

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.

Annual 2011

Disclaimer

AHDB, operating through its HDC division seeks to ensure that the information contained within this document is accurate at the time of printing. No warranty is given in respect thereof and, to the maximum extent permitted by law the Agriculture and Horticulture Development Board accepts no liability for loss, damage or injury howsoever caused (including that caused by negligence) or suffered directly or indirectly in relation to information and opinions contained in or omitted from this document.

No part of this publication may be reproduced in any material form (including by photocopy or storage in any medium by electronic means) or any copy or adaptation stored, published or distributed (by physical, electronic or other means) without the prior permission in writing of the Agriculture and Horticulture Development Board, other than by reproduction in an unmodified form for the sole purpose of use as an information resource when the Agriculture and Horticulture Development Board or HDC is clearly acknowledged as the source, or in accordance with the provisions of the Copyright, Designs and Patents Act 1988. All rights reserved.

AHDB (logo) is a registered trademark of the Agriculture and Horticulture Development Board. HDC is a registered trademark of the Agriculture and Horticulture Development Board, for use by its HDC division. All other trademarks, logos and brand names contained in this publication are the trademarks of their respective holders. No rights are granted without the prior written permission of the relevant owners.

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.

HDC
Stoneleigh Park
Kenilworth
Warwickshire
CV8 2TL

Tel – 0247 669 2051

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

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:	Dr Roy Kennedy
Contractor:	University of Worcester (previously contracted to University of Warwick)
Industry Representative:	Andy Richardson, Allium & Brassica Centre
Report:	Annual Report 2011
Publication Date:	25 January 2012
Previous report/(s):	Annual 2010 (with previous contractor: Warwick)
Start Date:	01 October 2010 (with current contractor: Worcester)
End Date:	31 August 2012
Project Cost:	£48,958

Headline

A lateral flow device (LFD) has been developed which can detect conidia of onion downy mildew in the air before symptom appearance in the crop. The use of the device has been optimised in the field in an onion crop.

Background and expected deliverables

Foliar diseases of onion crops (onion downy mildew and *Botrytis* leaf blight) can cause heavy yield losses in bulb and salad onion crops. In salad onions, yield losses can be as high as 100% with whole crops being discarded as downy mildew symptoms make them unmarketable. Actual yield losses in bulb onions of 60 to 75% have been recorded. The project will help reduce losses in onion crops resulting from this disease.

A reduction in the number of fungicide applications, while maintaining disease control, can be achieved by applying fungicides only at times when conditions are favourable for disease development. The production of large numbers of conidia of onion downy mildew are thought to be related to the times when disease spreads.

The expected deliverables from this project are:

- Better detection of downy mildew 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 onion crop posed by onion downy mildew.
- Less reliance on eradicant fungicide applications for downy mildew control.
- Lateral Flow detection tests which recognise conidia of onion downy mildew conidia.

Summary of the project and main conclusions

Using Lateral Flow Devices for detection of downy mildew conidia

This study indicates that the LFD developed in this project has potential to detect low concentrations of airborne disease inoculum that may be causing the initial disease epidemic. The field test demonstrated that the LFD device gave a positive output up to 7-9

days before symptoms were observed in the crop (Figure 1). Onion downy mildew was identified on onion plants within the crop on the 2nd June and the spores were identified in the air on the 23rd May by the lateral flow device. The use of air samplers provided information on the time of the day when onion downy mildew inoculum is present in the air. Future field trials will look to sample the airborne environment only during these periods.

Investigations so far have confirmed stability of the biological components within the developed downy mildew LFD which will ensure that the device can be stored. The prototype identified for field trials has been shown to operate over the required sensitivity of detection for airborne concentration of onion downy mildew which can initiate disease symptoms.

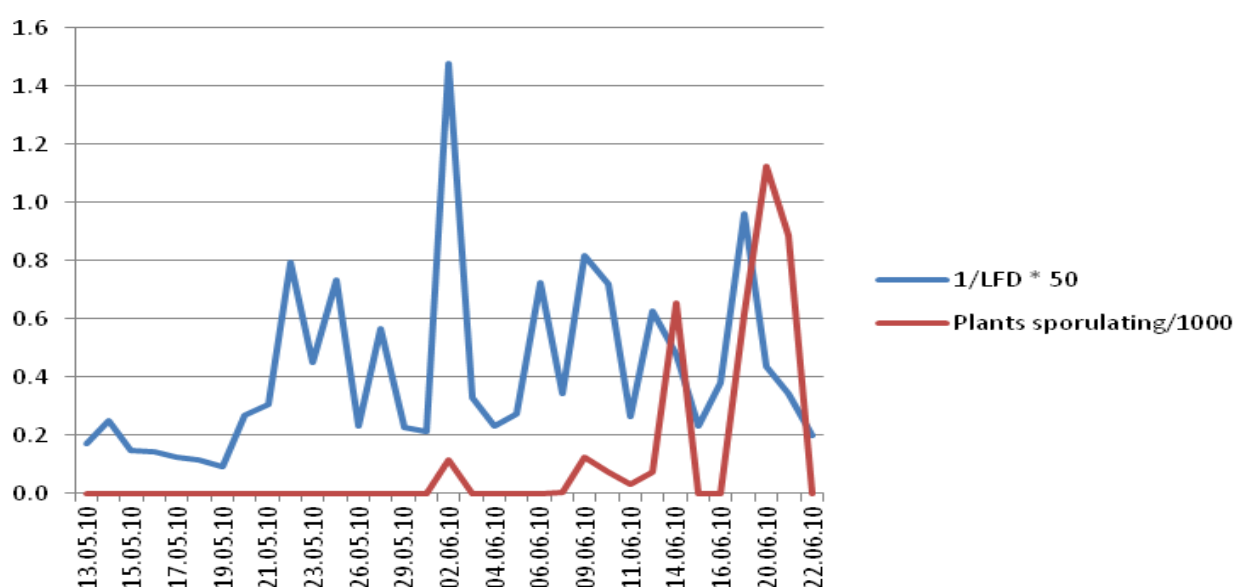


Figure 1: Monitoring onion downy mildew sporulation events in an onion field crop and available airborne disease inoculum

Financial benefit

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 time the first fungicide application more. 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 saving will be variable between years and depend on the reductions in sprays achieved.

Anticipated practical and financial benefit

Expected financial deliverables are therefore:

- The usage of the “in field “ test for onion downy mildew will improve the timing of the first application of fungicide for controlling this pathogen in onion crops.
- There will be less reliance on metalaxyl based fungicides for onion downy mildew control (these are being withdrawn).

By using the “in field test” for onion downy mildew in conjunction with models predicting onion downy mildew infection and sporulation growers will be better able to schedule fungicide applications to crops more effectively to produce cost savings.

Action points for growers

Until the test has been developed there are currently no action points but growers are advised to monitor the project progress and keep an eye out for any tests that arise.