How to monitor for key pests and beneficials

Strategic Farm Week 2020 Webinar

Rob Fox, Mark Ramsden, Emily Pope and Richard Meredith

CEREALS & OILSEEDS

Housekeeping

@AHDB_Cereals
@Cereals_West
@SquabRob
@emilypope_KT
#strategicfarm

Strategic Farm Week 2020

ahdb.org.uk/sf2020

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BASIS/NRoSO Points

Name; BASIS Account No; Postcode

Name; NRoSO Member No; Date of Birth; Postcode

Format

12:10
Rob Fox *Strategic Farm West Host @SquabRob*
Beneficials, pollinators and pests at Squab Hall

12:20
Dr Mark Ramsden *ADAS Crop Scientist @mwramsden*
How to develop a monitoring strategy for your farm

12:40
Emily Pope *Senior Knowledge Transfer Manager*
@emilypope_KT
Tools and resources to measure key pests and beneficials

12:50
Questions and discussion

Your host…
Richard Meredith
@Cereals_West
Head of Arable Knowledge Exchange

Session objective

Learn how to set up, monitor, analyse and use the information from your pitfall traps and sticky traps on-farm to best use this summer and autumn

Beneficials, pollinators and pests

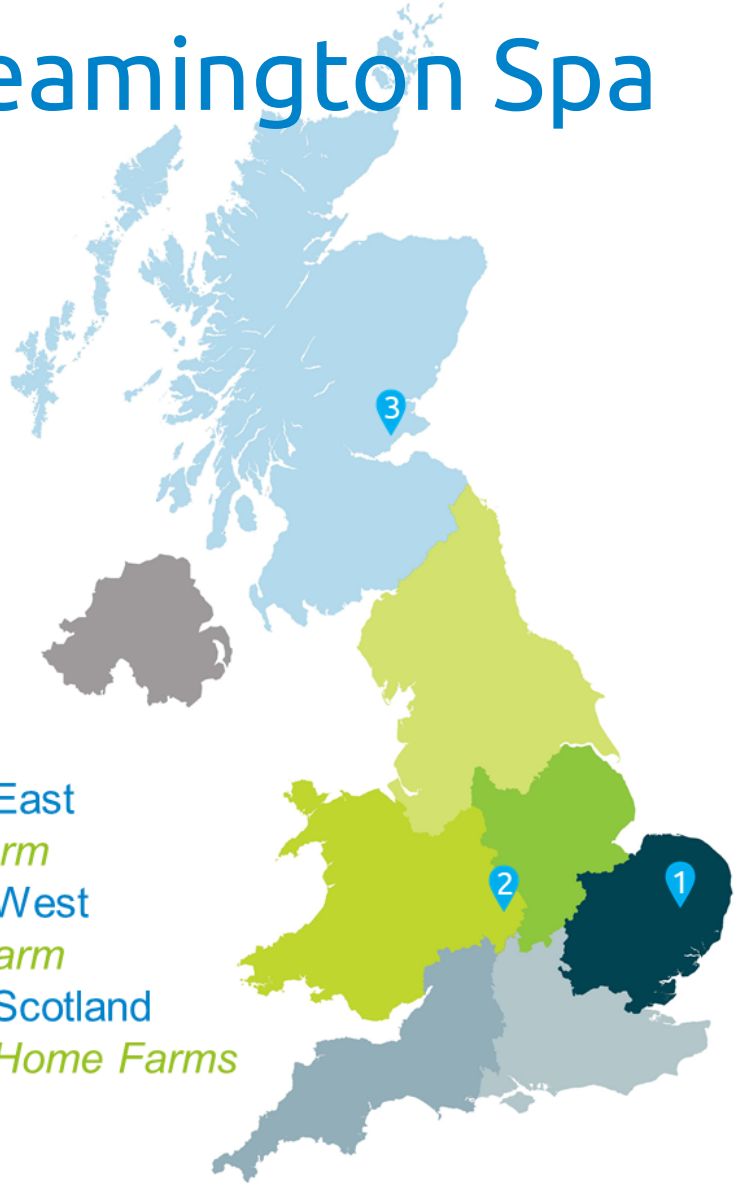
Rob Fox, ***Farm Manager at Squab Hall Farm and Strategic Cereal Farm West host***

@SquabRob

CEREALS & OILSEEDS

Rob Fox
Farm Manager, Squab Hall Farm, Leamington Spa

- AHDB Strategic Farmer 2018 – 2024
- 1000 acres arable
- 900 acres cropped
- Part of 1800 acre Arable Joint Venture

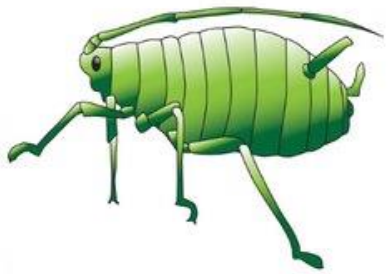


1 Strategic Cereal Farm East
Brian Barker, Lodge Farm
2 Strategic Cereal Farm West
Rob Fox, Squab Hall Farm
3 Strategic Cereal Farm Scotland
David Aglen, Balbirnie Home Farms

Pest pressures at Squab Hall Farm

Autumn

- Slugs on wheat and oilseed rape
- Adult cabbage stem flea beetle in oilseed rape
- Aphids in cereals and oilseed rape



Spring/ summer

- Cabbage stem flea beetle larvae in oilseed rape
- Bean weevil
- Pollen beetle in oilseed rape
- Pod midge in oilseed rape
- Bruchid beetle in spring beans
- Aphids in late drilled cereals
- Orange blossom midge

Pests and beneficials at Strategic Cereal Farm West

How to develop a monitoring strategy on your farm

Pests and natural enemies

Dr Mark Ramsden

2 June 2020

www.adas.uk

Everything Varies

Given the underlying variation... how can we make management decisions?

