Aphids can cause significant yield reduction through direct feeding damage and diseases introduced by virus transmission. Aphids also excrete honeydew during feeding, which sticks to the crop and provides an ideal environment for fungi, such as sooty moulds, to develop.

BYDV
The grain aphid and bird cherry-oat aphid are the main vectors of Barley/Cereal yellow dwarf viruses (BYDV/CYDV, hereafter referred to as BYDV). BYDV is most damaging when young plants are infected in autumn.

Infections cause leaf yellowing and stunting, initially confined to single plants scattered randomly in a field but later developing into distinct circular patches, sometimes merging into extensive infection as secondary spread occurs.

TuYV
The peach–potato aphid is the main vector of Turnip yellows virus (TuYV) in oilseed rape. TuYV can decrease yields by up to 30% and is most damaging when young plants are infected in autumn.

The infection doesn’t usually show until late spring/early summer, showing as purple tinging of leaf edges and pods, easily mistaken for frost damage, nutrient deficiency or other stresses.

Latest information
– It is no longer permissible to plant oilseed rape seed treated with clothianidin, imidacloprid or thiamethoxam.
– Plenum (pyrethrozine) and Biscaya (thiacloprid) can both be applied once in the autumn for controlling aphids that spread TuYV in oilseed rape.
– Insecticide resistance is widely established in peach–potato aphid and has been recently found in grain aphid.

Action
– Refer to AHDB Aphid News for information on aphid migration.
– If aphid numbers are high, pyrethrozine and thiacloprid can both be applied to oilseed rape once in the autumn.
– Grain aphid resistance may affect product performance. It is important that full recommended pyrethroid field rates are used; if control remains poor, growers should switch to an insecticide with an alternative mode of action.

AHDB Aphid News
AHDB Aphid News provides information about when aphids are migrating at key times of the year.

Suction traps and water pan traps are used to gather regional data and show how the major aphid species have developed over the season.

The first autumn migrations are reported and this information can aid decision-making on whether to spray against vectors of TuYV and BYDV.

Information in the newsletters should be used to rationalise the use of insecticides, time treatments better and reduce harm to beneficial insects. This will also lower the risk of selection for insecticide resistance by reducing unnecessary or wrongly timed sprays.

Visit cereals.ahdb.org.uk/pests for more information.

Always consider your local conditions and consult a professional agronomist if necessary.
Risk factors

Earlier-sown winter crops tend to be at high risk from virus spread because they are available for colonisation for longer than late-sown crops.

Spring crops sown later in spring are at a higher risk because they are at vulnerable growth stages during aphid flight for longer than early-sown crops.

The risk is heightened in all crops by mild conditions in autumn and winter, which encourage aphid flight, population development and movement within the crop.

Continued monitoring throughout the autumn is advisable and, where permissible, more than one treatment may be needed if conditions remain mild.

‘Green bridge’ transmission (ie from grass weeds, volunteers or where crops are drilled after a grass ley has been ploughed out) is most likely in early-sown crops and following mild, damp summers which encourage weed growth. On rare occasions, if large numbers of aphids are present on weeds which are cultivated during seedbed preparation, they can feed on new crop roots and transmit virus directly without appearing above ground level to provide a control opportunity. Warm, moist soil conditions facilitate aphid movement through soil.

All cereals, but particularly wheat, are at risk from aphid feeding damage in the summer. Winter barley may be less affected due to its earlier maturation. Impact is greater in drought-affected crops or crops damaged by other pests and diseases. Dry settled weather during early grain filling also increases the risk.

Chemical control in the autumn

**Oilseed rape**
- A restriction on the use of neonicotinoid-treated seed means it is no longer permissible to plant oilseed rape seed treated with clothianidin, imidacloprid or thiamethoxam
- Pyrémizine (Plenum) and thiacloprid (Biscaya) can both be applied once in the autumn
- Application timing is crucial and AHDB Aphid News can help identify when to spray

**Cereals**
- Cereals sown between January and June cannot be treated with clothianidin, imidacloprid or thiamethoxam but treatment is permitted at other times
- Seed treatments containing clothianidin (Deter) or imidacloprid (Tripod Plus) provide protection for 4–6 weeks
- If aphids are still invading after the six-week protection window, an additional foliar spray (pyrethroid) may be necessary

- If the crop has not had seed treatment, the weather is mild, large numbers of aphids are being found in suction traps and aphids can be found on crops, use a pyrethroid as soon as the first leaves appear
- If the pyrethroid treatment does not appear to control all aphids, this could be due to the presence of insecticide-resistant grain aphids – use an alternative insecticide (see IRA G advice)
- By GS31, cereals are more tolerant to further BYDV spread

