
The Scottish
Government
Riaghaltas na h-Alba


AHDB
AGRICULTURE & HORTICULTURE
DEVELOPMENT BOARD


SRUC


SRDP
Farm
Advisory
Service

Scotland Agronomy Roadshows 2023

Adrian James, Cereals & Oilseeds Knowledge Exchange Manager, AHDB

Housekeeping

BASIS/NRoSO Points

Please remember to fill in your details on the form on the table.

Name; BASIS Account No; Postcode

Name; NRoSO Member No; Date of Birth; Postcode

Agronomy Roadshows 2023

- **10th January 2023**– Buccleuch Arms TD6 0EW
- **12th January 2023** – Murrayshall Country House Hotel PH2 7PH
- **18th January 2022** – Thainstone House Hotel AB51 5NT

AHDB Update

- **Strategic Farm Scotland**
  - 2022 results are available on the AHDB YouTube page
  - Summer open day 2023 20/6/23
  - 2023 results webinars November 2023

  Please monitor the AHDB website for further dates and to register

RL review

Please fill out the questionnaire on you seat and leave it on the table.

Three focus groups planned for

31/1/23 8am-9.30am **13/1/23 12pm-1.30pm** **22/1/23 9am-10.30am**

Recommended Lists for cereals and oilseeds (RL) review (2022–2023) | AHDB

Please fill out the keeping in touch forms to update your information.

RECOMMENDEDLISTS

RL review

What do *you* recommend?

You rated the RL* **4.2/5.0**

Complete the questionnaire to direct the future of the RL**

For further information, visit:

ahdb.org.uk/rl-review

**Based on levy payer Shape the future ratings (2022)*

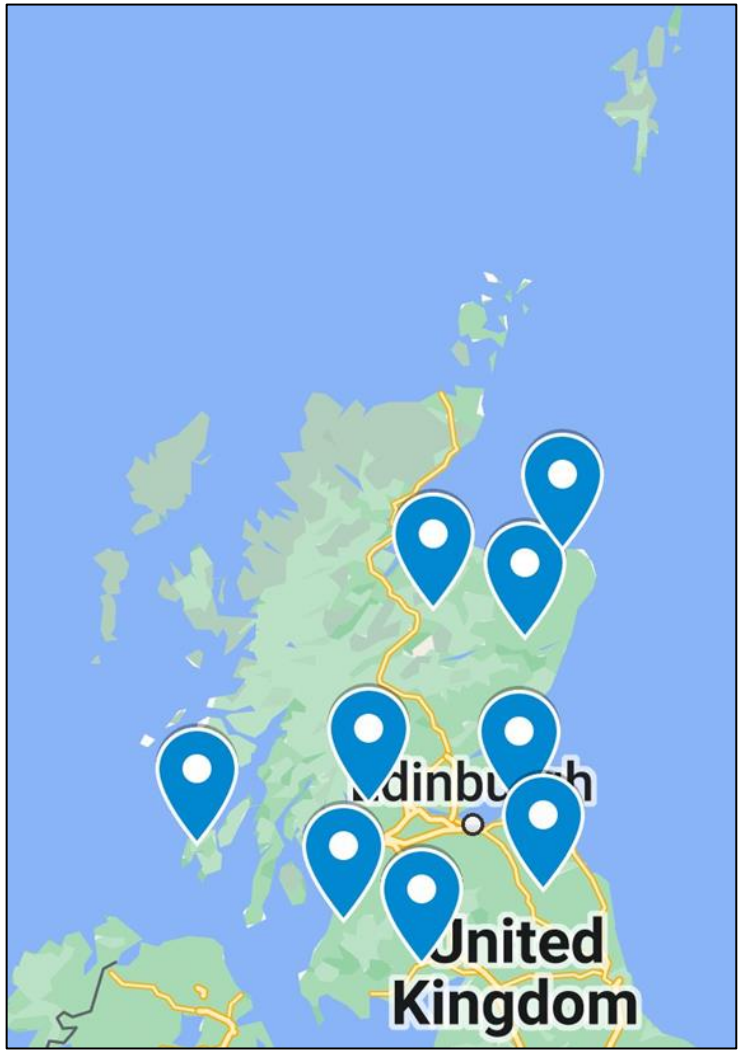
***Questionnaire open until 17 February 2023*

MONITOR FARM Scotland

AHDB

Monitor Farms in Scotland

- 1 arable
- 6 mixed
- 2 beef & sheep



Arable Scotland

Tuesday 4th July 2022, Balruddery Farm, Invergowie, Dundee, DD2 5LL

SRUC

AHDB

The James Hutton Institute

Event supporters/sponsors:

SRDP Farm Advisory Service

SEFARI

The Scottish Farmer

SSCR Scottish Society for Crop Research

Publications

Ordering publications from AHDB

AHDB has a number of technical resources for you to use on farm and in the office

If you would like to order a hard copy of one of our publications, please contact:
Email: **publications@ahdb.org.uk**
Telephone: 0247 799 0069
Your local Knowledge Exchange Manager

Agenda – Q&A after each talk

Morning session

10.00 Chair's welcome and introduction. Adrian James, AHDB

10.05 New priorities for cereals and oilseeds. David Bell, AHDB

10.15 Optimising fungicide inputs. Fiona Burnett, SRUC

10.40 Crop selection and variety performance. Steve Hoad, SRUC

11.00 Optimising fertiliser inputs: latest research. Ian Bingham, SRUC

11.15 IPM planning and latest evidence on new tools. Neil Havis, SRUC

11.35 Market updates. Julian Bell, SRUC

11.55 Market Intelligence. Megan Hesketh, AHDB

12.10 Bench Marking-Farm business management tool. Julie Clark, AHDB

Lunch 12.30-13.15pm

Afternoon session

13.15 Working with farmers to avoid pollution. Peter Wright, SEPA

13.40 Fundamentals of soil carbon. Sarah Buckingham, SAC Consulting

14.00 Practices to enhance biodiversity. Lorna Cole, SAC

14.25 Farmer case study McGregor farms. 2023 Scottish Arable farmer of the year

15.15 Final Discussion, event summary and close

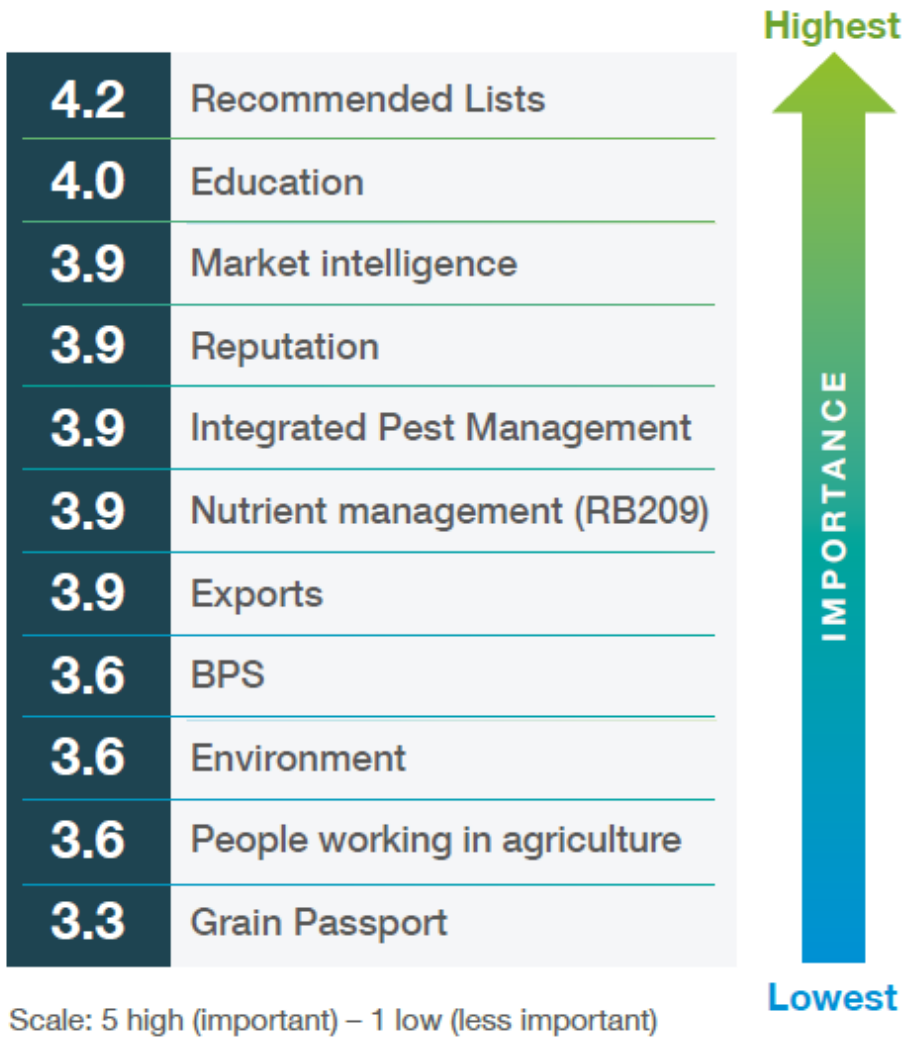
15.30 Finish


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

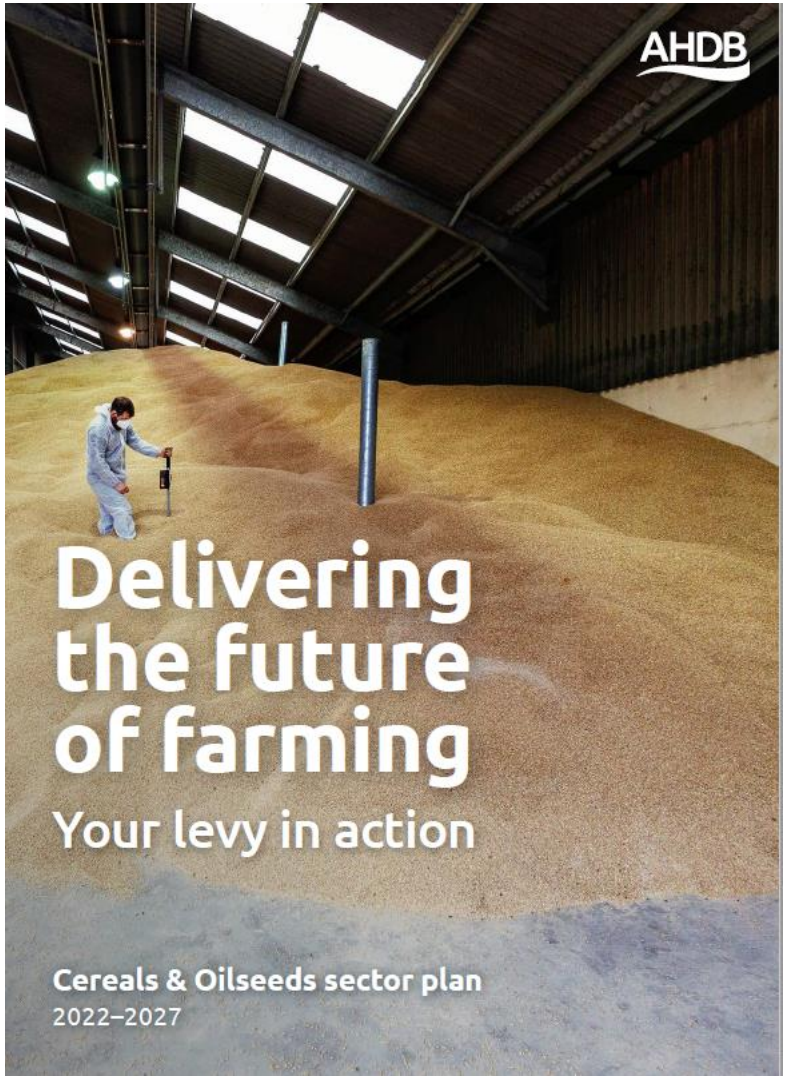
Delivering the Future of Farming 2023

Taking a look at the Cereals and Oilseeds Sector Plan

Cereals and Oilseeds Sector Plan



Cereals and Oilseeds Sector Plan



Almost all aspects of our commercial and politically independent work are valuable'

Stephen Briggs, Cereal and Oilseeds Sector Chair

Key themes

Trusted variety and product testing

Independent, practical research and market intelligence

Work across the supply chain

Cereals and Oilseeds Sector Plan

Trusted variety and product testing

AHDB's Recommended Lists, which gives levy payers the opportunity to compare varieties on an independent, consistent and fair basis, was ranked as the most important work that we fund.

Work across the supply chain

As an independent, commercially and politically unbiased body, AHDB is uniquely placed to bring the industry together and facilitate pre-competitive discussions to benefit all levy payers.

Independent, practical research and market intelligence

This work will provide you with independent, robust answers to your questions to help improve your profitability and sustainability. It will also protect and promote the industry's reputation.

Knowledge exchange

Knowledge exchange activity will remain core for Cereals & Oilseeds.

The Engagement (Knowledge Exchange) team is a key part of the service AHDB provides, facilitating farmer-to-farmer learning, carrying out on-farm research and connecting you with the best information and expertise. This is enabled by a network of Strategic Farms, Monitor Farms and Arable Business Groups, together with a wealth of other opportunities for levy payers and advisors.

The Engagement team is also a key conduit between levy payers and the rest of AHDB, ensuring that there is a two-way exchange of information feeding into everything that we do.

Work reducing or stopping following the vote

As a result of the vote, and the need to focus spend where you told us you got the most value, AHDB will discontinue work where there is duplication with others.

For example, The Institute for Agriculture and Horticulture (TIAH) was established by Defra in 2021 to support people and skills in agriculture, so we will stop work in this area. However, we will continue to monitor this area to ensure that no significant need remains, including in Wales, Scotland and Northern Ireland.

Questions?

