

Reducing the impact of cabbage stem flea beetle on OSR in the UK

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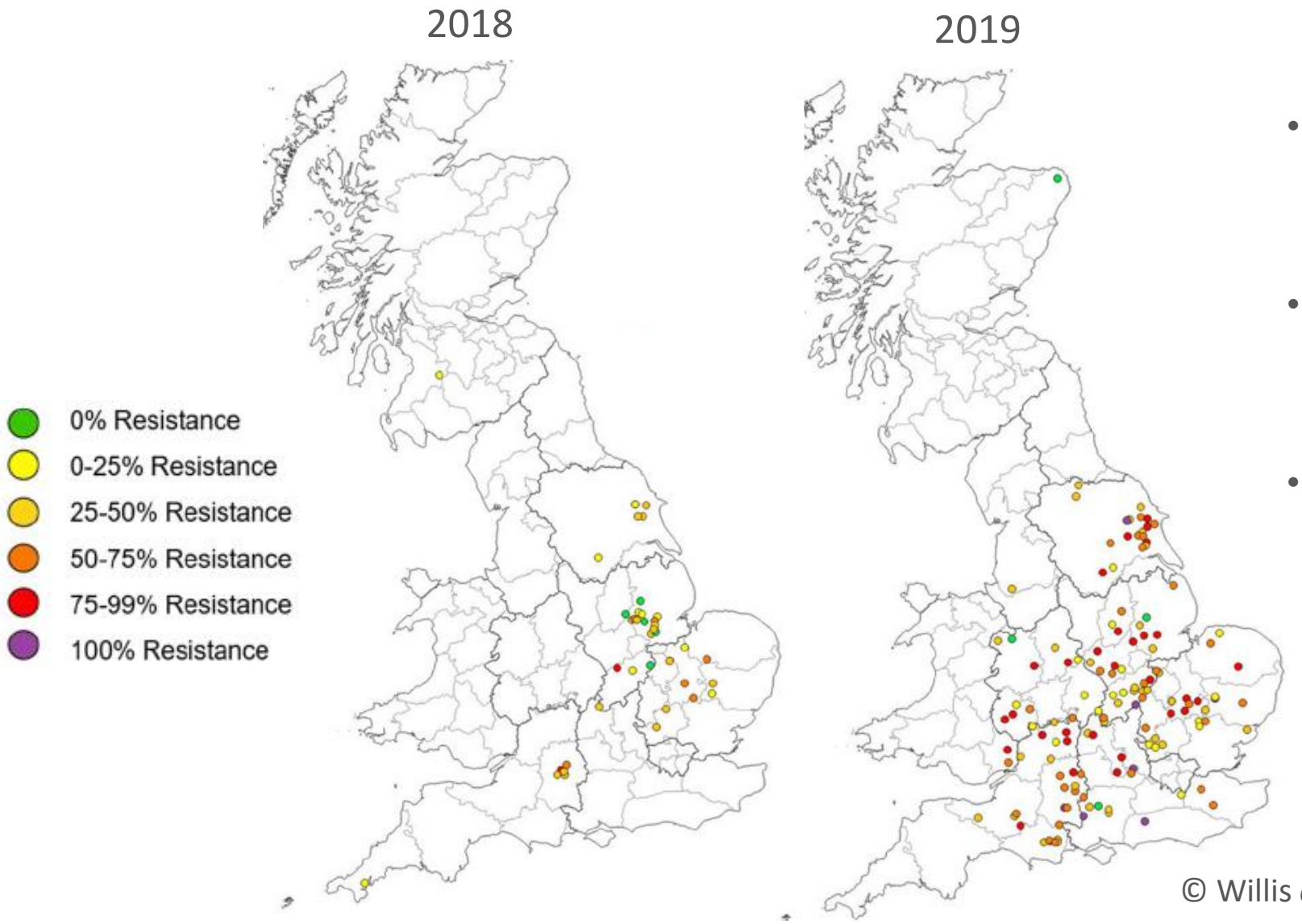
Resistance to pyrethroids compromising control



- Resistance widespread and at high levels across England.
- CSFB with resistance will survive a spray. Natural enemies unlikely to.
- Chemical control unreliable and possibly counter-productive.

