Orange wheat blossom midge

Latest information
- There are a number of winter wheat varieties resistant to OWBM.
- Natural enemies provide a useful level of control.
- Pheromone traps provide the earliest warning of midge activity.
- There are three active substances approved to reduce damage caused by OWBM.
- The effective window for treatment is narrow.

Action
- Grow resistant varieties where suitable.
- Use pheromone traps to monitor activity.
- If thresholds are exceeded, treat crops as quickly as possible.
- When control is necessary, prioritise seed crops and premium crops, i.e., milling.

Always read product labels, consider your local conditions and consult a professional agronomist, if necessary.

Importance
Two wheat blossom midge species occur in the UK: orange wheat blossom midge (Sitodiplosis mosellana) and yellow wheat blossom midge (Contarinia tritici). Orange wheat blossom midge (OWBM) is usually the most significant and economically important species.

Wheat blossom midge larvae feed on the developing seeds, causing small, shrivelled grains with poor germination. Damage to the outer layer of the grain (pericarp) allows water to enter, resulting in sprouting in the ear and facilitating secondary attack by fungi causing fusarium and septoria. This affects both the yield and quality of grain harvested.

Life cycle
Midges usually fly when air temperature exceeds 15°C but flight has been observed down to 10°C, especially within crop canopies.

Male midges fly to seek a mate on the first evening after hatching. Mated females then fly on the next five suitable evenings. They lay most eggs on their first evening of flight.

Females fly in low light conditions, so, on sunny days, they fly later in the evening than on dull, overcast days. Only female midges fly between fields and only when conditions are still. On windy days, they lay eggs on ears sheltered within crops.

Eggs are laid inside the florets of emerging wheat ears. Crops at GS53–59 are vulnerable. Depending on temperature, larvae hatch within 4–10 days.

After hatching, larvae crawl down to the developing grain and begin to feed. They exude enzymes that break down cell walls and convert starch back to sugar. Larvae hatching after flowering do not develop properly and cause little damage.

Layer of the grain (pericarp) allows water to enter, resulting in sprouting in the ear and facilitating secondary attack by fungi causing fusarium and septoria. This affects both the yield and quality of grain harvested.

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Risk factors
– Growing a susceptible wheat variety: OWBM can be found in any field where susceptible wheat varieties have been grown in the past four years
– Rye-grass is also a very good host plant for orange wheat blossom midge
– Larvae will pupate in warm, moist soil, usually after heavy rainfall
– Midges usually fly when air temperatures exceed 15°C
– Ears are most at risk from when a quarter of ears have emerged above flag leaf ligules until ears have completely emerged above flag leaf ligules (GS53–59)

Monitoring
Pheromone trapping
– Place traps within fields damaged by OWBM in the past two years, regardless of whether the current crop is cereals, any other crop or fallow
– Attach traps to stakes at crop height when the flag leaf sheath is swollen (GS45), a week before the first ears emerge
– A minimum of two traps should be placed in each field and should cover discrete blocks of cereals representing different soil types, rotations, rainfall or soil temperature
– Leave the traps in position until any crop in the immediate area has reached flowering (GS61)

<table>
<thead>
<tr>
<th>Pheromone trap catches</th>
<th>Midge/trap/day</th>
</tr>
</thead>
<tbody>
<tr>
<td>30 or more</td>
<td>General risk to crops in following week when fertilised females lay eggs. Monitor crops for female midges using the visual crop inspection method</td>
</tr>
<tr>
<td>Over 120</td>
<td>Very high risk. Treat susceptible wheat crops in surrounding fields at GS53–59 as soon as possible.</td>
</tr>
</tbody>
</table>

Yellow sticky traps
– Yellow sticky traps are used to assess risk and monitor movement in current wheat fields
– Give priority to milling or seed crops and to more sheltered feed crops
– Use at least two yellow sticky traps, hung at ear height in each field at ear emergence
– Both sexes are caught, as well as many other insects, so correct identification is essential

<table>
<thead>
<tr>
<th>Variety status</th>
<th>Treatment threshold</th>
</tr>
</thead>
<tbody>
<tr>
<td>Resistant</td>
<td>Not applicable</td>
</tr>
<tr>
<td>Susceptible feed crops</td>
<td>One midge for every three ears through GS53–59 or if a cloud of midges is seen when parting the crop</td>
</tr>
<tr>
<td>Susceptible milling and seed crops</td>
<td>One midge for every six ears through GS53–59 or if a cloud of midges is seen when parting the crop</td>
</tr>
</tbody>
</table>

Visual crop inspection
– Inspect susceptible crops at ear emergence (GS53–59)
– Inspection is best conducted from mid-evening as light levels fall when midges are spread evenly
– Walk about 30 metres into the field, examining up to 100 ears, to assess if infestations exist and exceed threshold levels

A catch of around ten midges/trap during ear emergence indicates an increased risk and the visual inspection method should be used.