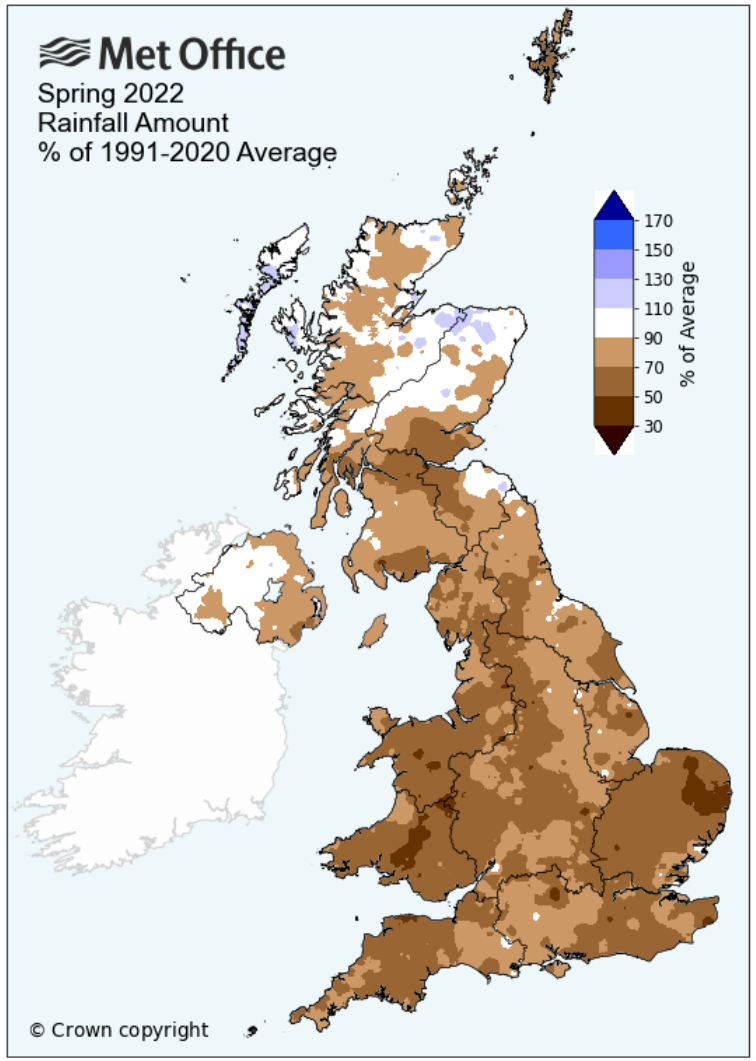
Optimising fungicide inputs

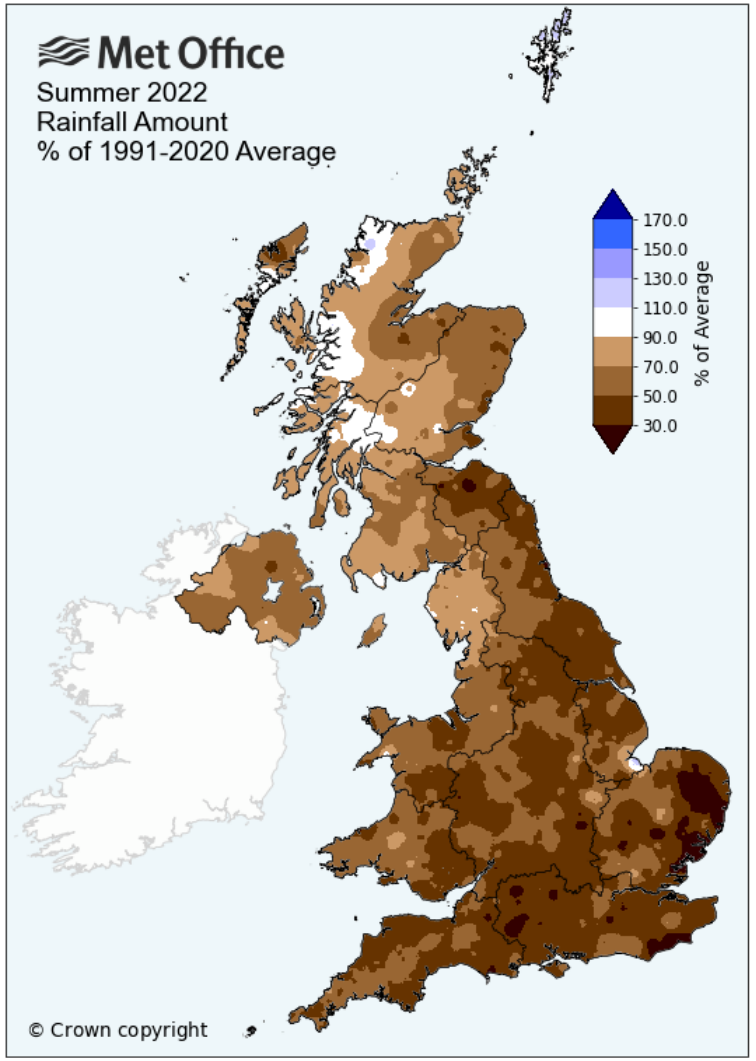
Fiona Burnett
Professor Applied Plant Pathology
SRUC

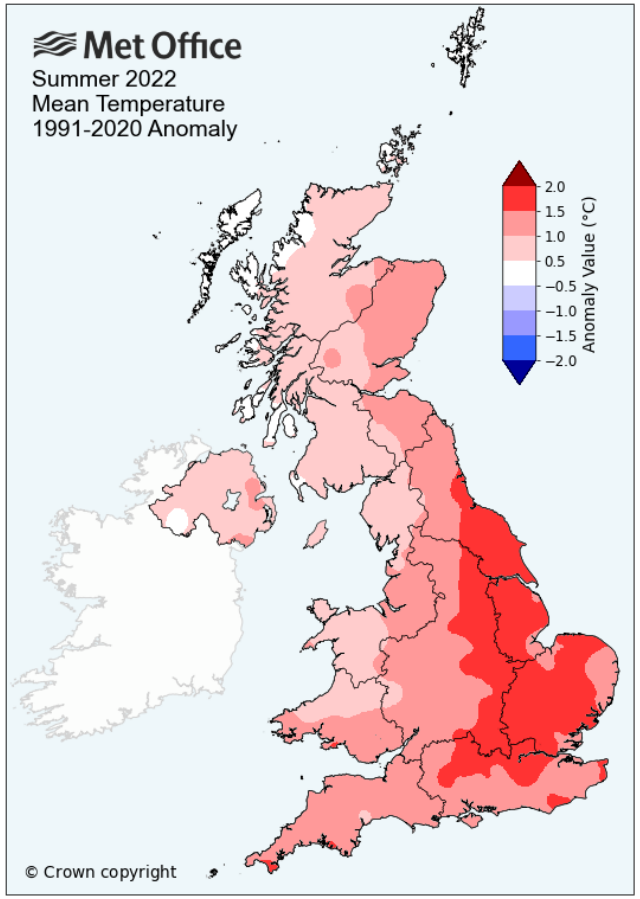
Introduction

- Technical efficacy of fungicides
  - Wheat
  - Barley
  - Oilseed rape
- Constructing programmes
- Where to use products
- Managing resistance

2022 season – *another* prolonged dry spring







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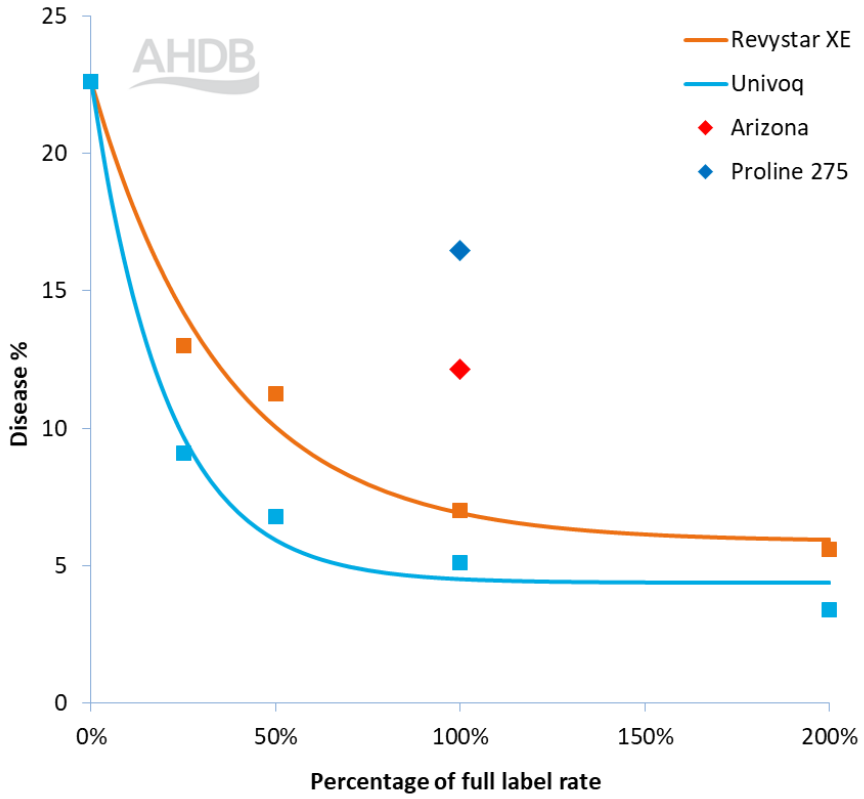
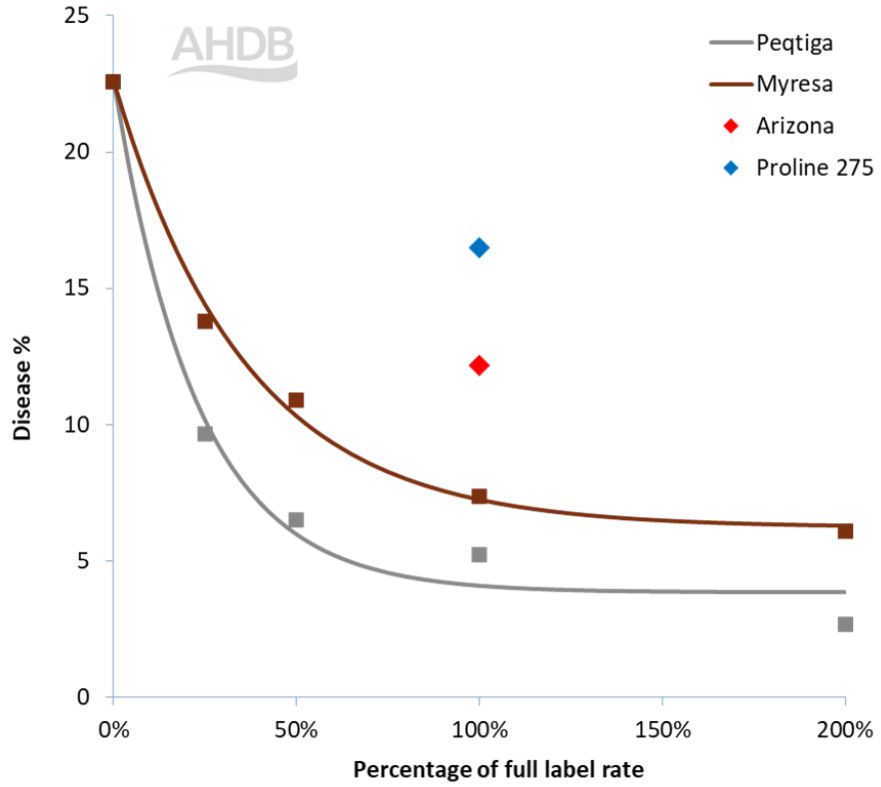
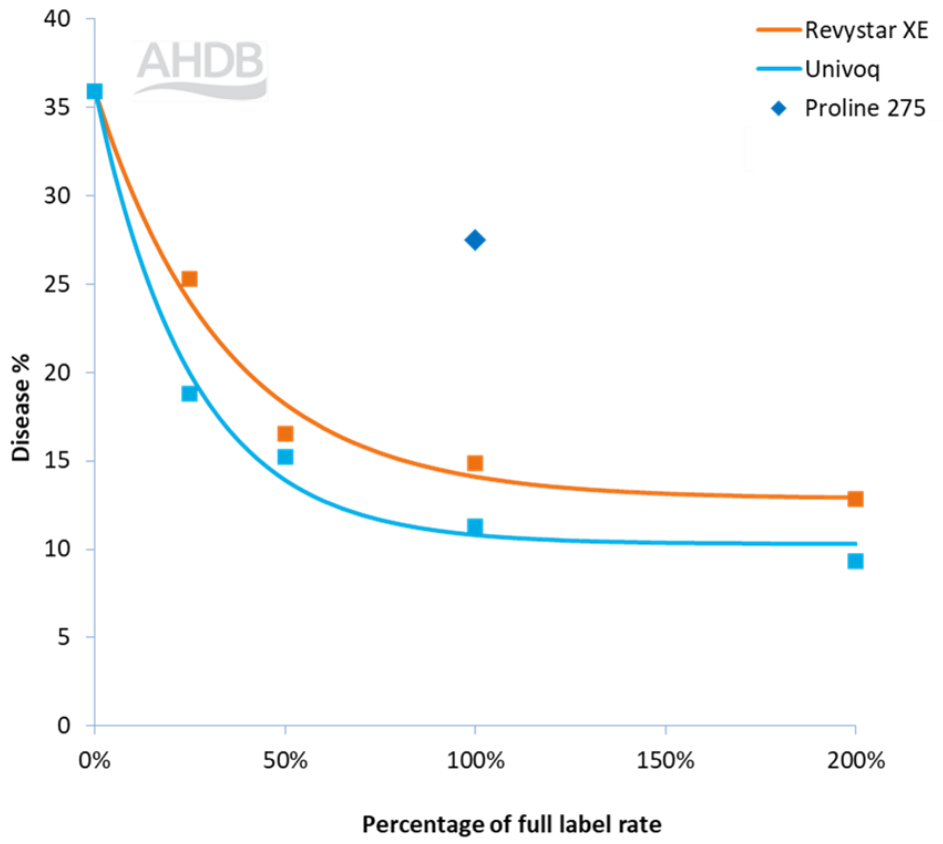
Wheat disease management

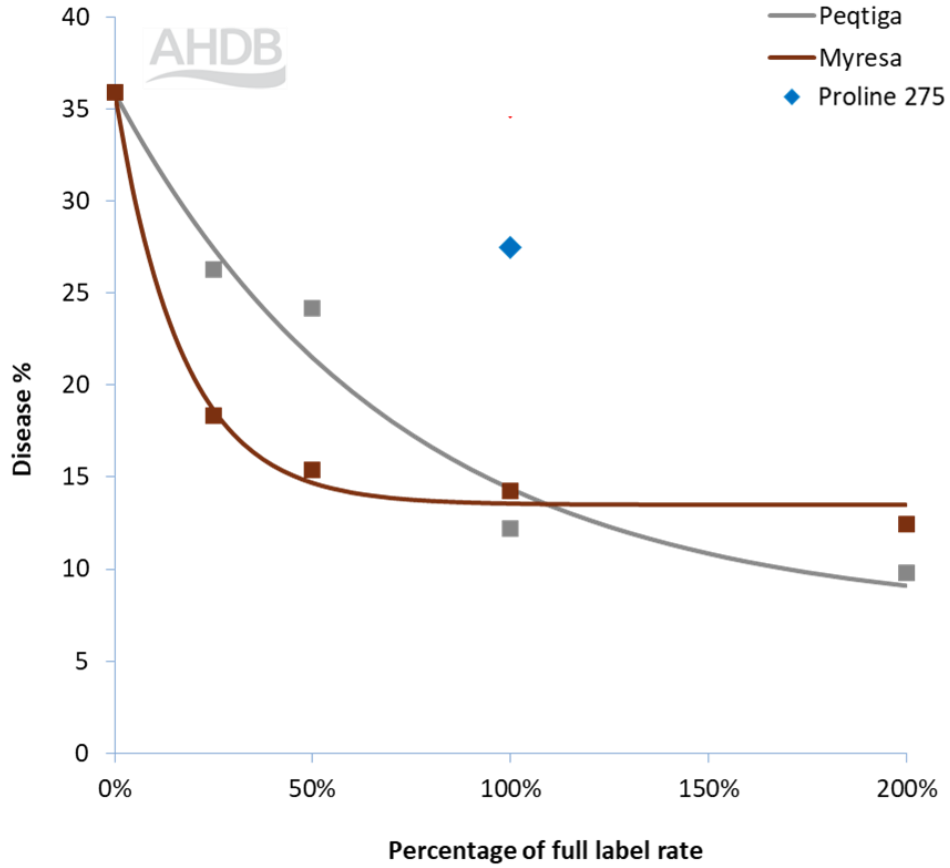
Septoria protectant 2022 (7 trials)



