

# Grower Summary

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## HNS 186

Control of downy mildew on  
shrub and herbaceous plants

Annual 2013

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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.ahdb.org.uk](mailto: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:** HNS 186

**Project Title:** Control of downy mildew on shrub and herbaceous plants

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**Report:** Annual Report 2013

**Publication Date:** July 2013

**Previous report/(s):** None

**Start Date:** 01 April 2012

**End Date:** 31 March 2014

**Project Cost:** £58,500

## Headline

- Thirteen treatments, including novel fungicides and biofungicides, a fungicide incorporated in the growing medium and a foliar fertiliser reduced downy mildew on *Geum*.
- Repeat applications of Fubol Gold damaged a small-leafed variety of *Hebe* but not a large-leafed variety.

## Background and expected deliverables

Downy mildew diseases can seriously damage over a dozen nursery stock and herbaceous perennials including *Buddleia*, *Digitalis*, *Gaillardia*, *Lamium*, *Hebe*, *Rose* and *Veronica*. Fungicides are the primary method of control for most growers. The availability of fungicides for use on ornamentals is currently declining due to changing legislation. Furthermore, there is a risk of some fungicides failing to control downy mildew diseases due to selection of fungicide-resistant strains; this has recently occurred with metalaxyl-M (e.g. Fubol Gold WG) failing to control impatiens downy mildew. The SCEPTRE HortLink project is evaluating a wide range of new fungicides and biofungicides for downy mildew control on edible crops, initially on *Brassica*. The project will examine the most promising new products identified in the SCEPTRE HortLink project and elsewhere for control of downy mildews on two ornamental crops, and for their crop-safety to a range of woody and herbaceous ornamentals. Simple crop protection programmes, based where possible on products designed to reduce the risk of resistance build-up, will be devised and tested. The HDC Factsheet on downy mildew diseases will be updated.

The overall aim of the project is to improve control of downy mildew diseases. Specific project objectives in Year 1 were:

1. To determine the effectiveness of selected novel fungicides and biofungicides;
2. To devise and determine the effectiveness of some simple alternating programmes.

## Summary of the project and main conclusions

Three fully replicated experiments were carried out in autumn 2012 on commercial nurseries. Objective 1 was examined in all experiments; Objective 2, which will be further investigated in Year 2, was examined in experiment 3.

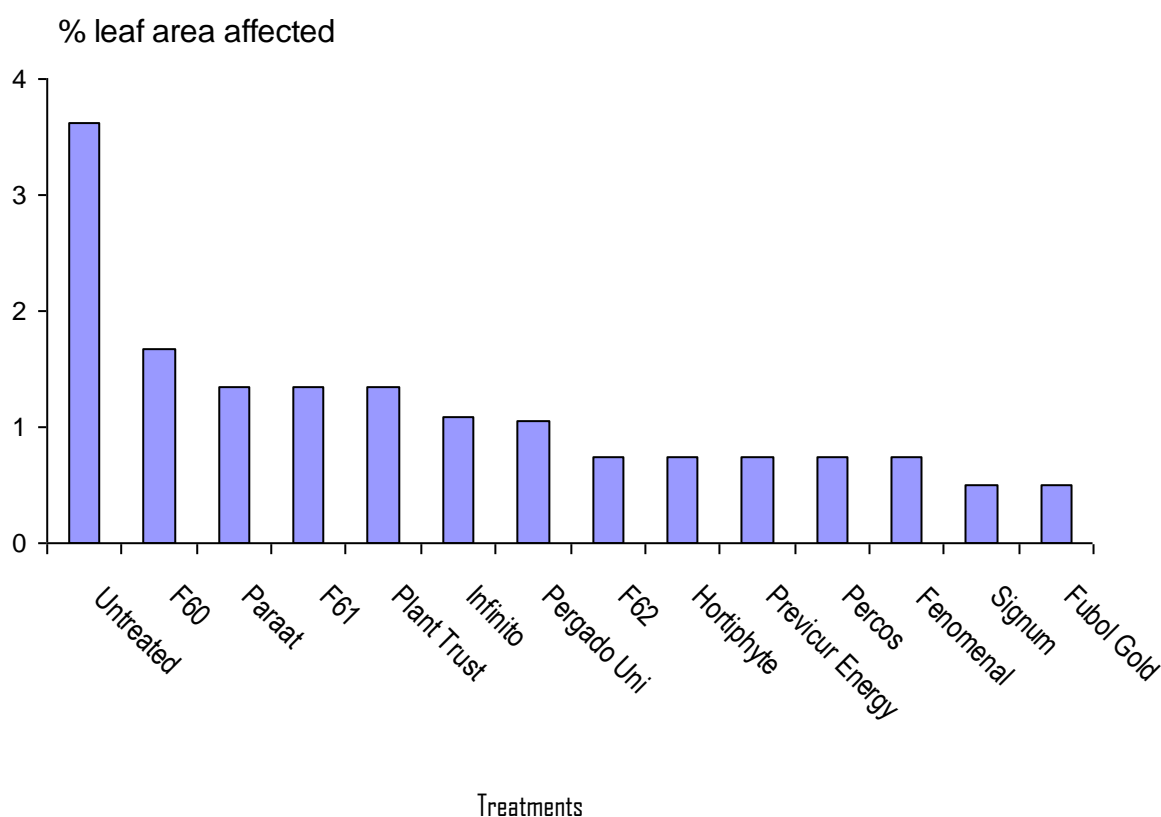
### ***Experiment 1 – Fungicides and biofungicides for control of Hebe downy mildew***

