



Agriculture & Horticulture  
DEVELOPMENT BOARD



# **Grower Summary**

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## **PC 298**

Protected Lettuce: Developing  
best practice for disease control

Final Report 2011

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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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## Headline

- A series of spray programmes, based on 2 or 3 application timings provided good control of key lettuce pathogens.
- Basilex used at half the manufacturers label rate provided effective control of bottom-rot caused by *Rhizoctonia solani* when used as part of a spray programme.
- Fubol Gold used at a reduced rate appeared to provide useful control of downy mildew when used as part of a spray programme.

## Background

There have been several recent approvals of new fungicides for use on protected lettuce e.g. Amistar (azoxystrobin), Signum (boscalid + pyraclostrobin), Scala (pyrimethanil), Teldor (fenhexamid), Switch (cyprodinil + fludioxonil) and the biological control agents Contans (*Coniothyrium minitans*) and Serenade (*Bacillus subtilis*). These products provide a useful addition to the range of tools available to help control foliar pathogens in the crop, and may, in the future, be supplemented by other products currently in the approval pipeline e.g. Revus (mandipropamid). However, information from growers suggests that there is a lack of clarity and confidence about the most efficient spray programmes to achieve effective disease control. This initial study investigated both the use of single products and the use of different combinations of products in spray programmes designed to enable comparisons of their efficacy against a range of different lettuce pathogens.

The information gathered from this work is aimed at providing growers with a greater understanding of the range of disease management options currently available to assist in the delivery of effective use programmes. An important part of this work was to develop the use of less hazardous crop protection products and also to switch to low residue risk products towards the end of the spray programmes to minimise the likelihood of maximum residue level (MRL) exceedences following routine residue testing.

It is envisaged that this study will initiate a rolling-programme of crop protection product evaluation in protected lettuce to ensure new actives and biocontrol measures are evaluated for effective incorporation into integrated programmes. Within the short time-frame of this initial study three primary pathogens of lettuce were studied; *Sclerotinia sclerotiorum*, downy mildew and *Rhizoctonia solani*. Additional data were also collected on other naturally occurring pathogens e.g. *Botrytis cinerea* during the study.

## Summary

Three fully replicated fungicide evaluation experiments were carried out between autumn 2009 and autumn 2010 on protected lettuce. Each experiment was carried out in the same 150m<sup>2</sup> glasshouse using a susceptible cultivar of butterhead lettuce. The aim was to establish a 'disease nursery' following inoculation with the appropriate pathogens. Each experiment was inoculated with the respective pathogen in an effort to provide sufficient challenge for the products. A series of products was selected against the introduced pathogen for use individually and as part of a series of spray programmes.

Experiment 1 (autumn 2009) focused on the control of *Sclerotinia sclerotiorum*. A range of fungicides including Amistar (azoxystrobin), Teldor (fenhexamid), Signum (boscalid + pyraclostrobin), Switch (cyprodinil + fludioxonil), Rovral (iprodione), Scala (pyrimethanil) and Contans (*Coniothyrium minitans*) were used as individual products (albeit repeatedly) or as components within spray programmes.

Low levels of *Sclerotinia* developed in this crop therefore little data was gathered. Residue testing was carried out on the treated crop and no MRL exceedences were reported.