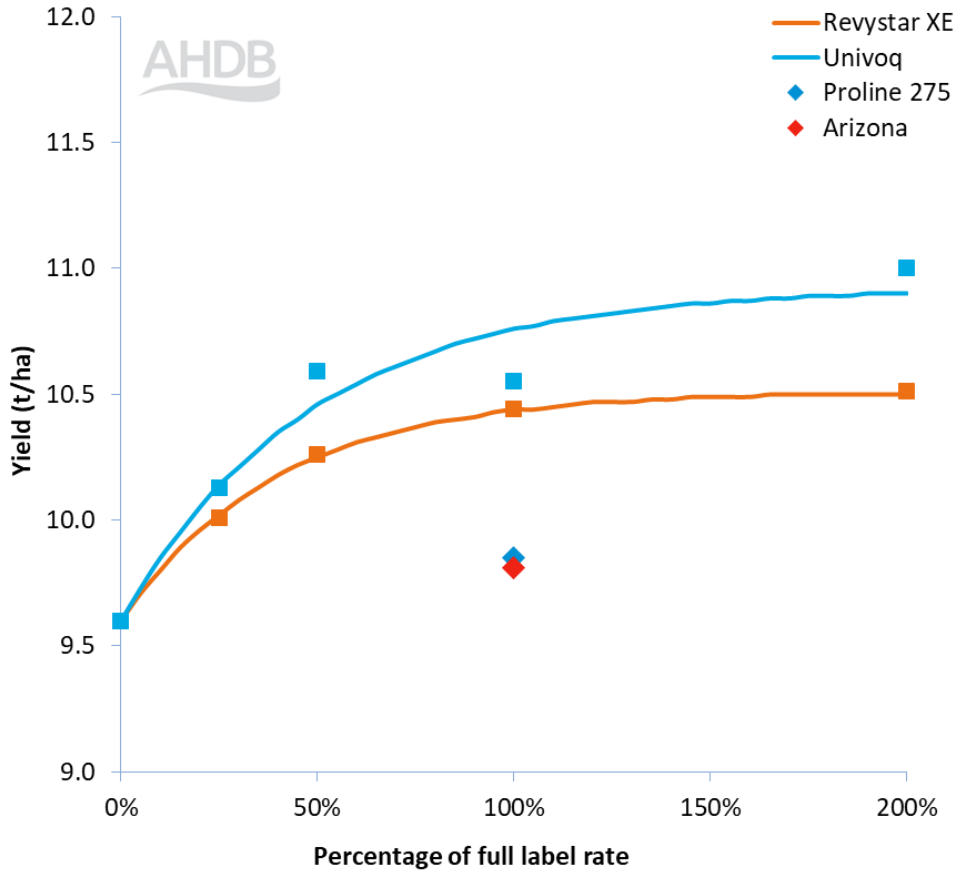


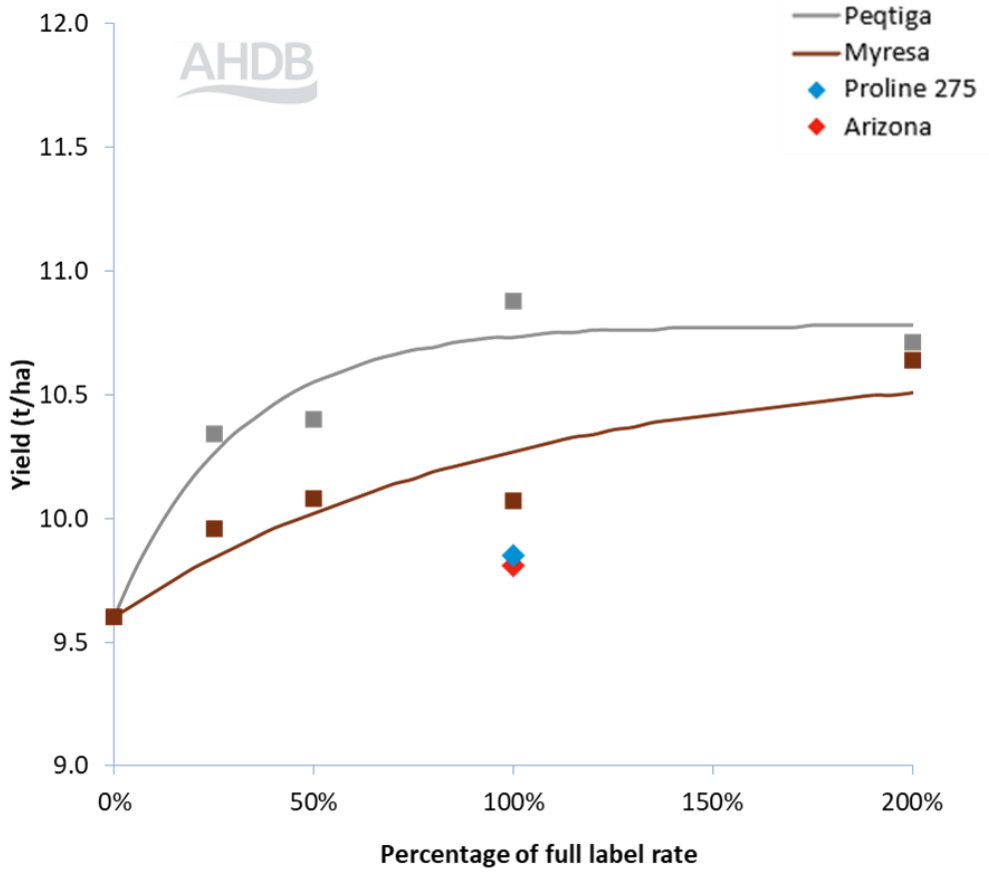
Septoria eradicant 2022 (2 trials)



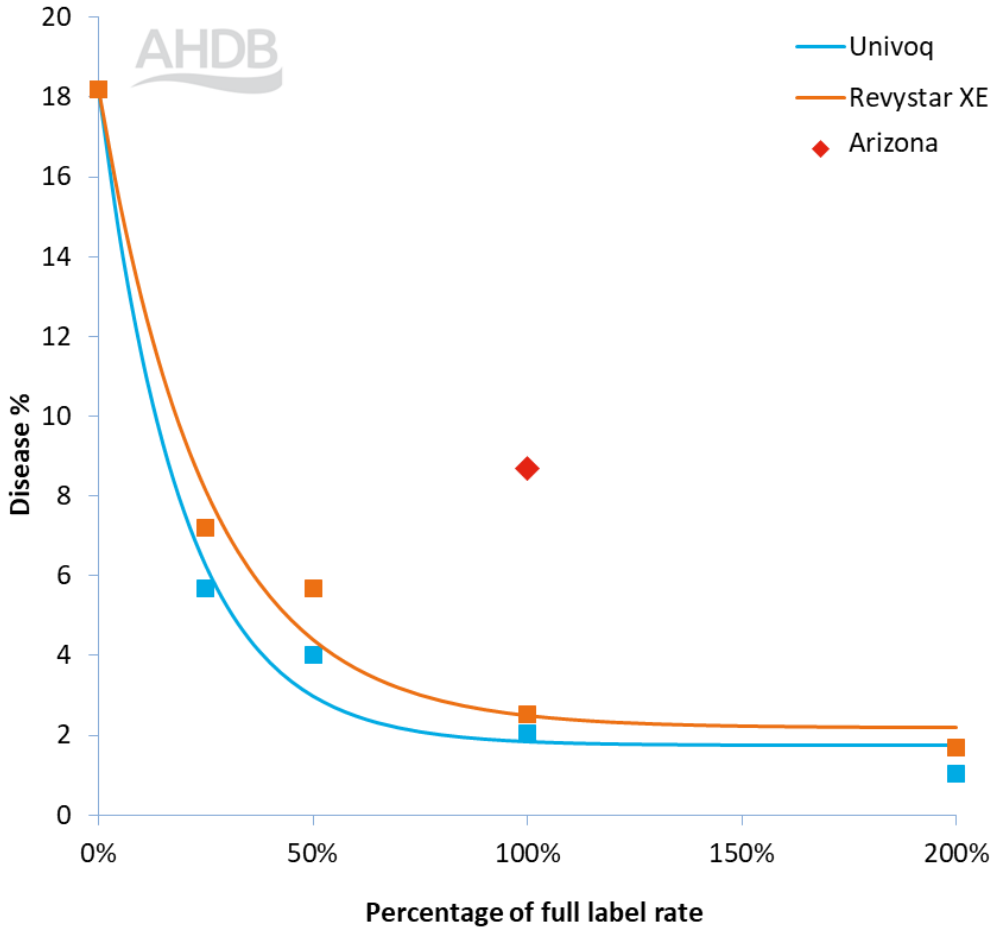


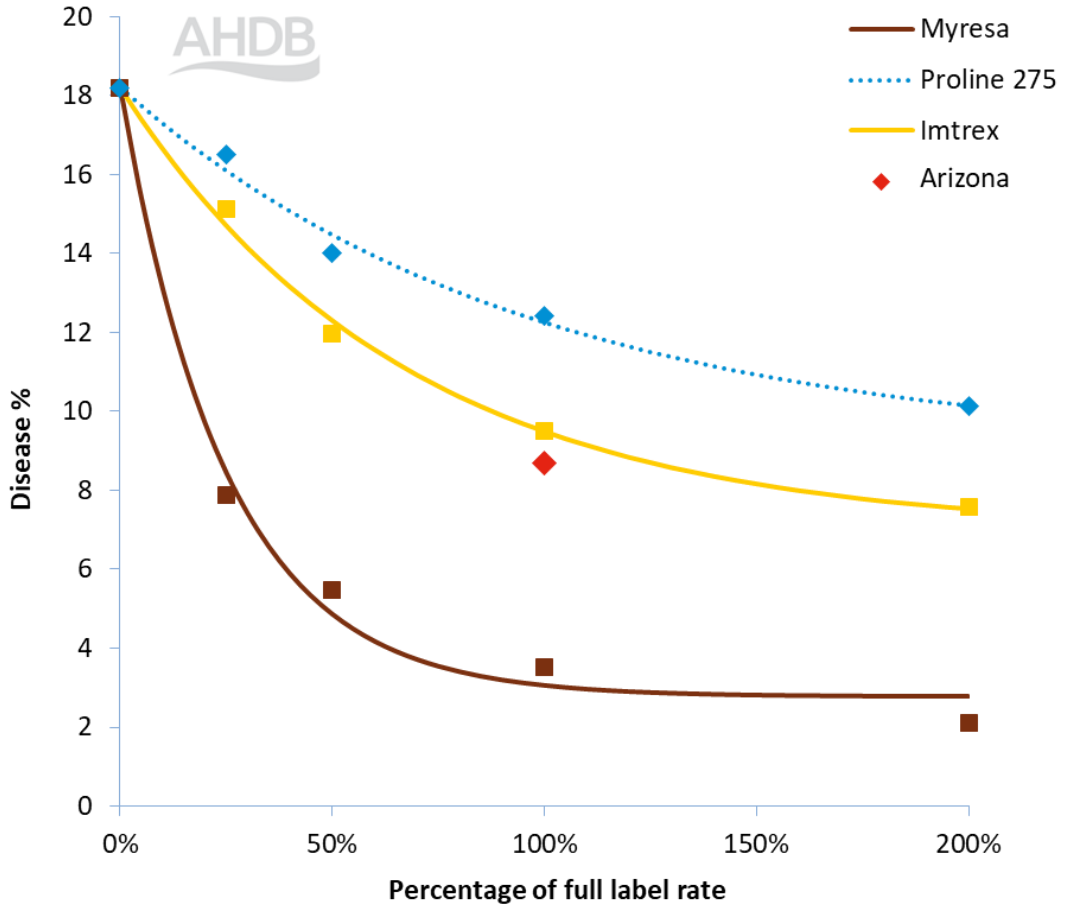
Septoria yield 2022 (6 trials)