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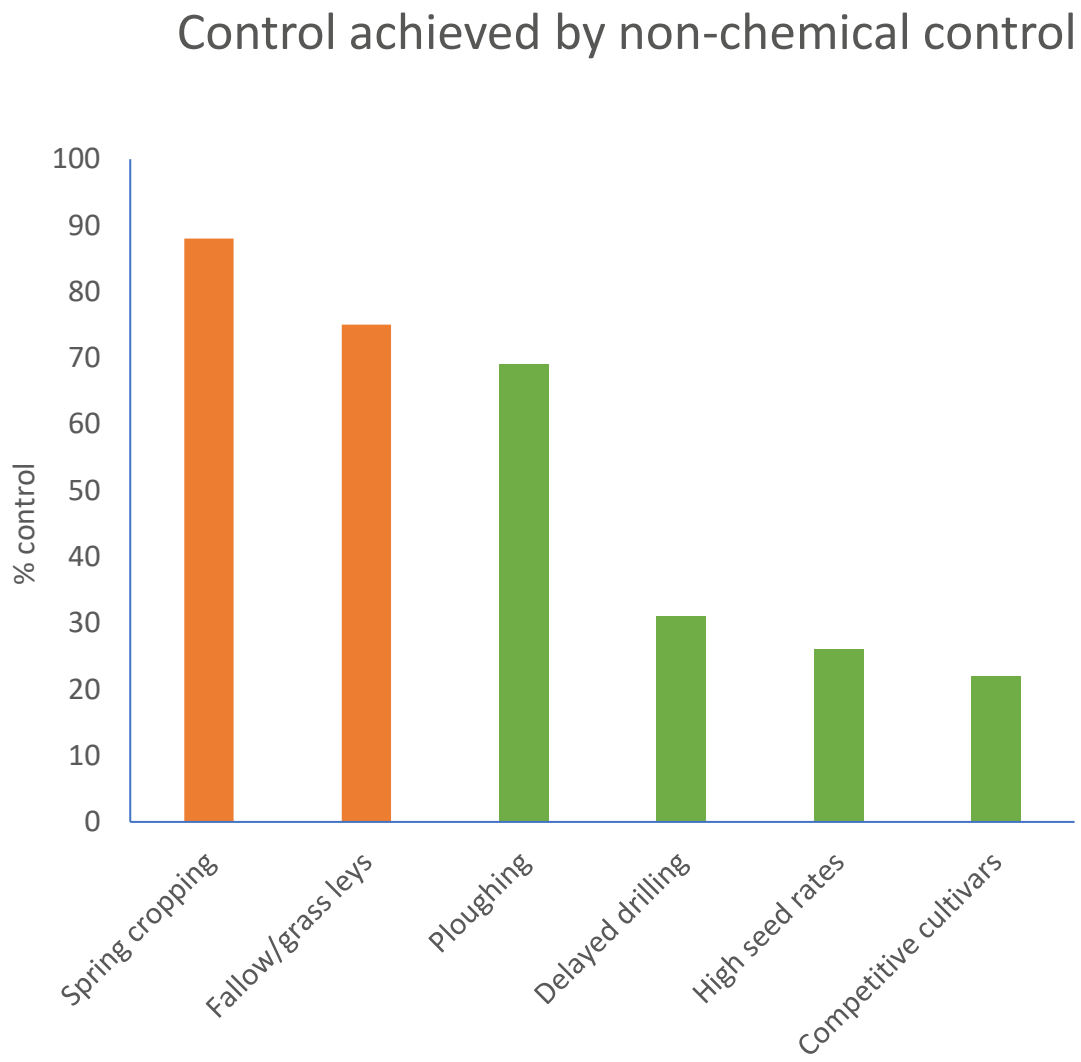
Non-chemical control is now critical

The Blackgrass analogy



- Increasing resistance since 1982 so cultural control required
- Wide range in control (eg ploughing -82% to 96%)
- Increased complexity
- Costs (direct and time)
- Unlikely to be registered if delivered in a can
- Control **additive** when measures combined (eg 88% control when stacking those in green)

