Project number:	HGCA-2009-3579 (Defra LINK 09130)
Project title:	Reducing the impact of sclerotinia disease on arable rotations, vegetable crops and land use
Lead partner:	ADAS UK Ltd
Scientific partners:	Rothamsted Research, SAC, Warwick Crop Centre, PGRO, Velcourt R&D
Industry partners:	AHDB-PCL, AHDB-HDC, AHDB-HGCA, BASF plc, Belchim Manufacturing Co Ltd., Velcourt R&D, PGRO, Microzone Ltd., Burkard Manufacturing Co Ltd., NPARU
Government sponsor:	Sponsored by Defra and the Scottish Government through the Sustainable Arable LINK programme
Start date and duration:	1 October 2009 – 1 April 2013

Project aim:	To improve the control of sclerotinia disease for susceptible crops in the rotation.

Key messages emerging from the project:

- Spray timing for sclerotinia control in oilseed rape according to crop growth and SkleroPro forecast alerts was successful in 2010, but not in 2011 where early infections in dry conditions were missed.
- The best predictor of sclerotinia disease incidence in oilseed rape was petal infection, as assessed by agar plate tests.
- PCR tests for airborne sclerotinia spores using Burkard traps indicated that regional sampling could provide useful disease risk information, subject to confirmation in future years.
- For peas and beans, flowering duration is short, so using models to time sprays effectively is unnecessary; their value may be to help decide whether to spray.
- Contans (biological control agent) did not give a significant reduction in sclerotial viability when applied at drilling with oilseed rape.
- The number of and size of sclerotia produced is different for various crops. Carrots produce the most numerous sclerotia and oilseed rape the greatest weight of sclerotia. The consequences of these differences are being assessed.

Summary of results from reporting year:

The main project objectives relate to the two life-cycle phases of *Sclerotinia sclerotiorum;* airborne spores and soil inoculum (sclerotia).

Objective 1: Improve timing of fungicide applications, based on airborne inoculum detection and/or weather data.

Two models for timing fungicide applications were tested in 3 oilseed rape experiments at ADAS sites: [1] sclerotial germination, based on soil temperature and rain, & [2] SkleroPro, based on air temperature and %RH. In 2011 the germination model predictions were frequently earlier than observed germination. This model will be amended to account for dry soil at cold temperatures. Observed germination was low and late compared to 2010. Spray timing during flowering according to SkleroPro alerts was correct at High Mowthorpe and Boxworth, with no alerts and no disease. Rosemaund (11% stem rot in UT plots) had one late flower SkleroPro alert. This missed an early infection event, as evidenced by good control from a yellow-bud fungicide application. PCR tests on samples from Burkard spore traps at Rosemaund, which sampled air continuously during flowering, showed peaks of sclerotinia DNA within the experiment crop. These peaks occurred at the same times as those detected using a Burkard trap sited approx. 40km away at Worcester. Further analysis will determine if PCR results mirror the agar plate tests for sclerotinia. Agar plate petal tests have so far been the best predictor of stem rot incidence (average petal infection, based on results from 10 oilseed rape sites 2010-2011 vs stem rot % incidence, R^2= 0.59).

Objective 2: Quantify the effect of soil management and crop rotation on sclerotinia disease.

A questionnaire about sclerotinia disease management and the potential for co-operative control was distributed by SAC at HGCA roadshows in winter 2010/11. There were 130 responses, giving details of currently used control strategies and rotations. The short and long term effects of sclerotinia disease on cropping decisions and economics are being modelled by SAC, to determine optimum crop rotations under different disease pressures.

In the ADAS field experiment using Contans (biological control treatment for sclerotinia) and Perlka soil treatments, there were no treatment effects on sclerotial germination, or infected petals. In an ADAS tillage experiment, inoculum was not significantly different between the min-till and ploughed areas.

In WCC polytunnel experiments on oilseed rape, beans, peas, and lettuce in 2011, the greatest weight of sclerotia (and largest) were produced on oilseed rape plants, but the most sclerotia (small) were produced by carrot plants, similar to 2010 data. When converted to sclerotia/m^2, the results were found to be comparable to those from ADAS field counts. The data will be used in the SAC modelling work.

Objective 3: Evaluate disease prediction systems and fungicide timing across a range of varieties and locations in England (industry partner in-kind contributions to link project).

Velcourt contributed two oilseed rape sites. In Kent, petal infection was high (94% infected) at early flower but low at late flower (19%). In untreated plots, final sclerotinia disease incidence was 17%. Control with different spray timings was inconsistent, at best a reduction to 8% stem rot with the early flower treatment (not significant). SkleroPro gave alerts for mid-flower, missing the early flower infection. In Lincolnshire, petal infection averaged 45%, with 10% stem rot in untreated plots. However, control was inconsistent with no significant differences between scheduled spray timings. SkleroPro did not give an alert until flowering had ended, so may have missed an earlier infection event.

PGRO contributed a green bean site in Norfolk, and a vining pea site in Lincs. At both sites, there was no disease. SkleroPro correctly gave no alerts during flower.

Belchim contributed two carrot sites, in Notts and Yorks. However, no disease developed at either site. In a Belchim field experiment on carrots, there was insufficient sclerotinia disease to measure treatments effects. In 2012, multiple field sites will be used, to increase disease risk.

Key issues to be addressed in the next year:

Most of the experimental work in 2011 (see above) will be repeated in year 3 by all partners. The prediction models will be reviewed and amended if possible.