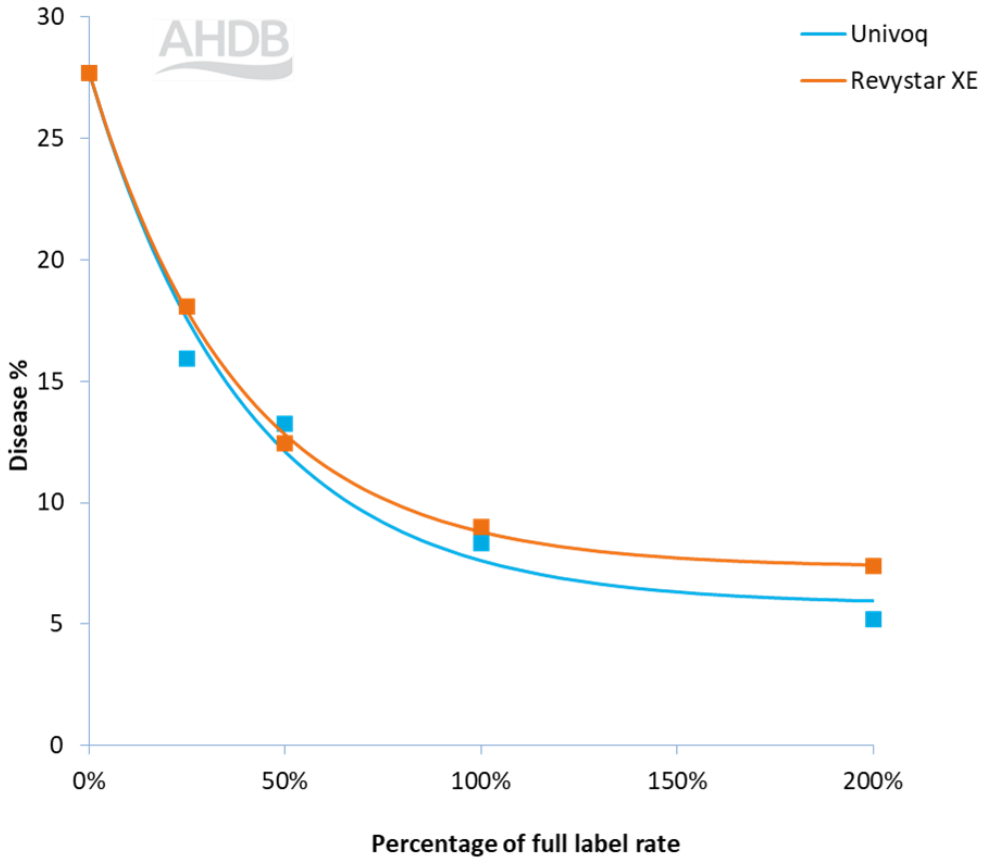


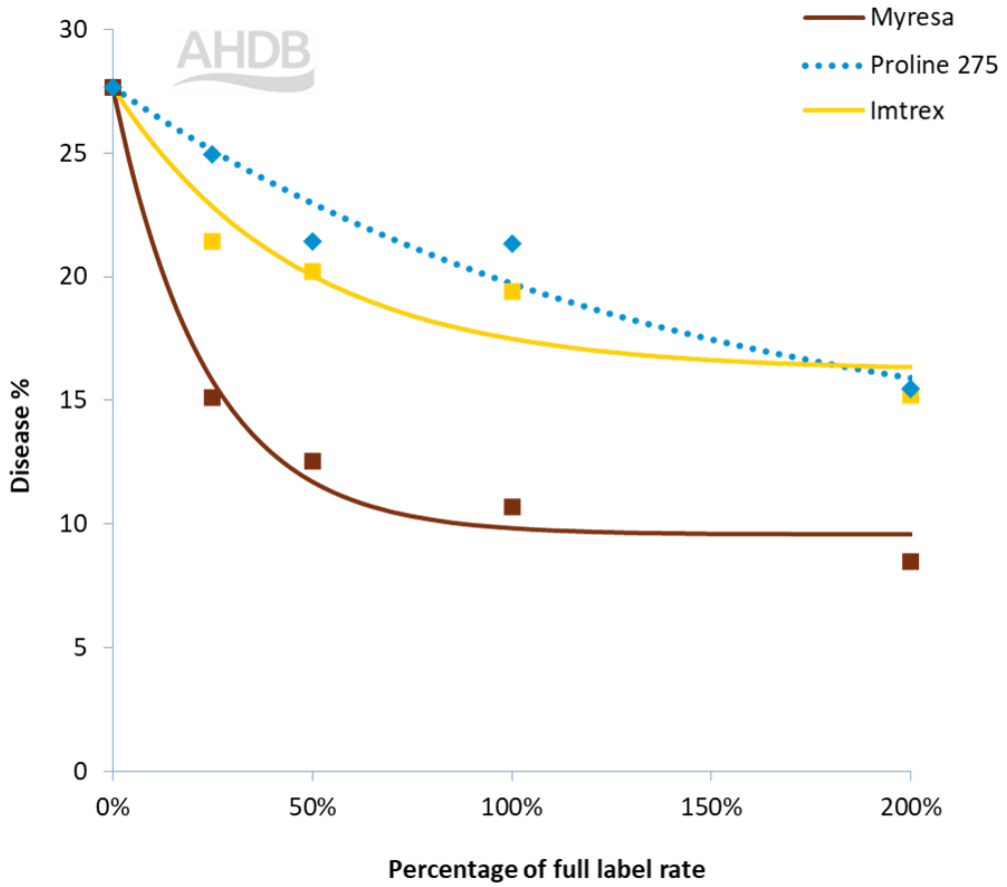
Septoria protectant 2020–22 (17 trials)



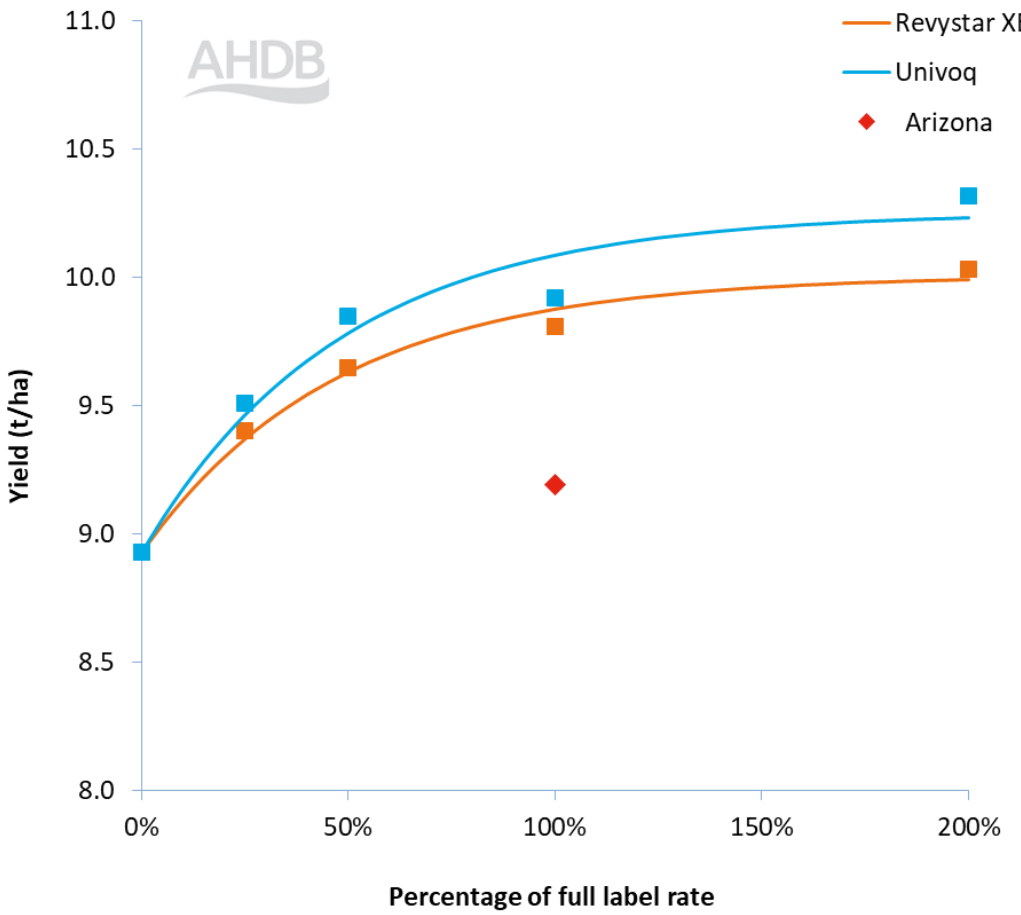


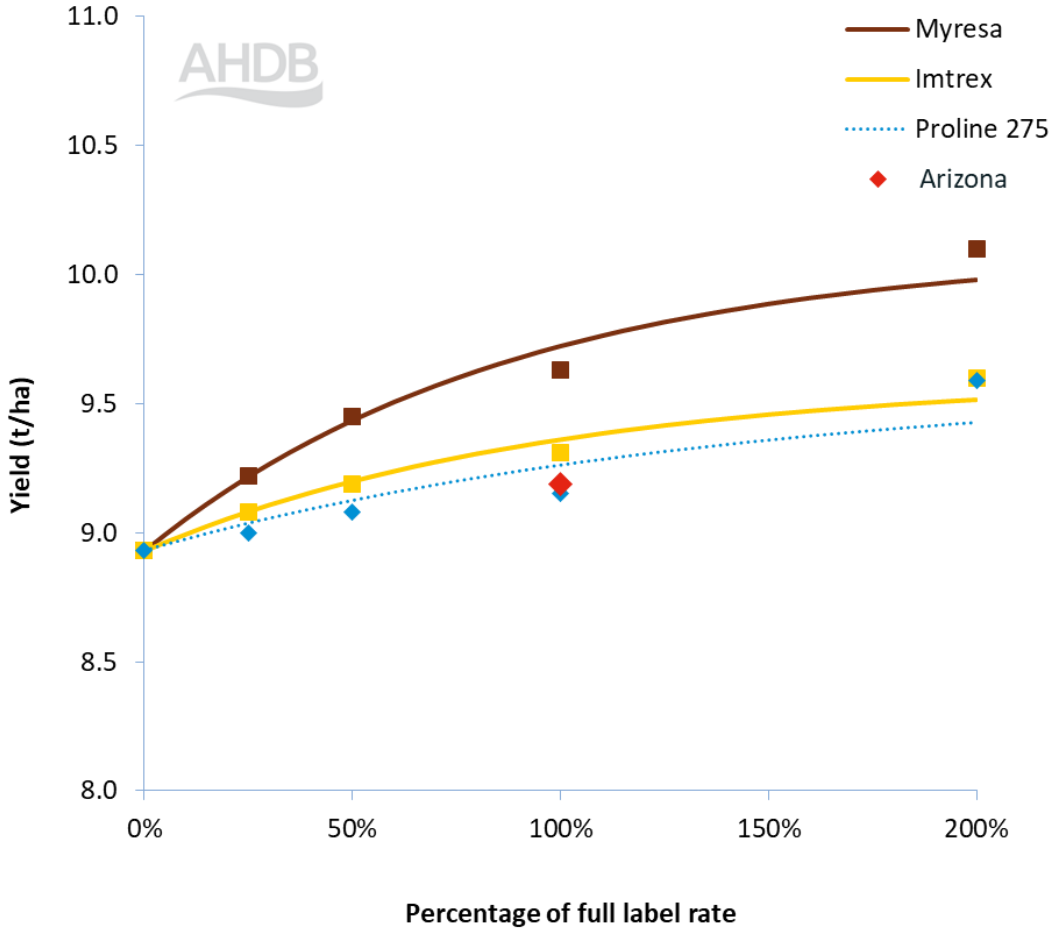
Septoria eradicant 2020–22 (10 trials)



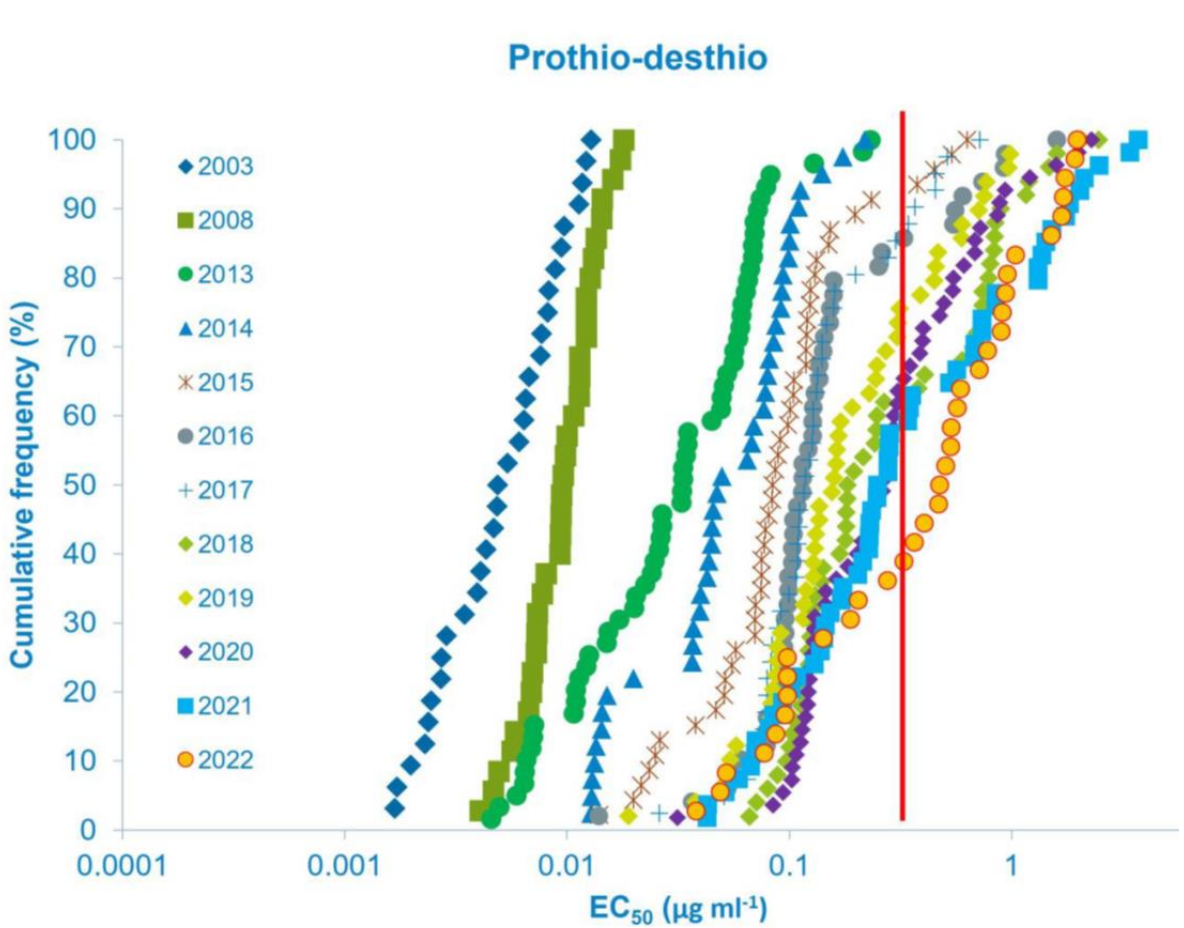


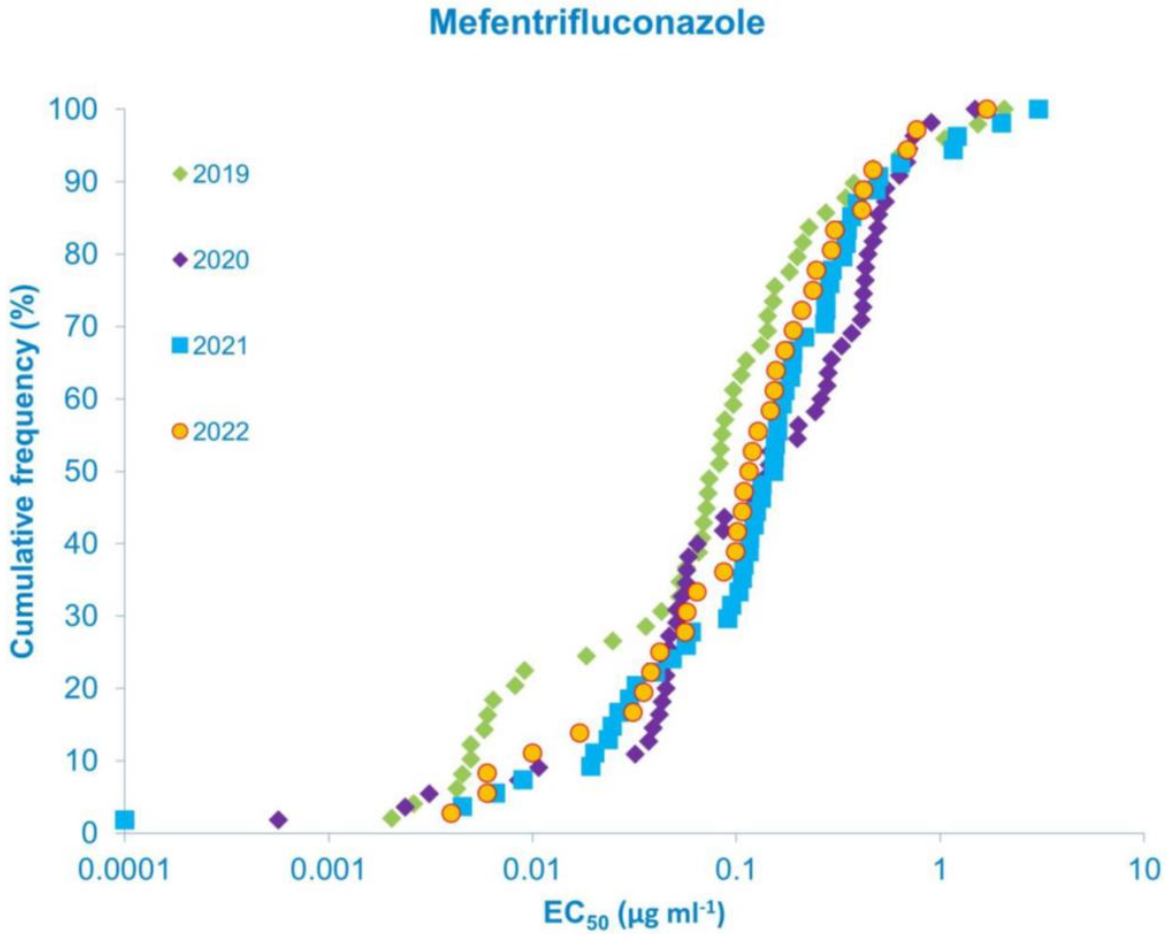
Septoria yield 2020–22 (19 trials)



