

# Harvest Weed Seed Control – the value of chaff tramlining?

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# Outline



- Resistance – need for novel approaches
  - Harvest Weed Seed Control
  - Chaff Tramlining
  - Trials
  - Summary
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# Need for novel approaches

## Current status of herbicide resistant weeds

- Black-grass – 20,000 farms in 35 Counties
- Ryegrass - >475 farms in 33 Counties
- Wild oats - >250 farms in 28 Counties

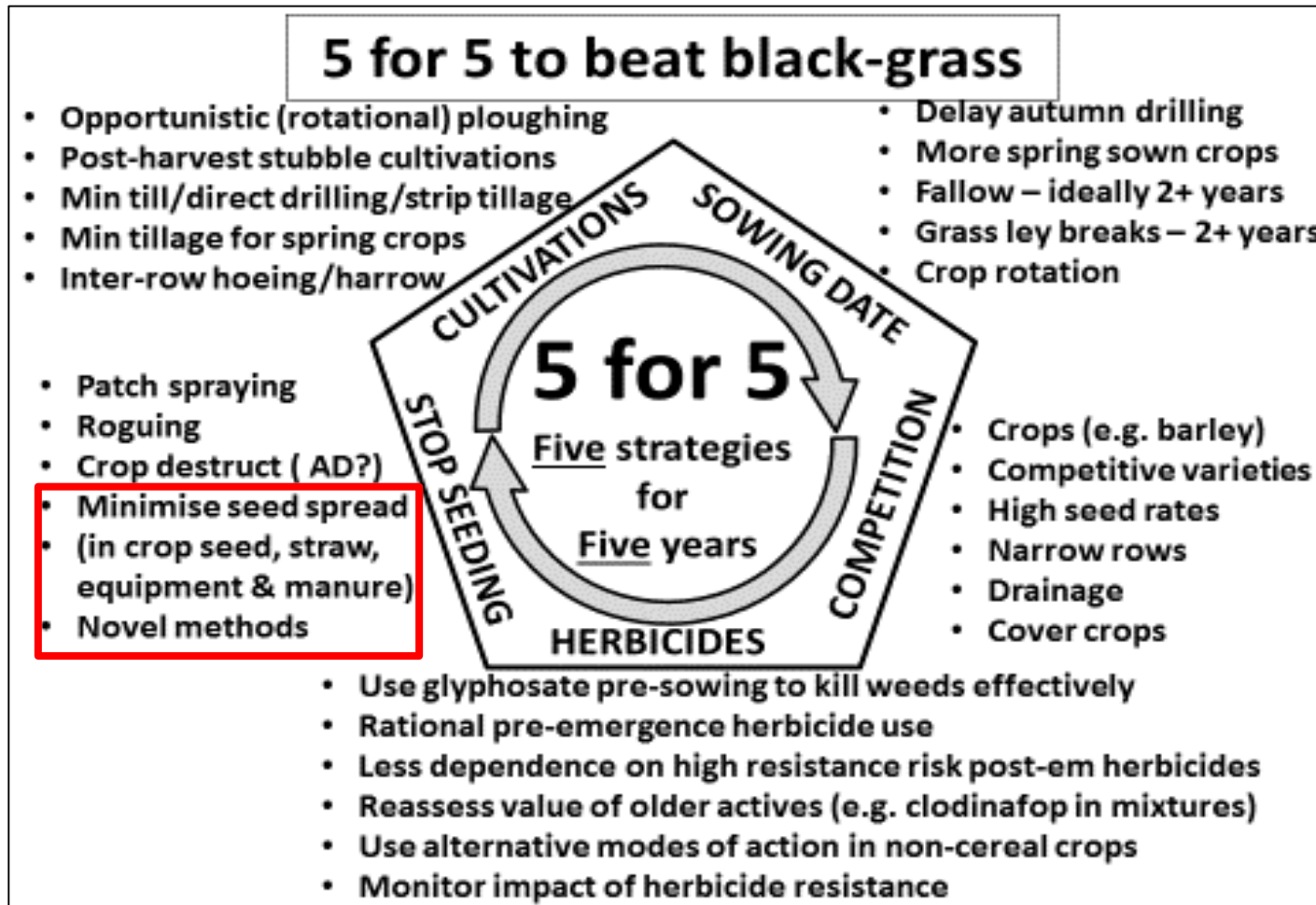
## Economic Significance

- 100 black-grass plants / m<sup>2</sup> – yield penalty 1 t/ha + can increase lodging risk
- All crops affected not just cereals
- Herbicide costs <£100/ha – limited effectiveness