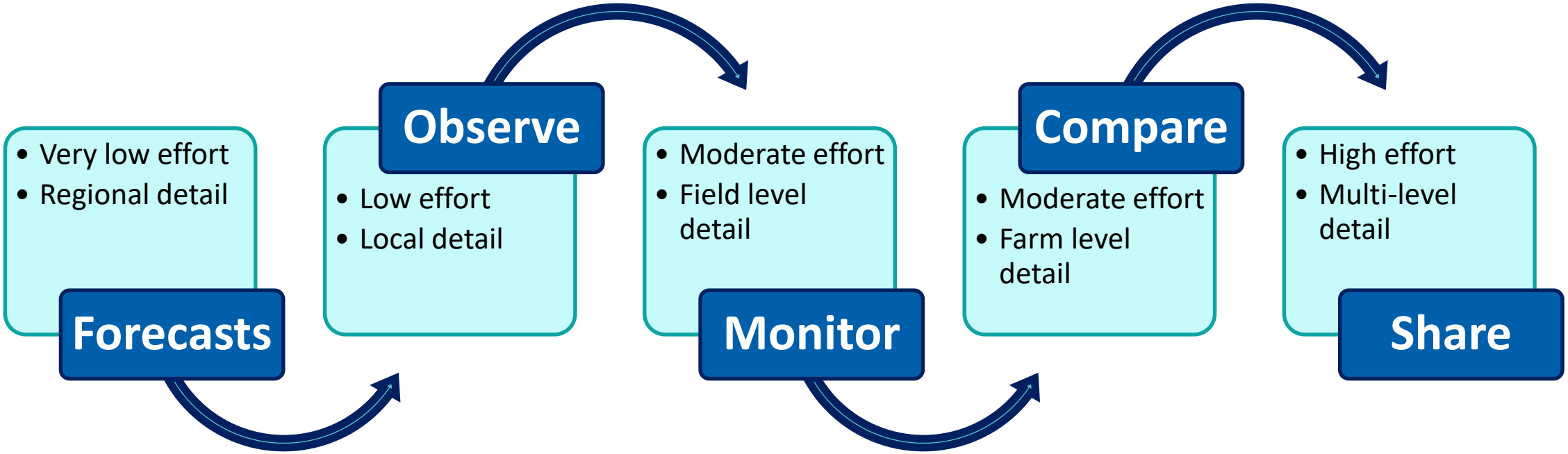
Principles of IPM (Sustainable Use Directive 2009/128/EC)

1. Suppression of pest should be supported by non-chemical options.
2. Pests must be monitored.
3. Monitoring should guide regional specific use.
4. Satisfactory non-chemical methods must be preferred.
5. Pesticides should be targeted.
6. Keep the use of pesticides to levels that are necessary.
7. Anti-resistance strategies should be applied.
8. Monitor the success of the applied plant protection measures.

Why measure? Research on the impact

To give you confidence when making pest management decisions.

1. Minimise crop inputs (time & money)
2. Maximise yield (quantity and quality)

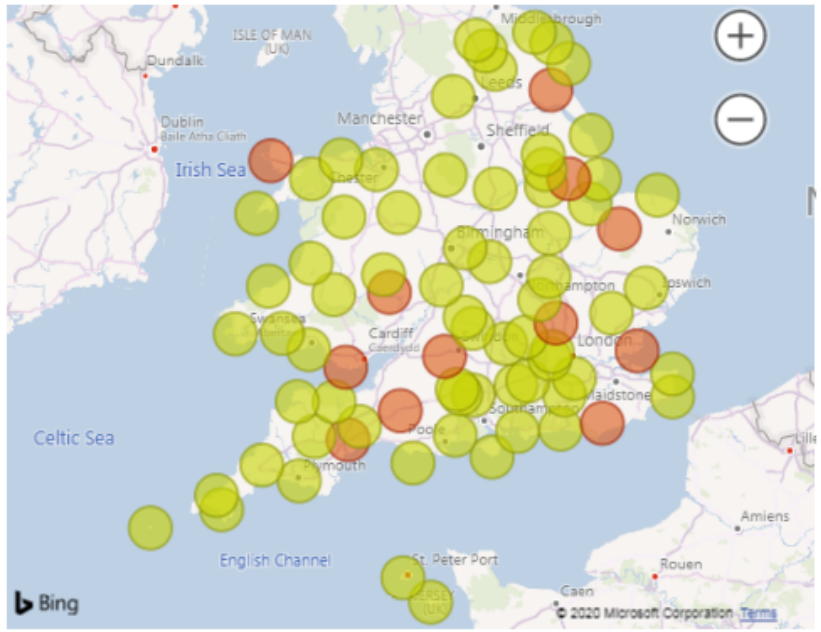


Forecasts

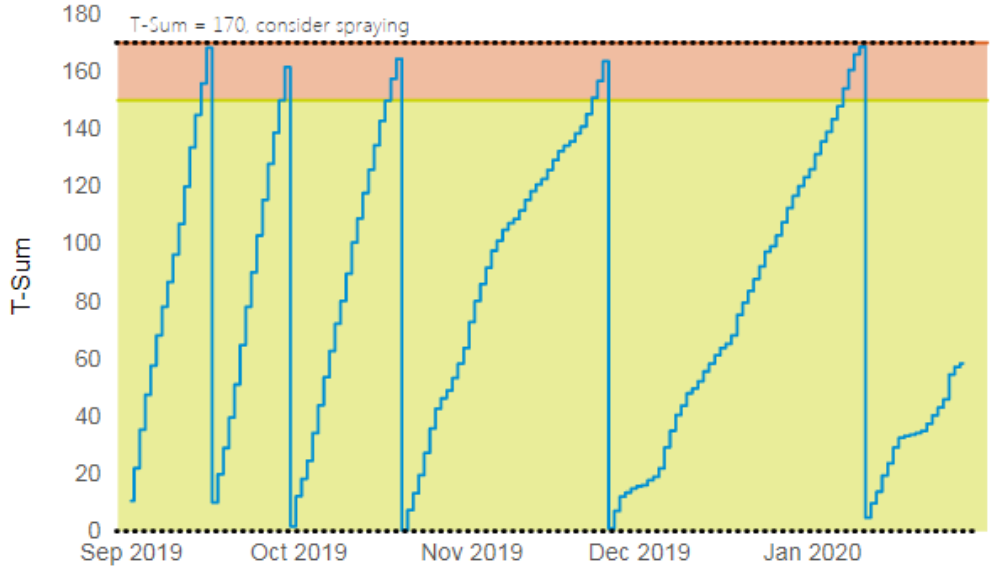
BYDV MANAGEMENT

Filter by: **Region** Multiple selections | **T-Sum start date** 9/1/2019 1/28/2020 | **Weather type** Observed / Observed + forecast