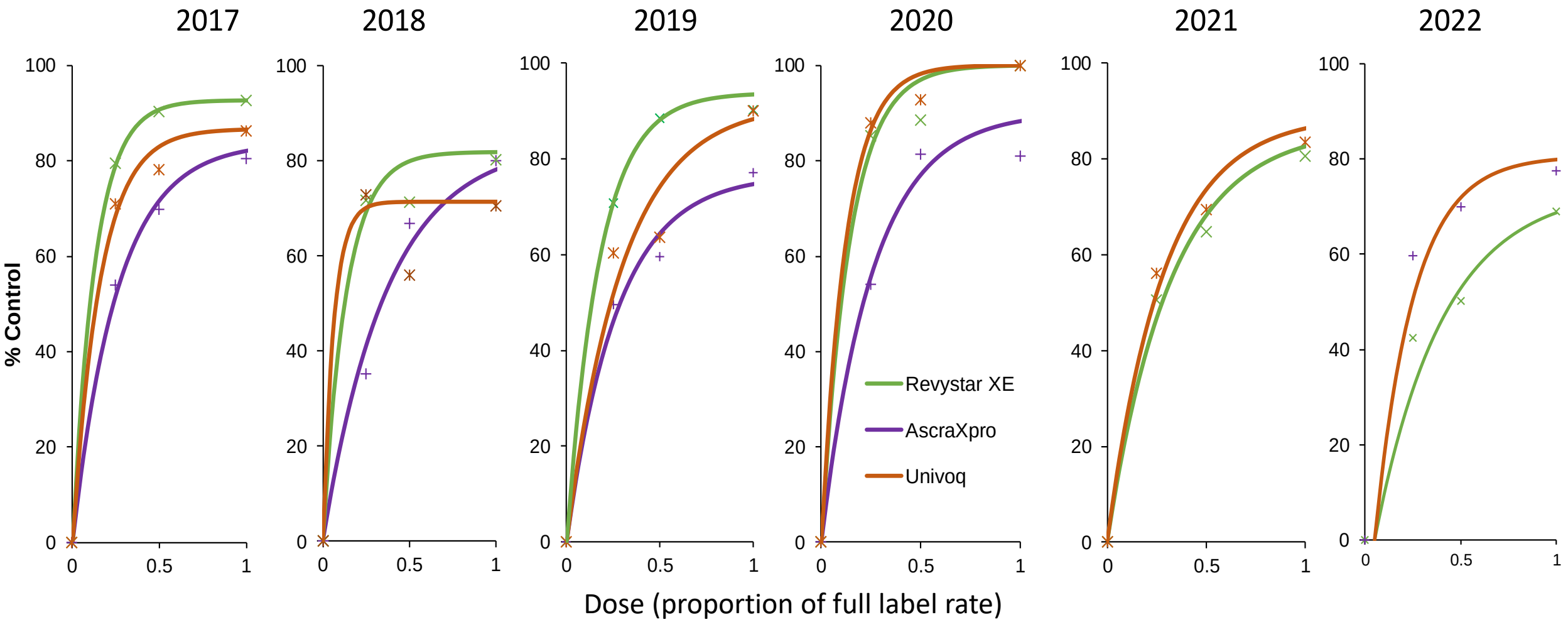


Azole sensitivity over time (Rothamsted)





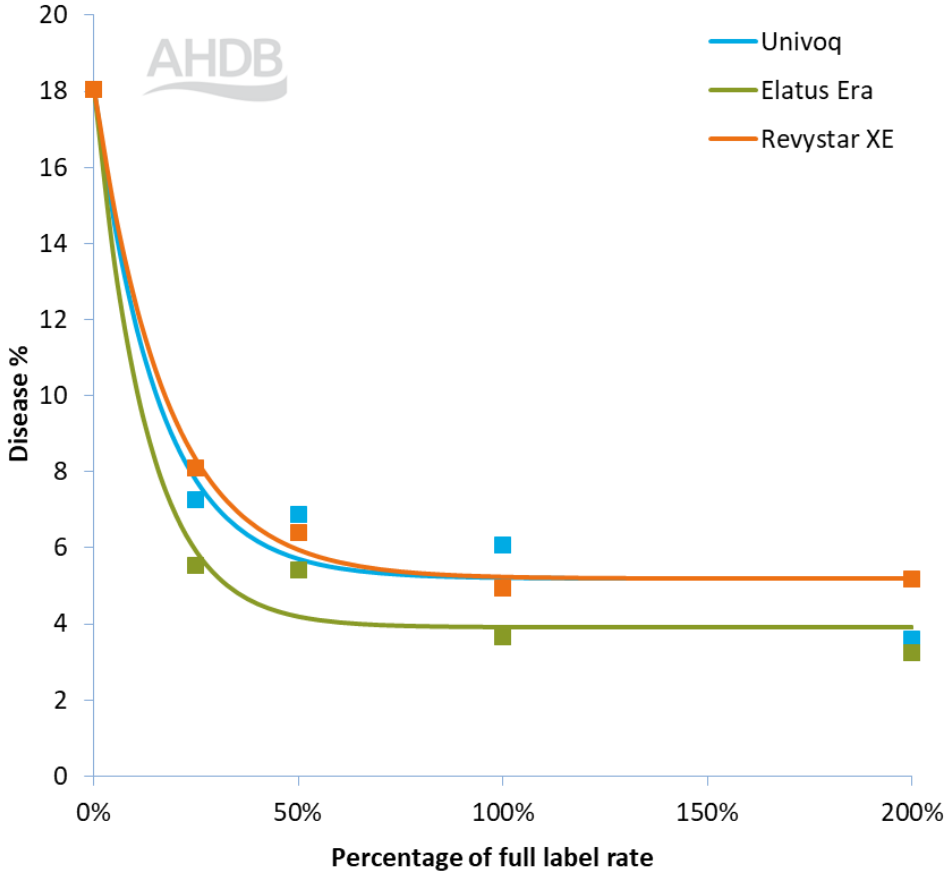
Changes in control from mixtures (since 2017)

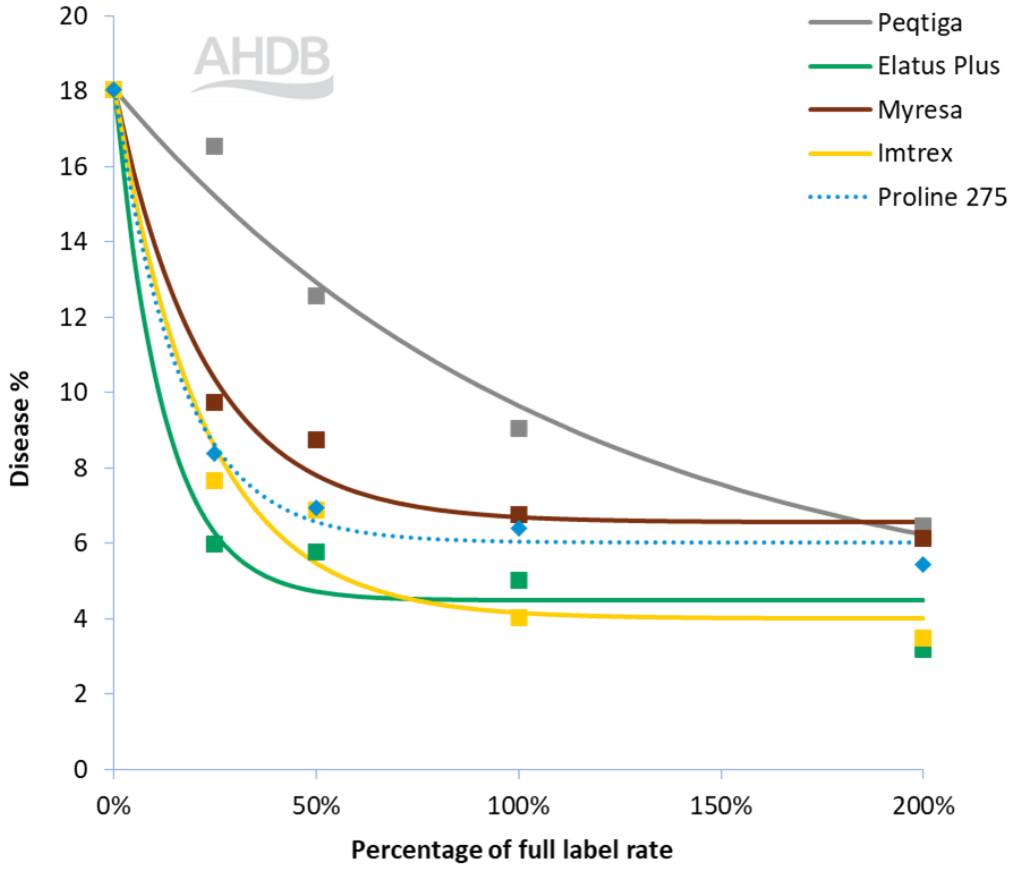


Septoria sensitivity update

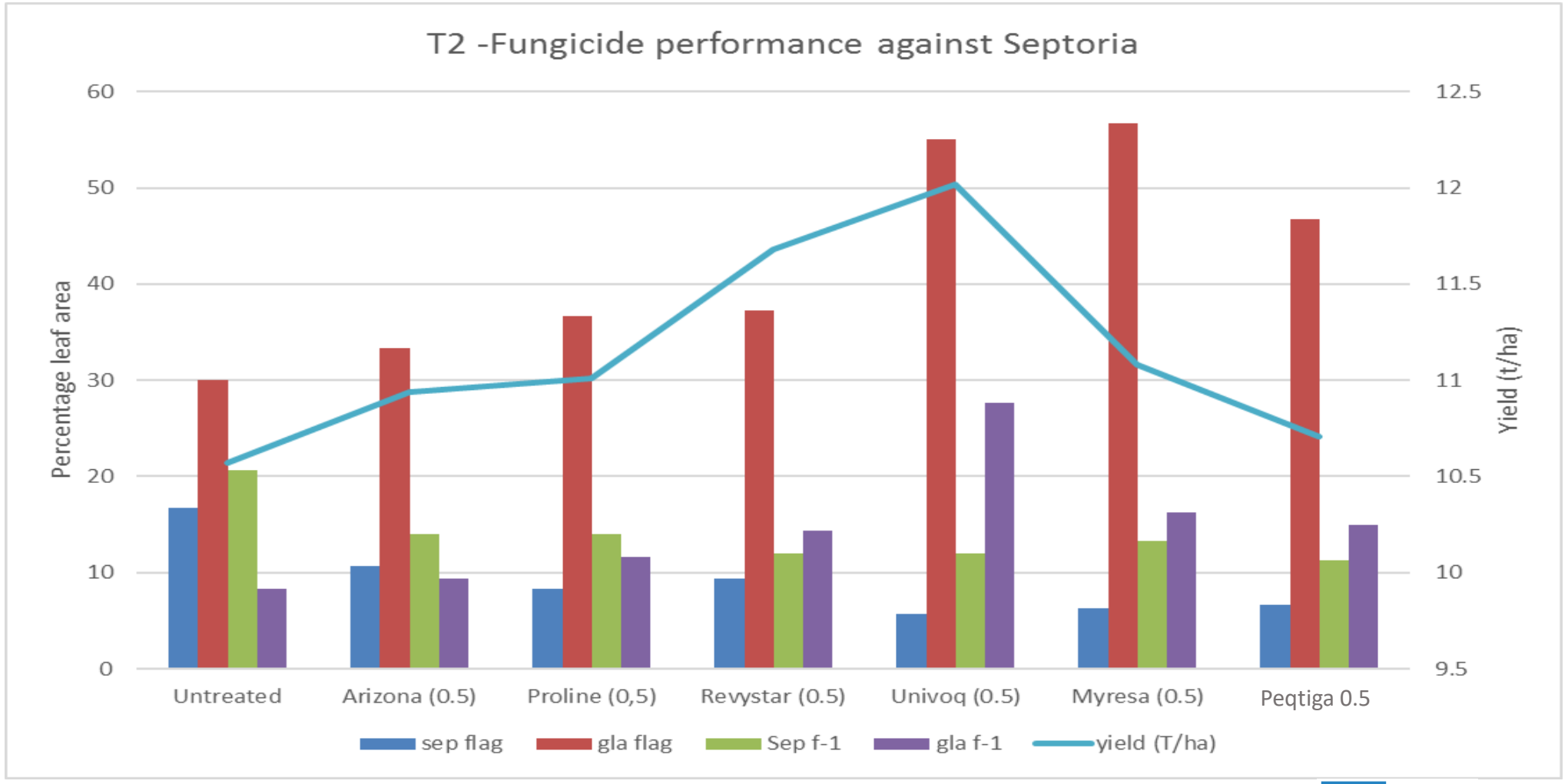
- All isolates tested were within previous ranges
- Individual samples vary considerably by site and season
- SDHI and azole isolates with reduced sensitivity are slowly accounting for an increasing proportion of the population
- Less sensitive isolates to SDHIs are becoming more complex
- Pre- and post-application monitoring shows a single fungicide application is sufficient to drive changes in the septoria population
- Build resistance management measures into programmes
- Mixtures, alternation and multisites are key components

Yellow rust 2020–22 (4 trials)





WW programmmes: T2 sprays cv Barrel, East Lothian 2022



Wheat programmes – what do we **really** need?

