

Managing dairy farms profitably with Clover Root Weevil (1-25)

Background

Clover Root Weevil (CRW), *Sitona lepidus*, feeds exclusively on clover and has spread rapidly since its arrival and identification in New Zealand around 1996.

It spread initially through Waikato, Bay of Plenty and Northland. By 2004, CRW had been found on dairy farms throughout the North Island. In early 2006 it reached the South Island and has since migrated as far as Southland.

White clover is its preferred host, with all cultivars susceptible, although more vigorous varieties show a level of tolerance. Both white clover and CRW go through seasonal cycles. CRW populations will tend to rise and fall with fluctuations in clover growth.

CRW can completely remove clover from pastures, decreasing pasture quality and negatively affecting nitrogen fixation.

Identification and damage

Adults

The CRW adult is a small speckled brown weevil up to 6 mm long found in the base of pasture throughout the year, but is most abundant in summer.

When feeding, the adult makes characteristic U shaped notches on the edge of the clover leaf. This damage is easily identified and different from other pests, e.g. slugs, clover-flea.



Figure 1: Adult Clover Root Weevil



Figure 2: Severe clover damage caused by an adult Clover Root Weevil

Larvae

CRW larvae are creamy white grubs from 1 to 6 mm long, found by digging into the root zone under white clover plants. They are present throughout the year, but most abundant from late autumn to early spring.

The larval stage is the most damaging. CRW larvae feed exclusively on clover roots, and associated nodules, reducing nitrogen fixation, clover production and persistence.

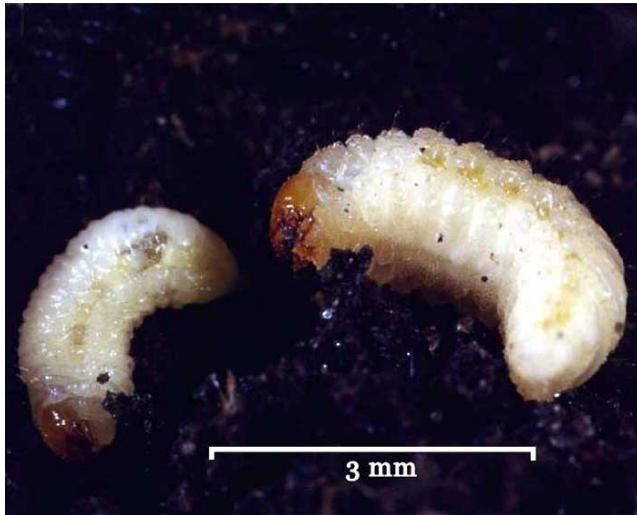


Figure 3: Mature larvae of the Clover Root Weevil



Figure 4: Damaged root nodules caused by Clover Root Weevil larvae

Potential productivity losses due to reduced nitrogen fixation

Clover roots capture nitrogen from the atmosphere. Livestock eat the clover (along with the nitrogen it has captured), then return the nitrogen to the pasture in their urine and dung. This nitrogen then becomes available to increase the growth of other pasture plants such as ryegrass. Clover therefore provides 'free' nitrogen fertiliser.

When CRW feeds on clover roots, they reduce the amount of nitrogen that can be provided by clover, and this must be supplemented with nitrogen fertiliser to maintain productivity.

In dairy pastures CRW damage can result in a substantial loss of productivity due to reduced clover levels and nitrogen fixation. These losses in nitrogen fixation can only be offset at this stage by applying nitrogen fertiliser, and drawing on existing soil organic nitrogen reserves, which vary with soil type, fertility and climate.

Control strategies

Biocontrol

In 2006, AgResearch introduced a small parasitic wasp (*Microctonus aethiopoides*) as a biological control agent against clover root weevil. It lays an egg inside the adult CRW, which immediately stops the weevil from being reproductive. After a major release programme by AgResearch with support from DairyNZ, this biological control agent is now present in most areas of the North and South Islands (see www.agresearch.co.nz/crw for the latest map on its known locations). The wasp is also spreading naturally from release points at the rate of 15-20 km per year.



Figure 5: Irish wasp hunting

Once established the wasp may take 2-4 years to effectively control CRW populations and for clover to return to pastures. It will not eliminate damage altogether and there will be cycles

Re-grassing

Where CRW is causing major damage, re-grassing after cultivation may be an option but this will not have a lasting effect as adult CRW will re-populate these areas quite rapidly.

Attempting to sow clovers directly into CRW-infested pastures will not be successful as the adult weevils eat the seedlings.

Where the parasitoid is absent or at very low numbers, use of a break-crop such as brassicas or maize will clean the paddock of clover root weevil.

Although CRW will invade the new pastures post-cropping, the parasitoid may have had a chance to establish in the area by then and be able to reduce the impact of the weevil.

Alternative clovers

All white clover cultivars are susceptible to CRW, but strong vigorous white clovers will tolerate damage better. If sowing white clover, choose the variety that is most appropriate for your area, soil type and production system.

Red clover is less preferred by CRW than white clover so it is strongly recommended that red clover be included in the pasture mix. The creeping varieties are best.

Nitrogen and phosphate application

Over 80% of New Zealand dairy farmers currently apply nitrogen fertiliser. While these applications are primarily targeting a grass response they are the first and most important step to minimise the impact of CRW on the farm business.

Clover plants under stress from CRW tend to be small leafed and low growing. Farmers with CRW infested pastures report improved clover growth and plant survival from small but frequent applications of nitrogen fertiliser applied year round, (25-30Kg N/Ha per application)
Additional phosphate based fertiliser, lime and any other soil-additives will not rejuvenate clover in presence of CRW.

Grazing regime

Good grazing management can preserve what clover is left in the pasture. In general, avoiding management that is detrimental to pasture growth will help minimise impacts of CRW. In spring, pastures that are grazed well to reduce competition from grasses and allow sunlight to reach clover plants, will lead to better clover growth. In summer, maintaining sufficient pasture cover protects clover stolons from burning in direct sunlight. In autumn avoid overgrazing and in winter avoid pugging.

How should dairy farmers respond to Clover Root Weevil?

It is important that dairy farmers and their advisers recognise this insect and understand the damage it does to clover, both above and below ground, and the impact it has on the nitrogen fixing capability of pasture.

In the meantime farmers should:

- Look for the presence of CRW damage on leaves, and dig under clover plants to look for healthy pink nodules and for CRW larvae
- Observe the survival and growth of clover plants in new and old pastures to assess CRW impacts
- Review nitrogen fertiliser policy in light of CRW, consistent with feed demand and feed supply, and environmental guidelines
- Review total fertiliser and lime policy in light of production, current soil fertility, reduced nitrogen fixation, and increased dependence on fertiliser nitrogen
- Do not attempt to re-establish clover into CRW infested pastures by drilling or over-sowing clover seed. Adult CRW prefer clover seedlings
- If you are in an area where the parasitoid has not yet established, consider going through a break crop to clean the paddock of CRW before resowing a new pasture. Use red clover in your pasture mix when regrassing
- Frequent, small applications of nitrogen fertiliser will improve clover growth, especially in new pasture
- Manage your grazing regime to preserve clover in the pasture where possible