

# Grower Summary

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## FV 333

Brassicas: forecasting light leaf spot and powdery mildew in vegetable Brassica crops based on “in field” detection of airborne spores

Final 2011

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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 HDC office ([hdc@hdc.ahdb.org.uk](mailto:hdc@hdc.ahdb.org.uk)), quoting your HDC number, alternatively contact the HDC at the address below.

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

<b>Project Number:</b>	FV 333
<b>Project Title:</b>	Brassicas: forecasting light leaf spot and powdery mildew in vegetable Brassica crops based on “in field” detection of airborne spores
<b>Project Leader:</b>	Roy Kennedy
<b>Contractor:</b>	National Pollen and Aerobiology Research Unit, University of Worcester
<b>Industry Representative:</b>	Andy Richardson, Allium & Brassica Centre
<b>Report:</b>	Final
<b>Publication Date:</b>	14th February 2012
<b>Previous report/(s):</b>	Annual 2010, Annual 2009
<b>Start Date:</b>	01 August 2008
<b>End Date:</b>	31 August 2011
<b>Project Cost:</b>	£ 38,988.00

## Headline

Detection tests for spores of Brassica powdery mildew and light leaf spot have been developed and tested.

## Background and expected deliverables

Light leaf spot and powdery mildew on Brussels sprout crops are important pathogens which can cause blemishes on the Brussels sprout button. Controlling light leaf spot infection within Brussels sprout crops in Northern Britain, where the pathogen is commonly found, is difficult given the time periods required for crop production. Many fungicides used to control ringspot and dark leaf spot can be used effectively to control light leaf spot. In contrast little information exists on the epidemiology of powdery mildew (*Erysiphe cruciferarium*) in vegetable Brassica crops. It is likely that this pathogen may become more important in drier areas where vegetable Brassicas are produced.

Application of fungicides with the active ingredients Boscalid and Pyraclostrobin (Signum) gave good control of light leaf spot infection in Brussels sprout crops provided that they could be applied at the time when light leaf spot ascospores were present in the air. Results from previous studies show that light leaf spot ascospores appear in the air in large enough levels to be a problem only during discrete periods. Light leaf spot inoculum may be present at other times but occurs at too low concentrations to become a problem in developing sprout crops. By using air sampling allied with rapid antibody based techniques periods of light leaf spot risk in Brussels sprouts crops can be identified. Using air sampling methods described by Wakeham *et al.* (2004, 2010) the risk of light leaf spot infection could be successfully assessed within crops of Brussels sprouts at Arbroath using a laboratory test.

Sprays of fungicide could be applied in response to peaks in airborne numbers of ascospores of light leaf spot. However if inoculum testing is to be used widely there will be a requirement for “in field” tests operated by the grower or consultant. This project has developed tests which can be used directly by the grower or consultant to determine the presence of pathogenic inoculum of light leaf spot and powdery mildew early in disease development within the crop (pre symptom)

The expected deliverables from this project are:

- Better detection of powdery mildew and light leaf spot in the field before disease is visible in the crop.

- Detection tests which can be used “in field” to determine the level of risk to the vegetable Brassica crop posed by these pathogens.
- Improved use of Signum within vegetable Brassica production systems and the reduced likelihood of tebuconazole resistance within light leaf spot populations (already been reported).
- Monoclonal antibodies which recognise powdery mildew conidia and light leaf spot ascospores.

### Summary of the project and main conclusions

Test kits have been developed that are able to identify the disease of Brassica powdery mildew (Figure 1) and light leaf spot. These kits are called lateral flow devices and they work by reacting with the disease to provide a test line reading. The depth of test line colour provides information on the disease level present. When no test line is observed (Figure 1: Spore concentration of >300) the crop is at high disease risk.



**Figure 1.** A semi-quantitative competitive lateral flow assay with powdery mildew conidial numbers tested between 0 – 4800

Brassica light leaf spot and powdery mildew disease is spread by spores in the air. The spores can be collected using a cyclone air sampler (Figure 2). The lateral flow test kits were used with the air sampler to identify airborne disease spore concentration. Visual readings were possible but only at high spore concentrations of spores. Using an electronic reader to provide digital test readout provided the potential for a semi-quantitative system to measure disease inoculum concentration.



**Figure 2.** Burkard multi-vial 8 day air cyclone sampler

In commercial Brassica cropping systems a Microtiter immunospore trap was operated as a reference trap to validate the quantitative readings made using the developed light leaf spot and powdery mildew lateral flow system. Air sampling systems show the potential to designate the likely onset of disease occurrence in field Brassicas.

### **Financial benefits**

- The usage of the “in field” test for Brassica powdery mildew and light leaf spot will improve the control of these pathogens in field crops.
- When used in conjunction with Brassica spot™ (environmental weather disease forecast) the improved spray timing for application of Signum to vegetable Brassica crops should be achieved. This will improve the efficacy of this chemical especially in production of vegetable Brassicas in Northern Britain.

### **Action points for growers**

- The ‘in field’ test kits can be requested from Roy Kennedy to determine when light leaf spot and powdery mildew are present the crops. Contact Roy Kennedy on 01905 855 255 or [r.kennedy@worc.ac.uk](mailto:r.kennedy@worc.ac.uk) to request the kit.
- Other “in field tests” are available for ringspot and dark leaf spot.
- Tests can also be used in conjunction with disease forecasts. Contact Roy Kennedy on 01905 855 255 or [r.kennedy@worc.ac.uk](mailto:r.kennedy@worc.ac.uk)