- T minus – autumn or winter clean up
- T0 – only for early rust protection
- **T1 – stem-base disease and protection of yield important leaves (risk based – multisite use maximised)**
- T1.5 – protection of leaf 2 is gap between T1 and T2 is stretched
- **T2 – protection of yield important flag – deploy new chemistry maximising lowest risk options**
- T3 – continued green leaf retention and protection from ear diseases (azole + ?)
- T4 – continued ear disease protection

Wheat fungicide programmes for 2023

- Maximise use of folpet split doses where possible
- Limit dose and application number of individual actives where you can
- Use balanced mixtures of systemics

- T0 – azole based and only if needed (+QoI or + folpet)
- T1 – choice of balanced mixes + folpet. Try and alternate from your T2 choices
- T2 – position for most effective balanced mixes +folpet
- T3 – azole based (+ folpet*) or (+SDHI*)

*watch max application numbers and latest timing

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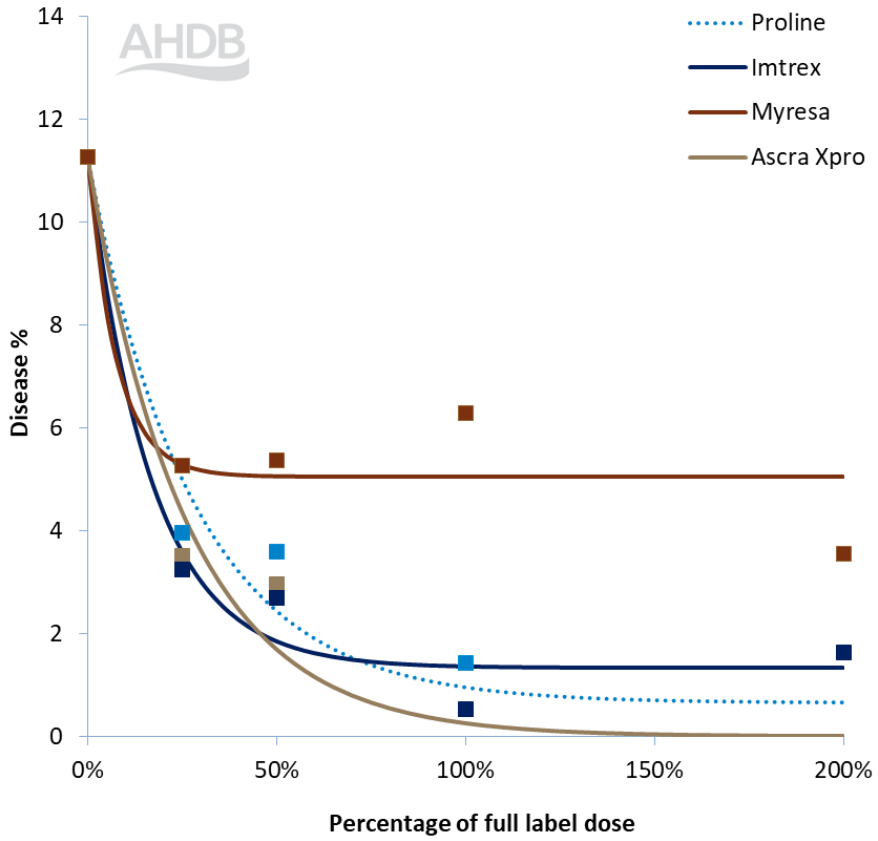
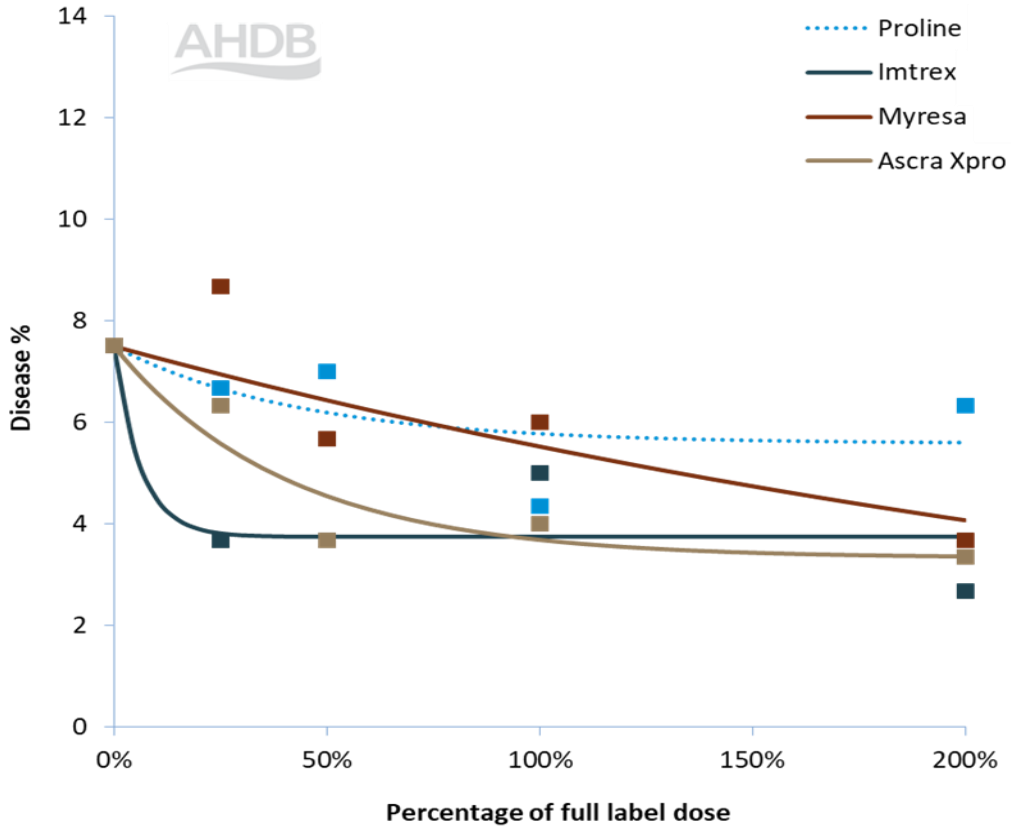
Barley disease management

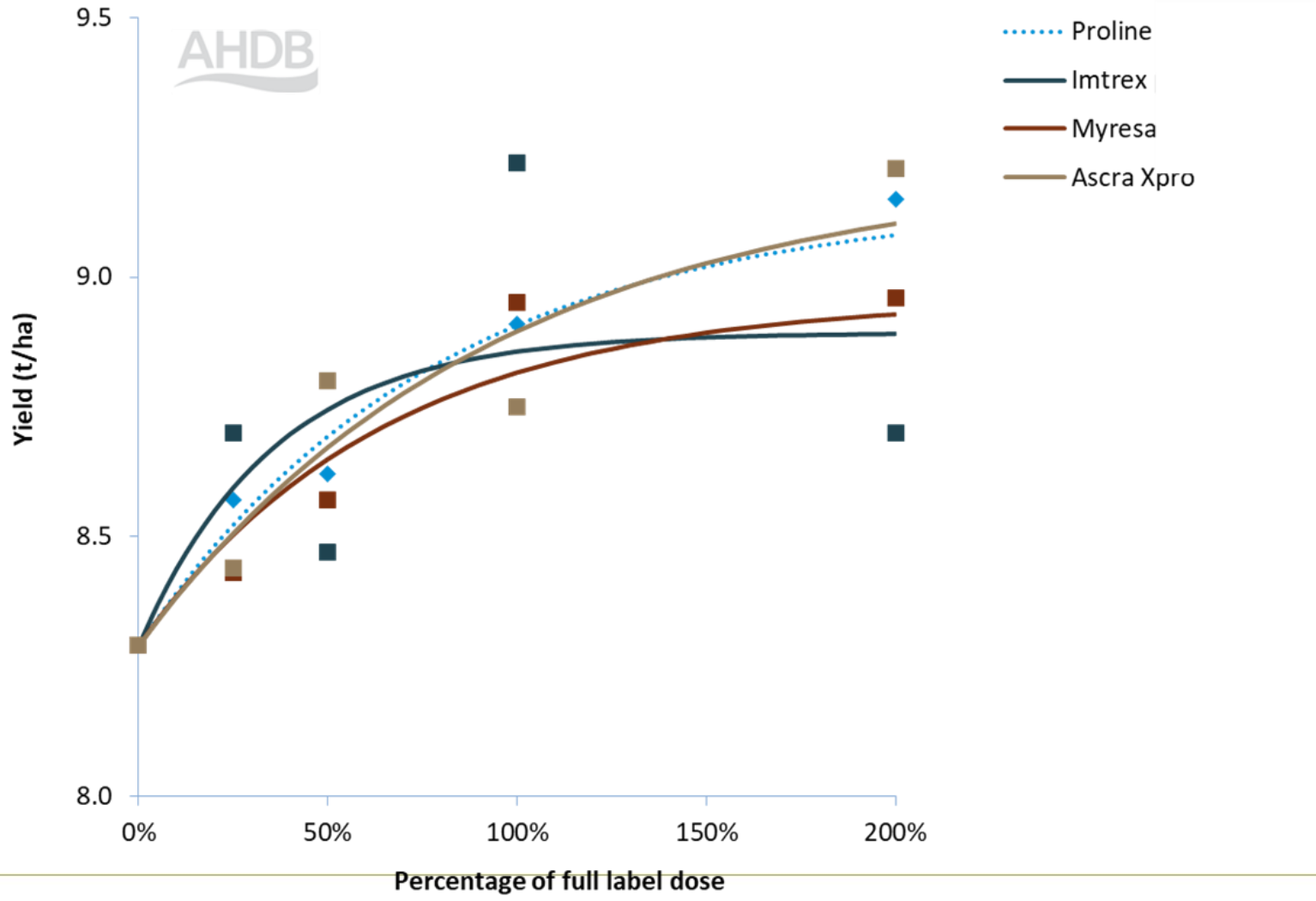
Rhynchosporium protectant 2022 (2 trials)



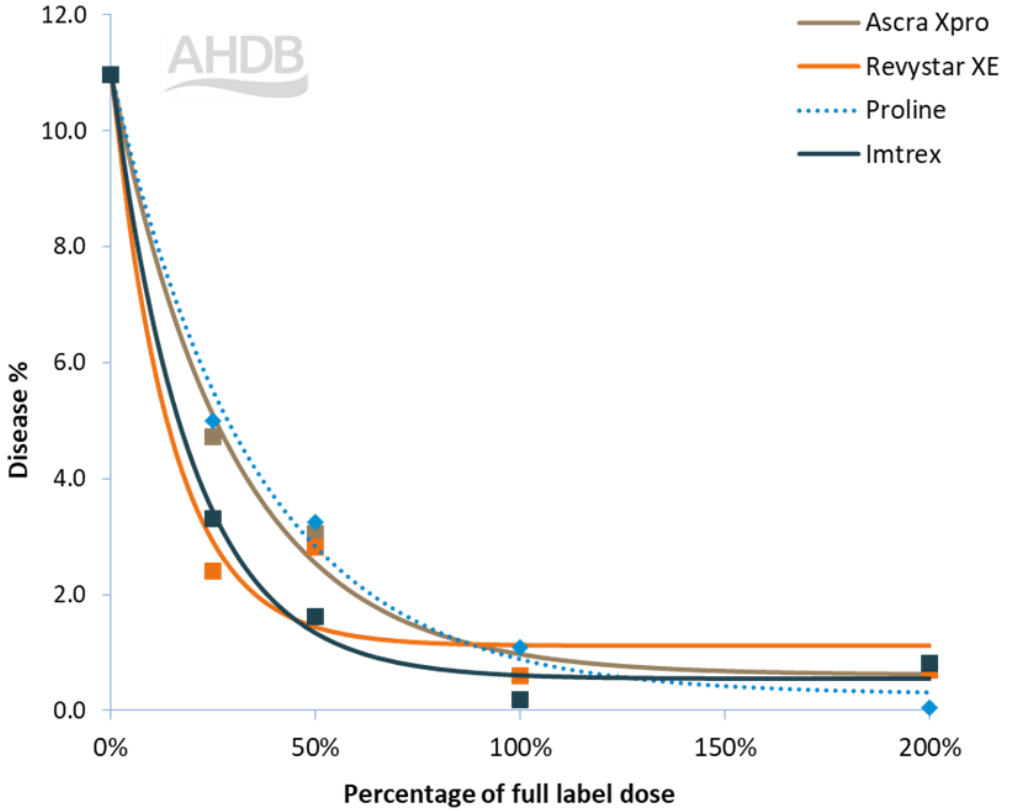
Rhynchosporium eradicant 2022 (1 trial)



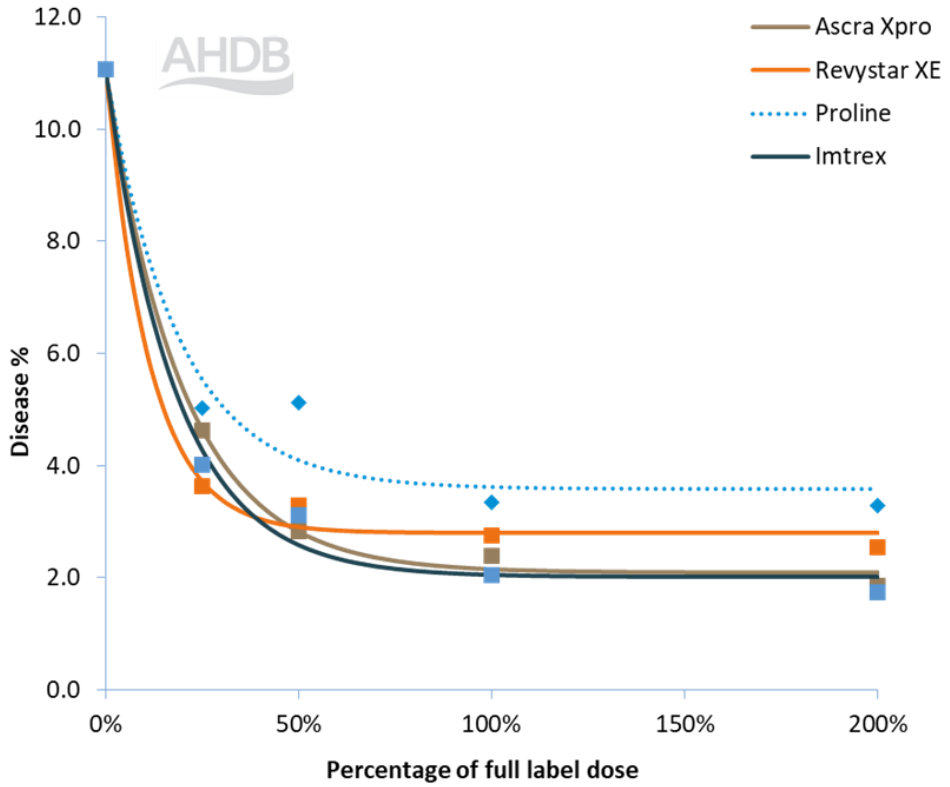
Rhynchosporium yield 2022 (2 trials)