Chemical control in the spring/summer

**Pirimicarb**
- Has fumigant (vapour) and translaminar activity
- Works best above 15°C, as fumigant activity is lost below this
- Relatively selective so some beneficial insects are not affected
- For mealy cabbage aphid in oilseed rape, use a non-ionic surfactant to penetrate the waxy layer
- Some aphids are resistant (see IRAG advice)

**Pyrethroids**
- Broad spectrum contact insecticides with some repellent activity
- Can be quickly degraded by UV light
- Can have adverse effects on beneficial insects
- Some aphids are resistant (see IRAG advice)

**Flonicamid**
- A feeding blocker insecticide
- For use on winter wheat only
- Use after GS53

**Chlorpyrifos**
- Some products have label recommendations for aphid control prior to GS39
- Some aphids are resistant (see IRAG advice)

**Dimethoate**
- Some products have label recommendations for aphid control prior to GS39
- Others are currently in use-up periods
- Some aphids are resistant (see IRAG advice)

Always read product labels and check for buffer zone reductions.

Control thresholds

**Oilseed rape**
- Mealy cabbage aphid: >13% of winter oilseed rape plants infested before petal fall
- >4% of spring oilseed rape plants infested before petal fall

**Cereals**
- Before GS61:
  - Half of tillers infested
- GS61 to two weeks before end of grain filling:
  - Two-thirds of tillers infested
Insecticide resistance

There are three different mechanisms of insecticide resistance in peach–potato aphid and one mechanism in grain aphid in the UK (Table 1). Neonicotinoid resistance in peach–potato aphids has been discovered in southern mainland Europe but has not been detected in the UK.

Table 1. Insecticide resistance in aphids in the UK.

<table>
<thead>
<tr>
<th>Chemical group</th>
<th>Actives</th>
<th>Example products</th>
<th>Resistance</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Organophosphates</strong></td>
<td>Chlorpyrifos, Dimethoate</td>
<td>Dursban WG, Danadim Progress</td>
<td>Peach–potato aphid&lt;br&gt;Mechanism: elevated carboxylesterase. Resistance has fallen substantially following a decline in the use of organophosphates against aphids.</td>
</tr>
<tr>
<td><strong>Carbamates</strong></td>
<td>Pirimicarb</td>
<td>Aphox</td>
<td>Peach–potato aphid&lt;br&gt;Mechanism: modified acetylcholinesterase (MACE). Resistance is common and widespread, with more than 80% of peach–potato aphids now resistant.</td>
</tr>
<tr>
<td><strong>Pyrethroids</strong></td>
<td>Beta-cyfluthrin, Lambda-cyhalothrin, Alpha-cypermethrin, Cypermethrin, Zeta-cypermethrin, Deltamethrin, Esfenvalerate, Tau-fluvalinate</td>
<td>Gandalf, Hallmark with Zeon Technology Alert, Permaxsect C, Fury 10 EW, Decis, Clayton Cajole, Mavrik</td>
<td>Peach–potato aphid&lt;br&gt;Mechanism: knockdown resistance (kdr). Two forms exist: kdr and a more potent variant termed super-kdr. kdr resistance is currently rare; however, super-kdr resistance is common and widespread. The majority of peach–potato aphids in the UK at present carry both super-kdr resistance to pyrethroids and MACE resistance to pirimicarb. Grain aphid&lt;br&gt;Mechanism: knockdown resistance (kdr). kdr resistance to pyrethroids in grain aphid is widespread but at a low frequency.</td>
</tr>
</tbody>
</table>

Cultural control and natural enemies

Volunteers in overwintering stubble will contribute to transmission via the ‘green bridge’. Good stubble hygiene will help prevent this.

If conditions allow:
- Delay sowing by a week to reduce BYDV spread by up to half
- Leave at least five weeks between ploughing and sowing the new crop
- Consider applying a desiccant herbicide if the cultivation to sowing interval is less than five weeks

Varieties
- Choose a moderately resistant spring barley variety (see the AHDB Recommended List) if growing crops after mild winters or in milder areas

Recent AHDB Cereals & Oilseeds-funded projects have shown an indication of varietal tolerance to TuYV (see Project Report 503 and Student Report 26)

Natural enemies
Ground beetles, soldier beetles, rove beetles and spiders may attack aphids in the autumn and winter and parasitoids can be active in mild weather. The parasitoid *Diaeretiella rapae* normally provides good control against the mealy cabbage aphid.