- T-Sum (day after tomorrow) > 150
- T-Sum (day after tomorrow) <= 150



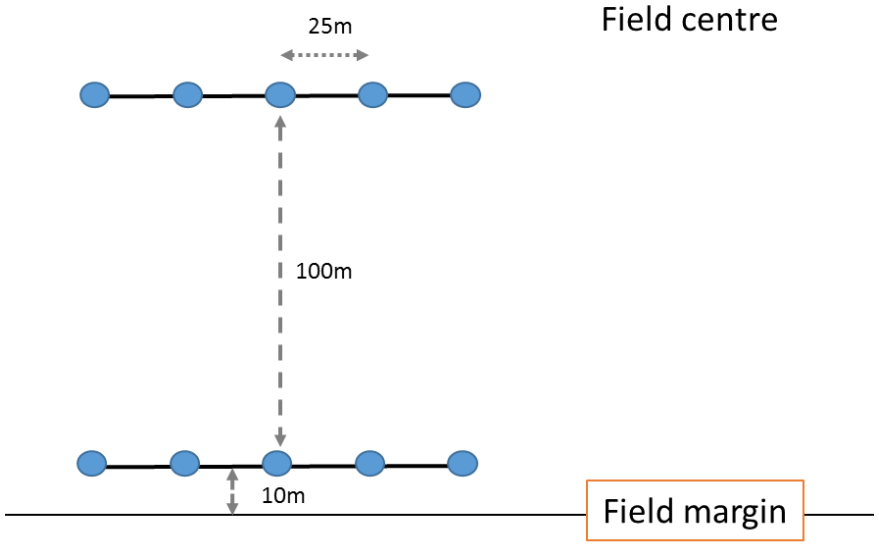
T-Sum | Aphid flight activity



AHDB This tool is powered by AHDB WeatherHub and uses observed weather data from the MetOffice (DataPoint) and forecast data from MET Norway