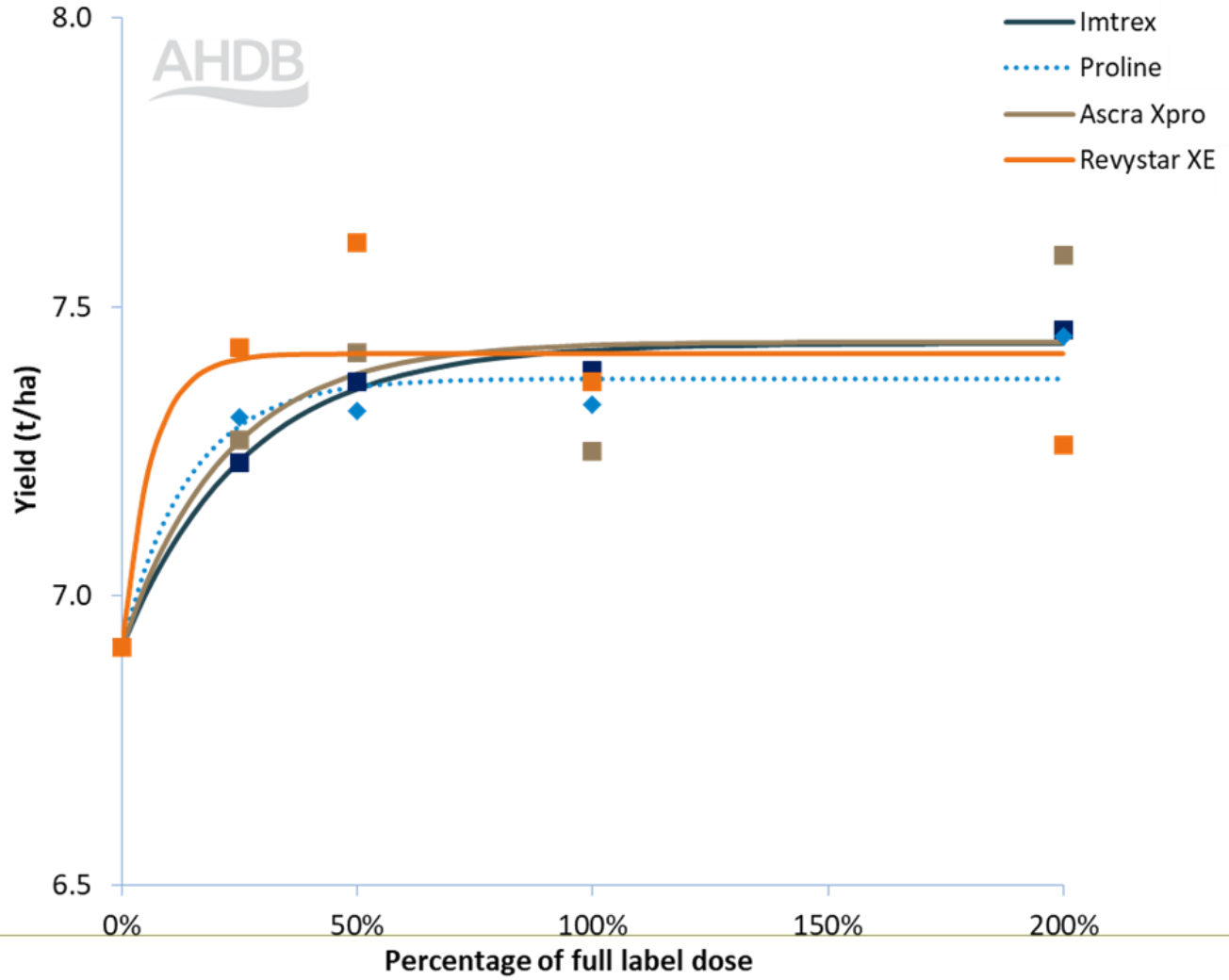
Rhynchosporium protectant 2021–22 (4 trials)



Rhynchosporium eradicant 2020–22 (6 trials)



Rhynchosporium yield 2020–22 (8 trials)



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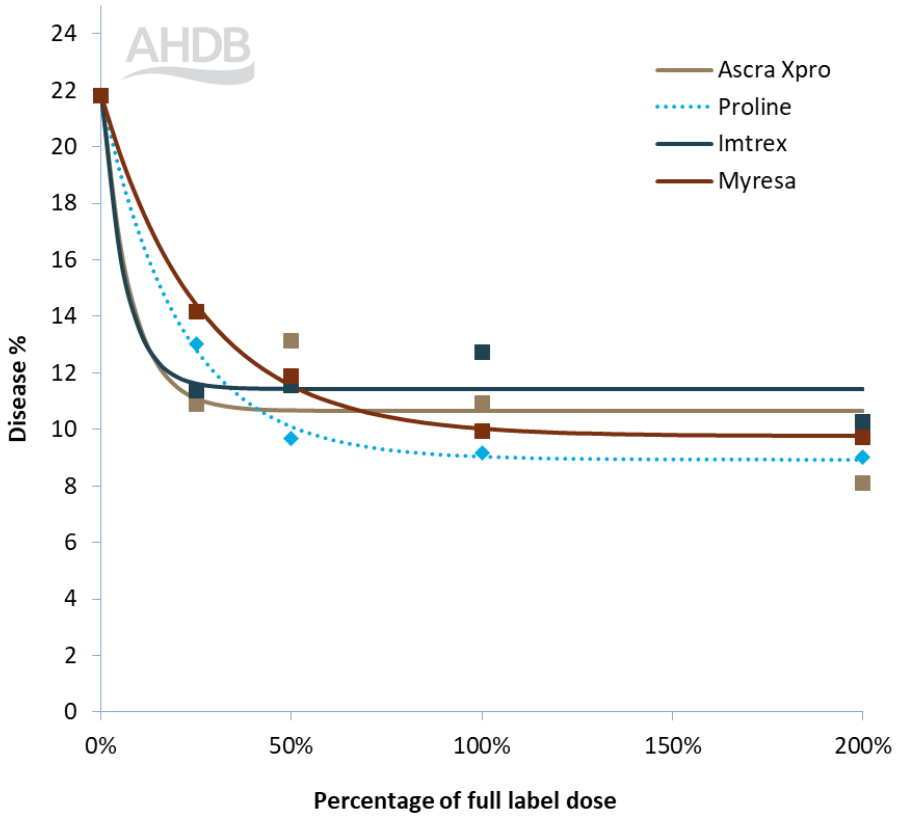
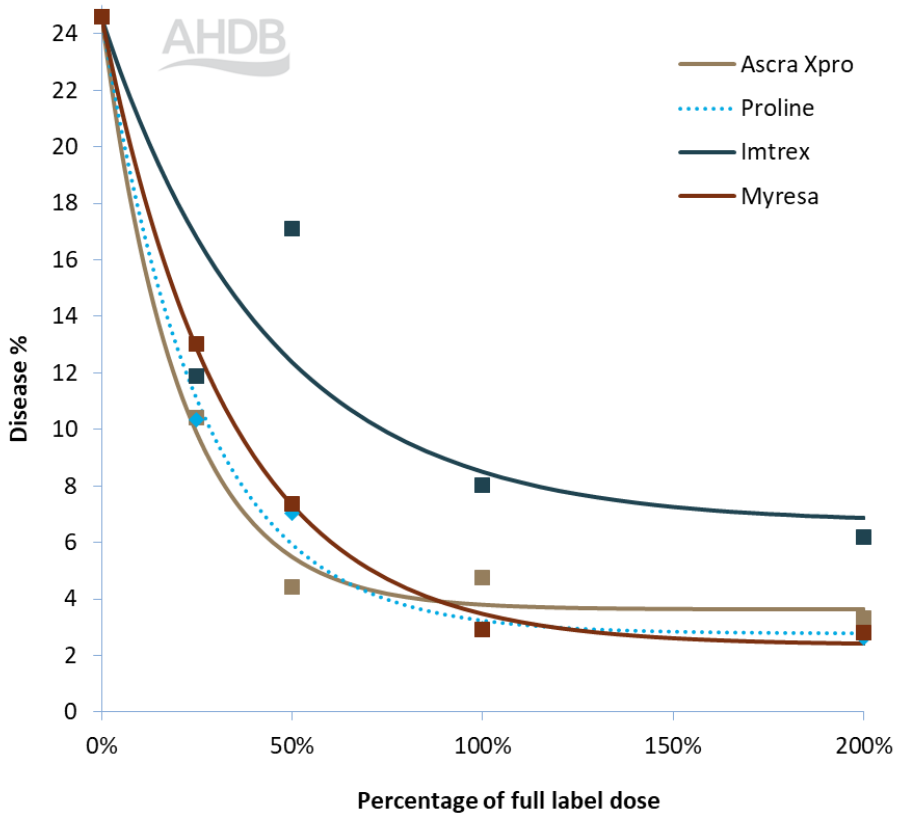
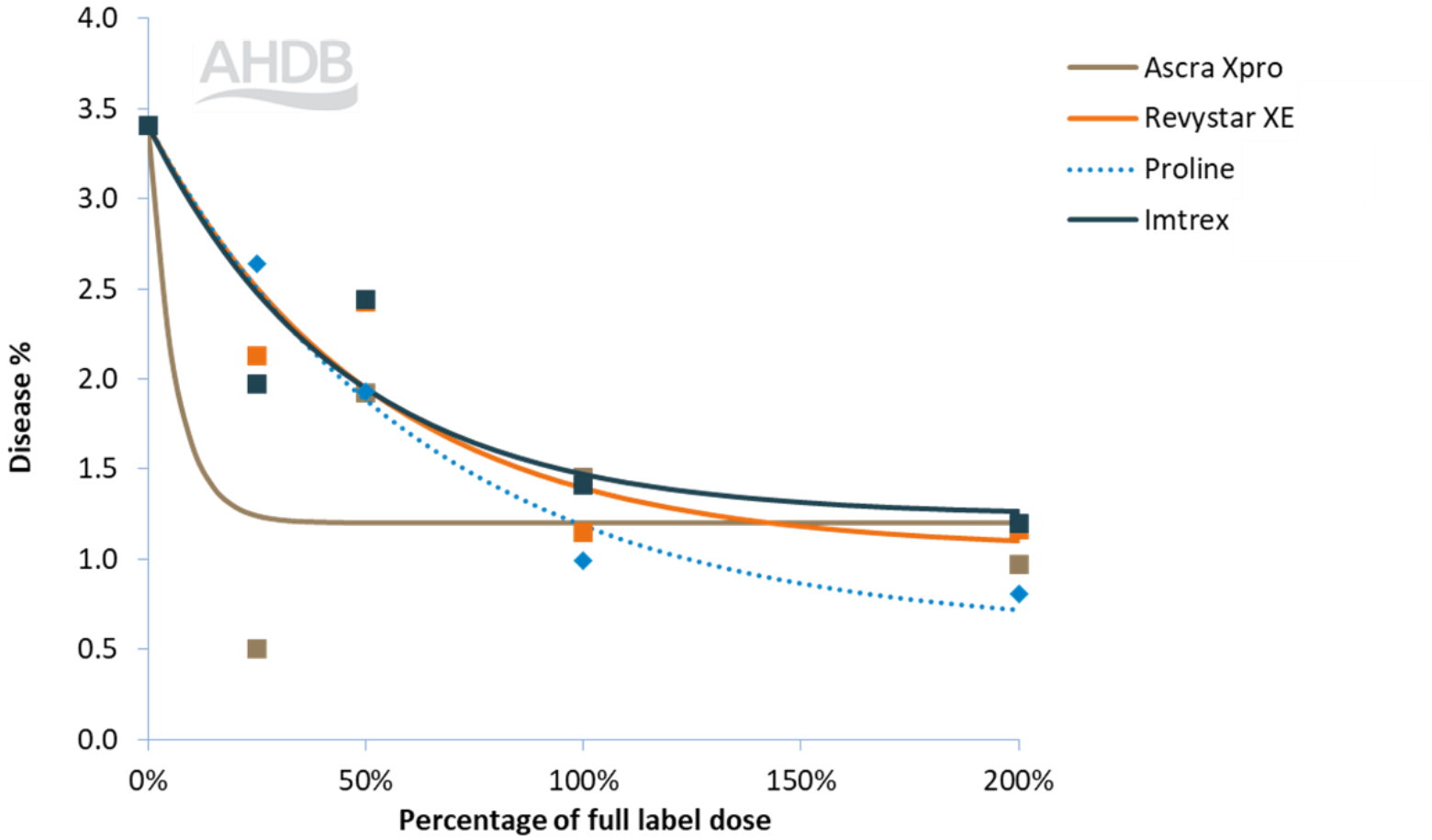
Net blotch protectant 2022 (1 trial)



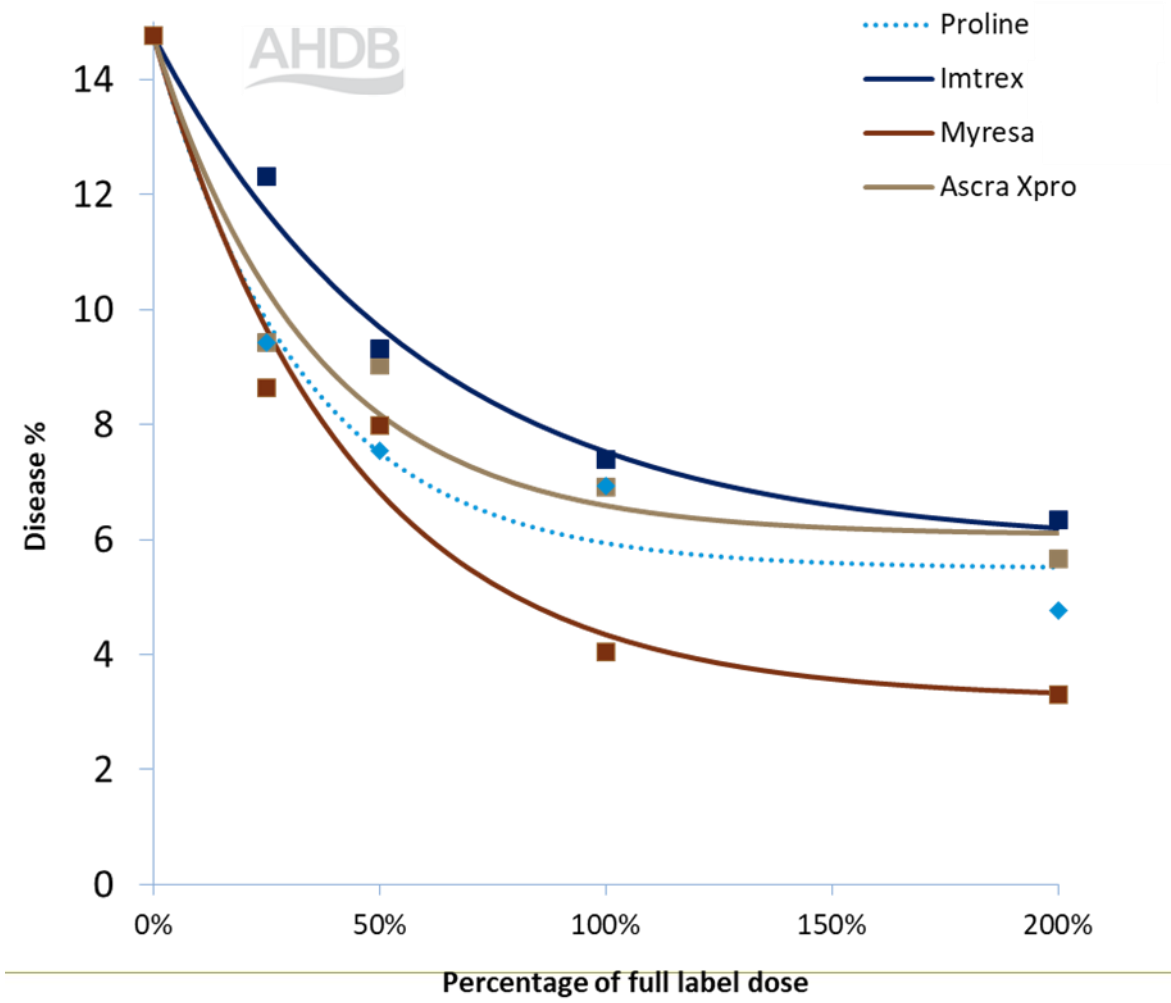
Net blotch eradicant 2022 (1 trial)