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Life cycle

Aug-Sept
Adults move to new crop, mate and feed on leaves causing 'shot holing'

Sept-Oct
Eggs laid at base of plants if mild

Oct-Feb
Eggs hatch when mild and larvae feed in leaf petioles

March-April
Larvae feed on main stem behind growing point

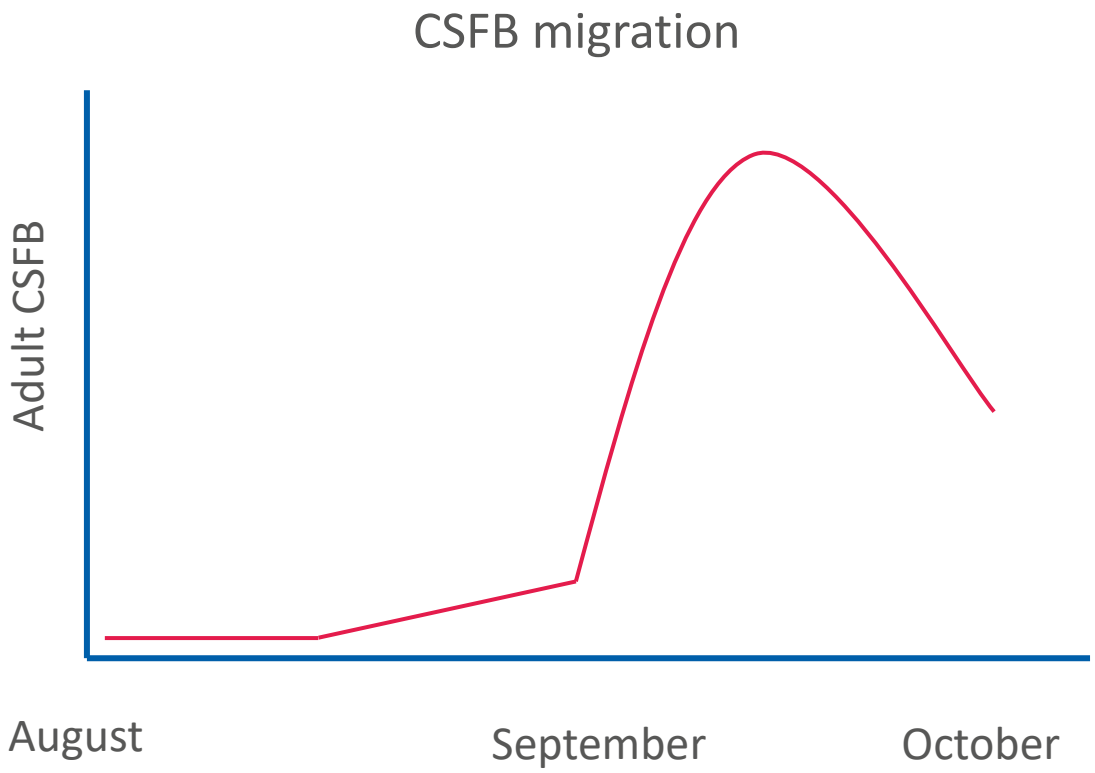
May
Larvae pupate in soil

June-July
Adults emerge and feed on foliage

Two pests

1. Adult beetles
2. Larvae

Sow date – mitigating and avoiding adult damage



