Grower Summary

SF 062a

Extending and exploiting new knowledge of strawberry powdery mildew

Final 2008

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Before using all pesticides check the approval status and conditions of use.

Read the label before use: use pesticides safely.

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Further information

If you would like a copy of this report, please email the HDC office (hdc@hdc.ahdb.org.uk), alternatively contact the HDC at the address below.

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GROWER SUMMARY

Headline

- A rule-based system has been developed to optimise the timing of treatments to control strawberry powdery mildew.

Background and expected deliverables

Strawberry powdery mildew is a significant threat to the economic sustainability of crops grown under protection. The industry is dependent on a few cultivars, which are mostly susceptible to the disease. Good control of powdery mildew can be achieved using fungicides, but production protocols are placing increasingly stringent limits on the products used, harvest intervals and the chemical residues permitted. In addition, growers rely on a relatively limited armoury of fungicide active ingredients, placing enormous selection pressure on the pathogen population.

This project aims to improve understanding of strawberry powdery mildew and use this knowledge to develop control strategies, which will integrate agronomic and chemical control methods to suppress disease to tolerable levels.

The expected deliverables from SF 62a include:

- Quantify the dose efficiency of key fungicides approved for controlling strawberry powdery mildew.
- Improved knowledge of the effect of venting practice on the environment within tunnels, interpreted with reference to the optimum conditions for fruit production, and for the growth and development of strawberry powdery mildew.
- Development of a rule based prediction system tested under commercial conditions.

Summary of the project and main conclusions

The results are summarised under the key objectives of the work.

Quantify the dose efficiency of key fungicides approved (or proposed) for controlling strawberry powdery mildew

Five fungicides were tested for the control of powdery mildew infection at quarter label rate and at full label rate. However the amount of infection measured in the field reduced throughout the time the experiment was being carried out even on the untreated plots. This

was due to the weather conditions within the site at that time in the 2007 season. This meant that it was not possible to draw significant conclusions from this piece of the work.

Define good tunnel management practices

Ideally, tunnels should be managed so that their environmental conditions remain optimal for fruit production for as much of the day as possible, whilst also avoiding conditions that are within the optimal range for powdery mildew development. This project demonstrated that this goal can be achieved on commercial scales. Temperature and relative humidity within and outside tunnels were measured at two sites. One site was managed in accordance with normal farm practice. On the other site, the grower paid special attention to venting. The external conditions on both sites were broadly similar, with few significant differences. The internal temperatures were also similar on both sites. However, the internal relative humidity was significantly lower on the site that had been managed with special attention to venting.

A venting plan should be produced each night (or early next morning) for the next day, by reference to the temperature forecast. The venting plan should aim to keep internal temperatures in the range 18-25 ^{o}C range during the day and to reduce the internal relative humidity to less than 70% during the day. Weather forecasts that predict air temperatures of 12-15^{o}C or greater, should act as a trigger to plan tunnel venting.

Implement and refine prediction risk warning scheme

Published literature was reviewed to investigate the extent of understanding about the relationships between environmental conditions and growth and development of strawberry powdery mildew. This provided considerable detail, which mostly originated from laboratory tests. The information was used as the basis for developing a rule based prediction system, which identifies the occurrence of high-risk infection periods for strawberry powdery mildew. The initial rules, defined from the laboratory-based experiments, were modified after field-based experiments that tested whether predictions of infection risk matched observations of disease progress in commercial crops.

These modifications had the objective of improving the prediction of initial development of strawberry powdery mildew symptoms in the field. Using historical records collected from commercial crops, the revised system was used to identify high-risk dates (and hence treatment timings) for strawberry powdery mildew, and these were compared to the dates that growers applied fungicides.

- The system predicted the same requirement for, or fewer applications than applied by the growers.
- Two growers also tested the system under commercial conditions.
- The control achieved was comparable to that achieved by the grower's normal management strategies, with less chemical products applications.

Financial benefits

In the short-term

- Improved venting can reduce relative humidity, resulting in slower germination of strawberry powdery mildew spores. It also helps maintain temperatures closer to the optimum range for fruit production. These benefits combine to reduce the need for fungicide treatment and to improve fruit quality.

In the medium-term

- The rule based system will allow fungicide timings to be targeted when they are likely to be most cost effective.

Action points for growers

- Appropriate venting is important for optimising crop development and growth and, as a component of integrated disease management, for suppression of powdery mildew.
- Venting decisions should be based upon weather forecasts and adjusted in response to observations in the tunnels.
- Growers should consider obtaining an on farm weather station, which can at least measure internal temperature and relative humidity, ideally from several fields.
- The rule-based prediction system will act as a guide for identifying high-risk infection periods, but growers should combine this with crop walking to check for disease symptoms.