
‘Inspiring our farmers, growers and industry to succeed in a rapidly changing world’

AHDB

SE AGRONOMY EVENT 2020

14th January 2020

IPM/IFM – Thinking outside the box

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CEREALS & OILSEEDS

PROGRAMME

09:45	**IPM strategies to control CSFB** Dr Sacha White, RSK ADAS
10:30	**BYDV – the ticking time bomb; current research and control strategies** Dr Gia Aradottir, NIAB Tag
11:15	**Refreshment break**
11:30	**Maxi-cover crop trial: digging into the benefits of using cover crops** John Williams, Principle Soil Scientist RSK ADAS
12.15	**Viably establishing your field margins so to encourage beneficials and reduce costs** Marek Nowakowski, Wildlife Farming Company
13.00	**Integrating IPM/IFM within crop husbandry to make my business more efficient and legally compliant (case study)** Jake Freestone, Farm Manager, Overbury Farms, Tewkesbury
13.40	**Variety Selection Tool introduction** Bastiaan Brak, AHDB Research Data Analysis
13.45	**Closing comments** Paul Hill, AHDB
13:50	**Lunch and event close**

CEREALS & OILSEEDS

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AGRICULTURE & HORTICULTURE DEVELOPMENT BOARD

INDEPENDENT

- We are a statutory levy board, funded by farmers, growers and others in the supply chain.
- Our purpose is to equip levy payers with, evidence-based information and tools to grow, become more competitive and sustainable.

CEREALS & OILSEEDS

AHDB POTATOES

AHDB PORK

AHDB DAIRY

AHDB AGRICULTURE & HORTICULTURE DEVELOPMENT BOARD

AHDB CEREALS & OILSEEDS

AHDB BEEF & LAMB

AHDB HORTICULTURE

POTATOES DAIRY BEEF & LAMB HORTICULTURE CEREALS & OILSEEDS PORK

AHDB Monitor Farms and Strategic Arable Farms

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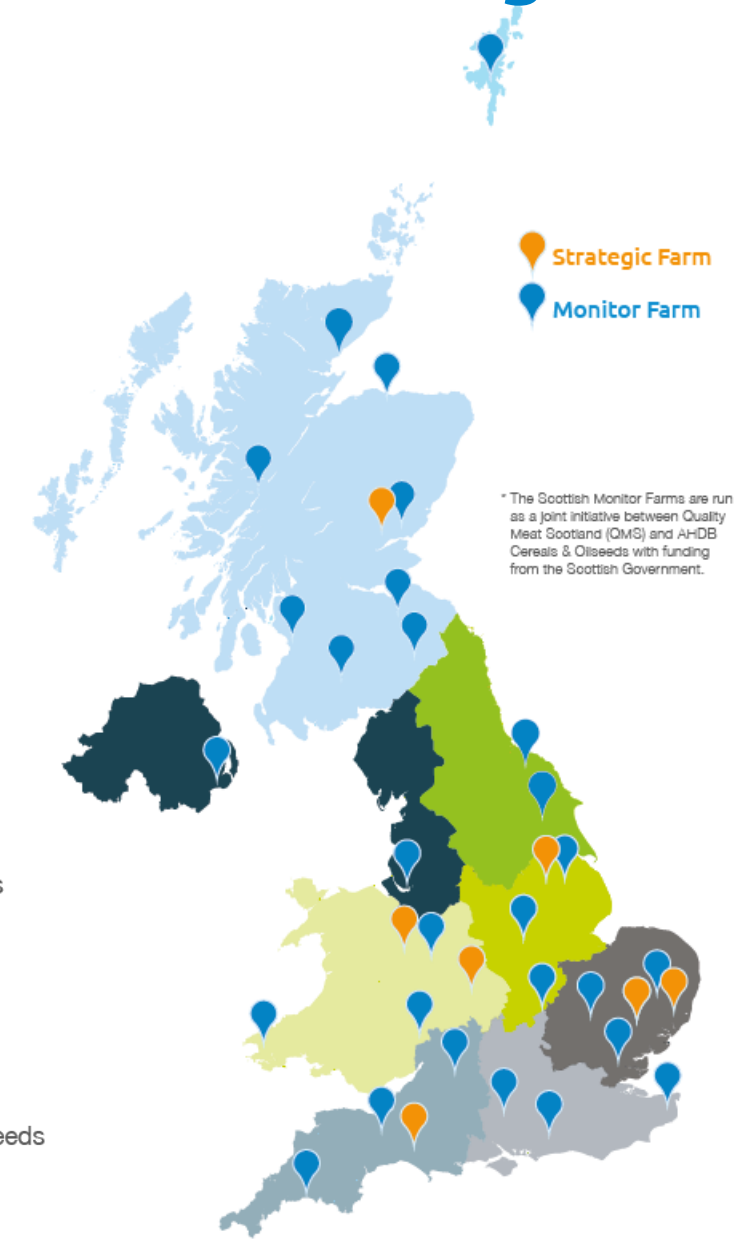

* The Scottish Monitor Farms are run as a joint initiative between Quality Meat Scotland (QMS) and AHDB Cereals & Oilseeds with funding from the Scottish Government.

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Farm Excellence Platform
Harnessing the proven benefits of ”farmer to farmer” learning

Development of business leaders who inspire improvements for the whole industry

Increased numbers benchmarking and using it to drive business improvement

Accelerated uptake of technical tools linked to increased productivity

Targeted improvement in key areas of technical importance

Monitor Farms

Monitor Farm Steering Group

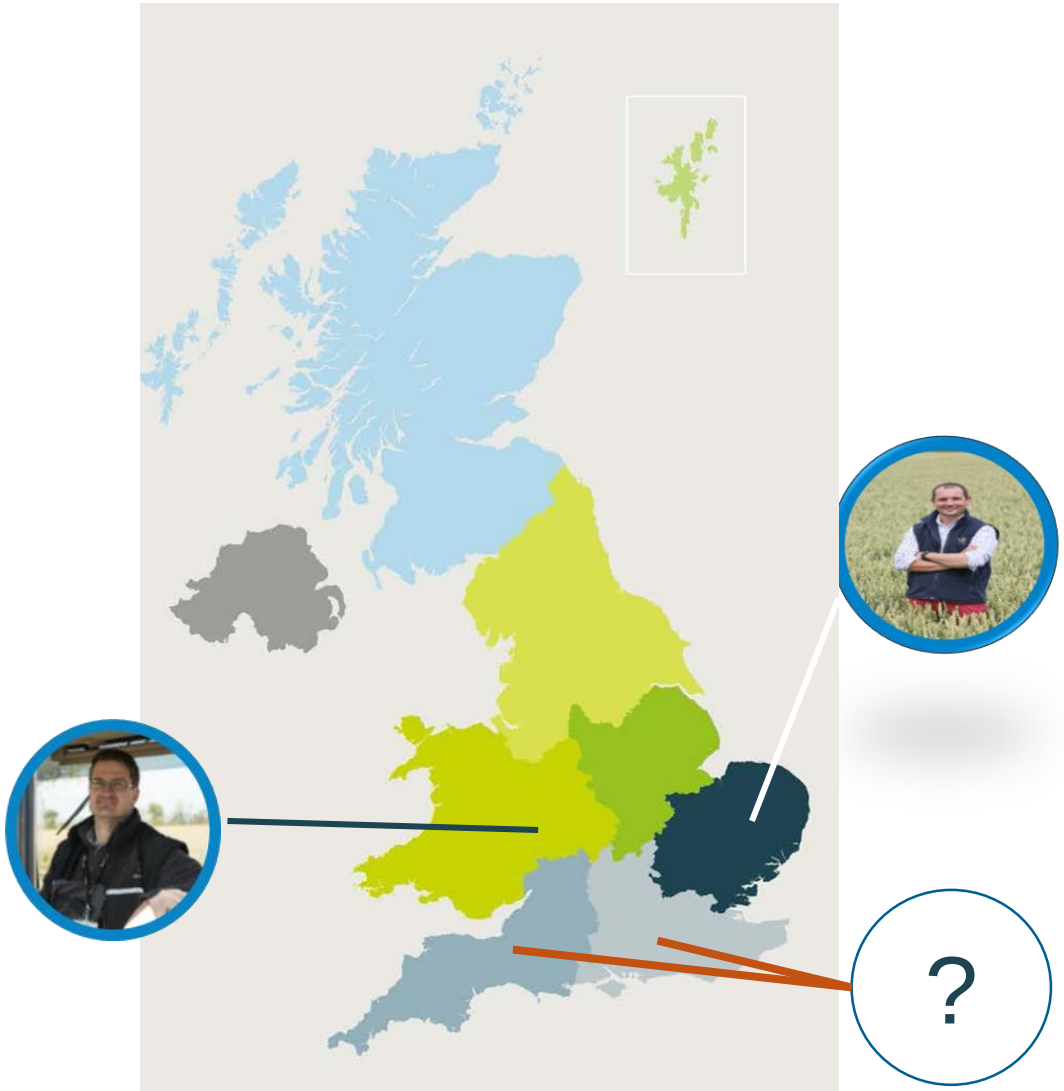
"farmer led, farmer driven"

Strategic Farms

Cereals & Oilseeds Strategic Farm East & West

Strategic Farms are based on commercial farms to bridge the gap between research trials and practical application

- 6 year programme
- Farmer-to-farmer learning
- Accelerate the uptake of knowledge
- Explore best practice
- Economic analysis of each demonstration



Technical Events

Arable Business Groups

Focus on detail

FARMBENCH

Farmbench.ahdb.org.uk

1. Minimise overhead costs
2. Set goals and budgets
3. Compare yourself with others and gather information
4. Understand the market
5. Focus on detail
6. Have a mindset for change and innovation
7. Continually improve people management
8. Specialise

IPM is a holistic approach to managing pests, diseases or weeds in which chemical pesticides are used only as a last resort, if at all.

TIMELINE

Preparing for Change

Direct Payment band**	Reduction percentage
Up to £30,000	5%
£30,000 - £50,000	10%
£50,000 - £150,000	20%
£150,000 or more	25%

All linked to the Govt. 25yr Environmental Plan & Agricultural Bill

Govt. Agricultural Bill (replacing the CAP)

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TIMELINE For Direct Payments		
YEAR		
2019	Direct Payments continue on the same basis as now with minor simplifications, where possible	Tests and trials for Environmental Land Management Scheme (ELMS)
2020	Direct Payments continue with further simplifications CS agreements continue to be signed & HLS agreements maybe extended??	Higher Animal Welfare standards defined and agreed
		TRANSITION PERIOD
2021	First year of progressive reductions to Direct Payments CS agreements continue to be signed but number becomes dependent on ELMS HLS maybe extended??	Transition support Scheme Enabling on-farm investment in equipment and technology to deliver public goods
2022 -2024	Progressive reductions to Direct Payments Final CS agreements maybe superseded by ELMS?	Final Countryside Stewardship agreements
2025 (GOVT. Election?)	Progressive reductions to Direct Payments	ELMS fully up and running???
2027	End of Transition Period & last year of Direct Payments	Targeted investment in R&D Animal health & welfare and ELMS fully operational
2028	**"Public money for public goods" fully operational**	

Yields in the South East of England*

Tonnes per hectare	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2015 - 2019 ave.	2010 - 2019 ave.	2014 - 2018 ave.	2009-2018 ave.
Wheat	8.3	8.2	7.9	8.0	7.0	7.3	8.8	9.1	7.8	8.4	8.1	9.3	8.5	8.2	**8.4**	**8.1**
All barley	6.2	6.2	5.9	6.1	5.8	5.8	6.7	7.0	6.0	6.0	5.7	7.0	6.4	6.2	**6.3**	**6.1**
Winter barley	6.6	6.6	6.8	6.4	6.6	5.6	7.1	7.7	6.3	6.4	7.0	8.0	7.1	6.8	**6.9**	**6.6**
Spring barley	5.9	6.0	5.3	6.0	5.4	5.8	6.4	6.7	5.9	5.8	5.2	6.6	6.0	5.9	**6.0**	**5.8**
Oats	6.4	6.1	5.4	5.8	5.7	5.3	6.3	6.1	5.6	5.5	4.9	6.0	5.6	5.6	**5.7**	**5.7**
Winter oilseed rape	3.1	3.4	3.6	4.0	3.3	3.1	3.3	3.8	2.7	3.6	3.3	3.0	3.3	3.4	**3.3**	**3.4**

**South East incorporates Berkshire, Buckinghamshire, East Sussex, Hampshire, Isle of Wight, Kent, Oxfordshire, Surrey, West Sussex and London.*

Source: Defra

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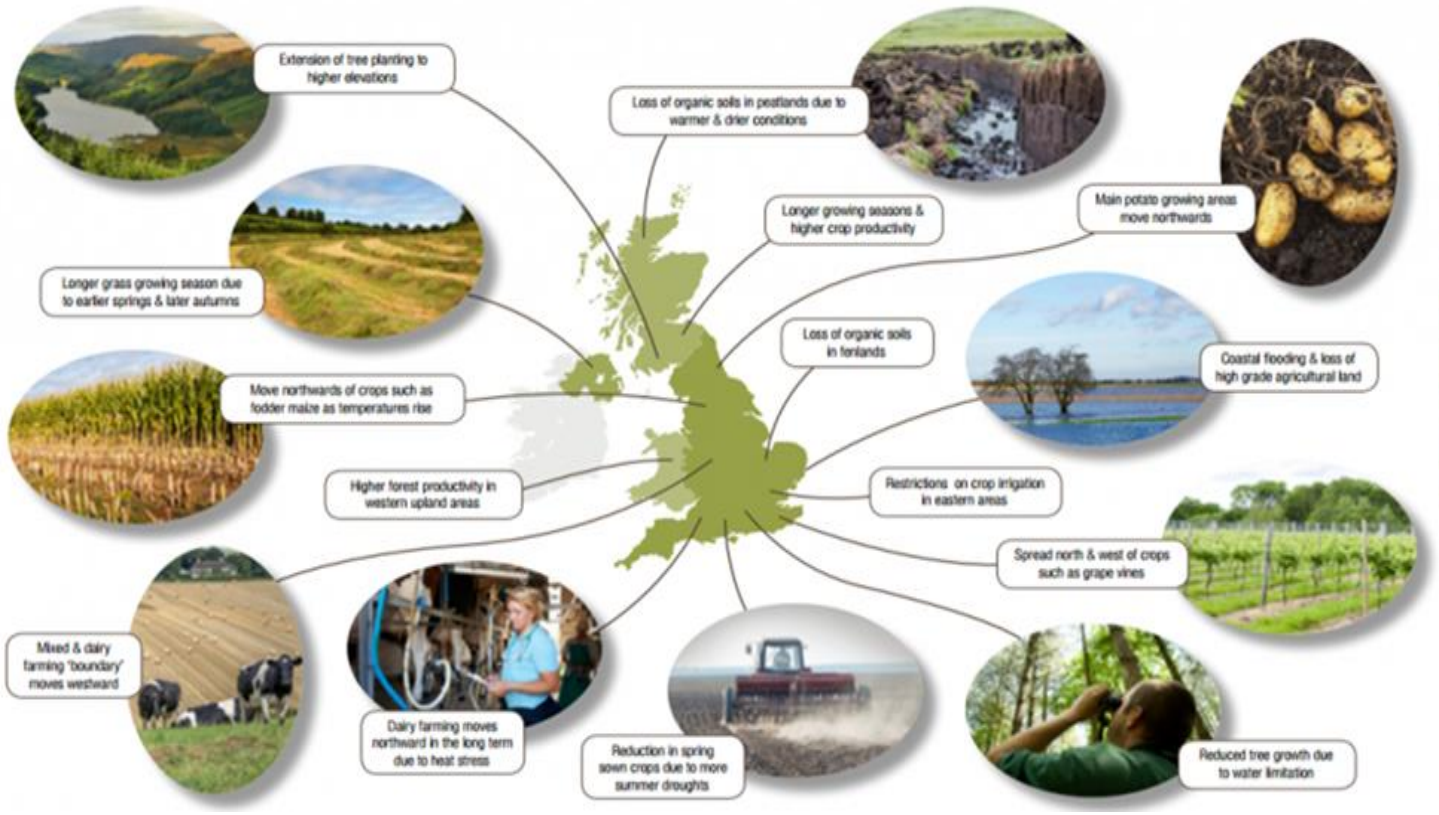
CLIMATE ~~CHANGE~~ - EMERGENCY

is the BIGGEST LONG TERM CHALLENGE we face?



Climate Change Impacts on Insect Pests, Weeds, and Disease

UK hotter than it has been for 100 years due to climate change, Met Office reveals

Over past decade average temperature increased 0.8C and rainfall up 20 per cent compared to 30-year period ending in 1990

CEREALS & OILSEEDS

Wheat			
Thousand hectares	Defra June Survey 2019	Final EBS forecast 2020	% change from 2019
East	464	447	-4%
South East	216	209	-3%
South West	162	159	-2%
East Midlands	326	263	-19%
West Midlands	166	154	-7%
North West	35	29	-16%
North East	72	64	-10%
Yorkshire & The Humber	237	182	-23%
Scotland	107	98	-9%
Wales & NI[1]	31	26	
UK	**1,816**	**1,631**	

Oilseed Rape			
Thousand hectares	Defra June Survey 2019	Final EBS forecast 2020	% change from 2019
East	107	82	-24%
South East	69	50	-28%
South West	48	33	-31%
East Midlands	125	89	-29%
West Midlands	49	42	-15%
North West	5	5	0%
North East	23	20	-11%
Yorkshire & The Humber	66	59	-10%
Scotland	32	29	-8%
Wales & NI[1]	6	5	
UK	**530**	**414**	

Winter Barley			
Thousand hectares	Defra June Survey 2019	Final EBS forecast 2020	% change from 2019
East	99	93	-6%
South East	38	38	0%
South West	49	42	-16%
East Midlands	49	31	-37%
West Midlands	35	31	-10%
North West	14	14	-2%
North East	31	28	-9%
Yorkshire & The Humber	73	59	-19%
Scotland	49	45	-7%
Wales & NI[1]	16	14	
UK	**453**	**395**	

Spring Barley			
Thousand hectares	Defra June Survey 2019	Final EBS forecast 2020	% change from 2019
East	98	121	23%
South East	78	82	5%
South West	83	93	12%
East Midlands	73	146	100%
West Midlands	25	32	26%
North West	23	28	19%
North East	11	45	308%
Yorkshire & The Humber	53	108	105%
Scotland	242	244	1%
Wales & NI[1]	23	31	
UK	**710**	**929**	

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Farm commodity costs 2018 v 2019

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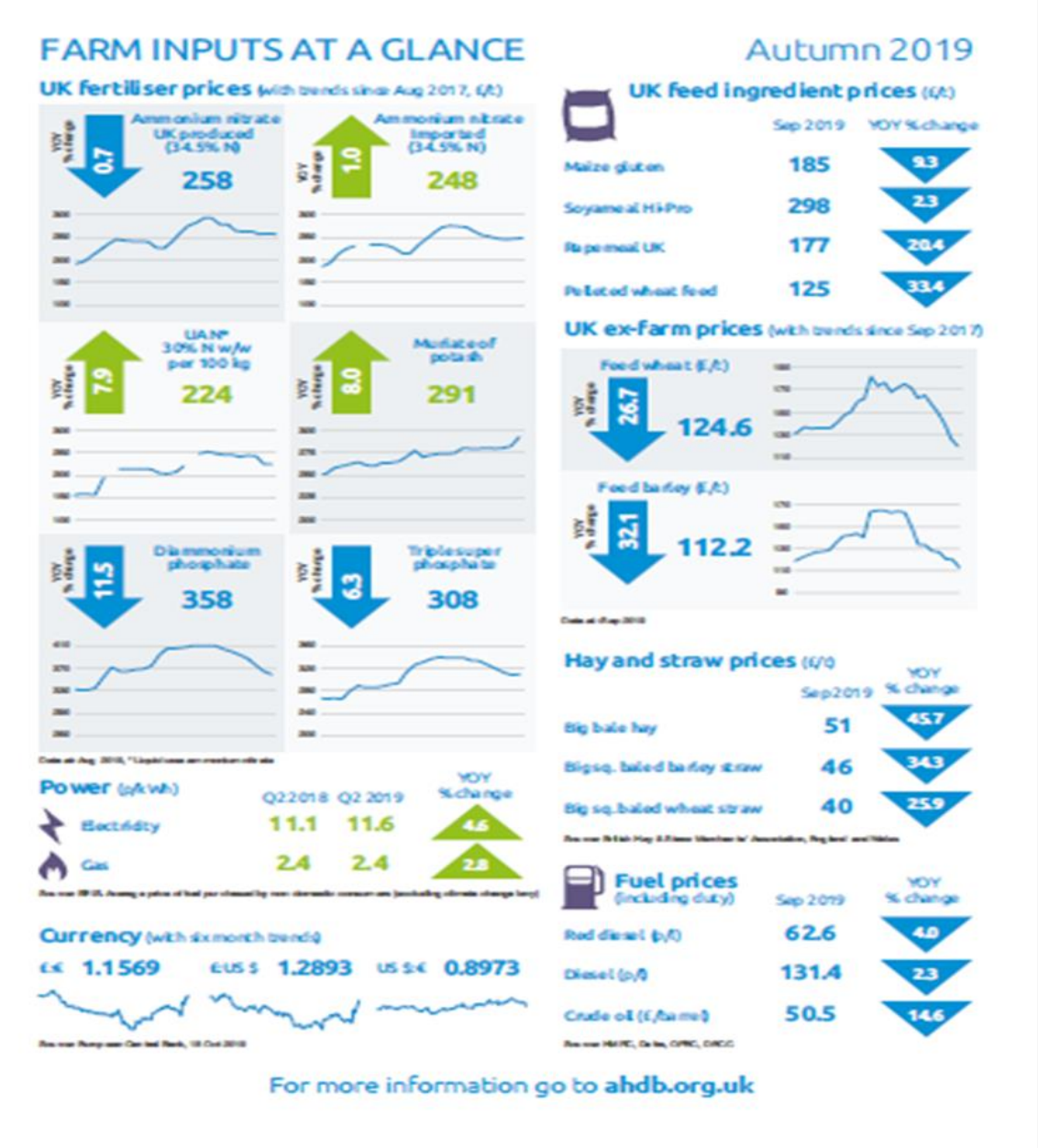
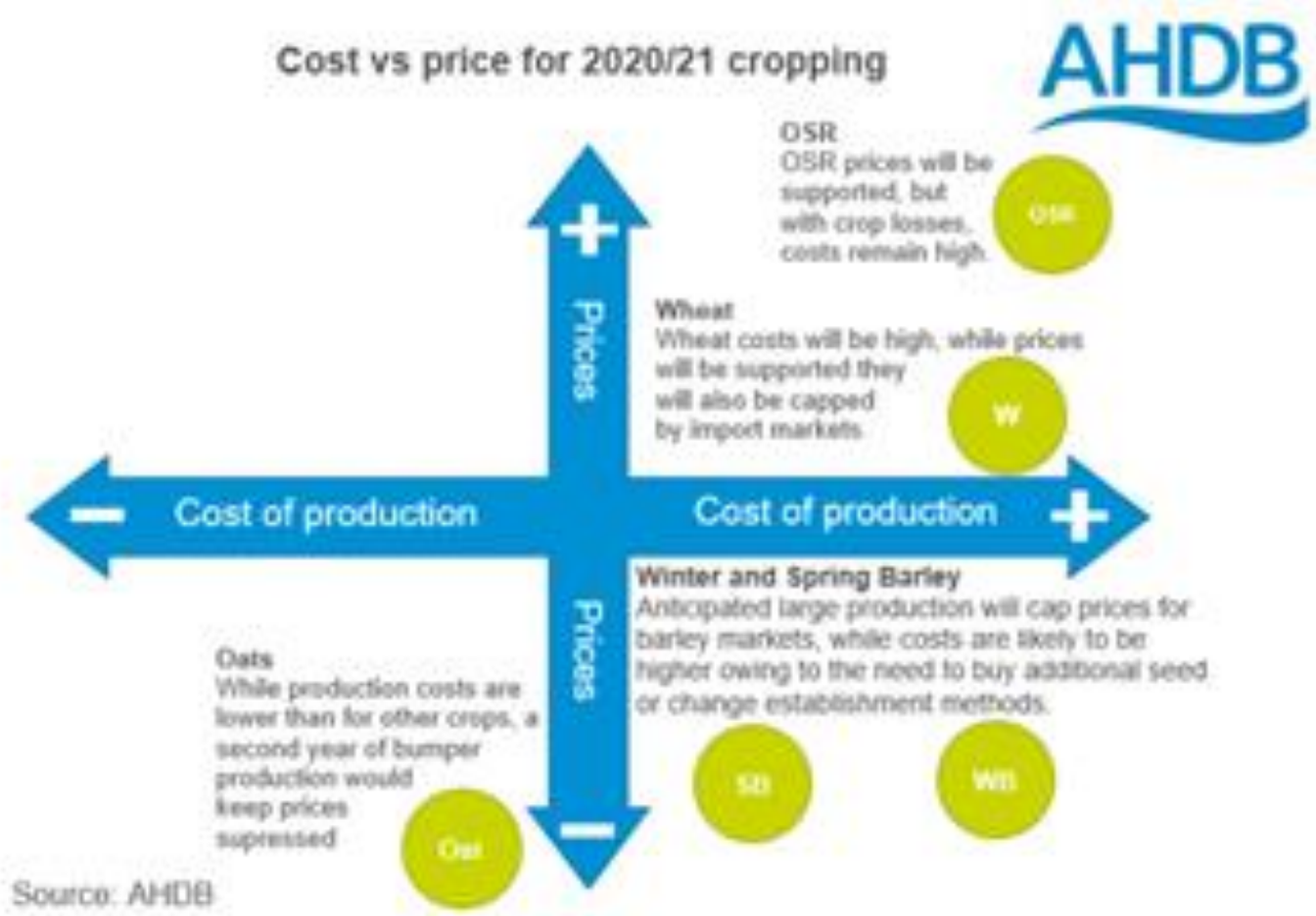
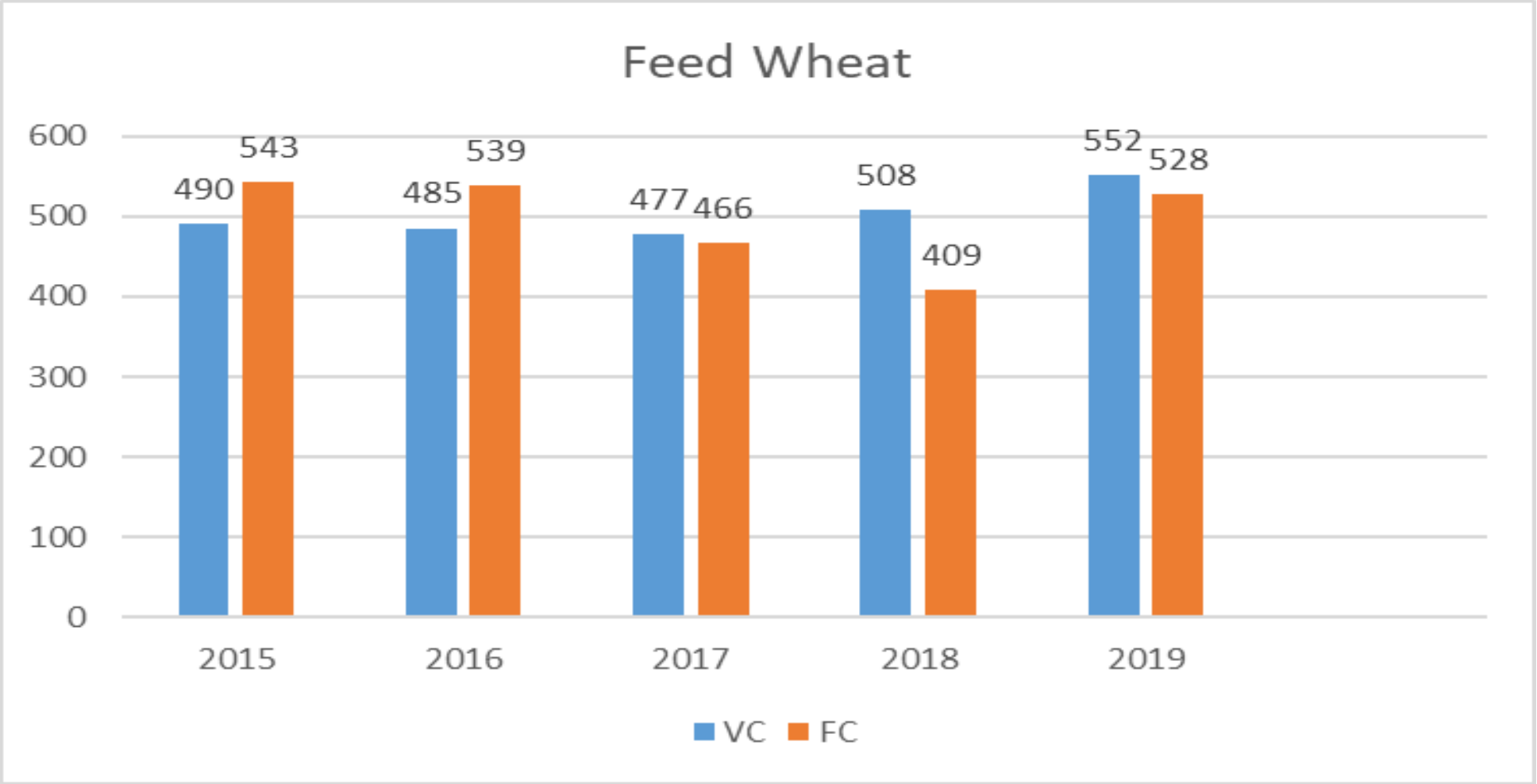




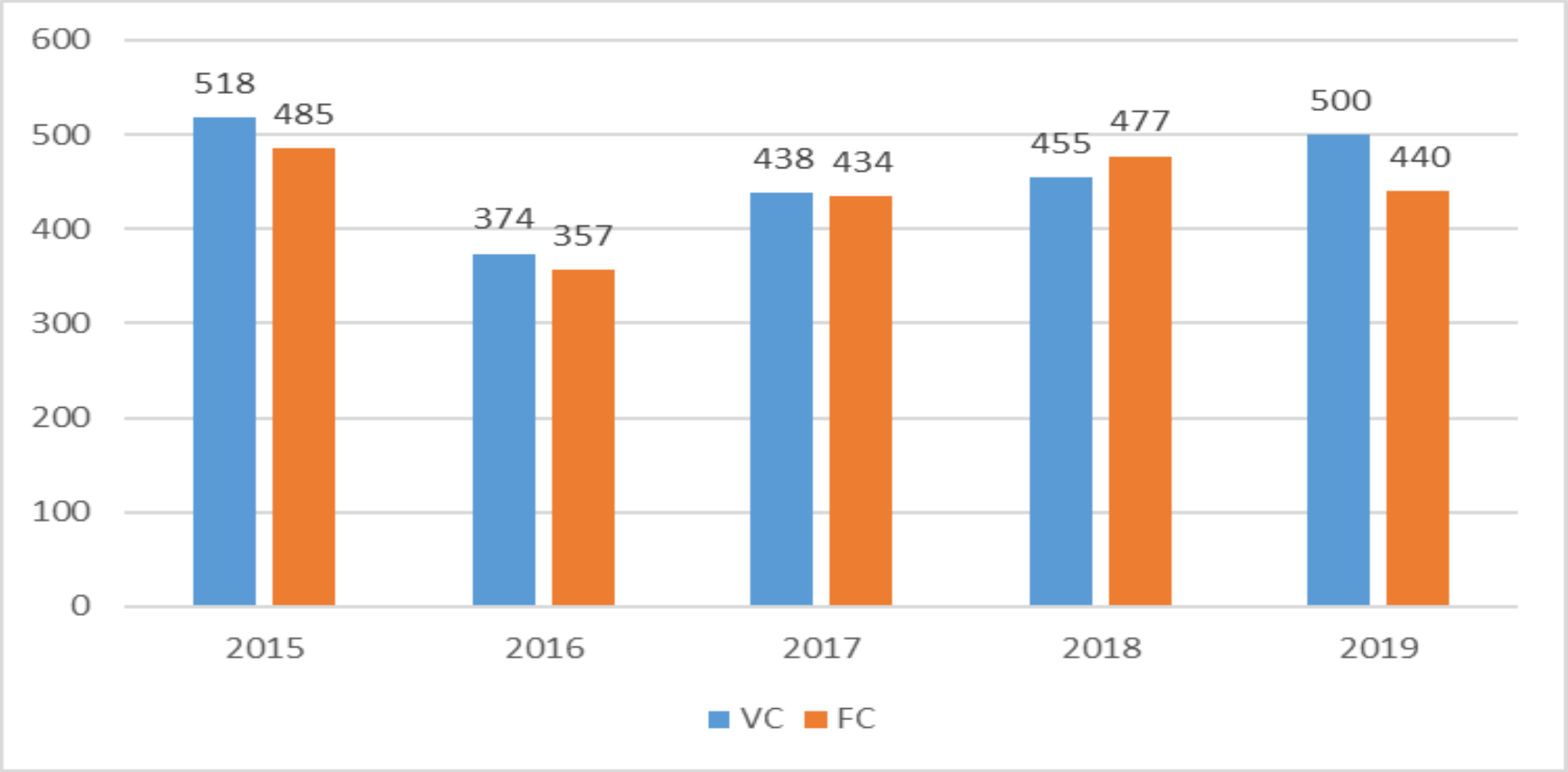
Understanding the relative cost and price of each crop can help to determine a strategy for marketing. Knowing that a crop is going to be high cost, with relatively low prices (e.g. spring barley) highlights the need to focus on minimising costs to maximise returns

Av. SE Milling Wheat
Variable Costs v Fixed Costs

Av. SE Feed Wheat
Variable Costs v Fixed Costs



SE OSR
Variable Costs v Fixed Costs (2015 – 2019)



Is Yield King & if it is, at what cost?

"Higher output accounts for just 10 to 30 per cent of higher profits in top-quartile farm businesses - lower costs contribute 65 to 90 per cent"

G. Redman, Andersons

"In any commodity-based industry such as agriculture, the best performers simply spend less money producing each unit of output when measured on a financial basis. This does not necessarily mean generating more output per hectare or per head of stock."

Challenges

Outlook 2020: Farm policy – big changes beyond 2020

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OPPORTUNITIES

- Environmental Legislation (natural capital)
- Water / Nutrient regulations
- GHG Regulations
- Pesticide resistance's & diminishing "actives" IPM
- [illegible]eductions
- [illegible]
- Supply chain challenges
- Public Perception / consumer habits (public money for public goods")
- Brexit ?????? (international competitors)

JV working by using the

Natural Capital to help promote our net margins

What is Natural Capital?

Stocks

- Species
- Communities
- Landscapes
- Ecosystems
- Soils
- Air
- Water

Services

- Pollination
- Biomass
- Nutrient cycling
- Water purification

Benefits

- Timber
- Energy
- Clean water
- Clean air
- Recreation
- Hazard protection
  (flooding, climate change mitigation)
- Wildlife conservation

What are the opportunities?

Climbing off the Industrial Agriculture “Hamster Wheel”

Environmental Schemes

No Till

Companion cropping

Cover Crops

Biodiversity

collaboration

Cover Crops

Rotations

Organics

Soil health

livestock

Dr Sacha White RSK ADAS

IPM strategies to control cabbage stem flea beetle

Dr Sacha White, Senior Research Entomologist, ADAS

14th January 2020

Today’s talk

- Life-cycle
- Causes of increased pressures
- Varietal choice
- Seed rate
- Drill date
- Trap cropping
- Defoliation

Life cycle

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

Pyrethroid resistance in CSFB

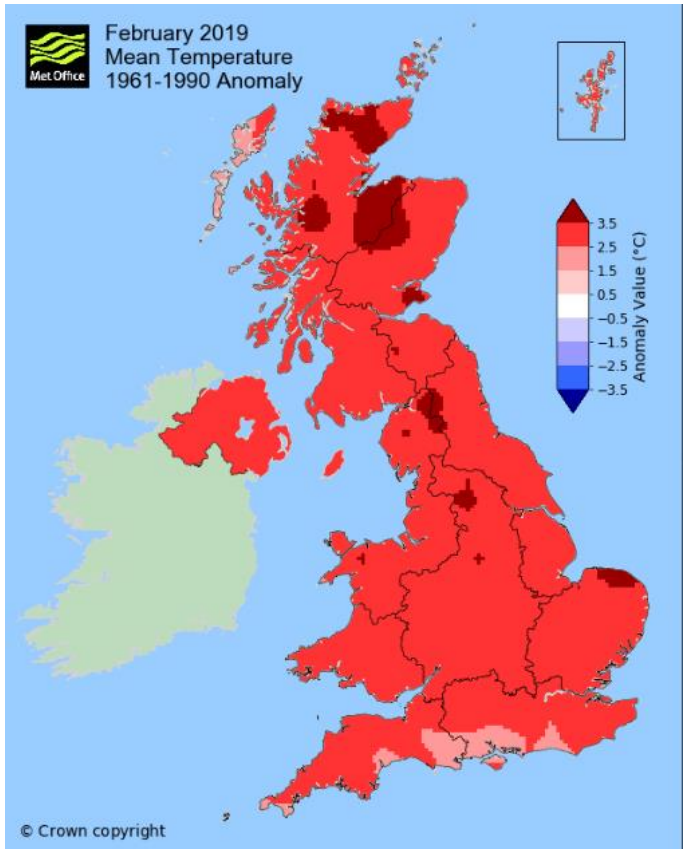
Response to
100% lambda-cyhalothrin
(7.5 g ai/ha) in 2019

% resistant

- 0%
- 0-25%
- >25-50%
- >50-75%
- >75-99%
- 100%

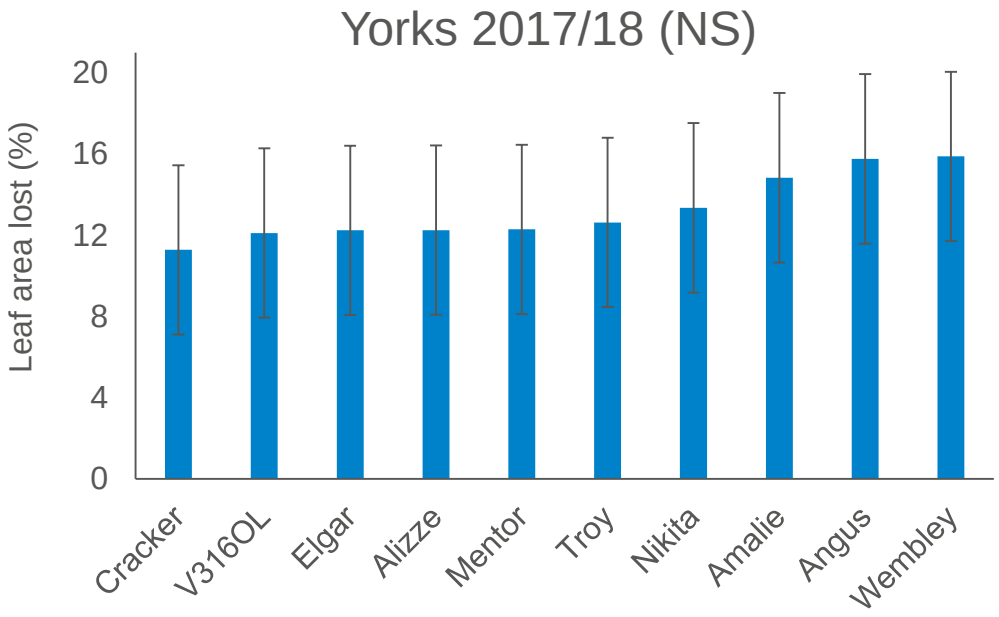
The weather factor…

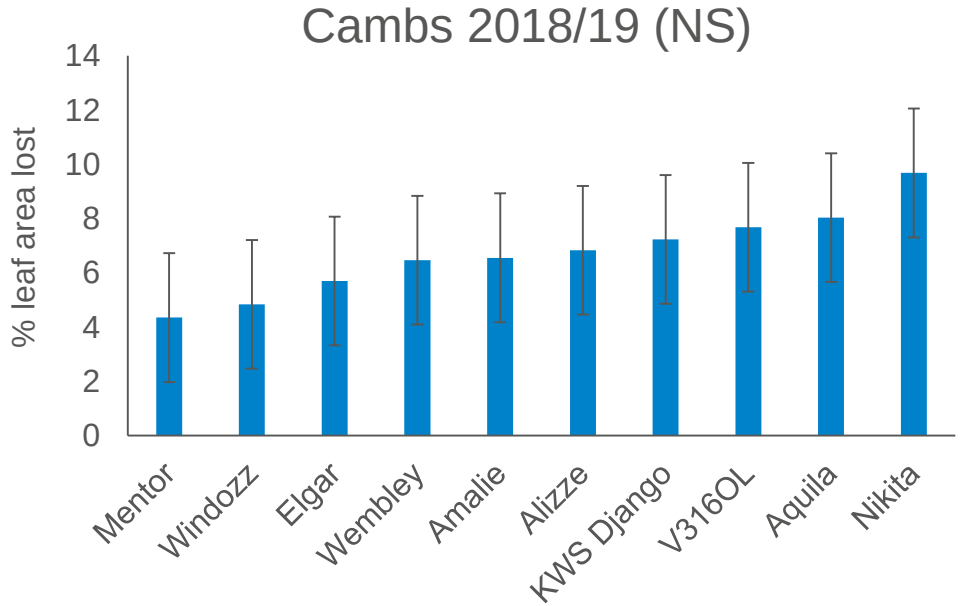
- Modelling work shows that:
- Autumn larval population greater if:
  - Warm September
  - Low rainfall in March, April, June and July
- Spring larval population greater if:
  - Warm November
  - Warm January
- Damage from adult CSFB worse if:
  - Hot June and July
  - Dry August



Varietal selection – adult damage

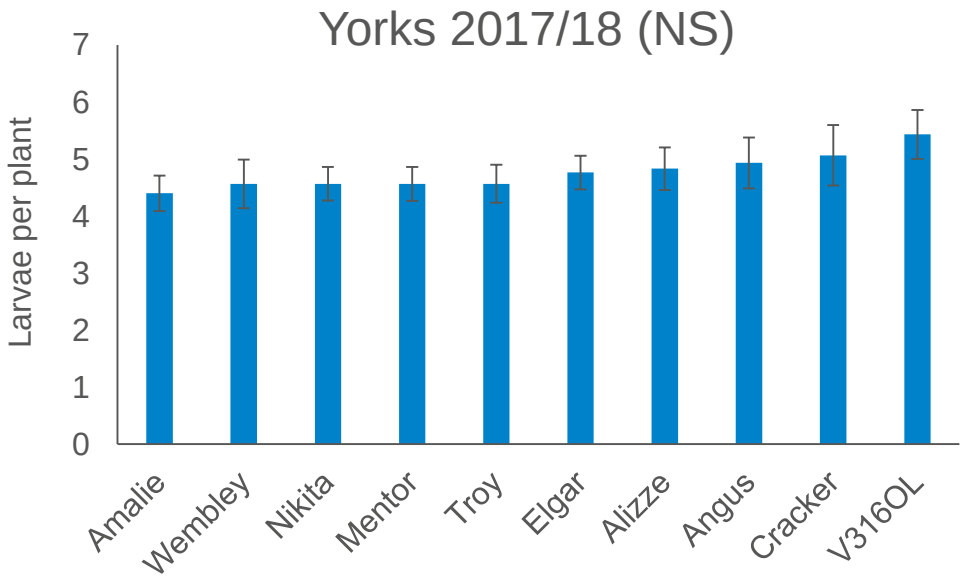
- Monitored 3 RL trials (2016/17) – no sig. differences.
- Drilled variety trials at BX and HM in 2017/18 and 2018/19.
- Adult damage – no sig differences.

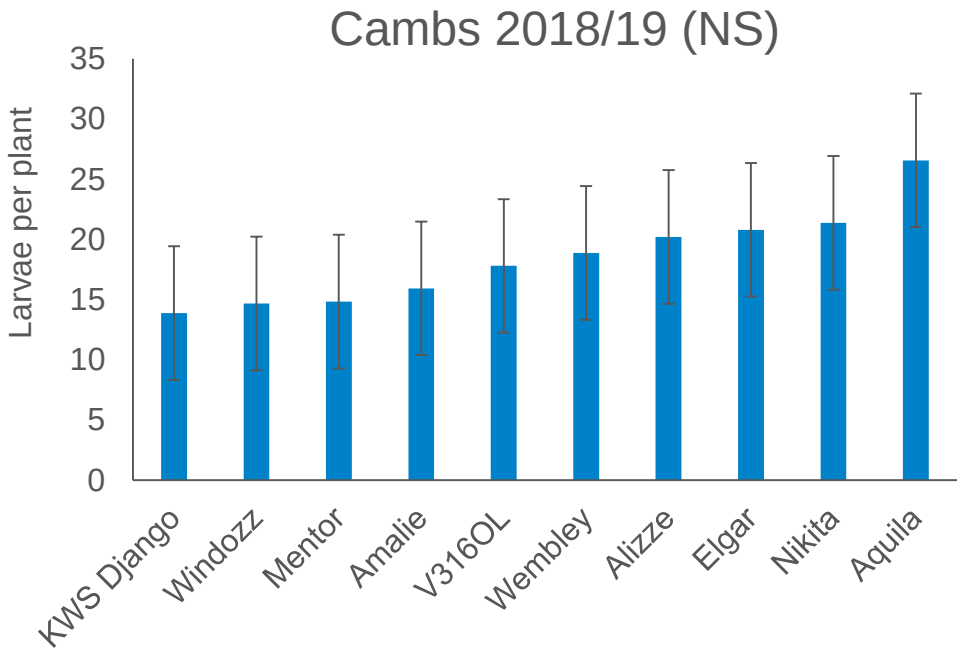




Varietal selection – larval damage

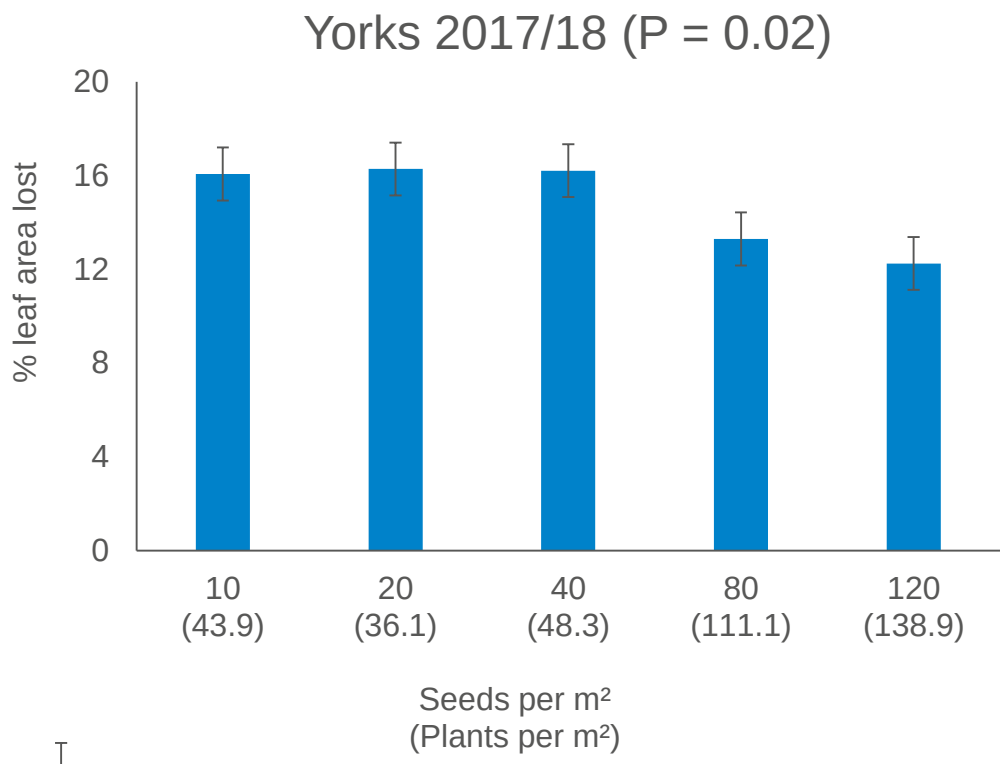
- Larval damage – no sig differences.
- Few differences in attractiveness or palatability.
- Varietal characteristics and tolerance may be important.
- Breeding lines.