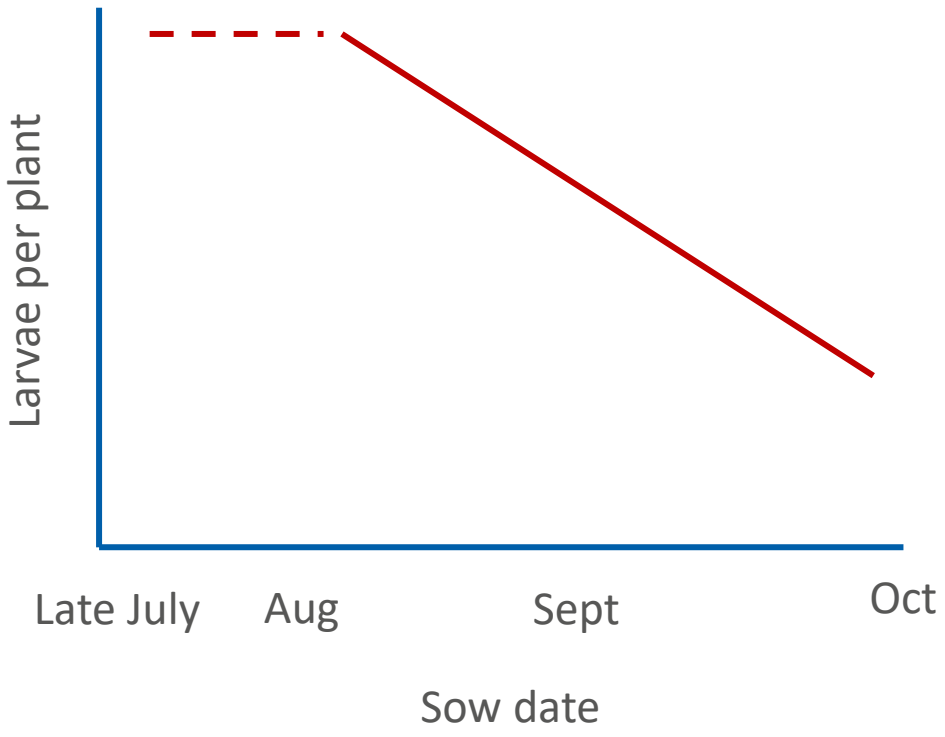
- Sowing early = well established crop able to tolerate even high levels of adult damage. Mitigation
- Crops emerging during peak migration at very high risk
- Very late sown crops (second half September) may emerge after bulk of migration. Beetles already in earlier sown crops. Avoidance
- Trial 2020/21

Sow date	% damage
26 Aug	7%
6 Sept	100%
15 Sept	3%

BASF
We create chemistry

ADAS

Sow date – avoiding and mitigating larval damage



- Larvae per plant highest with early sowing.