Counties (35) with herbicide resistant black-grass. Hull et al., 2014

# Need for novel approaches



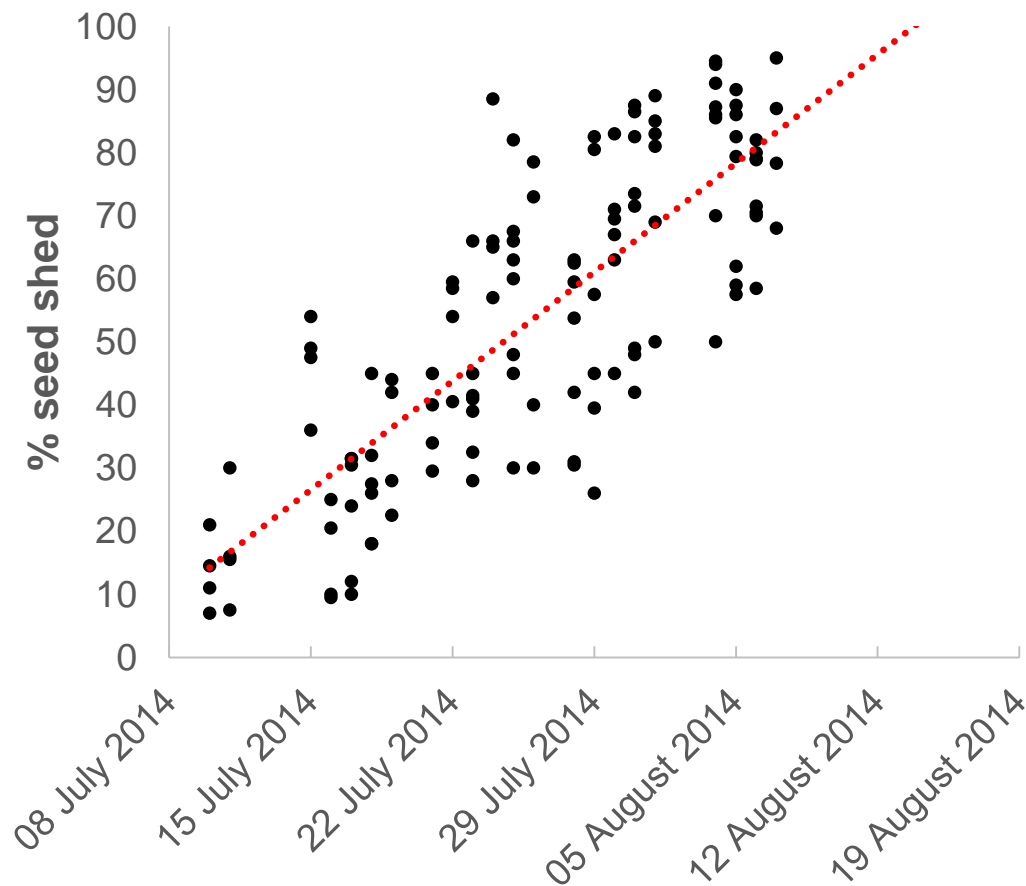
# Harvest Weed Seed Control



Harvest weed seed control (HWSC) exploits the high proportions of seed retained at maturity by some weed species

Species	Country	% retention at harvest	HWSC potential
<i>Avena fatua</i>	Australia	69-84	High
	USA/Canada	39	Low
	UK	4-20	Low
<i>Bromus sp.</i>	Australia	77	High
<i>Lolium rigidum</i>	Australia	85	High
<i>Lolium multiflorum</i>	USA/Canada	58	Intermediate
<i>Chenopodium album</i>	USA/Canada	90	High
<i>Galium sp.</i>	USA/Canada	74	High
<i>Sinapis arvensis</i>	USA/Canada	70	Intermediate
<i>Alopecurus myosuroides</i>	UK	10-50	Low

# Black-grass seed retention



- Ca. 10% per week seed shedding from early July
- 10-30% retained at wheat harvest
- More in winter barley and OSR