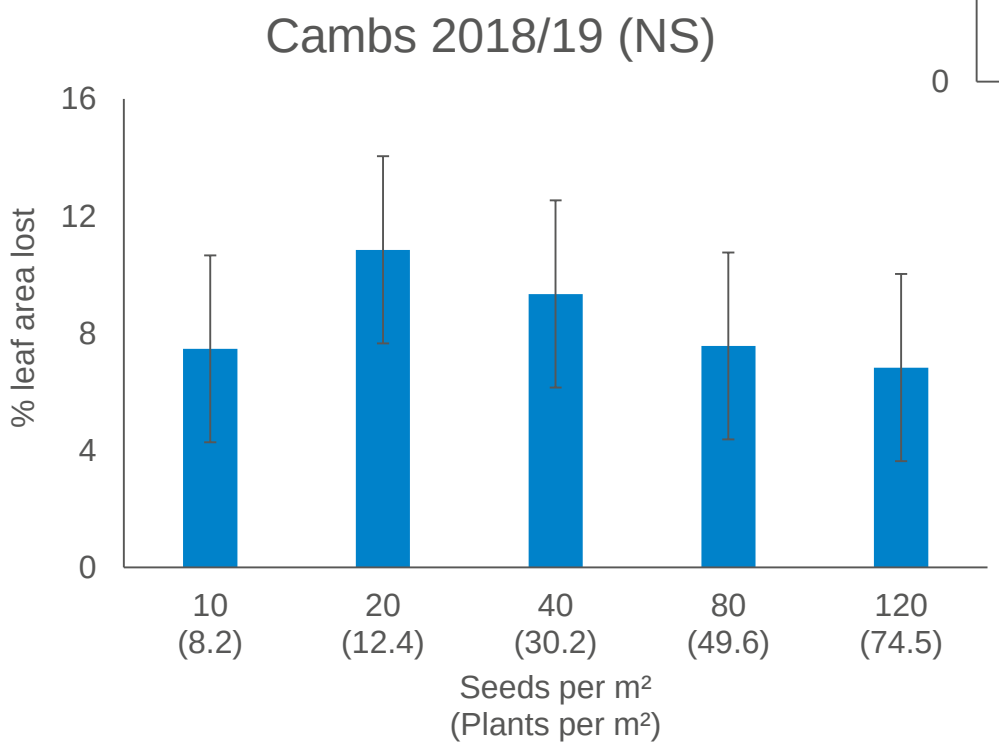




Seed rate – adult damage

- Trend for increasing seed rates to compensate.

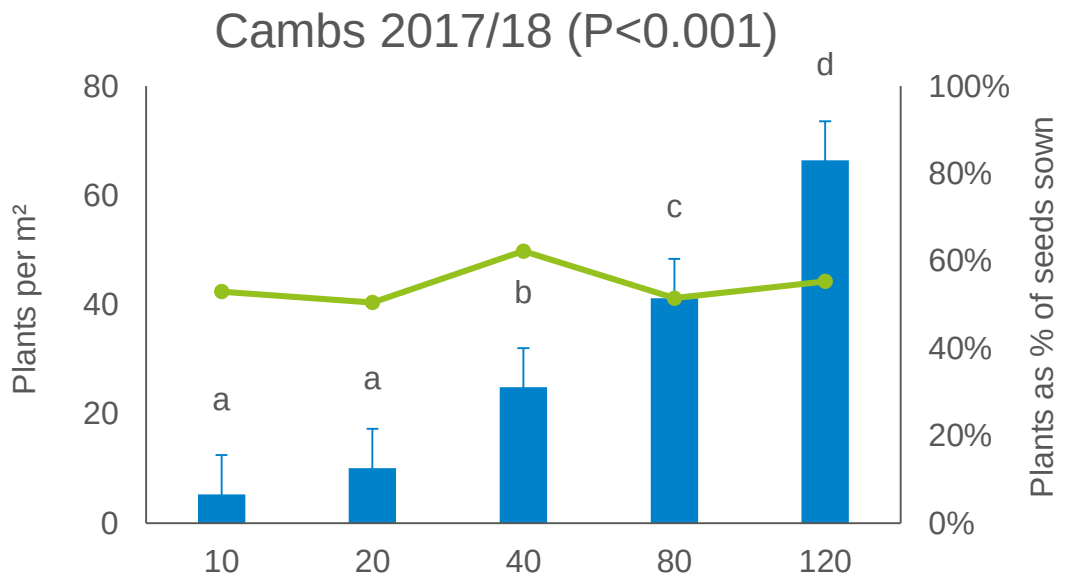


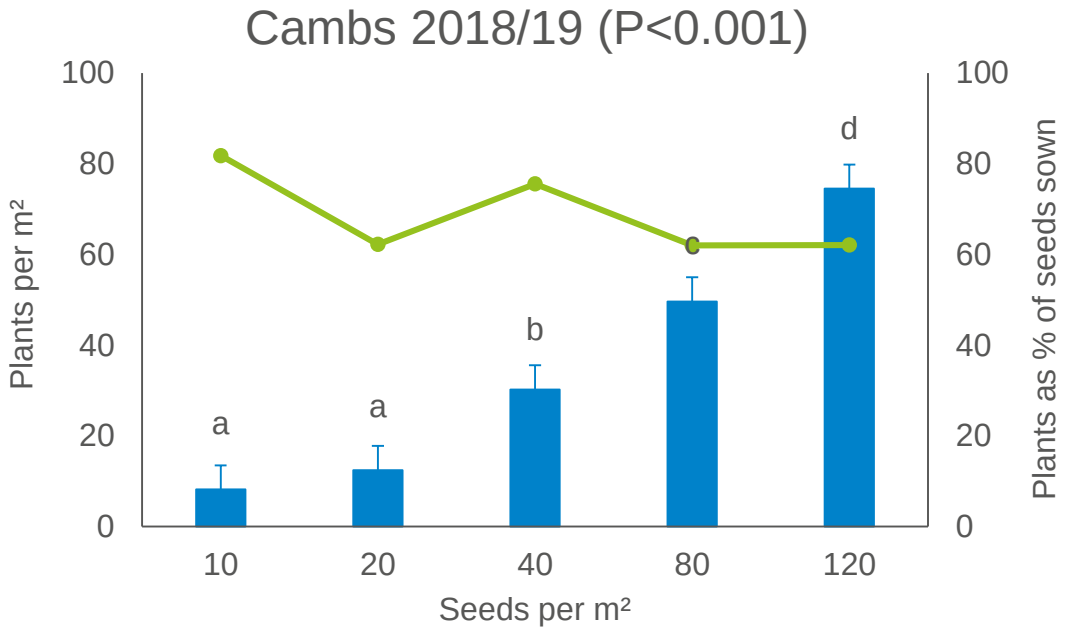


- Adult damage – Generally no sig differences.
- Less damage at highest seed rates on one trial.

Seed rate – plant populations

- Plant number increases with seed rate.
- Similar proportion of plants lost to CSFB at all seed rates.
- No clear benefit of increasing seed rate for crop establishment.



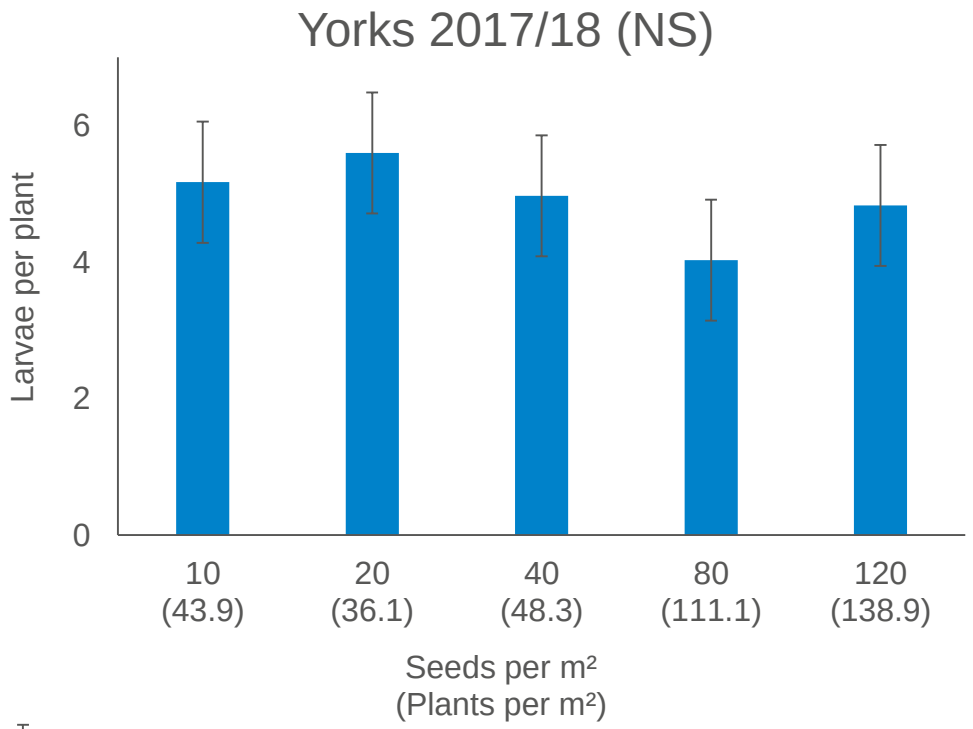


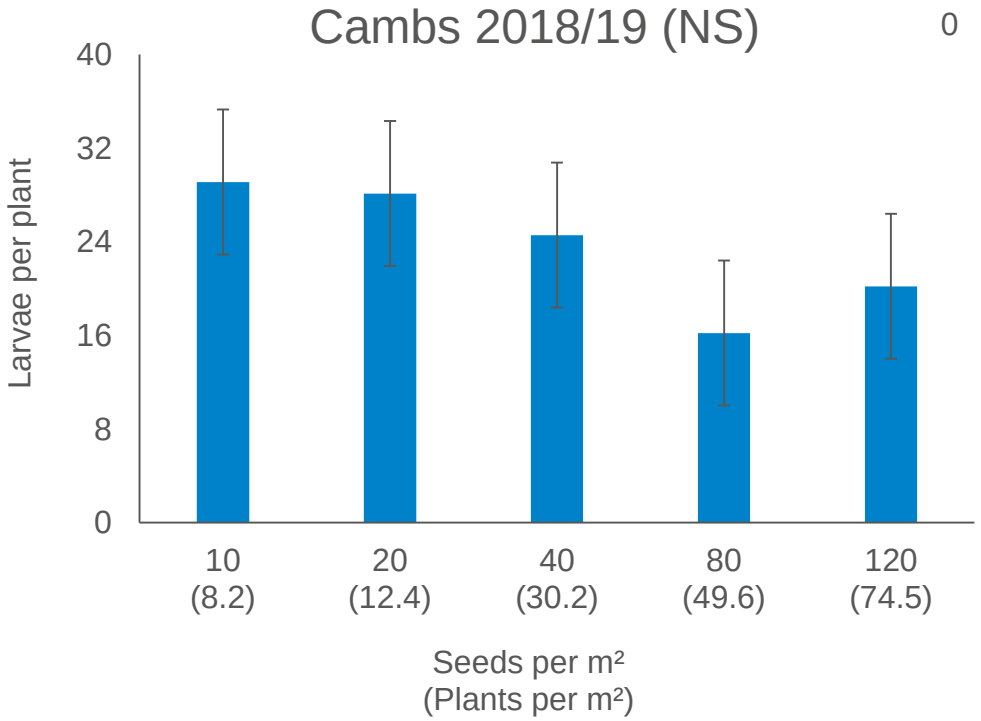
Plant population

Plants as % seeds sown

Seed rate – larval populations

- No significant differences in larvae per plant.

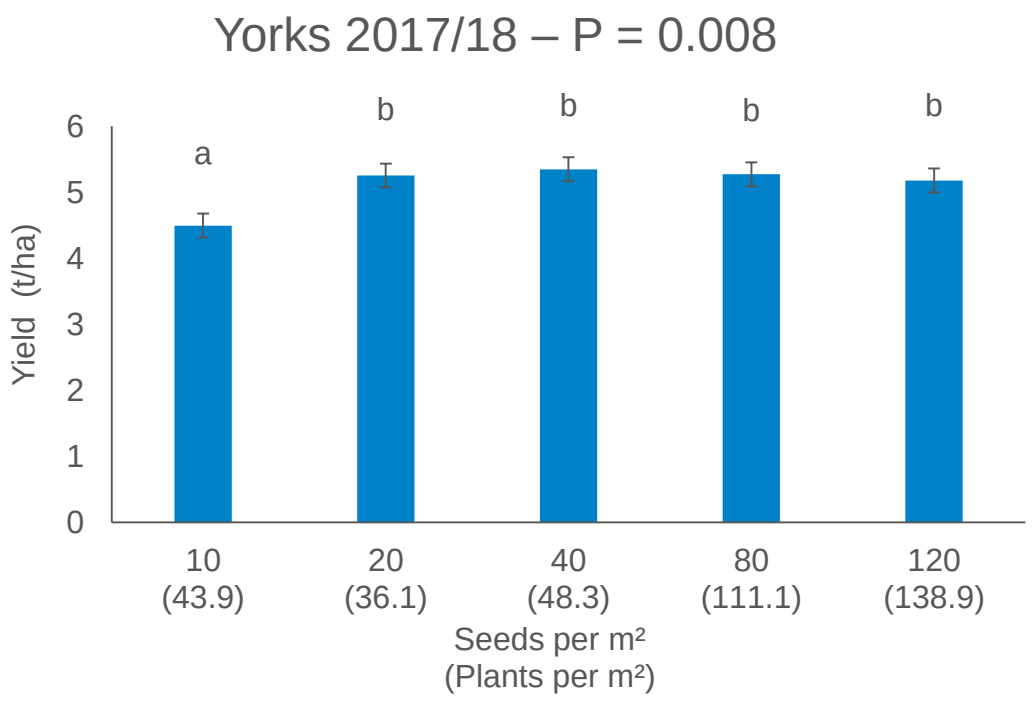


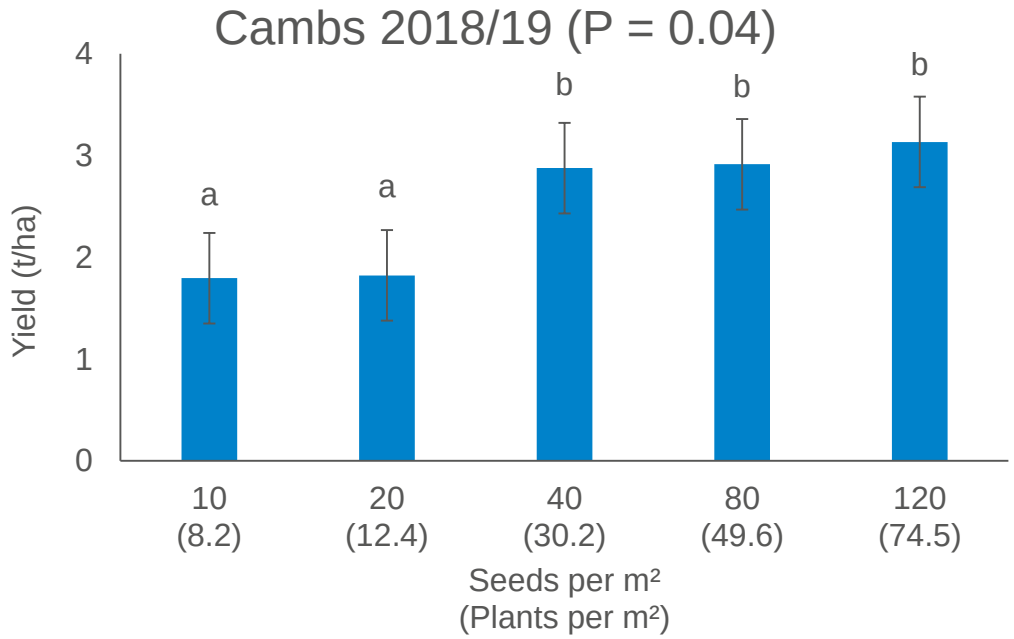


- Density dependent effect?

Seed rate – yield

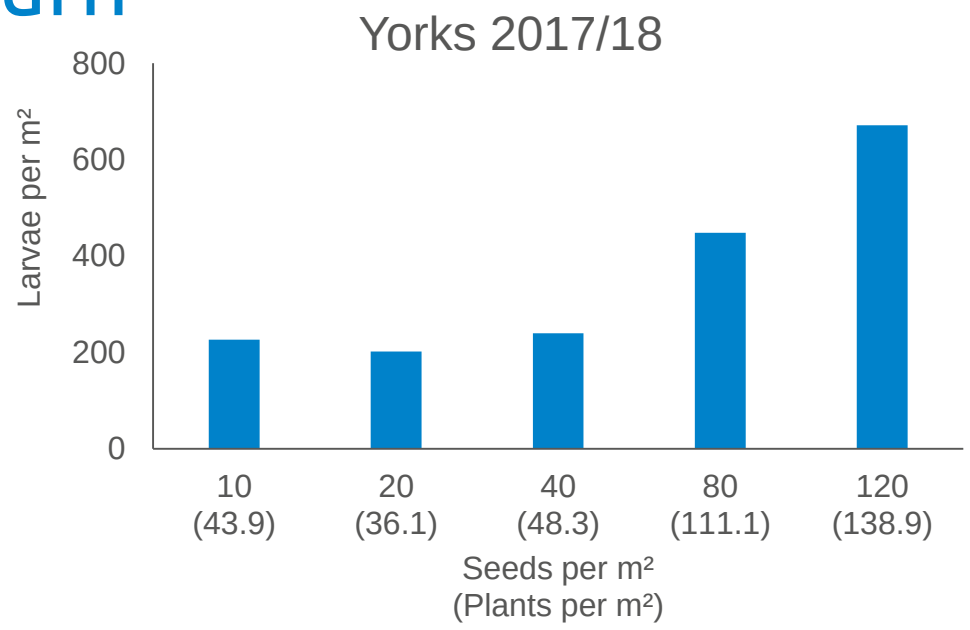
- Yield responses differed by site and year.
- Some significant yield reductions at lowest seed rates.
- Little benefit in seed rate >40 per m².

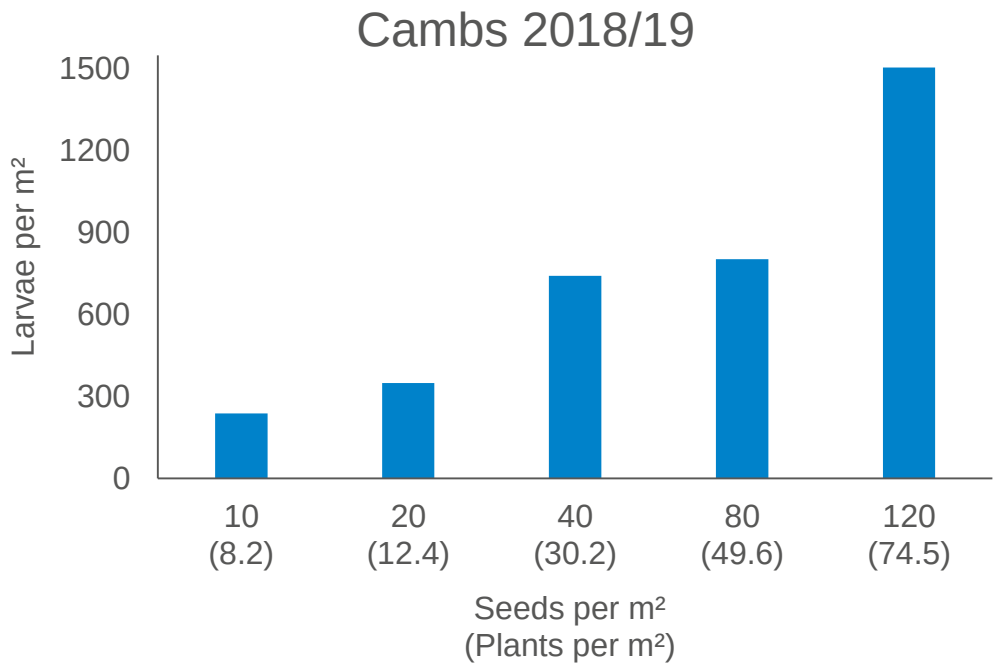




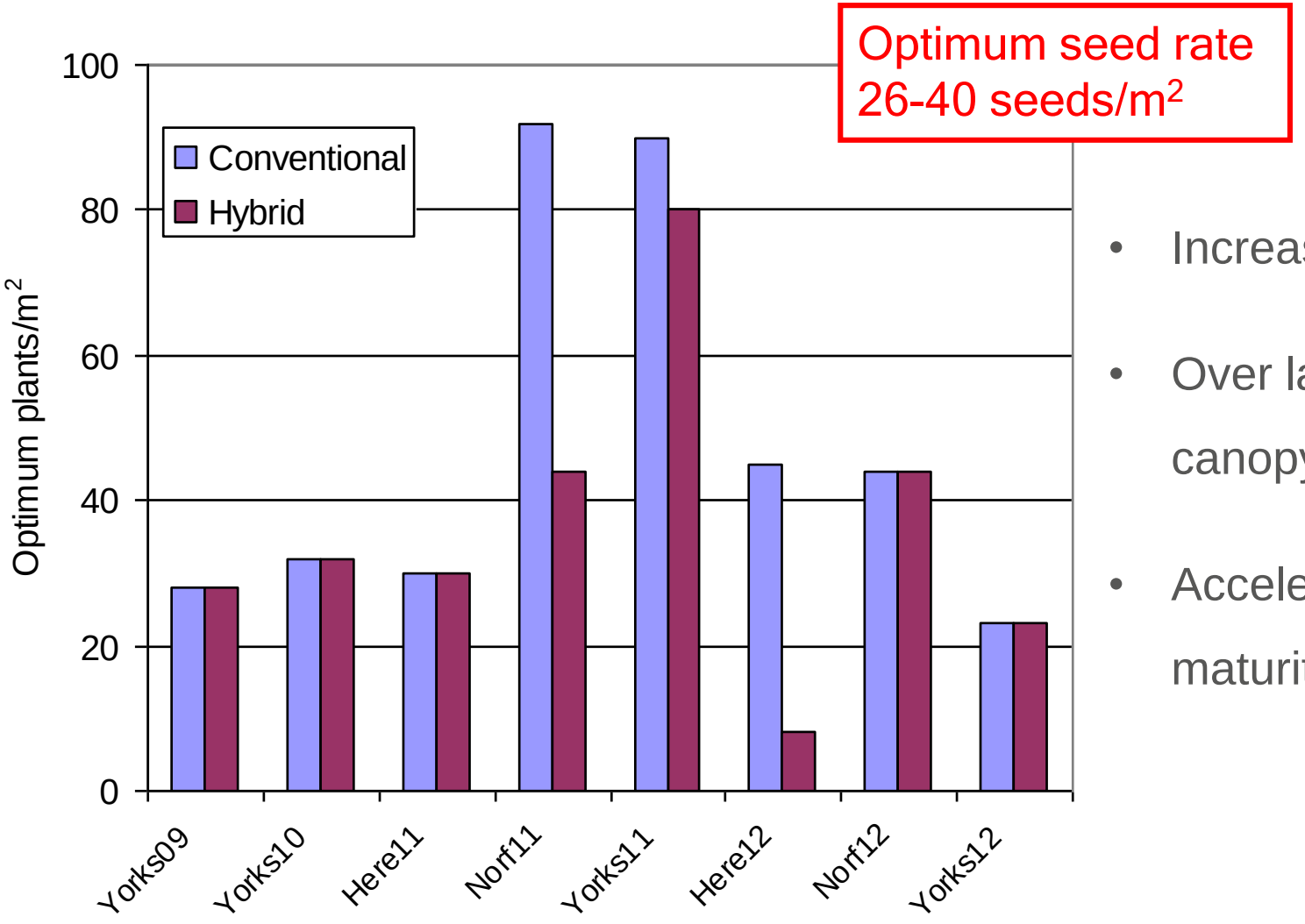
Seed rate – pest return

- Larvae per plant similar regardless of seed rate.
- So higher seed rates produce more larvae per unit area.
- Higher pest pressure in following season?





Economic optimum plants/m² for yield (2009-12)



- Increased lodging.
- Over large-canopy.
- Accelerated maturity.

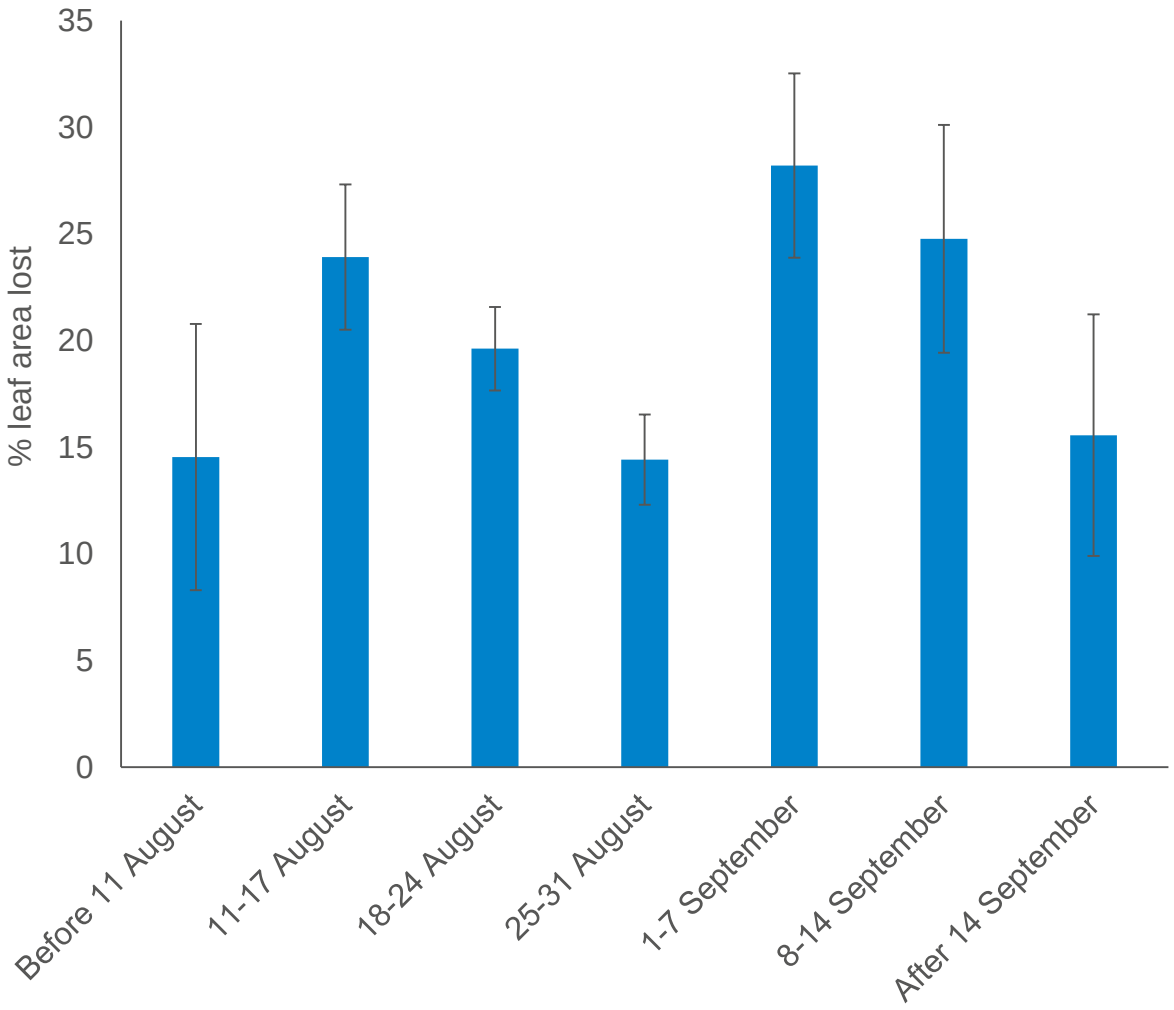
Roques & Berry (2015)

Seed rate conclusions

- Trials found no clear benefit of increasing seed rate for CSFB.
- Difficult to extrapolate findings to situations of **very** high CSFB pressure.
- Increasing seed rate for farm-saved seed may increase crop survival.
- But may decrease yield in situations where CSFB pressure isn’t very high.
- Increased pest carry over.

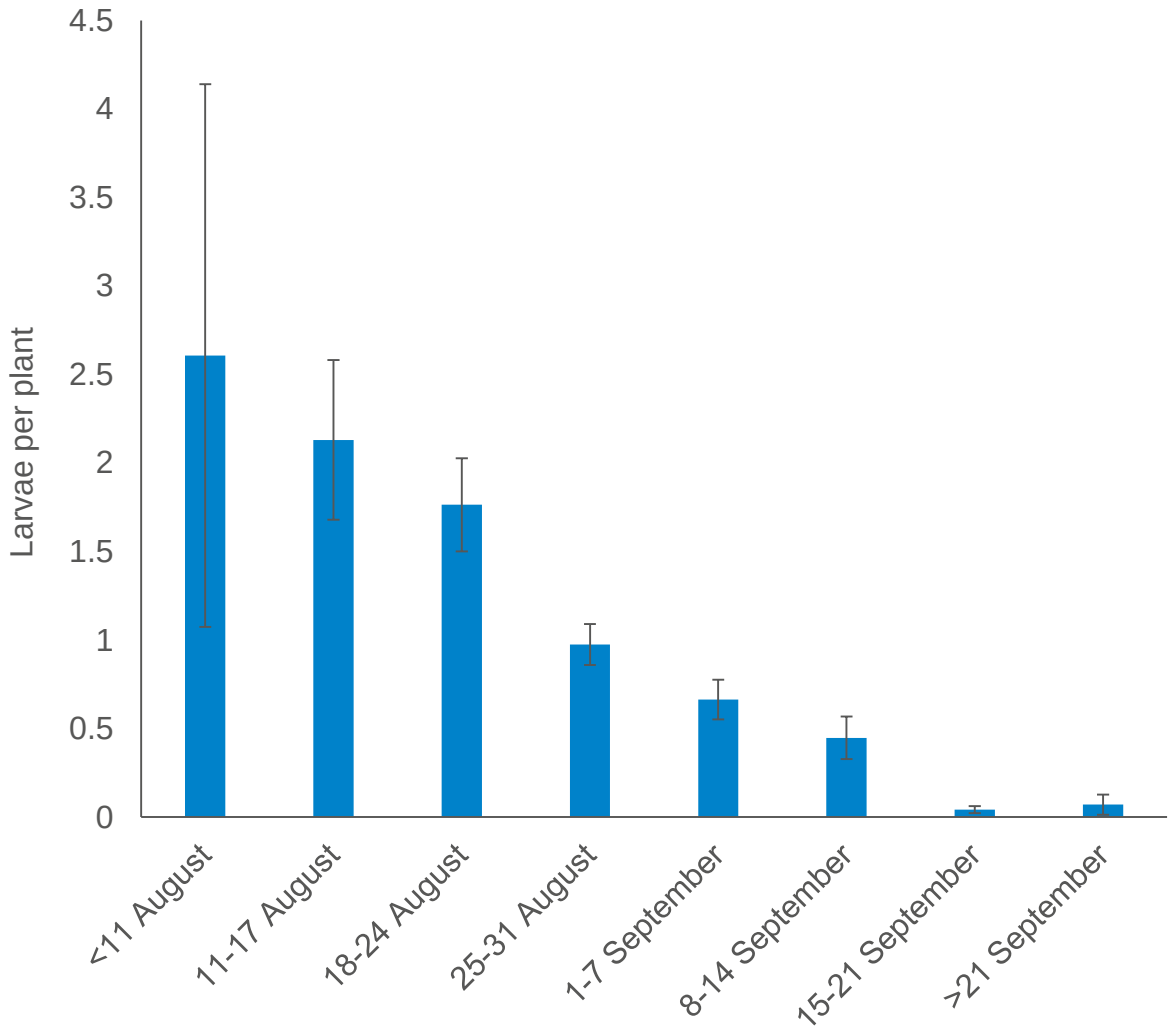
Drill date – minimising adult damage

- Survey work indicates trends in adult and larval damage.
- Modelling found August drilling results in less damage.
- Robust crops and pest avoidance.



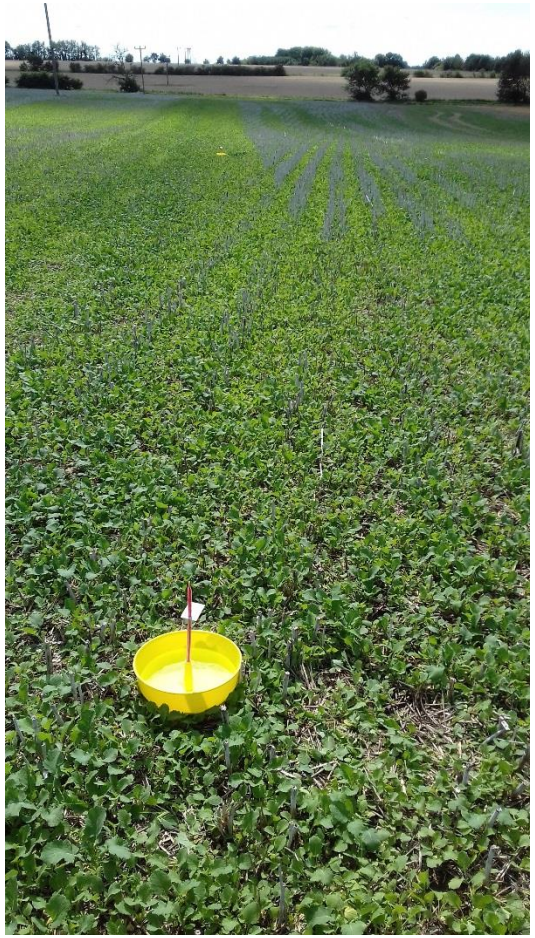
Drill date – minimising larval damage

- Modelling work found September drilled crops have fewer larvae.
- Difficult decision to make.
- Either early August or late September.



Volunteer OSR (vOSR) as a trap crop

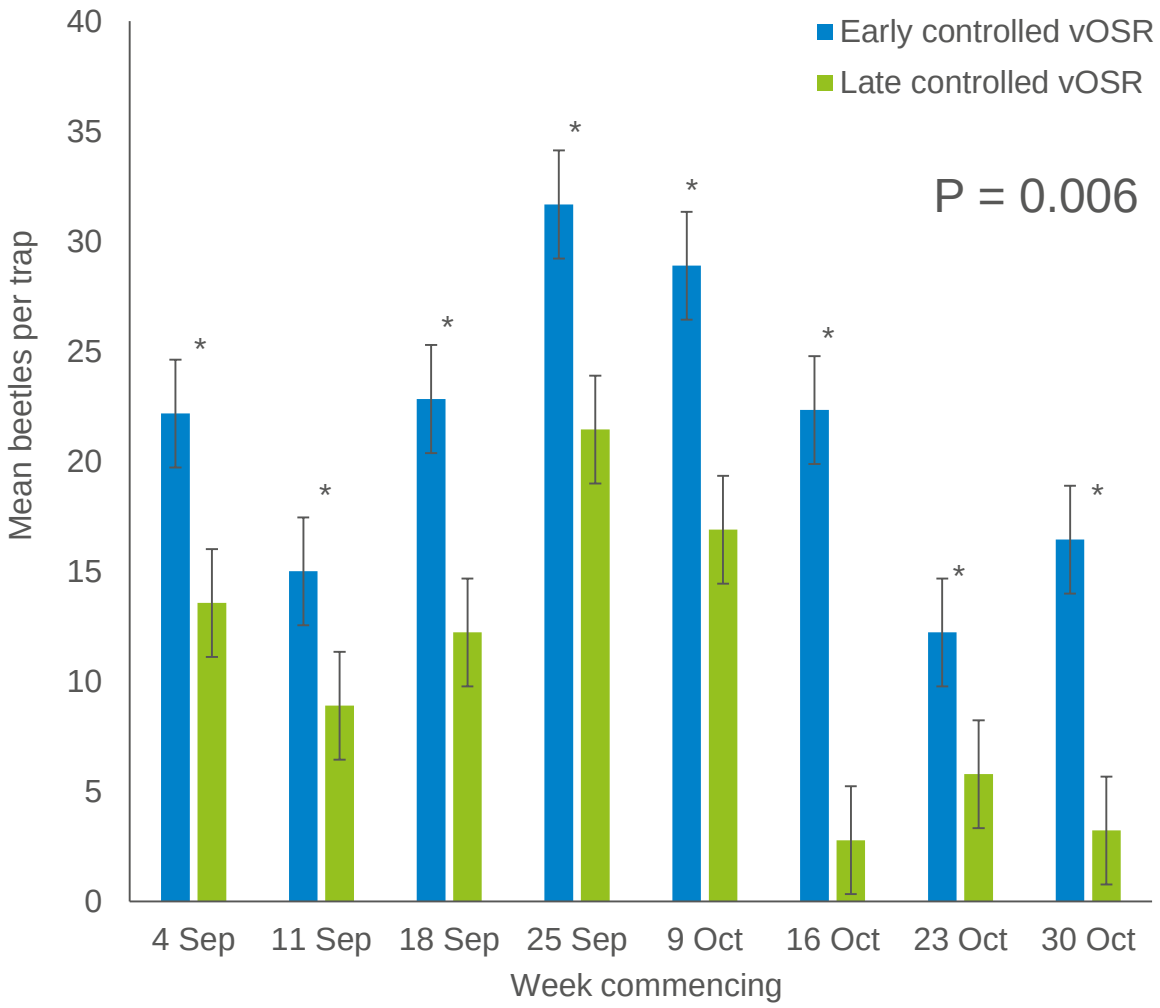
- In August, adult CSFB emerge from aestivation and migrate to OSR.
- Detect glucosinolate breakdown products (isothiocyanates) to locate crops.
- CSFB don’t discern between an OSR crop and a field of vOSR.
- vOSR normally appears before drilled OSR and controlled by mid-August.



Delaying control of vOSR

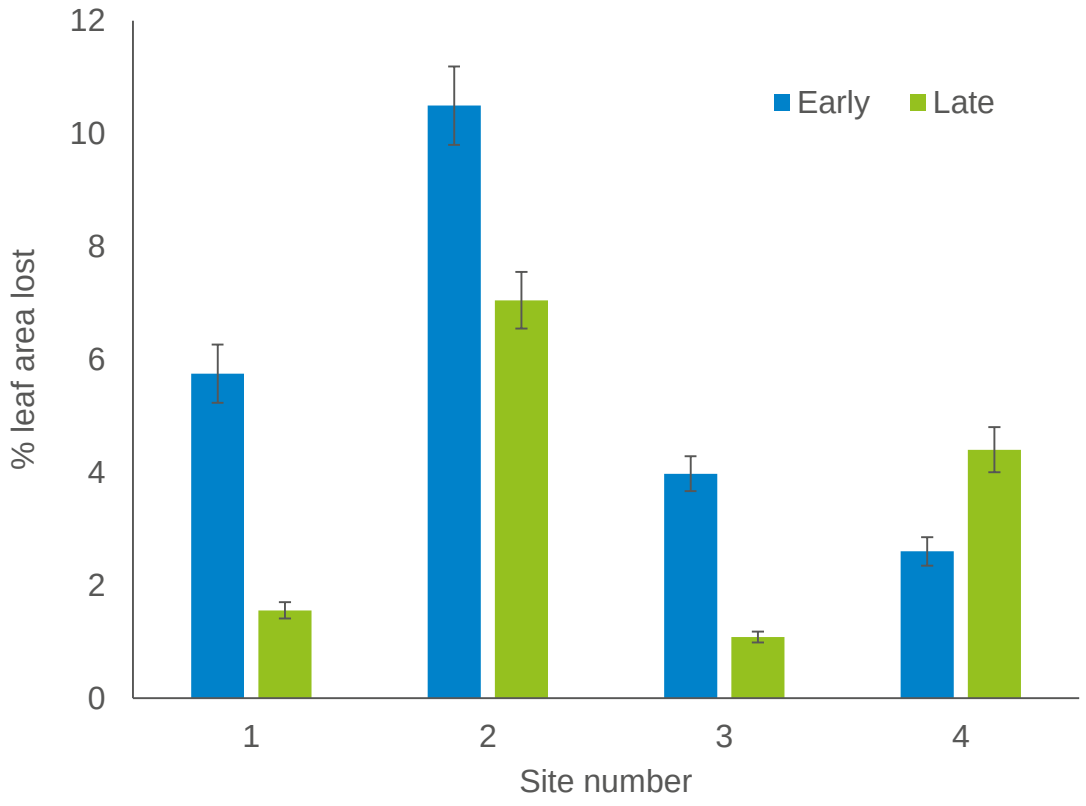
- If vOSR control is simply delayed will this be more attractive than drilled OSR?
- Exploits CSFB biological quirk.
- Investigated in 6 trials over 2 years.
- Compared CSFB pressure in crops next to fields in which vOSR controlled
  a) Early August
  b) Late September

Delaying control of vOSR – effects on adult CSFB



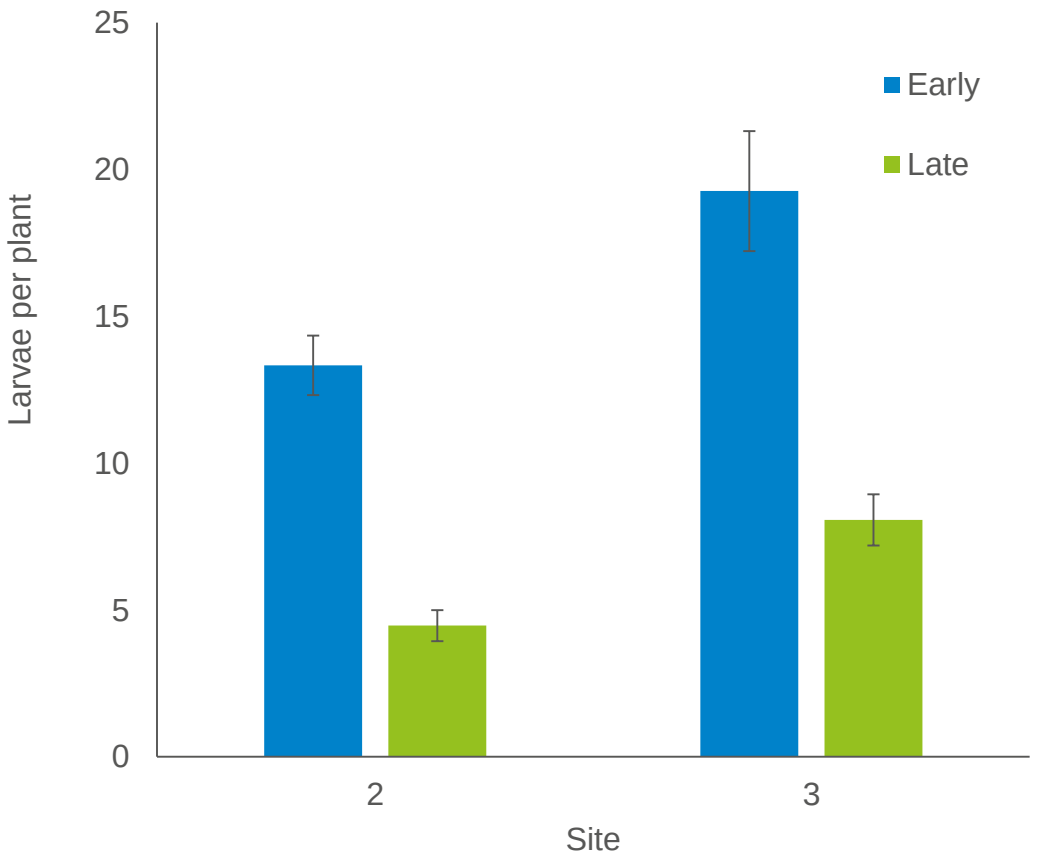
- Significant reductions in adults in neighbouring OSR crop.
- Reductions continue after vOSR controlled.

Delaying control of vOSR – effects on adult CSFB feeding damage



- Significant reductions in adult damage in neighbouring OSR crop.

Delaying control of vOSR – effects on larval infestation



- Reductions in larval populations in neighbouring OSR crop.