  Decreases as sow date is delayed

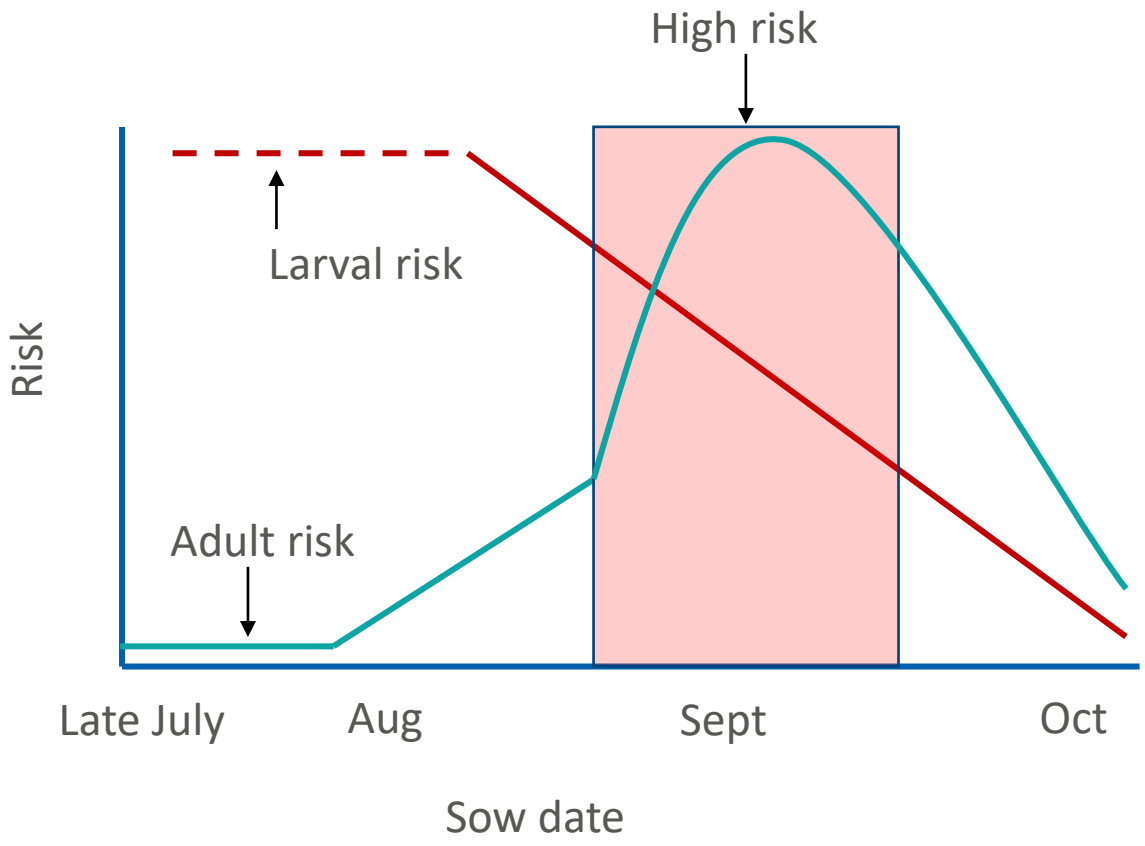
- Later sowing **avoids** larvae

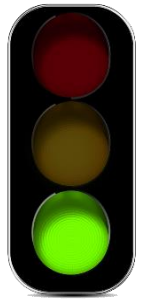
- Trial 2020/21

Sow date	Larvae per plant
26 Aug	18
15 Sept	4

- Possible that early sown (so larger) plants are better able to tolerate damage. Mitigation

Sow date is critically important





- But wait for good conditions for establishment

Sow window	Other controls should focus on
Prior to mid-August	Managing larvae
Mid-August to end August	Reducing adult damage and managing larvae
Early to mid-September	Reducing adult damage and managing larvae
Mid to late September	Reducing adult damage

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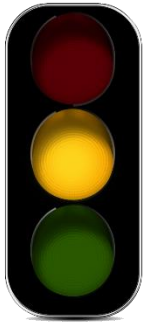
Companion crops - avoidance



- Sacrificial: Brassicas eg mustards
- Deterrent/masking: buckwheat, berseem clover, fenugreek etc
- Need to be frost-sensitive, non-competitive or easily removed with a herbicide
- Suspect that sowing approx. one week before OSR is optimal
- Buckwheat, berseem clover, fenugreek = significant reductions in adults and adult damage
- Target: reducing adult damage
- Sow dates: **Mid-Aug to mid-Sept**
- Is a mix best?

None

Berseem clover + fenugreek

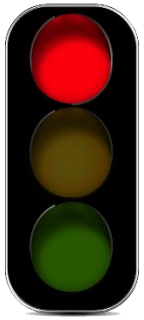
Berseem clover, fenugreek + buckwheat

Stubble management and straw - avoidance

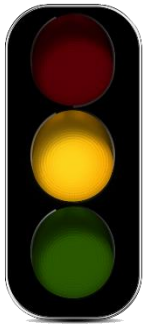
- Leaving stubble or straw may interfere with ability of the pest to find the crop.
- Trial results mixed but some significant reductions in adult damage found.
- Target: reducing adult damage
- Sow dates: **Mid-Aug to mid-Sept**
- Is longer stubble better?

Organic amendments – avoidance and mitigation

- Applying organic amendments (eg digestate, muck etc) may deter/mask the crops from adults. Avoidance.
- May also improve establishment. Mitigation.
- Target: reducing adult damage
- Sow dates: **Mid-Aug to mid-Sept**
- Are some amendments better than others?
- Optimal timing?