Observe

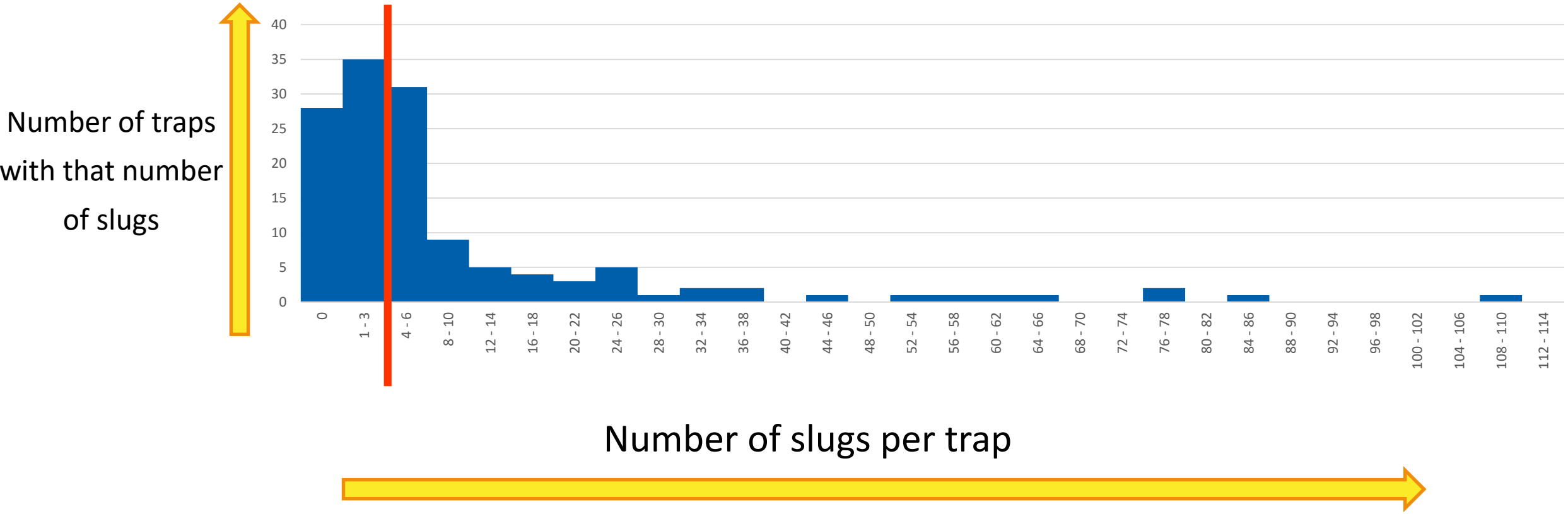
Monitor



What to look for, thresholds and recording

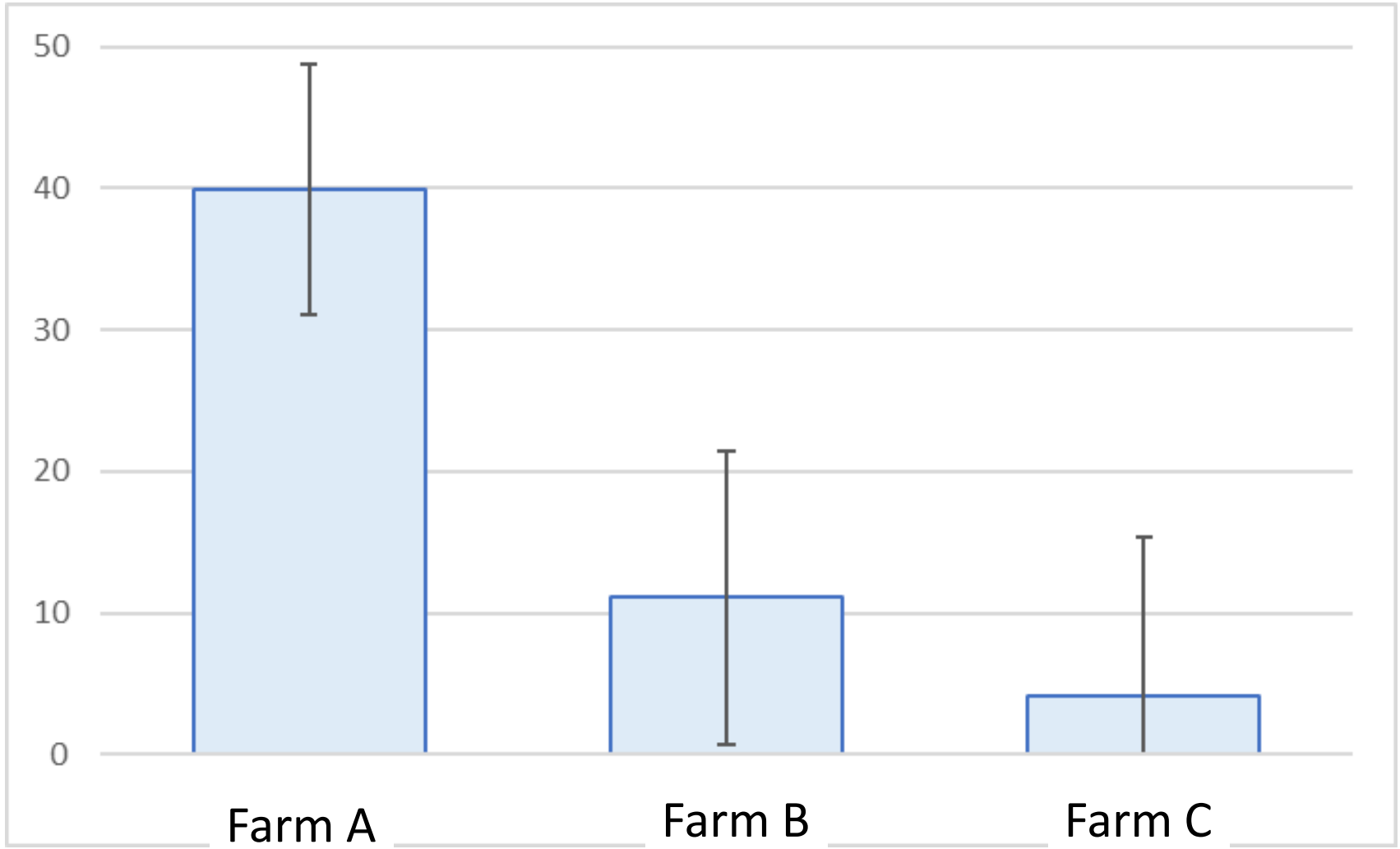
Pest	When to look	What to look for	Forecast available?	Threshold available?	Effort required
Slugs (wheat/OSR)	Prior to cultivation	No. slugs per refuge trap	X	✓	⏱⏱⏱
CSFB	Emergence/spring	% leaf area eaten	?	✓	⏱⏱
Autumn aphids (wheat/OSR)	Oct - Dec	Presence/absence	✓	(✓)	⏱
Bean weevil	Feb – final emergence	Presence/absence of notching	X	✓	⏱
Pollen beetle	Feb-April	Beetles/plant/m2	✓	✓	⏱⏱
Pod midge	During flowering	Presence of cabbage seed weevil	X	(✓)	⏱
Bruchid beetle	During flowering	Presence/absence	✓	✓	⏱
Summer aphids (wheat)	May - July	% tillers with aphids	(✓)	✓	⏱
Orange blossom midge	May - July	Trapping results	?	✓	⏱⏱⏱

Compare


Number of traps with that number of slugs
40
35
30
25
20
15
10
5
0
0
1 - 3
4 - 6
8 - 10
12 - 14
16 - 18
20 - 22
24 - 26
28 - 30
32 - 34
36 - 38
40 - 42
44 - 46
48 - 50
52 - 54
56 - 58
60 - 62
64 - 66
68 - 70
72 - 74
76 - 78
80 - 82
84 - 86
88 - 90
92 - 94
96 - 98
100 - 102
104 - 106
108 - 110
112 - 114
Number of slugs per trap