# Harvest Weed Seed Control



**95% of the weed seed entering the combine exists in the chaff making HWSC and obvious area for further investigation**

- Options include:
  - Chaff carts
  - Narrow windrow burning
  - Bale direct
  - Weed seed destruction
  - Chaff tramlining



# Chaff Tramlining

- Placement of chaff into narrow rows 20 – 30cm wide
  - Wheel tracks – chaff tramlining
  - Single row – chaff lining
- Looking to create a “hostile” environment for germination
  - Mulch effect to prevent germination
  - More compacted soils – tramlines
  - Different micro-climate
- Suited to both CTF and non-CTF system
  - Does require consistent combine lines year on year





# UK trials 2017

- **Objectives**

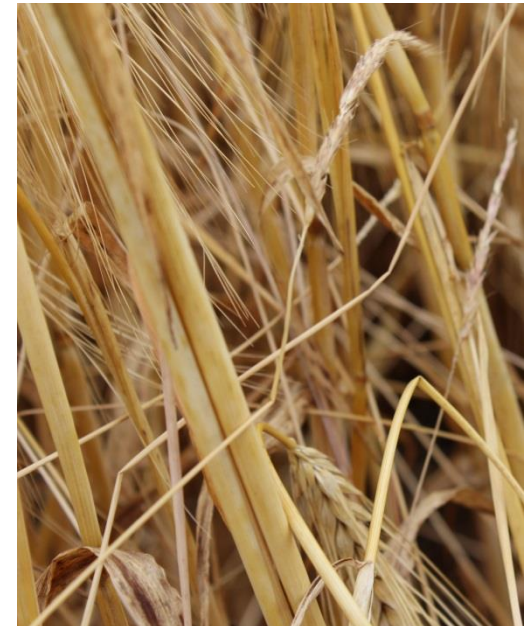
- Would it physically work under UK Conditions?
- Would it consolidate black-grass seeds?

- **Would it work under UK conditions?**

- 1250 ha cut, wheat, OSR, barley, oats, linseed beans – No problems

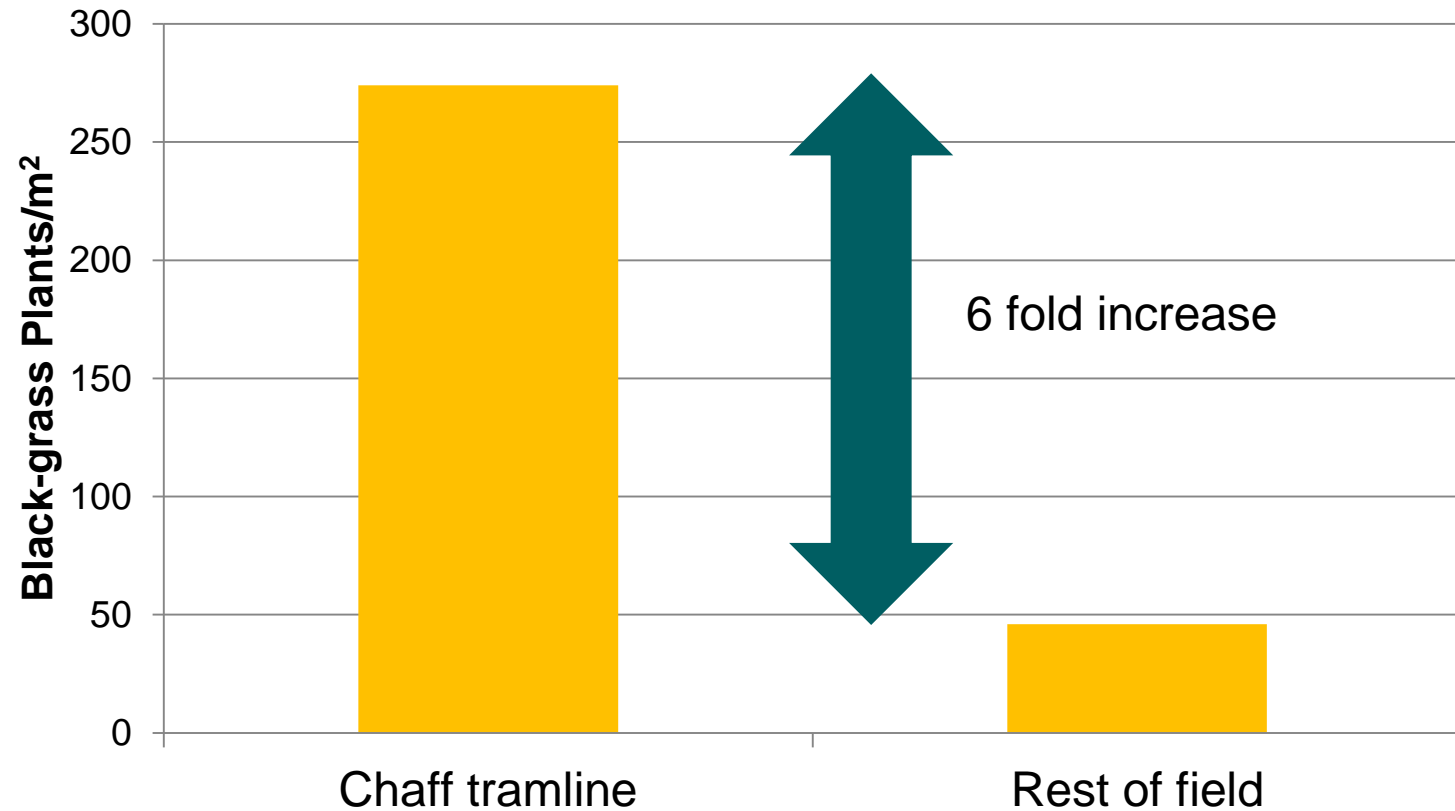
- **Would it consolidate black-grass seeds?**