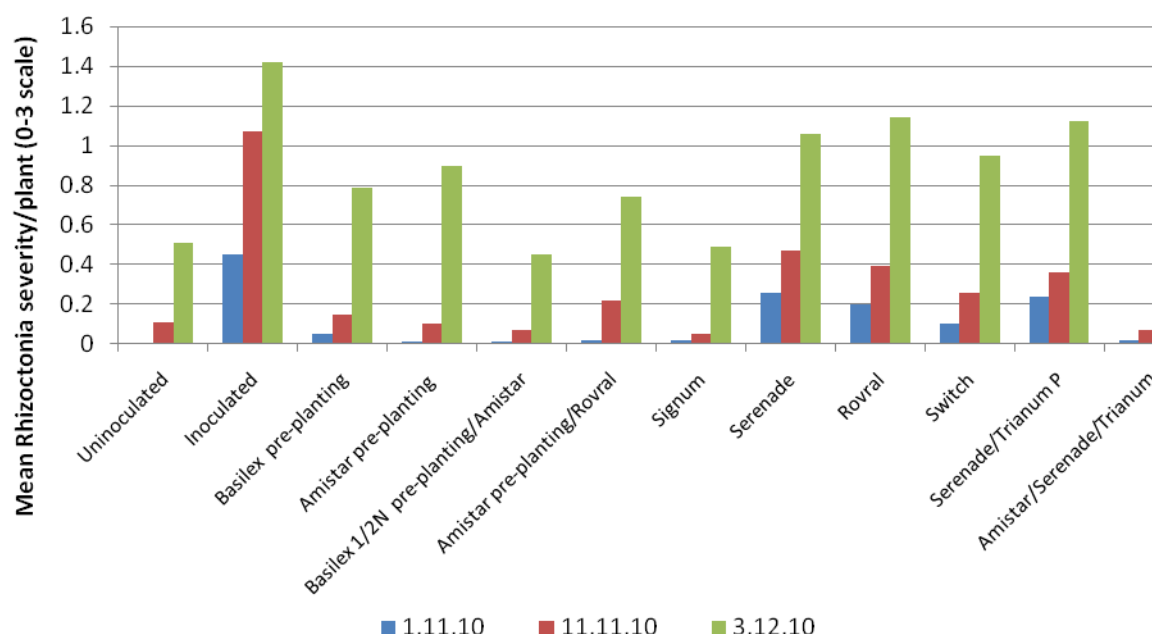
Trial 2 in spring 2010 studied fungicide effects on downy mildew study. The cultivar 'Cobham Green' was used, which contains very few *Bremia lactucae* (BL) resistance genes and therefore is highly susceptible. The seed and inoculum for this study were supplied by the research institute Naktuinbouw in Holland. Fungicide treatments in this study included Amistar, Fubol Gold (mancozeb + metalaxyl-M), Signum, Switch, Revus (mandipropamid), Previcur Energy (fosetyl-aluminium + propamocarb hydrochloride) together with Valbon (benthiavalicarb + mancozeb) and DP98 (phosphonate).

Downy mildew (DM) infection established well in the guard rows between the plots following inoculation. However, a spell of unseasonably warm weather halted progress of the infection and prevented rapid movement into the experimental area so the disease only developed at low levels. Data gathered on the control of downy mildew suggested that Revus, Previcur Energy and two of the experimental programmes where the same products were used in half-rate tank mixes with Fubol Gold appeared to be effective. The researchers also gathered information on the incidence and severity of *Sclerotinia* in this crop as a moderate naturally-occurring infection was observed. The inclusion of the strobilurin fungicides Amistar and Signum provided significant control of this pathogen.

No exceedences of MRLs were recorded on the sampled lettuce from this study.

The third study, carried out in autumn 2010, primarily investigated the efficacy of products against *Rhizoctonia* bottom-rot. Basilex (tolclofos-methyl) and Amistar as pre-planting treatments were compared with post-planting applications of Amistar, Rovral, Signum, Serenade and Trianum P (*Trichoderma* spp.) to control the disease. The results of this trial are given in the chart below:

## Severity of *Rhizoctonia* bottom-rot following treatment application over 3 assessment dates during the study



The standard pre-planting treatments were carried out in treatments 3-6, providing a good level of control, particularly in the early stages of the study. Treatment 5 used Basilex applied at half normal label rate and followed up 2 weeks later with a single application of Amistar. Treatment 7, 2 post-planting applications of Signum, also provided a good level of control. Full details of the treatment programmes and results are provided in the Science section of the full report.

None of the harvested lettuce exceeded the MRL in this study

## Financial Benefits

These initial studies, whilst not at a stage where a robust cost-benefit analysis can be conducted, do provide an indication that effective spray programmes can be devised which contain one or two treatments, although this does depend on the overall incidence and severity and disease. Also, some products are effective when used at lower than the manufacturer's recommended rate when disease pressure is not too severe. This approach needs further evaluation and consideration with respect to the potential development of resistance in the fungal organism, but is widely accepted as common practice in the arable sector.

The studies conducted also involved substitution of lower risk products such as biological control products e.g. Serenade and Trianum P to reduce the possibility of pesticide residues on crops. This strategy may well provide a good option for growers in the future if adequate levels of disease control can be demonstrated.

## **Action Points**

- Consider products for inclusion in spray programmes based on their full spectrum of activity rather than the label advice only.
- Consider pre-planting treatments where appropriate to reduce the number of products required for disease control post-planting.
- Consider the application of products at lower than the full label rate where disease pressure is low and where reduced-rate efficacy has been demonstrated.
- Consider substituting biological control products or alternative non-chemical products for fungicides as crops attain maturity to reduce risk of MRL exceedences where efficacy can be demonstrated.