



Horticultural
Development
Company

Grower summary

FV 352

Disease management in
organic brassica seed and
transplants

Annual Report 2009 – 2010

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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.org.uk), quoting your HDC number, alternatively contact the HDC at the address below.

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Headline

- Incorporation of composted green waste into the growing medium reduced damping-off at low disease pressures.
- Four seed treatments showed promise for the control of *Phoma* and *Alternaria* in Brassicas

Background and objectives

The use of healthy, clean seed and planting material is an important component of effective disease management for plant propagators and is essential for organic growers who have fewer options for disease control. This was highlighted at an HDC/HDRA stakeholder day (Managing Pests, Diseases and Weeds in Organic Vegetable Production, Ryton Organic Gardens 2007) where the importance of seed quality and good disease management was identified by stakeholder discussion groups as a priority area for future research.

Diseases caused by soil and seedborne fungal pathogens such as *Pythium* spp., *Rhizoctonia solani* (damping-off, soil-borne) and *Alternaria* spp., *Phoma* (seedborne) are a major problem for all plant propagators, especially for high volume / high value plants such as vegetable brassicas which have a total production value of ca. £200 million in the UK (Defra statistics, 2007). Additional disease problems may also be created for organic plant raisers through the increasing practice of companion planting (e.g. bird's foot trefoil for management of cabbage root fly) as the species employed are often fodder crops of variable seed quality which can harbour pathogens and reduce the germination and emergence of both companion and crop. A number of products which claim to have benefits for disease management in organic transplant production are now available in the EU and are marketed as growth promoters, plant strengtheners or crop protection agents. In particular, suppressive microbial inoculants and composts have shown promise for disease control and there is increasing interest in these products in conventional production systems because of the pressure to reduce pesticide use and the potential loss of many active ingredients with the proposed revision of EC directive 91/414.

The aim of this project is to evaluate a range of organically acceptable compost and brassica seed treatments for their efficacy and cost effectiveness in controlling damping-off diseases caused by *Pythium* and *Rhizoctonia* and seedborne diseases caused by *Phoma* and *Alternaria*.

Summary of results and conclusions

Compost treatments

The microbial products Trianum, Prestop, Mycostop, Subtilex, Revive P and green waste compost inoculated with *Trichoderma* (*T. viride* S17A or *T. harzianum* from Trianum) were tested for their efficacy in controlling damping-off of cauliflower seedlings caused by *P. ultimum* and *R. solani* and compared with a fungicide treatment (thiram- treated seed) in multiple experiments. The pathogens were introduced into Bulrush Organic Modular Compost and the microbial treatments added as drenches or granules at the recommended rates. Green waste compost with or without *Trichoderma* was added at 20% v/v. The amended Bulrush compost was dispensed into modules and cauliflower seed (cv. Belot) sown. The number of healthy seedlings was assessed over time.

Damping-off disease pressure varied between experiments but overall there was no consistent or clear benefit from adding the microbial products tested for control of *P. ultimum* or *R. solani*. However, at low disease pressures there was some evidence that green waste with or without *Trichoderma* was beneficial. The thiram-treated seed consistently controlled *P. ultimum* but was less effective against *R. solani* at high disease pressures.

Seed treatments

Hot water, two plant oils (thyme and clove), and five microbial products (Serenade, Mycostop and three experimental products) were assessed for their efficacy in the control of two seed-borne fungal pathogens of brassicas, and improving emergence of the companion plant bird's foot trefoil. Seed was treated at recommended rates and pathogen infestation levels assessed in a standard 2,4-D blotter seed test (brassicas) or freeze-blotter test (bird's foot trefoil). Effects on emergence and disease transmission were assessed by sowing seeds in trays of Bulrush Organic Modular Compost.

Hot Water, Thyme oil, and HDC B0002 gave statistically significant reductions in *Phoma* seed infestation levels, and a greater reduction than the chemical standard Thiram. Hot Water in particular reduced infestation to undetectable levels (i.e. <1.5%). In transmission/emergence tests the proportion of seedlings affected by *Phoma* was significantly reduced by treatment with hot water, thiram, thyme oil and Serenade with hot water having the greatest effect.

All treatments gave a statistically significant reduction in the level of *Alternaria* infestation compared to the untreated control. The greatest reductions were achieved with Hot Water, Thyme oil, clove oil, the microbials Serenade and HDC B0002, and the fungicide Thiram. Again Hot Water reduced infestation to undetectable levels (i.e. <1.5%).

Emergence was relatively poor for the bird's foot trefoil and was not improved by any of the treatments.

Treatment with hot water led to a small but significant increase in damping off. None of the treatments gave a significant reduction in damping-off compared to the untreated controls. Overall there would appear to be four leading treatments for control of seed-borne disease in Brassicas: hot water, thyme oil, Serenade and HDC B0002. The first three of these treatments have also been tested and shown promise in previous work on both seedborne fungi and bacteria. Currently, hot water is the only treatment that can be legally used, as it does not require approval. Unfortunately its routine application is not without problems and the temperature-time regimes need to be optimised on a per seed-lot basis to ensure maximum efficacy and minimum seed damage. Thyme oil is a natural plant product with broad spectrum disinfectant activity but would require formal approval as a pesticide before it could be used as a commercial seed treatment. Serenade ASO is a microbial product based on a strain of *Bacillus subtilis*. It is currently approved for foliar application to all crops (via a SOLA), but does not have approval as a seed treatment. The manufacturer should be encouraged to seek approval for seed treatment. Experimental product HDC B0002 is also a microbial product and the manufacturer should be encouraged to seek approval as a seed treatment.

Approval status of products

Table 1. Pesticide approval status of the various treatments/products examined in this study

Treatment/Product	Status
<i>Compost treatments</i>	
Trianum	Not approved in the UK, listed on Annexe 1 of 91/414.
Prestop	Not approved in the UK, listed on Annexe 1 of 91/414.
Mycostop	Not approved in the UK. Approved in several EU countries.
Subtilex	Not approved.
Revive P	Not approved, but marketed as a 'Microbial Soil Treatment'.
Green Waste	Approval not required.
<i>Seed treatments</i>	
Hot water	Approval not required.

Thiram	Approved as a seed treatment for Brassicas.
Thyme oil	Not approved, Annexe 1 listing in progress?
Clove oil	Not approved, listed on Annexe 1 of 91/414.
Serenade ASO	Not approved for application to seeds. Approved for foliar application to all crops (SOLA).
Mycostop	Not approved in the UK. Approved in several EU countries.
HDC B0001	Experimental product. Not approved.
HDC B0002	Experimental product. Not approved.
HDC B0003	Experimental product. Not approved.

Financial benefits

None to date.

Action points for growers

- Consider incorporation of composted green waste into growing media for Brassica transplants.
- Do not routinely use hot-water treatments without optimisation on a per-seed lot basis to avoid the potential for detrimental effects on emergence.
- Consider supporting an HDC-funded 'commodity approval' for thyme oil.
- Contact the manufacturers of the potential microbial seed treatments (Agraquest and Becker Underwood) or their distributors to demonstrate interest in the products.