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POPULATION DYNAMICS OF THE SEEDFLY,  
PEGOHYLEMYIA JACOBÆAE (HARDY) (DIPTERA: ANTHOMYIIDAE),  
AND ITS POTENTIAL AS A BIOLOGICAL CONTROL AGENT OF  
RAGWORT, SENECIO JACOBÆA L.

A thesis submitted for the degree of  
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Plate 1 Ragwort seedfly adult

## ABSTRACT

The aim of this study was to assess the effectiveness of a seedfly, Pegohylemyia jacobaeae (Diptera: Anthomyiidae) as a biological control agent of ragwort, Senecio jacobaea. Seedfly populations were sampled from October to April in 1982/83 and 1983/84 at two sites in the central North Island, New Zealand. Supplementary laboratory experiments were conducted to clarify aspects of the seedfly/ragwort interaction.

In the field a six week pre-oviposition period was recorded before ragwort flowered. The absence of ragwort flowers had no effect on ovary development in laboratory reared flies but the pre-oviposition period predicted by a day degree summation model was shorter than that observed in the field.

The extended pre-oviposition period resulted in competition for oviposition sites when ragwort first flowered, with consequent low fecundity and multiple oviposition. This competition was higher in the second year due to a tenfold increase in the number of flies emerging compared with the previous year. The total number of ragwort seedheads was similar in both years but inflorescence development was faster in 1983/84. A combination of increased seedfly population, increased competition for oviposition sites and improved synchrony between

emergence and ragwort flowering in 1983/84 resulted in a twofold increase in infestation levels compared to 1982/83.

Estimates of seedfly mortality within the seedhead were 33% and 60% in 1982/83 and 1983/84 respectively but were affected by the variable length of the third larval instar. Laboratory and field data indicated that pupating third instar larvae leave the seedhead in conditions of high surface moisture and prolonged dry conditions resulted in high mortality. Pupal mortality ranged from 14.3 to 57% but this was also affected by estimates of third instar larvae. Pupal diapause is initiated at temperatures above 15-20°C and in the central North Island seedfly rarely diapause in winter.

Seedfly infestation levels ranged from 10% (1982/83) to 20% (1983/84) and up to 200 seedheads/m<sup>2</sup> escaped predation. Ragwort seeds are long-lived, have a high germinating capacity, and uneaten seeds from seedfly infested seedheads were viable. It was concluded that at the study sites the seedfly's impact on the ragwort population was negligible.

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Photos taken by:

- \* Barry Campbell
- \*\* Liz Halligan
- \*\*\* Hugh Neilson
- \*\*\*\* Dr.R.E. Rowland

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