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參展科別 **地球與環境科學科**

作品名稱 ***Neolema ogloblini*- An agent in the biological control of Tradescantia**

得獎獎項 **一等獎**

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Abstract

Tradescantia *(Tradescantia fluminensis)* is the worst weed in New Zealand. By smothering and shading out seedlings, Tradescantia prevents forest regeneration. Current control methods are ineffective and simultaneously cause harm to native forest. In 2011 *Neolema ogloblini*, a Brazilian beetle was introduced into New Zealand as a biological control for Tradescantia. To be successful in New Zealand, a country with different environmental factors, the beetles' ranges of preference (temperature and light intensity) had to be investigated. A gender specific trait also identified, to enable desired sex ratios within founding populations to be selected. [18] This would ensure that the beetles are not released in areas of physiological stress, and can be optimised to have the greatest impact on Tradscantia.

To establish how the intensity of light affects the distribution and amount of Tradescantia eaten by *N.ogloblini* a choice chamber investigation was conducted. Different layers of shade cloth provided a range of light intensities 150-3450Lux (likely to be found under forest canopy where Tradescantia is problematic). Thirty beetles of a range of sizes and approximately same maturity were randomly distributed through the chambers. Each chamber contained a shoot of Tradescantia with 5 leaves. After a 24hour period the number of beetles in each chamber were counted and the amount of surface area of the leaves eaten measured.

The effect of temperature on the amount of leaf surface area eaten was investigated by selecting 90 beetles of a range of sizes and withholding food for 24hours. Five beetles were placed in each of three containers containing two leaves. Each trial container was precooled/warmed to the test temperature before the beetles were added. Leaves of a similar size, shape, mass and maturity were used. All leaves were

genetically identical and collected from the same location. Sets of three containers were held in the dark at the following temperatures for 24hours: 9°C, 15°C, 20°C, 25°C, 30°C and 35°C. The surface area of leaf eaten at each temperature (mm^2) was calculated.

Lastly, microscopic dissections were conducted, using 32 beetles ranging in size, to establish if length (measured from the top of the head to the base of the abdomen) could be used as a phenotypic marker to identify beetle gender.

While only a very weak positive relationship between increasing light intensity and the number of beetles was found a significantly higher area of leaf was eaten at a light intensity of 3450Lux compared to 150Lux. The amount of leaf area eaten is significantly reduced at temperatures of 15˚C and below, and significantly increased at 35˚C. There is no significant difference in the amount of leaf area eaten when comparing temperatures between 20-30˚C. Females have on average a larger body length (median=4.92mm) than the males (median=4.215mm).

Therefore, sites with warmer temperatures in dappled light conditions (3450Lux) should be prioritised for the release of *N.ogloblini*, as this is the location in New Zealand at which their use as a biological control will be optimised. Beetle length can be confidently used to select desired gender ratios.

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A Brazilian beetle preference (temp & light intensity) was studied for the biological control of Tradescantia . This research is very interesting of number of beetles has a positive relationship with increasing light intensity.