herbert districts.

The climbing rat (photo 5 and 6) is a smaller animal which varies in colour. They measure up to 130 mm in length and weigh up to 80 gm. Back colour varies from grey to red brown. Belly colour is white, grey or cream, sometimes grading to pale orange on the sides. The tail of the climbing rat has a tile pattern as opposed to the series of rings in the case of the ground rat. The climbing rat is an agile climber.



Photo 5 and 6: Climbing rats may be red brown or khaki in colour and are agile climbers.



Climbing rats do not burrow, but instead make grass nests (Photo 7). They can breed all year round, with peak breeding in sugarcane fields occurring after canopy closure (Photo 8). Although breeding rates are lower than ground rats, climbing rats will continue to migrate into cane fields from adjacent harborage areas. They require suitable non-crop harborage areas to maintain their population as they exit crops completely during harvest and re-invade after canopy closure, usually from February onwards.



Photo 7: Climbing rat nest in cane.



Photo 8: Crop stage when climbing rats invade.

Cane damaged by climbing rats is chewed about 1.5 metres above ground level. The bitten stalk is usually bent over at the point of attack (Photo 9 and 10). Climbing rat damage is often found in blocks beside harborage areas. Damage commonly extends from the edge of the block in for about 15 metres. Reduced yields are similar to those caused by ground rats. Bitten stalks reduce the tonnes of cane/ha and open the stalks up to secondary infection by bacteria, fungi, and insects which lower the CCS. Damage caused by climbing rats is generally much less than that caused by ground rats. Because climbing rat damage occurs on block edges, this sometimes leads to an impression that climbing rats cause more damage than ground rats; however this is not normally the case.



Photo 9 and 10: Climbing rat stalk damage.

Management strategies

Successful rat management requires an integrated approach. Baiting by itself is unlikely to be effective.

Keep blocks weed-free

Shoots and seeds of grasses and broadleaf weeds provide rats with high protein levels required to maximise their breeding potential. High levels of protein stimulate female ovulation and help males to maximise their sperm production. Good in-crop weed control (Photo 11) removes this food source and prevents rats from reaching the body condition suitable for sustained, high levels of breeding. Weed management should aim to prevent weed seed set, starting in the fallow and continue through to older ratoons.



Photo 11: Good weed management is essential to reduce rat populations.

Keep headlands clean

Slash headlands regularly to prevent grass weeds from seeding and keep the ends of rows weed free by perimeter spraying.

Manage harbourage areas

Harbourage areas are non-crop areas on your farm where rats shelter when the crop is harvested. Any grassy and weedy patches on your farm are potential harbourage areas for rats (Photo 12). Higher levels of both ground and climbing rat damage are more likely when harbourage areas are in close proximity to cane blocks. The aim of managing harbourage areas is to prevent grasses and weeds from seeding and to make these areas unfavourable to rats. Strategies include slashing, fencing and grazing, and shading out grass and weeds with trees planted at 1.5-2 metre spacing (Photo 12 and 13).



Photo 12: A grassy bank harbourage (on the right) compared to a revegetated section next to it.



Photo 13: Revegetating to shade out grass and other weeds.

Encourage biological control

Owls are a natural predator of rats and can be encouraged to stay around cane paddocks by providing nesting boxes (Photos 14 and 15) and artificial perches.

Five species of owls are known to hunt in cane. They are the barn owl, barking owl, southern boobook, masked owl, and eastern grass owl.

Nesting boxes can be home-made. Designs are often available from many local NRM groups. For example, visit www.barronrivercatchment.org.au. Alternatively, they can be purchased from companies such as www.nestingboxes.com.au.

Old gum trees with hollows are valuable habitat trees, offering nesting sites for owls. Nesting boxes suitable for owls are quite large and heavy and may require specialist equipment to assist in mounting in trees.



Photo 14 and 15: Owl nesting boxes.

Monitoring

Monitoring allows a more strategic approach to baiting. Check for evidence of rat burrows and chewed cane stalks in newly ratooning blocks and in developing plant cane. Look for climbing rat damage at about 1.5 metre stalk height and nests in the cane canopy. Also check with your local Productivity Service company to gain an idea of the district rat pressure.

Strategic baiting

The aim of baiting is to knockdown rat populations before their peak breeding occurs. Baiting after the rat population has exploded is much less successful, as they can breed at a faster rate than death rates from baiting.

Usually some ground rats carry over from the previous crop and will favour grassy sections in paddocks. Winch rows are also a favourite site for ground rat burrows. Baiting should target these areas.

Damage mitigation permit

As both ground and climbing rats are native animals their control is subject to the Queensland Government issuing a Damage Mitigation Permit. An industry-wide permit is currently issued and reviewed every three years. This avoids the necessity of individual growers applying for individual permits. However, growers need to abide by the conditions of the permit, which include:

- Registered baits may be used between **1 October and 30 June**.
- Growers must provide details of blocks they intend to bait. Growers may provide details of rat baiting by phone fax or email to their local productivity service company.
- For in-crop baiting, ZP Rat Bait or Rattoff® may be used, as directed by the product label.
- Rattoff® may be applied by helicopter or unmanned aerial vehicle to **lodged** cane, under APVMA Permit 84001. This permit applies to Queensland only and specifically to Mackay and Herbert regions. It only relates to the ground rat.
- The only non-crop harbourage areas permitted for baiting are man-made infrastructure and only Racumin®, Storm® Secure or TOMCAT® may be used in these areas.

Timing of baiting

Baiting for ground rats is best carried out as they re-colonise ratoons after harvest or plant cane, up until March. Follow up baiting may be necessary if rat populations are high or there are plentiful alternative feed sources.

Baiting for climbing rats should occur later than for ground rats, as they colonise the cane crop later (from February onwards). The application window under the Damage Mitigation Permit (1 October-30 June) allows for optimum baiting for both species.

Remember!

Baiting alone will not control rats!

Keep blocks weed free

Manage harbourage areas

**Coordinated management by neighbouring farms
is most effective**

**Provide your baiting intentions before you
bait, to maintain the Industry wide Damage
Mitigation Permit**

In-crop use

ZP Rat Bait: sachets containing extruded pellets with zinc phosphide evenly distributed within the pellet

Rattoff® ZP: sachets containing zinc phosphide coated sterilised grain

Around farm buildings

Racumin® Rat and Mouse Paste: satchel containing coumatetralyl paste

Tomcat®: either pellets or blocks for use in bait stations; Tomcat® Green contains bromadiolone, whilst Tomcat® Red contains brodifacoum

Storm® Secure: wax blocks containing flocoumafen

References and acknowledgements

Samson, P. Sallam, N. Chandler, K (2013) *Pests of Australian sugarcane*. SRA.

Dyer, B. (2010). *Queensland Sugarcane Industry Species Management Plan (2010)*. SRA.

The Rat Pack (2000).

Photos by Brenden Dyer.