

## Endophytic bacteria isolated from *Leptospermum scoparium* produce compounds that inhibit *Ilyonectria* and *Neofusicoccum* species *in vitro*

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*Leptospermum scoparium* J.R.Forst. et G.Forst. var. *scoparium*, or mānuka, is a New Zealand indigenous shrub. This shrub is valued for the essential oil and medicinal honey it produces that have antimicrobial properties. International research has demonstrated that endophytic bacteria can either directly produce, or modify, metabolites *in planta*. Therefore, bacteria within the mānuka endomicrobiome may also produce antimicrobial compounds. A total of 192 endophytic bacteria were recovered from surface sterilised leaf, stem and root tissue from three different sites. These bacteria were assessed in dual culture assays against the grapevine pathogens *Ilyonectria* spp. and *Neofusicoccum* spp. Eleven and three endophytic bacteria showed ability to inhibit *I. liriodendri* and *N. luteum*, respectively. These endophytic bacteria produced both diffusible and volatile compounds that inhibited the pathogens. Isolate W4R11 inhibited the growth of *Ilyonectria* spp. by 41–64% after 7 days incubation. Isolate W1R33 could inhibit the faster growing *Neofusicoccum* spp. by 20–53% after 3 days incubation. Microscopy showed that diffusible compound produced by isolate I1R21 caused hyphae and spore abnormality of *Ilyonectria* spp. This study indicated that mānuka can potentially provide a new source of microorganisms for use in sustainable agriculture.

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## Detecting and controlling *Serratia marcescens* in a laboratory colony of *Mastrus ridens*

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*Mastrus ridens* (Hymenoptera: Ichneumonidae) is an ecto-parasitoid of cocooning *Cydia pomonella* (codling moth, CM) larvae, and has been introduced into New Zealand in a classical biocontrol programme. Large numbers of *M. ridens* are currently being reared in the laboratory on diapausing CM larvae for release into apple-growing regions. Within the rearing colony, a bacterial epizootic was discovered that killed both CM larvae and developing *M. ridens*. DNA from infected CM larvae was amplified using bacterial 16s rDNA primers, with sequencing identifying the bacterium as *Serratia marcescens* – a common species associated with insects. The epizootic probably arose from CM larvae in oviposition cages. The rearing method has been modified to minimise the presence of bacteria. *Mastrus ridens* pupae are now removed from the corrugated cardboard rolls (in which they develop on CM larvae) and held in emergence containers that have been sterilised by washing with sodium hypochlorite. Any diseased adult *M. ridens* are detected by the red colour of their abdomen and only healthy adults are selected as parents for subsequent generations. Improved hygiene and selection of healthy adult parasitoids successfully controlled the *S. marcescens* epizootic.