Grower Summary

CP 119

Sensor based pre-symptomatic detection of pests and pathogens for precision scheduling of crop protection products

Final 2018

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Use of pesticides

Only officially approved pesticides may be used in the UK. Approvals are normally granted only in relation to individual products and for specified uses. It is an offence to use non-approved products or to use approved products in a manner that does not comply with the statutory conditions of use, except where the crop or situation is the subject of an off-label extension of use.
Before using all pesticides check the approval status and conditions of use.
Read the label before use: use pesticides safely.

Further information

If you would like a copy of the full report, please email the AHDB Horticulture office (hort.info.@ahdb.org.uk), quoting your AHDB Horticulture number, alternatively contact AHDB Horticulture at the address below.

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Project title:	Sensor based pre-symptomatic detection of pests and pathogens for precision scheduling of crop protection products
Project number:	CP119
Project leader:	Dr Martin McAinsh, Lancaster University Prof Frank Martin, University of Central Lancashire
Report:	Final report, 11, 2018 Year
Previous report:	Annual report, 2017
Key staff:	
Location of project:	Lancaster Environment Centre, Lancaster University
Industry Representative:	
Date project commenced:	01.11.2015

GROWER SUMMARY

This project has not led to any definitive change in grower practices and has had no input from industry representatives and can therefore not be completed for this project.

Headline

There is potential for the development of vibrational spectroscopy as proximal sensor devices for the detection of abnormalities associated with pests and pathogens in crop plants. This project has demonstrated that microscopic pest detection is conceptually achievable both indirectly and directly pre- and post-harvest. In many cases, pre-visual symptomatic detection is possible. At this stage however, it remains difficult to quantify the financial benefits of the evaluated sensors, especially with respect to their current cost of operation for realistic commercial applications. Therefore, no change to growing practices based on this technology is currently beneficial.

Background

This project was intended to evaluate the feasibility of developing biospectroscopy (MIR and Raman spectroscopy) as sensors in various horticultural settings to mitigate crop loss. Rapid non-destructive sensors will aid in the development of sustainable technologies for the reduction of crop loss to pests and pathogens pre- and post-harvest. Early detection of pests and pathogens will increase the efficacy of crop protection products, while reducing their overuse and thus negative environmental impacts.

Summary

The exploratory nature of the project and preliminary results generated have not been reproduced in practical growing situations. Nevertheless, autonomous detection of disease at various points of progression from pre-symptomatic to late symptomatic, based on spectral data obtained by MIR spectrometers has shown high accuracy rates. In the context of this research and the specific methods used, preliminary detection rates range from around 80-100% accuracy. Higher accuracy is achieved for direct detection compared to indirect detection of pathogens. If such results can be translated into horticultural practice, there is significant potential to detect pathogens and reduce crop loss autonomously through incorporation into horticultural machinery or alternatively hand-held sensors.

Financial Benefits

As no consultation with industry representatives was undertaken throughout this project, an adequate financial benefits analysis has not been performed.

Action Points

- In conclusion of this project, no change to grower practice is advised.

- When these sensors become commercially available, training and/or consultation will be required.