Grower Summary

FV 356

Onions: Further development and calibration of detection tests for conidia of onion downy mildew in combination with MORPH forecast model MILONCAST.

Final 2012

Disclaimer

The results and conclusions in this report may be based on an investigation conducted over one year. Therefore, care must be taken with the interpretation of the results.

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

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Project Number:	FV 356
Project Title:	Onions: Further development and calibration of detection tests for conidia of onion downy mildew in combination with MORPH forecast model MILONCAST.
Project Leader:	Professor Roy Kennedy
Contractor:	University of Worcester
Industry Representative:	Andy Richardson, Allium and Brassica Centre
Report:	Final Report 2012
Publication Date:	21 December 2012
Previous report/(s):	Annual Report 2011
Start Date:	01 October 2009
End Date:	31 August 2012
Project Cost:	£48,958

Headline

A lateral flow device (LFD) has been developed which can detect spores of onion downy mildew in the air before symptom appearance in the crop. The device has been validated using spore trapping systems.

Background

Onion downy mildew, caused by the fungal plant pathogen *Peronospora destructor*, can cause heavy yield losses in both salad and bulb onion cropping systems. The disease once established in a crop can readily become airborne and inoculum (conidia) is dispersed both locally and over longer distances to infect other salad and bulb onion crops. Once a crop is infected and, if favourable environmental conditions exist, a further period of 7–10 days is required before disease symptoms are then observed. A forecast model (MILIONCAST) is available to describe the effect of environmental conditions on downy mildew conidial production, infection and symptom development. However the model is unable to provide information on whether the crop has actually been exposed to airborne downy mildew inoculum. At present fungicidal control is the only effective means of controlling the disease and avoid crop loss and is applied with no knowledge of disease presence.

HDC FV 356 project reports on the development of a 10 minute in field test detection system to monitor field airborne concentration of onion downy mildew disease inoculum. The results obtained from these tests can, when used in conjunction with an environmental forecast model, assess the likely risk of disease development in an onion cropping system. As part of a risk assessment system producers will be able to make informed decisions on when to apply control treatments. This should enable produces to reduce unnecessary fungicide applications and schedule fungicide applications within areas more effectively.

Summary

The findings of this project indicate that the critical date for applying fungicide applications to the crop can be identified by using a daily ‘infield’ Lateral Flow test in conjunction with a disease forecast system (MILIONCAST). Onion downy mildew disease potential can be identified ahead of visible symptoms. This is a critical point in considerations of disease control. If early applications of fungicide can be targeted when onion downy mildew spores are present at times when the environmental conditions are conducive to infection, the activity of control methods will be enhanced.

The downy mildew lateral flow test has a shelf life of one year at 4^0C and operates over a spore concentration which can elicit disease symptoms in susceptible onion crops.
The downy mildew lateral flow test will be made available commercially in 2014.

Financial Benefits

The main financial benefits will be in the use of the device to reduce unnecessary fungicidal applications to the crop. Fungicide usage is costly and is one of the major inputs in crop production. Using the lateral flow device the grower/consultant will be able to check for the presence of onion downy mildew in the air and better time the first fungicide application. Lateral flow tests are expected to cost approximately £4-5 per test. This cost must be compared with £40 per hectare for fungicide treatment. In high risk years it is common to spend in excess of £300 per hectare on fungicides in a bulb onion crop. However savings will be variable between years and depend on the overall reductions in sprays achieved.

The amount of spores produced during the night may vary with environmental conditions. Information on the presence or absence of critical spore threshold numbers could help growers to identify periods when disease is likely to spread. However, besides information on sporulation also further information on when conditions are favourable for infection and the latent period are required before growers can decide on the best times to apply control measures.

By using the “in field test” for onion downy mildew in conjunction with the forecast model will enable able better scheduling of fungicide applications to onion crops. There will be less reliance on metalaxyl based fungicides for onion downy mildew control (the authorized use of these are under review).

Action Points

- Use air samplers to trap onion downy mildew disease inoculum ahead of symptom development in the crop.
- Test weekly air samples for onion downy mildew disease inoculum using lateral flow devices.
- Use environmental models to identify onion downy mildew spore release and infection periods.
- Utilisation of the integrated disease management system for control of onion downy mildew. Information on airborne downy mildew inoculum and environmental data will assist growers to schedule fungicide applications to crops more effectively to produce cost savings.