Nine conventional fungicides, two biofungicides and a foliar fertiliser were evaluated as high volume sprays and Plant Trust (fosetyl-AI) as a growing medium incorporation, for control of downy mildew (*Peronospora grisea*) on *Hebe x franciscana* 'Variegata' in a low multispan tunnel on a nursery in Norfolk. The conventional fungicides comprised Fubol Gold (mancozeb + metalaxyl M), Signum (boscalid + pyraclostrobin), Fenomenal (fosetyl-AI + fenamidone), Infinito (flupicolide + propamocarb), Pergado Uni (mandipropamid), Previcur Energy (fosetyl-AI + propamocarb), Paraat (dimethomorph), Percos (ametoctradin + dimethomorph) and one coded products (F62); the biofungicides were both coded products (F60 and F61); the foliar fertiliser was Hortiphyte (potassium phosphite). Fungicides and the foliar fertiliser were applied every 14 days and the biofungicides every 7 days from 6 September to 20 December. The Plant Trust was incorporated and plants potted three weeks after other treatments were established. No downy mildew occurred despite the introduction of hebe plants affected by the disease into the tunnel. No crop damage or effect on plant quality was observed.

### ***Experiment 2 – Fungicides and biofungicides for control of Geum downy mildew***

The same treatments as used in Experiment 1 were examined for control of downy mildew (*Peronospora potentillae*) on *Geum* 'Mrs Bradshaw' on a nursery in Norfolk.

Plug plants were already infected by a low level of downy mildew at potting. The first two applications of all treatments were therefore applied at a 7 day interval (6 and 13 September) as is likely to be done in good commercial practice when downy mildew occurs, and thereafter at 14 (fungicide) or 7 (biofungicide) day intervals. All treatments reduced disease incidence and severity (Figure 1). Signum and Fubol Gold gave the best control, with Fenomenal, Percos, Previcur Energy, Hortiphyte and F62 almost as good. The two biofungicides (F60 and F61), Paraat and Plant Trust were slightly less effective than Fubol Gold and Signum in this experiment. Following cold weather in December and January, patches of leaf yellowing developed on 18-47% of plants that had been treated with Infinito, F61 and F62.



**Figure 1.** Effect of fungicides, biofungicides (F60 and F61) and a foliar fertiliser on *Geum* downy mildew, Norfolk – December 2012

### ***Experiment 3 – Fungicide products and simple programmes for control of Hebe downy mildew***

Seven treatments were evaluated for control of downy mildew on *Hebe* 'Frozen Flame' from 29 August to 19 December 2012. The treatments comprised Plant Trust incorporation in the growing medium; Fenomenal applied as a monthly drench and as a spray; programmes of Fenomenal, Signum and Hortiphyte each alternating with Fubol Gold every 14 days, and Hortiphyte as a monthly foliar spray. Downy mildew was first observed in mid September and increased in November. By 7 January 2013, downy mildew affected 14% leaf area on untreated plants. Disease severity appeared to be reduced by Plant Trust, by Fenomenal drenches and sprays, and by Hortiphyte sprays (Table 1). Fenomenal drench and spray treatments, applied at monthly intervals, were most effective and reduced the disease to around 1% leaf area affected. Treatment with Fubol Gold resulted in leaf tip pale discoloration, first visible 1 week after the third spray application (the maximum spray number); damage symptoms increased with a further spray (applied under an Experimental Permit) and some plants showed shoot tip dieback and plant collapse (Figure 2).

**Table 1.** Effect of fungicide programmes on *Hebe* downy mildew, Worcs – 2012

Product(s)	Application method	Total no. applications	% leaf area affected (7 Jan 2012)	% plants marketable
1. Untreated	-	0	14.3	75
2. Plant Trust	Incorporation	1	7.8	84
3. Fenomenal	Drench	5	1.6	97
4. Fenomenal	Spray	5	1.0	100
5. Fenomenal /Fubol Gold	Spray	9	- <sup>a</sup>	0
6. Signum /Fubol Gold	Spray	9	-	3
7. Hortiphyte /Fubol Gold	Spray	9	-	25
8. Hortiphyte	Spray	5	2.7	97

<sup>a</sup> Unable to assess downy mildew due to spray damage to plants; earlier observations indicate low disease levels.