The highest crop risk is on the three nights following a rise in pheromone trap catches.

Place pheromone traps at height of crop ears

Place yellow sticky traps level with emerging ears

Adult orange wheat blossom midge
**Cultural control**

**Rotation** has little effect on overall risk of OWBM. Where crops are grown in blocks, this may help monitoring and control in current crops. It may also reduce future risk.

**Cultivation** methods that are more aggressive can cause the greatest reductions in OWBM numbers but may also have a negative effect on natural enemies that also overwinter in the soil. The presence of straw residues can reduce the incidence of OWBM but may encourage slugs.

**Resistant varieties** do not require monitoring or insecticide treatment. Wound plugs form on attacked grains and prevent larvae from feeding. Varieties that are resistance to OWBM are listed on the AHDB Recommended List. Resistant varieties are, however, susceptible to yellow wheat blossom midge, although this species is less common.

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**Growth stages**

For more information, see Cereal growth stages – a guide for crop treatments cereals.ahdb.org.uk/publications

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### Monitoring timings

<table>
<thead>
<tr>
<th>Growth Stage (GS)*</th>
<th>Thresholds</th>
<th>Risk assessment</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Pheromone trapping</td>
<td>Visual inspection</td>
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<tr>
<td>Booting</td>
<td></td>
<td></td>
</tr>
<tr>
<td>GS41</td>
<td></td>
<td></td>
</tr>
<tr>
<td>GS43</td>
<td></td>
<td></td>
</tr>
<tr>
<td>GS45</td>
<td></td>
<td>Set up traps</td>
</tr>
<tr>
<td>GS47</td>
<td></td>
<td></td>
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<tr>
<td>Ear emergence</td>
<td></td>
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</tr>
<tr>
<td>GS51</td>
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<tr>
<td>GS53</td>
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<tr>
<td>GS55</td>
<td></td>
<td></td>
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<tr>
<td>GS59</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Flowering</td>
<td></td>
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</tr>
</tbody>
</table>

*Refer to the AHDB Cereal growth stages guide for information on growth stages

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Orange wheat blossom midge larvae

Orange wheat blossom midge damage

Orange wheat blossom midge laying eggs
Biological control

Natural enemies
All of these natural enemies are vulnerable to insecticides. Only use insecticides when orange wheat blossom midge infestations above the thresholds are observed and only treat at susceptible stages.

Dance flies (*Platypalpus* spp.) feed on adult midges during flight. Occasionally, large numbers in June can significantly reduce midge populations.

Parasitic wasps *Macrogiens penetrans* and *Platygaster tuberosula* lay their eggs within midge eggs. Wasp larvae attack midge larvae as they hatch the following year and prevent pupation.

Spiders’ webs can trap many wheat blossom midges.

Ground beetles (Carabidae) eat midge larvae. Numbers eaten increase if soil is dry, preventing larvae burrowing into it.

Further information
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AHDB Recommended Lists for cereals and oilseeds (annual)
cereals.ahdb.org.uk/pests

Encyclopaedia of pests and natural enemies in field crops (AHDB, 2014)

Cereal growth stages – a guide for crop treatments (AHDB, 2009)

AHDB Recommended Lists for cereals and oilseeds (cereals.ahdb.org.uk/varieties)

Project Report 451: Integrated management strategies for varieties tolerant and susceptible to wheat blossom midge (AHDB, 2009)


Publication orders
0845 245 0009
cereals.publications@ahdb.org.uk

Chemical control

Three active substances are approved for OWBM control: *lambda-cyhalothrin* (eg Hallmark Zeon) and *beta-cyfluthrin* (Gandalf) are both pyrethroid insecticides, *thiacloprid* (Biscaya) is a neonicotinoid.

An insecticide should be applied if the threshold is reached during ear emergence, to reduce damage from OWBM larvae. Larvae cannot be controlled once they have moved down into the ear, emphasising the need to use monitoring to time spraying effectively.

Warning: Correct insecticide timing is critical.

Always read product labels and check for buffer zone reductions.

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