



New Project Summary Report for FV 417: Plant Defence Elicitors to Provide Induced Resistance Protection in Brassica, Allium and radish crops

Project Number	31304170		
Title	Use of Plant Defence Elicitors to Provide Induced Resistance Protection in Brassica, Allium and radish crops		
Short Title	FV 417		
Lead Contrator	MyInefield Research Services (MRS)		
Other Contractors			
Start & End Dates	31 March 2013	30 March 2015	
Industry Representative	Liz Johnson, Alistair Ewan	Andy Richardson,	Euan Alexander
Project Budget	£304,565		
AHDB Contribution	£300,435		

The Problem

Plant defence elicitors trigger natural resistance in the plant and have proven credentials against bacterial and fungal pathogens. Experimental elicitors such as ASM and BABA have been shown to control infection with Pseudomonas fluorescens rot in broccoli, under controlled conditions (2) and a separate study showed protection in apple seedlings against Erwinia amylovora (3). In Asia, Probenazole (Orzymate) is approved for use against bacterial and fungal blight in rice. However, the majority of elicitor trial work has targeted fungal infection, e.g. application of BABA was shown to control fungal infection of lettuce by triggering plant defence genes (4). In oil seed rape trials in Scotland, a combination of cis-jasmone, Bion and BABA was found to be highly effective against the fungal disease light leaf spot (5). For bacterial diseases, there are few other feasible options. Although antibiotics are used in some countries, their application is banned in many others, including the UK. Plant defence elicitors generally have little or no toxicity and are not microbiocidal. Instead they work through priming the plant's own defence mechanisms and as such have lower eco-toxicity and a negligible effect on soil health. In addition, the action of elicitors on plant resistance is an ideal way to defend against weak (opportunistic) pathogens.

use of plant defence elicitors in a commercial setting is likely to vary between crops and disease systems. It is most likely that such elicitors will aid in crop protection as part of an integrated management system

Many plant defence elicitors remain experimental, i.e. unlicensed for use in UK and / or further afield. Some fungicide active ingredients, such as azoxystrobin are known to induce resistance pathways (6) and, under various trade names (e.g. Amistar), are licensed for use on Brassicas and Allium in the UK (see Table 1). Other active ingredients with elicitor activity are marketed as fertilizers or nutritional supplements, e.g. chitosan-containing products and as such are not subject to approval status.

Aims and Objectives

Project

Project The overall aim of the project is to obtain experimental data on the efficacy of plant defence elicitors on bacterial diseases and one fungal pathogen on a range of Brassica, radish and Allium crops. The work will extend previous projects (FV378, FV393) with the aim of identifying workable solutions for these selected crops in the first instance.

1. Test plant defence elicitors Bion®, Regalia®, SoftGuard, Vacciplant®, and SiTKO-SA against light leaf spot on Brussels sprouts. Trial to be duplicated in 2 sites (Fife and Borders) - run by SAC Commercial Ltd

2. Test bacteria-targeted plant defence elicitors Harpin, SiTKO-SA, SoftGuard, Algal600 and Amistar against head-rot bacteria in broccoli. Trial to be carried out under controlled condition at JHI.

3. Test bacteria-targeted plant defence elicitors Harpin, Bion®, SoftGuard, Algal600 and Amistar® against Xanthomonas on cabbage. Trial to be carried out under controlled condition at JHI. 4. Test bacteria-targeted plant defence elicitors Harpin, SiTKO-SA, Bion®, Regalia®, SoftGuard, Algal600, Amistar® and Signum® against Pseudomonas on white and red radish. Trial to be carried out under controlled condition at JHI.

5. Expand red onion trial to test whether plant defence elicitors Harpin, SiTKO-SA, Regalia®,

SoftGuard, Algal600 and Amistar® can control Burkholderia-mediated soft rot in onion sets. Trial to be carried out in ground grown plants (from seed) under controlled condition at JHI.

6. Participate in HDC-led growers events, such as the BGA technical seminar series and others for knowledge transfer.

7. Report on the commercial availability of plant defence elicitors with the aim of providing grower advice on their efficacy.

aim(s):

objective(s):

Approach

The work will be divided into five work packages based on the disease system to be investigated: 1: Light leaf spot fungi (Pyrenopeziza Brassicae) on Brussels sprouts (DW, SAC Commercial Ltd lead)

2: Head rot bacteria (Pseudomonas fluorescens, Ps. marginalis. Pectobacterium atrosepticum) on broccoli (NH, JHI lead)

3: Black rot bacteria (Xanthomonas campestris pathovar campestris - Xcc) on cabbage (NH, JHI lead)

4:. Leaf blight bacteria (Pseudomonas cannabina pv. alisalensis - Pca) on radish (NH, JHI lead)
5: Soft rot bacteria (Burkholderia gladioli pv. alliicola - Bga) in onion bulbs (NH, JHI lead)
The work packages will be considered separately for clarity. The programme of work will be run
over two years to allow trials to be repeated on subsequent years (Fig 1 – Gantt chart). In 2013,
trials will be established for broccoli, cabbage, Brussels sprouts and radish. Red onion sets will be
grown from seed and will take a full season to establish. Onion trials will be initiated in 2014.
Results from the project will be compared with other projects that are investigating induced
resistance as part of integrated disease management. The work will focus on active ingredients
that have a reasonable expectation of gaining approval for the particular crop type in the short-medium term