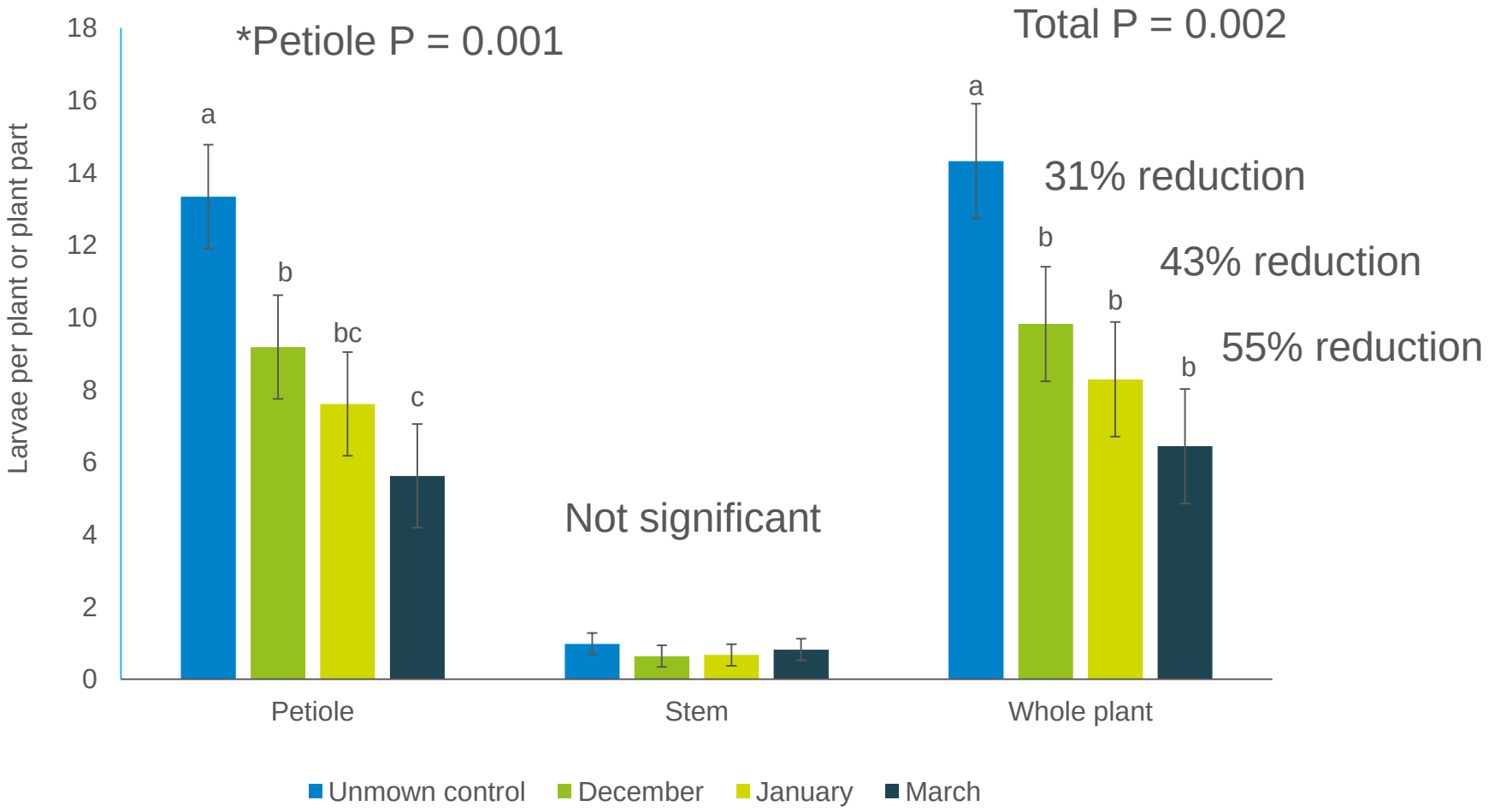
Volunteer OSR conclusions

- Delaying control of vOSR reduced CSFB incidence and damage.
- Any eggs or larvae laid in vOSR would die so breaks pest life-cycle.
- Benefits not seen at two sites. Why?
  - Area of vOSR?
  - Crop stage v's vOSR stage?
- May not be practical or fit into rotation.

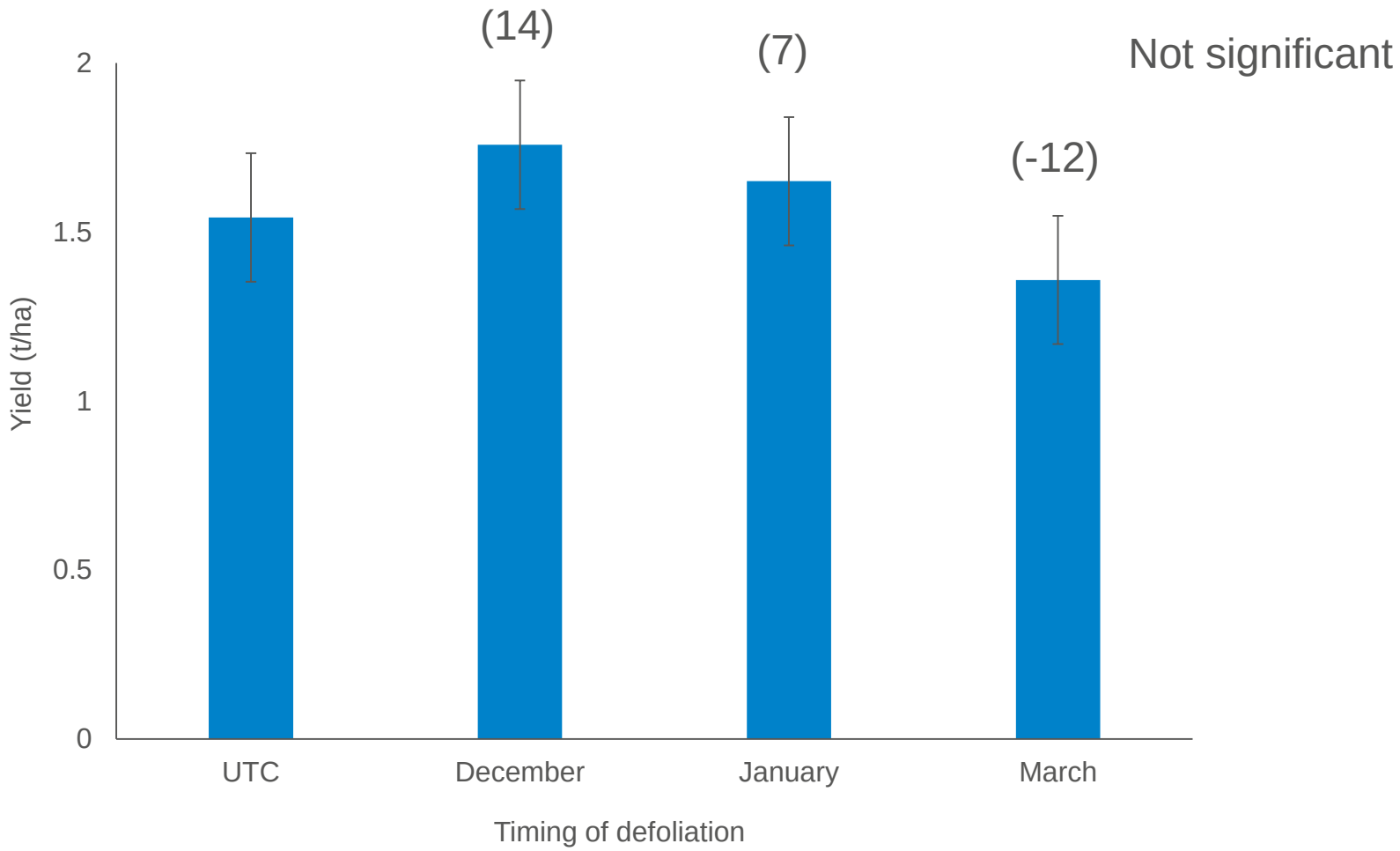
Controlling larvae

- Resistance means pyrethroids provide little control.
- Defoliating OSR in winter can have negligible yield impact provided occurs before stem extension.
- Can winter defoliation control CSFB larvae?
- Physical control (e.g. livestock ingesting larvae) or exposing larvae to cold and natural enemies.
- Plot trials using a mower to defoliate.

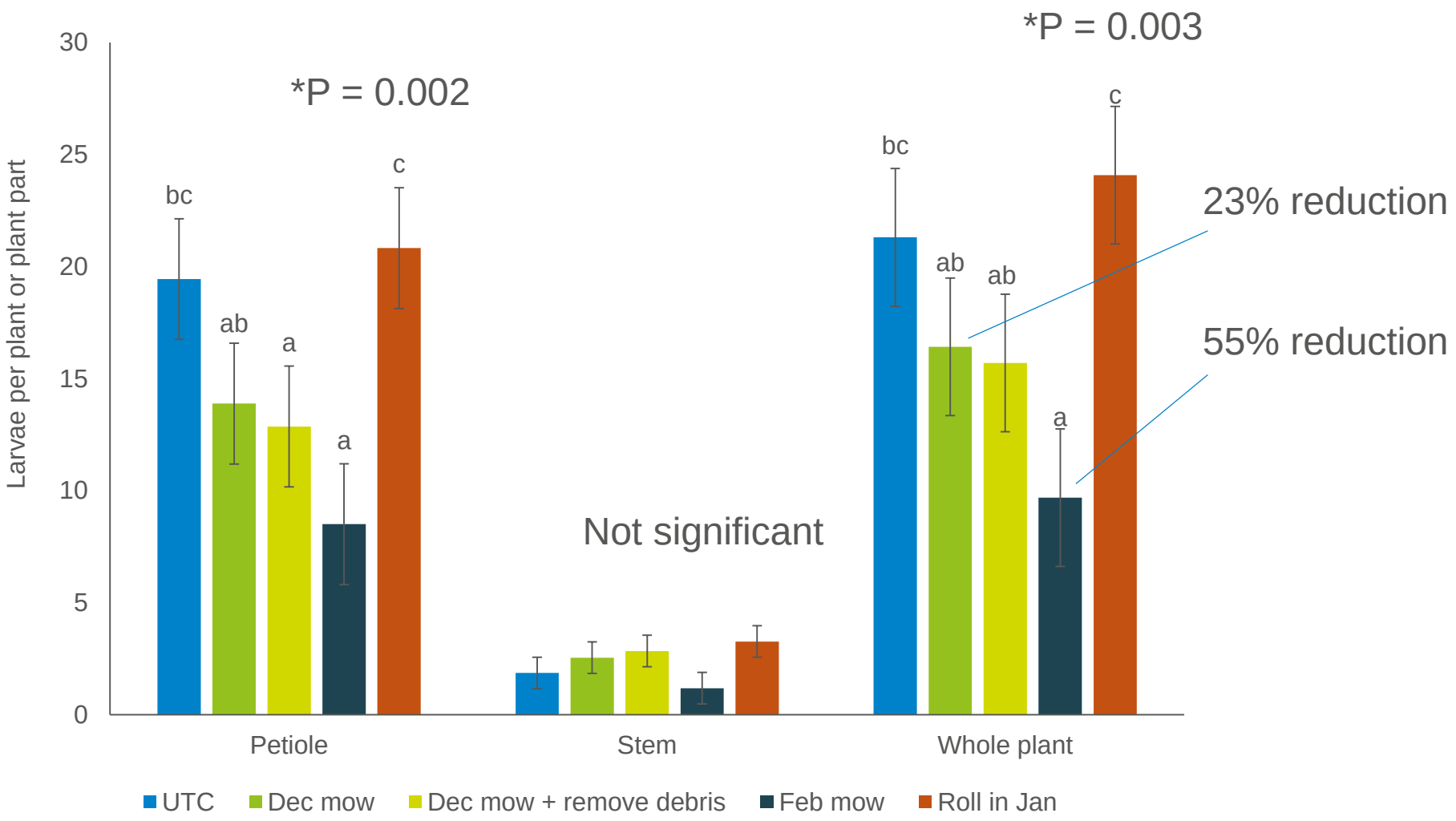
Impact of defoliation on larval populations (late March) (2016/17)



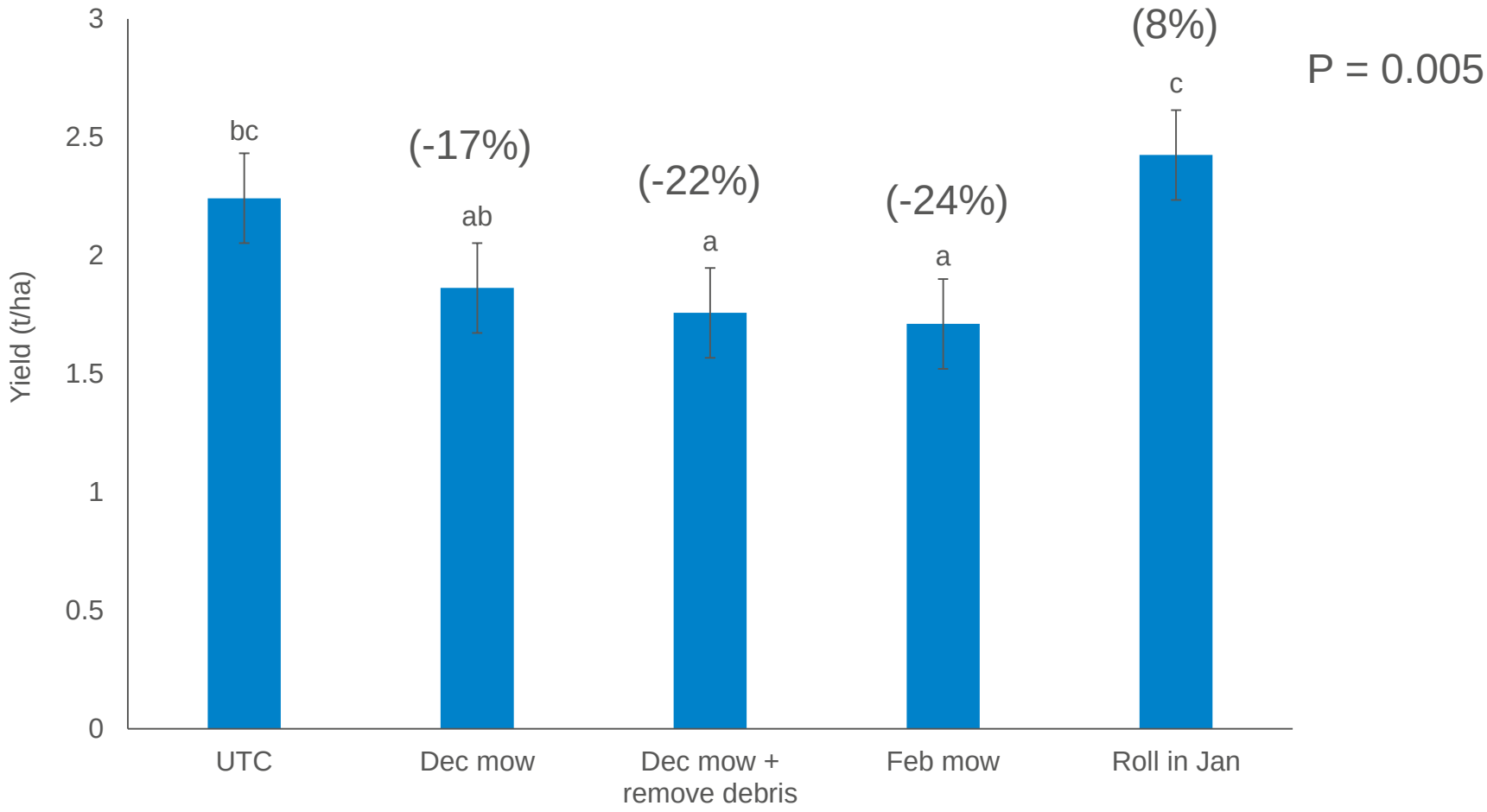
Impact of defoliation on yield (2016/17)
(figures in brackets = % difference from control)



Impact of defoliation on larval populations (late March) (2018/19)



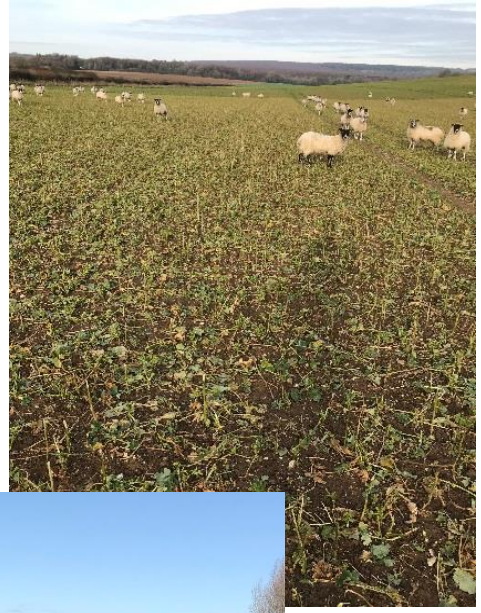
Impact of defoliation on yield (2018/19) (figures in brackets = %difference from control)



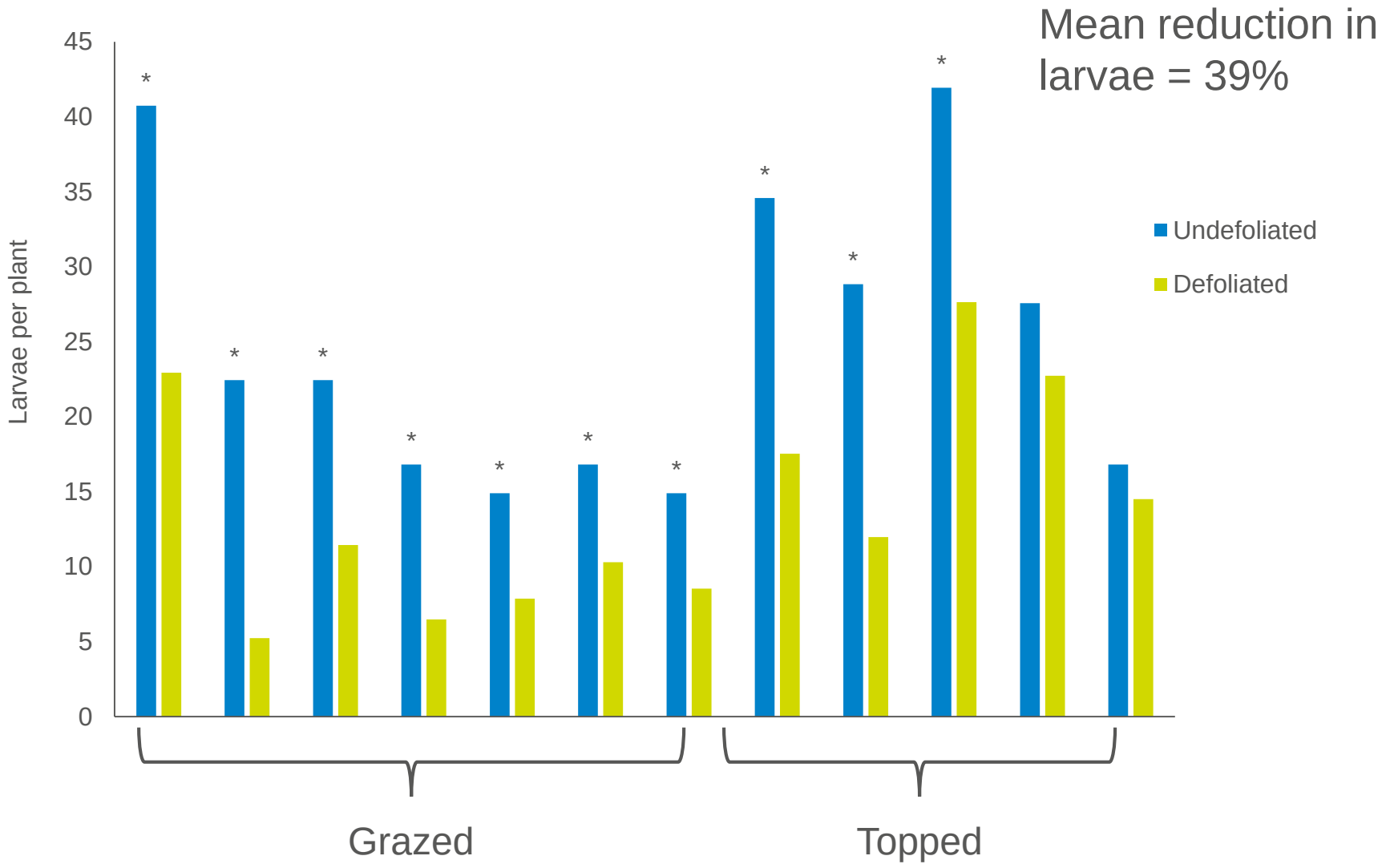
P = 0.005

Defoliation Field Lab

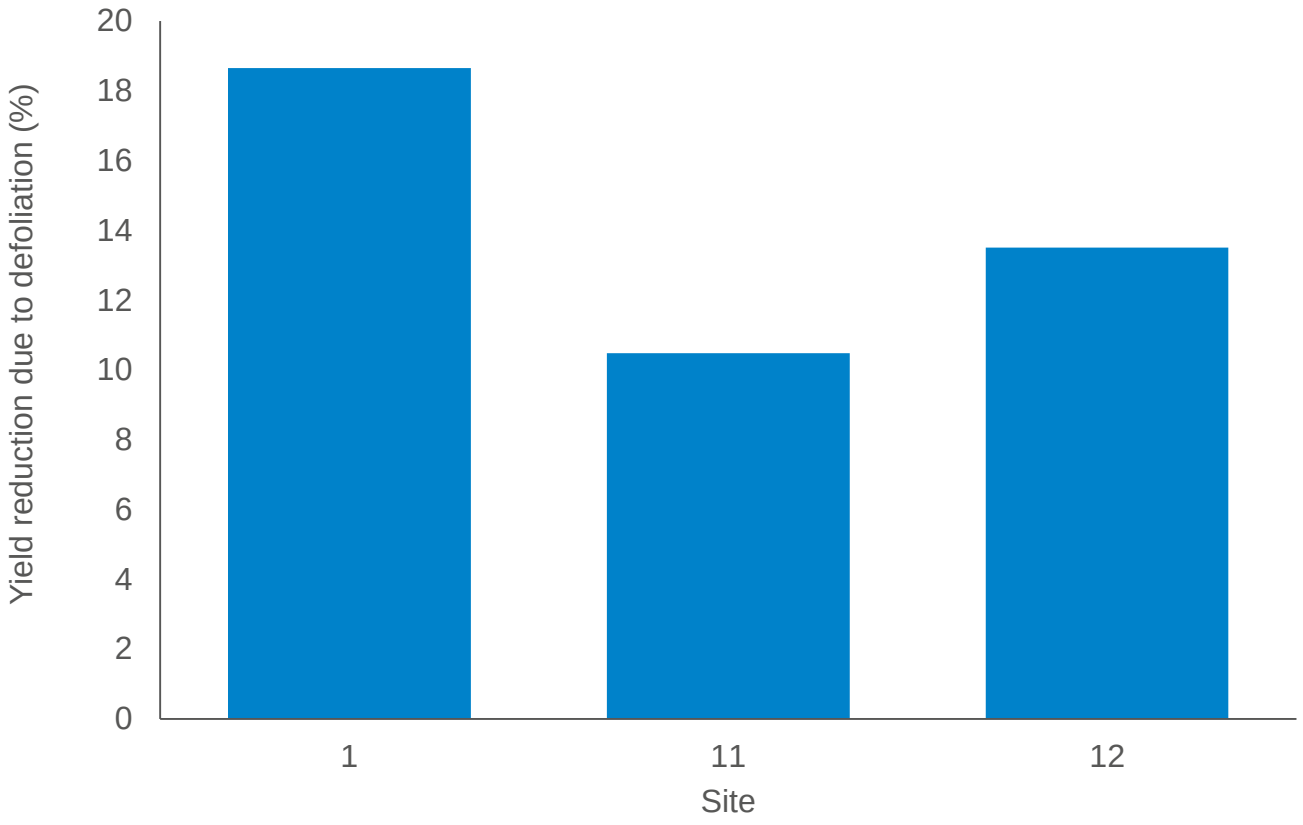
- Farmer-led project.
- Network of farmers taking part in an Innovative Farmer ‘Field Lab’ last winter.
- 8 farms (Hertfordshire, Norfolk and West Sussex).
- 12 fields across 8 farms.
- Defoliated using topper or sheep.
- Late December to March.



Field Lab results – larval populations



Field Lab results - yield



Defoliation conclusions

- Can reduce larval populations. Innovative Farmer field lab showed grazing or topping to be effective.

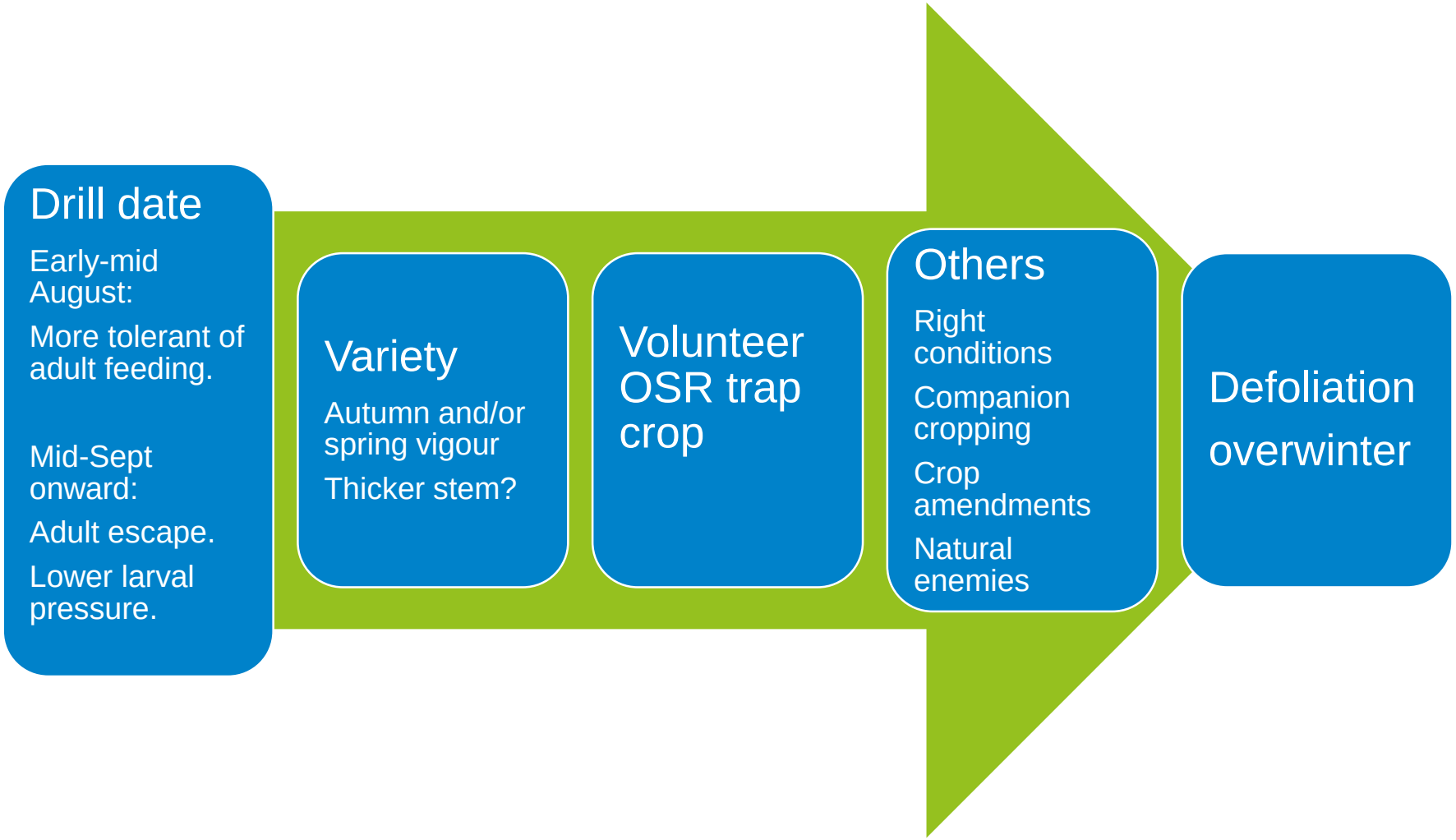
- Yield effect unclear. Yield reductions in 2018/19. Likely due to poor spring conditions, e.g. dry spring, cool May.

- Choose good crop with damage.

- Defoliate prior to stem extension.

- Further Field Lab this winter. Would you like to take part? Email sacha.white@adas.co.uk.

IPM components



Take home messages

- Managing CSFB extremely challenging.
- No silver bullet.
- Suite of non-chemical control options needed.
- Consider natural enemies.

Thank you for listening. Any questions?

Thanks to:

Charlotte Rowley

Emma Hurrell

Helen Aldis

Fiona Geary

Max Newbert

Luke Cotton

Host farmers & agronomists

ADAS technical staff

Steve Ellis

Sarah Kendall


‘Inspiring our farmers, growers and industry to succeed in a rapidly changing world’

Dr Gia Aradottir

BYDV epidemic Barrow, Suffolk 2016
(© Dewar Crop Protection Ltd)

APHIDS AND BYDV

Dr Gia Aradottir

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GREENLAND SEA
NORWEGIAN SEA
Ísafjörður
Sauðárkrókur
Akureyri
Egilsstaðir
ICELAND
Borgarnes
Reykjavík
Keflavík
100 miles
100 km

Gia Aradottir

- Imperial College London, Department of Biological Sciences PhD DIC 2010
  (Entomology/Chemical & Agroecology/Pop gen)
- Royal Holloway, University of London, School of Biological Sciences MSc 2003
  (Entomology – Beetle cytogenetics)
- University of Iceland, Faculty of Science, Department of Biology BSc 2002
  (General biology/Ecology/Zoology)

ICELANDIC INSTITUTE OF NATURAL HISTORY

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ROTHAMSTED RESEARCH

Aphid resistance for smallholder farmers in Africa

Innovate UK

Celebrating 75 Years of Seeding Africa

SCIENTIFIC REPORTS

OPEN

The first crop plant genetically engineered to release an insect pheromone for defence

Toby J.A. Bruce, Gudbjorg I. Aradottir, Lesley E. Smart, Janet L. Martin, John C. Caulfield, Angela Doherty, Caroline A. Sparks, Christine M. Woodcock, Michael A. Birkett, Johnathan A. Napier, Huw D. Jones & John A. Pickett

sky NEWS HD

NIAB

Cereal aphid pests in the UK

The bird cherry-oat aphid
Rhopalosiphum padi

- Host-alternates
- Overwinters on bird-cherry trees
- Found on lower leaves or stem
- BYDV carrier
- Major pest: wheat, barley, oats and maize

English grain aphid
Sitobion avenae

- Cereals and grasses all year round
- Mostly asexual reproduction
- Found on flag and upper leaves of cereals
- BYDV carrier
- Major pest: wheat
- Moderate pest: barley, oats

Rose-grain aphid
Metopolophium dirhodum

- Host-alternates
- Overwinters on roses as an egg
- Often found on lower leaves of cereals
- BYDV carrier
- Pest: wheat, barley, oats and rye


16 November 2018


17 June 2019

Aphid life cycle

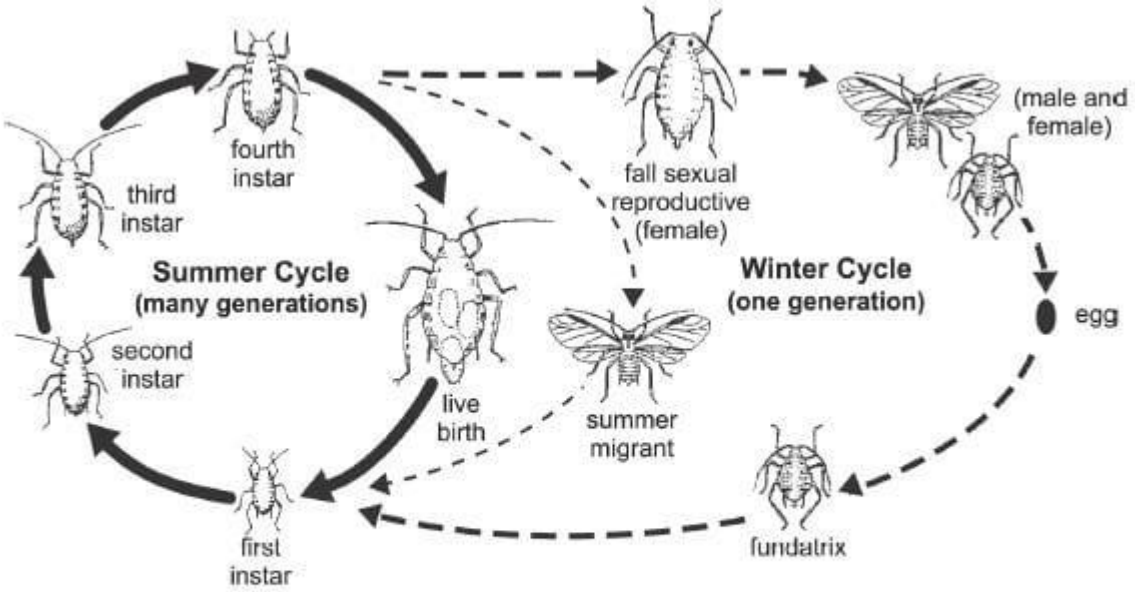


Figure 2. General life cycle of aphids. Asexual reproduction occurs during most of the year (summer cycle). Some aphid species produce a generation of sexual individuals that produce overwintering eggs as shown in the winter cycle.

- In Autumn BYDV is transmitted by:
  - Winged BYDV carrying aphids flying in from elsewhere (temperature above 11°C)
  - Wingless aphids from volunteers or grass (green bridge)
  - Below 3°C very little aphid activity

Barley Yellow Dwarf Virus and aphids

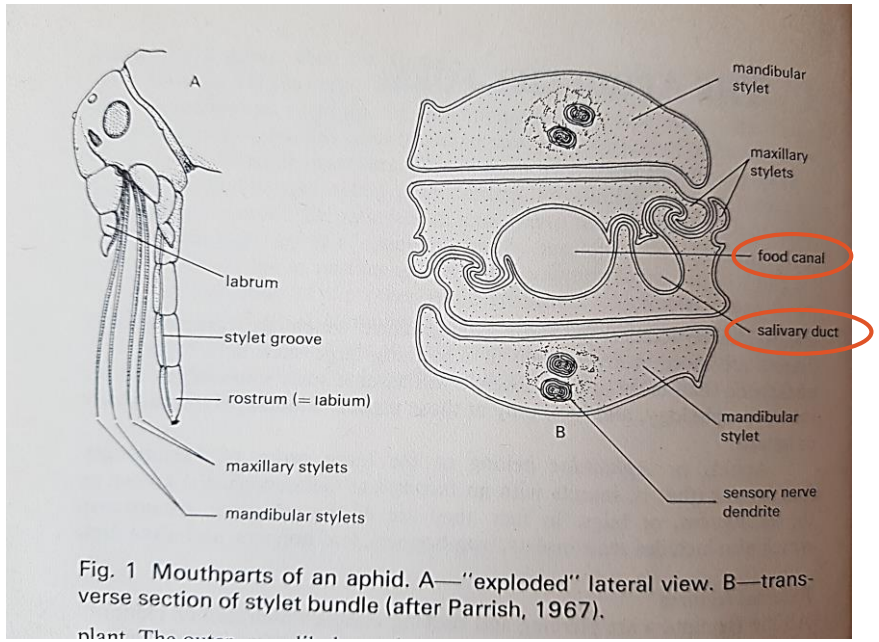


Fig. 1 Mouthparts of an aphid. A—"exploded" lateral view. B—transverse section of stylet bundle (after Parrish, 1967).

From Blackman, 1974

- Aphids prefer BYDV infected plants – then switch to uninfected once aquired virus
- Cereal aphids pick up virus while phloem feeding and produce more winged aphids on infected plants
- Virus circulates in aphid and is transmitted selectively to host plants
- BYDV phloem limited
- Reduced translocation of assimilates because of phloem damage
  - Increases carbohydrates
  - Increases dry weight
  - Reduces chlorophyll content
  - Inhibits photosynthesis
- External symptoms due to collapse of phloem tissues

From Ali *et al.*, 2018

Barley Yellow Dwarf Virus

- BYDV – PAV & MAV
  - PAV most prevalent serotype worldwide, followed by MAV (Riedel *et al.*, 2011)
  - Main symptoms:
    - Dwarfing of shoots
    - Leaf discoloration (yellow, purple, red or chlorosis)
    - Reduced number of ears
    - Sterility of ears
    - Delayed heading
    - Reduction in winter hardiness
  - Yield losses reported even when infection asymptomatic (Ali *et al.*, 2018)
- CYDV – (was BYD – RPV)

Effect of BYDV

Photo Alan Dewar

- Most severe when hosts are infected as seedlings
- Yield losses reported vary
  - Global losses reported between 11-33%, can go up to 86%
- More specifically estimated at
  - 15-25% in oats and barley
  - 7-46% in wheat
- Mixed infection with other viruses e.g. CYDV-RPV, Wheat dwarf virus etc increase losses
- Annual and perennial grasses act as 'green bridge' inoculum reservoir

Ali *et al.*, 2018

Pest Management Science

Pest Manag Sci **60**:113–125 (online: 2004)
DOI: 10.1002/ps.796

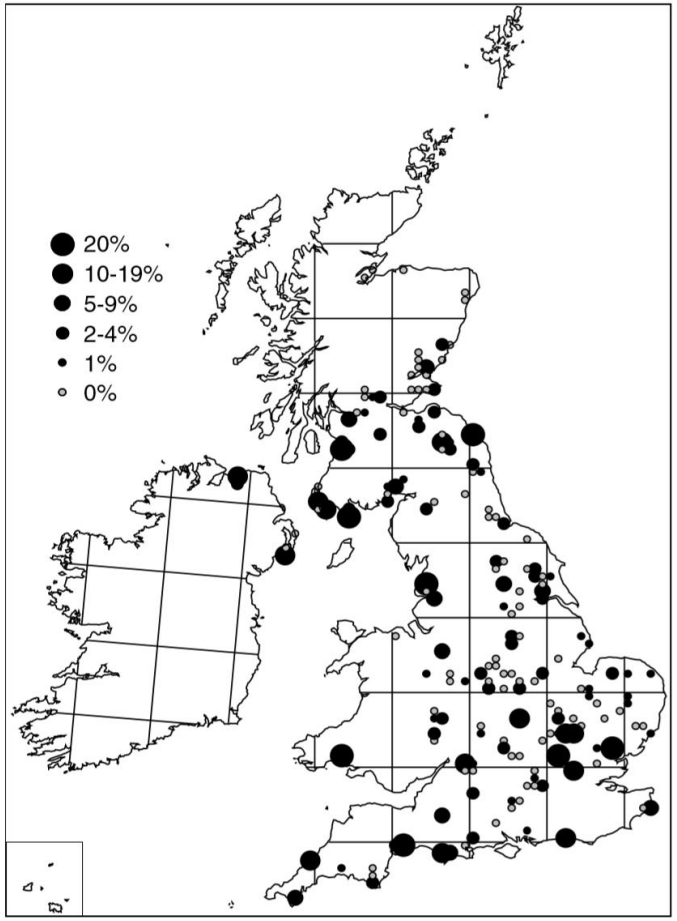
Occurrence of barley yellow dwarf virus in autumn-sown cereal crops in the United Kingdom in relation to field characteristics†

Garth N Foster,[1]* Shona Blake,[1] Steve J Tones,[2] Ian Barker[3] and Richard Harrington[4]

[1]*Scottish Agricultural College Auchincruive, Ayr, KA6 5HW, UK*
[2]*ADAS, Mamhead Castle, Mamhead, Exeter, Devon, EX6 8HD, UK*
[3]*Central Science Laboratory, Sand Hutton, York, YO4 1LZ, UK*
[4]*Rothamsted Research, Harpenden, Hertfordshire, AL5 2JQ, UK*

- Aphids detected in 43% of fields (623 total)
- BYDV incidence 28%

Distribution of BYDV in 1995-1998



A. Total BYDV.

Table 4. Levels of barley yellow dwarf virus in 623 fields sown 1995–7 and sampled 1996–8, divided into Northern Ireland and six land-types in Great Britain[5]

		% of fields infected with				Mean virus level			
Land-type	Number of fields	BYDV	MAV	PAV	RPV	BYDV	MAV	PAV	RPV
South-west and coasts	33	58	39	39	24	3.79	1.79	2.30	1.12
Central coastlands	52	40	33	33	31	3.69	1.92	1.73	1.52
Southern lowlands	179	33	15	11	6	1.59	0.61	0.65	0.11
Northern Ireland	28	25	18	11	18	1.14	0.43	0.54	0.18
Northern lowlands	162	25	16	14	5	1.04	0.69	0.33	0.13
Midland lowlands	152	18	12	6	4	0.50	0.33	0.13	0.08
Low moorland and northern uplands	17	18	12	6	6	0.41	0.12	0.06	0.06

Pest Management Science *Pest Manag Sci* **60**:113–125 (online: 2004)
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[3]*Central Science Laboratory, Sand Hutton, York, YO4 1LZ, UK*
[4]*Rothamsted Research, Harpenden, Hertfordshire, AL5 2JQ, UK*

- More virus in early sown than late sown
- Barley more heavily infected than wheat (sowing date?)
- Closer to the sea, higher incidence
- Weedy fields had higher virus levels
- Higher virus indices in medium size fields
  - Larger fields in intense arable areas with low aphid pressure?
  - Smaller fields benefit from beneficial insects from field margins?
- No impact of setaside land or land out of cultivation on BYDV incidence

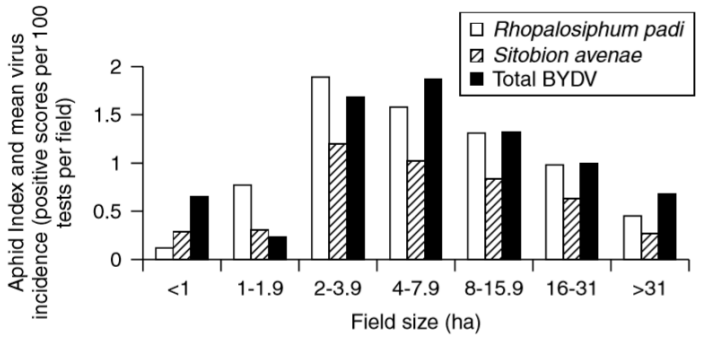


Figure 3. Mean aphid indices for *Rhopalosiphum padi* and *Sitobion avenae*, and mean level of barley yellow dwarf virus over the three cropping seasons 1995/6 to 1997/8, grouped on the basis of field size classed in a geometric series.

Tropical Plant Pathology, vol. 38(1):011-019, 2013

www.sbfito.com.br

RESEARCH ARTICLE / *ARTIGO*

Barley yellow dwarf virus-PAV in Brazil: Seasonal fluctuation and biological characteristics

Gabriela Parizoto[1], Adriane Rebonatto[1], Jurema Schons[1] & Douglas Lau[2]

[1]Faculdade de Agronomia e Medicina Veterinária, Universidade de Passo Fundo, 99001-970, Passo Fundo, RS, Brazil; [2]Embrapa Trigo, 99001-970, Passo Fundo, RS, Brazil

Author for corrrespondence: Jurema S

ABSTRACT

The yellow dwarf disease in wint
dwarf virus (CYDV) (*Luteoviridae*). Thes
population is affected by oscillations in th
RPV in aphids and grasses were analyzed
aphids collected, 12.7% transmitted B/CY
The viruses that *R. padi* transmitted were l
transmitted BYDV-PAV. Among the whe
PAV and 0.7% of which were also infect
with peaks in the winter crop season. The
padi (EF=94.4%), *S. avenae* (EF=76.1%),
several common vector species efficiently
pathosystem" in Southern Brazil.
Key words: *Luteoviridae*, aphids, BYDV,

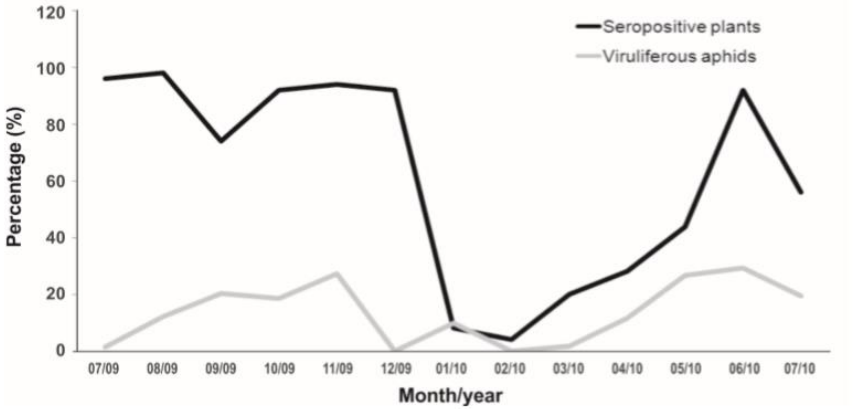


FIGURE 3 - Relation between the percentage of viruliferous aphids and seropositive plants for species of BYDV and CYDV collected in Coxilha, RS in the period of July 2009 to July 2010.