In the summer, parasitic wasps, hoverflies, lacewings and ladybirds are attracted to aphid infestations and can provide control of potentially damaging populations.

Some fungal diseases are also specific to aphids and can provide some control, especially in damp conditions.

Minimum tillage leaves more predators but increases the risk of ‘green bridge’ transfer, so is not advised in areas where this is a high risk.

Measures, such as grass strips, proposed to increase natural enemies of crop pests, can provide refuges for cereal aphids. Wildflower strips with diverse grass mixture are less likely to harbour pests and will encourage parasitoids and hoverflies.

Further information
See AHDB’s Encyclopaedia of pests and natural enemies in field crops cereals.ahdb.org.uk/publications

The Insecticide Resistance Action Group (IRAG) has issued guidelines on the control of grain aphid populations that may contain individuals with kdr resistance to pyrethroid insecticides.

Successful BYDV control should take account of:
- Use of seed treatments
- Effective grass weed and cereal volunteer control
- Time of sowing

- Monitoring of aphids migrating into cereal crops prior to any foliar treatment in the early autumn
- Effective timing and application of foliar insecticide applications
- Continued aphid monitoring post-treatment in the late autumn
**Summer 2015**

**Information Sheet 42**

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**Peach–potato aphid (Myzus persicae)**

- Aphids are green, yellow, or light red
- The main vector of TuYV: up to 30% of aphids could be carrying the virus
- Feeds on a wide range of plants including brassicas, potatoes and ornamentals
- Migrates into oilseed rape crops during late summer and autumn and will continue to spread into winter if temperatures remain mild
- Widespread resistance to pyrethroids and pirimicarb; resistant populations will not be effectively controlled

**Grain aphid (Sitobion avenae)**

- Aphids are green, reddish-brown or brown with black legs
- One of the main vectors of BYDV and can substantially reduce grain quality through feeding on the ears
- Spends all year on cereals and grasses
- Migrates into newly-sown cereal crops during autumn and will survive throughout the winter if temperatures remain mild
- Numbers increase most rapidly during settled, dry weather
- Colonies overwintering on crops tend to be infested by parasitoids
- Outbreaks leading to feeding damage in summer tend to occur after colder winters because natural enemies have little to feed on in spring and produce fewer offspring to control summer aphids
- Problems in spring-sown cereals are far less frequent and usually involve early aphid flights into late-sown crops
- Spring oilseed rape can become severely infested after mild winters
- Mild winters can allow infestations on winter oilseed rape to increase to damaging levels
- Spring oilseed rape may impact on product performance, particularly when sprays are applied at reduced field rates. It is important that full recommended pyrethroid field rates are used. If control remains poor, a pyrethroid-based product should not be used again and growers should switch to an insecticide with an alternative mode of action.

**Mealy cabbage aphid/cabbage aphid (Brevicoryne brassicae)**

- Aphids are covered by a grey, waxy secretion
- Found under leaves and causes puckering and yellowing
- Later infestations move on to developing flowers and pods
- Eggs, temporarily stopping their involvement in BYDV spread
- Asexual aphids overwinter in cereals and can continue to spread BYDV but will fare poorly in harsh winters
- With increasingly mild winters, asexual aphids that overwinter in cereal crops may establish in the UK, most likely in the South West at first
- Area of maize increases, although it can also feed and transmit BYDV in small-grain cereals

**Bird cherry–oat aphid (Rhopalosiphum padi)**

- Aphids are green to dusky brown, with rust red patches at the rear
- One of the main vectors of BYDV
- Some sexual aphids migrate to bird cherry trees in autumn to lay eggs, temporarily stopping their involvement in BYDV spread
- Asexual aphids overwinter in cereals and can continue to spread BYDV
- Problems in spring-sown cereals are far less frequent and usually involve early aphid flights into late-sown crops
- Spends all year on cereals and grasses

**Rose–grain aphid (Metopolophium dirhodum)**

- Unimportant as a vector of BYDV because it spends the winter as an egg on roses
- With increasingly mild winters, asexual aphids that overwinter in cereal crops may establish in the UK, most likely in the South West at first
- Area of maize increases, although it can also feed and transmit BYDV in small-grain cereals

**Corn leaf aphid (Rhopalosiphum maidis)**

- Occurs sporadically in the UK and requires mild winters
- Likely to become more important as winters get milder and as the area of maize increases, although it can also feed and transmit BYDV in small-grain cereals

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Insecticide Resistance Action Group

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