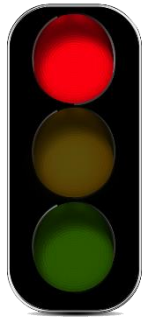
Variety – avoidance and mitigation



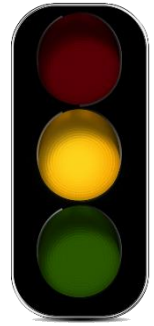
- Resistant breeding lines with reduced palatability found. Some time until available commercially.
- Limited evidence of tolerance and/or reduced palatability in commercial lines. Work ongoing.
- Varietal characteristics of commercial lines may be of value. Eg autumn vigour and spring vigour.
- Targets: Adults & larvae?
- Sow dates: all depending on characteristic and resistance.

Establishment methods – avoidance and mitigation

- Methods that minimise soil moisture loss and encourage rapid establishment (mitigation)
- Some evidence that low soil disturbance methods reduce larval load.
- Likely because these reduce harm to soil borne natural enemies eg ground beetles and parasitoid pupae.
- Targets: Adults & **larvae**
- Sow dates: Start Aug to mid-Sept. For reducing larval pressure, mainly **Start to mid/late-Aug.**
- Work ongoing.



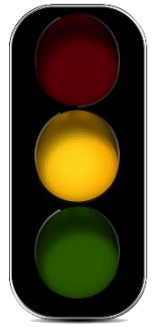
Trap crops - avoidance



- Good evidence that trap crops reduce CSFB pressure.
- Leaving volunteers easier and possibly more effective than drilling a border trap crop.
- Field of volunteers draw migrating CSFB away from nearby sown fields.
- Significant reductions in adult damage and larval load.
- Leave at least 3 ha of volunteers until late September (at least).
- Targets: Adults & larvae
- Sow dates: **mid-August sow dates onward**

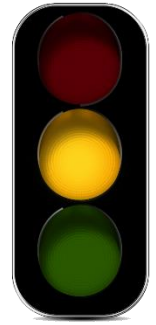
Seed rate – mitigation and avoidance

- Increasing seed rate has limited effect on diluting adult damage. May help compensate for plant loss in dry conditions.
- Recent trial found that larval loads are lower at higher seed rates.
- But plants taller, thicker stems and more leaves so possibly more tolerant of larvae.
- Norfolk crop: very low seed rate had ~50 larvae per plant and yielded 4-5+ t/ha.
- Targets: Adults & **larvae**
- Sow dates: All but mainly **Start to mid/late-Aug** if lowering seed rate to reduce larval damage.



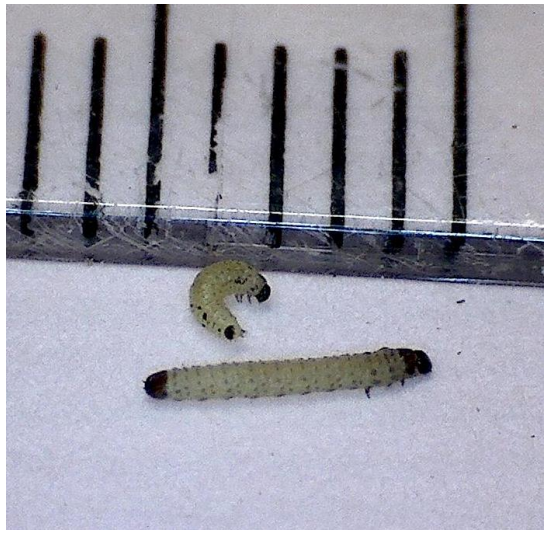
Defoliation - avoidance

- Defoliating the crop (topper or grazing) in the late autumn/winter significantly reduces larval load.
- Timing, crop condition, severity and attention to other pests critical.
- Poor spring weather will affect recovery.
- Targets: Larvae
- Sow dates: **Early to late August**