- Trial field – winter barley CV. Volume
- Average black-grass population 219 heads/m<sup>2</sup> prior to harvest
- Crop harvested on 14<sup>th</sup> July 2017 – estimated 30-50% black-grass seed retained
- Following crop OSR
- Black-grass assessed early October



# UK trials 2017

## UK Chaff Deck evaluation Autumn 2017

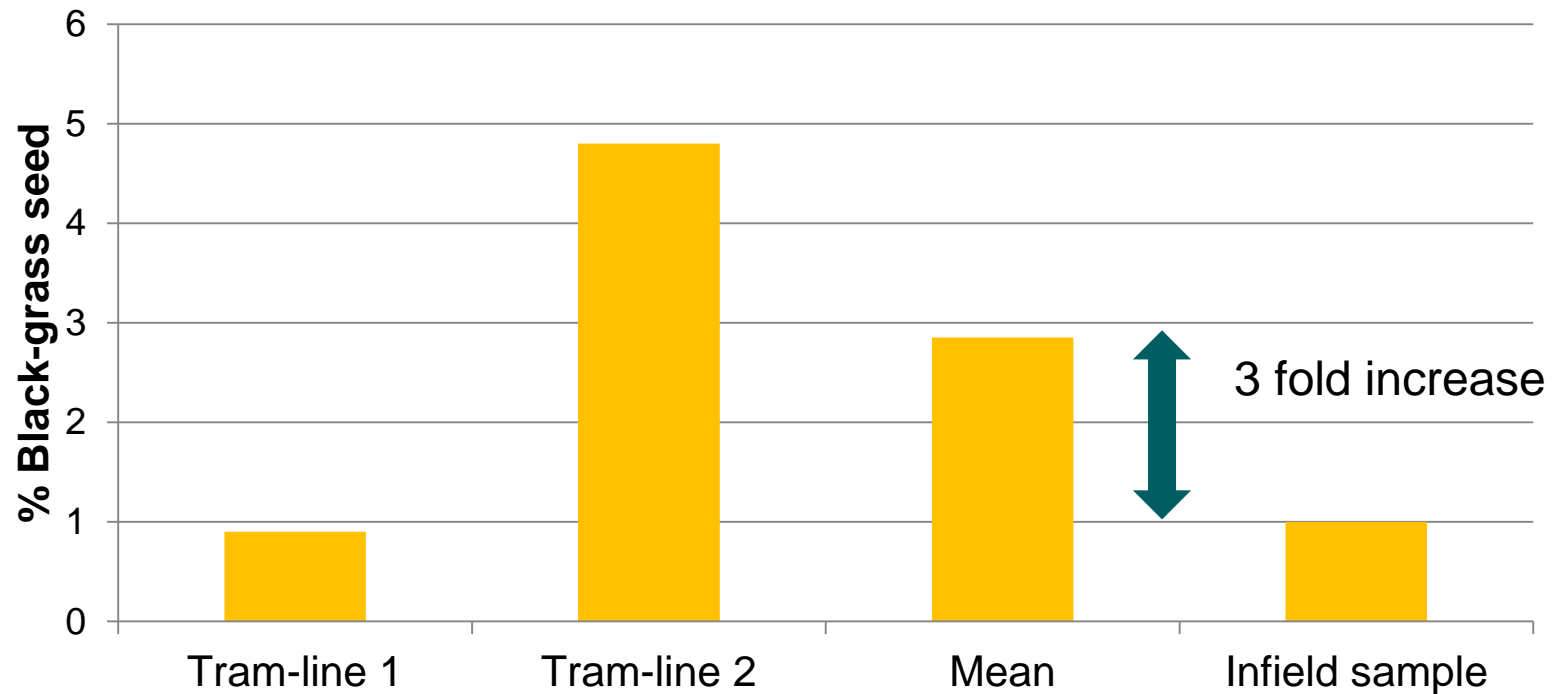




