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

Clover Root Weevil (*Sitona lepidus*) was first identified 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. There is no geographic or climatic limitation to the spread of this insect pest throughout New Zealand.

The CRW adult is a small speckled brown weevil up to 6 mm long found in the base of pasture throughout the year. Numbers vary seasonally with lows in winter and summer, and highest population densities in spring and autumn. 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.

CRW larvae are creamy white grubs from 1 to 6 mm long, found by digging into the root zone under white clover plants. CRW larvae are present throughout the year, and feed exclusively on clover roots, and associated nodules, reducing nitrogen fixation, and clover production and persistence.

**What do we know about Clover Root Weevil?**

In 1997 the estimated cost to dairy farmers of doing nothing about CRW was between $250 and $560 per ha, due to loss of high quality clover feed, and the cost of replacing fixed nitrogen losses with applied fertiliser nitrogen.

Research is targeting a multi-pronged approach with biological control agents, to lower CRW populations, and identify strains of clover tolerant to CRW. Showing promise are a parasitic wasp and an insect disease that can be applied as a bio-insecticide. Improved management of clover will also play an important role.

Impact of CRW is greatest a couple of years after first arrival, as populations of CRW larvae rise rapidly restricted only by the amount of clover root feed supply. Up to 1500 weevils per square metre were counted in Waikato pastures in 1997.

Over time, CRW larvae populations fluctuate at lower levels depending on the surviving clover feed supply, adult egg laying behaviour, and survival of larvae. All these factors are influenced by the severity of dry weather in summer.

CRW larvae reduce atmospheric nitrogen fixation, by eating clover root nodules and clover roots. This underground damage, plus damage to plant foliage, reduces the quantity of clover forage, and amount of nitrogen for both clover and grass growth.

Indications are that nitrogen fixation by clover has been reduced by 50% to 100% in recent years, primarily due to CRW. 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.
Over 80% of New Zealand dairy farmers currently apply nitrogen fertiliser from 25 to 200 kg N/ha annually, at typical rates of 25 to 50 kg N/ha per application. While these application rates 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 leaved 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.

Farmers may observe clover returning to pasture after CRW attack. While CRW will not eliminate entirely its host species, the level of clover after invasion is usually much less than before. Both white clover and CRW go through seasonal cycles. CRW populations will tend to rise and fall with fluctuations in clover growth.

Additional phosphate based fertiliser, lime and any other soil-additives will not rejuvenate clover in presence of CRW. Re-grassing after cultivation does not have a lasting effect on CRW, as adults re-populate these areas.

- There is no “silver bullet” for Clover Root Weevil

**How should dairy farmers respond to Clover Root Weevil?**

It is important that dairy farmers and their advisors 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 mean time this does not mean farmers should do nothing about it, they should:

- Look for the presence of CRW damage on leaves, and dig under clover plants looking for healthy pink nodules and for CRW larvae
- Do not assist CRW dispersal by moving hay from infested areas to those that are not, particularly from North Island to South Island
- Observe the survival and growth of clover plants in new and old pastures, to assess CRW impacts
- Review your 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.
- Include white clover in the seed mix sown after full cultivation. New clover plants develop a taproot, which may be an advantage for survival in year one.
- Apply nitrogen fertiliser for the clover as well as for the grass to support clover growth and survival, especially in new pasture.
- Be very skeptical of any salesman claims of a “silver bullet” solution to CRW.

Until a biological control means is available and demonstrated to be effective, apply known best management practice to sustain as best you can the clover content of pastures, including planned and judicious use of nitrogen fertiliser, to support the feed requirements of the dairy farm system.

Even when bio-control agents come along, management will depend on a number of strategies, most important being improved management of white clover in pasture.