Grower Summary

FV 219b (HL 01108)

Optimising field-scale control of Fusarium basal rot and white rot of onion using Trichoderma amended substrates and pellets, and onion residues

Final 2013

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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.

The following are members of the Consortium for LINK project HL 01108:

East Malling Research

and

Agriculture and Horticulture Development Board (via the HDC division)

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South Eastern Produce Limited

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Sylvan Spawn Limited.

Project Number:	FV 219b (HL 01108)
Project Title:	Optimising field-scale control of Fusarium basal rot and white rot of onion using Trichoderma amended substrates and pellets, and onion residues
Project Leader:	Dr Ralph Noble
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Start Date:	01 March 2011
End Date:	November 2013
Project Cost (total project cost):	£68,000

Headline

Novel treatments for onion neck rot were evaluated in this project

Background and expected deliverables

White rot is still a major problem in the UK bulb and salad onion industry, and Fusarium basal rot of onion is an increasing problem, and is likely to increase further with predicted climate change. The only approved fungicides for Fusarium of onion are a seed treatment with metalaxyl-M + thiram, which is aimed at controlling seedling blight rather than basal rot, and Signum (boscalid + pyraclostrobin). All commercial onion varieties are susceptible to white rot, and varieties that show resistance or tolerance to Fusarium basal rot do not have the same quality attributes of susceptible varieties. *Trichoderma* species have been used successfully to suppress diseases caused by *Fusarium oxysporum*, including onion basal rot. Prestop (*Gliocladium catenulatum*) has an off-label approval for Fusarium control and Serenade (*Bacillus subtilis*) has an off-label approval for white rot control. The main problem has been the development of a cheap delivery method that can achieve sufficiently high inoculum levels of biocontrol agents in soil.

Summary of the project and main conclusions

- Pelleted bulb onion seed with high populations of spores (>10^6 g pellet) of the biocontrol agents HDC F37, HDC F39, HDC F41 and Prestop (previously known as HDC F42) was produced by Incotec/Elsoms
- HDC F37 sprayed at drilling at 0.5 g/m^2 significantly reduced the level of white rot but did not suppress Fusarium basal rot; seed pellets containing HDC F37 also showed some reduction in white rot but the effect was not statistically significant
- Serenade ASO (previously known as HDC F43) drenched at 2 g/m^2 was ineffective in suppressing Fusarium but the level of white rot was lower in plots treated with Serenade ASO (previously known as HDC F43) at this rate
- White rot was consistently controlled in pot experiments using compost + HDC F35 when the soil biocontrol propagule count was increased to 10^6 cfu/g
- Mechanised application of dried compost + HDC F35 along the planting row at 12 t/ha increased the soil biocontrol propagule count to 3.6 x 10^6 cfu/g; due to a low level of white rot in the field, the effect on disease could not be established.

Inoculum development

- Pelleted bulb onion seed with spores of the biocontrol agents HDC F37, HDC F39 and HDC F42 was produced by Incotec/Elsoms. High populations (>10^6 cfu/g pellet) of biocontrol agent propagules were detected in the treated pellets
- The biocontrol agent populations in the seed pellets were unaffected by two months storage at 5˚C and declined by 10-30% after eight months storage at 5˚C
- Seed germination in soil was unaffected by the biocontrol agent in the pellet but Prestop (previously known as HDC F42) resulted in lower germination in peat modules and in one out of two laboratory tests

Pot experiment with pelleted seed

- Plants grown from pelleted seed containing HDC F37 or Prestop (previously known as HDC F42) inoculum or fungicide (metalaxyl-M + thiram) had 31 to 37% less Fusarium than plants grown from untreated pellet seeds
- Healthy plants grown from HDC F37 or fungicide treated pellet seed produced larger bulbs at harvest than plants grown from untreated pellet seeds
- None of the pellet seed treatments significantly affected white rot in the plants

Pot experiments with sets

- Across three years, the most consistent level of Fusarium disease control was obtained with a HDC F41 drench treatment; a Prestop (previously known as HDC F42) drench treatment was also effective in the two years that it was tested
- Across three years, the most consistent level of white rot disease control was obtained with a compost + HDC F35 treatment; a HDC F37 drench treatment was also effective in the two years that it was tested
- A Folicur fungicide set dip + drench treatment was effective against both diseases

Field Experiments

- HDC F37 sprayed at drilling at 0.5 g/m^2 significantly reduced the level of white rot but did not suppress Fusarium basal rot; seed pellets containing HDC F37 also showed some reduction in white rot but the effect was not statistically significant
- Drenches of HDC F39 (3 g/m^2) or HDC F42 (5 g/m^2) suppressed Fusarium basal rot and the level of white rot was also lower in plots treated with HDC F42 at this rate; Prestop (previously known as HDC F42) sprayed at drilling at 2.5 g/m^2 was ineffective in controlling either disease

- Serenade ASO (previously known as HDC F43) drenched at 2 g/m^2 was ineffective in suppressing Fusarium but the level of white rot was lower in plots treated with Serenade ASO (previously known as HDC F43) at this rate
- Broadcasting compost + HDC F35 at 50 t/ha increased the soil biocontrol propagule count to 2.7 x 10^5 cfu/g but was ineffective against white rot
- Matured green waste compost, screened to 20 mm with a moisture content of 41% could be applied to planting rows in the field through a converted set planter; compost with a moisture content of 44% or greater tended to clog
- Dried compost + HDC F35 applied along the planting row at 12 t/ha increased the soil biocontrol propagule count to 3.6 x 10^6 cfu/g; due to a low level of white rot, the effect on disease could not be established
- A double application of Folicur alternated with a double application of Signum reduced white rot in one out of two seasons; it was ineffective in controlling Fusarium
- A seed pellet treatment of metalaxyl-M + thiram had no effect on white rot but showed some reduction in Fusarium, although the disease reduction was not statistically significant

Financial benefits

Although HDC F37 is not currently registered for use on onions or as a seed pellet treatment, it may become available for these purposes since it is registered as a biopesticide for other crops. Serenade ASO (previously known as HDC F43) showed some efficacy against the disease in a field trial as a drench treatment. However, unlike HDC F37, it was ineffective in pot experiments. A spray at drilling and/or pellet seed treatment of HDC F37 is likely to be more cost effective than a drench treatment with Serenade ASO (previously known as HDC F43).

If Folicur and Signum are being used on onion crops that are mainly at risk from Fusarium rather than white rot, this could be a waste of fungicide applications (see below) and potential savings could be made.

The method for applying compost along the planting row is a more efficient method than broadcasting over the entire area, with a saving of 75% of the compost needed. This should also enable growers to apply compost at application rates well within the limits set by the Environment Agency for NVZs. However, further work is needed to evaluate the costs of producing and applying compost in this method, establishing the crop benefits compared with using inorganic fertilisers, and the potential for applying biopesticides with the compost.

Action points for growers

- If Folicur and Signum are being used on crops that are mainly at risk from Fusarium rather than white rot, sufficient areas should be left untreated to check if the treatment is having any effect.