# UK trials 2018

- Background black-grass population 512 plants/m<sup>2</sup>
- 77% black-grass seed shed pre-harvest – winter wheat

## Distribution of black-grass seed post harvest



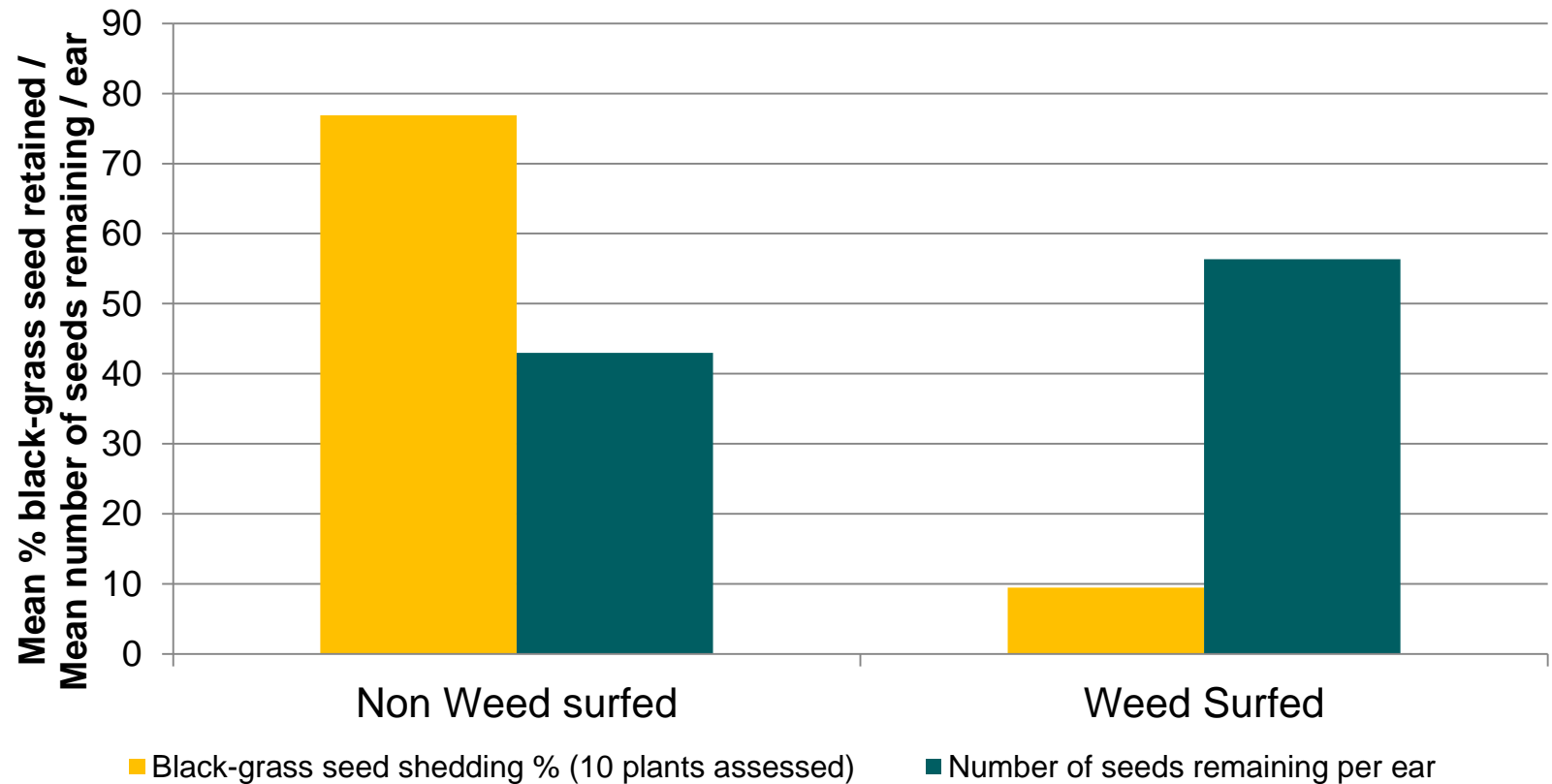
# UK trials 2018 – could we delay seed shed?



