

Brown Beetle

Mussel shells used in the brown beetle battle

SOPHIE PREECE

AN ACT of research serendipity may have found a natural weapon against the brown beetle that predated on Marlborough grapevines.

PhD student Mauricio González-Chang says the invasion of adult grass grubs (*Costelytra zealandica* White) in Marlborough vineyards has resulted in substantial yield losses in both the year of the attack and the following one. Toxic pesticides are required to kill the beetle, but that's becoming less and less tenable for conventional growers and is not an option for those under organic management, says Mauricio.

For the past three years he and Steve Wratten, both from Lincoln University's Bio-Protection Research Centre, have been working with Kono Beverages, with funding from Callaghan Innovation, to develop a range of "agro-ecological" techniques to disrupt the beetles' lifecycle and behaviour, and therefore reduce their impact. In the past year New Zealand Winegrowers and Wither Hills have also supported the project.

Mauricio says previous studies suggest most of the beetles emerge from areas covered by grass. The

females seem to respond to the vines' silhouettes as they fly and frequently land on the tips of the plant, where they chew on young leaves, shoots and flower buds. They then release a pheromone to attract males and, after mating, drop to the vine floor and lay eggs there.

One of the study's recent breakthroughs followed an experiment with crushed mussel shells beneath the vines. The shells were intended as a mulch to control weeds and to reduce irrigation application, but yielded surprising results when the treated rows attracted fewer adult beetles to the vines.

Mauricio says the crushed mussel shells in the under-vine rows may change the light wavelength emitted from below, from the beetles' perspective, so that longer wavelengths dominate, altering the beetles' behaviour.

To test the theory, Mauricio installed a range of infra-red sensitive video cameras around the vineyard and recorded the "vast numbers" of grass grubs arriving in the outer rows. In the spring of 2015 he went on to

film areas with mussel shells and those without, and says the proportion of adults landing at the two contrasting sites was obvious, with few landing on the vines when the shells were present.

The decrease in adults landing on the vine plants resulted in a 73% reduction in leaf damage, he says. It's an impressive result, but recent experiments indicate that the mussel shells could drive the adults further into the block because they were only deterred from treated plants. Mauricio says thus far mussel shells have only been used on the edges of bays, where larval levels were dense, and the work will now look at how many bays down rows need to be treated before the beetles are diverted from the entire vineyard.

While the initial project ends in November this year, Mauricio says the work is likely to progress. He plans to continue studying the behaviour of the beetles, in order to reduce their impact, while also looking at the potential of a greater biodiversity within the vineyards and around the boundaries, increasing predation on this and other vineyard pests.

To witness the invasion of adult grass grubs in a Marlborough vineyard, including a comparison of vines with and without mussel shells, search "Mauricio González-Chang" on www.youtube.com.



The larvae and beetle stages

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