PREVENTION STRATEGIES

BYDV management

Sowing date

Genetic resistance

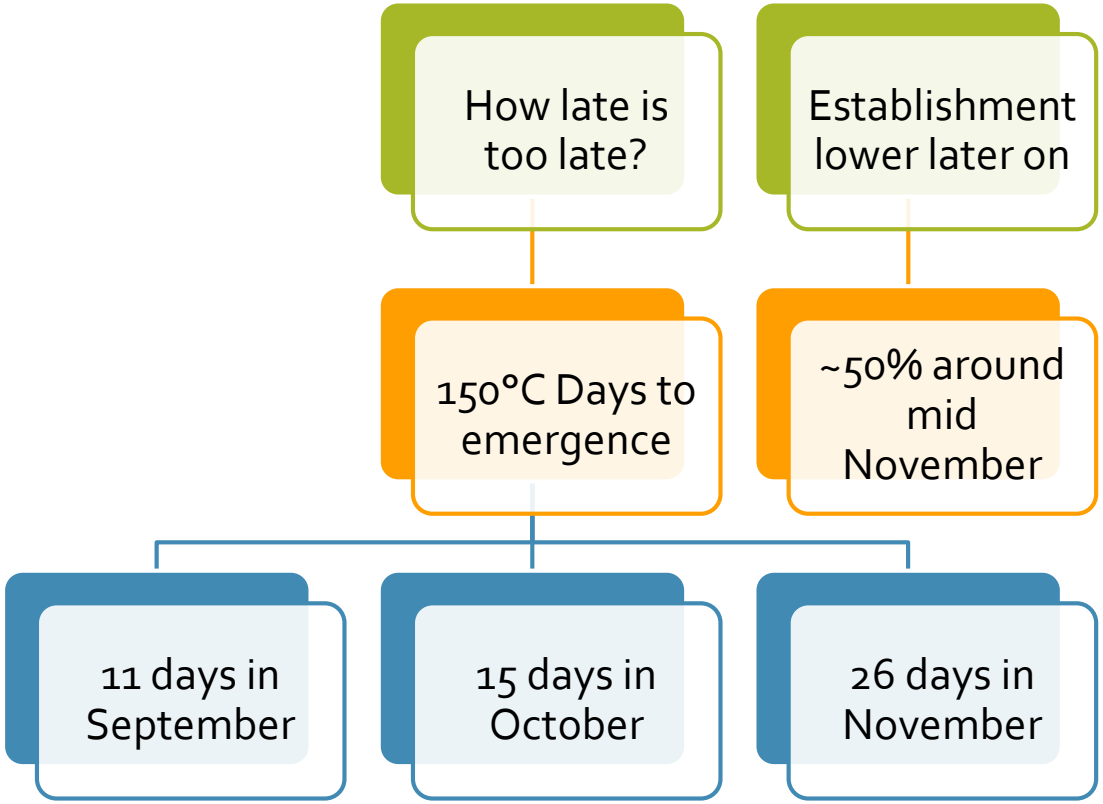
Cultural practices

Chemical/Biological control

Cultural control

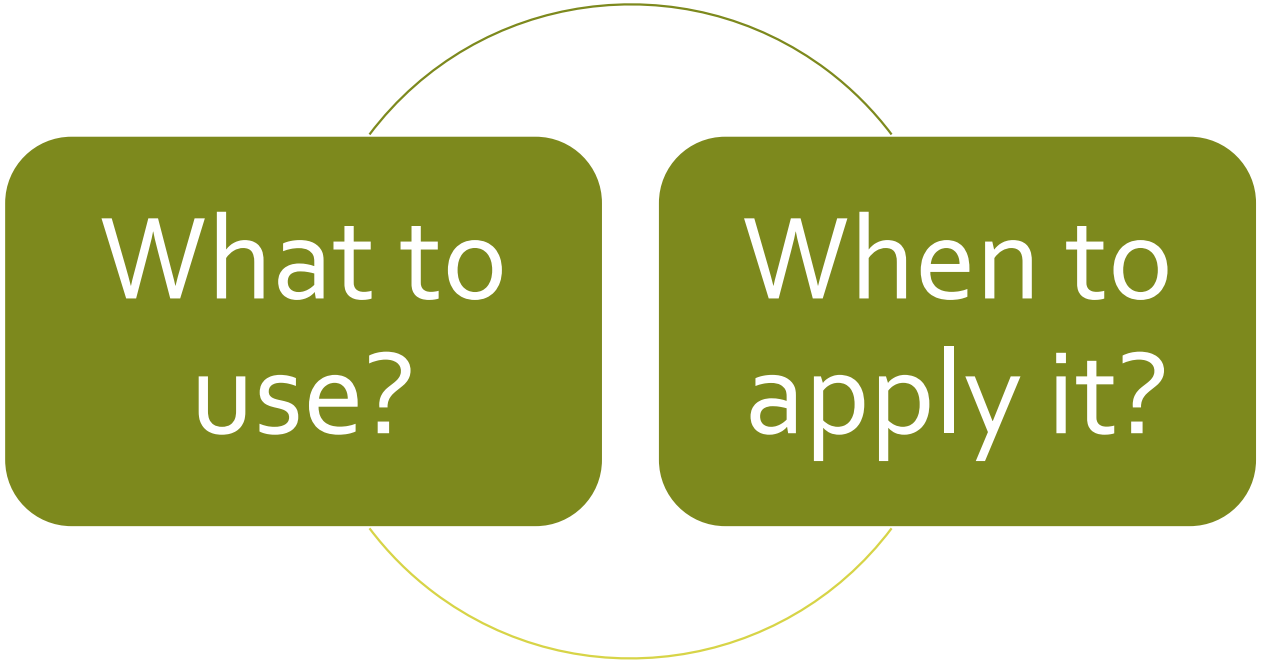
- Remove green bridge
  - Leave 5 weeks between ploughing and sowing new crop
  - And/or control grassy weeds & cereal volunteers with herbicides
- Direct drilling will increase beneficial insects
- Use higher seed rate?
- Variety selection
- Delay drilling to avoid aphids in Autumn

Drilling date



AHDB wheat growth guide https://ahdb.org.uk/wheatgg

Chemical control



EU Legislation on Neonicotinoid insecticides

On 27th April 2018, the EU agreed to extending the ban on 3 neonicotinoids from the end 2018 to ALL outdoors crops, making pest control more difficult.

Lambda-cyhalothrin spray failures reported against English grain aphids, *Sitobion avenae*, in England in June 2011

Steve Foster
Rothamsted Research

Revision to *IRAG-UK Guidelines*: insecticide resistance status in UK cereal crops (2019)

"When grain aphids are clearly the main aphid pest present then growers need to be aware that pyrethroid sprays may not be effective. If they spray and suspect that control has been poor they should not spray again with a pyrethroid-based product but switch to another insecticide with an alternative MOA".

Steve Foster Rothamsted Research

Aphicides

Pirimicarb – carbamate very specific for aphids – available for use on wheat in the UK

Pymetrozine – being phased out

Sulfoxaflor – not approved in the UK

Spirotetramat - marketed in UK but not for cereals

Cyantraniliprole - marketed in UK but not for cereals

Flonicamid – approved for use on wheat in the UK

Steve Foster
Rothamsted Research

When to apply treatment?

AHDB

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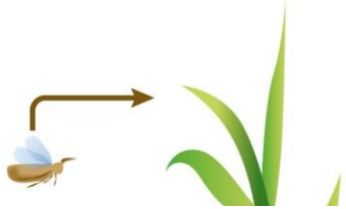
Home > BYDV tool

BYDV management tool

Aphids can transmit barley/cereal yellow dwarf viruses (BYDV). Initially, aphids colonise relatively few crop plants. However, the second-generation tends to move away from the plant originally colonised. Controlling this generation is a key part of a BYDV management strategy.



The second generatic
temperatures, above

T-Sum calculations sh

- On the day of cr
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Enter the T-Sum start
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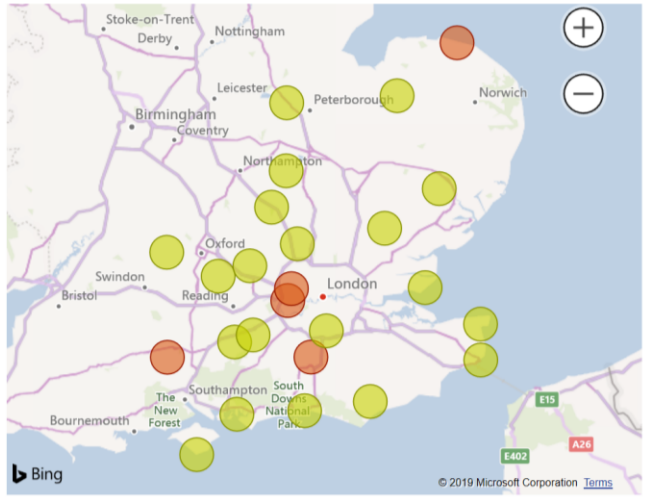
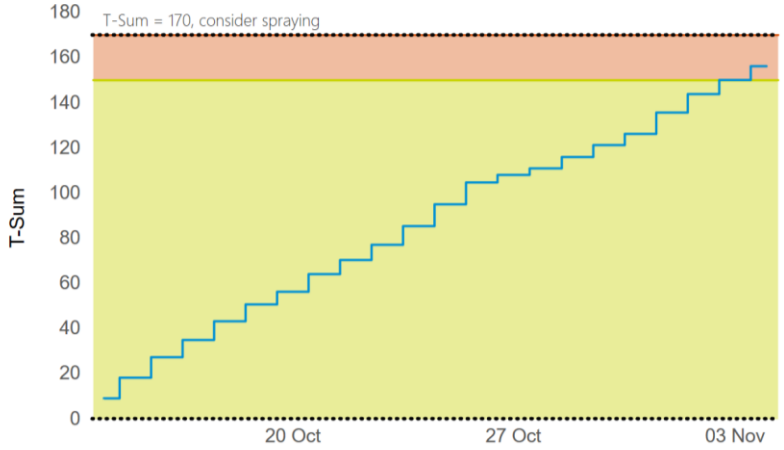
BYDV MANAGEMENT

Filter by: **Region** Multiple selections | **T-Sum start date** 14/10/2019 04/11/2019 | **Weather type** Observed | Observed + forecast

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



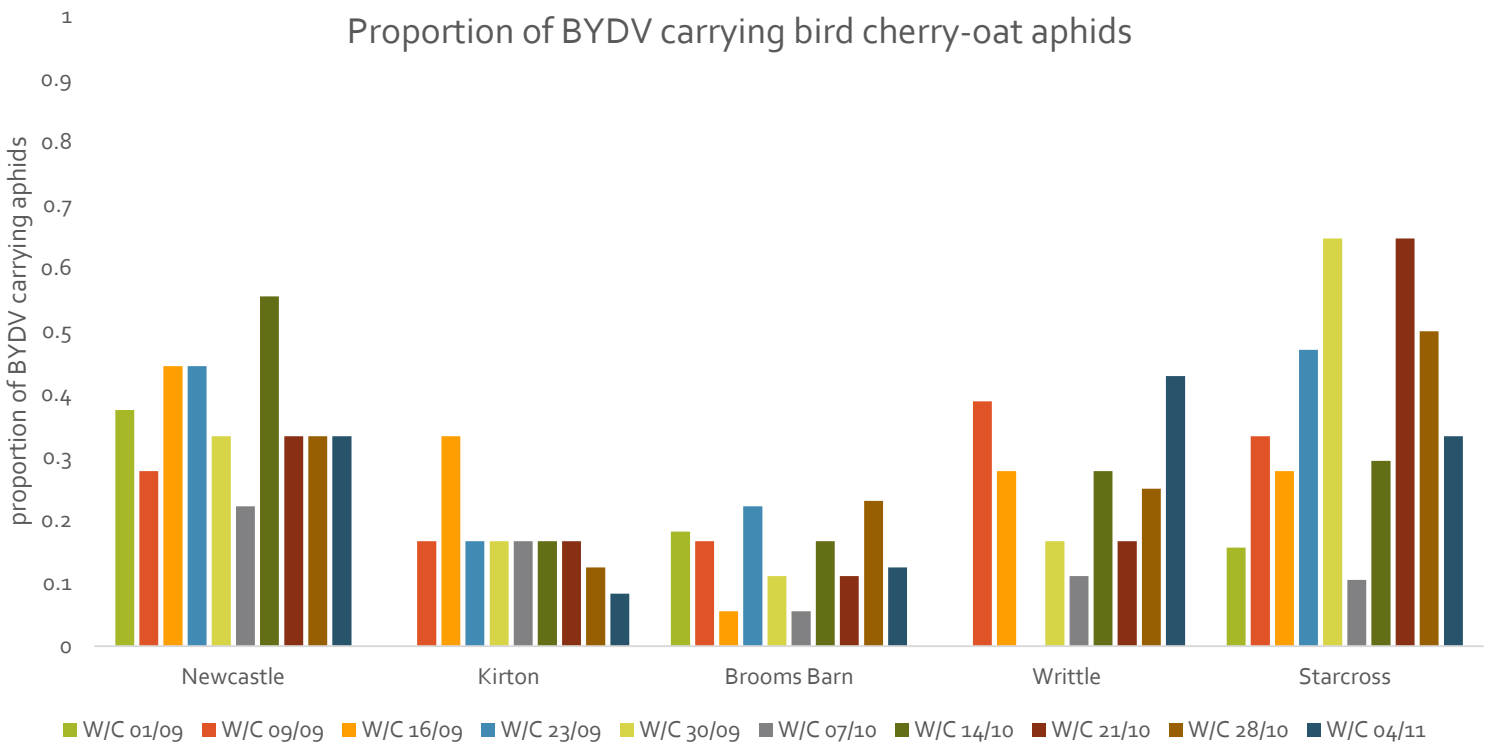
T-Sum | Aphid flight activity



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

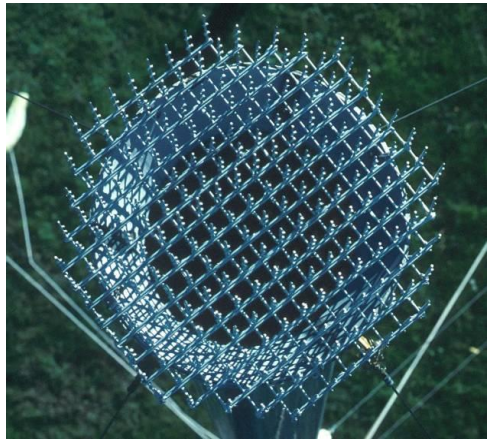
https://ahdb.org.uk/BYDV

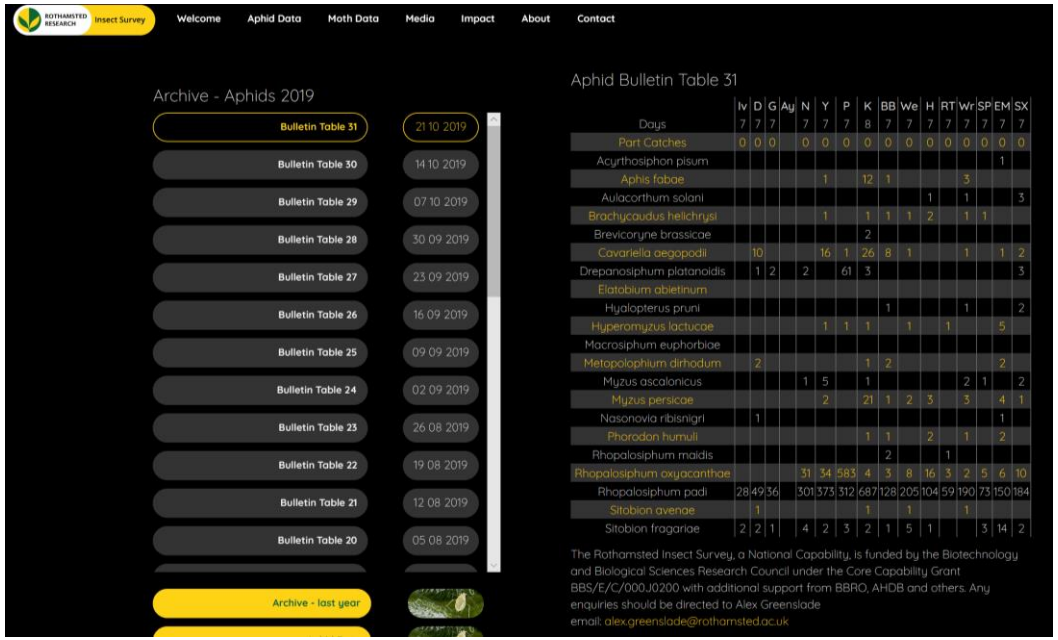
BYDV prevalence in UK cereal aphids Autumn 2019



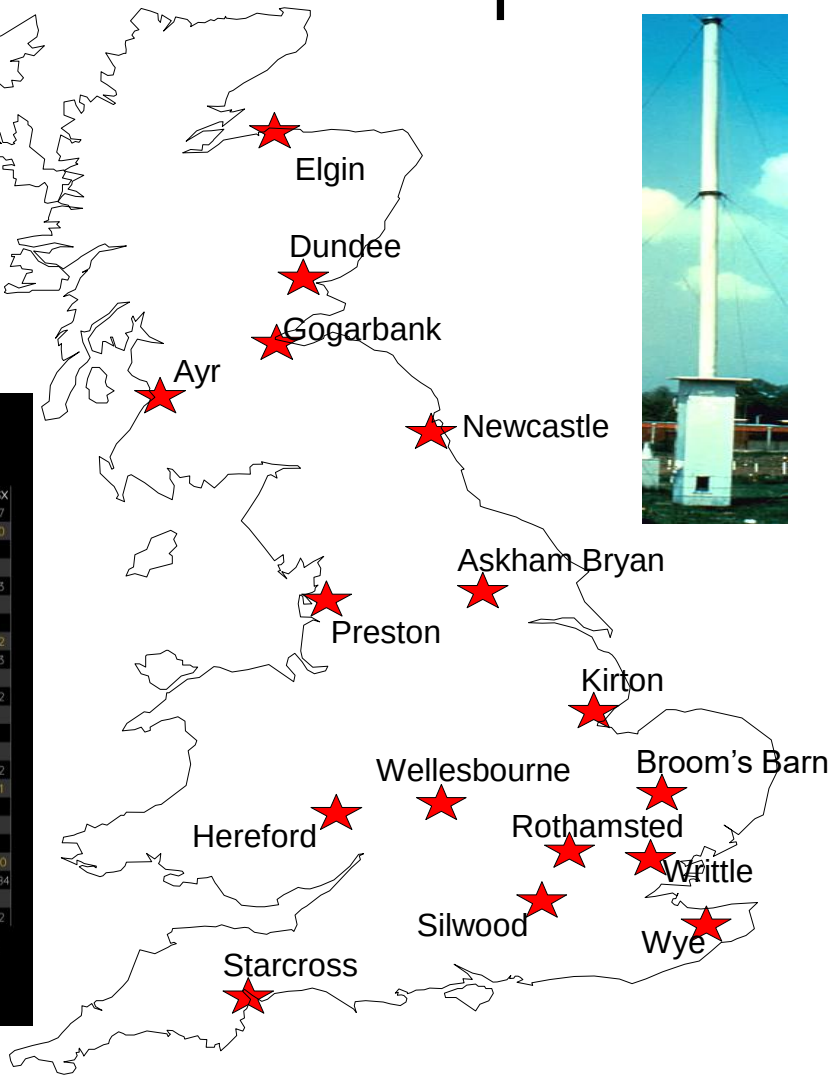
- AHDB and the Rothamsted Insect Survey now report prevalence of BYDV carrying aphids in 'Aphid news' as well as the aphid bulletin with aphid numbers
- www.ahdb.org.uk/aphid-news to subscribe
- Very few English grain aphid recorded this autumn

UK suction trap sites





	Iv	D	G	Ay	N	Y	P	K	BB	We	H	RT	Wr	SP	EM	SX
Days	7	7	7		7	7	7	8	7	7	7	7	7	7	7	7
Part Catches	0	0	0		0	0	0	0	0	0	0	0	0	0	0	0
Acyrthosiphon pisum															1	
Aphis fabae						1		12	1				3			
Aulacorthum solani											1		1			3
Brachycaudus helichrysi						1		1	1	1	2		1	1		
Brevicoryne brassicae								2								
Cavariella aegopodii		10				16	1	26	8	1			1		1	2
Drepanosiphum platanoidis		1	2		2		61	3								3
Elatobium abietinum																
Hyalopterus pruni									1				1			2
Hyperomyzus lactucae						1	1	1		1		1			5	
Macrosiphum euphorbiae																
Metopolophium dirhodum		2						1	2						2	
Myzus ascalonicus					1	5		1					2	1		2
Myzus persicae						2		21	1	2	3		3		4	1
Nasonovia ribisnigri		1													1	
Phorodon humuli								1	1		2		1		2	
Rhopalosiphum maidis									2			1				
Rhopalosiphum oxyacanthae					31	34	583	4	3	8	16	3	2	5	6	10
Rhopalosiphum padi	28	49	36		301	373	312	687	128	205	104	59	190	73	150	184
Sitobion avenae		1						1		1			1			
Sitobion fragariae	2	2	1		4	2	3	2	1	5	1			3	14	2



http://www.rothamsted.ac.uk/insect-survey/STTrapSites.php

Biological control

Remember, there is a lag period: natural enemies take time to build up their numbers

Increased pyrethroid spraying will have a negative effect on beneficial insects

Genetic resistance to BYDV

- *Bdv2* resistance gene from an introgressed translocation line
  - Reduces disease development rate
  - Reduces virus infection efficiency
  - Reduces virus accumulation
- Barley tolerance/resistance genes (*Ryd2*, *Ryd3*) from Ethiopian landraces (Riedel *et al.*, 2011)
- KSU study
  - Everest moderate resistance level 4
    - (1 res – 9 susc)
  - Avg yield losses of 7.8%
  - Susceptible varieties lost avg 28.5%

First wheat with BYDV resistance set for 2020 drilling

David Jones

03 September 2019

More in

Arable | Disease management | Variety selection | Wheat

© Blackthorn Arable

The first wheat variety with resistance to a wid
next autumn, cutting the need for multiple autu

RAGT launches Wolverine with BYDV resistance

13th September 2019 | Arable, Plant Breeding, Seeds

Plant breeder RAGT Seeds unveiled a new winter wheat variety with Barley Yellow Dwarf Virus (BYDV) resistance, the result of a two-decade development programme, at a seed trade meeting held near Cambridge earlier this week. In another first, the company intends to market the variety through a grower royalty system as used with some of its oilseed rape varieties.

RGT Wolverine is a high-yielding nabim Group 4 feed wheat which will complete NL2 trials this year. It will then be under

Frontier News Archive

BYDV tolerant barley variety may offer growers a lifeline in pest management

10th September 2019

Frontier Agriculture #3DThinking trials harvested this summer have demonstrated that a new BYDV tolerant variety of winter barley – KWS Amistar - could prove useful to growers in areas at high risk of Barley Yellow Dwarf Virus infection.

BYDV is spread by aphids and can result in significant yield losses, or even plant death. The ban on the use of neonicotinoid seed treatments, which were previously used to manage BYDV infection, has left farmers and their advisors seeking alternative management strategies.

KWS Amistar is a conventional 6-row variety containing a tolerance gene which means plants will still get infected, but will be able to tolerate the virus and grow normally, with minimal yield loss

Jim Knight, seed business development manager for Frontier said: "We included these trials in our #3DThinking programme because we are keen to help growers solve the puzzle of crop management now that we can no longer rely
were certainly impressed by the performance of KWS Amis
tolerant). It had a good specific weight, the sixth highest in
varieties. It also exhibited stiff straw in a season where mar

"We have around 60 farmers planning to grow KWS Amista
treatments and we're expecting to see more growers switch
performing in their own right, even before we factor in their

"KWS Amistar is an early example of how plant genetics ca
exciting new varieties to market, with the first BYDV tolerar

PRODUCTS | ABOUT | NEWS | SERVICES | RESOURCES | CONTACT

News | Cereals | BYDV tolerant barley is a t...

BYDV TOLERANT BARLEY IS A TOP PERFORMER

PUBLISHED ON 24TH JUNE 2019

- ALL NEWS
- CEREALS
- MAIZE
- OILSEEDS

Six row BYDV tolerant winter barley, Rafaela was introduced to the market last year from breeders Limagrain UK. A year on and the variety has proven the value of its BYDV tolerance trait, alongside offering valuable agronomic characteristics such as excellent performance in black-grass situations.

ONGOING RESEARCH

> *“Predators are highly susceptible to autumn applied pyrethroids.”*

AHDB

from theory to field

A sticky situation with BYDV

Researchers are looking at ways to improve systems for monitoring and managing the rising threat of BYDV in cereal crops. *CPM* finds out their conclusions so far and the work that still needs to be done to better understand the many factors that could be used to manage this complex disease.

Theory to Field

According to studies, aphid count catches bring a better system of monitoring than assessing aphid infestation on plants, says Francesca Salinari.

something which we’ve been looking at in the pilot project,” says John. “We’ve then been using this local information in combination with the AHDB’s BYDV management tool or Agrii BYDV Alert app (both use T-sums to predict the timing of pyrethroids) to control the spread of BYDV.”

Locating traps

Sticky traps are already used for some crop pests, such as pollen beetle and carrot fly. Recent GWCT studies have found that using them located horizontally on the ground is an effective way of sampling winged cereal aphids.

Last autumn the sticky trap system was trialled by eight growers or agronomists to assess their practicality in a commercial

Yellow sticky traps can be placed in crops, horizontally to the ground, to catch aphids as they’re on the wing.

Wheat
Genetic
Improvement
Network

Resistance to cereal aphids and BYDV

Looking at diversity panels, landraces and wild relatives for new sources of resistance

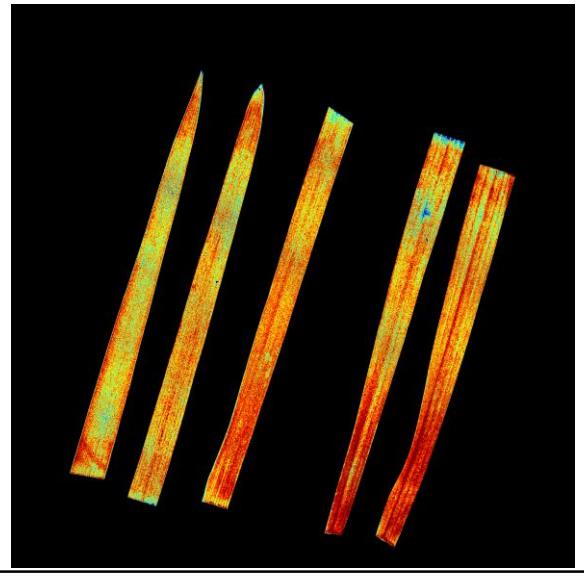
Department
for Environment
Food & Rural Affairs

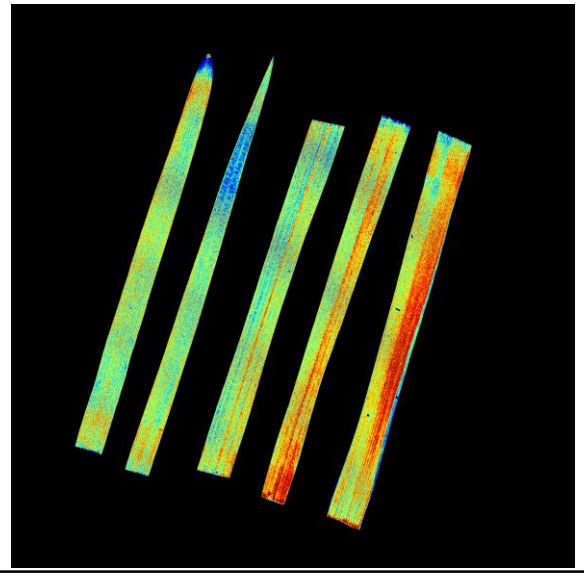
Remote detection of aphids and BYDV

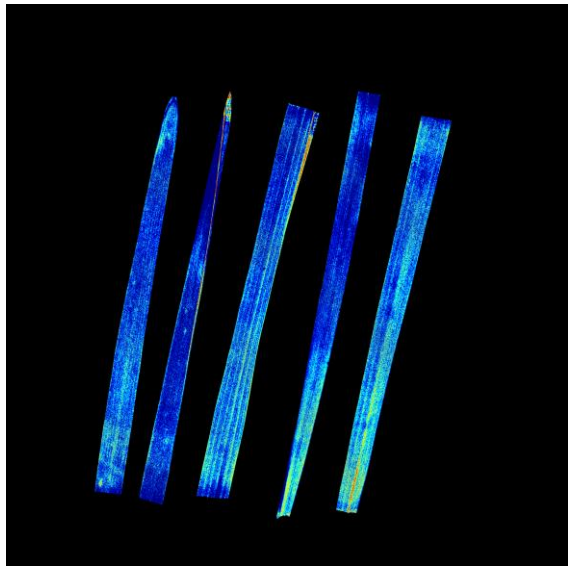
Aphid-free control

Aphid only

BYDV (@ 2 weeks)







Take home messages

Photo Alan Dewar

- Variety/ies with resistance to BYDV are becoming available in UK
- Tools and information on aphid presence and BYDV prevalence available
- Agronomic practices, timings and green bridges

THANK YOU

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@GIAradottir


Refreshment Break

John Williams (ADAS)

Maximising the benefits from cover crops
MAXI Cover Crop

John Williams, Anne Bhogal and Charlotte White ADAS

Outline

Cover crops

- Choices & Considerations
- Environmental benefits

The Maxi Cover Crop Project

- Outline
- Cover crop performance
  - Above ground biomass & N uptake
  - Root characteristics
- Impacts on the following crops
  - Yield, N & P
- Validation tramline trial key findings

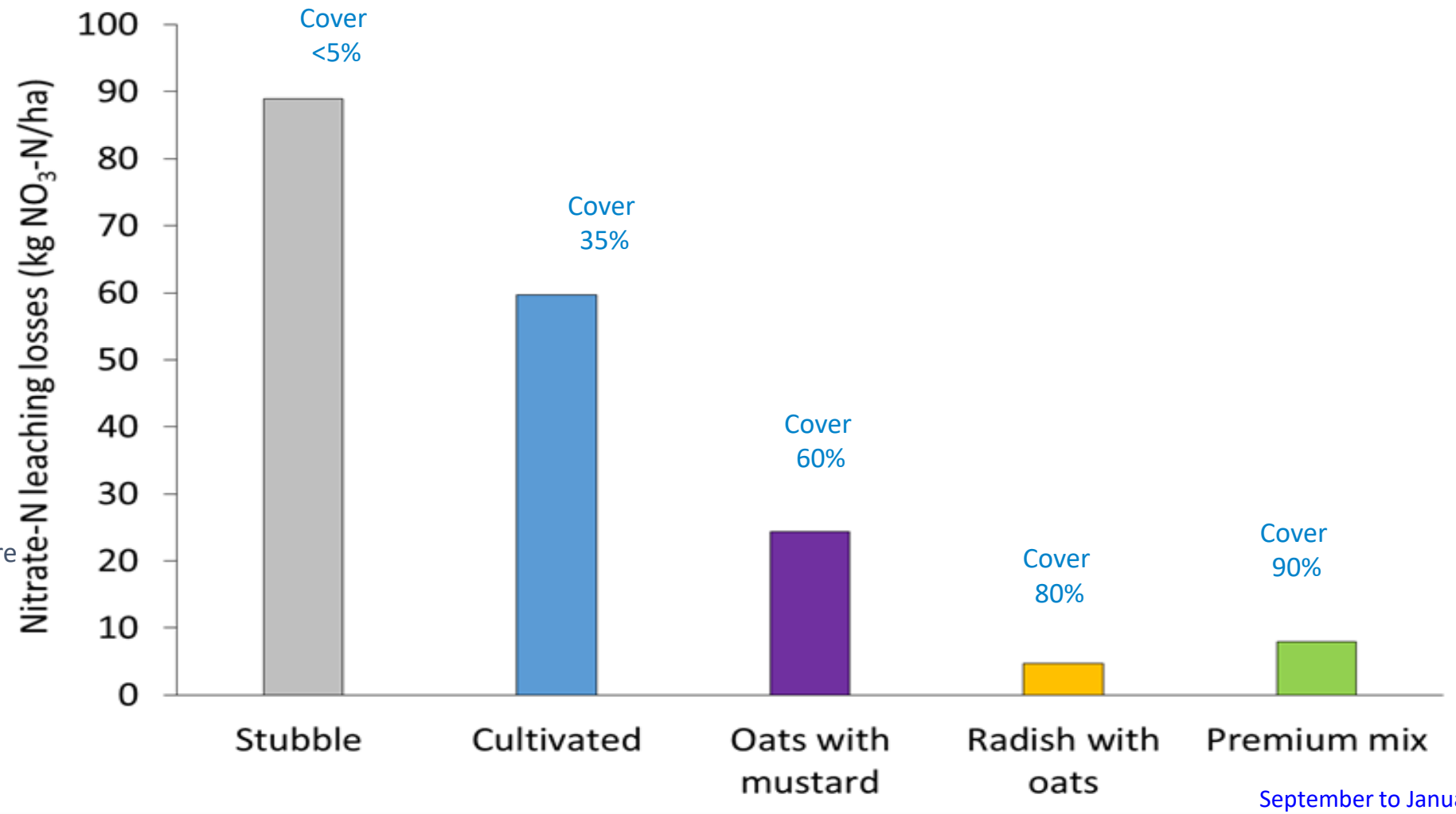
Key messages

Cover Crops – Why?

- Reduce erosion, run-off & nitrate leaching
  - Retain N (& P) improve soil fertility
- Potential benefits for soil structure, water holding capacity & porosity
  - rooting & fresh organic matter
- Weed management, disrupt pest & disease cycles
- Biodiversity & habitat provision
  - Greening measures
- Grazing & forage

Protection against nitrate-N leaching losses

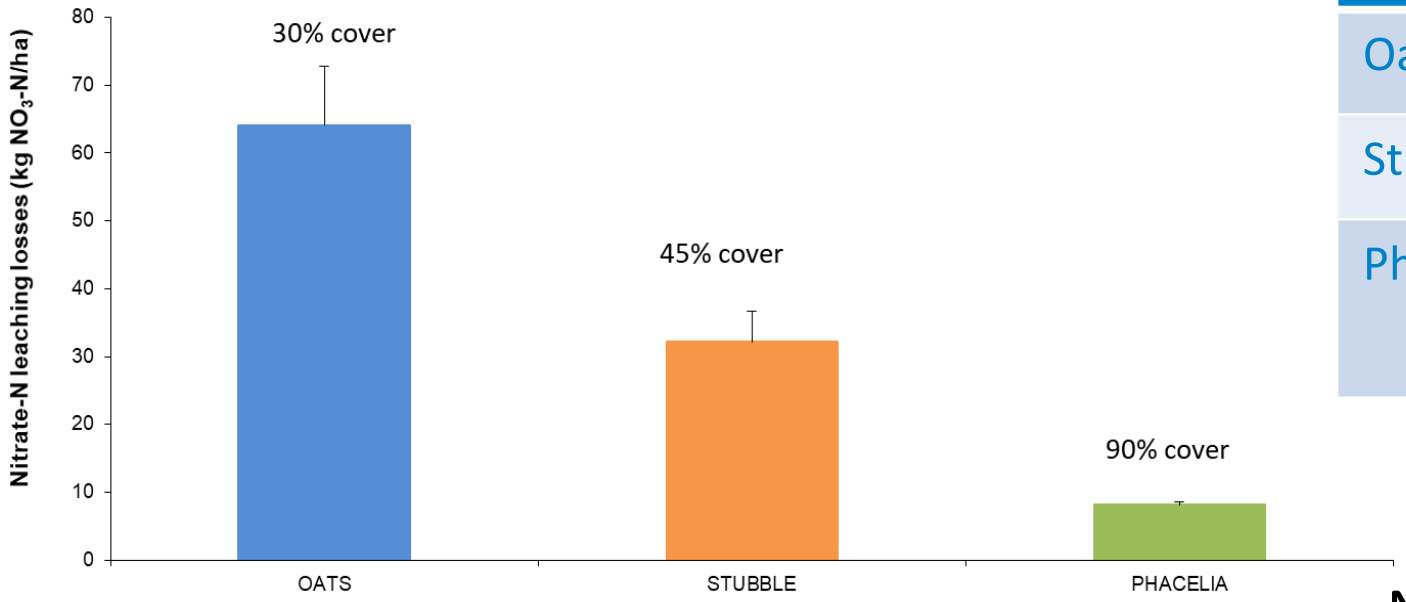
Cover crops drilled
29 August 2018; Lincolnshire



September to January (inclusive)
Total rainfall = 300 mm

Increase soil N supply

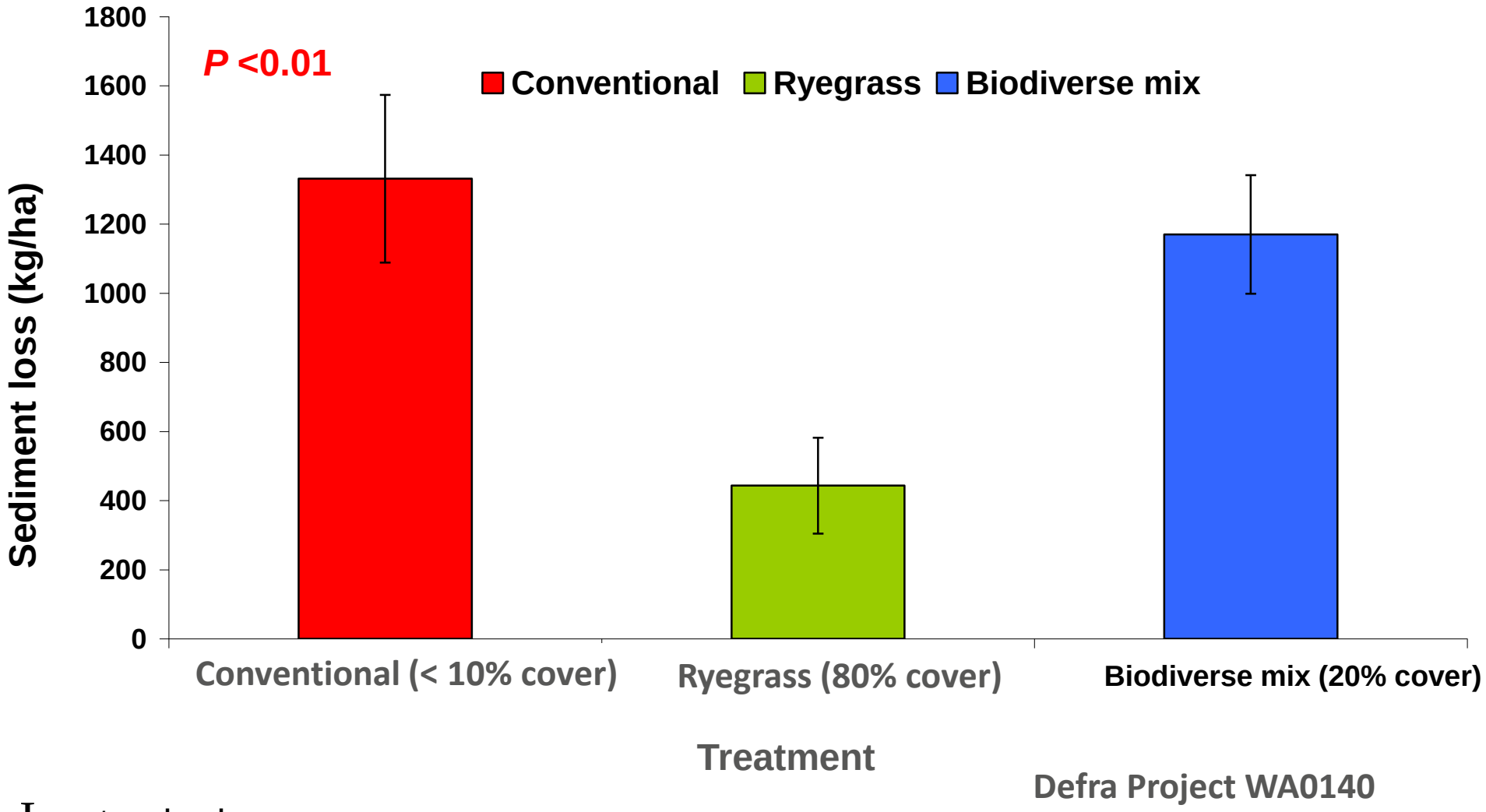
Nitrate leaching losses 2018-19; Shallow chalk, Hampshire



Treatment	SNS (kg/ha)	SNS Index
Oats	25	0
Stubble	39	0
Phacelia & Oats	74	1

N recommendation reduced by 30 kg/ha on Phacelia treatment, with no impact on grain yields

Sediment loss following maize



Defra Project WA0140

I = standard error

Considerations

- Cover crop choice
  - What do I want to achieve?
  - What fits with my rotation?
    - Rotational conflicts
  - Seed cost
  - EFA Compliant?
- Establishment
- Management
- Destruction
- Test & Modify

Cover crop species

Legumes

Vetch, clovers, peas, beans, trefoil

Non-Legumes

Brassicas: Mustards, radish

Grasses: rye/oats

Others: Phacelia, buckwheat, chicory

	Brassicas	Cereals	Legumes	Other
Examples	Mustards, Radishes,	Oat, rye, rye-grass	Vetch, clovers, peas	Phacelia
Sowing	Mid Aug – early Sept	Mid Aug – Mid Sept	June – Aug	Mid Aug – Mid Sept
Qualities	Good root system, Biofumigation potential nutrient uptake	Rapid early growth & cover, Deep rooting	N fixing (modest over-winter) Fibrous root system	No rotational conflicts, good root system & nutrient uptake
Considerations	Rotational conflicts with OSR	Rotational conflicts with cereals	Rotational conflicts peas & bean; Careful drilling of small-seeded	Not entirely frost tolerant, needs soil moisture

Cover crop mixtures

At least two cover crops

- EFA: min 1 cereal & 1 non cereal from a short list

Multiple benefits

- E.g. Evidence that grass + legume mix enhances N fixation

Risk management

- More resilience

Additional cost

Potentially more complicated management (different seed sizes, destruction etc.)

Maxi Cover Crop Project

Maximising the benefits from cover crops through species selection and crop management

After the AHDB review on cover crops 2016 – No. 90

Objectives:

- Quantify effects of different cover crops on soil properties, crop rooting & yield
- Validate effects of cover crops and establishment on monitor farms

Plot experiments and validation tramline trials

Three sites (cover crop ⇒ spring crop ⇒ winter crop)

1. Stetchworth, Cambridge (2016-18)
2. Kneesall, East Midlands (2017-19)
3. Wilberfoss, Yorkshire (2017-19)

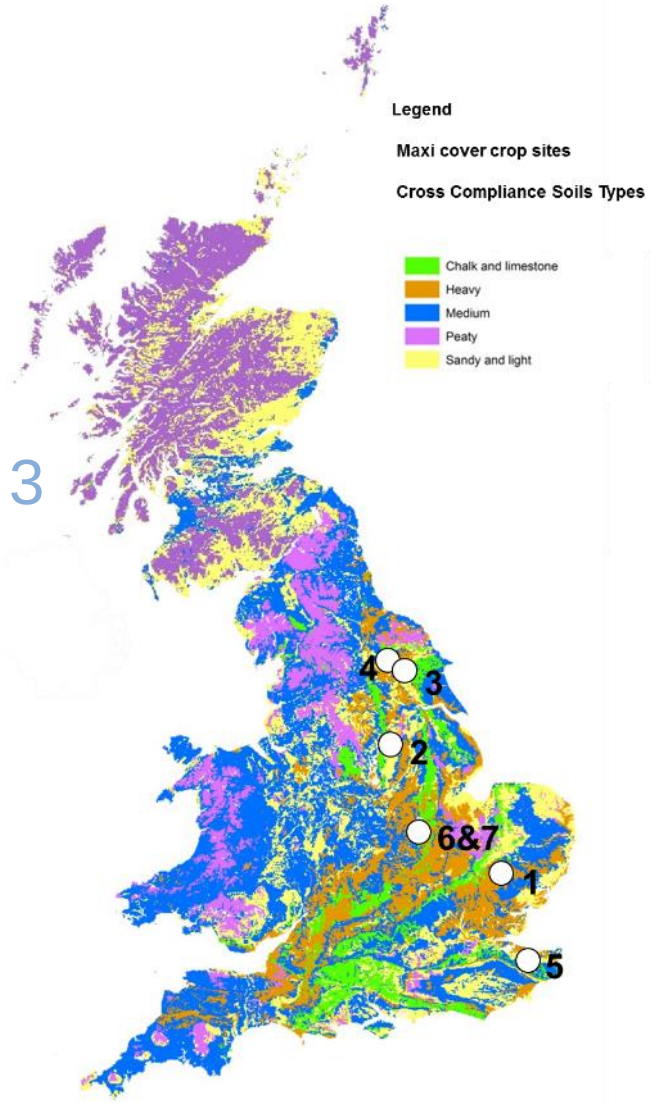
11 Cover crop treatments (no cover, 7 straights, 3 mixes) x 3

Four validation trials @ Monitor farms

Cover crop mixes (2 x species mixes vs. no cover):

4.&5. Yorks & Kent (2016-2018)

6.&7. Hunts. & Cambs (2017-2019)



Plot experiments – Cover crop treatments

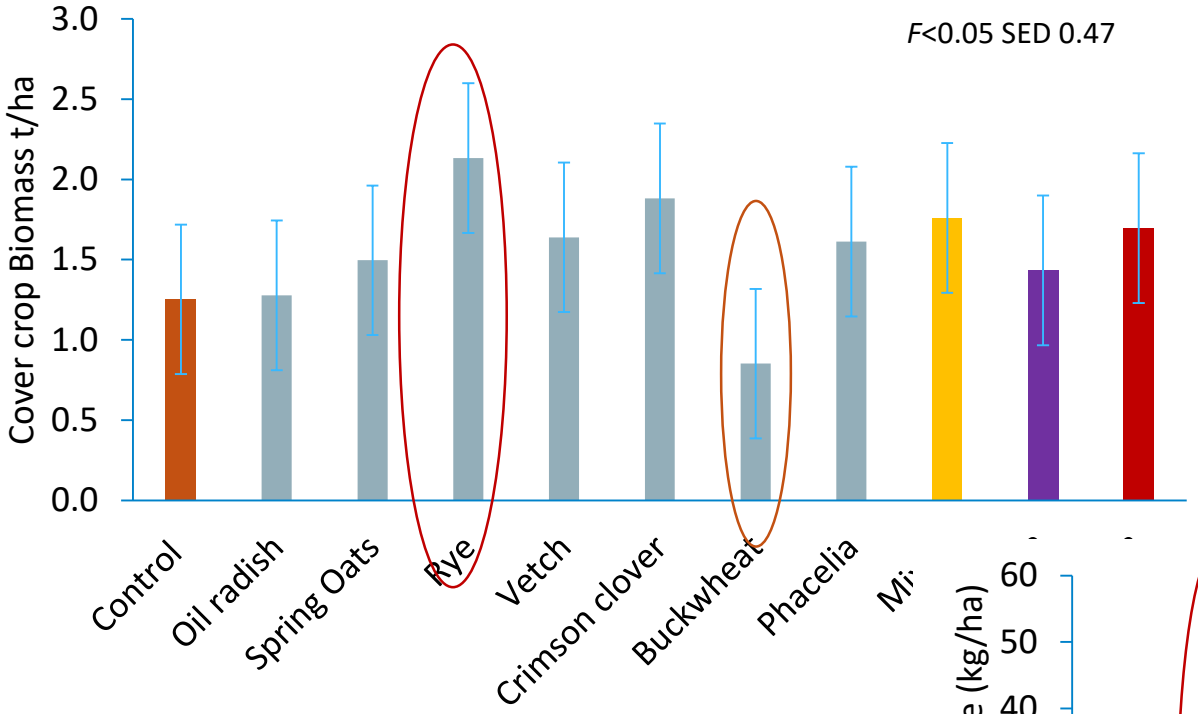
	Treatment	Seed rate
1.	Uncovered control (stubble, volunteers & weeds)	
Straights (individual species):		
2.	Oil Radish (Terranova)	10 kg/ha
3.	Spring Oats (Canyon)	50 kg/ha
4.	Rye (Inspector)	50 kg/ha
5.	Vetch (Amelia)	60 kg/ha
6.	Crimson Clover (Contea)	10 kg/ha
7.	Buckwheat (Lileja)	70 kg/ha
8.	Phacelia (Natra)	10 kg/ha
Mixes:		
9.	Spring Oats (83%) & Crimson Clover (17%) **'Mix 1'**	36 kg/ha
10.	Oilseed Radish (30%), Phacelia (20%) & Buckwheat (50%) **'Mix 2'**	20 kg/ha
11.	Spring Oats (53%) & Crimson Clover (11%) Oilseed Radish (11%), Phacelia (7%) & Buckwheat (19%); **'Mix 3'**	37.5 kg/ha