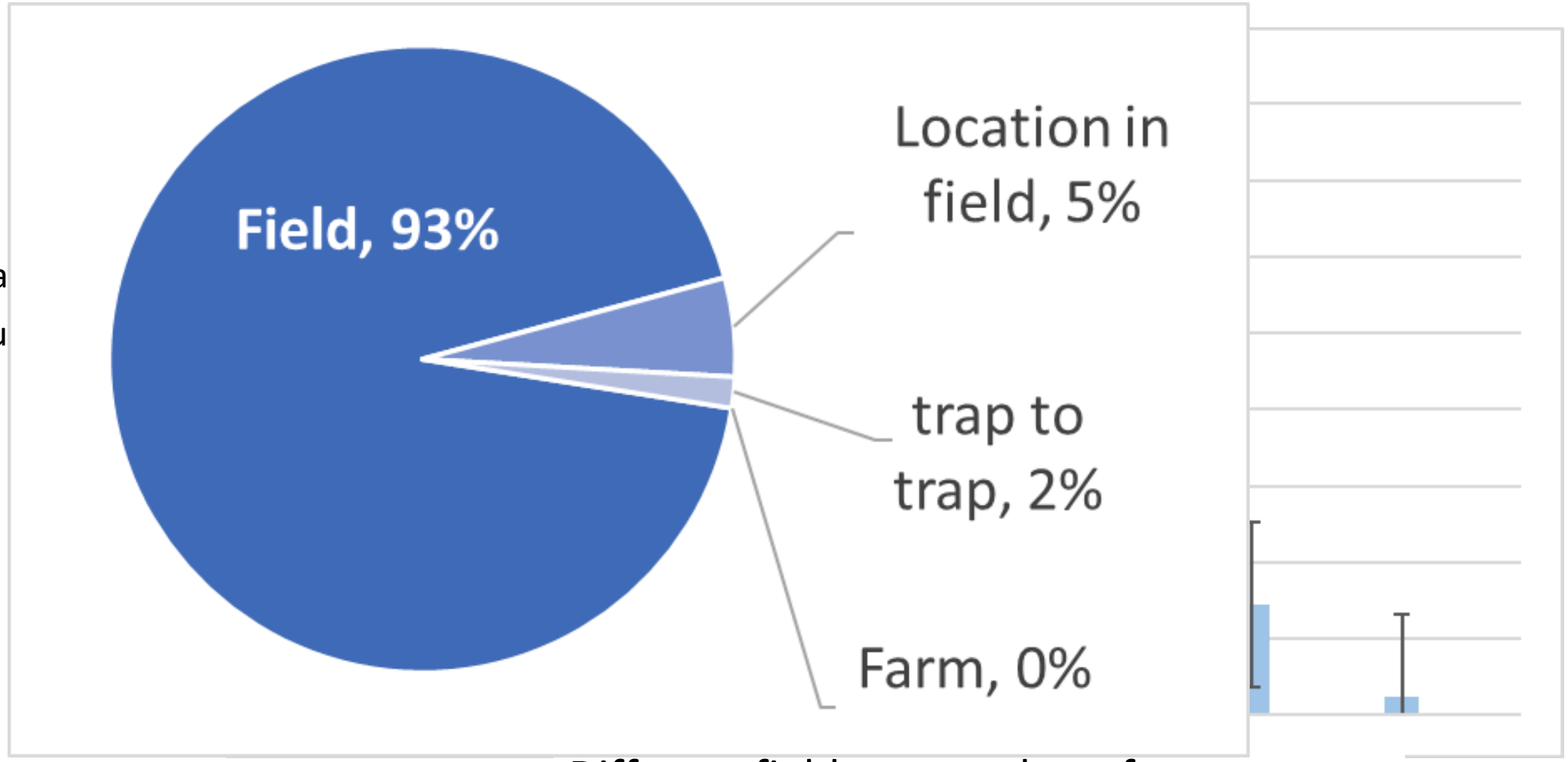
Share

Average number of slugs per trap



Share

Avera
of slu



Different fields across three farms

Cereal aphids & natural enemies 2020

Inspect tillers from the base of the stem to the tip of each leaf and the ear.

For the purpose of the 2020 survey, you do not need to confirm which aphids you find.

Taking part

1. Walk 10m into any cereal crop between the end of May and when it has senesced.
2. Inspect at least 20 tillers, recording the following:
    - Growth stage
    - The number of tillers with one or more of the following on them:
        - Aphids (any species)
        - Aphid mummy (which indicates it's parasitised by a wasp)
        - Hoverfly larvae
        - Ladybird larvae
        - Adult ladybird
        - Other invertebrates
3. Repeat this up to five times along a transect parallel to the field edge, monitoring 20 tillers approximately every 25m.
4. Walk about 100m into the crop, and repeat the process above along a transect parallel to the first transect.
5. You can either email the data Mark.Ramsden@adas.co.uk, or complete this online form (mobile friendly).

How to develop a monitoring strategy on your farm

- Everything varies
- Priorities the insects you are interested in, and read up on them.
- More detailed monitoring gives you more confidence, but requires greater effort.

1. *Use forecasts*
2. *Make observations little and often*
3. *Monitor when crops are vulnerable and pests are about*
4. *Compare within and between fields to see how much variation you are getting*
5. *Share and learn*

Tools and resources to measure for key pests and beneficials

Emily Pope *Senior Knowledge Transfer Manager*

@emilypope_KT

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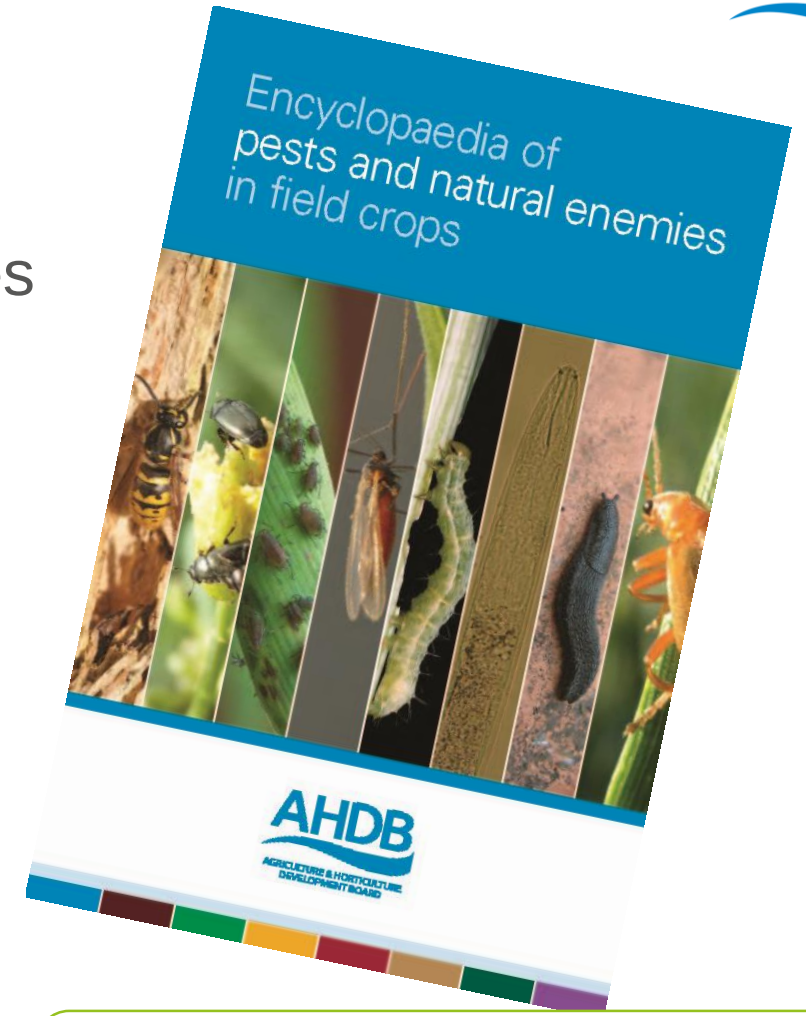
ahdb.org.uk/pests

