Grower Summary

SF 113

Strawberry: Comparison of five non-pesticide mildew control products on strawberry

Final 2011

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

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Headline

Commercial control of powdery mildew can be achieved using the combination of potassium bicarbonate and sulphur and offers the opportunity of minimising the risk of detectable pesticide residues occurring in harvested fruit.

Background and expected deliverables

Powdery mildew is an important disease of strawberry causing significant yield losses each year. Current production systems provide conditions that are conducive to infection and development of the disease. Chemical control close to harvest using fungicides is limited to the product Nimrod (bupirimate) with a one day harvest interval or perhaps the use of Amistar (azoxystrobin), Systhane (myclobutanil), Kindred (myptyldinocap) and Topas (penconazole) at times when picking frequencies allow three day harvest intervals in between picks. Given such limitations, new methods for mildew control, especially during fruiting, are an important priority. The industry is seeking to develop residue free production strategies which will reduce the reliance made upon conventional fungicides.

A number of products recently released onto the market could be used as alternatives. These include biological control agents, natural plant derivatives and foliar feeds. Some of these products have received approval as crop protection products for use in strawberries. This project aimed to examine the effect of a combination of five such products.

Summary of the project and main conclusions

The five products tested are listed in the table below. The products which have not currently received approval as crop protection products have been assigned HDC chemical codes.

Table 1. Products tested during the experiment together with their approval status. Note that the formulation of sulphur used was Kumulus DF as there is no limit to the number of applications that can be made in strawberries.

Trade name	Active ingredient	Number of permitted applications	Rate of application	Approval status
Potassium bicarbonate	Potassium bicarbonate	60kg per Ha	10g/L (max application rate is 20g/L)	Approved as commodity substance
sulphur	80% w/w sulphur	-	2g/L	Approved
Serenade ASO	*Bacillus subtilis*	20 per crop	25ml/L	Approved
HDC F7	Plant extract from R*eynoutria sacchaliensis* L.	-	10ml/L	Not approved
HDC F8	Plant extract and foliar feed	-	5ml/L	Not approved

Commercial experience of using these products suggests that their efficacy when used on their own will not be sufficient to offer commercially acceptable levels of control and so the products were applied in combinations of two or three products as shown below.

Table 2. Combinations of products applied

Treatment	Product combinations
1	Potassium bicarbonate + Serenade ASO
2	Potassium bicarbonate + HDC F7
3	Potassium bicarbonate + sulphur
4	HDC F8 + HDC F7
5	HDC F8 + sulphur
6	HDC F7 + sulphur
7	Serenade ASO + sulphur
8	Serenade ASO + sulphur + HDC F7
9	Control

Products were applied weekly using a motorized knapsack sprayer to a 60-day crop of 'Sonata' planted in early July. Assessments of mildew were then conducted weekly just prior to making the product applications.

There were significant effects of the product combinations on severity of mildew and the data provides useful practical guidelines to strawberry growers on the control of mildew. Of the combinations tested, only those containing potassium bicarbonate, sulphur and Serenade ASO are approved plant protection products and only these three products provided a useful level of control. Results from a combination of these products are summarised in Figure 1 (below).

