Exploitation of the sex pheromone of apple leaf midge *Dasineura mali* Kieffer (Diptera: Cecidomyiidae): 2. Use of sex pheromone trap for pest monitoring

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Abstract

Catches of apple leaf midge, *Dasineura mali*, in sex pheromone traps and subsequent galling damage to shoots over four successive midge generations per season were investigated during 2004 and 2005 in apple orchards in Kent, south eastern England, Trentino, northern Italy and South Island, New Zealand. The orchards were newly planted or established, had widely varying apple leaf midge populations and were subjected to different pesticide management regimes. The Julian date of the peak catch of midges in the sex pheromone traps increased approximately linearly with increasing generation number. There was also a strong increasing relationship between the Julian date of peak catch and increasing absolute value of latitude. A linear relationship was fitted within the range of 41 – 51 degrees latitude included. Strong linear relationships on log-log transformed scales were found between the total and peak numbers of midges caught per generation and the populations of galls that developed subsequently. The best fit of $\log_{10}$(total galls/ha) = 2.138 + $\log_{10}$(total no. midges caught/generation) was obtained for the first and second generations. The relationship indicates that a total catch of 10 midges in a trap for a particular generation will result in approximately 2000 galls/ha subsequently for that generation and that a catch of 1000 midges will result in approximately 100,000 galls/ha, providing that there are sufficient shoots and tender young leaves present to accommodate them. The proportion of shoots and leaves galled per ha will depend on the numbers of shoots and leaves present in the particular orchard but knowledge of these parameters should allow simple estimates to be made. The regressions were significantly weakened when the third and especially the fourth generations were included, largely because of gall saturation or because tree growth had ceased. The relationships were not significantly affected by pesticide management regime, orchard age or country of location. In a further study, a good correlation was found between pheromone trap catches and the percentage of shoots infested with eggs of *D. mali* for the first and second generation in an experimental orchard in Kent during 2006. The results indicate that the sex pheromone traps are effective for monitoring the flight activity of successive generations of *D. mali*, can be used to predict the severity of galling attacks to shoots and are likely to be useful for timing insecticide sprays against eggs.

Key words: apple leaf curling midge, *Dasineura mali*, Cecidomyiidae, sex pheromone, pest monitoring, damage threshold, insecticide spray timing