



Agriculture & Horticulture
DEVELOPMENT BOARD



Grower Summary

SF 123

Raspberry: Efficacy of novel
products for the control of
Phytophthora rubi root rot

Annual 2013

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

Project Number: SF 123

Project Title: Raspberry: Efficacy of novel products for the control of Phytophthora rubi root rot

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Contractor: ADAS UK Ltd

Industry Representative: Tim Place – Church Farm

Report: Annual Report 2013

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Previous report/(s): Annual Report 2012

Start Date: 01 April 2011

End Date: 31 March 2014

Project Cost: £35,000

Headline

- Novel plant protection products for the control of *Phytophthora* spp. have been identified with potential to control raspberry root rot

Background and expected deliverables

Soil-borne *Phytophthora rubi* (previously known as *Phytophthora fragariae* var. *rubi*) can infect raspberry and cause wilting leading to the death of otherwise long-lived plants. Other species of *Phytophthora* can also cause root rot, but *P. rubi* causes the most common and serious form of rot (Kennedy and Duncan, 1991). Sections of row and their fruit yields are lost for the remainder of the crop's life as the soil contamination means that any replacement plants are also likely to succumb to infection. *Phytophthora ideae* has now also been found causing root rotting in *Rubus* spp., but it does not cause a wilt. It is likely that *Phytophthora* spp. resting spores survive in land re-used for raspberries, even after a gap of five years or more. The resting spores will be stimulated to germinate when roots grow out through the soil. The motile zoospores produced move in irrigation water. Once a plant becomes infected the pathogen multiplies and neighbouring plants become affected as zoospores spread. Although some crops are grown in substrate, plant losses still occur through the contamination of the substrate (such as by spore-contaminated irrigation water from open reservoirs), from using growing medium that becomes contaminated prior to use, and from rooting-through if pots are stood directly on woven ground-cover. The disease can also spread from infected, but initially symptomless plants, introduced to the crop.

Where fruit crops are soil-grown, growers can still (for now) use the soil fumigants Basamid (97% w/w dazomet) or chloropicrin pre-planting. The chloropicrin EAMUs (previously SOLAs) expire on 23 June 2013 and authorisation may be continued as a 120 day approval. Soil fumigation does not appear to totally eliminate the chance of plants with *P. rubi* wilt from appearing in a crop. There is currently no commercial soil test for *P. rubi* (although the molecular research on detection and quantification which could lead to a test is being carried out in Project SF 130). Growers not wishing to disinfest soil with a fumigant (possibly because a pre-planting *Verticillium dahliae* Harris test has proved negative) will not know the risk of *P. rubi* infection and could suffer if it is present.

Growers usually apply fungicide drenches biannually to raspberry crops against *Phytophthora* root rot, either as a soil-applied drench or via the drip irrigation. SL567A (44.7% w/w metalaxyl-M) use under EAMU 2195 of 2007 is possible but resistance to metalaxyl has been reported in other crops such as to *Phytophthora infestans* in potato. The

potato blight fungicide, Shirlan (fluazinam) has been used through an EAMU for several years. Paraat (500 g/kg dimethomorph) is a locally systemic product introduced more recently to the UK. There is always a greater chance of resistance developing in pathogens where products have only a single mode of action and thus chemical companies are developing mixtures. *Phytophthora* root rot can still be reported from drench-treated plantations. Alternatives to the currently used products would be beneficial to the industry.

The aim of the current work is to identify new drench treatments that protect raspberries from root infection by *P. rubi*.

Specific objectives are:

- To identify suitable products for the control or suppression of *Phytophthora* root rot in raspberry.
- To test products using inoculated growing media to determine their efficacy in the prevention of *P. rubi* root rot in raspberry.
- To provide information to growers and the relevant chemical companies on any products that have efficacy and to seek co-operation within the industry for work towards the production of EAMUs.

Summary of the project and main conclusions

Objective 1 – Identification of candidate products for root rot control

Five products with potential efficacy against *Phytophthora* root rot in raspberry were identified in Year 1 of the project. The evaluation of these products was commenced in 2012 in an inoculated trial alongside the industry standard Paraat (dimethomorph). The newly identified products include Fenomenal (fenamidone + fosetyl-aluminium), Resplend (ametoctradin + dimethomorph), Prestop (*Gliocladium catenulatum*) and an experimental product. Fenomenal has recently been registered in the UK for use on outdoor strawberries against red core and crown rot, with its efficacy against *Phytophthora cactorum* shown in HDC project SF 99. Resplend is approved for use against the closely related potato blight pathogen, *Phytophthora infestans*. Prestop is a biopesticide with full label recommendation for use against root pathogens on protected cane fruit and an EAMU for outdoor crops. Ranman Twinpack (cyazofamid) was initially selected in 2011, but removed from the final selection because gaining extension of use from potato is not very likely. After consultation with the HDC Soft Fruit Panel and the product's suppliers (then BASF) a second biological product, Serenade ASO (*Bacillus subtilis* strain QST 713) was introduced following information on the activity of this product in soil against *Phytophthora* spp. and the issuing of

EAMUs for the drench treatment of outdoor raspberries, and for trees in amenity situations and forest nurseries, against *Phytophthora* root rot. The fifth candidate was a chemical product shown to give control of the *Phytophthora* species causing crown rot in strawberries (Project SF 99).

Objective 2 – Evaluation of products for control of P. rubi in raspberry

Drenches of Paraat, Fenomenal, Resplend, Serenade ASO, Prestop and an experimental product coded HDC F142 were carried out on 3 October 2012 on cv. Polka modules potted in May 2012. After investigating a number of different root inoculation techniques in 2011, the selected method of burial of mycelial plugs of *P. rubi* in potted raspberry plants was carried out a week later. An isolate from a Scottish culture collection (SCR3333, FVR11, IMI355974) was used after it had not proved possible to obtain a fresh isolate from the rotted roots of a series of samples of field-collected raspberry plants.

No wilting or stem staining developed in the fruiting canes before their removal in January 2013. The crop will be monitored throughout 2013 for wilting of the new shoots, with destructive assessment, including of the roots, due in January 2014.

Financial benefits

Effective treatments will reduce crop loss and extend the life of the plantation. Increasing the range of products available to growers against *Phytophthora* root rot via potential EAMUs would increase the types of active ingredients used and reduce the chance of fungicide resistance developing. This will be particularly important if all soil sterilisation products are withdrawn from the industry. Products effective on raspberry are likely to have an effect on other *Phytophthora* species such as those affecting strawberry and many ornamental species. The selected products will probably need to be tested on a field scale before being approved for use. After this, growers will still be advised initially to drench small areas of their varieties in case of phytotoxicity.

The confidence of growers to plant into soil without sterilisation, to save expenditure, will be increased. Growers who might otherwise plant in growing media to avoid *Phytophthora* root rot on a field with a history of this disease might be able to return to soil use with the application of a novel fungicide or biofungicide drench directly after planting. This could save growers the need for the materials associated with container production, including for some growers the expense of having to use mains water because their borehole water has too much chloride.

If the newly available biological control product Prestop, proves effective, then this may help the industry comply with the EU Sustainable Use Directive for reduced pesticide use.

Action points for growers

There are no grower action points at this stage as the efficacy testing is ongoing. However, the prevalence of *Phytophthora* root rot in sampled soil-grown raspberry plantations indicates that growers would benefit from being able to utilise a soil diagnostic test to guide planting decisions. Greater use could also be made of already commercially available lateral flow devices to test whether or not wilting seen is caused by *Phytophthora* root rot and thus ensure that the appropriate cultural and chemical control measures are used.