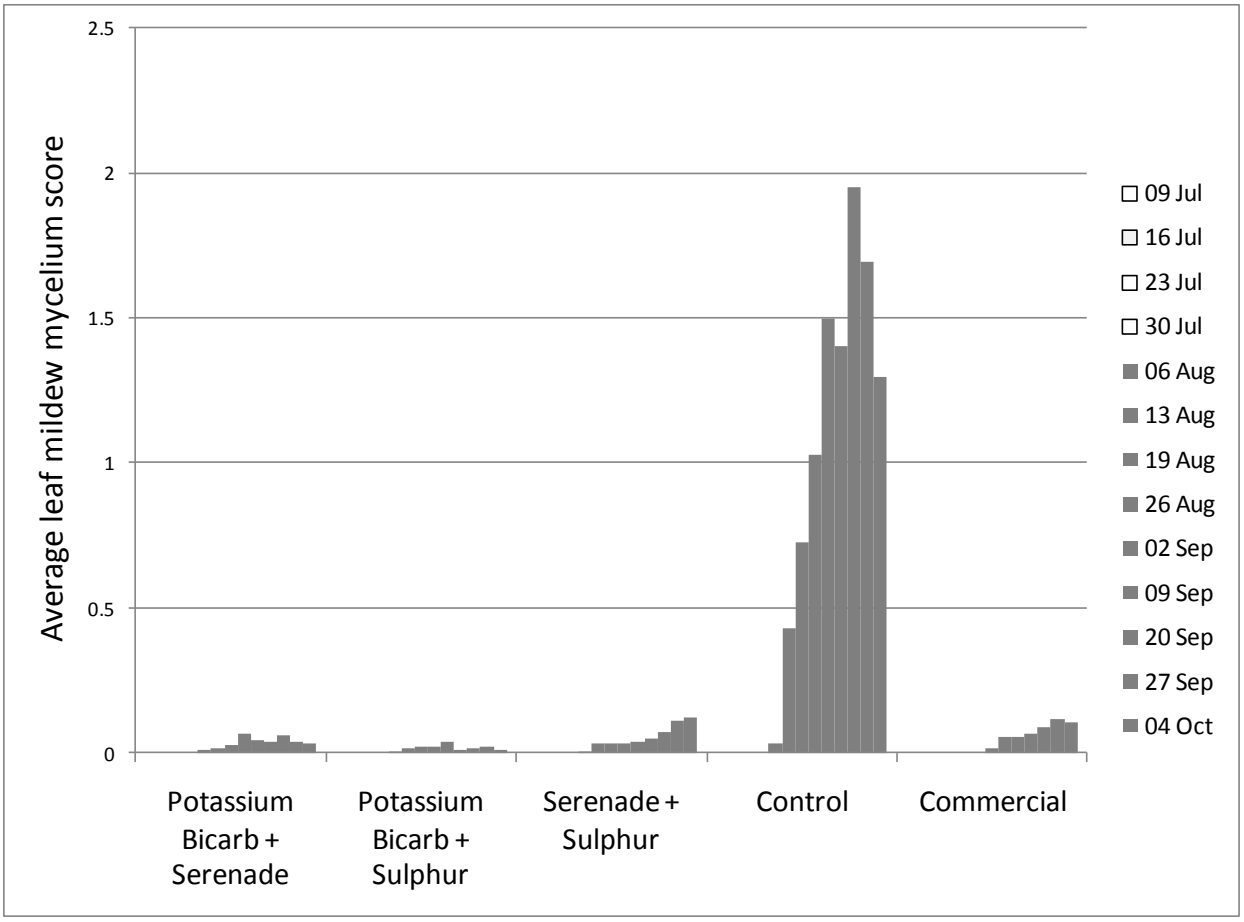

Figure 1. Effect of three combinations on mildew in strawberry. The open symbols represent the period during which sprinklers were used. Only those treatments which consist of approved plant protection products are shown here. Assessments were also made in the commercial tunnel next to the experimental tunnel.

Sprinklers were used during the first four weeks following planting from 9th July to 3rd August. Whilst the use of sprinklers is primarily aimed at reducing transpiration rates and cooling plants to improve establishment and yield, their use also prevented development of the symptoms of mildew. As soon as the sprinklers were switched off, leaf cupping, mildew mycelium and purple blotching was seen. Sprinklers can only be used until the start of flowering and so control after this period must be through applications made to the crop.

All combinations significantly reduced the severity of mildew to a level that was consistent with commercial best practice. Potassium bicarbonate, in particular when combined with sulphur, was the most effective combination and caused significantly lower levels of mildew than most other treatments. However, repeated use of sulphur is known to have a phytotoxic effect on strawberry, whilst potassium bicarbonate can give rise to some leaf scorch if

overused, particularly in hot conditions. Therefore great care should be taken when using these products either singly or in combination over a period of time, with their effects monitored closely during management of the spray programme.

Conclusions

- Sprinklers prevented the development of mildew symptoms throughout their period of use.
- Potassium bicarbonate + sulphur was the most effective combination tested and caused the lowest severity of mildew in the experiment described here.
- Weekly applications of control products are necessary as the rate at which mildew severity increased in the control treatment was significant.
- Potassium bicarbonate is the only product which is able to eradicate powdery mildew.
- Be aware of the potential long term damage that can be caused by repeated use of sulphur in strawberry and the risk of leaf scorch occurring in certain conditions where potassium bicarbonate is employed. Great care should be taken when using these products either singly or in combination over a period of time, with their effects monitored closely during management of the spray programme.

Financial benefits

The recording of yield was not part of the experimental protocol and so comparisons of the financial benefits of the product combinations tested are not possible. However, control of mildew is essential and the products tested here will form a useful part of any powdery mildew control programme. Potassium bicarbonate in particular offers a relatively inexpensive method of control.

Action points for growers

- Make use of sprinklers until first open flower to aid plant establishment but also to prevent the development of mildew symptoms.

- Use combinations of potassium bicarbonate, sulphur and Serenade ASO as part of mildew control strategies.

- Be aware of the potential long term damage that can be caused by repeated use of sulphur in strawberry and the risk of leaf scorch occurring in certain conditions where

potassium bicarbonate is employed. Great care should be taken when using these products either singly or in combination over a period of time, with their effects monitored closely during management of the spray programme. Consider using reduced rates should problems appear.

- Apply combinations weekly. Be careful not to miss a week's application as mildew severity can increase significantly during this time.

- As an eradicant, combinations containing Potassium bicarbonate can be used to eradicate mildew but take care to reduce and avoid the risk of scorch occurring