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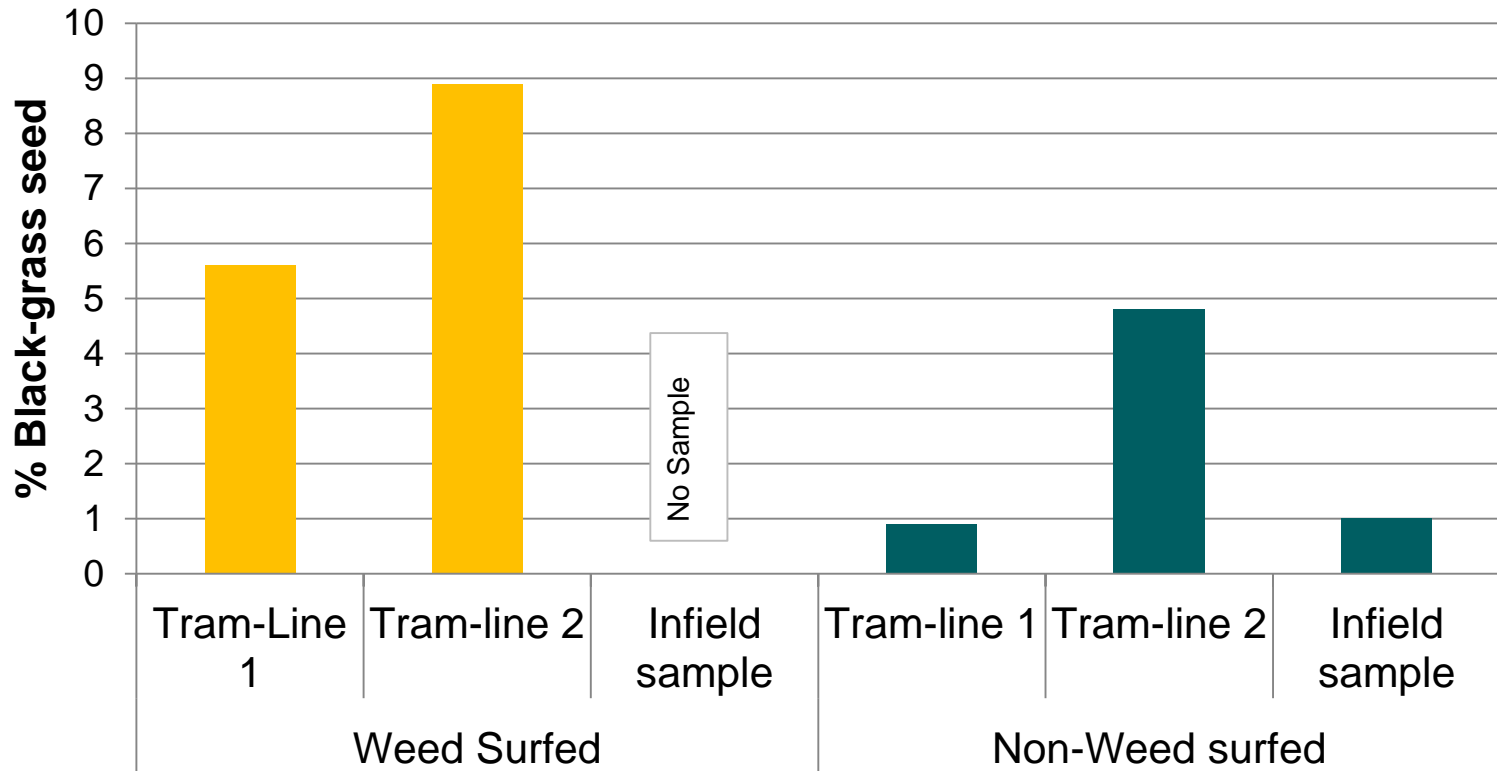
## Black-grass seed retention pre-harvest