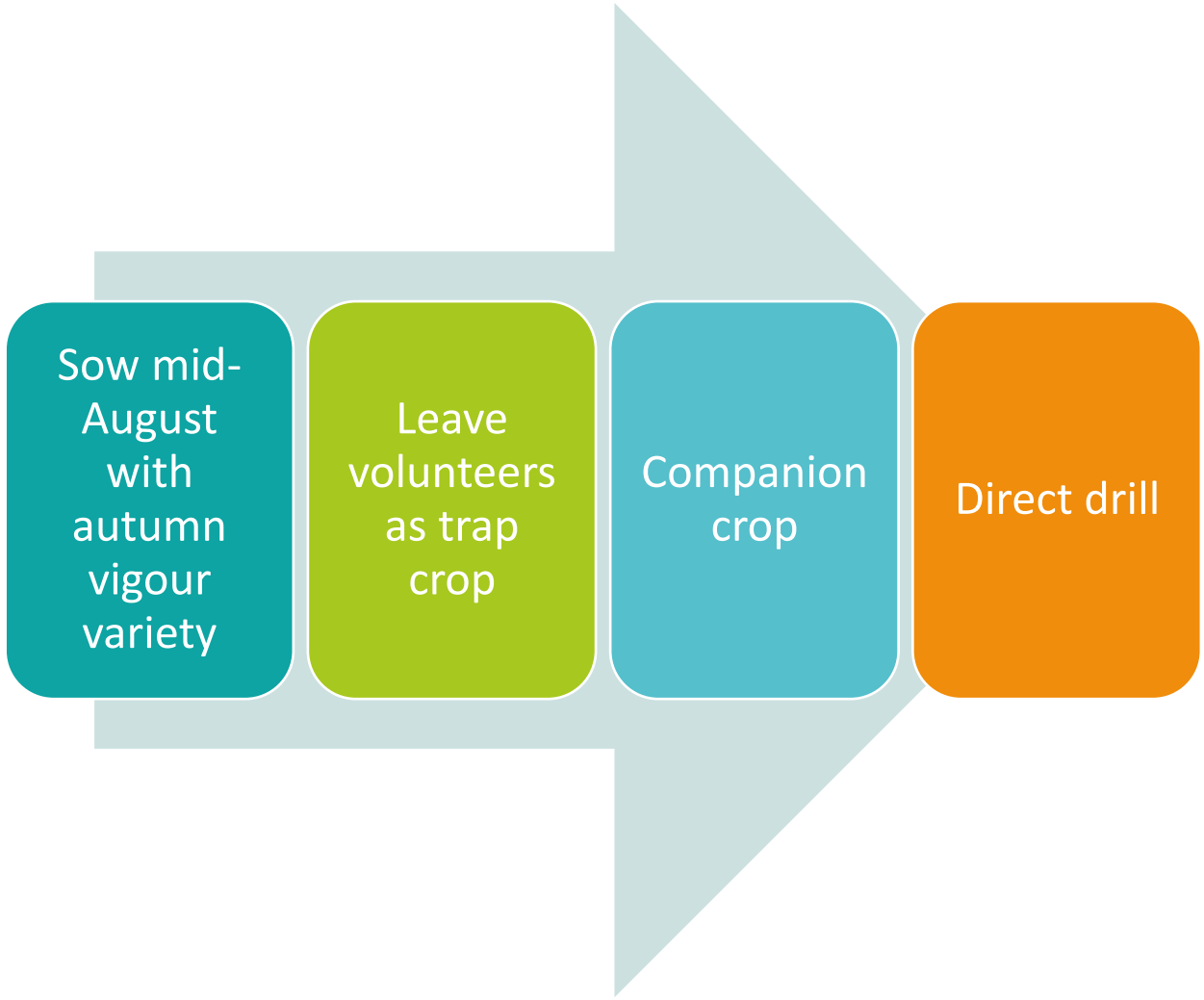
Current work

- ‘Reducing the impact of cabbage stem flea beetle’ – ADAS & HAU. AHDB and industry-funded.
- csfbSMART – NIAB. Defra-funded.
- Varietal resistance – JIC & RRes. BBSRC-funded.
- Biopesticides – HAU (AHDB-funded) & CHAP.
- Natural enemies –IF Field Lab (AHDB-funded) and Ecostack (EU-funded)



Conclusions

- Range of measures to use as part of IPM.
- Select around sow date.
- Measures unlikely to be effective on their own so stack to improve reliability and overall control.
- Consider the knock-on effects eg leaving straw will increase slug risk.



Thanks for listening and thanks to all these:

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