Cover crop performance

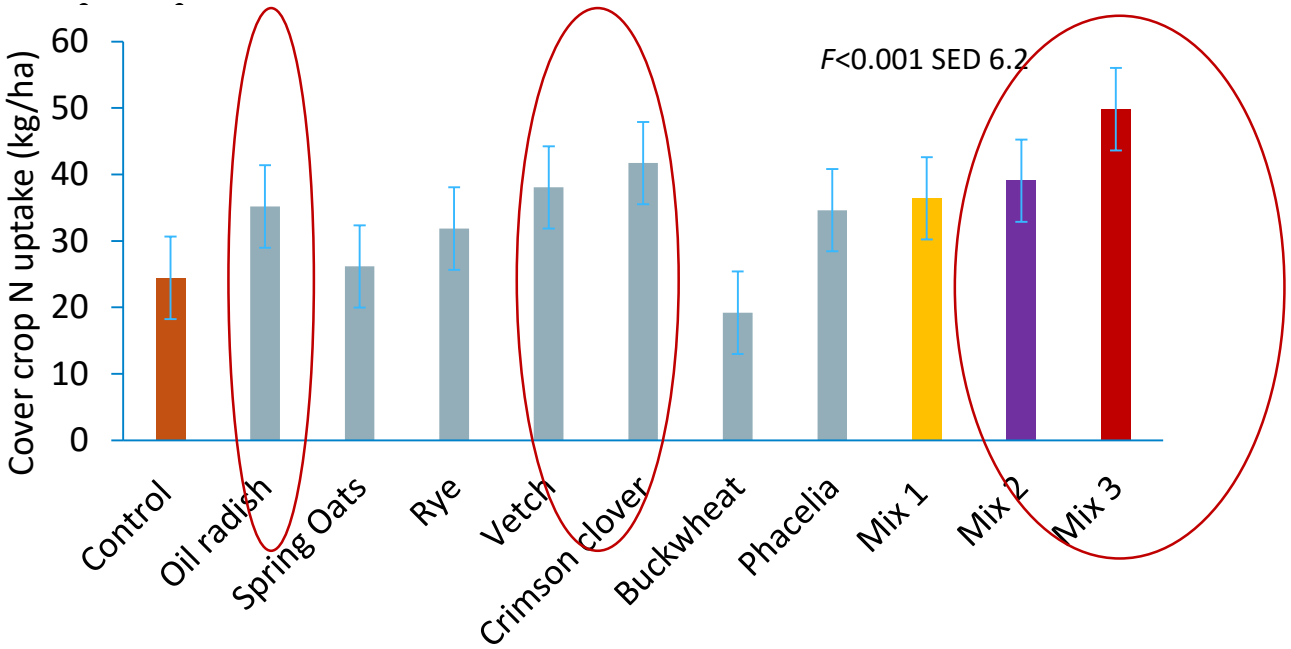
Drilling date	Soil texture	Biomass (t/ha)	N uptake (kg/ha)	'Top performers' (N recovery)
September 2016	Light	<0.1 – 1.1	0.5 - 25	Phacelia & radish
August 2017	Light/medium	1.0 – 3.5	10 - 70	Mix 2 & 3, Rye & radish
August 2017	Medium	1.5 – 3.0	30 - 90	Vetch & clover

Early establishment to maximise the benefit

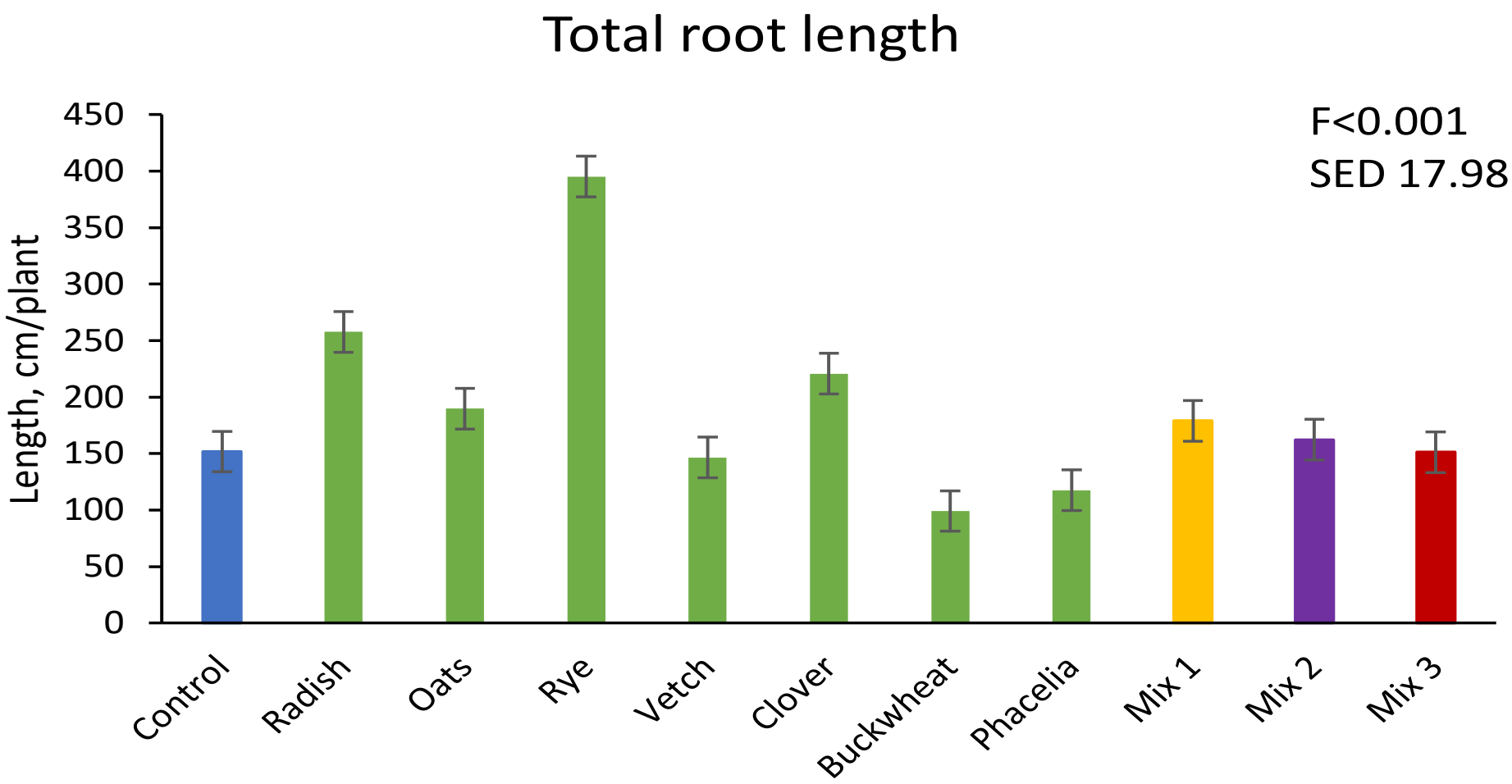
Cover crop performance – cross site



>35 kg N/ha

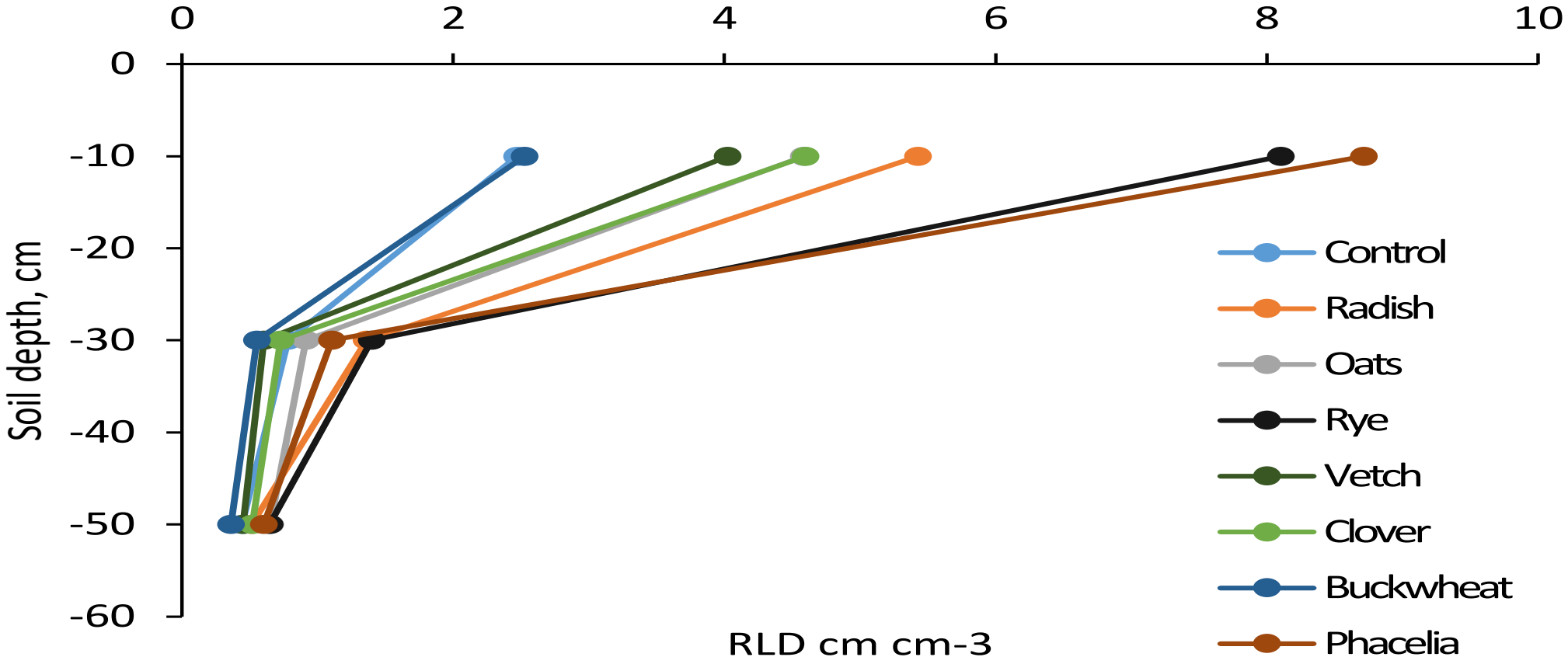


Cover crop characteristics, cross site averages (mid November)



Rye and radish greatest total root length,
Buckwheat and phacelia least total root length

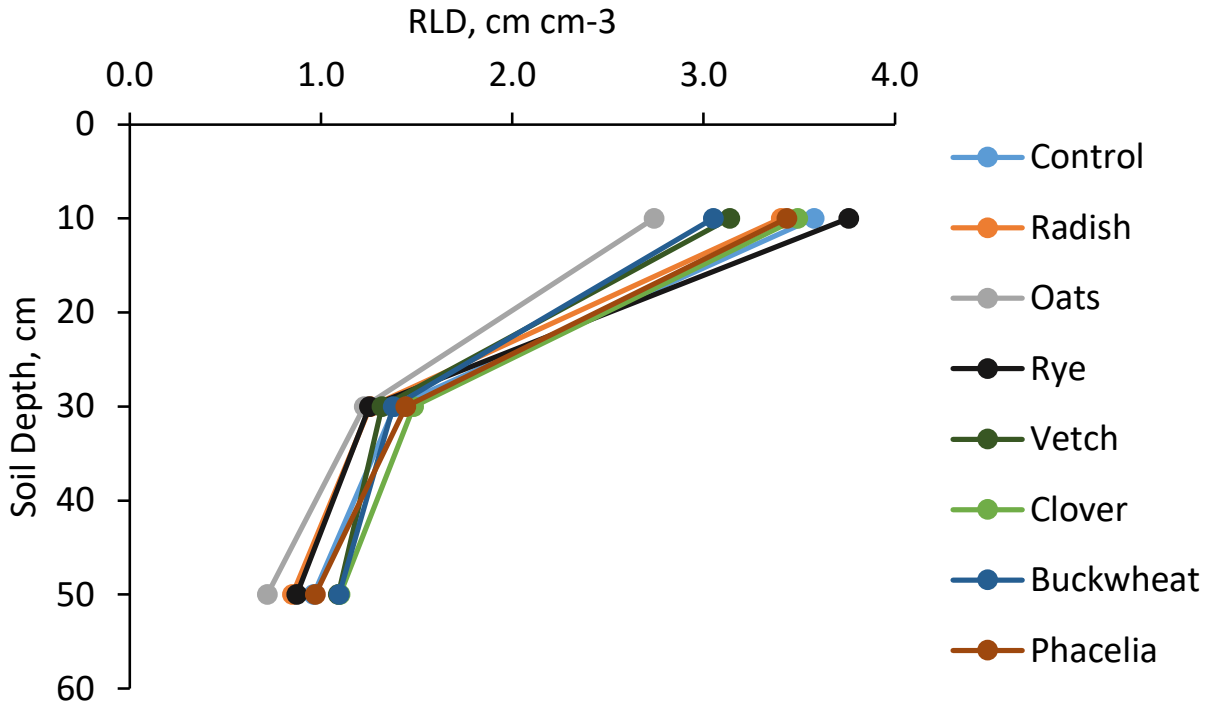
Cover crop characteristics cross site: Deep rooting at destruction (February)

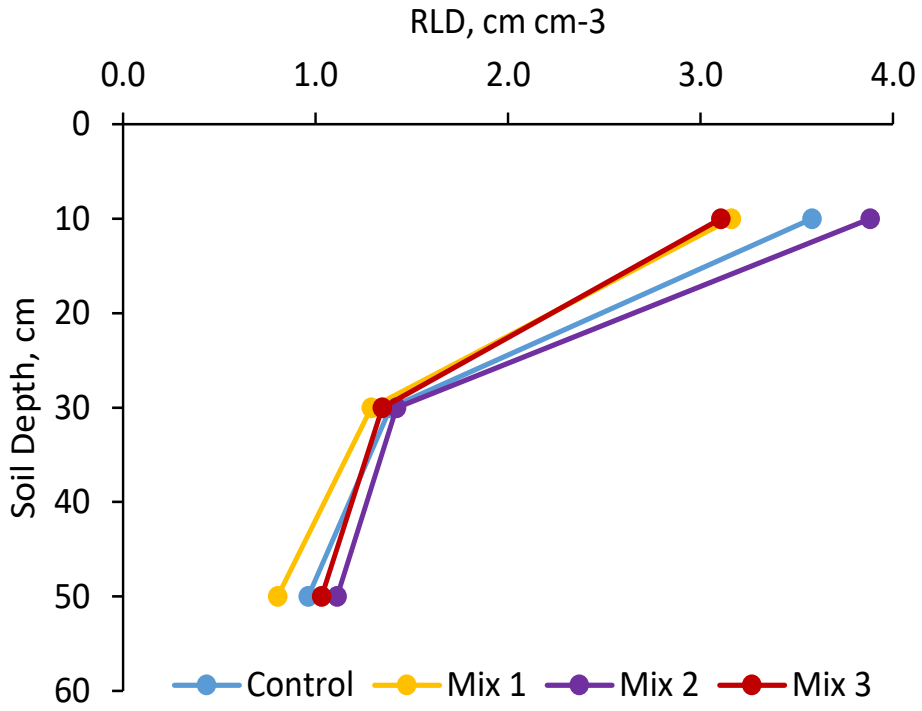


Phacelia and Rye had greatest Root length density (RLD)
Phacelia slow to root in autumn, but well rooted by destruction
N.B. Doesn't include the radish tap root, due to nature of sampling

Impact on the following crop cross site: Spring barley rooting

Treatment: $F<0.05$, SED 0.24
Depth: $F<0.001$, SED 0.16
T*D: NS, SED 0.52

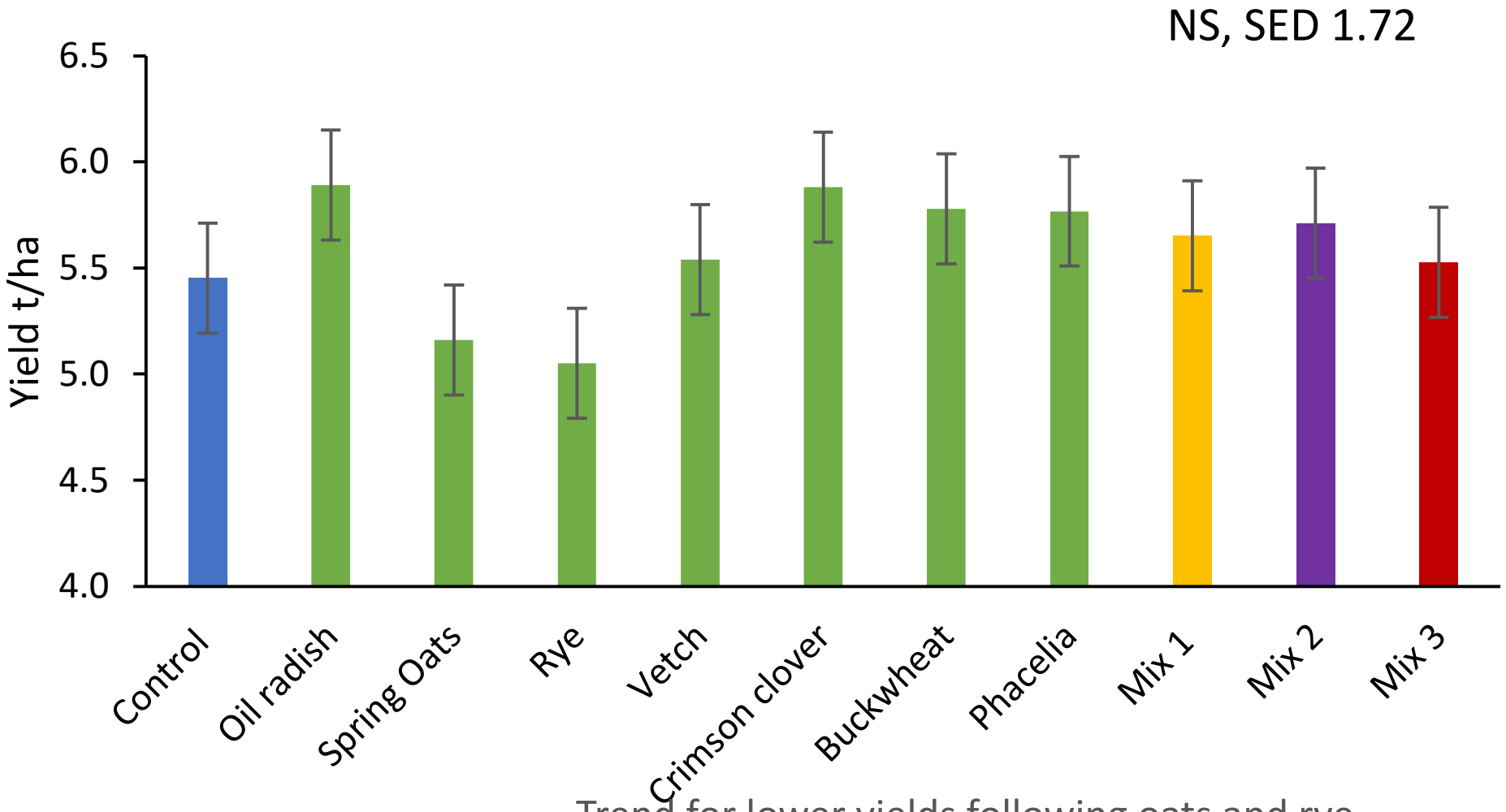




Rooting of the following spring barley was lowest after oats (followed by Mixes 1 &3)
Rooting was best following Mix 2 (no cereal)

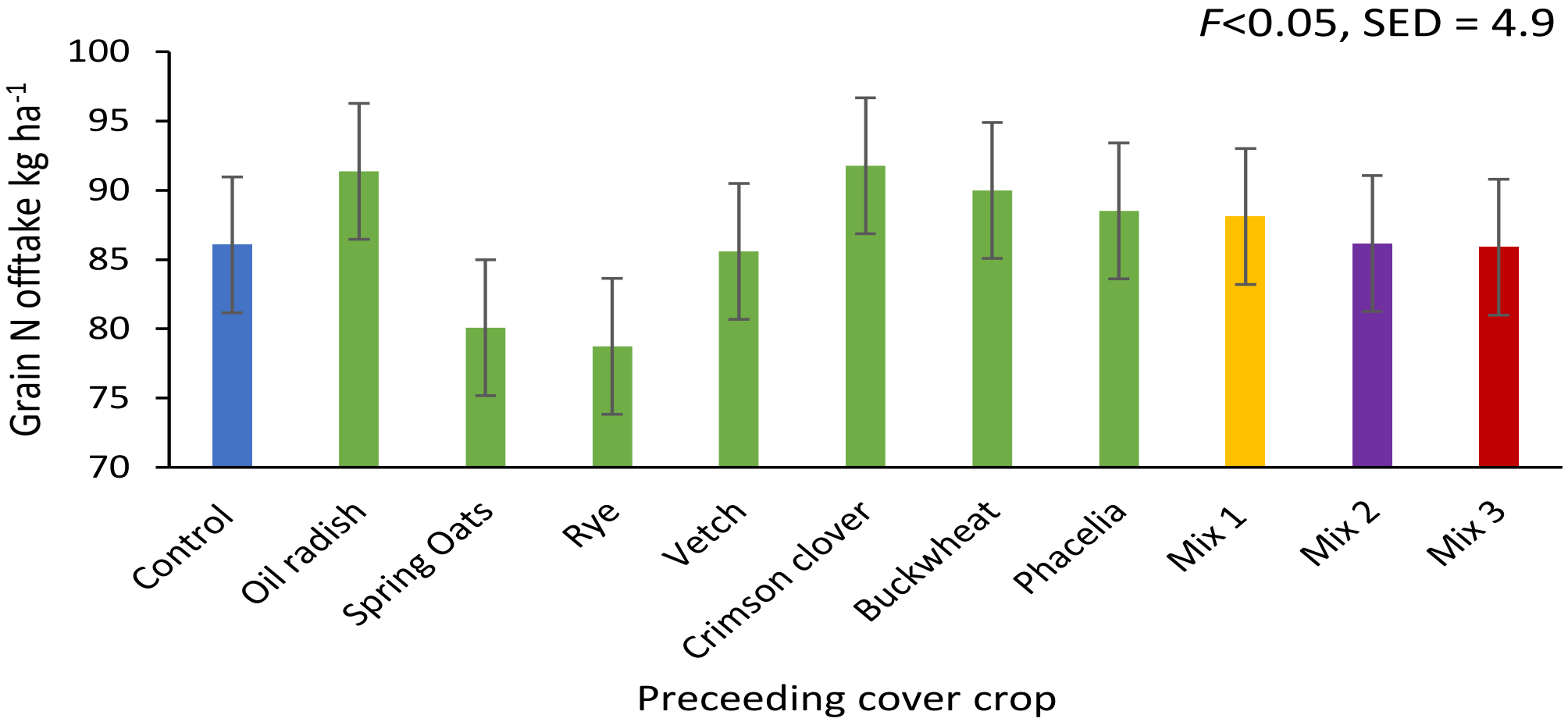
Mix 1: Oats (83%) & Clover; Mix 2: Oil radish (30%) Phacelia (20%), buckwheat (50%)

Impact on the following crop cross site: Spring barley yield



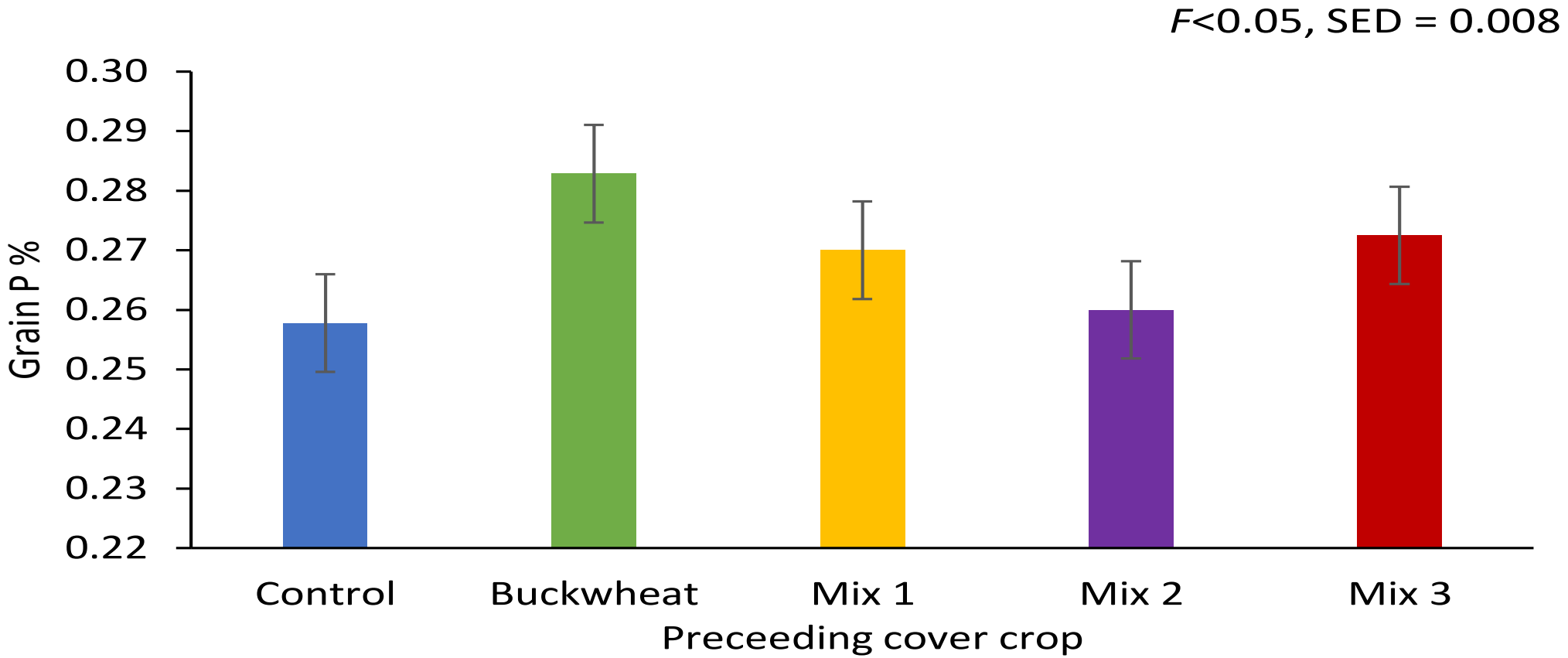
Trend for lower yields following oats and rye.
Highest yields following oil radish but no significant differences

Impact on the following crop cross site: Spring barley N offtake



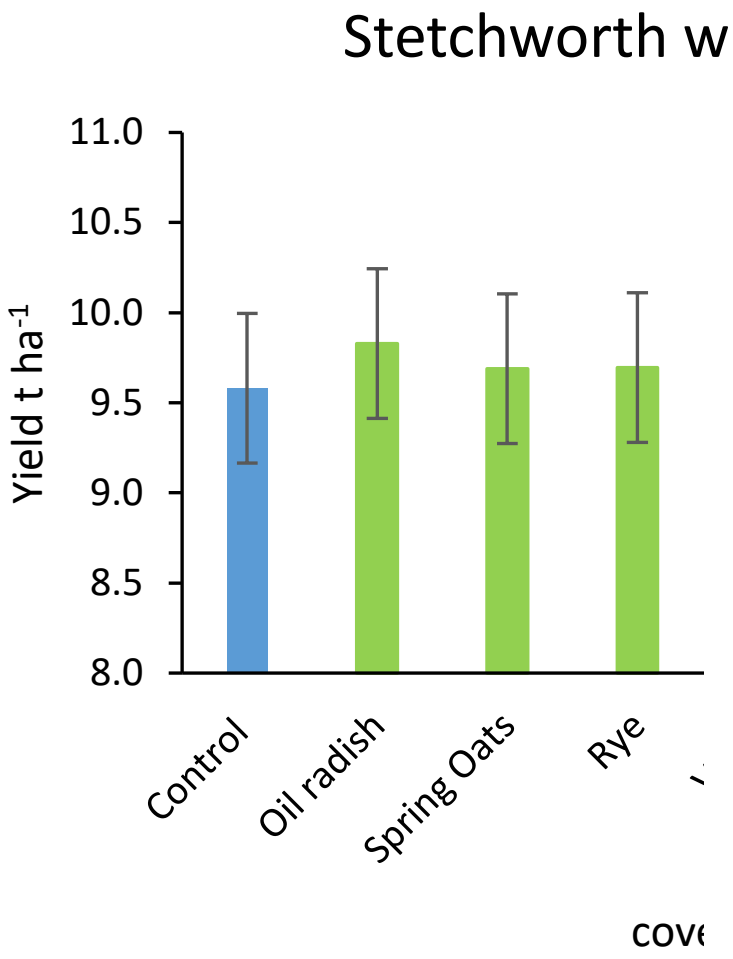
Highest grain N offtake following crimson clover and oil radish; lowest following rye and oats

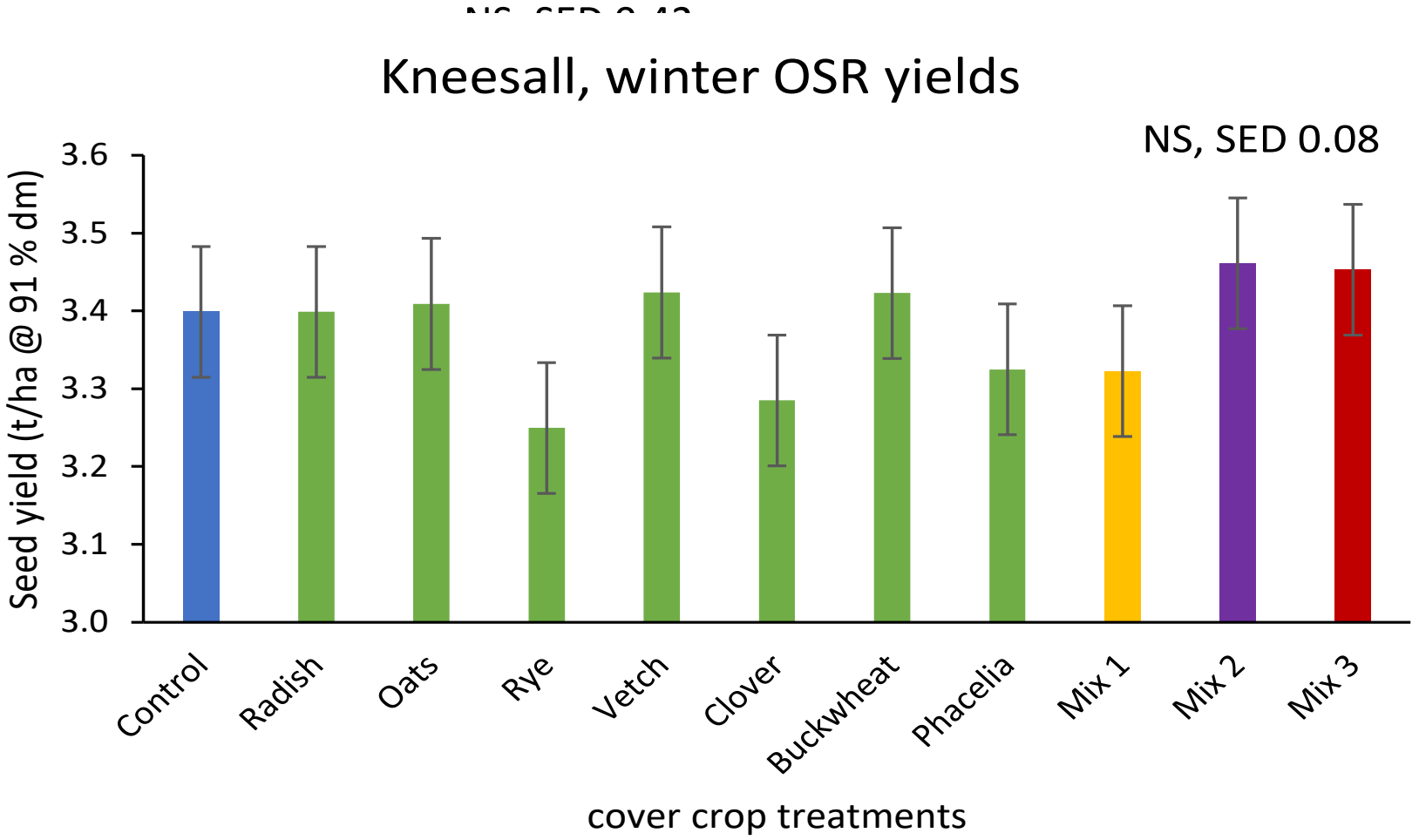
Impact on the following crop cross site: Spring barley grain P



Highest grain P content following buckwheat
Soil P index 1 to 2 (13 mg/l to 23 mg/l)
Buckwheat above ground P content was second highest at 1.41 %
However, buckwheat biomass was low, lowest P offtake
Requires further investigation

Legacy effects on following winter crop





Plot experiments and validation tramline trials

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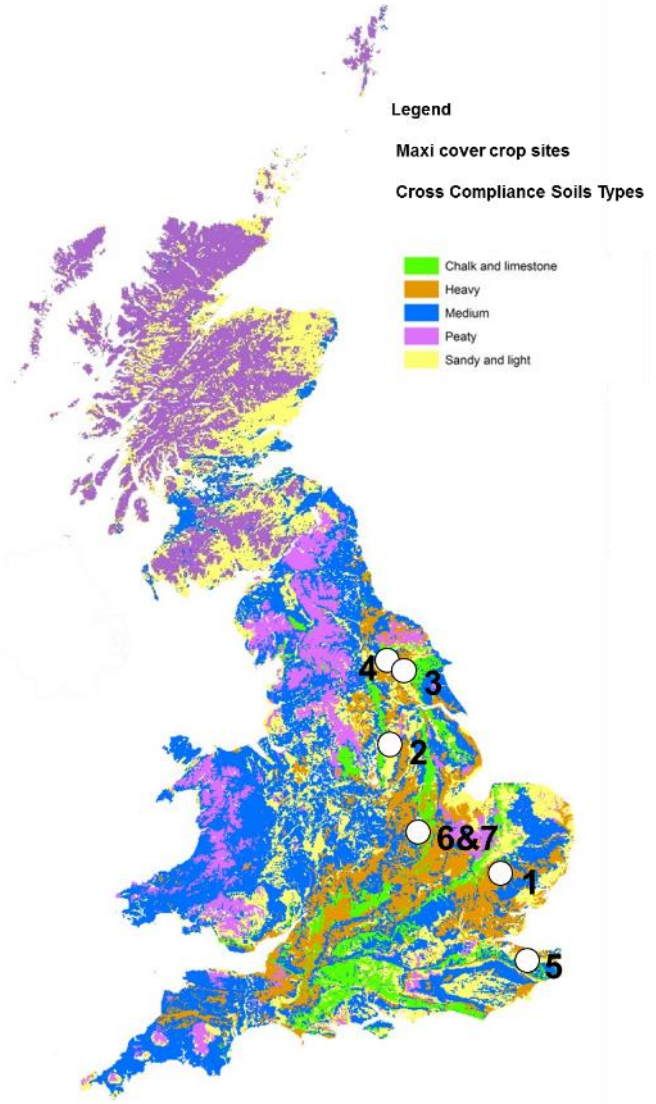
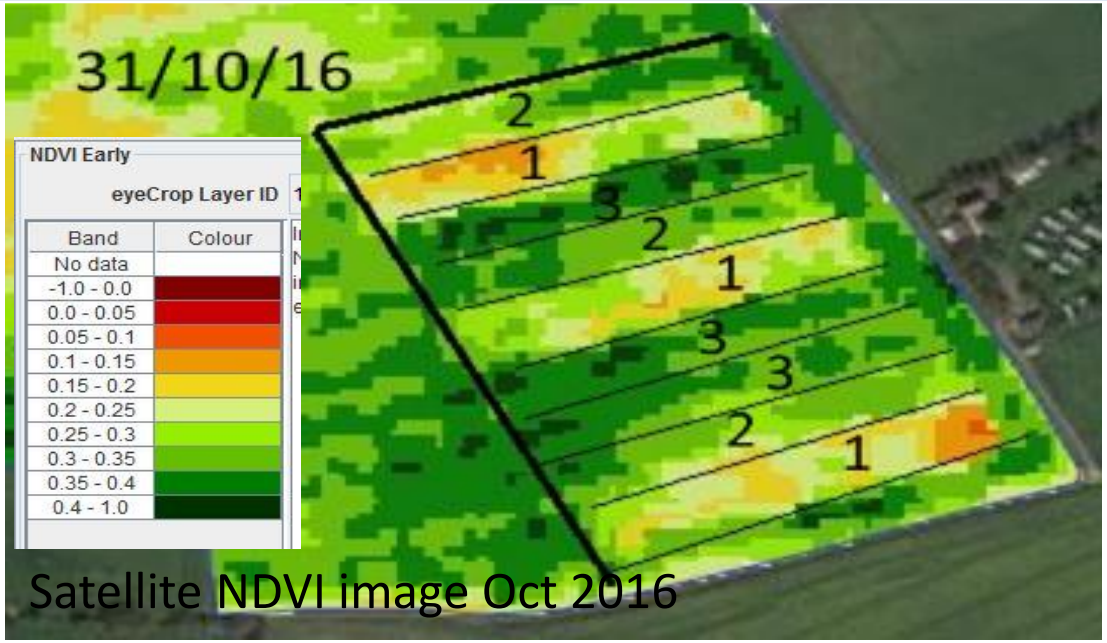


Cover crop validation tramline trial: Kent

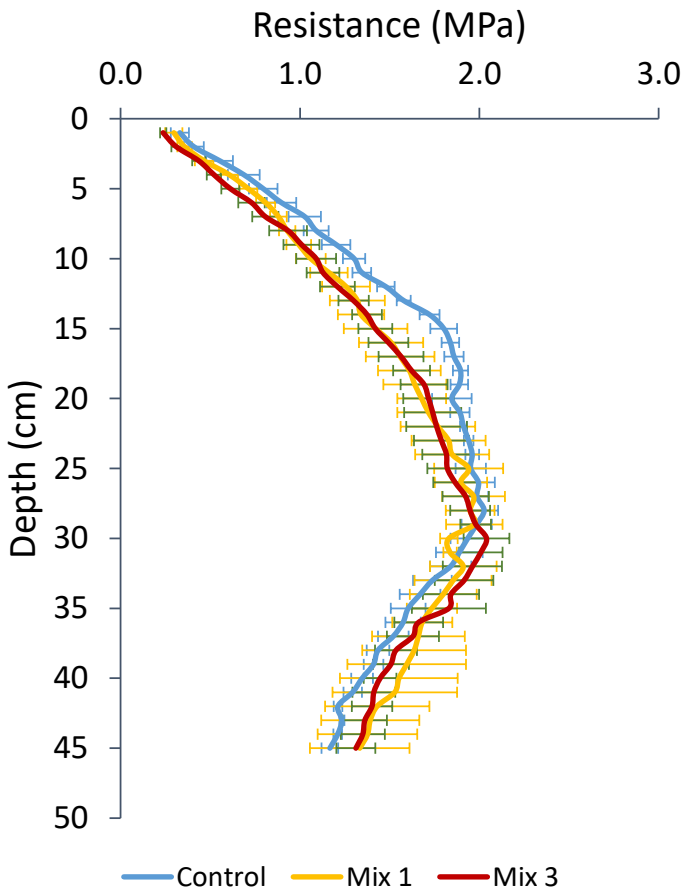
Treatment		Details
1	Control	Stubble (no cover crop)
2	Mix 1	Oats (83%) and clover (17%) at 36 kg/ha
3	Mix 3	Spring oats (53%) + Crimson clover (11%) + Oilseed radish (11%) + Phacelia (7%) + Buckwheat (19%) at 37.5 kg/ha

- Drilled 7th Sept 2016 x 3 reps
  - Strip till drill & rolled
- NDVI image 7 weeks after drilling
  - Good cover with mix 3
- Covers destroyed 6/2/17 with glyphosate

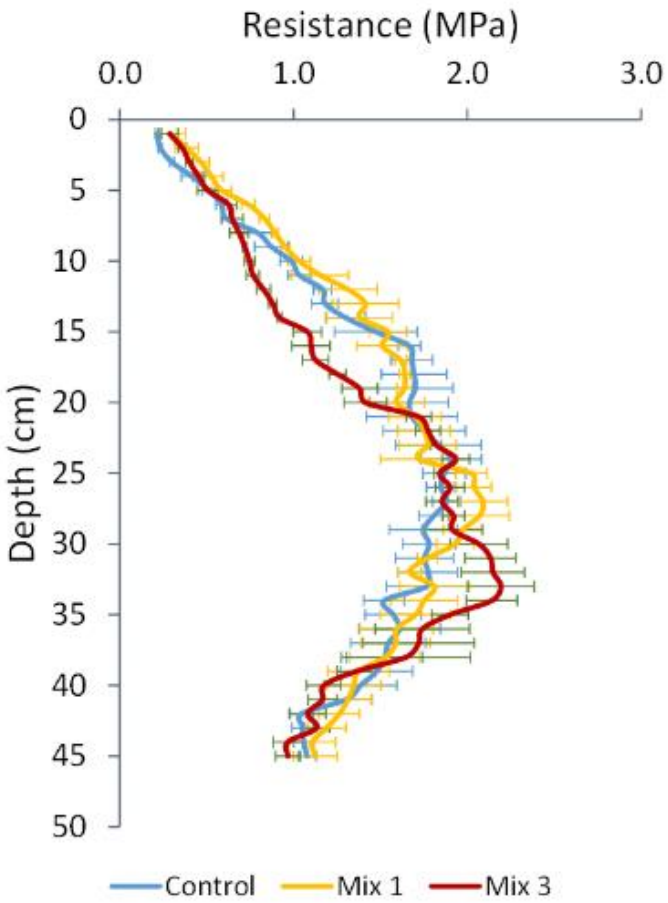


Satellite NDVI image Oct 2016

Cover crop validation tramline trial: Kent
Soil penetration resistance



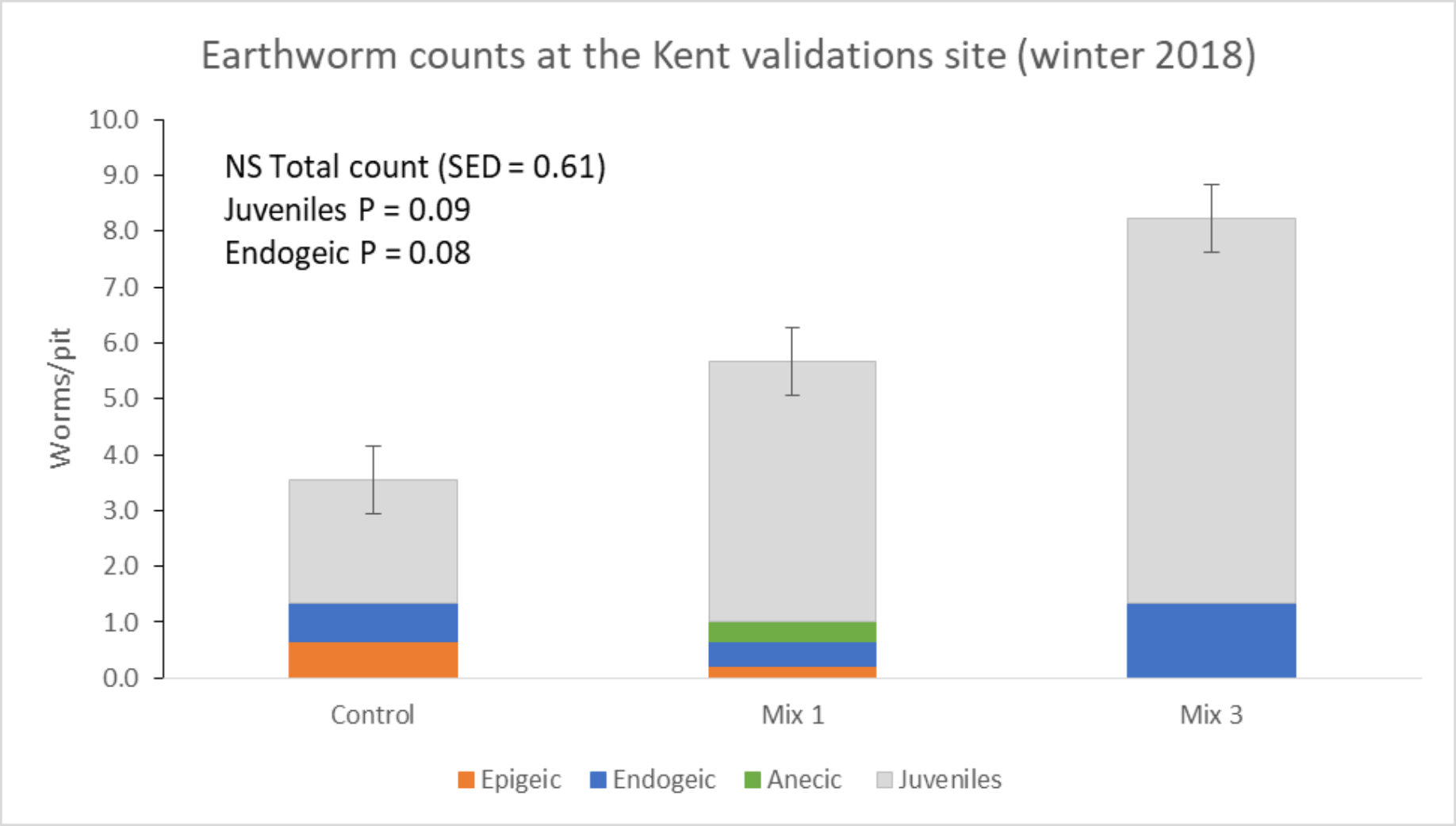
Penetrometer resistance, Feb 2017 (post cover crop)



Penetrometer resistance, March 2018 (WOSR)

Mix 1: Oats (83%) & Clover; Mix 3: Spring oats (53%), Crimson clover (11%) Oil radish (11%) Phacelia (7%), buckwheat (19%)

Validation tramline trials: Kent
Earthworm numbers

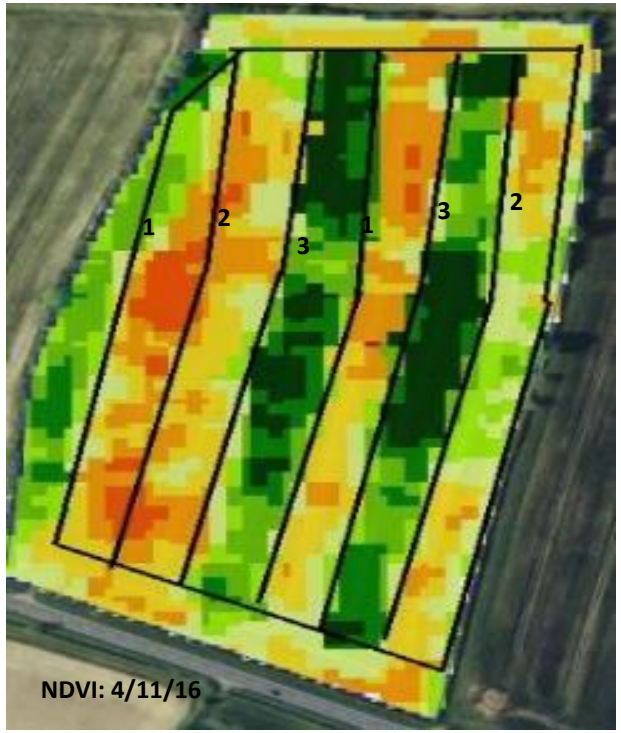


Mix 1: Oats (83%) & Clover; Mix 3: Spring oats (53%), Crimson clover (11%) Oil radish (11%) Phacelia (7%), buckwheat (19%)

Cover Crop Validation tramline trial: York

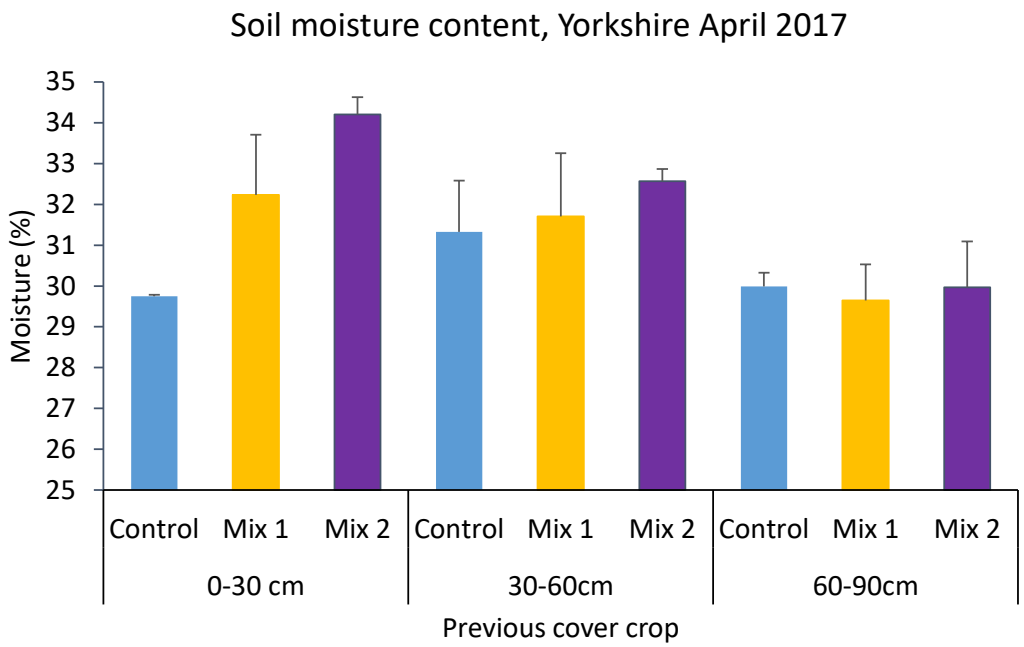
Treatment		Details
1	Control	Stubble (no cover crop)
2	Mix 1	Oats (83%) and clover (17%) at 36 kg/ha
3	Mix 2	Oil radish (30%), phacelia (20%) & buckwheat (50%) at 20 kg/ha

- Drilled 26th Aug 2016 x 2 reps
  - Strip till drill
  - Oats, radish & buckwheat drilled, lighter clover & phacelia seeds broadcast with slug pellet applicator
- NDVI image 10 weeks after drilling
  - good cover mix 2, poorer with mix 1
- Destroyed with glyphosate 3/4/2017

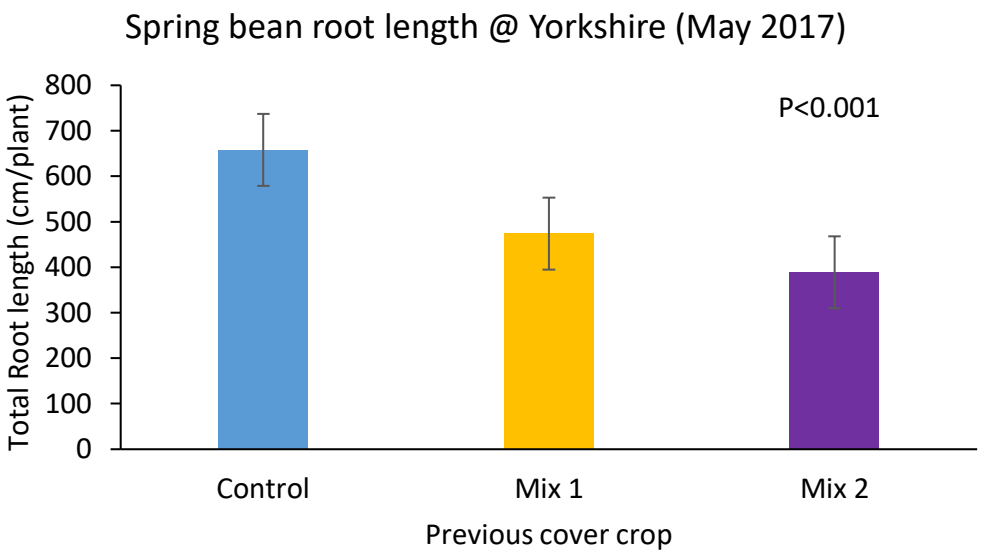


Satellite NDVI image Nov 2016

Cover Crop Validation tramline trial: York



Soil moisture greater at 0-30 cm *P<0.1* with cover crop



Rooting significantly reduced following cover crops.