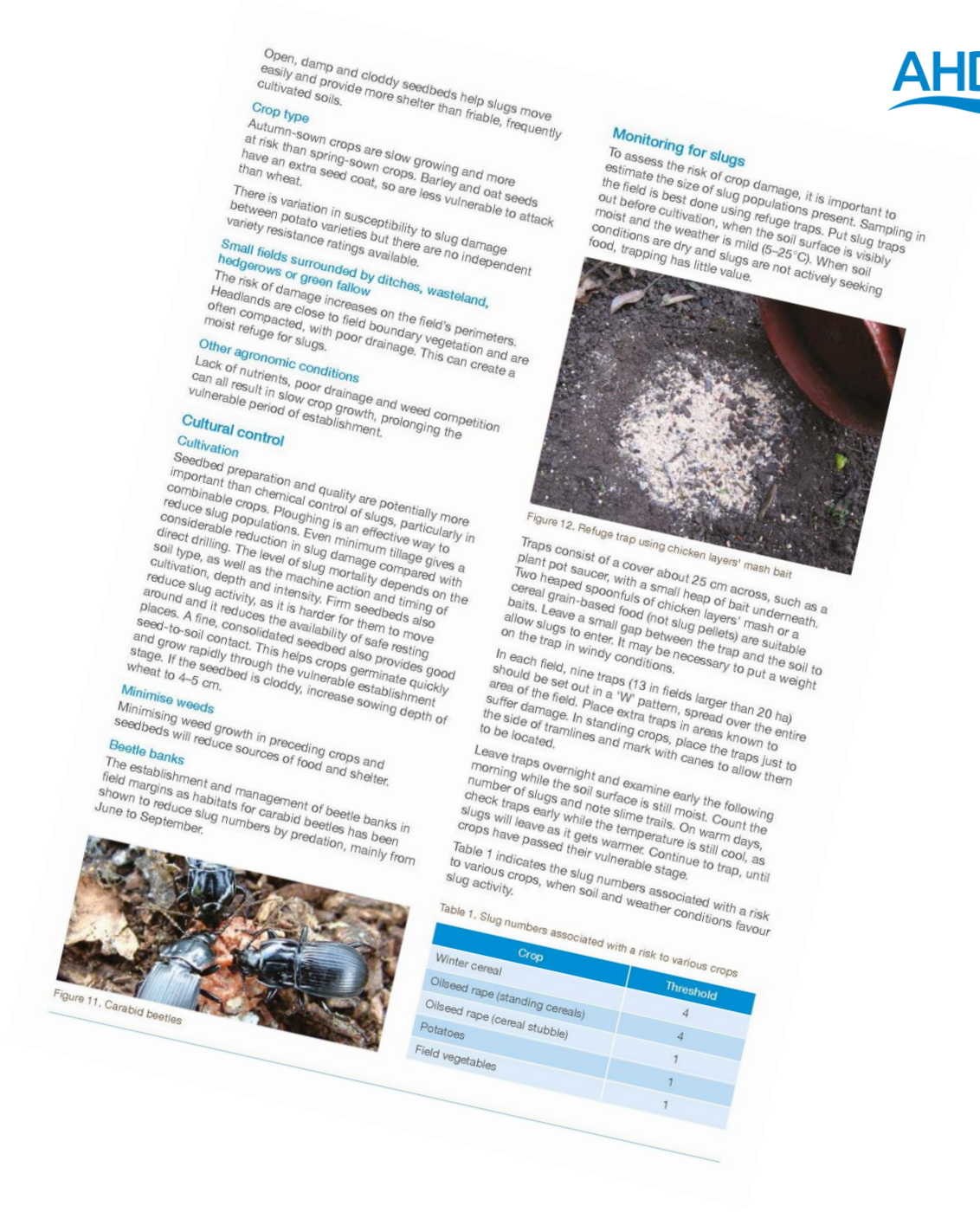
- AHDB Encyclopaedia of pests and natural enemies
  - ID
  - Risk factors
  - Life cycle
  - Monitoring
  - Control thresholds
  - Non-chemical control
  - Insecticide resistance (where known)
  - Major and minor pests commonly associated with cropping systems



To order a copy, email **publications@ahdb.org.uk**

Slugs

- Integrated slug control **ahdb.org.uk/knowledge-library/integrated-slug-control**
- Utilising the patchy distribution of slugs to optimise targeting of control: improved sustainability through precision application (PhD), Project code: SR43 Harper Adams University



Open, damp and cloddy seedbeds help slugs move easily and provide more shelter than friable, frequently cultivated soils.

Crop type

Autumn-sown crops are slow growing and more at risk than spring-sown crops. Barley and oat seeds have an extra seed coat, so are less vulnerable to attack than wheat.

There is variation in susceptibility to slug damage between potato varieties but there are no independent variety resistance ratings available.

Small fields surrounded by ditches, wasteland, hedgerows or green fallow

The risk of damage increases on the field's perimeters. Headlands are close to field boundary vegetation and are often compacted, with poor drainage. This can create a moist refuge for slugs.

Other agronomic conditions

Lack of nutrients, poor drainage and weed competition can all result in slow crop growth, prolonging the vulnerable period of establishment.

Cultural control

Cultivation

Seedbed preparation and quality are potentially more important than chemical control of slugs, particularly in combinable crops. Ploughing is an effective way to reduce slug populations. Even minimum tillage gives a considerable reduction in slug damage compared with direct drilling. The level of slug mortality depends on the soil type, as well as the machine action and timing of cultivation, depth and intensity. Firm seedbeds also reduce slug activity, as it is harder for them to move around and it reduces the availability of safe resting places. A fine, consolidated seedbed also provides good seed-to-soil contact. This helps crops germinate quickly and grow rapidly through the vulnerable establishment stage. If the seedbed is cloddy, increase sowing depth of wheat to 4–5 cm.

Minimise weeds

Minimising weed growth in preceding crops and seedbeds will reduce sources of food and shelter.

Beetle banks

The establishment and management of beetle banks in field margins as habitats for carabid beetles has been shown to reduce slug numbers by predation, mainly from June to September.

