

Research and Development

Annual/Interim Project Report - Financial Year

2003-4

(Not to be used for LINK projects)

Section 1 : Project details

1. (a) DEFRA Project Code
- (b) Project Title
- (c) Project start date (d) Project end date
- (e) DEFRA Project Officer
- (f) Name and address of contractor
- (g) Contractor's Project Officer

Section 2 : Scientific objectives

2. Please list the scientific objectives as set out in CSG 7 (ROAME B). If necessary these can be expressed in an abbreviated form. Indicate where amendments have been agreed with the DEFRA Project Officer, giving the date of amendment.

1. Transfer knowledge gained during the project to the horticultural industry.
2. Measure the susceptibility of adults and nymphs of three aphid species (*Myzus persicae*, *Brevicoryne brassicae*, *Nasonovia ribisnigri*) to proprietary biopesticides based on insect pathogenic fungi.
3. Devise insecticidal control strategies for the pest aphids of lettuce and Brassica foliage that will minimise the development of insecticide resistance.
4. Develop an empirical forecast for *Brevicoryne brassicae*.
 - Develop and validate an IPM strategy for the control of pest aphids of salad and Brassica crops.

Section 3 : Summary of progress

3. Please summarise, in layperson's terms, scientific progress since the last report/start of the project and how this relates to policy objectives set out in ROAME A. Please provide information on actual results where possible rather than merely a description of activities.

Objective 1

A project Advisory Group was formed at the start of the project to guide decision-making and facilitate knowledge transfer to the industry. The Brassica Growers Association R & D Committee and the Outdoor Salads R & D Committee nominated project co-ordinators (Fred Tyler, Robert Montgomery, John Sedgwick) as members of the Advisory Group. The Advisory Group has met three times (25 Sep 2003, 13 Jan, 2 Nov 2004) and has disseminated information to the industry through membership of the BGA R & D Committee, the Outdoor Salads R & D Committee, the HDC and the Vegetable Consultants Association.

Objective 2

Four proprietary fungal biopesticides (Vertalec, PFR, BotaniGard and Naturalis) and two adjuvants (Addit and Codacide) were obtained from UK based suppliers and evaluated against populations of *M. persicae*, *B. brassicae* and *N. ribisnigri* in a laboratory bioassay. Fixed age populations of each species were treated at the manufacturers' recommended rate using a Potters tower. The 45 most active individuals were then transferred to three four week old plants of either Brussels sprout cv Montgomery (*M. persicae* and *B. brassicae*) or lettuce cv Saladin (*N. ribisnigri*) enclosed within a bread bag. Plants were maintained within a controlled environment room at 20°C ± 2°C, 60% humidity, photoperiod 16h, for nine days. Aphid mortality was recorded every third day and nymphs removed and counted. Any dead aphids were removed daily and incubated on damp filter paper within Petri dishes (20 ± 1°C, darkness) for seven days and inspected for the presence of mycelium on the cadavers. The presence of sporulating mycelium was taken as evidence of fungus-induced mortality. Each aphid species was examined in separate bioassays and each bioassay replicated on five separate occasions.

All of the biopesticides tested showed evidence of infection in the three aphid species examined.

Differences in the susceptibility of aphids were observed between species and between treatments.

Myzus persicae was the most susceptible aphid species to the fungal biopesticides examined. The most virulent biopesticide examined was BotaniGard. This product consistently resulted in fungal-induced mortality, regardless of aphid species. All biopesticides produced conidia on aphid cadavers although the proportion of sporulating cadavers was lower for *B. brassicae*. It is possible that the waxy cuticle of this aphid species inhibits the production of conidia which could affect further cycling of the infection. BotaniGard was selected for further evaluation against nymphs in laboratory bioassays and in field plot experiments. The field plot experiments have been completed but the data are yet to be analysed.