Mix 1: Oats (83%) & Clover; Mix 2: Oil radish (30%) Phacelia (20%), buckwheat (50%)

Cover Crop Validation tramline trial: York
Spring bean Yields

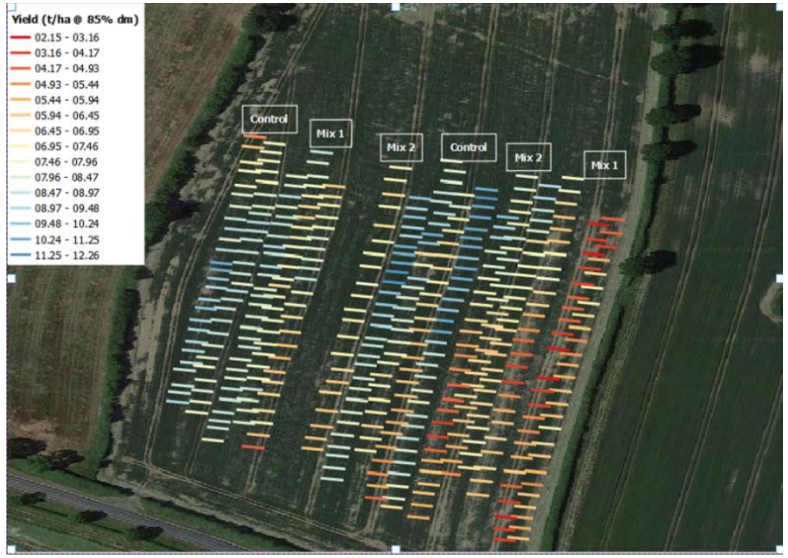
- Agronomics statistical analysis of yield maps
- Mix 1 significantly lower yield compared to control

Treatment	Mean yield (t/ha @ 86% dm)	Difference in yield from the control treatment (t/ha,95% confidence limits)
1. Control (stubble)	3.5	
2. Mix 1		-0.36 ± 0.32
3. Mix 2		-0.20 ± 0.26

Mix 1: Oats (83%) & Clover; Mix 2: Oil radish (30%) Phacelia (20%), buckwheat (50%)

Cover Crop Validation tramline trial: York Winter wheat yields

- Agronomics statistical analysis of yield maps
- Mix 1 significantly lower yield compared to control



Treatment	Mean yield (t/ha @ 86% dm)	Difference in yield from the control treatment (t/ha,95% confidence limits)
1. Control (stubble)	8.3	
2. Mix 1		-2.1 ± 1.3
3. Mix 2		-0.9 ± 1.3

Mix 1: Oats (83%) & Clover; Mix 2: Oil radish (30%) Phacelia (20%), buckwheat (50%)

Cover Crop Validation Tramline Trials: Impacts on yields are variable

Site:	Kent	Yorks.	Hunts.	Cambs
Crop:	Barley	Beans	Barley	Barley
Season	2017	2017	2018	2018
Yields (t/ha)				
No cover	9.4	3.5	7.1	3.9
Mix 1	+ 0.1	- 0.4*	No change	-1.0*
Mix 2		- 0.2		-1.4*
Mix 3	+ 0.4		0.1	

**P<0.05 (compared to the control treatment)*

Summary – Cover crops

- Good evidence that cover crops can reduce nitrate leaching losses, control erosion and provide soil structural benefits
- Considerations:
  - Species choice – what do you want to achieve & does it fit with your rotation?
  - Drill as early as possible
  - Leave a good window between destruction and spring crop establishment
  - Be prepared for variable yield impacts

Acknowledgements

Farmers:

- David Blacker
- Mark Bowsher-Gibbs
- Russel McKenzie
- Gary Thacker

Consortia & contributions:

Large Plot site hosts

- Stetchworth Estates
- Leyfields Ltd
- EM Wilkinson & Sons

Thanks for listening

John.williams@adas.co.uk

Marek Nowakoski (Wildlife Farming Company)

Presentation Information

Improving the delivery of IPM habitats. An eye on the future.

Marek Nowakowski.

What is IPM

IPM is an integrated strategy that focuses on the prevention of pests through techniques such as biological control, habitat manipulation, modification of cultural practices, and use of resistant varieties. Pesticides are used only after monitoring indicates pests have reached a threshold level.

"Fighting crop pests on the widest front".

Insects can be both friend and foe!

Beetles and Bugs

Centipedes

Flies

Lacewings

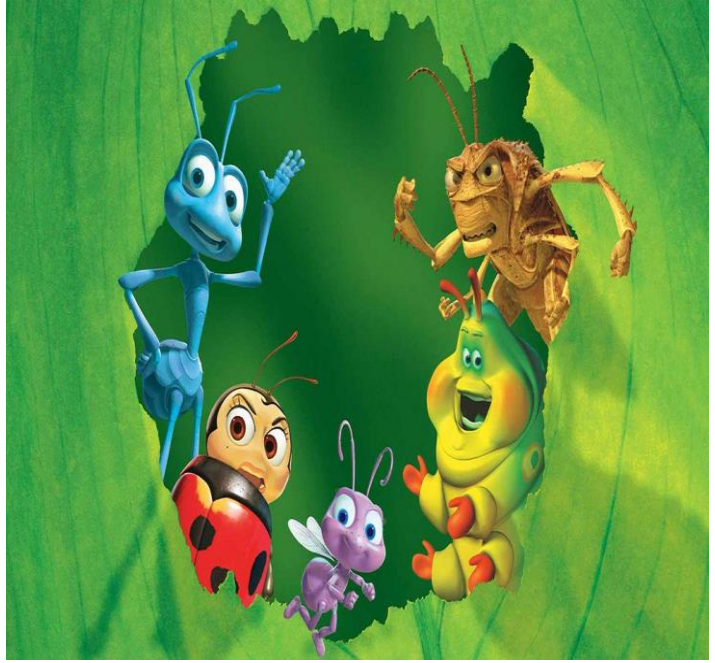
Spiders, Mite

Sawfly, Wasps, ants, bees.

All the above are habitat dependant.

Pest or Polinator?

IPM Where are we?



Is it effective?
Would surrounding crops with habitats reduce pest damage by increasing Beneficial insects?
An experiment of 132 studies and 6,759 sites worldwide was inconclusive.
(www.Pnas.org/cgi/doi.1073/pnas)

Some thoughts.

- Pests build up rapidly, predators more slowly.
- What habitats do we need and how much?
- Can we balance cost of predators needs(insurance cost) with potential yield loss(Potential financial loss)?
- Pressure to reduce pesticides especially insecticides..

HABITAT QUALITY NOT QUANTITY

Habitat quality and variety are the key to biodiversity increases.

Appropriate management is vital.

Wildlife Farming Company
- Proven Wildlife Delivery -

Centre for Ecology & Hydrology
NATURAL ENVIRONMENT RESEARCH COUNCIL

Delivering a better balance and staying in business

“KEEP IT SIMPLE”

90% decline in biodiversity is due to habitat loss :

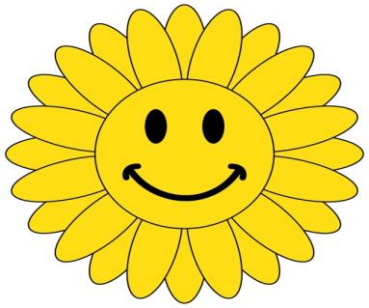
PUT THE HABITATS BACK

Farmland birds starve in winter

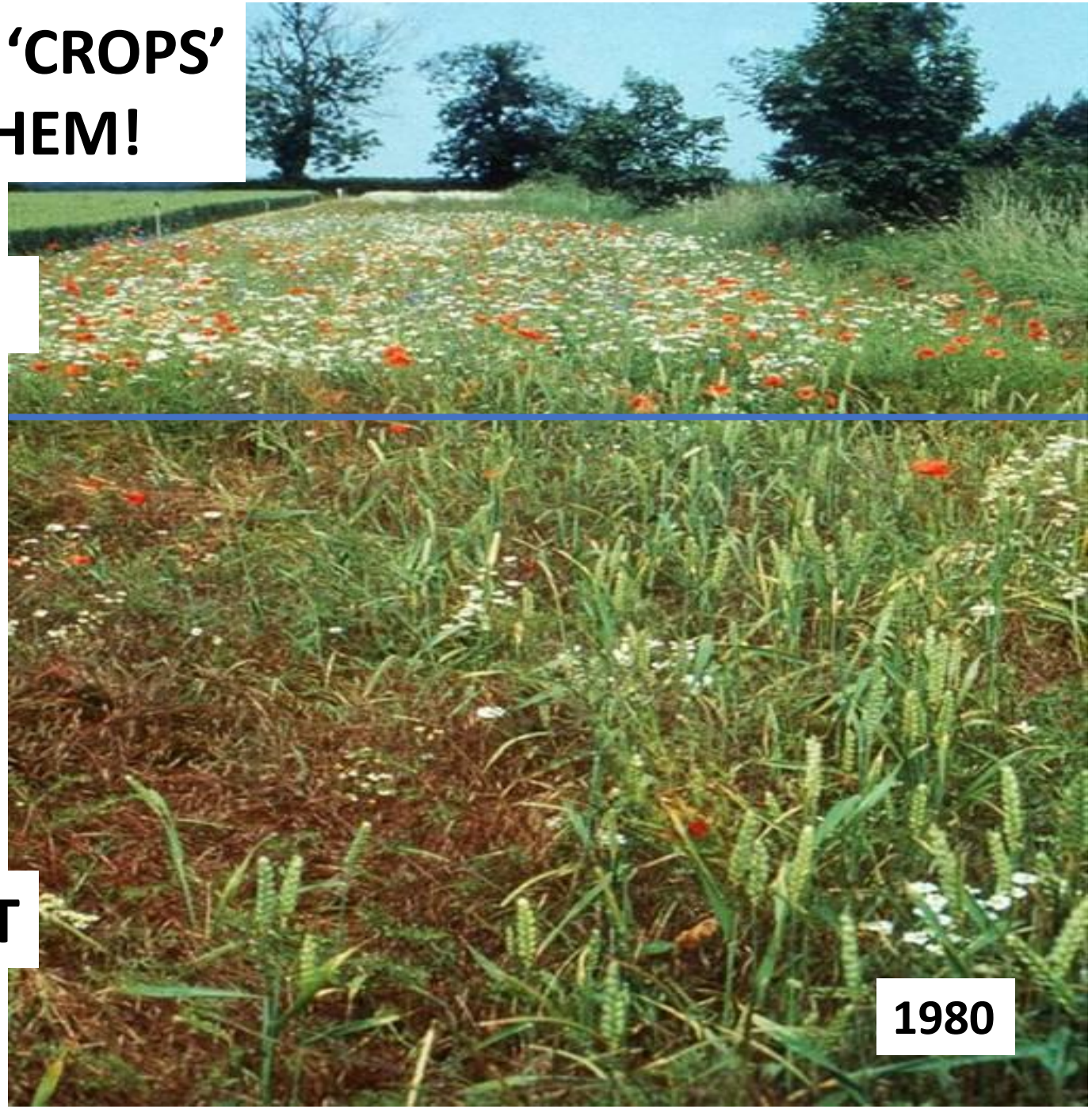
FEED THEM

We've lost 98% of our flowers (pollen and nectar)

SOW SOME FLOWERS



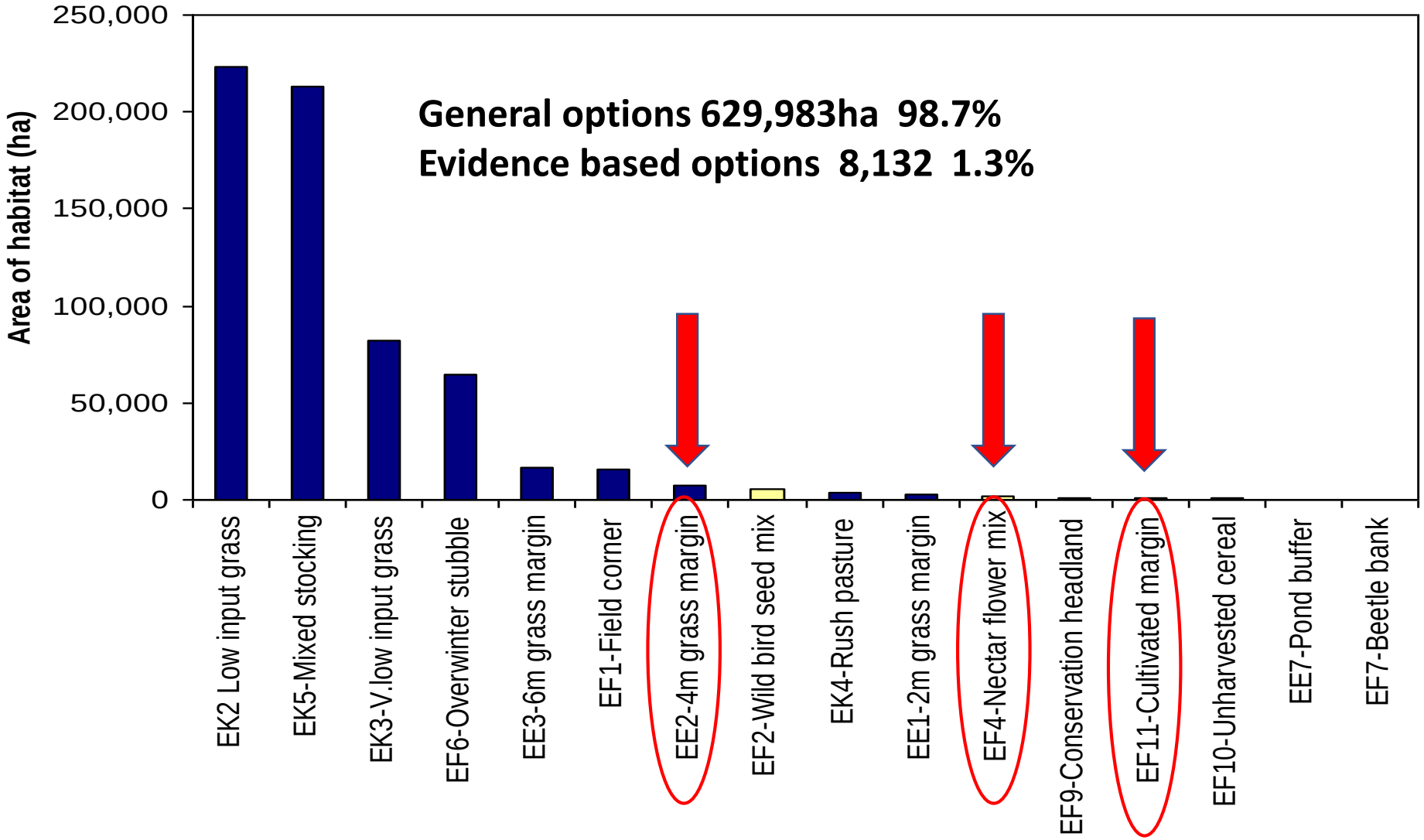
HABITATS ARE ‘CROPS’ SO FARM THEM!



BY DESIGN

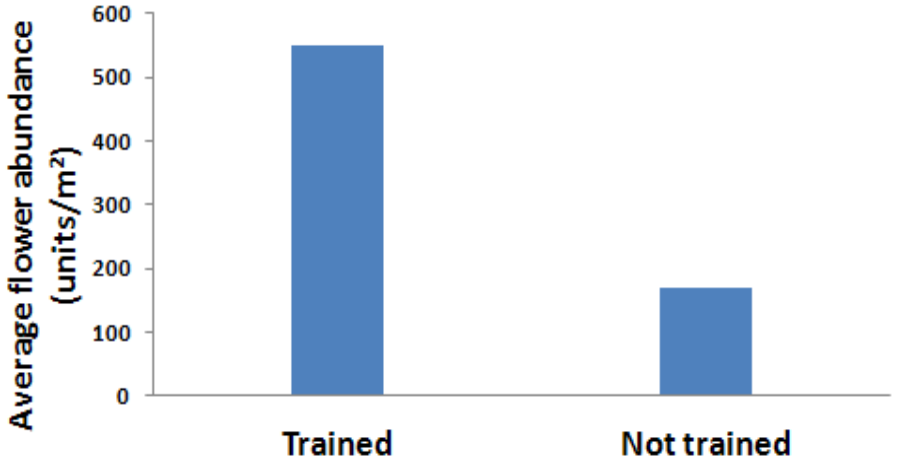
BY ACCIDENT

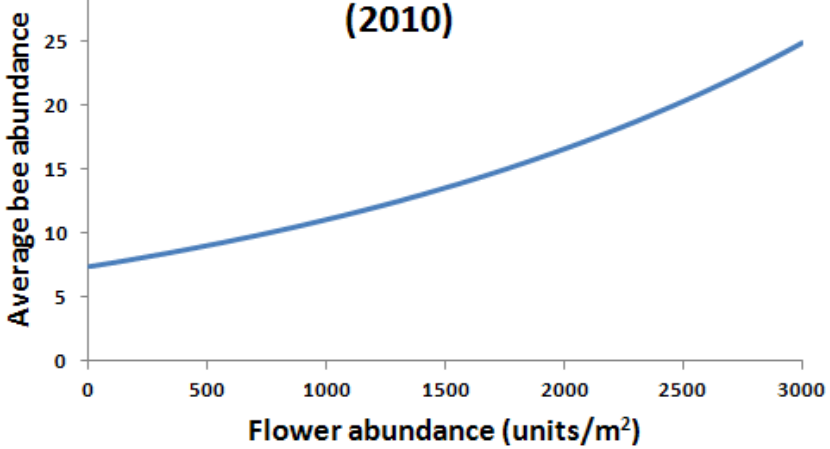
Evidence-based *vs* General options *ELS. 2009*



Delivering knowledge through training

FarmCAT
Improving agri-environment schemes





MIXTURE TYPES

TUSSOCKY GRASS + - FLOWERS

PERENNIAL FLOWERS

WILD BIRD/GAME MIXES

ANNUAL FLOWERS

98% OF FLOWER MEADOWS GONE

FLOWERS FEED MANY BENIFICIAL INSECTS

GRASS & FLOWERS	LEGUME
LONGEVITY > 10 years	3 years
COST £300- £350 ha	£100- £120 ha
DELIVERY April- Sept	Mid June- Mid July
Species rich	Species poor
Cuttings best removed	Cuttings can be left

THE GOLDEN RULES FOR FLOWERS.

Poor management = Poor results

FLOWER SEED DEPTH IS CRITICAL.

SOW AT THE CORRECT TIME OF YEAR.

PERENNIAL SPECIES MAY NEED REPEATED CUTTING IN YEAR ONE TO REDUCE WEEDS/GROWTH.

CUTTING ANNUALS MEANS NO SEED =DEAD

CUTTING PERENNIALS MEANS FLOWERS NEXT YEAR

Know your enemy

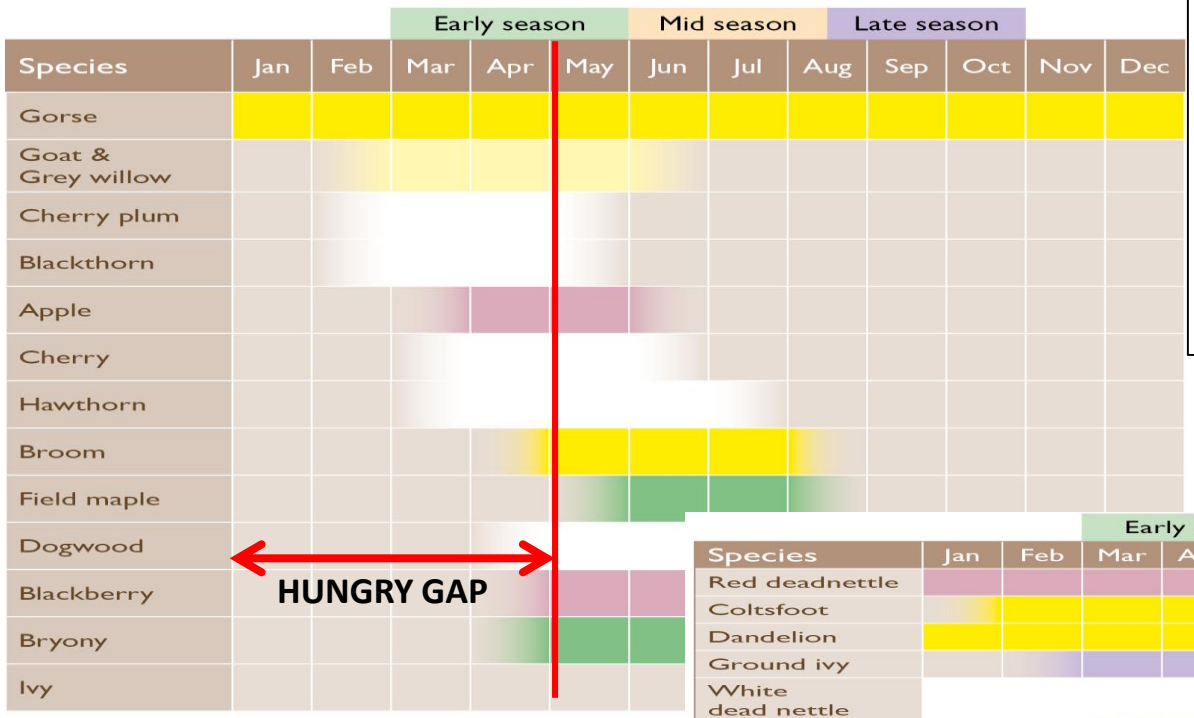
Weed pressure

Fertility

Don't be frightened of cutting it does NOT kill perennials

SAME FIELD
2013 Year one
mown 6 times
Heavy clay soil
P index 3-4

TREES AND SHRUBS

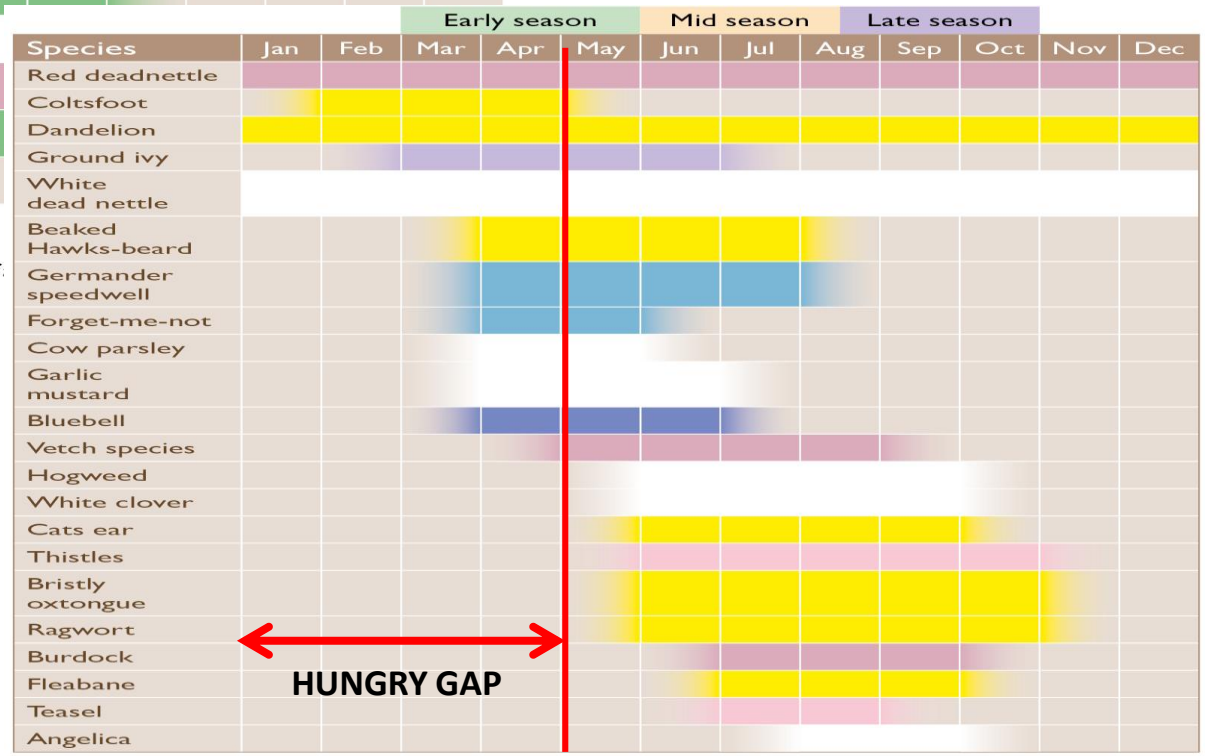


Key: Coloured squares depict flower colour and floweri

What insects do you want?

Have you got the right plants?

FLOWERS FOR FREE

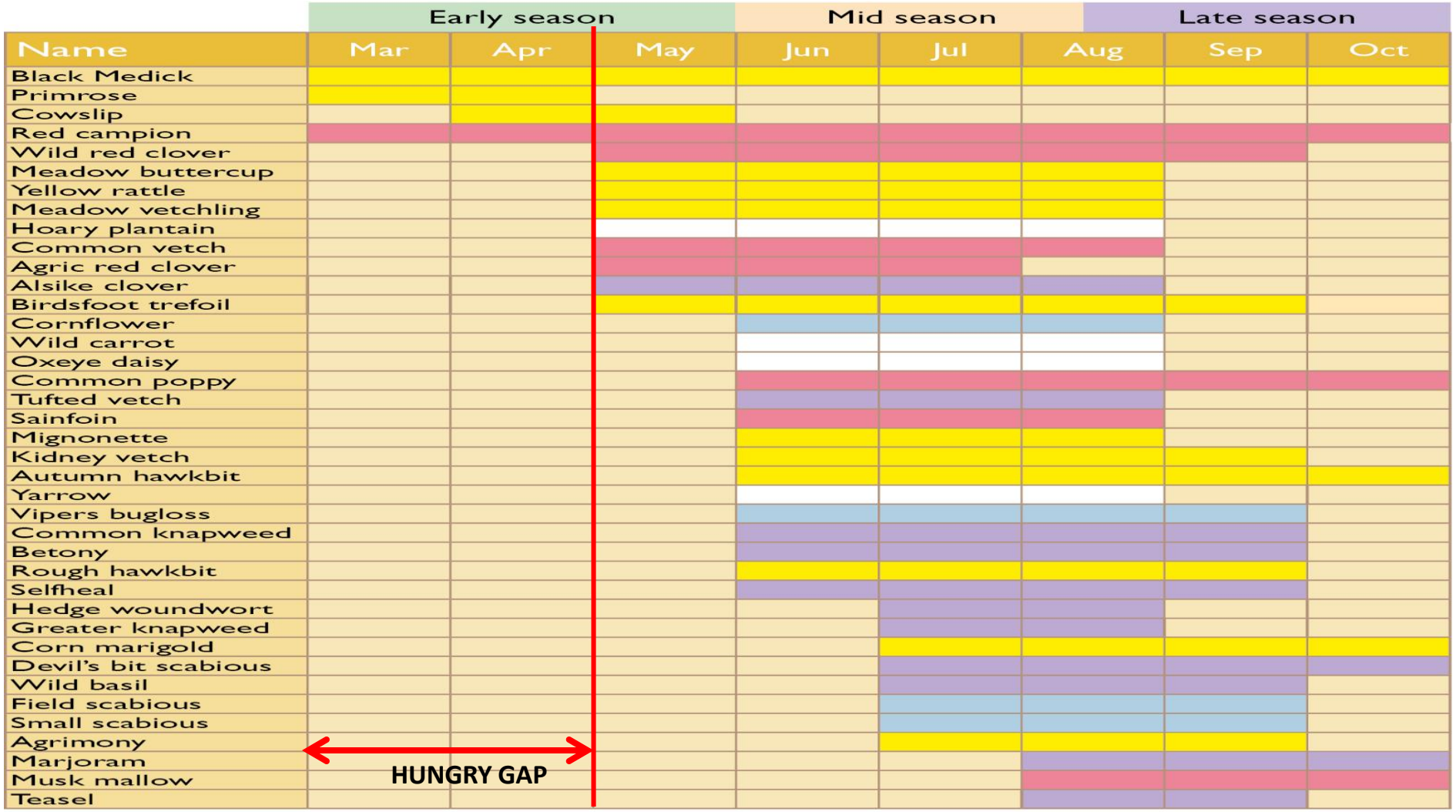


Key: Coloured squares depict flower colour and flowering period

Wildlife Farming Company
- Proven Wildlife Delivery -

Edwards Ecological Services Ltd

COMMERCIAL FLOWERS



Key: Coloured squares depict flower colour and flowering period

Wildlife Farming Company
- Proven Wildlife Delivery -

Edwards Ecological Services Ltd

TARGETED BEE HABITATS

Wildlife Farming Company
- Proven Wildlife Delivery -

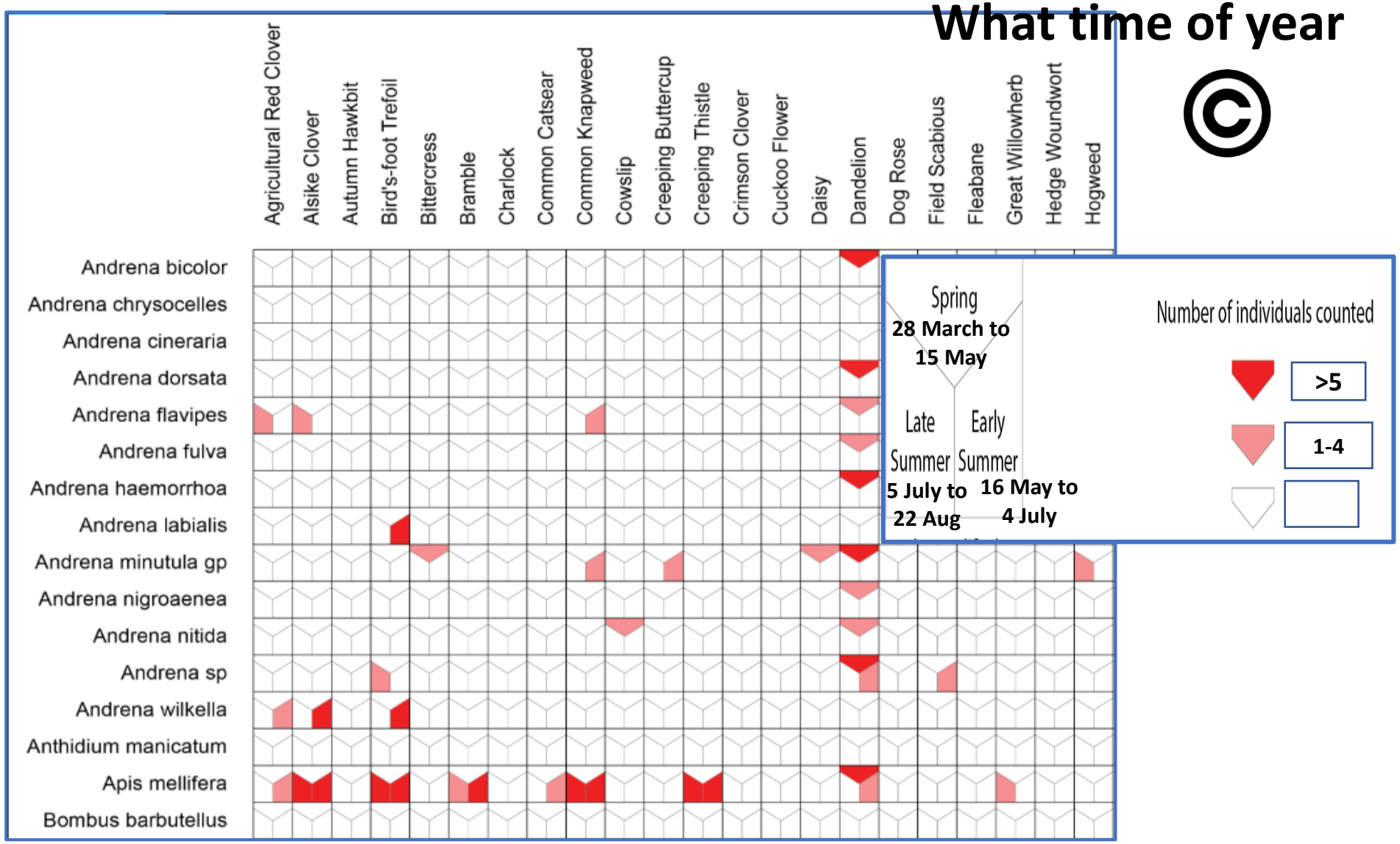
Edwards Ecological Services Ltd

BEE PREFERENCES

Which bee

Which flower

What time of year



©

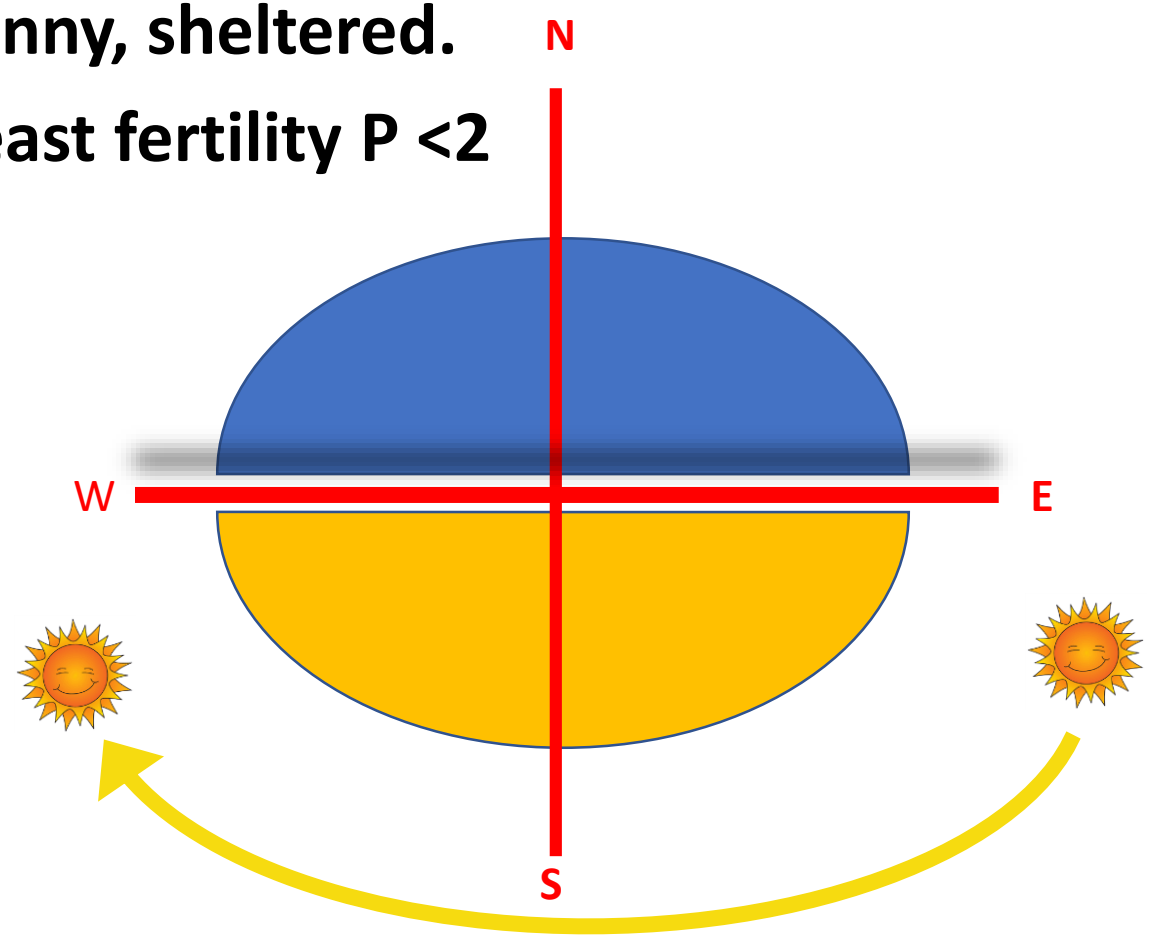
Habitat placement

CREATING FLOWER MIXES

WHERE TO SOW:

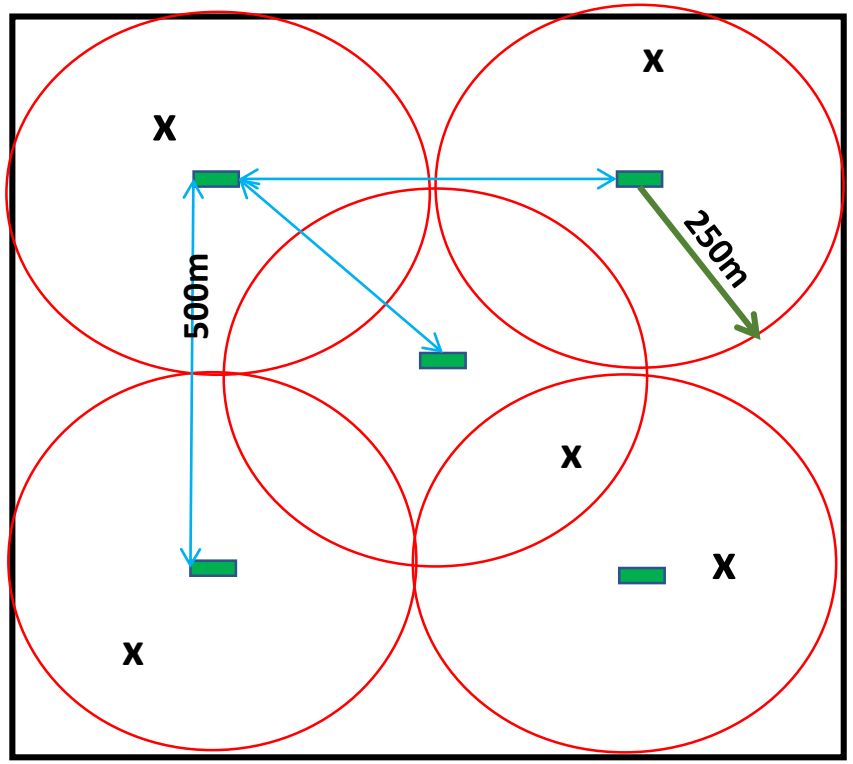
Warm, sunny, sheltered.

Area of least fertility P <2



HOW MANY SOWN HABITATS PER 100HA?