Figure 11. Carabid beetles

Monitoring for slugs

To assess the risk of crop damage, it is important to estimate the size of slug populations present. Sampling in the field is best done using refuge traps. Put slug traps out before cultivation, when the soil surface is visibly moist and the weather is mild (5–25°C). When soil conditions are dry and slugs are not actively seeking food, trapping has little value.

Figure 12. Refuge trap using chicken layers' mash bait

Traps consist of a cover about 25 cm across, such as a plant pot saucer, with a small heap of bait underneath. Two heaped spoonfuls of chicken layers' mash or a cereal grain-based food (not slug pellets) are suitable baits. Leave a small gap between the trap and the soil to allow slugs to enter. It may be necessary to put a weight on the trap in windy conditions.

In each field, nine traps (13 in fields larger than 20 ha) should be set out in a 'W' pattern, spread over the entire area of the field. Place extra traps in areas known to suffer damage. In standing crops, place the traps just to the side of tramlines and mark with canes to allow them to be located.

Leave traps overnight and examine early the following morning while the soil surface is still moist. Count the number of slugs and note slime trails. On warm days, check traps early while the temperature is still cool, as slugs will leave as it gets warmer. Continue to trap, until crops have passed their vulnerable stage.

Table 1 indicates the slug numbers associated with a risk to various crops, when soil and weather conditions favour slug activity.

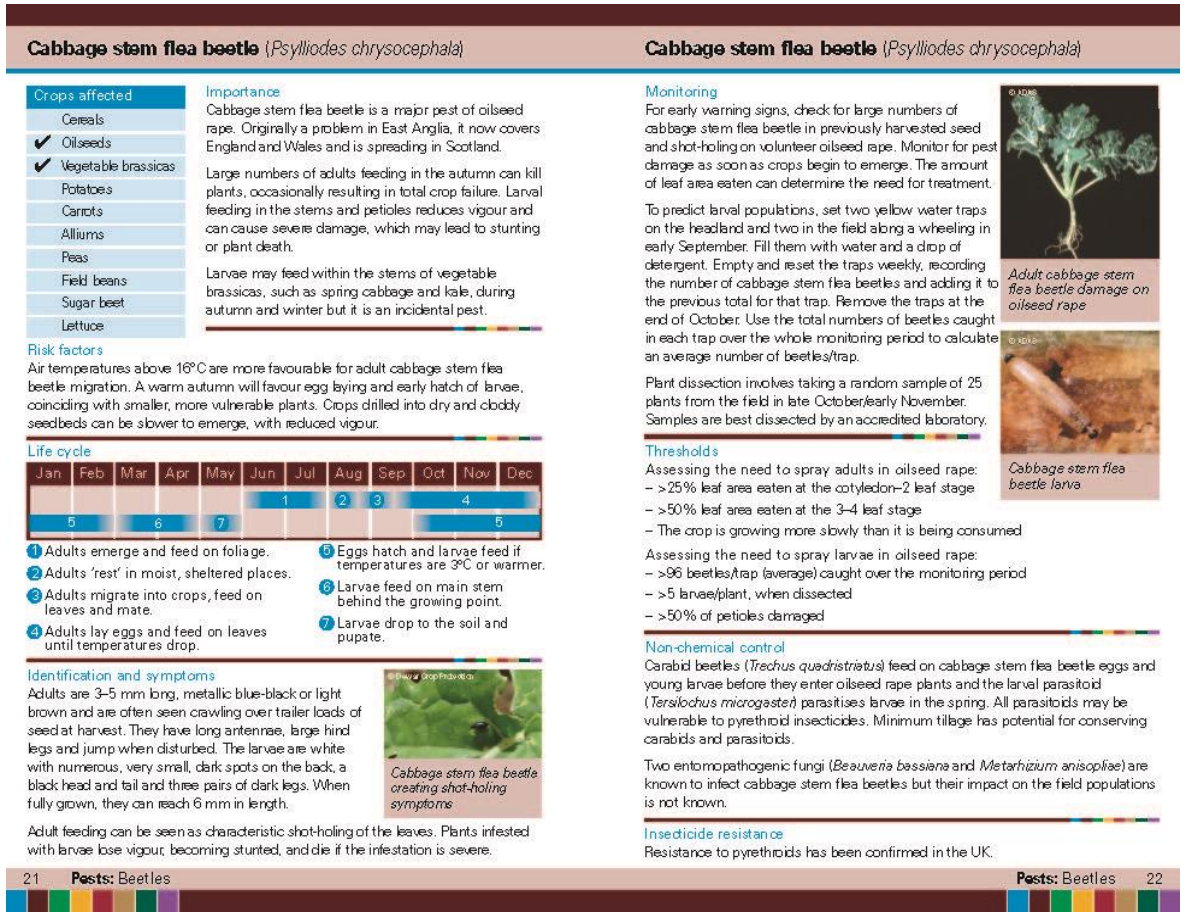
Table 1. Slug numbers associated with a risk to various crops

Crop	Threshold
Winter cereal	4
Oilseed rape (standing cereals)	4
Oilseed rape (cereal stubble)	1
Potatoes	1
Field vegetables	1

Cabbage stem flea beetle

For more information visit
ahdb.org.uk/csfb

- Novel approaches to control cabbage steam flea beetle (PhD), 2019-2022 *@CSFB_Hoa* Harper Adams University
- Defoliation Of winter oilseed rape for cabbage stem flea beetle management 19/20 *fiona.geary@ahdb.org.uk*
- Integrated pest management of cabbage steam flea beetle in oilseed rape, Project number 21120049 ADAS RSK



Cabbage stem flea beetle (*Psylliodes chrysocephala*)

Crops affected
- Cereals
- ✔ Oilseeds
- ✔ Vegetable brassicas
- Potatoes
- Carrots
- Alliums
- Peas
- Field beans
- Sugar beet
- Lettuce

Importance

Cabbage stem flea beetle is a major pest of oilseed rape. Originally a problem in East Anglia, it now covers England and Wales and is spreading in Scotland.

Large numbers of adults feeding in the autumn can kill plants, occasionally resulting in total crop failure. Larval feeding in the stems and petioles reduces vigour and can cause severe damage, which may lead to stunting or plant death.

Larvae may feed within the stems of vegetable brassicas, such as spring cabbage and kale, during autumn and winter but it is an incidental pest.