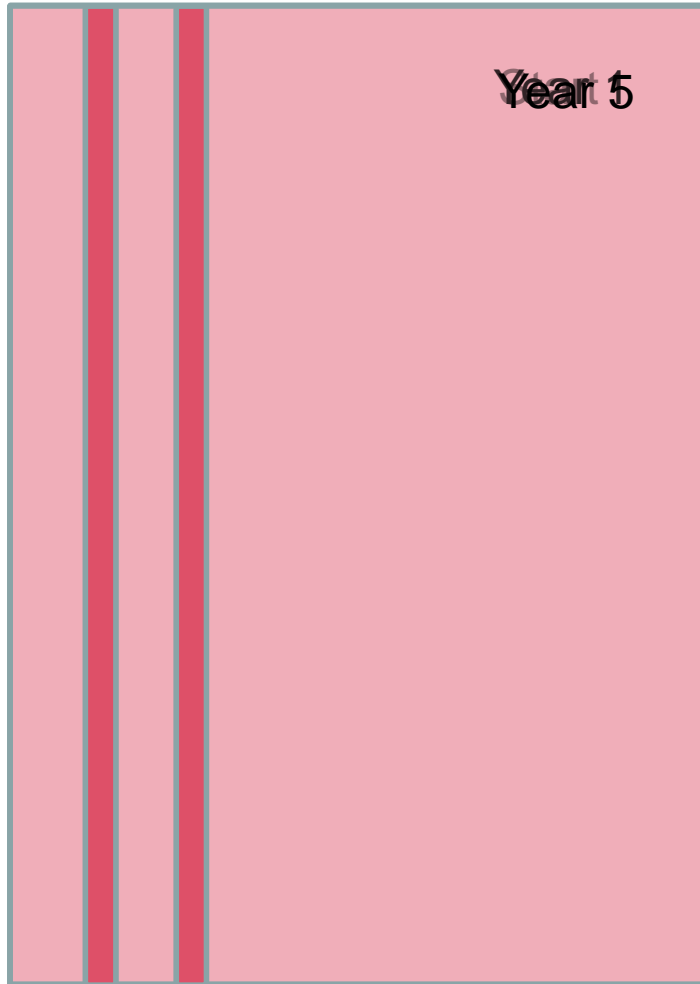
# UK trials 2018 – could we delay seed shed?



**Distribution of black-grass seed post harvest**



# Longer term benefits



- Main aim is to try and consolidate the weed seeds being returned to the field
  - 100 heads/m<sup>2</sup> = 1t/ha
- Full benefits likely to be realised across the rotation – greater weed retention depending on crop
- Subsequent management of chaff tramlines?
  - Do nothing
  - Treat separately
  - Key area for further study



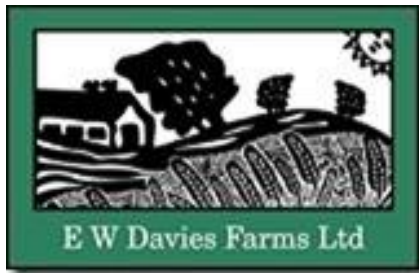
# Summary



- Herbicide resistance is an ever increasing problem
  - New herbicide MOA are rare
  - Long term integrated approaches are required
  - 95% of the weed seed entering the combine exists in the chaff
  - HWSC exploits the high proportions of seed retained by some weed species at maturity
  - Chaff tramlining has proved to consolidate black-grass seeds – great benefits observed for brome spp.
  - Full benefits from chaff tramlining will be realised across the rotation – combined with other approaches
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# Acknowledgments



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