



Agriculture & Horticulture
DEVELOPMENT BOARD



New Project

CP 88

Enhancing the monitoring and trapping of protected crop pests by incorporating LED technology into existing traps (HDC MPhil by thesis Studentship)

Project Number:	CP 88
Project Title:	Enhancing the monitoring and trapping of protected crop pests by incorporating LED technology into existing traps (HDC MPhil by thesis Studentship)
Project Leader:	Dr Andy Evans
Contractor:	Scottish Agricultural College
Industry Representative:	Alan Davis (Protected Ornamentals Panel Chair),
Start Date:	1 ST October 2011
End Date:	30 th September 2013
Project Cost:	£43,600

Project Summary:

Novel traps for monitoring and trapping protected crop pests will be developed that utilise light emitting diode (LED) technology to significantly enhance the efficacy of current traps for monitoring pests such as whitefly, aphids, leaf miners, thrips and fungus gnats. The project will utilise the colour attraction exhibited by these pests so that LED's can be deployed in conjunction with existing traps (such as the blue for thrips, yellow for whitefly for example) to significantly increase the efficacy of traps in catching pests, and provide more effective pest monitoring so that use of biological control agents and/or use of insecticides can be optimised. As well as being suitable for detecting low pest populations, these traps may also be deployed for mass trapping of pests, and be designed to be less likely to trap beneficial insects such as those used for biological control.

Benefits to industry

Pest monitoring is a cornerstone to cost effective implementation of integrated pest management (IPM) programmes used in protected crops. With restrictions on the number of insecticides available for use likely to increase over the next few years, particularly in response to the implementation of EC 91/414/EEC, pest management is becoming a challenge to many growers. Insecticides (including acaricides) are applied to around 70% of UK protected crop area on average, with 40% of the protected crop area receiving some form of biological control (Garthwaite et al., 2009). The decision to apply insecticides and/or

biological control agents to protected crops is often undertaken by the detection of specific pests on traps such as yellow or blue sticky traps. These traps rely on the behaviour and activity of the pest to be effective. The colour and/or design of these traps have the potential to be enhanced by using specific wavelengths of light that elicit a strong behavioural response from pests. This project aims to link the behavioural response of pests to specific wavelengths of light ('colour') and use of light emitting diodes (LED's) that can be integrated with a coloured trap to significantly enhance the attraction of pests to the trap. This will allow growers to detect at an early stage the presence of specific crop pests, and to optimise the timing of any insecticide and/or biological control treatments for the management of pests within protected crops. Early identification of a pest problem due to the enhanced attractiveness of these LED traps may allow pest problems to be tackled at a more manageable stage of the pest life cycle, so that pest numbers don't increase to economically damaging levels. This could lead to a reduction in the number of insecticide and/or biological control applications to the crop. Development of LED traps that trap fewer biological control agents will also enhance the efficacy of these agents.

Research into the use of LED's to enhance trap catches of pests has been carried out by the USDA (Chu et al., 2003; Chen et al., 2004), and the Project Leader (Dr Andy Evans, SAC) has made contact with the USDA to facilitate progress on the approach outlined in this proposal

LED's are relatively cheap and can be deployed continuously or on a timer to enhance trap catches. It is envisaged that in the first instance LED's will be utilised with existing coloured sticky traps, but development of novel trap designs incorporating LED technology will also be explored.

There will not be any significant additional resources required by growers in the take up of these novel traps. The traps will be utilised as a replacement or an addition to the current pest monitoring approaches currently being undertaken, and will be supplied with details on how to get the best use out of them within an existing or new IPM programme.

Knowledge transfer activities will make growers aware of the enhanced efficacy of these novel LED traps, particularly in their role at detecting low pest populations and/or their use to mass trap specific crop pests.

The traps will be trialled with growers during the project to gauge their response and experience in using the traps, which will provide further information on how best to deploy and develop them as a commercial product.

References

Chen, T.Y., Chu, C.C., Fitzgerald, G., Natwick, E.T., Henneberry, T.J. (2004). Trap Evaluations for Thrips (Thysanoptera: Thripidae) and Hoverflies (Diptera: Syrphidae). *Environmental Entomology*, 33:1416-1420.

Chu, C.C., Jackson, C.G., Alexander, P.J., Karut, K., Henneberry, T.J. (2003). Plastic cup traps equipped with light-emitting diodes for monitoring adult *Bemisia tabaci* (Homoptera: Aleyrodidae). *Journal of Economic Entomology*, 96: 543-546.

Garthwaite, D.G., Thomas, M.R., Parrish, G. & Smith, L. (2009). Pesticide Usage Survey Report 220: Protected crops (edible & ornamental) in Great Britain 2007.

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