



Agriculture & Horticulture
DEVELOPMENT BOARD



Grower Summary

TF 181 (HL 0194)

Exploiting semiochemicals,
conservation biocontrol and
selective physical controls in
integrated management of pear
sucker

Annual 2011

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HDC is a division of the Agriculture and Horticulture Development Board.

Project Number: TF 181 (HL 0194)

Project Title: Exploiting semiochemicals, conservation biocontrol and selective physical controls in integrated management of pear sucker

Project Leader: Jerry Cross (EMR)

Contractor: Consortium for LINK project HL 0194:

Industry Representative: Oliver Doubleday

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Headline

Nettles, willow and hazel should be provided round pear orchards as the best sources of anthocorid predators

Background and expected deliverables

Pear sucker is a devastating pest of pears which cannot currently be effectively and reliably controlled by UK growers. This project aims to combine exploitation of semiochemicals, conservation biocontrol and selective physical controls to develop improved Integrated Pest Management methods for the pest. The pear sucker sex pheromone is known to exist and could be identified. This would provide a tool for monitoring pear sucker populations and, more importantly, a possible means of control of the pest by mating disruption, mass trapping or attract-and-kill approaches. Anthocorid bugs are known to be powerful predators of pear sucker and can naturally regulate pear sucker populations but they do not overwinter in pear orchards and their influx in spring is often inadequate or too late. There is an opportunity to improve the species composition of hedgerows/windbreaks and develop management methods for a greater, more-timely influx. Extensive underpinning research in the Netherlands has identified a number of volatile substances produced by foliage infested with pear sucker that attract anthocorid predators. Two of the compounds are inexpensive and readily available and lures containing one of these have been shown to be attractive. It may prove possible to exploit these to enhance further the influx of anthocorid predators. Growers currently use spray programmes of chemicals that are considered to act physically to control pear sucker, including high volume sprays of water and wetters, sulphur and magnesium sulphate. The treatments used are not evidence-based. The life stages against which they act, their relative efficacy, optimum concentrations and, crucially, effects on anthocorids have not been determined. Careful experimental investigation through laboratory and field testing should enable the value of these treatments to be determined and selection and optimisation of treatments to avoid disruptive effects on natural enemies.

Summary of project and main conclusions

Objective 1. Identify and exploit the pear sucker sex pheromone for pest monitoring

US workers have reported that for *C. pyricola* the female sex pheromone is best extracted by making whole body washes in hexane and the long-chain hydrocarbon, 13-methylheptacosane (13Me27:H) has been proposed to be the major pheromone component. During 2010 efforts were focussed on repeating the analyses of hexane body washes of both winterform and summerform *C. pyri* and on testing 13Me27:H for attractiveness to *C. pyri* in field tests.

Analytical results were similar to those obtained during 2009 but are more definitive with more replicates and the replicates done under very standard conditions and analysed soon after preparation. As previously, analyses of washes from males and females showed that no compounds existed in the males that were not present in the females and vice versa. In addition, there were no significant differences in the relative amounts of each compound between males and females. This was true for both winterform and summerform insects. Most of the compounds were identified as *n*-alkanes, 2- and 3-methylalkanes and long chain aldehydes. There were, however, significant quantitative differences between the profiles from winterform and summerform insects with the relative amounts of the *n*-alkanes and aldehydes higher in the latter. 13Me27:H was detected as a minor component in all the body washes. In the winterform there was a slightly higher percentage in those from males and in the summerform there was slightly more in those from females and it is considered unlikely that this is a pheromone component in *C. pyricola*.

No attraction of the opposite sex of *C. pyri* has been demonstrated in the field using 13-Methylheptadecane 1 mg mL⁻¹ or unmated males or females. Hexane washes of females also failed to attract male *C. pyri* males.

Objective 2. Develop conservation biocontrol methods to maximise anthocorid populations and other natural enemies of pear sucker in spring

Sampling of the replicate tree species hedgerow plots planted in spring 2008 was started. A data base of 5753 arthropods sampled was constructed. However, numbers of anthocorids collected were rather small and erratic. Identification of the dominant psyllids and aphids from shoot samples collected from the established existing hedgerow plots in 2009 was completed. The seasonal dynamics of the key species have been determined providing valuable information for exploitation for conservation biocontrol. The trees were only in their third season of growth and the characteristic aphid, psyllid and predator fauna associated

with each subject had only just started to establish. Nettles had established strongly at all 3 sites and were tall and the abundant arthropod fauna of nettles was present on many subjects. Further sampling is planned for 2011, in the final year of the project.

An experiment using protein (milk and egg white) markers and monoclonal antibody detection methods demonstrated low levels of migration of anthocorid adults from a border strip nettle into an adjacent pear orchard. Numbers were small and no obvious difference between nettles cut to the ground and uncut was apparent. Migration occurred for distances > 50 m.

Objective 3. Exploit synomones for attracting anthocorids into pear orchards

Sub-objective 3.1. Establishment of blends and release rates of synomones for attracting anthocorids

Work is ongoing to characterise the chemical signature of pear sucker infested pear foliage and to try to emulate the attractive signal with synthetic lures. To date, we have not been able to demonstrate attraction to anthocorids to the compound identified in this project or in previous Dutch work, either singly or in mixtures.

Objective 4. Efficacious, physically-acting spray treatment that is safe to anthocorid predators

Spray trials with Surround (kaolin) reduced numbers of pear sucker nymphs by over 75% and showed good promise for the control pear sucker early on in the season (pre bud burst).

Financial benefits

Losses to the UK pear industry due to pear sucker, which vary considerably from season to season depending on weather conditions, have not been quantified but the pest is present in every commercial pear orchard, many orchards suffering regularly. Assuming 10% of the crop is forgone as a result of these infestations, this is equivalent to 2,300 tonnes of pears, worth £2.9 m per annum. Additionally, a substantial number of young trees in newly planted orchards become infected with the pear decline phytoplasma, vectored by pear sucker, and a

number orchards are so badly attacked by the pest that they have become unviable and have to be grubbed. Loss/replanting of 25 ha of pear orchards per annum directly or indirectly as a result of pear sucker costs the UK industry a further £1.3 m per annum. Additionally, growers typically spend £200 per ha on pesticides to control pear sucker though this amount rises steeply (to up to £500 per ha) if a problem arises. The cost of control of pear sucker to the industry is estimated to be approximately £0.5 m per annum. Thus the grand total costs of the pest to the industry are in the region of £5 m per annum.

Action points for growers

- Growers who would like a copy of the pear sucker identification guide or who would like the species of pear sucker present in their orchards checked, should contact Jerry Cross or Michelle Fountain at East Malling Research (Email: jerry.cross@emr.ac.uk; michelle.fountain@emr.ac.uk, Office: 01732 523748).
- Growers should conserve nettles, willow and hazel trees in the vicinity of pear orchards to act as early season sources of Anthocorids and consider planting these if they are not present.
- Sprays of dormant season kaolin give good suppression of the first generation of pear sucker nymphs.