In treatments 5-7, the two products were applied alternately every 2 weeks; treatments 3, 4 and 8 were applied monthly.



**Figure 2.** Close up of *Hebe* 'Frozen Flame' leaf damage after four sprays with Fubol Gold at 1.9 g/L

**Table 2.** Summary of products evaluated as sprays for control of downy mildew and their approval status (February 2013) for use on ornamental crops

Product	Active ingredient(s) (fungicide group)	Rate of use	Approval		Max spray number
			Outdoor (O)	Protected (P)	
1. Untreated	-	-	-	-	-
2. Fubol Gold	mancozeb (M3) + metalaxyl M (4)	1.9 kg/ha	✓ 0217/12	✓ 0217/12	3
3. Signum	boscalid (7) + pyraclostrobin (11)	1.35 kg/ha	✓ 1842/09	✓ 1842/09	2
4. Fenomenal	fosetyl-Al (33) + fenamidone (11)	2.5 kg/ha	NA	NA	-
5. Infinito	flupicolide (43) + propamocarb (28)	1.6 L/ha	✓0952/13	NA	4 if 1.6 L rate (O)
6. Percos	ametoctradin (45) + dimethomorph (40)	0.8 L/ha	✓ 0819/13	✓ 0819/13	4
7. Pergado Uni	mandipropamid (40)	0.6 L/ha	✓ 1605/12	✓ 1605/12	4 (O) 1 (P)
8. Previcur Energy	fosetyl-Al (33) + propamocarb (28)	2.5 L/ha	NA	NA	-
9. Hortiphyte	potassium phosphite	2.5 L/ha	✓	✓	NS
10. Paraat	dimethomorph (40)	0.36 kg/ha	-	✓ 2585/11	2
11. F62	Novel chemical	-	NA	NA	-
12. F60	Novel biological	-	NA	NA	-
13. F61	Novel biological	-	NA	NA	-
14. Plant Trust	fosetyl-aluminium (33)	Incorp	Label	Label	1

Spray applications were applied at 1000 L/ha. Fenomenal used as a drench was applied at 1.5 g/L, 200 ml/pot.

NA – Not approved for use as a spray treatment; treatment applied under an Experimental Permit. Note that Fenomenal is permitted for use on protected ornamentals as a drench with up to three applications per year at 50-150 g/100 L; Previcur Energy is permitted for use on protected ornamentals as a drench with up to two applications at a maximum of 30 L/ha.

LTAEU – Used under the Long Term Arrangements for Extension of Use.



NS – not stated.

## Financial benefits

Downy mildew diseases can seriously damage some major shrub and herbaceous species. Losses in *Hebe* for example are estimated to exceed £200,000 annually. This project will benefit growers through identification of some new fungicides and biofungicides with activity against downy mildew and their potential for use on ornamentals. Development of sustainable programmes using fungicide and biofungicides that are crop-safe and effective will reduce losses and downgrading due to downy mildew.

## Action points for growers

- Consider use of the following fungicides as high volume sprays for control of *Geum* downy mildew: Signum, Infinito (outdoor crops only), Fubol Gold, Paraat, Percos and Pergado Uni.
- Consider use of Plant Trust as a growing medium incorporation at potting and Fenomenal as a drench treatment after potting as components of programmes for control of downy mildew on *Geum* and *Hebe*.
- Use two or more fungicides from different mode of action group to reduce the risk of selecting resistant strains of downy mildew (see Table 2 for categorization of products by fungicide group).
- Test treat a small number of plants to check for phytotoxicity before using a fungicide widely on a new species or variety for the first time.
- Some novel fungicides and biofungicides with activity against downy mildew were identified in this project; HDC will issue publicity if and when these products are approved for use on ornamental crops.
- Note that Fenomenal and Previcur Energy are currently permitted on ornamentals only as drench treatments; applications to CRD for approvals to allow their use as spray treatments are being considered by HDC.
- Note that use of Percos outdoors is restricted to applications between June and September to container crops and that use on outdoor crops standing on hard surfaces is prohibited.
- Note that Hortiphyte applied as a foliar fertiliser can give incidental control of downy mildew on *Geum* and *Hebe*.

- Note that Fubol Gold may cause slight damage to some varieties of *Hebe* if the maximum number of permitted sprays (three) is used; and severe damage if this spray number is exceeded.
- Note that multiple applications of Infinito and cold (frosty) weather can result in leaf yellowing on *Geum*.