BYDV control based on aphid monitoring

Epidemiology

Two strains of barley yellow dwarf virus (BYDV) are common in the UK: one transmitted mainly by the bird cherry-oat aphid and the grain aphid; the other by the grain aphid.

There are two types of bird cherry-oat aphid. One overwinters exclusively as eggs on bird cherry trees, but does not spread BYDV in winter cereals. The other colonises grasses or cereals all year round and reproduces without mating. It can spread virus whenever weather conditions allow during autumn and winter.

The grain aphid survives on grasses and cereals throughout the year. It is more frost hardy than the bird cherry-oat aphid, often persisting longer during winter. It rarely lays eggs but reproduces without mating.

The aphids introduce virus into all winter cereals in two ways:

- Cereal volunteers or grass weeds within a field can act as hosts for aphids and virus after stubble destruction. Such ‘green bridge’ BYDV occurs when surviving aphids colonise and infect newly emerging cereal crops. This typically causes large, discrete patches of severely infected plants. Very little BYDV is introduced in this way, except in warmer coastal parts of south-west England, Scotland and Wales.

- Winged aphids flying from grass or cereal volunteers elsewhere can introduce virus into newly emerging crops during the autumn. BYDV is introduced most commonly in this way. Infection, typically patchy, often on scattered individual plants, can be extremely variable in severity. Infection spreads during the winter as the progeny of migrant aphids move and breed.

Action:

- Consider using a seed treatment, eg imidacloprid, for your earliest drilled cereal crops.
- Cultivate to destroy all ‘green bridge’ sources of infection.
- Monitor BYDV risk from first emergence of earliest crops.
- Spray any crops predicted to be at economic risk of early infection at the advised time.
- Continue monitoring risk throughout the winter.
- Apply mid-winter or late winter sprays at the advised time if necessary to any crops predicted to be at economic risk of late infection.

Risk forecasting

Risk forecasting is based on the use of a model. Aphids are trapped and counted UK-wide in autumn to assess numbers migrating into crops.

The model uses weather data to predict aphid numbers likely to colonise crops, their survival time, breeding rate, between plant movement and virus spread during autumn and winter.

Mild weather encourages BYDV. In warm winters, the risk of economically important virus spread continues until March.

Several field-specific factors also increase BYDV risk: early sowing, coastal proximity, south-west facing aspect and mixed farming. Such factors can be used to generate crop-specific risk forecasts.
Summary

Aphicide sprays are highly effective. Though cheap in relation to the cost of a BYDV outbreak in winter cereals, routine use may not be justifiable. Basing spray decisions on accurate risk forecasts would save money, preserve non-target beneficial insects and minimise the threat of insecticide resistance developing in aphid vectors. HGCA and MAFF funding has been used to devise a system for assessing BYDV risk throughout the UK on which spray decisions can be based.

Spraying

Early-sown crops, as well as those in the south and west of the country are usually, but not always, at greatest risk.

Insecticides applied in tank-mixes with post-emergence herbicide treatments may be too late to give complete control.

Wheat is generally more tolerant of BYDV than barley, although varieties of both crops differ greatly in tolerance. Insecticides have their greatest effect on the less tolerant varieties sprayed when forecast risk of BYDV is high.

A decision support system module for wheat and barley, based on the model, is being developed for farmer and consultant use. This will provide options for spraying based on predicted risk (Figure 1).

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