This diagram is a farmers guide based on data from CEH research



Sown habitat

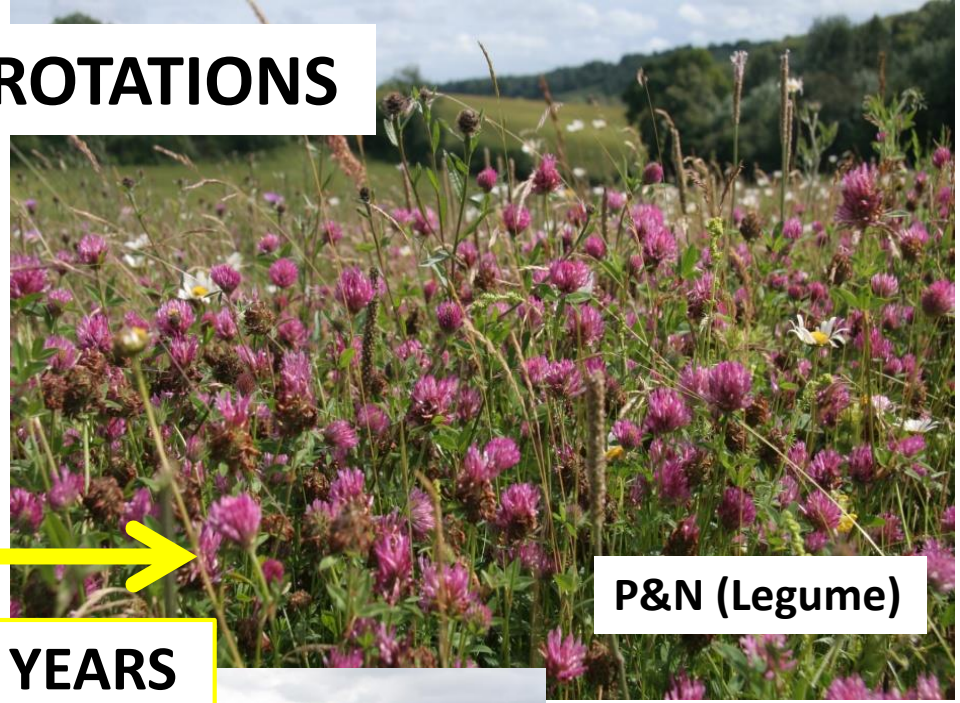
A 250m Radius circle covers 20 ha

x A bee nest

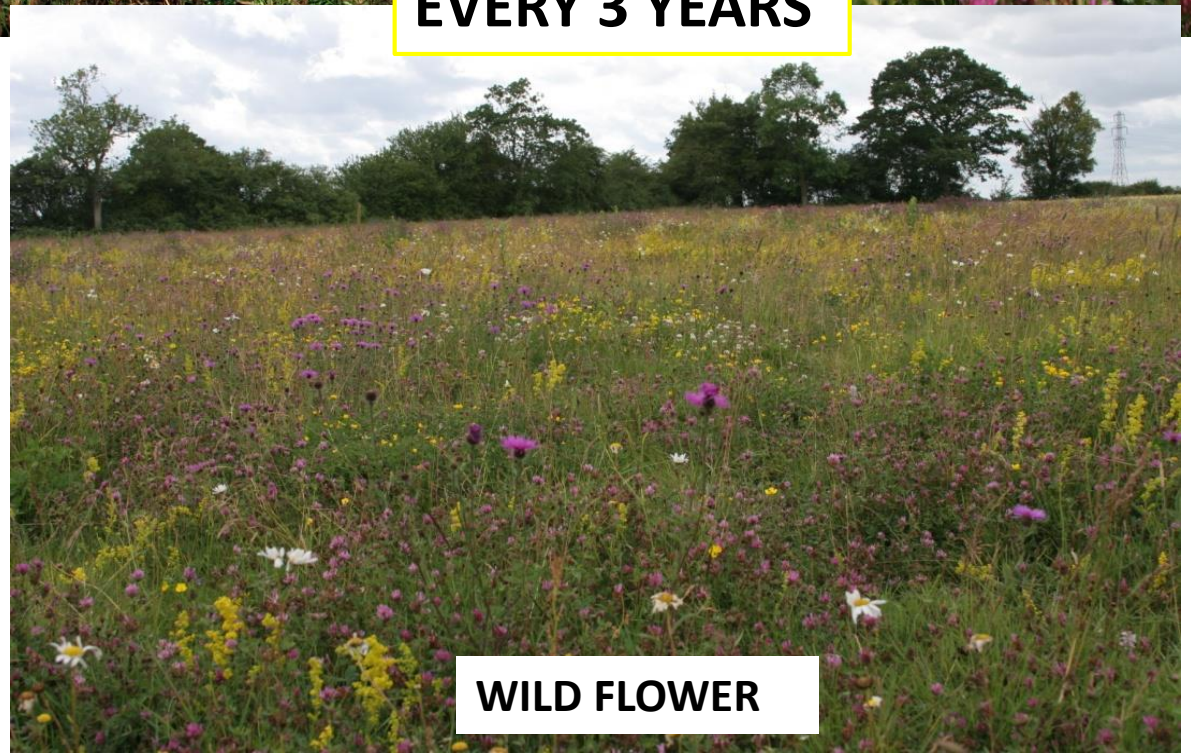
Longest distance between sown habitats

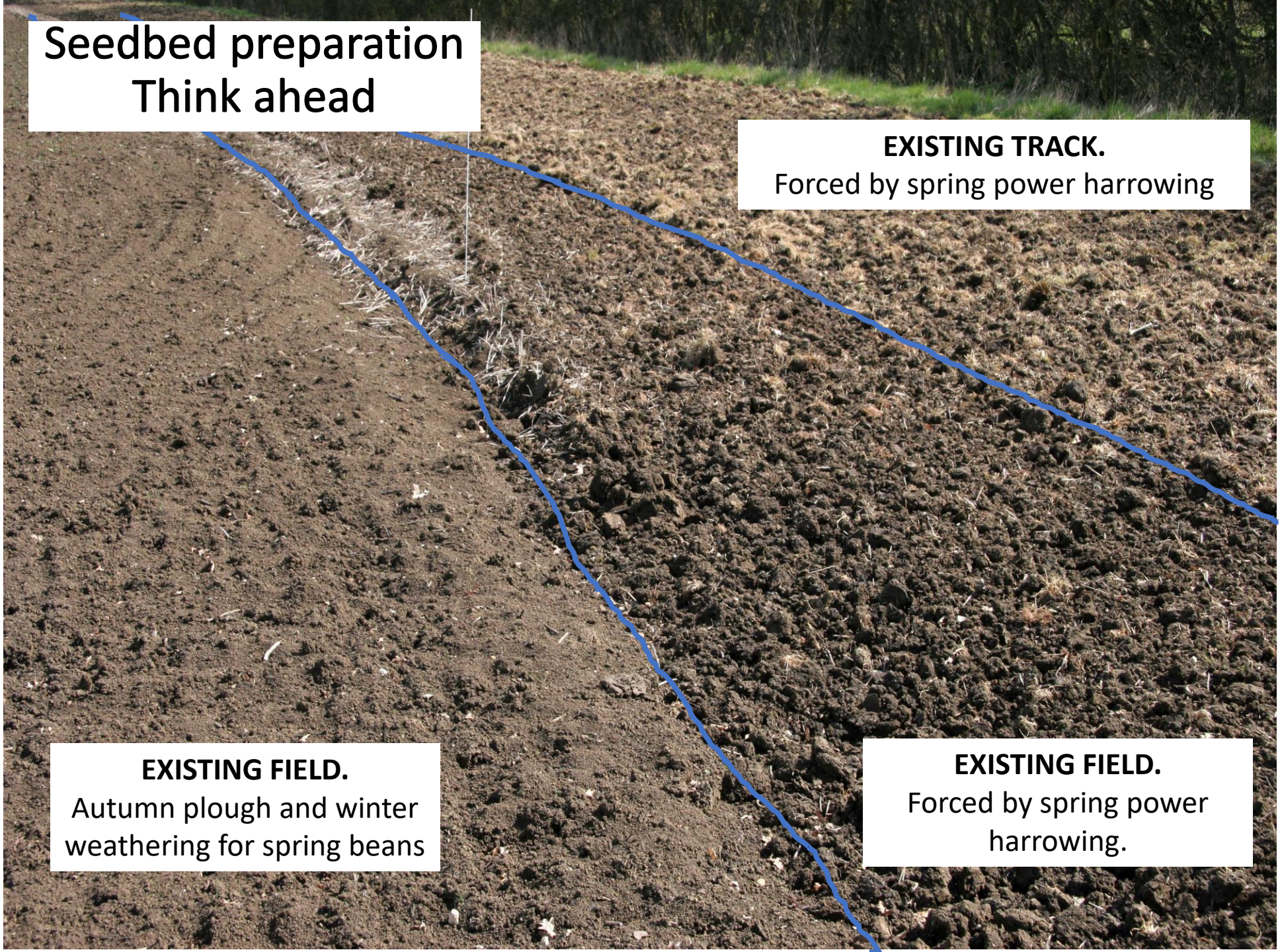
The distance the smallest solitary bee species can travel for forage?

HABITAT ROTATIONS

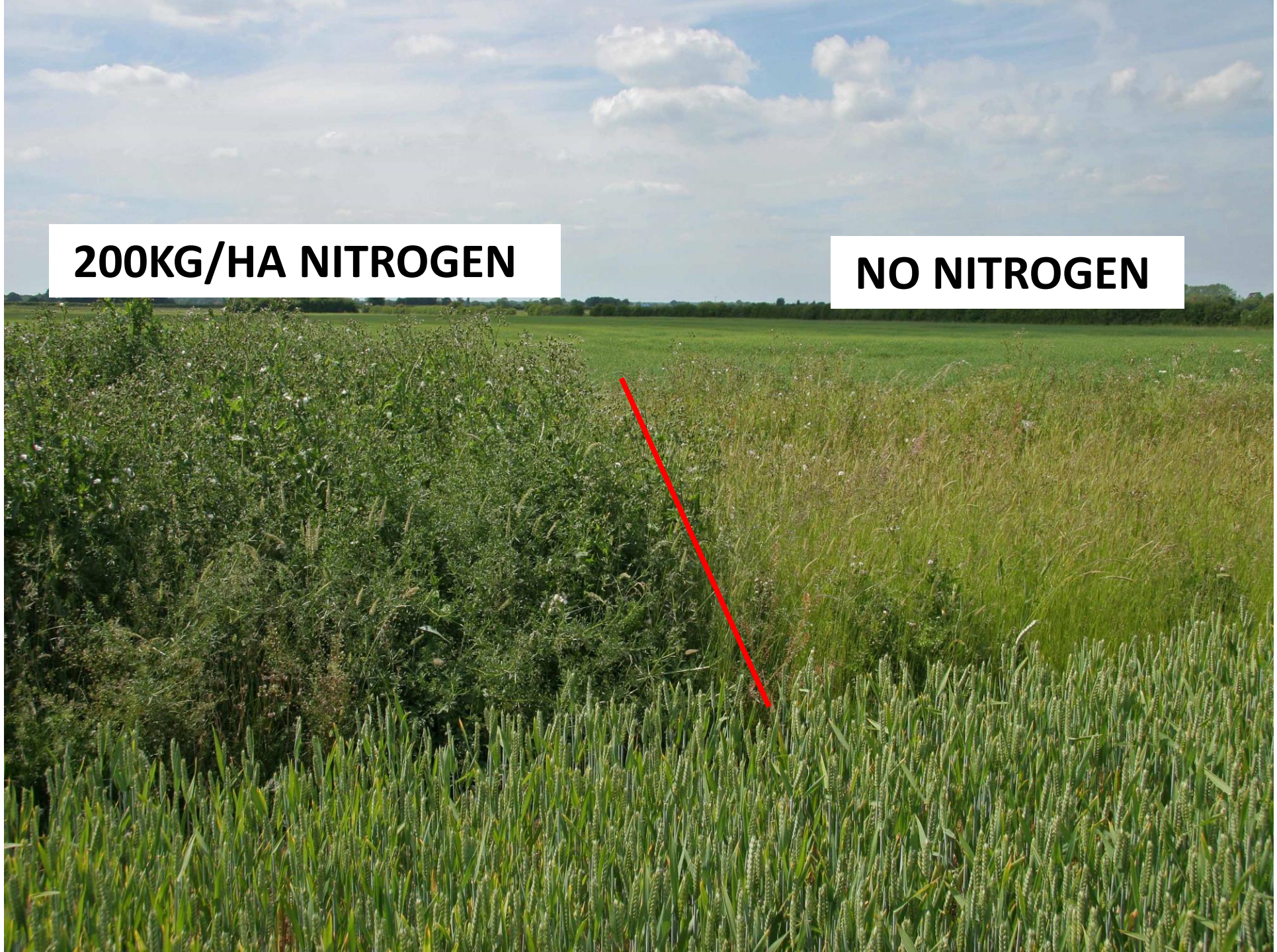


EVERY 3 YEARS




Seedbed preparation
Think ahead
EXISTING TRACK.
Forced by spring power harrowing
EXISTING FIELD.
Autumn plough and winter weathering for spring beans
EXISTING FIELD.
Forced by spring power harrowing.

Reviving old flower areas


200KG/HA NITROGEN
NO NITROGEN

Incremental hedge cutting

Whole community diversity increased by over 20%

Insects increase if.
Cut in Jan-Feb not Sept-Oct
Cut every second or third year

LOOKING AHEAD

Meaningful environmental delivery must come from farmland, it's 80% of the UK landmass

Farmland will impact on all these.

Delivering public goods.

Clean air
Clean water
Landscape
Biodiversity
Pollination
Carbon capture

ENVIRONMENTAL HISTORY TIME SCALE

Post war.1970's.Feed the nation. Grants for **habitat removal** & production.
ADAS.(ended in 1980) Free government advise/research.
1981.Wildlife & countryside act. Legal protection of species & habitats.
1981. SSSI's. Part of WCA (Wildlife & countryside act).
1987. ESA's. Protection of environmentally valuable land.
1991. Stewardship schemes start. ELS/HLS payment for habitats.
2005. Subsidies decoupled from production to environment. Greening.
2015. EFA's become part of greening.
2016. Mid/higher tier. Discretionary environmental payments.
2016. **Payment by results** pilot. Higher payments for higher delivery.
>2018 Saving the planet??

What may things look in the future

A shift from an area payment to a delivery payment

EU/UK

BPS
Pillar 1

2021 Starting to move towards PG and abolished in 2027

PUBLIC GOODS
A new name for an old pillar 2 system

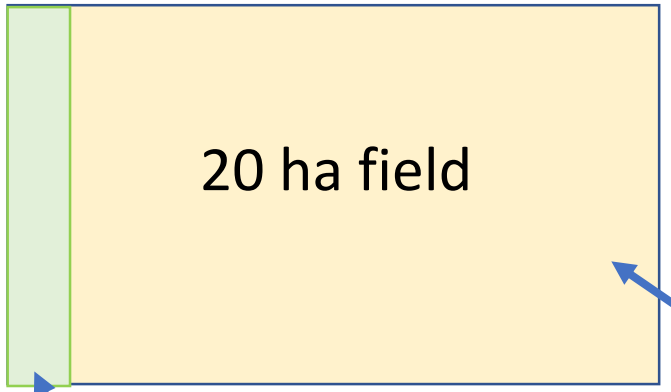
NATURAL CAPITAL
Puts £ values on public goods

ELM (payment by results)
Eg. Animal welfare
Rural livelihoods
Pollination
Water, Air, soil
Carbon capture

The concept.
Can't justify paying farmers for owning land(BPS) so pay them to deliver public goods instead

Future payments?

Available funds £800 million for environmental (Pillar 2) and £2.2 billion for BPS (Pillar 1).
BPS £226ha (Sept 2018)

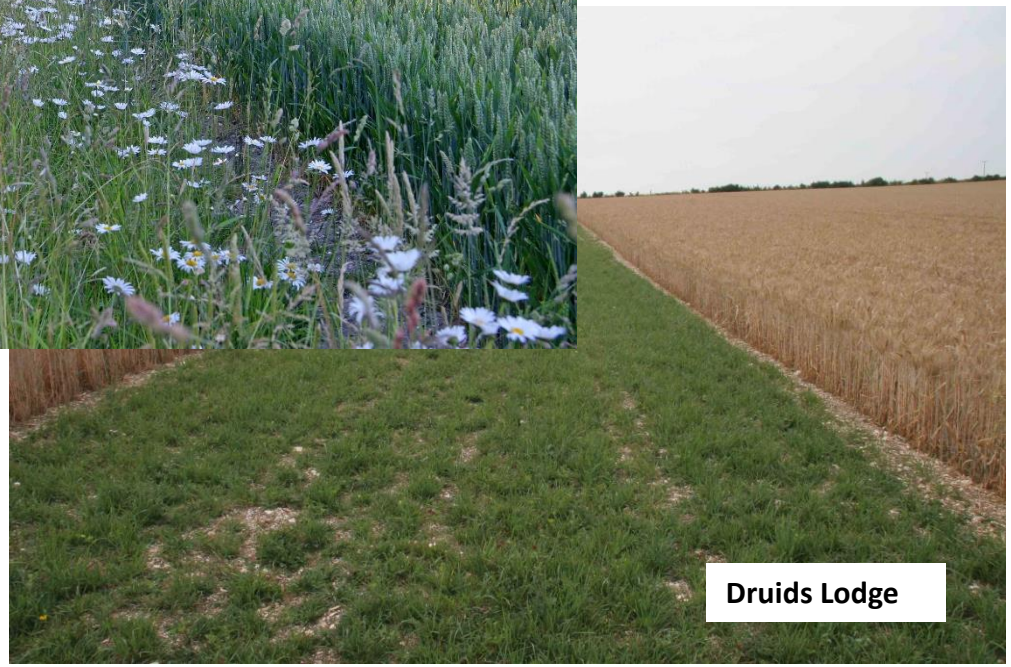


AB9. 0.5 ha of bird food = £320

19.5 ha of wheat.
BPS £ 226/ha x 19.5ha = £4,407 if public goods are delivered?

ASSIST
Natural pest control?

Flower habitats for beneficial insects



PAYMENT BY RESULTS.

Results-Based Agri-environment Payment Scheme (RBAPS) pilot study in England.

What's it all about?

- A 3 year 2016-18 EU funded pilot in England, Ireland, Spain and Rumania.
- Can delivery standards be improved by paying for quality?
- Applicants must be in an existing scheme.
- 34 agreements in two areas in England.
- Norfolk/Suffolk. Bird food and P&N
- Wensleydale.N.Yorkshire.Waders and species rich grassland.
- 2019 & 20. A two year extension.
- Accuracy of self assessment.
- Farmer attitude to the scheme..

NATURAL ENGLAND

WINTER BIRD FOOD. *Assessment 1 to 31 September*
Min 0.5 ha, min width 6m. In place until 31 Dec.
Sites are not fixed.
Sow at least 5 from; Cereals, Red and white Millet,
Quinoa, Fodder Radish, Dwarf sunflower, Linseed,
GOP, Mustard, SOSR. 50-60kg/ha N,P,K may be applied.

POLLEN AND NECTAR. *Assessment period 15 June to 31 July.*
Min 0.5ha. In place until end of project.
Sow a min of 5 legume species plus 2 non legumes.
Seed rate. 8-15kg/ha. Sow April-May or July-August.
5%Black Medick,15% Alsike,15%Red,15% Crimson,15% White.
Repeated cutting in establishment year is permissible.
Subsequent cutting. 50% 21 May & 7 June. All 1 Sept- 31 Oct.

WINTER BIRD FOOD PAYMENTS £/ha

Results Criteria: Number of Established Sown Species Producing Seed*	Grant payment rate where 50% or more of plot assessments reach the required plant or seed head threshold
5+	Tier 6 (£842)
4	Tier 5 (£674)
3	Tier 4 (£505)
2	Tier 3 (£337)
1	Tier 2 (£168)
0	Tier 1 (£0)

Mid tier AB9 £ 640ha

POLLEN & NECTAR PAYMENTS £/ha

Result Criteria: Number of sown flowering species present	Results Criteria: Percentage cover of flowering sown species * and Grant payment rate					
	0-49	50-59	60-69	70-79	80-89	90-100
5+	Tier 1 (£0)	Tier 6 (£423)	Tier 7 (£494)	Tier 8 (£564)	Tier 9 (£635)	Tier 10 (£705)
4	Tier 1 (£0)	Tier 5 (£353)	Tier 6 (£423)	Tier 7 (£494)	Tier 8 (£564)	Tier 9 (£635)
3	Tier 1 (£0)	Tier 4 (£282)	Tier 5 (£353)	Tier 6 (£423)	Tier 7 (£494)	Tier 8 (£564)
2	Tier 1 (£0)	Tier 3 (£212)	Tier 4 (£282)	Tier 5 (£353)	Tier 6 (£423)	Tier 7 (£494)
1	Tier 1 (£0)	Tier 2 (£141)	Tier 3 (£212)	Tier 4 (£282)	Tier 5 (£353)	Tier 6 (£423)
0	Tier 1 (£0)	Tier 1 (£0)	Tier 1 (£0)	Tier 1 (£0)	Tier 1 (£0)	Tier 1 (£0)

x

x Mid tier AB1 £ 511ha

Environmental thoughts for the future

Is climate change the new focus?

Where will ELM sit in the future? (Public goods)

What environmental values are 5% EFA's?

Have existing environmental schemes run out of time?

Env payments. Insufficient incentives, penalties, training?

Where will payment by results fit?

Pesticideovigelence. Prof. Ian Boyd (Defra) is proposing pesticides follow similar rules to the pharmaceutical industry..

Environmental thoughts for the future

Is climate change the new focus?

Dieter Helm (Chair Natural capital, DEFRA chief economist)
Carbon sequestration.
£1 billion to ELM; Broad & shallow, Higher tier,landscape scale.
£2 billion to Carbon sequestration;forestry,peat soils,wetlands.

GHG Emissions. Focus is increasingly on agriculture.
CO2 & methane. More Forestry, grass, peat soils, less livestock
George Eustice (DEFRA) Make UK the world leader in sustainable pesticide usage.
Intensive, extensive, re-wilding. Scientists don’t yet know.

Habitat creation summary points

Quality not quantity

PBR attitude

Correct management

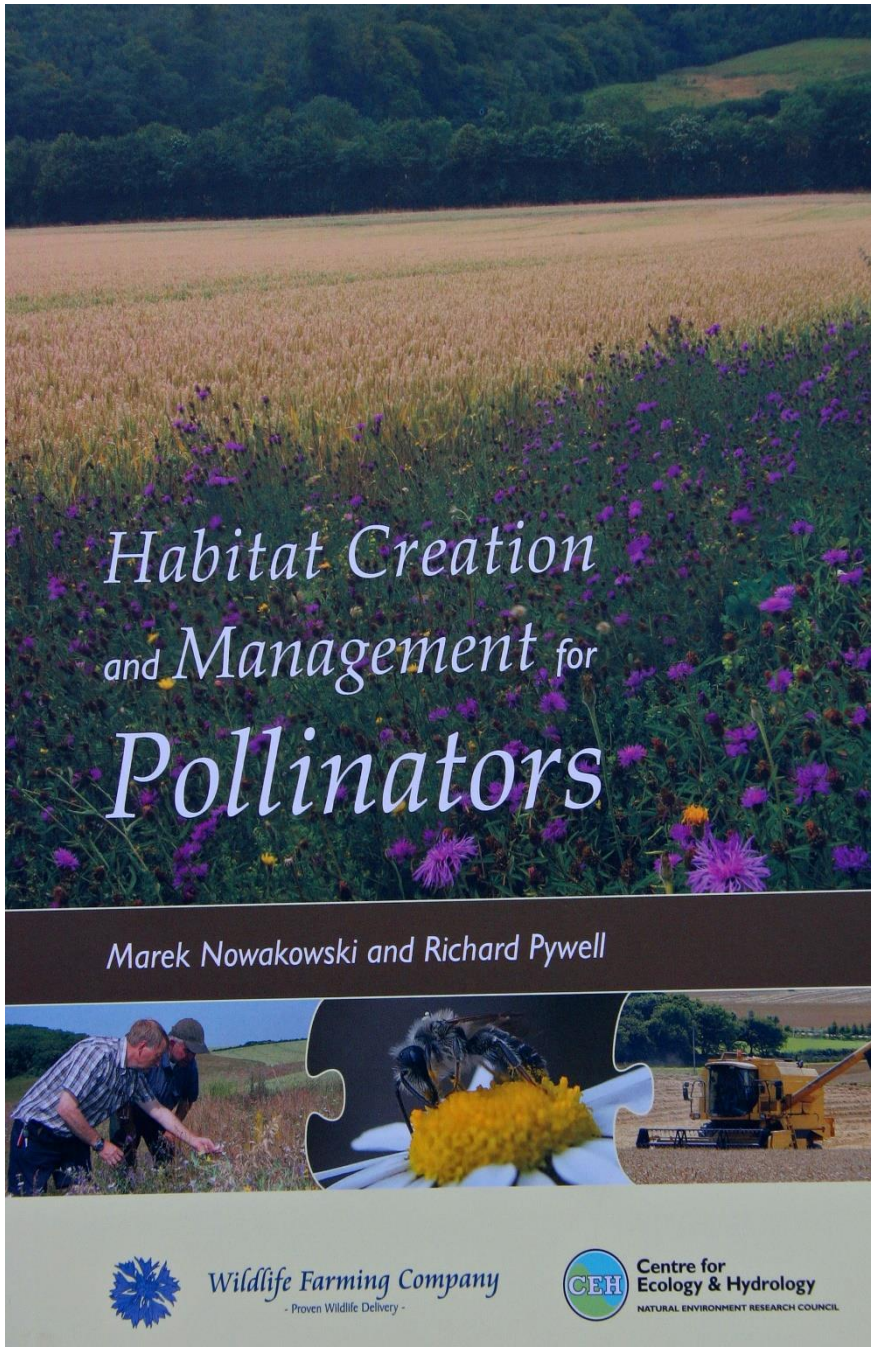
Training/knowledge

Utilise hedges

Global issues

PROFITABLE FARMING
PRACTICAL CONSERVATION
FIND THE SWEET SPOT

We know how to do it so someone make the deal more realistic and rewarding!



http://www.ceh.ac.uk/book-habitat-creation-and-management-pollinators

Jake Freestone (Farm manager, Overbury Farms)
Putting IFM into action (Case Study)

Conservation Agriculture- Making IPM Real

Jake Freestone N.Sch
Farm Manager
OVERBURY

14th January 2020

- **Introduction**

- Introduction
- **Conservation Agriculture**

- Introduction
- Conservation Agriculture
- **IPM- Working**

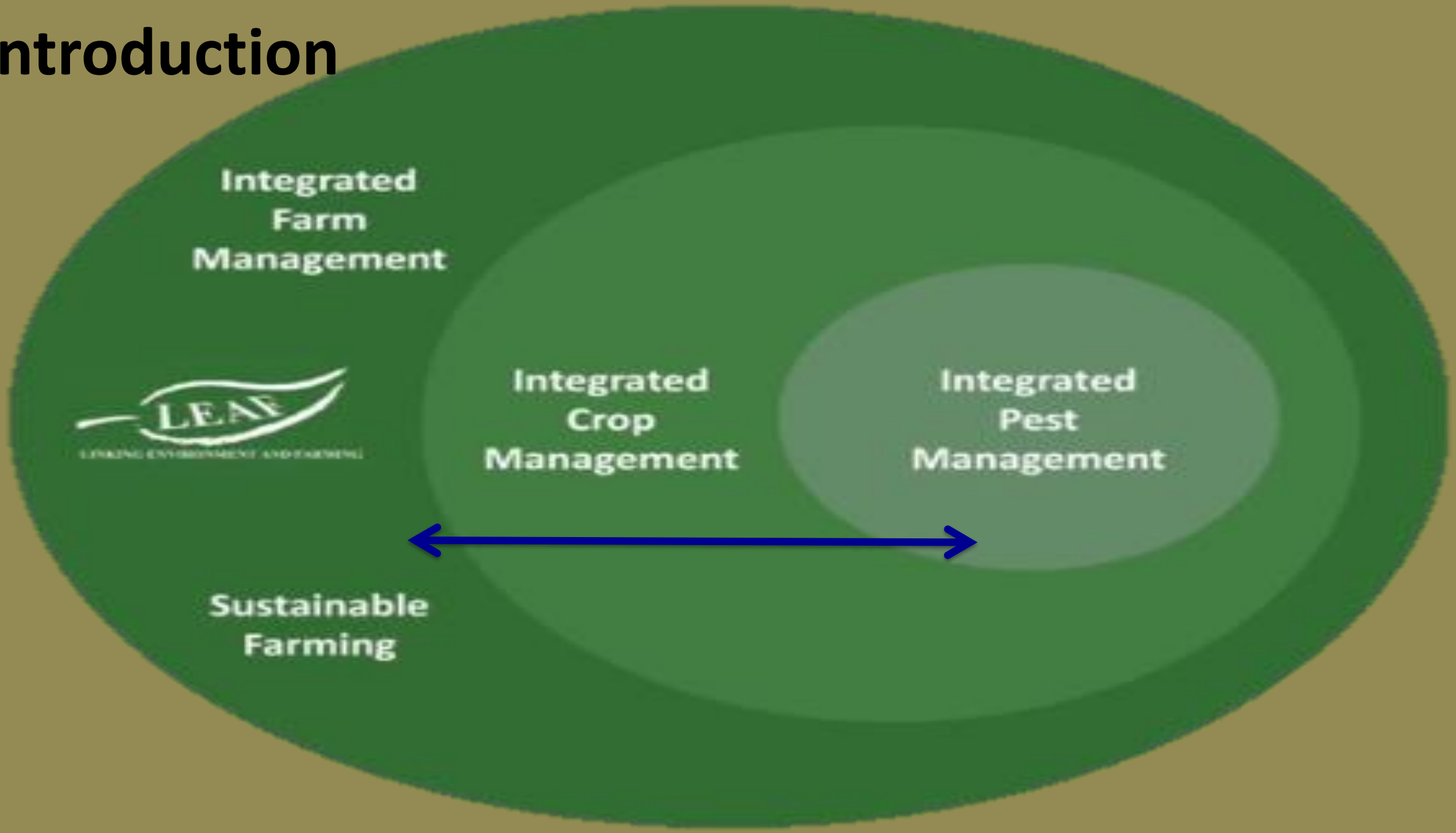
- **Introduction**

Introduction

Introduction

- Losing active Ingredients
- Sustainable Use Directive
- Public Good, Agricultural Bill
- Net Zero
- Industry advocates
- Opportunity

Introduction



Introduction

LINKING ENVIRONMENT AND FARMING

LEAF Sustainable Farming Review

You are using the Review tool on behalf of: Overbury Enterprises

Click on one of the sections below to continue completing your LEAF Sustainable Farming Review:

LEAF Sustainable Farming Review 2020

- Organisation and Planning
- Soil Management and Fertility
- Crop Health and Protection
- Pollution Control and By-Product Management
- Animal Husbandry
- Energy Efficiency
- Water Management
- Landscape and Nature Conservation
- Community Engagement
- LEAF Marque Document Collection

Go to my Reports

- Introduction
- **Conservation Agriculture**

Conservation Agriculture

- Minimise Soil Disturbance
- Keep the Soil Covered
- Long and Diverse Crop Rotations

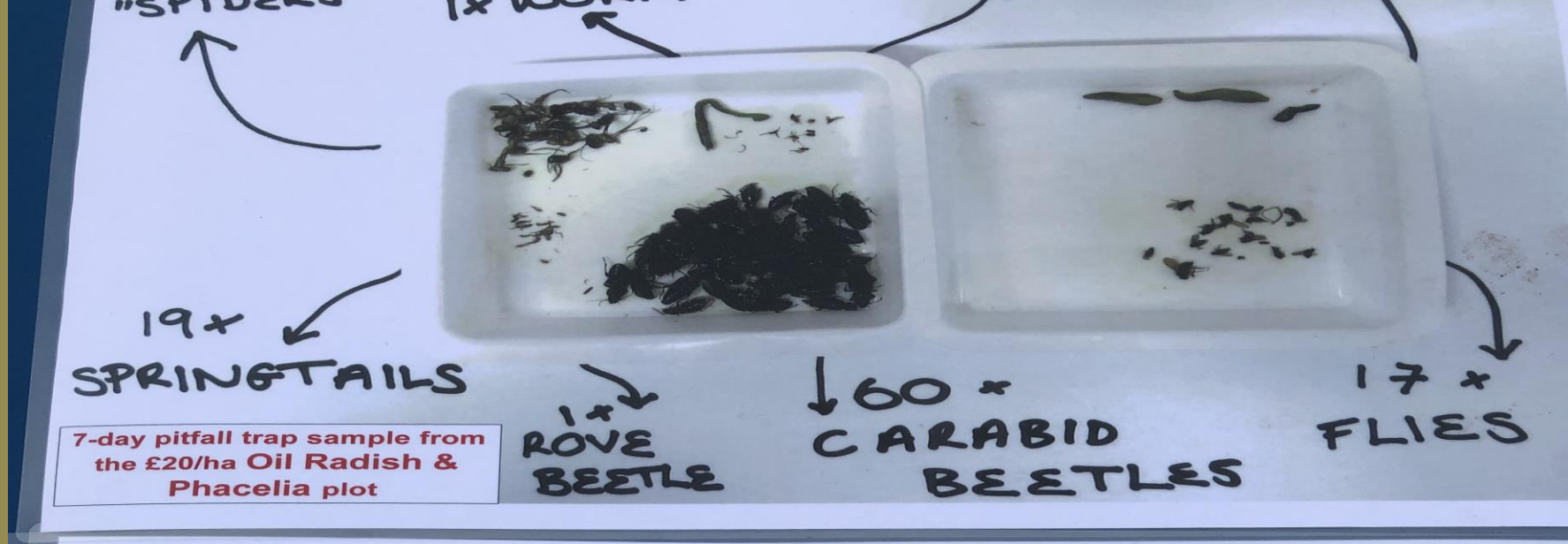
Conservation Agriculture

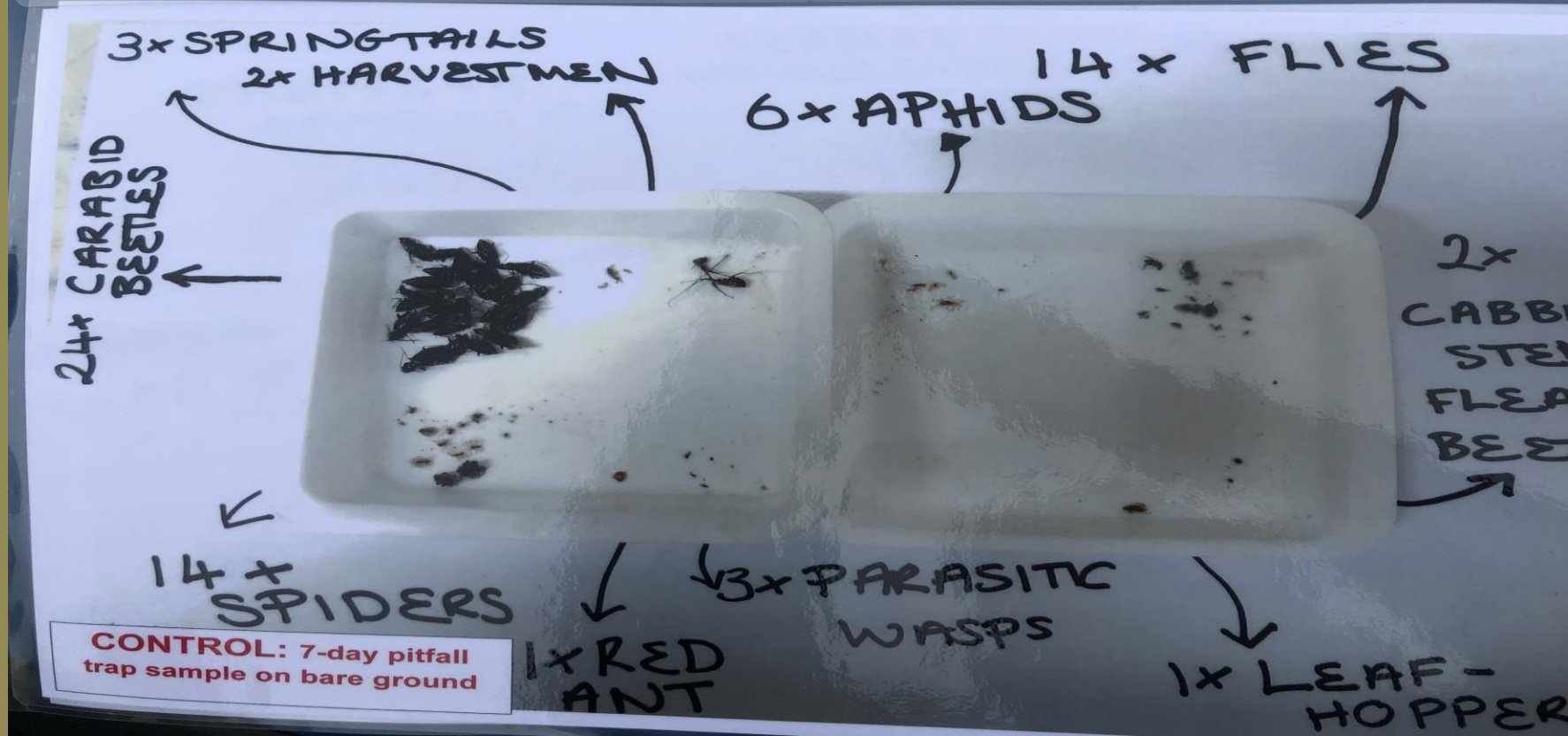
Minimise Soil Disturbance

Building a Home

Increasing Predators

Healthier soil hosting more beneficial insects, and more pests





Wessex Water

Faster, Cleaner water infiltration

Photo courtesy Kamilla Skaalsveen @KSkaalsveen

Minimal Soil Disturbance Saves £'s

Plough Based

- **Pre-2004**
- Establishment Cost per ha £169

Min Till

- **2004-2009**
- Establishment Cost per ha £153

One Pass System

- **2009 -2015**
- Establishment Cost per ha £124

Zero Tillage

- **Current**
- Establishment Cost per ha £52

it really does….

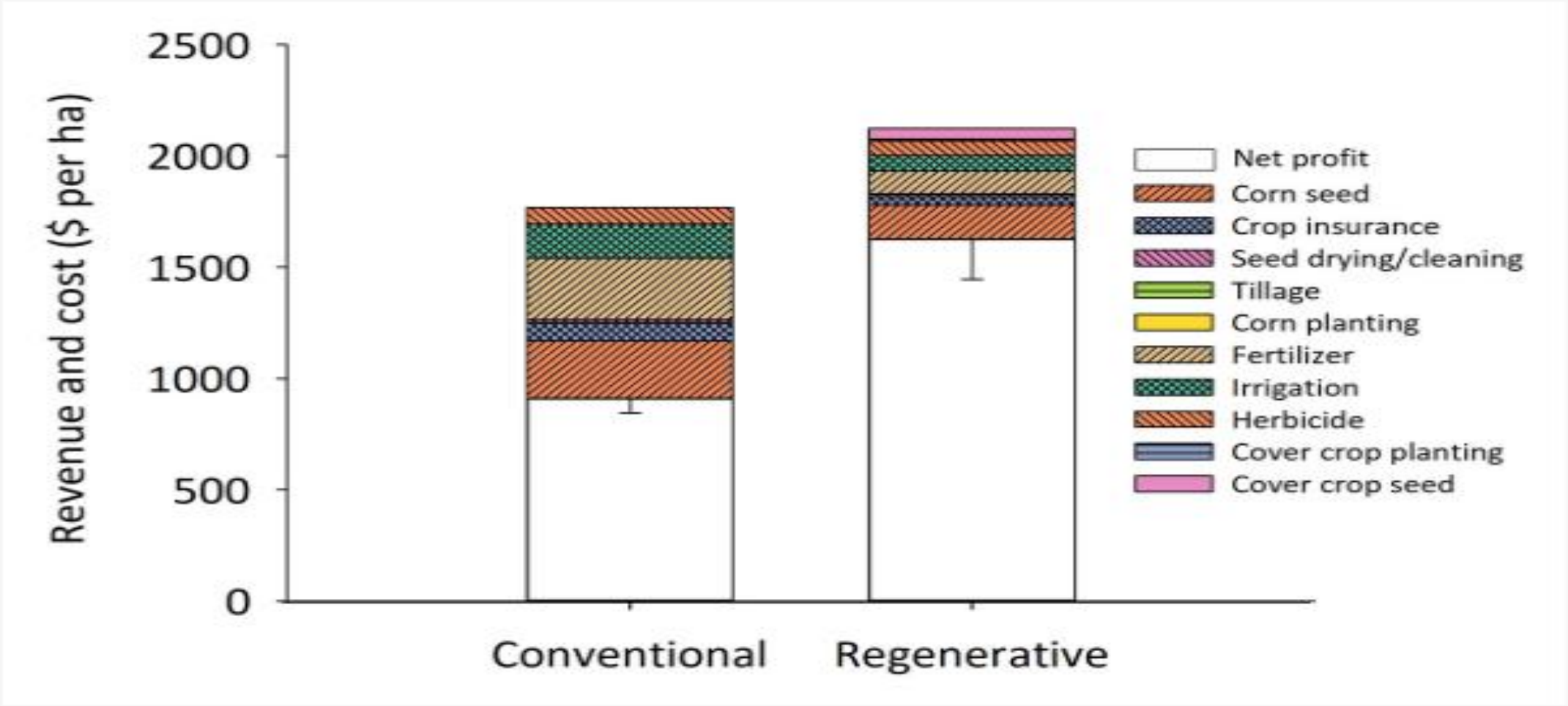


Figure 2: Regenerative corn fields generate nearly twice the profit of conventionally managed corn fields.

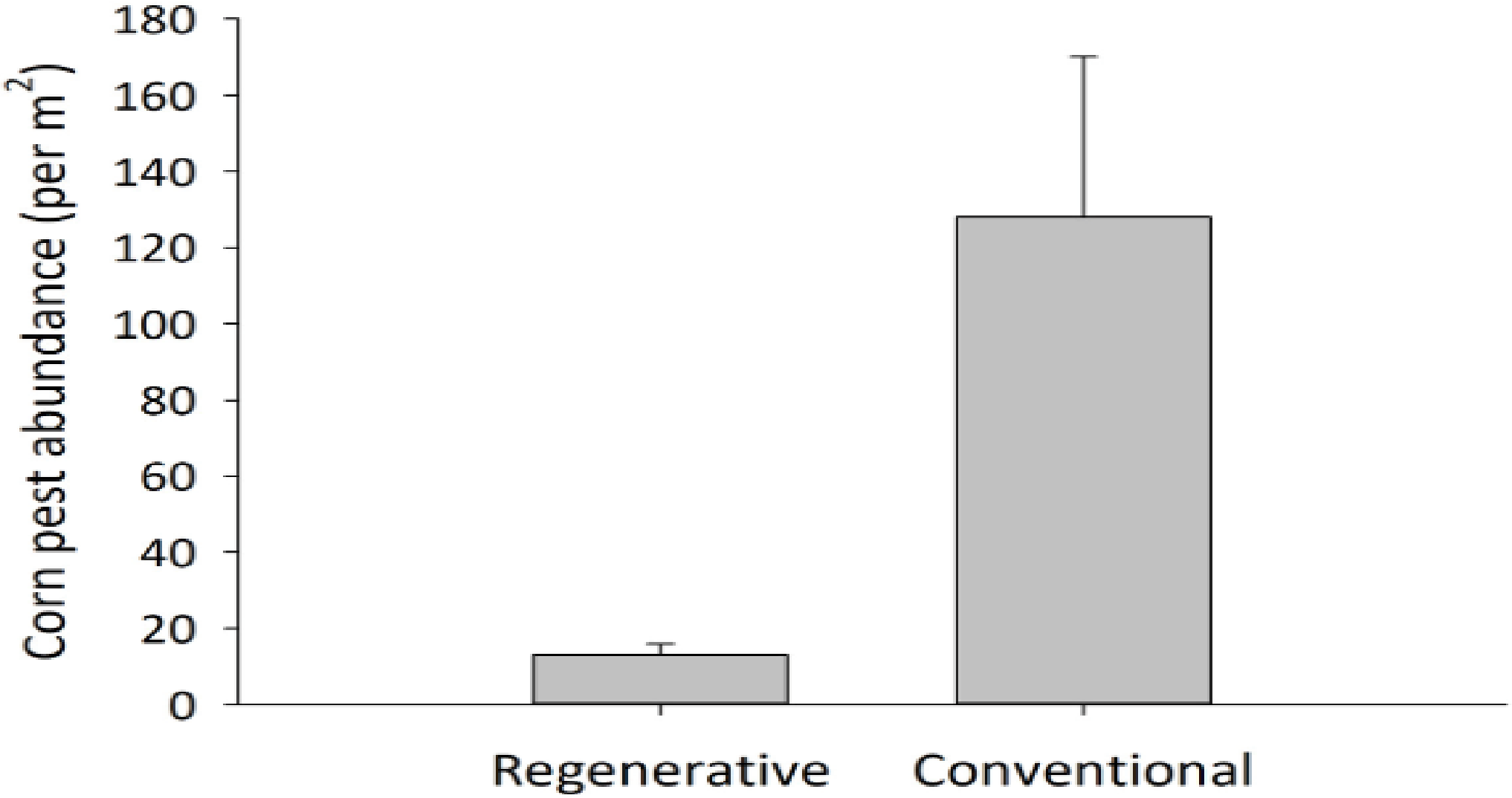
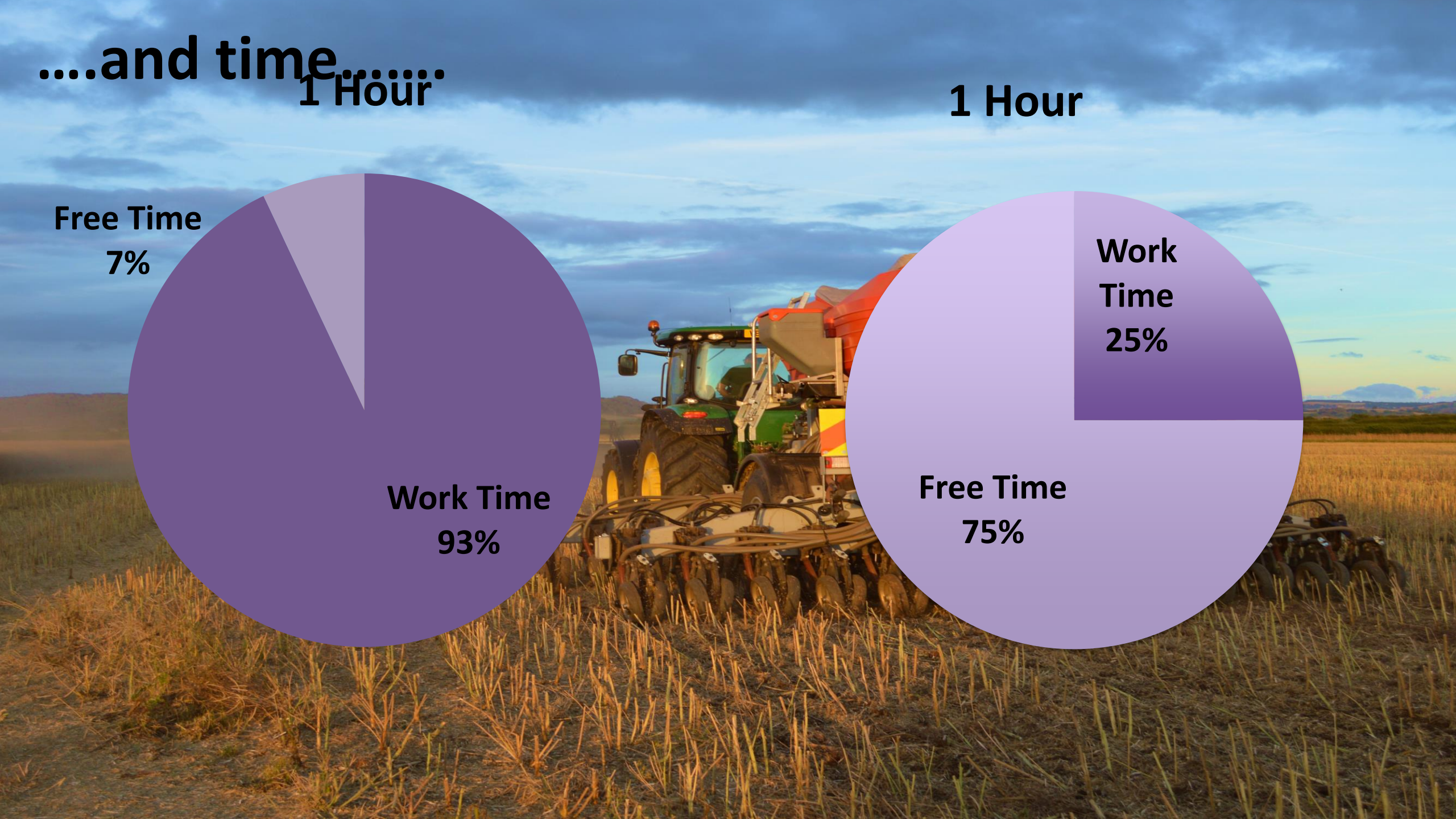


Figure 1: Insecticide-treated cornfields had higher pest abundance than untreated, regenerative cornfields.

