

New Project Summary Report for PE 016: Sweet peppers: Preliminary evaluation of IPM compatible monitoring and control measures for *Nezara viridula*

Project Number	30800160
Title	Sweet peppers: Preliminary evaluation of IPM compatible monitoring and control measures for <i>Nezara viridula</i>
Short Title	PE 016
Lead Contractor	R J Consulting Ltd
Other Contractors	N/A
Start & End Dates	30 June 2013 - 31 January 2014
Industry Representative	Mr Gary Taylor
Project Budget	£8,980
AHDB Contribution	£8,980

The Problem

Nezara viridula is believed to be native to Ethiopia but is now widely distributed across tropical and subtropical regions of the world. It feeds on a wide range of plants and is a serious pest of many important food crops.

Nezara viridula has been imported into the UK on fruit and vegetable products for many years but was not found in the wild until 2003. It is mainly confined to the south-east of England which is thought to be the northern limit of its outdoor range. It is now considered to be established in London and the surrounding area. Breeding populations have most commonly been found in man-made habitats such as

parks, gardens and allotments, where it seems particularly fond of leguminous plants. The adults are strong fliers and are capable of long-distance natural dispersal during warm weather.

Nezara viridula has found a favourable niche in heated glasshouses in the north London area and it seems highly likely that it will eventually be transported to other parts of the country on produce and packing materials. It also seems likely that the pest would survive year round any where in the UK if it were within a glasshouse with frost protection between crops.

In 2012, HDC commissioned Dr Jacobson to produce a factsheet which provides an introduction to the biology and recognition of the pest and helps growers to distinguish it from less damaging native species of plant bugs (Jacobson, 2012). This document will help to prevent unnecessary insecticidal treatments due to misidentification of the target organism.

In 2012, HDC obtained an EAMU (Number 1994/12) enabling growers to use lambda-cyhalothrin (Hallmark with Zeon Technology) against *N. viridula* on pepper and aubergine crops. However, this product is extremely harmful to the biological control agents used against other pests in the IPM programmes for these crops. Most notably, applications of lambda-cyhalothrin could lead to secondary problems with *Frankliniella occidentalis* (western flower thrips) and associated infection with tomato spotted wilt virus (Jacobson, 2009; O'Neill, 2009). It is vitally important that UK growers have access to IPM compatible control measures against *N. viridula* as soon as possible.

In 2013, HDC commissioned Project PE014, in which Dr Jacobson and Associates collated information about monitoring and control measures used against *N. viridula* in other parts of the world. The study gleaned information via literature searches, insecticide databases and direct from suppliers of biological, chemical and other IPM-related products, as well as from professional contacts in the IOBC and IBMA who have had first hand experience of *N. viridula* in other countries / other crops.

The results of PE014 which were related to *N. viridula* were submitted to HDC as an interim report in April 2013 and have since been summarised for growers in a Technical Briefing Note (Jacobson, 2013). The desk study identified several monitoring and control measures that could be exploited by UK growers in the short, medium and longer-term. Based on these results, we believe that it should be possible to develop monitoring methods that can be used to accurately time IPM compatible treatments based on biological, physical and chemical techniques. Subjects of immediate interest include:

Sexually mature males of *N. viridula* have been shown to release a pheromone which is attractive in the field to females, males, and late-stage larvae of the same species. In parallel to the HDC desk study, partners in PE014 have accessed the chemical components of the pheromone which can now be tested

in traps in and around glasshouses in the north London area.

Mercury vapour light traps have been used for monitoring adult *N. viridula* in Australian pecan crops. This technique could have potential as an alternative to pheromone traps and should be evaluated in UK glasshouses. If effective, the study could be extended to investigate alternative sources of light.

Plants which are more attractive to *N. viridula* than the crop have been used as traps in and around valuable broad acre crops in the USA, Australia and New Zealand. Unpublished reports from allotments in the London area indicate that podding beans are highly attractive to the pest. The size and growth habit of dwarf French beans could make them ideal candidates for use as trap plants under the main crop canopy.

Pymetrozine (Chess) has been used to control related pests in other crops. It should be properly evaluated both as a high volume spray and via the irrigation in a commercial crop situation.

The next step is to complete a preliminary evaluation of the four products / techniques that may be utilised by growers in the short-term. It is possible that these monitoring and control measures will provide an integrated control strategy which will solve the problem. If not, the proposed study will pave the way for further research over the next 2-3 years.

Aims and Objectives

The overall objective of the project is to evaluate the potential of IPM compatible monitoring and control measures for *Nezara viridula* in sweet pepper crops.

Approach

These are preliminary studies and, as such, resources must initially be devoted to developing methods of assessing the efficacy of the materials under test.

Russell IPM will supply pheromone lures to be evaluated in and around glasshouses in the Lea Valley. At this stage, the objective will simply be to determine whether the traps are attractive to both male and female *N. viridula*. Some fine tuning of the formulation may be required to optimise their effect. This will be done by 'trial and error'.

The efficacy of mercury vapour light traps will be evaluated in and around glasshouses in the Lea Valley. As with pheromone traps, the objective will simply be to determine whether the traps are attractive to both male and female *N. viridula*. If so, the team will liaise with other researchers to consider alternative sources of light.

Dwarf French beans will be grown in pots to the point of producing pods and then positioned under crop canopies in commercial greenhouses. They will be examined at least twice per week for presence of *N. viridula* and life cycle stages recorded. If the trap plants successfully draw *N. viridula* away from the crop, then we will investigate the need to apply effective insecticides to those trap plants in order to prevent the spread of any offspring hatching from eggs masses laid.

Pymetrozine (Chess) will be properly evaluated both as a high volume spray and via the irrigation in a commercial crop situation.

A suitable method of assessing numbers of *N. viridula* in the crop will be developed. This may be based on one of the monitoring systems under test or by plant examination depending on preliminary results.

Trials will be designed and data analysed with the assistance of Dr John Fenlon. The trial design will be similar to that developed with Dr Fenlon in 1998 (Jacobson et al. 1998) and subsequently used in many HDC funded trials including those in pepper crops in 2009 and 2010 (Jacobson 2009 & 2010). In summary, the plots will be large and the effect on the pest population will be monitored over time, in comparison to untreated controls, using a large number of sample points per plot. Although there will be no true replication, the analysis will be based on sampling variation within individual plots. Thus the major tool of analysis is that of analysis of variance in which the sampling variation within each treatment area is combined and used as a test for differences between means of samples from each plot.

The resulting information will be presented to HDC as a formal report, compiled in an appropriate 'technical briefing note' assuming relevant information is generated and summarised for growers in an article for HDC News.