Objective 3

Novel insecticides were selected through discussion with the Advisory Group and manufacturers. The selected insecticides were evaluated against populations of resistant and susceptible *M. persicae*, *N. ribisnigri* and *B. brassicae*. Some of the insecticides were applied as seed or granule treatments whilst the majority were applied as foliar sprays. The treatments included the novel insecticides, industry standards and insecticide-free controls. Lettuce and cabbage plants were raised in the glasshouse and transplanted into small plots in the field at Wellesbourne. The plants were caged immediately to prevent a natural infestation of aphids. The cages were constructed from plastic supports covered with fine mesh netting. Approximately 14 days after planting, aphids were introduced into the cages (one clone/species per cage) and left to establish. Lettuce was used as a host plant for *N. ribisnigri* and cabbage for the two other species. For the seed and granule treatments, aphids were assessed one week after introduction. The plants were then re-infested 6 weeks after planting and re-assessed after a further week. For the spray treatments, cages were opened briefly to count the aphids prior to treatment and allow a single application of the recommended rates of the insecticides to be applied. Aphid numbers were then assessed four and 14 days after application. Each treatment was applied to two replicate plots infested with each clone/species on two occasions. Although the data have not been analysed fully yet there were some pronounced differences between treatments and between the effects of certain treatments on different clones/species of aphid. The analysed results will be discussed by the Advisory Group and the information will be used to plan experiments for 2005.

Section 4 : Amendments to project

4. Are the current scientific objectives appropriate for the remainder of this project?

YES

If **NO**, explain the reasons for any changes giving the financial, staff and time implications.

Contractors cannot alter scientific objectives without the agreement of the DEFRA Project Officer

Section 5 : Progress in relation to targets

5. (a) List the primary milestones for the year/period under report as on CSG 7 (ROAME B).

It is the responsibility of the contractor to check fully that ALL primary milestones have been met and to provide a detailed explanation if this has not proved possible

Milestones		Target date	Milestones met?	
Number	Title		in full	on time
1.2	First meeting of project Advisory Group	15/10/2003	YES	YES
1.4	First popular article submitted	15/03/2004	YES	YES
3.2	Novel insecticides obtained for testing	29/03/2004	YES	YES
2.6	Best fungal biopesticide selected from laboratory bioassays	14/04/2003	YES	YES

Section 5 : Progress in relation to targets (continued)

5. (b) Do the remaining primary milestones look realistic?

YES

(c) If you have answered **NO** at (a) or (b), please provide an explanation.

Section 6 : Project costs and staffing input

6. In this reporting period, what was:

(a) the approved expenditure?

£85,390

(b) the actual expenditure?

£84,950

(c) * the approved staff input?

1.02

(d) * the actual staff input?

0.94

* staff years of direct science effort

Section 7 : Publications and other outputs

7. (a) Please give details of any outputs, e.g. published papers/presentations during this reporting period.

Collier, R.H. (2003). No quick fix. Grower, December 11 2003, 22-23.

Collier, R.H. (2003). Integrated Pest Management in field vegetable crops. Plant it! Issue 4 December 2003.

Collier, R.H. (2004). New project to evaluate integrated aphid control strategies. Vegetable Farmer, September 2004, 10-13.

Presentations

The project has been described at the following events:

Collier, R.H. (2004). HDC/Defra aphid meeting. 28 January 2004.

Collier, R.H. (2004). HDC Roadshows in Scotland, Kent, Lancashire, Cornwall. February – March 2004.

Chandler, D. (2004). HRIA Growers Farm walk. 22 July 2004.

Section 7 : Publications and other outputs (continued)

7. (b) Have oppportunities for exploiting Intellectual Property arising out of this work been identified ?
If you have answered **YES**, please give details.

NO

- (c) Has any other action been taken to initiate Technology Transfer?
If you have answered **YES**, please give details.

NO

Section 8 : Future work

8. Please comment briefly on any new scientific opportunities which may arise from the project.

Section 9 : Declaration

9. I declare that the information I have given is correct to the best of my knowledge and belief.
I understand that the information contained in this form may be held on a computer system.

Signature

Name

Date

Position in Organisation