….and time……



Rotations

Keep the Soil Covered

Keep the Soil Covered

- Introduction
- Conservation Agriculture
- **IPM- Working**

Integrated Pest Management

- Rotation
- Cover Crops
- Cultivation
- Variety Choice
- Monitoring
- Pesticide

Rotations

Cover Crops

Weed Suppression

Reduce soil erosion

Reduce soil compaction

Improve water infiltration

Build SOM

Fertility building (legumes)

Improve soil health

Nutrient capture

Encourage pollinators

Cover Crops

Cultivation

Variety Choice

AHDB Recommended List - Table 1

Winter wheat 2019/20

Yield, agronomy and disease resistance

AHDB RECOMMENDED

	KWS Zyatt	Skyfall	KWS Trinity	RGT Illustrious	Crusoe	KWS Siskin	KWS Extase	KWS Lili	LG Detroit	KWS Firefly	KWS Barnel	Elliot	KWS Bassett	Zulu
End-use group	nabim Group 1					nabim Group 2				nabim Group 3				
Scope of recommendation	UK	UK	UK	UK	UK	UK	UK	UK	E&W	UK	UK	UK	UK	UK
		C	*			C	NEW		NEW	NEW				C
Fungicide-treated grain yield (% treated control)														
United Kingdom (11.2 t/ha)	101	99	98	97	97	102	101	100	100	102	101	101	99	98
East region (11.2 t/ha)	100	99	98	97	96	102	101	100	100	103	101	101	99	98
West region (11.3 t/ha)	101	99	97	98	97	102	102	100	102	103	100	100	99	97
North region (11.2 t/ha)	99	98	98	94	93	100	[102]	103	[95]	[99]	105	102	99	100
Untreated grain yield (% treated control)														
United Kingdom (11.2 t/ha)	86	81	76	83	74	85	95	72	77	86	72	82	74	72
Agronomic features														
Resistance to lodging without PGR (1–9)	7	8	8	7	7	6	7	7	8	8	7	7	7	6
Resistance to lodging with PGR (1–9)	8	8	8	8	8	7	8	8	7	8	8	8	8	7
Height without PGR (cm)	83	82	81	88	81	83	89	81	84	81	82	84	84	88
Ripening (days +/- JB Diego, -ve = earlier)	0	0	+1	+1	+1	+1	0	+2	+1	+1	+1	+1	+2	+1
Resistance to sprouting (1–9)	[5]	5	6	[6]	6	[5]	-	7	-	-	[6]	[5]	[6]	5
Disease resistance														
Mildew (1–9)	7	5	8	6	6	8	6	8	5	5	6	6	5	7
Yellow rust (1–9)	8	5	9	9	9	9	9	7	9	9	9	9	8	5
Brown rust (1–9)	6	8	7	6	3	5	7	4	5	8	5	7	5	7
Septoria nodorum (1–9)	[6]	[6]	[6]	[6]	6	[7]	-	[6]	-	-	[5]	[6]	[6]	[6]
Septoria tritici (1–9)	6.4	5.9	5.5	6.1	6.5	6.7	8.1	5.9	5.7	7.0	4.5	6.0	5.1	5.2
Eyespot (1–9)	7@	6@	5	6@	5	4	[4]	5	[5]	[4]	4	4	5	4
Fusarium ear blight (1–9)	6	7	6	6	6	5	6	6	7	5	6	7	6	6
Orange wheat blossom midge	-	R	-	-	-	-	-	-	R	R	R	R	R	R

On the 1–9 scales, high figures indicate that a variety shows the character to a high degree (e.g. high resistance).
Comparisons of varieties across regions are not valid.

Monitoring

AHDB CEREALS & OILSEEDS

BEEF & LAMB | DAIRY | HORTICULTURE | PORK | POTATOES

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Events | Publications | Corporate | Tools | News

search site... Search

» Home » AHDB Aphid News » BYDV management tool

BYDV management tool

About the BYDV management tool

Download information about the BYDV tool

Barley/cereal yellow dwarf viruses (BYDV) are mainly transmitted by the bird cherry–oat aphid and the grain aphid.

Initially, aphids colonise relatively few crop plants. When the second generation offspring are produced, these tend to move away from the plant originally colonised. Controlling this generation is a key component of a BYDV management strategy.

The timing of the second generation can be approximated by accumulating daily average air temperatures above a baseline temperature of 3ºC. It takes around 170 'day degrees' (DD) for the second generation to be produced.

This tool can be used to calculate when the 170DD threshold has been reached at sites in our weather station network.

Select a weather station site or sites ('region').

Use the 'Starting Date' slider to set the start date for temperature accumulation. This should be either:

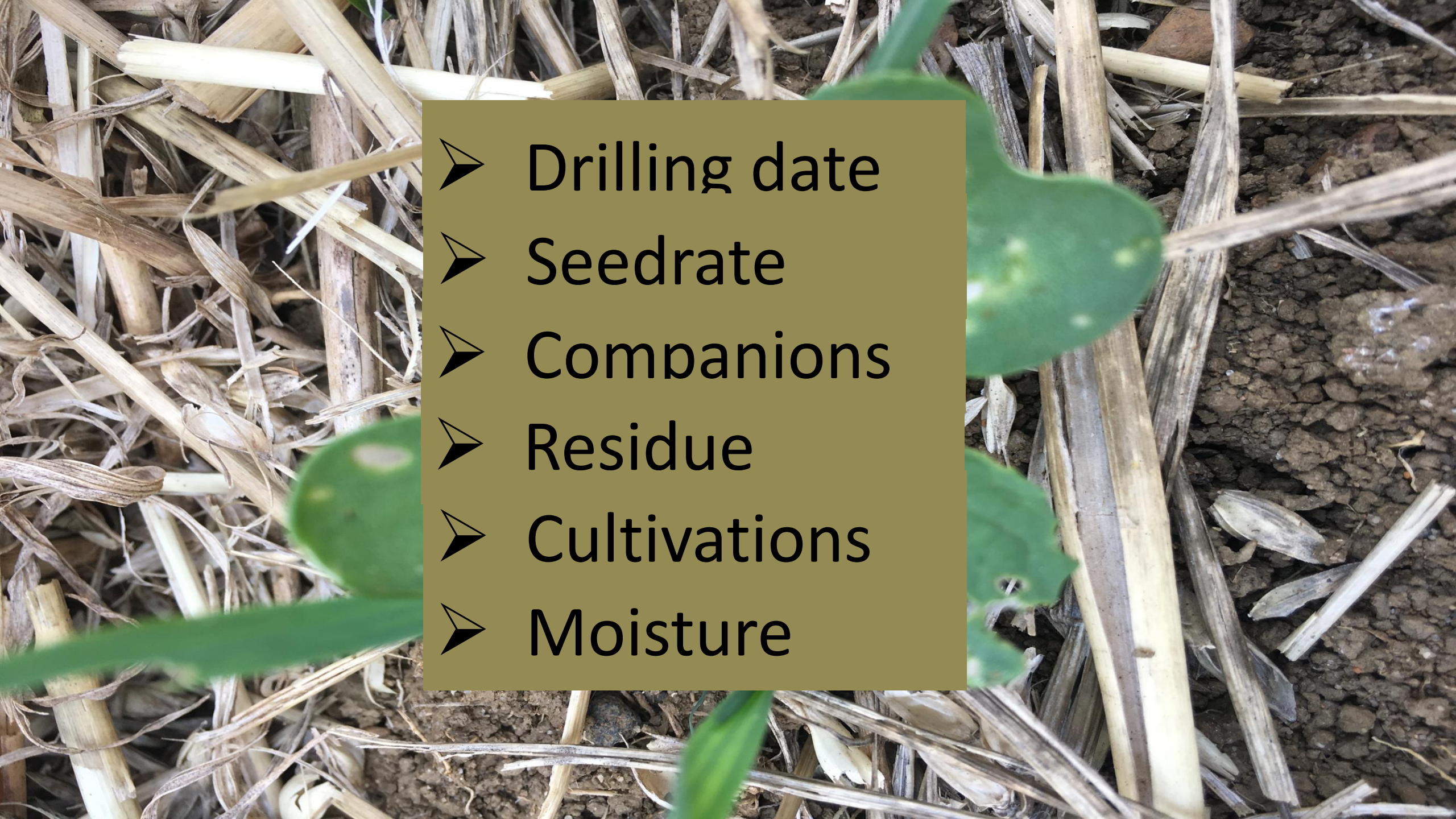
> When aphids are present and protection from neonicotinoid-treated seed has run out (around eight weeks after sowing)

> On the date of emergence for other crops

> Following a pyrethroid application (account for product persistence, see label)

Pesticides

- Right Advice
- Right Product
- Right Rate of Active
- Water quality and volume
- Application Technique



- Drilling date
- Seedrate
- Companions
- Residue
- Cultivations
- Moisture


Vetch
Oilseed Rape
Berseem Clover

Costs/Ha	
Seed	£30

Benefits £/Ha	
Herbicide	£35
Fertiliser	£25
Insecticide	£5

Net Benefit £35/Ha

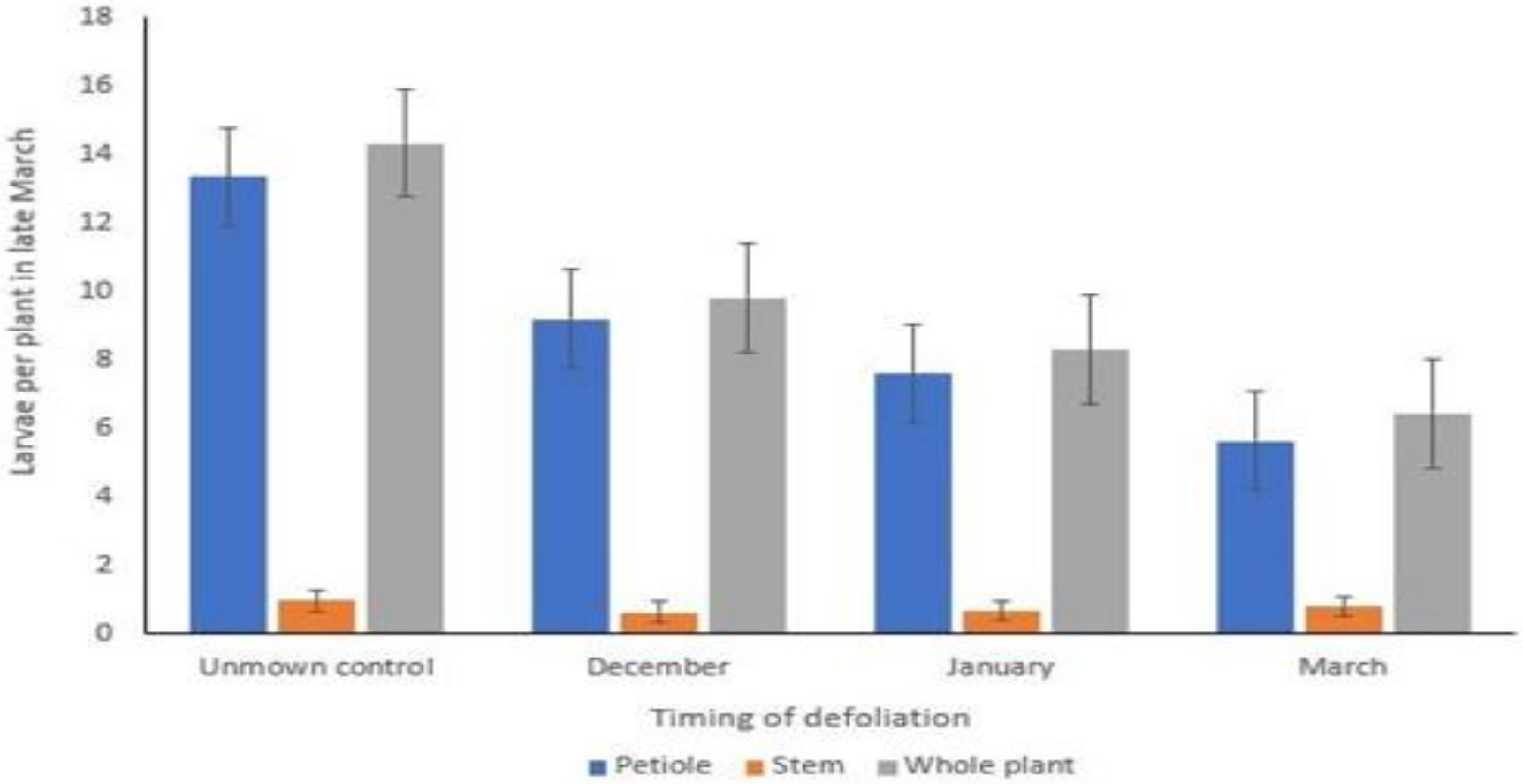


Figure 1. Impact of defoliation in December 2016, or January or March 2017 on numbers of CSFB larvae in oilseed rape plants at ADAS Boxworth.

Integrated Pest Management in Summary

- System approach
- Lots of advice
- Exciting way to farm
- Future support?
- Reverse the decline

“Never be afraid to try something new.
Remember amateurs built the Ark…
professionals built the titanic…..”

Thanks for listening

@No1FarmerJake

farmerjakef.blogspot.com

@No1FarmerJake

Bastiaan Brak , AHDB

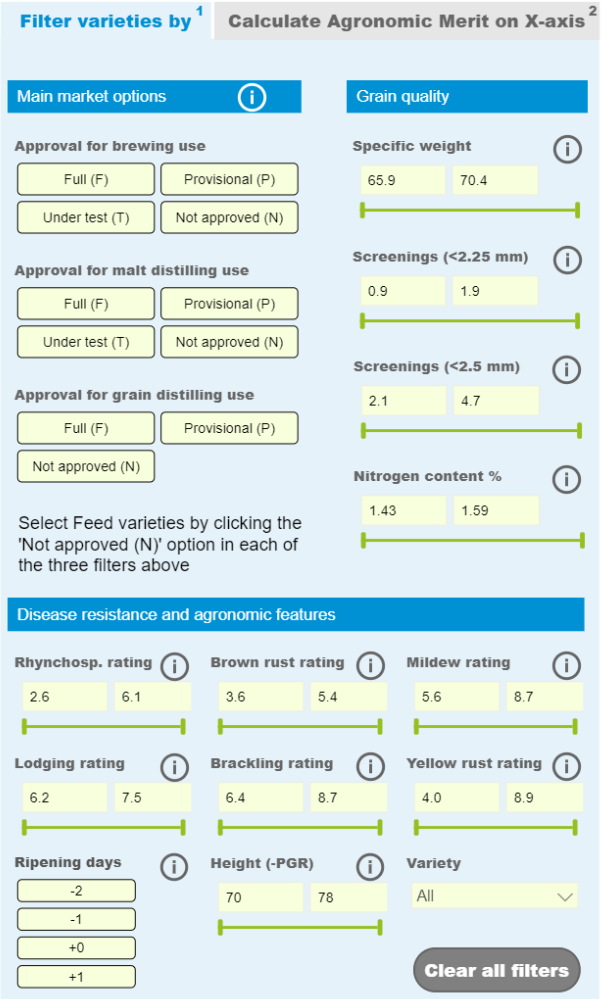
Agronomy SE 2020

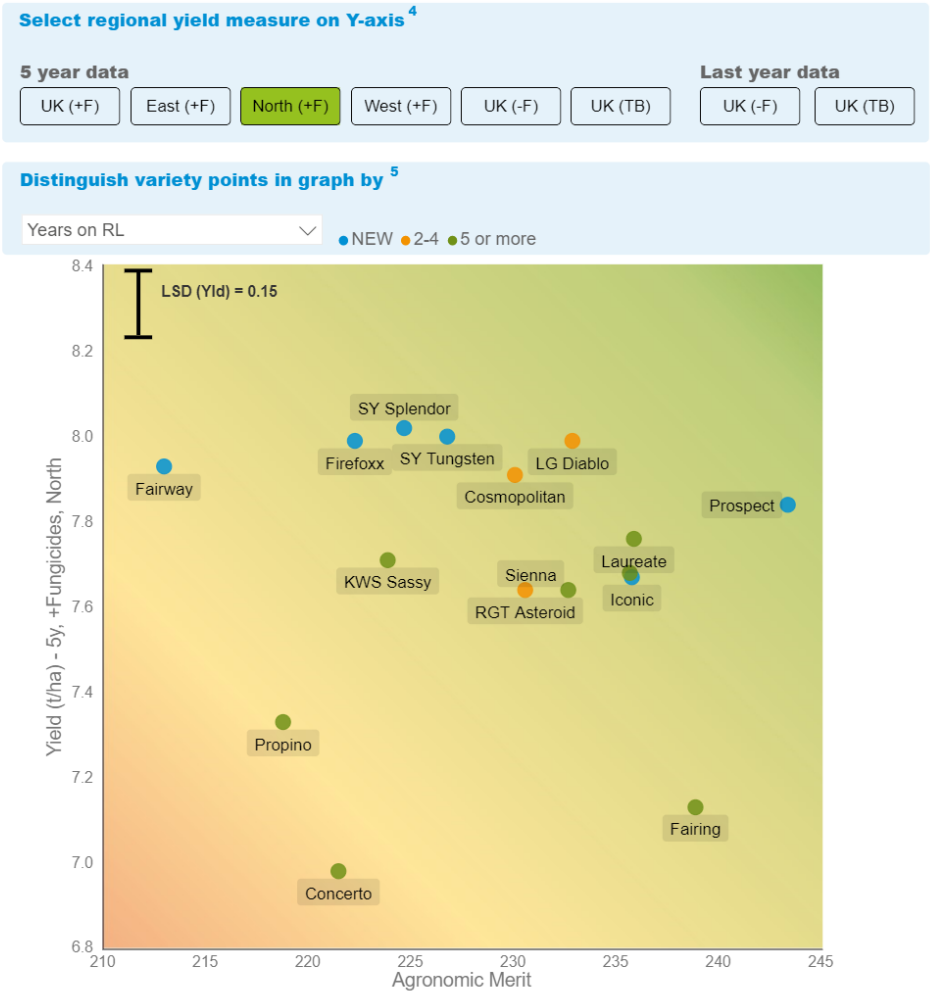
Variety selection as the basis of IPM

Bastiaan Brak (AHDB)

CEREALS & OILSEEDS

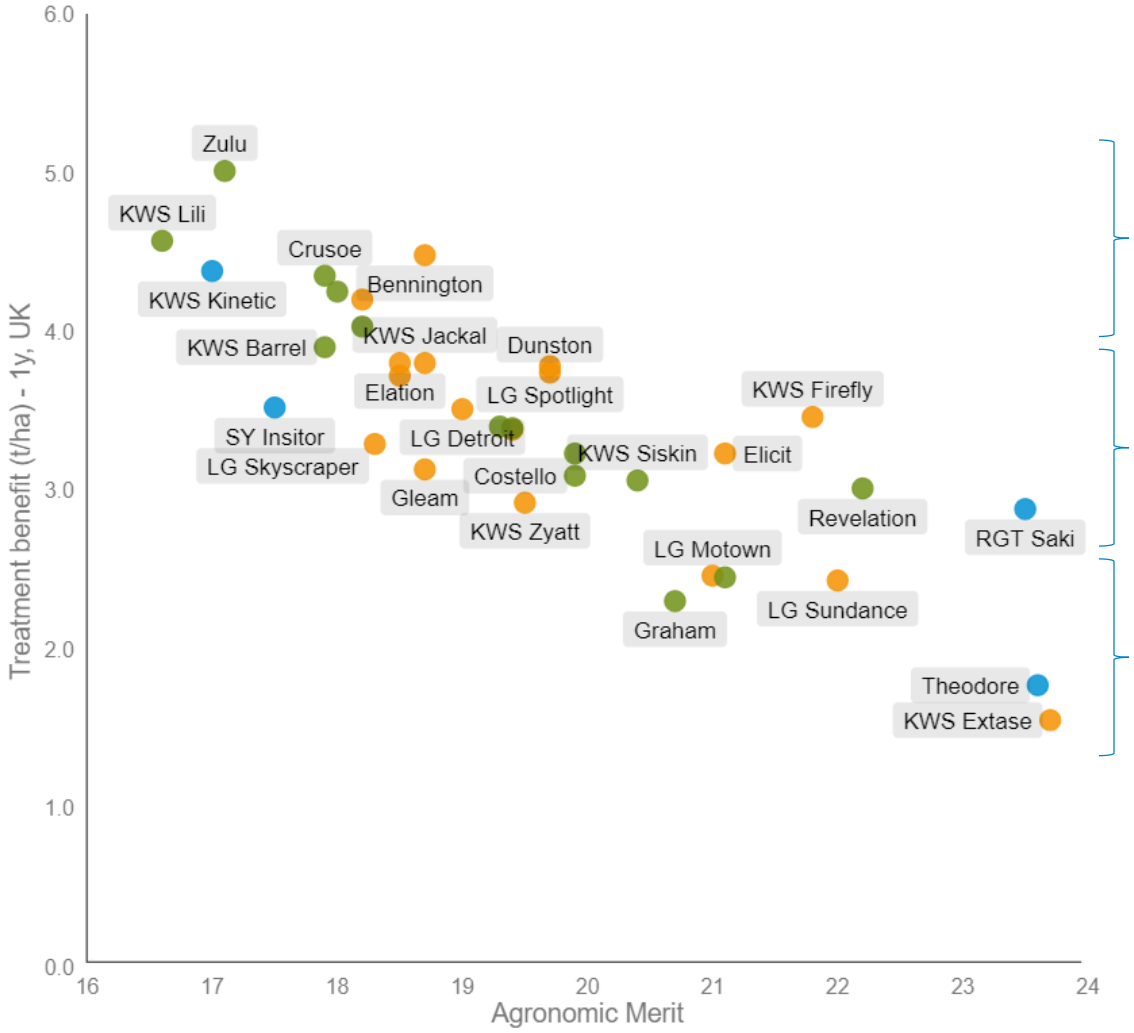
Variety selection tool – WW, SB available NOW





ahdb.org.uk/vst

Treatment benefit: Yld (+F) – Yld (-F)



"High fungicide input" varieties

"Medium fungicide input" varieties

"Low fungicide input" varieties

ahdb.org.uk/vst

Take home message

The new Recommended List Variety Selection Tool makes it easier for farmers to select (new) varieties in the context of disease management / fungicide input

ahdb.org.uk/vst

AHDB Event Summary & Finish

IPM tools

Disease monitoring tools

- Phoma forecast
- Light leaf spot forecast
- BYDV management tool
- Sclerotinia risk report
- Mycotoxin rainfall risk tool

Pest monitoring tools

- AHDB Aphid News
- Wheat bulb fly

Crop production tools

- RB209 App
- Variety selection tool (December 2019)

Sign up to alerts:
comms@ahdb.org.uk

or visit:
ahdb.org.uk/tools

Decision-making

- WeatherHub

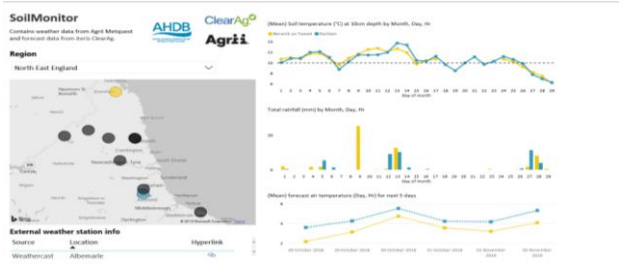
Provide evidence-base to farmers to make better informed decisions regarding current and future crop and soil management

- Excess winter rainfall

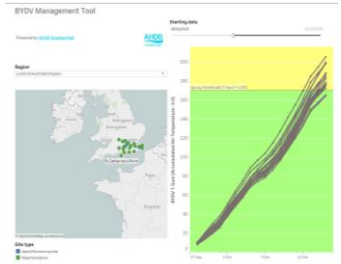
We publish information on excess winter rainfall (EWR) to help you estimate potential losses of nitrate through leaching.

- Brexit toolkit

Tools to help analyse your business, plan your direction and act on informed business decisions



Plan propyzamide applications



OSR - Very early phoma onset forecast

- RB209 App

The Nutrient Management Guide (RB209) provides guidelines for crop nutrient requirements and the nutrient content of organic materials

Sign up to alerts:
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or visit:
cereals.ahdb.org.uk/monitoring

Disease monitoring tools

- Phoma forecast

Provides information on the date when 10% of oilseed rape plants are expected to show symptoms of phoma leaf spot, generally regarded as the treatment threshold

- Light leaf spot forecast

Shows the proportion of the oilseed rape crop (disease resistance rating of 5) estimated to have more than 25% of plants affected by LLS in the spring for the current season

- Sclerotinia risk report

Weekly reports on forecasted sclerotinia infection risk, during the main risk period

- Fusarium infection risk report

Weekly regional report on fusarium infection risk which may help complete mycotoxin risk assessment

- BYDV management tool

The tool can be used to help you calculate when cereal crops are at the greatest risk of infection

Sign up to alerts:
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or visit:
cereals.ahdb.org.uk/monitoring

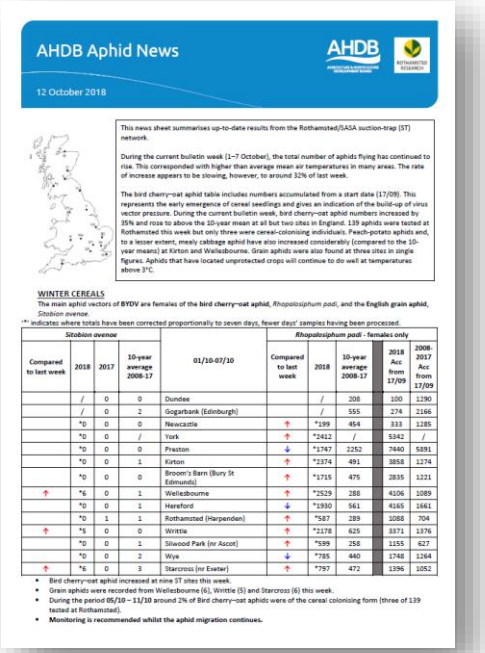
Pest monitoring tools

- AHDB Aphid News

Provides regional information on aphid numbers at key times of the year

- Wheat bulb fly survey

The survey can aid decision-making on whether a seed treatment is justified



AHDB Aphid News

12 October 2018

This news sheet summarises up-to-date results from the Rothamsted/SASA suction-trap (ST) network.

During the current bulletin week (1–7 October), the total number of aphids flying has continued to rise. This corresponded with higher than average mean air temperatures in many areas. The rate of increase appears to be slowing, however, to around 32% of last week.

The bird cherry–oat aphid table includes numbers accumulated from a start date (17/09). This represents the early emergence of cereal seedlings and gives an indication of the build-up of virus vector pressure. During the current bulletin week, bird cherry–oat aphid numbers increased by 35% and rose to above the 10-year mean at all but two sites in England. 139 aphids were tested at Rothamsted this week but only three were cereal-colonising individuals. Peach-potato aphids and, to a lesser extent, mealy cabbage aphid have also increased considerably (compared to the 10-year means) at Kirton and Wellesbourne. Grain aphids were also found at three sites in single figures. Aphids that have located unprotected crops will continue to do well at temperatures above 3°C.

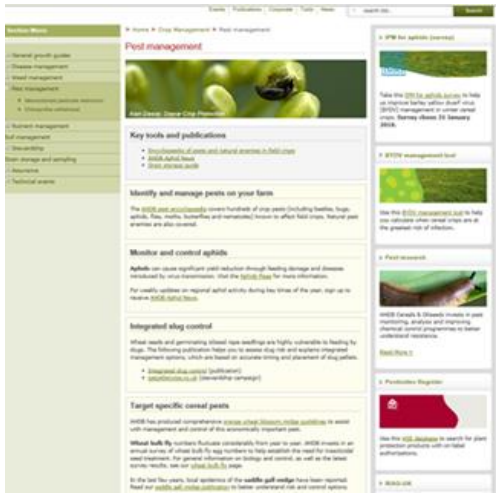
WINTER CEREALS

The main aphid vectors of **BYDV** are females of the **bird cherry–oat aphid**, *Rhopalosiphum padi*, and the **English grain aphid**, *Sitobion avenae*.

'*' indicates where totals have been corrected proportionally to seven days, fewer days' samples having been processed.

Sitobion avenae					*Rhopalosiphum padi* - females only				
Compared to last week	2018	2017	10-year average 2008-17	01/10-07/10	Compared to last week	2018	10-year average 2008-17	2018 Acc from 17/09	2008-2017 Acc from 17/09
	/	0	0	Dundee		/	208	100	1290
	/	0	2	Gogarbank (Edinburgh)		/	555	274	2166
	*0	0	0	Newcastle	↑	*199	454	333	1285
	*0	0	/	York	↑	*2412	/	5342	/
	*0	0	0	Preston	↓	*1747	2252	7440	5891
	*0	0	1	Kirton	↑	*2374	491	3858	1274
	*0	0	0	Broom's Barn (Bury St Edmunds)	↑	*1715	475	2835	1221
↑	*6	0	1	Wellesbourne	↑	*2529	288	4106	1089
	*0	0	1	Hereford	↓	*1930	561	4165	1661
	*0	1	1	Rothamsted (Harpenden)	↑	*587	289	1088	704
↑	*5	0	0	Writtle	↑	*2178	625	3371	1376
	*0	0	1	Silwood Park (nr Ascot)	↑	*599	258	1155	627
	*0	0	2	Wye	↓	*785	440	1748	1264
↑	*6	0	3	Starcross (nr Exeter)	↑	*797	472	1396	1052

- Bird cherry–oat aphid increased at nine ST sites this week.
- Grain aphids were recorded from Wellesbourne (6), Writtle (5) and Starcross (6) this week.
- During the period **05/10 – 11/10** around 2% of Bird cherry–oat aphids were of the cereal colonising form (three of 139 tested at Rothamsted).
- **Monitoring is recommended whilst the aphid migration continues.**



Pest management

Key tools and publications

Identify and manage pests on your farm

Monitor and control aphids

Integrated slug control

Target specific cereal pests

Sign up to alerts:
comms@ahdb.org.uk

or visit:
cereals.ahdb.org.uk/monitoring

Management tools

- Seed rate conversion

The seed rate conversion tool to allows you to calculate the kg/ha of seed you require based on your planned seed rate/m^2 and the thousand grain weight

- Spray volume calculator

This tool to can be used to convert gallons/acre to litres/ha and vice versa

- Yield calculator

This conversion tool converts tons/acre, tonnes/acre and tonnes/ha and vice versa

- Fertiliser conversion

This spray tool can convert gallons/acre to litres/ha and vice versa

- Machinery cost calculator

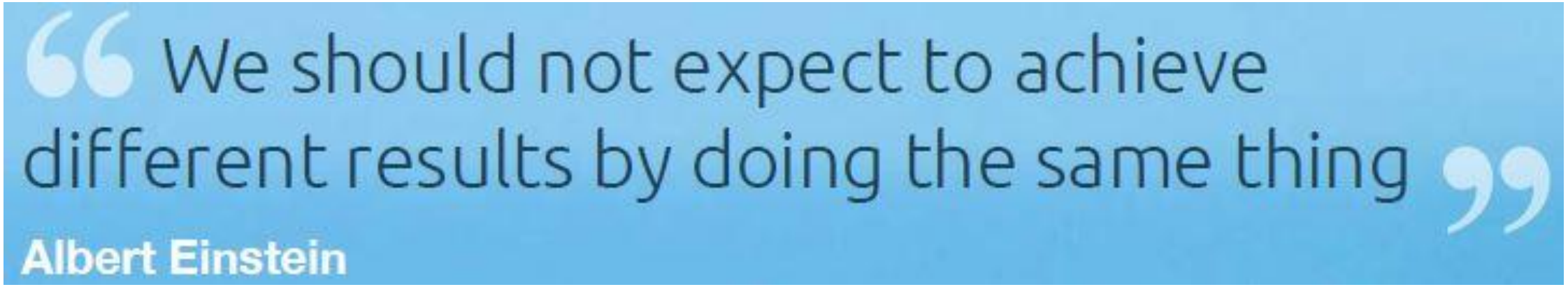
This calculator allows you to calculate the cost of farm machinery per hectare or per hour. It can illustrate the savings or cost of owning your own equipment, hiring or getting in a contractor

- Soil monitoring tool

This tool has been designed to guide propyzamide planning

Visit:
cereals.ahdb.org.uk/tools

3. Compare yourself with others and gather information



FARMBENCH

ahdb.org.uk/farmbench

Canterbury MF Event Dates

AHDB
AGRICULTURE & HORTICULTURE DEVELOPMENT BOARD

13th February 2020 (10.30 – 13.30)	Labour & Machinery Review Drilling into your fixed costs to sow a profit Labour & machinery review **Harry Henderson & Rob Meadley of Brown & Co**
12th March 2020 (10.30 – 13.30)	Consumer trends and grain marketing strategies for now (and maybe after Brexit) **Steve Evens AHDB** **Andy Huxham(Graindex) alternative marketing** **Speaker from FC Stone – London – identifying the lucrative markets**

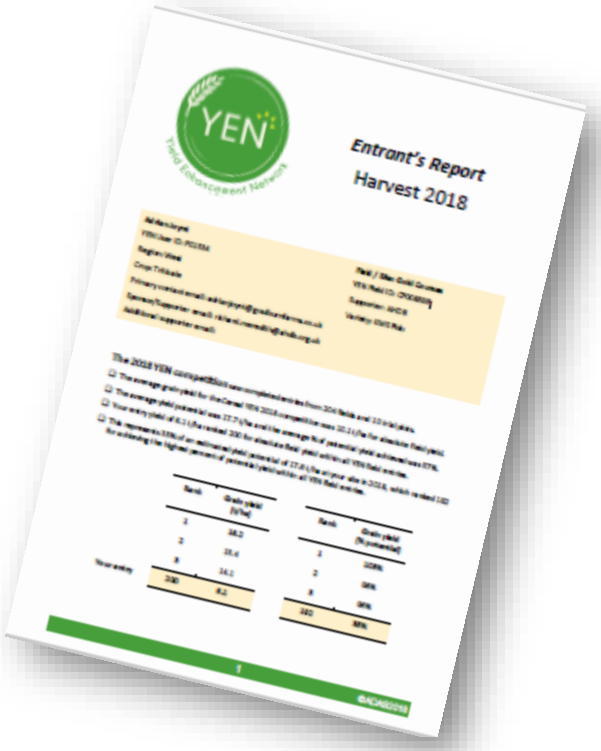
CEREALS & OILSEEDS

Petworth MF Event Date

23rd January 2020 (10.30 - 13.30)	Collaborative Ventures **Adrian Matthews – JV specialist & Ag. bus. Consultant** **Rob Fox, Farm Manager (case study)**

Yield Enhancement Network (YEN)
Strategies to develop yield consistency

The YEN exists to help any member from the UK, Europe or beyond to close the gap between current yields and potential yields



Report includes:

- Data on growing conditions
- Soil analysis
- Yield analysis
- Crop nutrition
- Treatment comparisons

AHDB Southern YEN Conference **27th February 2020** **9.45 – 13.30**	**Sparsholt College, Westley Court Conference Centre, Winchester. Hants**	• **Dr Sarah Kendall : YEN the story so Far** • **David Hoyles : Practical & meaningful farm trialling** • **Dr Syed Shah: Micronutrients & biostimulant trial data** • **Dr Sajjad Awan: Nutrition (why, what and when to use)** • **Alex Wilcox : My strategy to achieve yield**

Integrated Pest Management

Key AHDB Publications

- Encyclopaedia of pests and natural enemies
- Encyclopaedia of arable weeds
- Encyclopaedia of arable diseases
- Recommended Lists for cereals and oilseeds

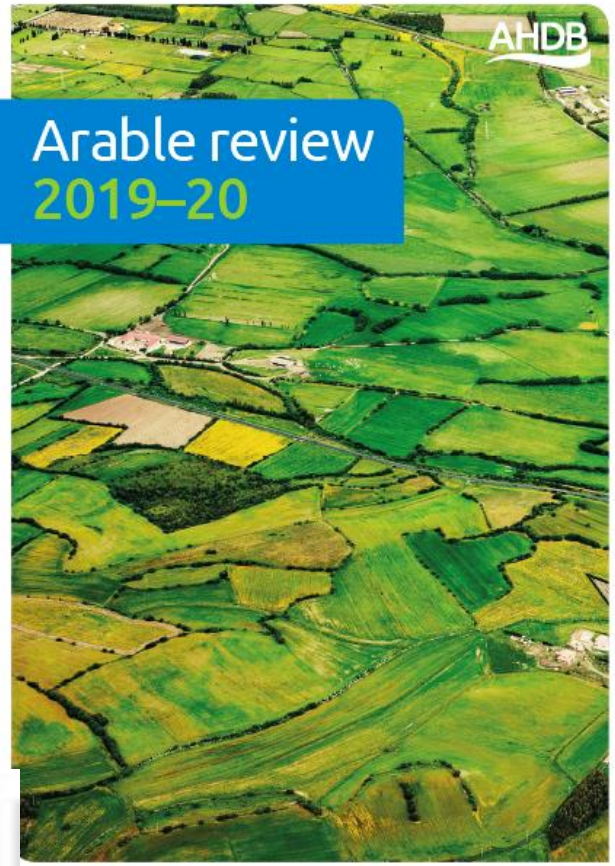
AHDB Experts

- Charlotte Rowley, Crop Protection Scientist – Pests
- Joe Martin, Crop Protection Scientists – Weeds
- Catherine Harries, Crop Protection Scientist – Diseases

Key current AHDB Research

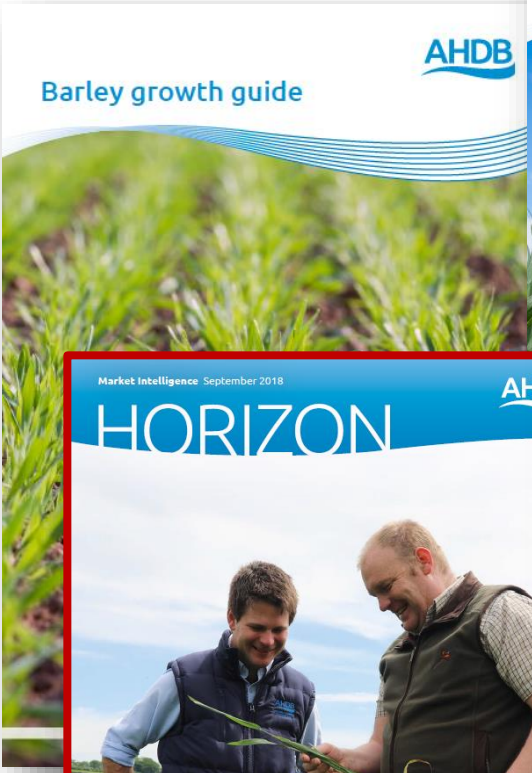
- Novel approaches to CSFB control (21510042)
- Management of aphids and BYDV risk (P1901308)
- Fungicide performance in wheat, barley and oilseed rape (21120013)
- Monitoring and understanding fungicide resistance (21120018a)
- Investigating herbicide resistance in brome (21120059)
- Cost-benefit of variable rate PPPs (2140012101)

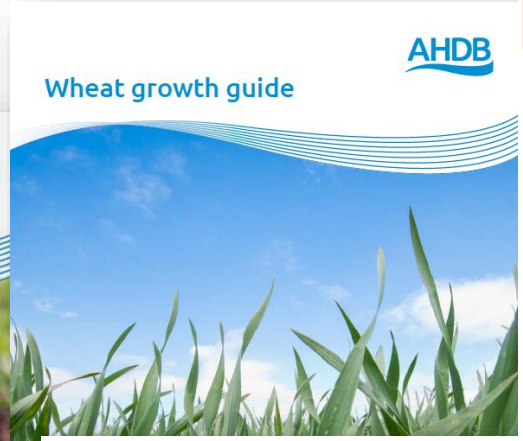
New publications

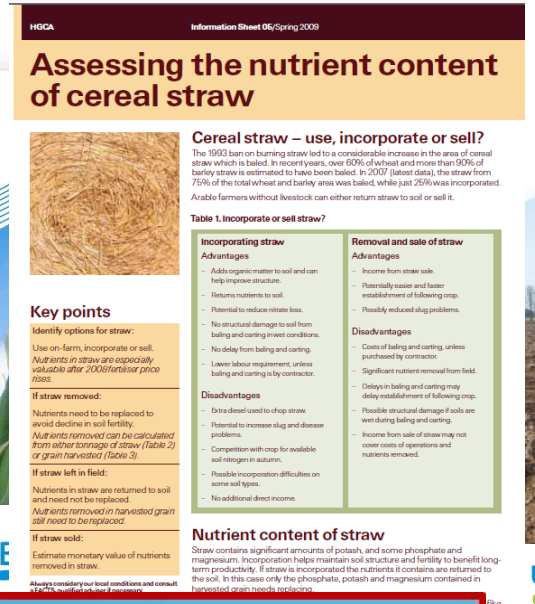


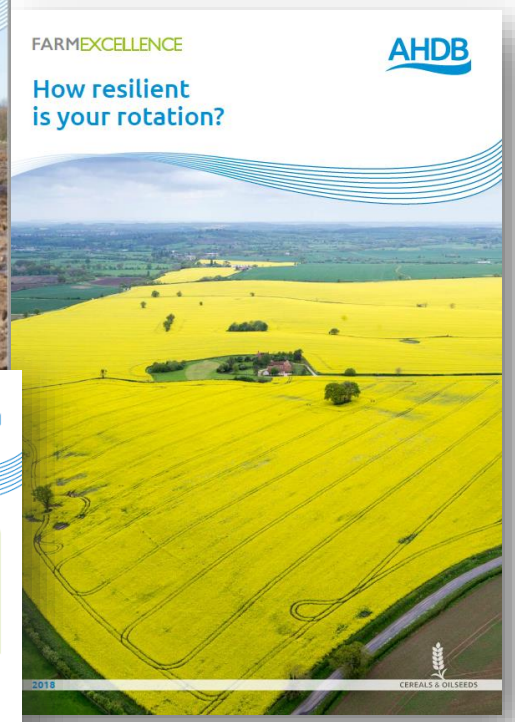
Publications@ahdb.org.uk
Tel: 0247 799 0069

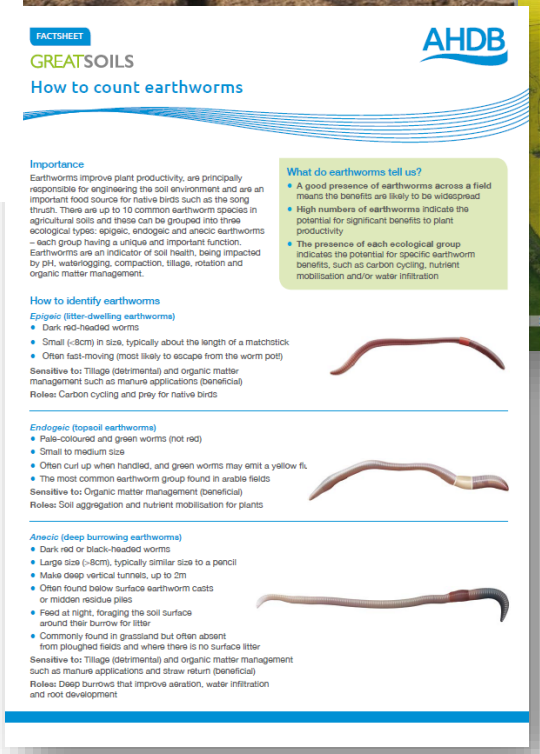
other publications

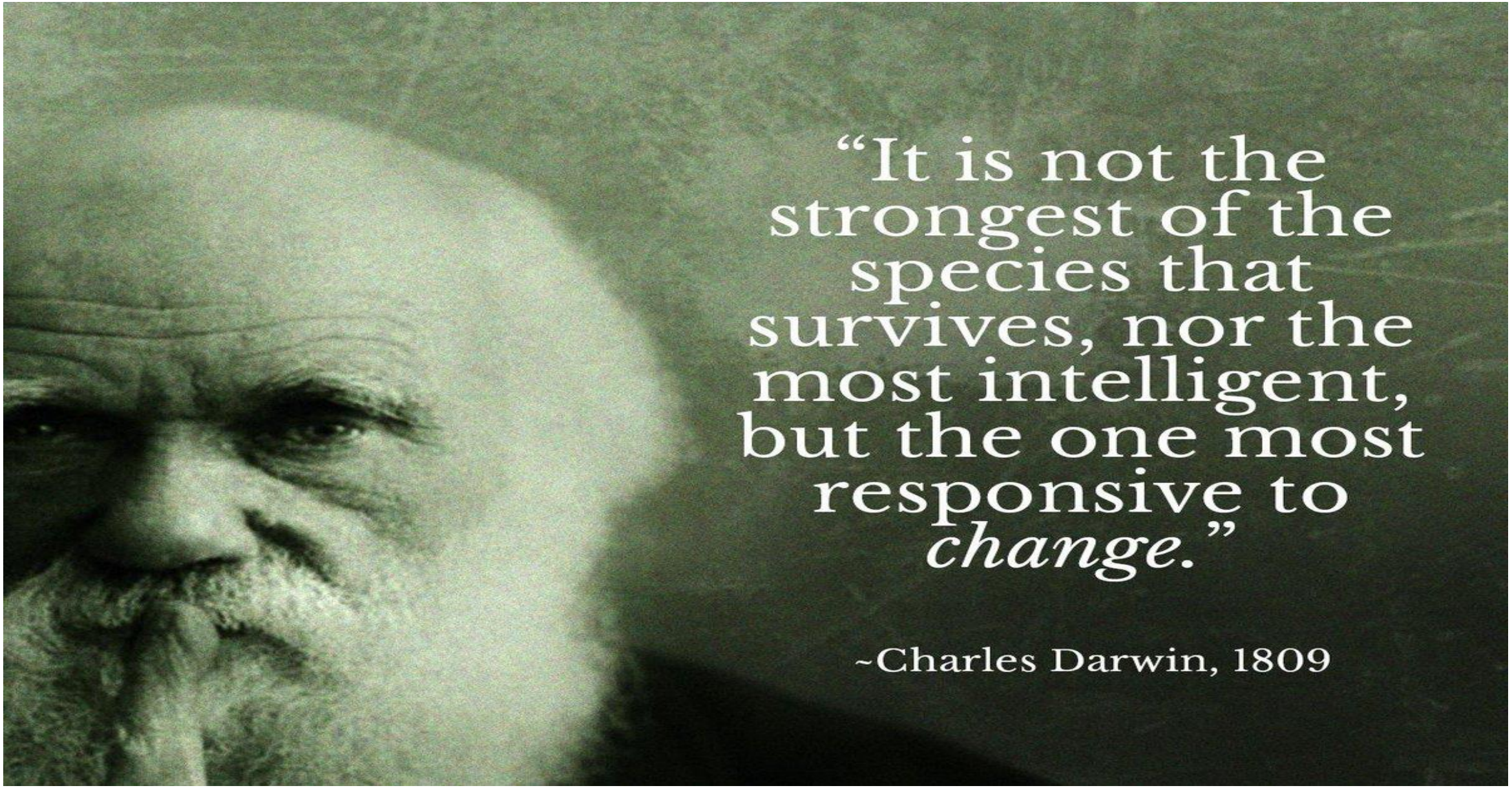











"It is not the strongest of the species that survives, nor the most intelligent, but the one most responsive to *change*."
~Charles Darwin, 1809


‘Inspiring our farmers, growers and industry to succeed in a rapidly changing world’