



Agriculture & Horticulture
DEVELOPMENT BOARD



New Project

SF 133

Optimising tarsonemid control on
strawberry using predatory mites'

Project Number:	SF 133
Project Title:	Optimising tarsonemid control on strawberry using predatory mites'
Project Leader:	Dr Michelle Fountain
Contractor:	East Malling Research
Industry Representative:	Mrs Harriet Duncalfe, Maltmas Farm Richard GreatRex, Syngenta Bioline
Start Date:	01 April 2012
End Date:	31 March 2015
Project Cost (total project cost):	£51,700 (£66,430)

Project Summary:

Objective 1: Evaluation of phytoseiid species

Replicated caged trials in year one will test which species of phytoseiid mite are effective at predated tarsonemid mites on strawberry plants and will determine:

- 1) The most effective predatory mite species in polytunnel and glasshouse crops
- 2) The most effective temperature for each predatory species to operate
- 3) The distribution of the predatory mites on the strawberry plants.

Amblyseius andersoni, *Neoseiulus barkeri*, and *Neoseiulus cucumeris* will be tested in polytunnel conditions (Table 1). *Amblyseius swirskii*, *Neoseiulus californicus* and *Amblyseius montdorensis* will be tested, based on their effectiveness against other pests, including tarsonemid species, in glasshouse conditions (Table 1). The efficacy of the latter three species will provide useful data for glasshouse strawberry propagation. Polytunnel species will be taken forward into Objectives 3 and 4.

Crucially, the experiments will be done twice; once at low temperatures and once at higher, summer, temperatures.

Counting tarsonemid and phytoseiid mites on samples of young folded (where tarsonemid mites reside), medium and older aged leaves will provide evidence on the distribution and number of mites and the potential of phytoseiids to forage for other strawberry pests. It will also determine the preferred habitat of each species and confirm that the predator can

Table 1. Six species of predatory mite to be tested for efficacy for control of tarsonemid mite in strawberry in year 1

Species	Commercially available	Native to UK	Use	Notes
<i>Amblyseius andersoni</i>	Yes	Yes	Polytunnel	May be effective at low temperature
<i>Neoseiulus barkeri</i>	Yes	Yes	Polytunnel	Small species may be able to enter folded leaf more effectively
<i>Neoseiulus cucumeris</i>	Yes	Yes	Polytunnel	Commercial standard
<i>Amblyseius swirskii</i>	Yes	No	Glasshouse	Currently permit is for glasshouse use only
<i>Neoseiulus californicus</i>	Yes	No	Glasshouse	Occurs widely in commercial strawberry, but only licenced for release in glasshouse crops
<i>Amblyseius montdorensis</i>	Yes	No	Glasshouse	Currently permit is for glasshouse use only

develop successfully on tarsonemid mites as prey.

Objective 2: Review of chemical treatment effects on predatory mites in strawberry

In year 1 a desk based study to data mine and review current literature on the toxicity of commonly used commercial pesticides on predatory mites will be compiled. In particular this should generate an understanding of the safe use of predators following pesticide application. Chemical industry contacts and providers of mite release products will be contacted about specific products to ascertain compatibility of acaricides/insecticides with the use of predatory mites to control tarsonemid mites. The result will be recommendations on the combined use of pesticides and predatory mites to control tarsonemids and identify future research needs.

Objective 3: Timing and rate of predatory mite introduction in caged trials

In year 2, the most efficacious species of predatory mite for tarsonemid control in polytunnels will be tested at the most appropriate temperatures for the species (based on findings from Objective 1) at different timings and rates or methods of release in caged trials in the polytunnel (Table 2). If only one species was effective then it would be possible to test different application methods.

- Timings would be either as a preventative (plants inoculated with tarsonemid mites after addition of predatory mites) or as a curative (plants inoculated with predatory mites which are already infested with tarsonemid mites).
- Rates would be one, two or three introductions of phytoseiids.
- Application methods could include sprinkle or slow release methods, but this would depend on availability products for the phytoseiid species.
- The programme for years 2 and 3 will greatly depend on preceding results.

Table 2. Example of application programme of predatory mites to strawberry plants to protect against or control tarsonemid mites

Level 1	Level 2	Level 3	
		Application timing	Method
<i>Experiment</i>	<i>Timing</i>	<i>Rate</i>	<i>Method</i>
High and/or low temperature	Preventative or Curative	One application	Sprinkle or Sachet
		Two applications	Sprinkle or Sachet
		Three applications	Sprinkle or Sachet
-	Untreated control	None	None

Objective 4: Test most successful predatory mite regimes in the field

In the final year of the project the most successful species and application methods from the previous cage trials will be tested in Spanish polytunnels at Rocks Farm, EMR. This is likely to consist of two species of predatory mite (early and late season) and a preventative and curative application at the most effective application rate. The planting will be tarsonemid inoculated cv. Finesse in three raised beds per tunnel. Careful monitoring of the young

folded leaves from the centre of each plot will reveal the efficacy of the treatments in the polytunnel. There will be five replicates of each treatment including an untreated control. The treatments will depend greatly on the results from Objectives 2 and 3, but could be:

1. Preventative programme – predatory mites applied before tarsonemids are introduced
2. Curative programme – tarsonemid mites allowed to build up to high levels >5 motile mites per leaflet before the most appropriate predatory mite species is deployed
3. Untreated control

Aims & Objectives:

(i) Project aim(s):

The overall aim of the project is to identify effective predatory mites for prevention and control of strawberry tarsonemid mite in polytunnel protected and glasshouse crops and improve application timing and treatment methods

(ii) Project objective(s):

1. To evaluate six species of predatory phytoseiid mites for their effectiveness at controlling strawberry tarsonemid mite at low temperatures and high temperatures, for use in polytunnel and glasshouse conditions
2. To review the data available on chemical treatment effects on predatory mites in strawberry
3. To determine the most effective timings and application rates of the most efficacious predatory mites found in Objective 1 to control tarsonemid mites
4. To test the most successful predatory mite species and application strategies in a field trial in strawberry under polythene

Benefits to industry

This project will enable growers to exploit a wider range of predatory mite species for tarsonemid control in strawberry on protected and glasshouse propagation. It will give guidance on the timing, rates and application methods of predatory mites and information on their comparative efficacy. This will benefit UK strawberry growers in controlling tarsonemid mite, increasing yield and sustaining crops over a longer period of time. It will also help growers to meet the objectives of the Sustainable Use Directive.

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