

Studying the Scottish Peach-potato Aphid Population: the Braveheart Legacy

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Introduction

The peach-potato aphid *Myzus persicae* is a global plant pest and in Scotland a major problem for the seed potato industry. It is a very efficient virus vector and can carry several insecticide resistance mechanisms which hamper its control. In Scotland *M. persicae* reproduces all year round by continuous parthenogenesis (asexual), which limits genetic diversity, resulting in the population consisting of asexual clones. Previous studies using molecular markers have shown that there are three dominant clones; C, I and J, present in the Scottish population (Fenton *et al.*, 1998; 2005). Clone J (a.k.a. Braveheart clone) has been collected as early as 1977. These clones have little or no insecticide resistance but are present in larger numbers than aphids carrying high levels of resistance. Understanding the ecology of the *M. persicae* clones in Scotland can help with insecticide resistance management and future control.

Questions

- Do the C, I and J clones still dominate the population?
- What other genotypes are present and how resistant are they?
- How does the population change from field to field and year to year?

2.

304 and 314 individual *M. persicae* were collected in 2003 and 2004 respectively. Each sample was taken at least 3 metres apart. The DNA was extracted and stored at -20°C.

3.

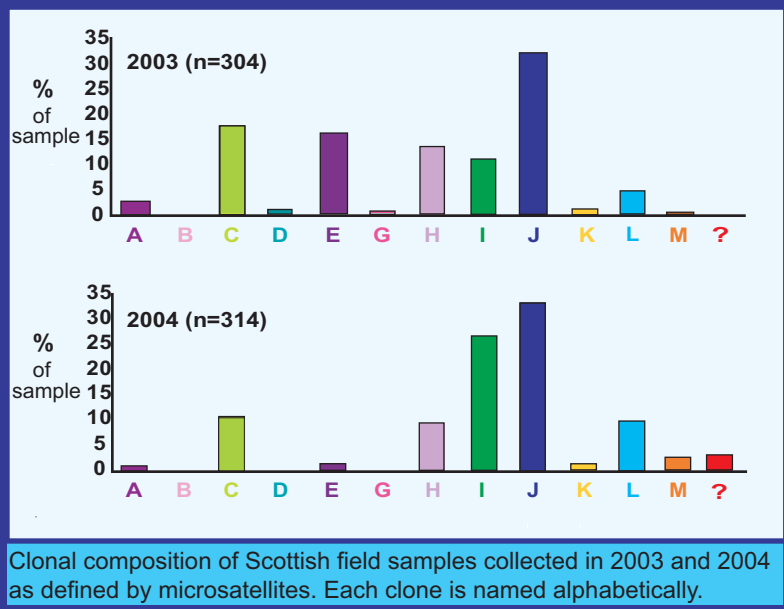
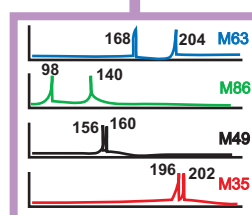
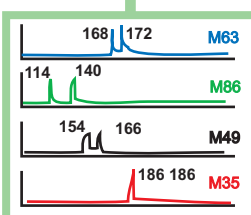
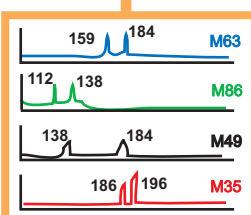
Four sets of DNA microsatellites markers were amplified using fluorescently labelled primers (M35, M49, M63 and M86). Products were separated on an ABI 377 automated sequencer and results analysed using Genscan and Genotyper software. Each clone has a unique set of microsatellite sizes which allows individuals to be categorised into a clone.

Methods

1.

Samples collected from fields around Scotland, including potato and brassicas

Potato Field



Clonal composition of Scottish field samples collected in 2003 and 2004 as defined by microsatellites. Each clone is named alphabetically.

Results and Conclusions

- The C, I and J clones still made up the largest proportion of the population in 2003 and 2004 despite having little or no insecticide resistance.
- The Braveheart clone (J) was the most predominant in both years.
- Three new clones with high insecticide resistance were found - H, K and M. These had not been found in 1995 or 2001.
- A new totally insecticide susceptible clone was also found and denoted L.
- Clones with high levels of insecticide resistance (A, B, E, H, K and M) only made up a small proportion of the population.

Future Work

The dynamics of insecticide resistant clones and their turnover from season to season will be further investigated by field sampling in 2005. The field collections are subject to local stochastic variation so, to get an unbiased sample, alatae (winged forms) caught in the Scottish suction traps will also be genotyped. To try and understand why Scottish clones C, I and J continue to do so well, their physiology will be compared to other clones from Europe.

References

Fenton *et al.*, 1998. *Molecular Ecology*, 7, 1475-1487
Fenton *et al.*, 2005. *Bulletin of Entomological Research*, 95, 483-494

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