In vitro* testing of New Zealand manuka oil and Lema oil for inhibition of *Erwinia amylovora

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Current tools for the control of fire blight disease of apples caused by *Erwinia amylovora* have limitations, including the increasing pressure by markets against the use of streptomycin. Coast Manuka and Coast Lema® Oil products have been previously shown to provide control against some bacterial, fungal and yeast diseases. Experiments were carried out to determine whether either of these products provided control against *Erwinia amylovora*. Coast Lema Oil (0.5, 1, 2, 3, 4% w/v) inhibited *E. amylovora* when added to a bacterial suspension. Coast Manuka Oil (0-4% w/v) failed to inhibit *E. amylovora* when added to the bacterial suspension. It was also demonstrated that Coast Lema Oil (0.5, 1, 2, 3, 4% w/v) and Coast Manuka Oil (0.5, 1, 2, 3, 4% w/v) inhibited *E. amylovora* replication when added to agar. Filter paper discs soaked in Coast Lema Oil (2, 3, 4% w/v) caused small inhibition zones around the product when placed directly onto *E. amylovora*. Coast Manuka Oil (0-4% w/v) was unsuccessful in causing inhibition zones around the discs when placed directly onto *E. amylovora*. These initial results indicate that Lema oil has the potential to control fire blight in pipfruit trees.

Modelling emergence of bronze beetle (*Eucolaspis* spp.) adults using degree-days and threshold temperatures

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Eucolaspis spp. beetles are native and endemic to New Zealand, and are important pests of exotic fruit crops. Organic apple orchards in Hawke's Bay seem to be particularly vulnerable, and there adult beetles emerge during spring/summer, feed on leaves and fruitlets and cause significant economic loss. Seasonal variations in bronze beetle occurrence, especially in adult emergence, add further problems to already deficient control measures available to organic growers. Phenological models that could predict adult emergence in the field would greatly benefit bronze beetle control programmes. Pupal development was observed in bronze beetles at three constant temperatures (12, 15 and 18°C) in the lab, and the lower threshold temperature (4.69°C) and degree-days (237 degree-days) required for adult emergence from pupae were calculated using linear regression. Adult emergence data obtained from other trials and from Plant & Food Research were used to validate the thermal calculations. A biofix date of the second week in September and horizontal degree-day calculation method using soil temperature (at 10 cm depth) gave best predictions. Further research on thermal requirements of pre-pupal post-diapause larvae would augment these findings.