Risk factors

Air temperatures above 16°C are more favourable for adult cabbage stem flea beetle migration. A warm autumn will favour egg laying and early hatch of larvae, coinciding with smaller, more vulnerable plants. Crops drilled into dry and cloddy seedbeds can be slower to emerge, with reduced vigour.

Life cycle

1. Adults emerge and feed on foliage.
2. Adults 'rest' in moist, sheltered places.
3. Adults migrate into crops, feed on leaves and mate.
4. Adults lay eggs and feed on leaves until temperatures drop.
5. Eggs hatch and larvae feed if temperatures are 3°C or warmer.
6. Larvae feed on main stem behind the growing point.
7. Larvae drop to the soil and pupate.

Identification and symptoms

Adults are 3–5 mm long, metallic blue-black or light brown and are often seen crawling over trailer loads of seed at harvest. They have long antennae, large hind legs and jump when disturbed. The larvae are white with numerous, very small, dark spots on the back, a black head and tail and three pairs of dark legs. When fully grown, they can reach 6 mm in length.

Cabbage stem flea beetle creating shot-holing symptoms

Adult feeding can be seen as characteristic shot-holing of the leaves. Plants infested with larvae lose vigour, becoming stunted, and die if the infestation is severe.

Cabbage stem flea beetle (*Psylliodes chrysocephala*)

Monitoring

For early warning signs, check for large numbers of cabbage stem flea beetle in previously harvested seed and shot-holing on volunteer oilseed rape. Monitor for pest damage as soon as crops begin to emerge. The amount of leaf area eaten can determine the need for treatment.

To predict larval populations, set two yellow water traps on the headland and two in the field along a wheeling in early September. Fill them with water and a drop of detergent. Empty and reset the traps weekly, recording the number of cabbage stem flea beetles and adding it to the previous total for that trap. Remove the traps at the end of October. Use the total numbers of beetles caught in each trap over the whole monitoring period to calculate an average number of beetles/trap.

Plant dissection involves taking a random sample of 25 plants from the field in late October/early November. Samples are best dissected by an accredited laboratory.

Adult cabbage stem flea beetle damage on oilseed rape

Cabbage stem flea beetle larva

Thresholds

Assessing the need to spray adults in oilseed rape:
- >25% leaf area eaten at the cotyledon–2 leaf stage
- >50% leaf area eaten at the 3–4 leaf stage
- The crop is growing more slowly than it is being consumed

Assessing the need to spray larvae in oilseed rape:
- >96 beetles/trap (average) caught over the monitoring period
- >5 larvae/plant, when dissected
- >50% of petioles damaged

Non-chemical control

Carabid beetles (*Trechus quadristriatus*) feed on cabbage stem flea beetle eggs and young larvae before they enter oilseed rape plants and the larval parasitoid (*Tersilochus microgaster*) parasitises larvae in the spring. All parasitoids may be vulnerable to pyrethroid insecticides. Minimum tillage has potential for conserving carabids and parasitoids.

Two entomopathogenic fungi (*Beauveria bassiana* and *Metarhizium anisopliae*) are known to infect cabbage stem flea beetles but their impact on the field populations is not known.

Insecticide resistance

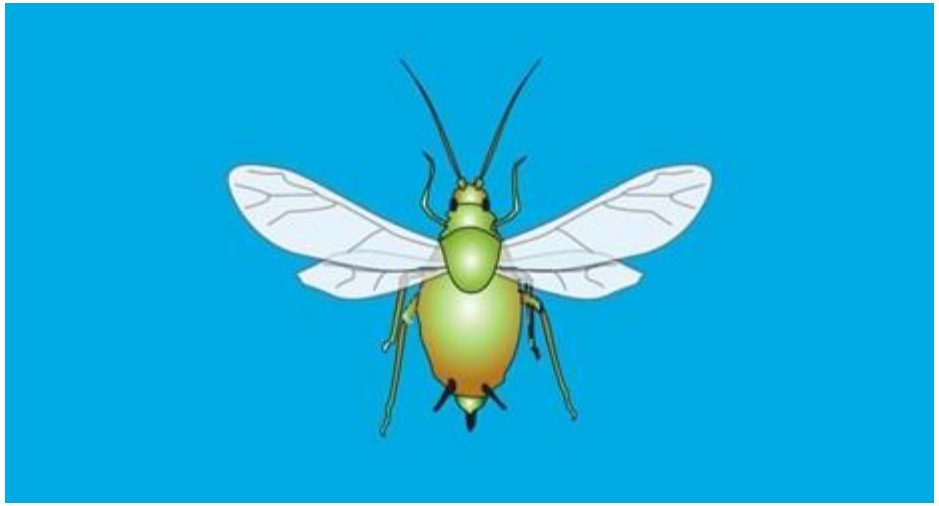
Resistance to pyrethroids has been confirmed in the UK.

Aphids

- Management of aphid and BYDV risk in winter cereals, 2019-2022, Project code: 21120077a

- Improved in-crop monitoring and use of trap-cropping as novel approaches to the integrated pest management of aphid BYDV vectors in winter cereals (PhD) commencing 2020 Harper Adams University

- Sign up to receive weekly regional information on aphid species and numbers between April and November **ahdb.org.uk/aphid-news**



Keep up to date and get in touch

Charlotte Rowley

Crop Protection Scientist (Pests)
Charlotte.Rowley@ahdb.org.uk

To access monitoring and forecasting tools, visit:
ahdb.org.uk/tools

Questions and discussion

CEREALS & OILSEEDS

Strategic Farm Week 2020

Watch Strategic Farm research videos

Take part in the webinars

Listen to the podcast special

Download the ‘how to’ resources

ahdb.org.uk/sfweek2020

Coming up…

- Regional Monitor Farm webinars
- Recommended List webinars
- AHDB Cereals monthly webinar
  - Next up: Farming today – how are you coping?
    - Wednesday 3 June, 7-8 PM
    - https://ahdb.org.uk/events/farming-today-how-are-you-coping

Information and register at **ahdb.org.uk/events**

Thank you

REC

If you have any questions or would like to follow up, please get in touch:

Email richard.meredith@ahdb.org.uk

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