Cabbage stem flea beetle

Life cycle and impact
Cabbage stem flea beetle (Psylliodes chrysocephala) is widespread in the UK and northern Europe.

The life cycle is driven by temperature. Adult beetles migrate into oilseed rape crops during crop emergence. This is the stage at which the crop is most vulnerable, as the beetles can feed on and destroy the growing point. If damage is severe, beetle feeding can kill seedlings even before they emerge. Once the cotyledons are through, the crop is usually more tolerant of attack.

The beetles chew holes in cotyledons and early true leaves, giving rise to ‘shot-holing’ symptoms, which can result in stunting and poor plant vigour. Eggs are laid at the base of plants. Egg development and larval activity are inhibited by temperatures below 3°C.

Newly hatched larvae may enter plants and feed in petioles from October to early April. They bore into leaf petioles and, later, into the main stems, which can destroy the growing points and affect plant vigour.

Towards the end of spring, larvae leave the plant and pupate in the soil. Adults emerge in June/July and feed on foliage. They ‘rest’ in moist, sheltered places over the summer and adult beetles are often found in large numbers in harvested seed, where they do no harm.

Risk factors
Air temperatures above 16°C are more favourable for adult CSFB migration.

A warm autumn will favour egg laying and early hatch of larvae, coinciding with smaller, more vulnerable plants. Eggs laid on early emerging crops are likely to hatch faster than those laid in later emerging crops.

A dry autumn resulting in low soil moisture can delay crop growth so that it develops more slowly than it is being eaten.

Crops drilled into dry and cloddy seedbeds can be slower to emerge with reduced vigour.

The larvae are predominantly white, with numerous small dark dots on the back and three pairs of dark legs. Fully grown larvae are about 6 mm long and have a black head and a large black plate on the upper surface of the hind end.

Latest information
- Neonicotinoid-treated seed cannot be planted following the restrictions imposed in December 2013 unless covered by an emergency authorisation.
- Crops are most vulnerable at emergence if the growing point is destroyed or if the crop is growing more slowly than it is being eaten.
- Resistance of adult cabbage stem flea beetles (CSFB) to pyrethroids has been confirmed in the UK.

Action
- Monitor local pressure by checking the number of CSFB in the previous crop’s harvested seed and assessing damage to volunteer oilseed rape plants.
- Monitor larval numbers in late October/early November.
- Only spray if thresholds are exceeded or there is evidence of high pest pressure.
- Pyrethroids should only be applied when absolutely necessary (to minimise the spread of resistance).

Pyrethroid resistance and control without neonicotinoids
The confirmation of pyrethroid-resistant CSFB in the UK means that, for some, pyrethroids may provide little or no control.

As well as knock-down resistance (kdr), an unknown metabolic-based resistance mechanism which confers strong pyrethroid resistance has been confirmed. The latter resistance mechanism has only been confirmed in the UK, unlike kdr which is also present in continental Europe.

Pyrethroid sprays should only be applied where there is evidence of high pest pressure at emergence or if thresholds are exceeded post emergence.

To prevent resistance from spreading, it is important to spray only if absolutely necessary and to use full recommended field rates.

If control is poor, a repeat spray with a pyrethroid-based product should be avoided.
Monitoring

Early warning signs
Adult beetles emerging from the soil in summer can be monitored to assess the risk of damage occurring in the autumn:
- Check for large numbers of CSFB in the previous crop’s harvested seed
- Look out for signs of CSFB damage to volunteer oilseed rape plants
- Use water traps to check for large numbers of CSFB

Adult shot-holing
Once the cotyledons are through, an assessment of shot-holing can be used to determine the need for a spray.

Plant dissection
Dissect a random sample of 25 plants taken from the field in late October/early November. Take note of the number of larvae per plant and the amount of damage caused.

Water-trapping
- To assess the risk of larval damage, set four yellow water traps (filled with water and a drop of detergent) on the soil surface in early September: two on the headland and two in the field along a wheeling
- On a weekly basis, record the number of adult CSFB in each trap, adding it to the previous week’s number to obtain an accumulated total for each trap; empty and reset the traps on each visit
- At the end of October, remove the traps
- Use the total number of CSFB caught in all traps over the whole monitoring period divided by the number of traps to calculate an average number of beetles per trap over the trapping period

Treatment thresholds

<table>
<thead>
<tr>
<th>Growth stage</th>
<th>Treatment thresholds for adult beetles</th>
<th>Treatment thresholds for larvae</th>
</tr>
</thead>
<tbody>
<tr>
<td>GS05</td>
<td>Radicle emerged from seed</td>
<td></td>
</tr>
<tr>
<td>GS07</td>
<td>Hypocotyl with cotyledons emerged from seed</td>
<td>Crop is most vulnerable to adult CSFB damage</td>
</tr>
<tr>
<td>GS08</td>
<td>Hypocotyl with cotyledons growing towards soil surface</td>
<td>If risk is high, apply insecticide at the first sign of attack</td>
</tr>
<tr>
<td>GS09</td>
<td>Cotyledons emerging from soil</td>
<td></td>
</tr>
<tr>
<td>GS10</td>
<td>Cotyledons unfolded</td>
<td>Consider treatment if CSFB have eaten over 25% of leaf area or if the crop is growing more slowly than it is being eaten</td>
</tr>
<tr>
<td>GS11</td>
<td>First leaf unfolded</td>
<td>Set up yellow water traps</td>
</tr>
<tr>
<td>GS12</td>
<td>2 leaves unfolded</td>
<td>Check traps weekly</td>
</tr>
<tr>
<td>GS13</td>
<td>3 leaves unfolded</td>
<td>Consider applying a spray if the average number of beetles/trap exceeds 96</td>
</tr>
<tr>
<td>GS14</td>
<td>4 leaves unfolded</td>
<td>Inspect plants in late October/early November</td>
</tr>
<tr>
<td>GS15</td>
<td>5 leaves unfolded</td>
<td>Remove traps at the end of October</td>
</tr>
<tr>
<td>GS19</td>
<td>9 or more leaves unfolded</td>
<td>Consider treatment if more than 50% of petioles are damaged or there are more than five larvae/plant</td>
</tr>
<tr>
<td>GS21</td>
<td>1 side shoot detectable</td>
<td></td>
</tr>
<tr>
<td>GS25</td>
<td>5 side shoots detectable</td>
<td></td>
</tr>
<tr>
<td>GS29</td>
<td>9 or more side shoots detectable</td>
<td></td>
</tr>
</tbody>
</table>

Further information
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Research Review 84: A review of AHDB impact assessments following the neonicotinoid seed treatment restrictions in winter oilseed rape (AHDB, 2016)


Project Report 428: Revised thresholds for cabbage stem flea beetle on oilseed rape (AHDB, 2008)
cereals.ahdb.org.uk/pests

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