New Project Summary Report for SF 140: Control of potato aphid (Macrosiphum euphorbiae) on strawberry in spring

Project Number	31701400
Title	Control of potato aphid (Macrosiphum euphorbiae) on strawberry in spring
Short Title	SF 140
Lead Contractor	East Malling Research
Other Contractors	
Start & End Dates	31 March 2013 - 30 March 2016
Industry Representative	Mr Andrew Reeve, Langdon Manor Farm
Project Budget	£33,841
AHDB Contribution	£33,841

The Problem

Aphids are common and important pests of strawberry. They damage plants directly by sucking sap, causing plant distortion, contaminating foliage, flowers and fruits with honeydew and cast skins. The most common species, the strawberry aphid (Chaetosiphon fragaefolii), transmits a number of virus diseases which often occur in complexes. Another important pest species, the melon and cotton aphid (Aphis gossypii), infests foliage and flowers forming dense colonies in patches which produce copious secretions of honeydew which rapidly become blackened by sooty mould. This aphid can also transmit mottle virus. Strains of this aphid species with

reduced sensitivity to insecticides are widespread and growers have difficulty achieving control with organophosphate (OP), carbamate or pyrethroid insecticides. In recent years growers have reported problems in controlling aphids in early spring, in particular M. euphorbiae (Fig. 1). This is more likely to be a consequence of lower temperatures reducing the efficacy of products than aphicide resistance alone (IRAG 2008, 2012). As the strawberry growing season is increasingly beginning earlier with crops under fleece and tunnels this is becoming a more regular and widespread problem.

Aims and Objectives

(i) Project aim(s):

To improve the control of potato aphid (Macrosiphum euphorbiae) in the spring on strawberry

(ii) Project objective(s):

1. Screen up to 10 insecticides to determine the most efficacious products for controlling potato aphid on strawberry (Yr 1)
2. Compare the most efficacious insecticide at different temperatures to determine the effects that climate has on the product's performance (Yr 2)
3. Determine if control can be improved with the addition of adjuvants and/or two way mixes of insecticides (Yr 3)

Approach

Objective 1 Screen up to 10 insecticides to determine the most efficacious products for controlling potato aphid on strawberry (Yr 1)

Site:

Hard-standing at East Malling Research, New Road, East Malling, Kent ME19 6BJ

Treatments:

In year 1 we will test up to 10 crop protection products (Table 2), including flonicamid (Mainman, Mutiny, Teppeki) and new emerging actives from chemical companies (including bio-controls) for efficacy at controlling M. euphoria on strawberry (Fragaria x ananassa). Contact has been made with the companies in Table 1 and this list will be finalised before the start of the project in discussion with Viv Powell and Roma Gwynn.

The trial will be done using drip irrigated potted plants (Evie II) in their second year of growth (to

give a higher degree of canopy density). There will be no 'crop destruct' costs as the plants will only be used for this experiment and will be disposed of at the end of the trial. Each plant will be inoculated with at least two M. euphorbiae in early spring and colonies allowed to develop. Treatments will be applied at 1000 l/ha using a hand pump knapsack sprayer with a hand lance (to minimise inter-plot contamination by spray drift). The treatments will be applied once the aphid populations have built up in May, allowing us to determine which insecticides are most effective in the spring. We will ensure that the treatments are applied at typical spring temperatures (e.g. between a range of 0oC and 15oC).

Experimental design:

The experiment will be a randomised block experiment with four replicates of each treatment including an untreated control. Each plot will consist of six plants (=240 plants). The plots in each block will be arranged end to end in a row, with 1 m spacing between.

Assessments:

A pre-assessment of the numbers of adult and nymph aphids on three young leaves in the centre of each plant will be counted. Post treatment application assessments will be done after 3 and 10 days, counting numbers of live adults and nymphs on a number of leaves that will give statistical differences between efficacious treatments and the controls. If biological treatments are selected for testing then Roma Gwynn will be consulted for the best timing of assessments. Aphid species will be checked according to EPPO PP1/252 (Fig. 1). Data will be transformed if distribution is skewed and analysed using ANOVA for comparisons to the untreated control and between treatments. The crop will be examined for the presence of phytotoxic effects (or visible remains of the product).

Meteorological records:

Wet and dry bulb temperature with aspirated psychrometer, wind speed and direction before and after spraying. Full records available from EMR met station. Two temperature and humidity data loggers will be placed in the crop at the onset of the experiment.

Objective 2. Compare the most efficacious insecticide at different temperatures to determine the effects that climate has on the product's performance (Yr 2)

Treatments:
In year 2 the most efficacious products will be tested at three temperatures (heated glasshouse, unheated glasshouse and outdoors) using facilities at EMR. These experiments will be done in the spring to ensure that the outdoor temperatures are cool.

Experimental design:
The experimental will be replicated and set up in a similar way to the year 1 trial. There will be 4 replicates of each treatment under the 3 different climates.

Assessments:
As for Objective 1.

Objective 3 Determine if control can be improved with the addition of adjuvants and/or two way mixes of insecticides.

Treatments:
In the final year the most promising products will be admixed (but two AChE products (e.g. pirimicarb and chlorpyrifos) will not be admixed) or adjuvants will be added to determine whether performance of the products can be further improved under spring temperatures. It may also be possible to use Naturalis-L in combination with a chemical insecticide under humid conditions. The experimental design and assessments will be the same as for previous years.

Quality assurance:
East Malling Research (EMR) is an officially recognised efficacy testing organisation and the work will be done to GEP standards. A GEP compliant protocol for the experiments will be produced at the outset of each year. All trials will be assessed by counting numbers of aphids on leaves and will adhere to EPPO PP1/252.

Report:
Data will be collated and statistically analysed in consultation with EMR's qualified statistician. Full reports of the work will be produced in accordance with HDC's normal reporting requirements.