BYDV

Two different aphid species transmit barley yellow dwarf luteovirus (BYDV) to cereals and grasses in the UK. Very low populations, which may go unnoticed, can cause economic damage.

In autumn most aphids probably come from grasses, especially perennial ryegrass. Virus may also come from other cereal crops and volunteers.

Grain aphid

*Sitobion avenae*

The aphids may be green, red or brown with black legs.

Transmits: The MAV and PAV strains of BYDV.

**Economic importance**

The grain aphid is the main BYDV vector in eastern, mid and northern Britain. Losses can be up to 2.5 t/ha.

**Risk factors**

Winter crops: In mild winters significant spread may occur in any crops exposed to migrations of the winged aphids. These can continue into November and infect later sown crops.

**Spring crops:** After mild winters BYDV may be transmitted to late-sown crops by winged aphids.

**Life cycle**

The grain aphid is mainly asexual feeding on cereals and grasses all year round. The aphid is more frost-resistant than the bird cherry-oat aphid with a LT50 (lethal temperature for 50% of the aphids) of -8°C. Grain aphids survive on crops through most winters. Numbers increase during mild spells when further BYDV spread may occur.

**The asexual strain**

– overwinters on cereals and grasses.

Aphids are frost-susceptible, the LT50 being -0.5°C. In colder winters survival of this strain is restricted to milder coastal districts.

Bird cherry-oat aphid

*Rhopalosiphum padi*

The aphids are green to dusky brown with rust red patches at the rear.

Transmits: The PAV and RPV strains of BYDV.

**Economic importance**

The bird cherry-oat aphid is the main vector of BYDV in south-west England and in warm autumns elsewhere.

**Risk factors**

Winter crops: Crops sown early, particularly in a warm autumn, are most susceptible to bird cherry-oat attack. These conditions allow aphids to breed rapidly before frosts kill them.

Spring crops: After mild winters BYDV may be transmitted to late-sown crops by winged aphids.

**Life cycles**

The sexual strain

– overwinters as eggs on bird cherry trees.

Most wild bird cherry trees are found in northern Britain although they occur across the UK.

Eggs of bird cherry-oat aphid are very frost-resistant. Bird cherry trees are not infected by BYDV, so spring migrants are initially virus-free. Aphids of the sexual strain do not transmit BYDV within winter cereal crops.
Natural enemies

Ground beetles and spiders may attack aphids in the autumn and winter and parasitoids can be active in mild weather. Minimum tillage leaves more predators, but increases the risk of ‘green bridge’ transfer.

Grass banks and grassed field margins may assist predator survival, but can also harbour infective aphids. Grassed areas should be considered in large arable fields of 20 ha or more.

‘Green bridge’ transmission

Warm, moist soil conditions facilitate aphid movement through soil. ‘Green bridge’ transmission is most likely in south-west England, on early-sown crops and in mild, damp autumns. Aphids can transfer directly from grass or ploughed-down grass or weedy stubbles to new cereal crops. The aphids can feed on new crop roots, and transmit virus directly without appearing above ground level to provide a control opportunity. Any cereal aphid species present may transmit virus – often the RPV strain of BYDV.

Cultural control

1. Clean stubble before preparing seedbed.
2. Leave at least five weeks between ploughing and sowing the new crop.
3. Consider applying a desiccant herbicide if cultivation to sowing interval is less than five weeks.
4. Delay sowing by a week to reduce BYDV spread by up to half.
5. Choose a moderately resistant spring barley variety (see HGCA Recommended Lists) if growing crops after mild winters or in milder districts.

Chemical control

Applying a seed treatment incorporating imidacloprid (Secur) can provide about six weeks’ protection, less at very low seed rates. It may not replace the need to spray. In mild seasons the threat of aphid infestation may continue through the winter. A pyrethroid spray will kill most wingless aphids.

Chemical control is ineffective on spring-sown crops.

Action thresholds

No satisfactory thresholds for treatment exist.

Spray timing

BYDV starts to spread within the crop when the second wingless aphid generation emerges. Spread, initially slow, accelerates as the third wingless aphid generation appears. Aphid breeding is governed by temperature, so a ‘T sum’ system of accumulated day degrees above 3ºC can be used to predict best spray timings.

Temperature accumulation should be started from:
- six weeks after sowing for imidacloprid-treated crops
- date of emergence for other crops
- one week after application for pyrethroid-treated crops.

1. Calculate ‘T sum’ by subtracting 3°C from the daily mean temperature and adding the result to the running total.
2. If ‘T sum’ is 170 (second generation could be starting) – consider a tank-mix insecticide if treating the crop for another purpose.
3. If ‘T sum’ is 340 (significant spread imminent) – apply a spray treatment as a priority. A crop should suffer little yield loss from fresh BYDV infection after GS 31 or after a prolonged cold period. A month with mean daily temperatures below 5ºC will severely reduce grain aphid survival.

An example of the effect of date of crop emergence on need to spray in a mild winter

Early emerged crops are most at risk of BYDV infection. Decisions on whether to treat crops emerging in September must be made by the start of October. The treatment window is wider for later-emerging crops.

Use ‘T sum’ (see above) for specific locality.