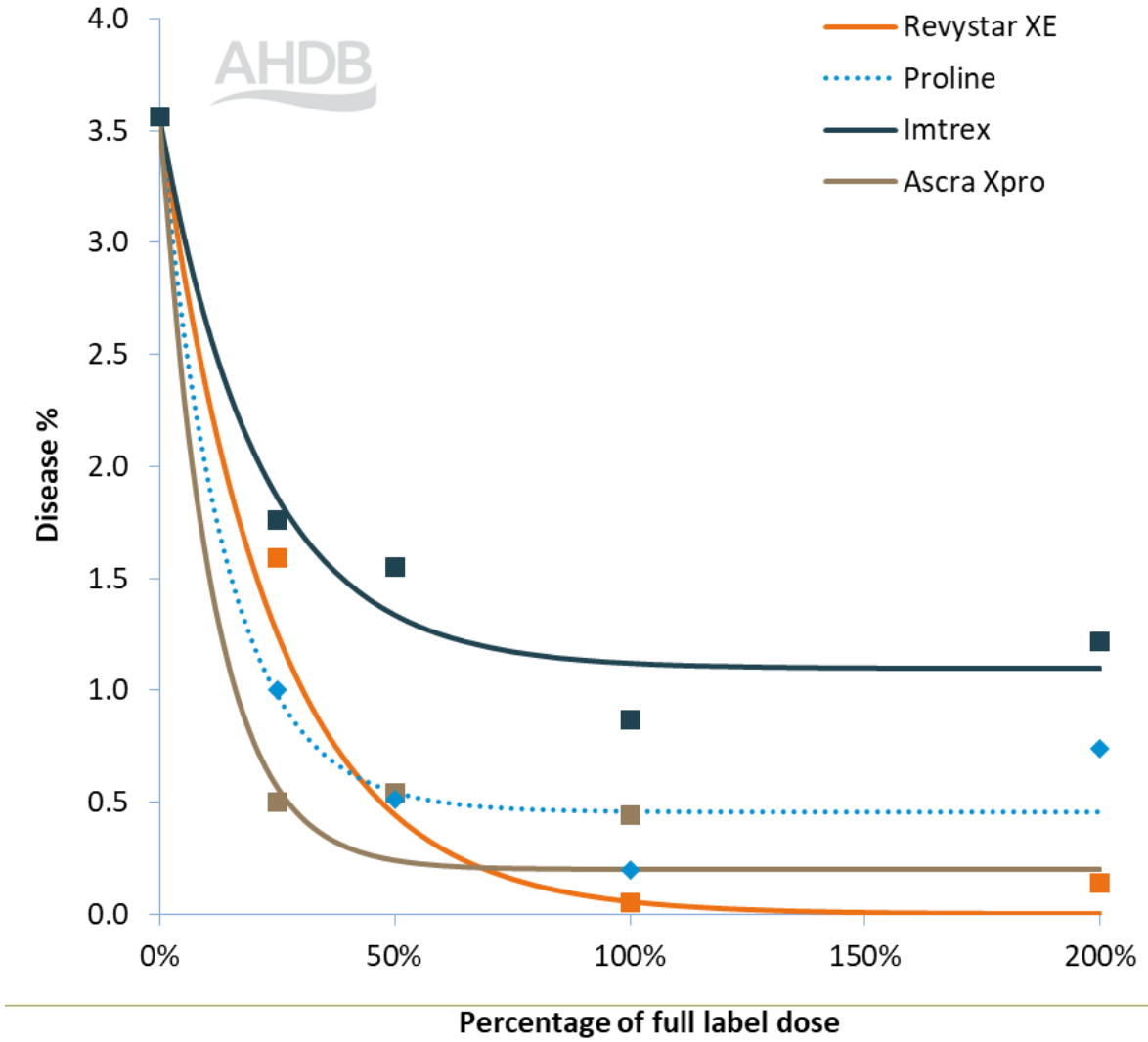
Net blotch eradicant 2020–22 (3 trials)



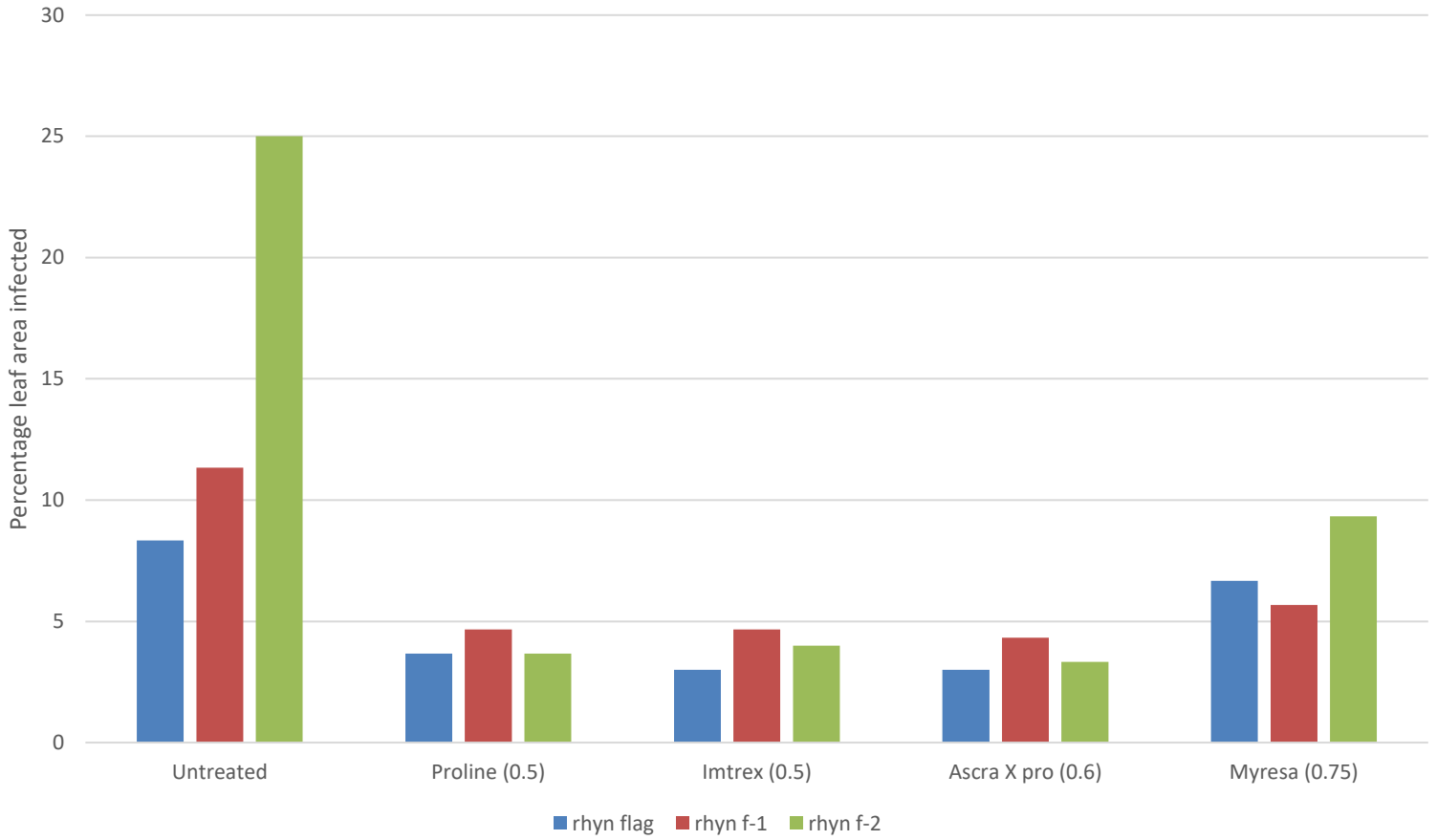
Ramularia protectant 2022 (4 trials)



Mildew 2020–22 (4 trials)



WB programmes: T1 treatments, LG Mountain, Lanark 2022



WB Programmes: +/- multisite folpet

Effective disease control but no significant yield differences between treatments

Untreated

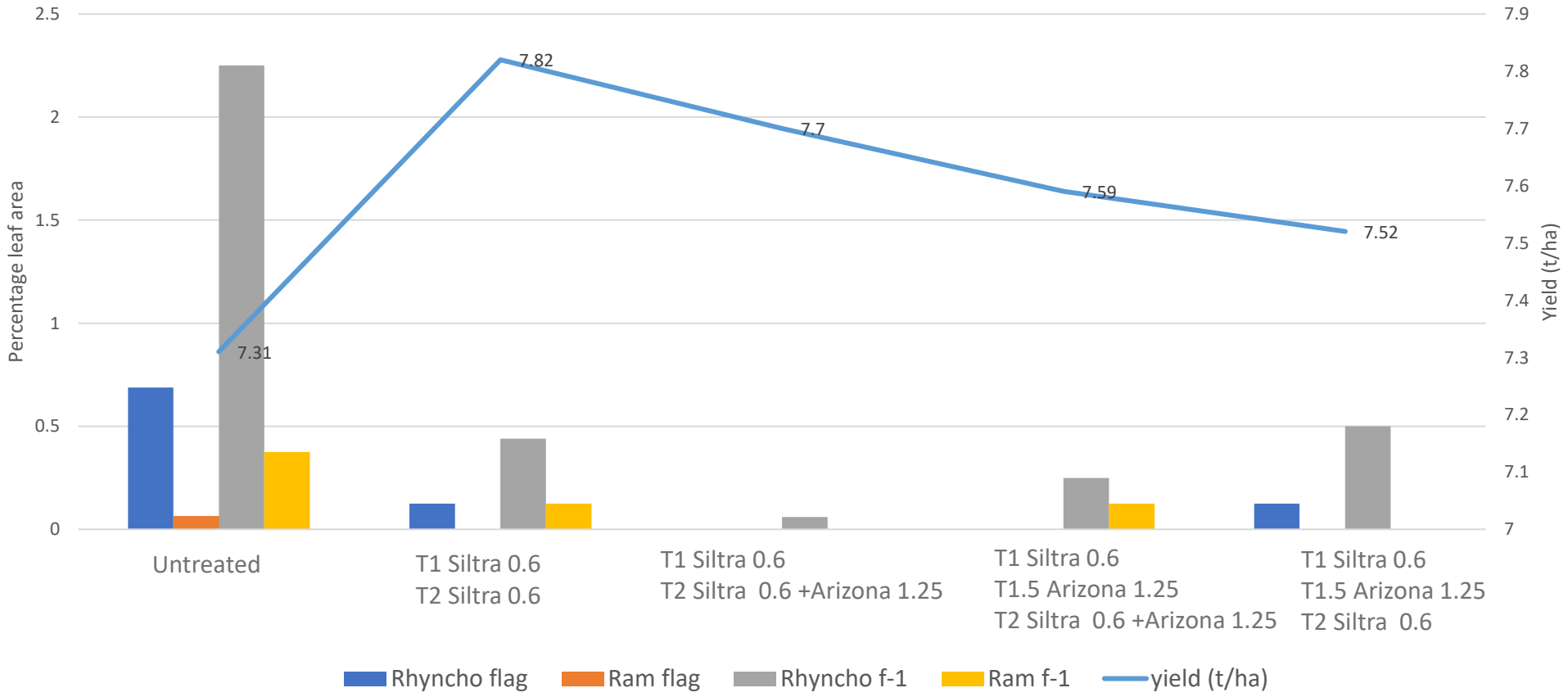
T1 SDHI/azole

T2 SDHI/azole

T1 SDHI/azole + folpet

T2 SDHI/azole + folpet

Spring barley programmes: Laureate, Boghall 2022



Barley summary

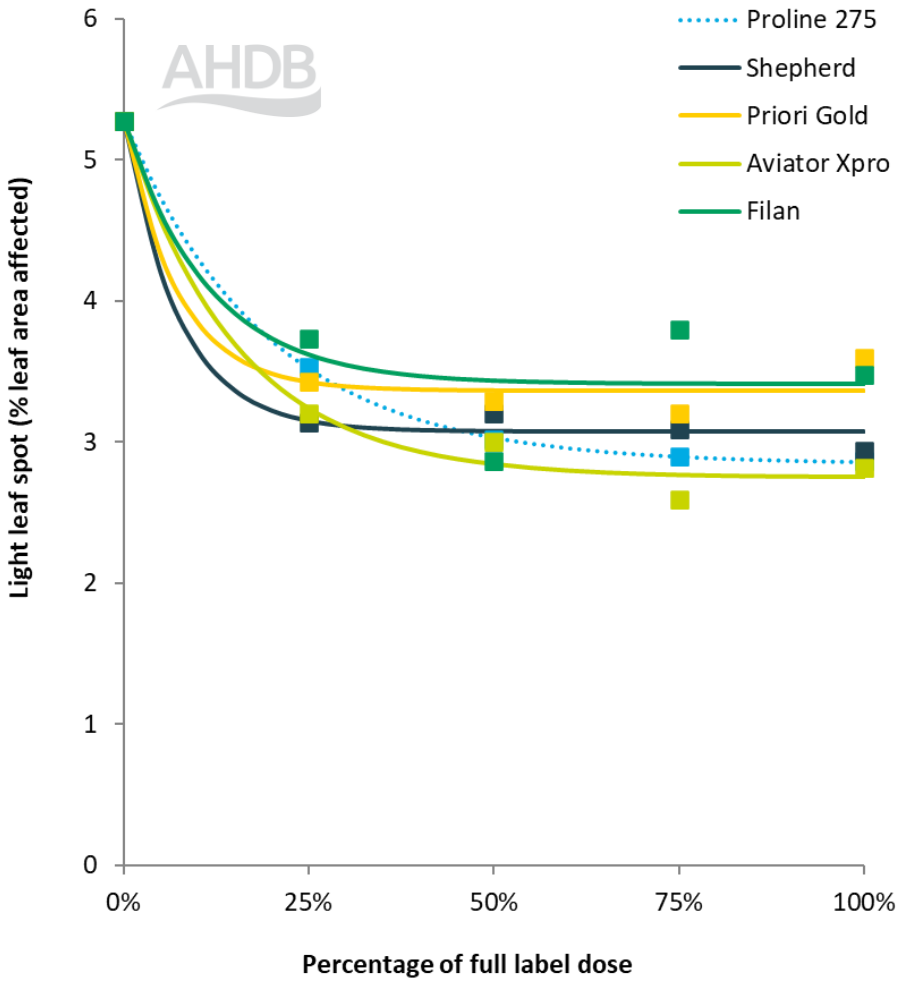
Winter barley

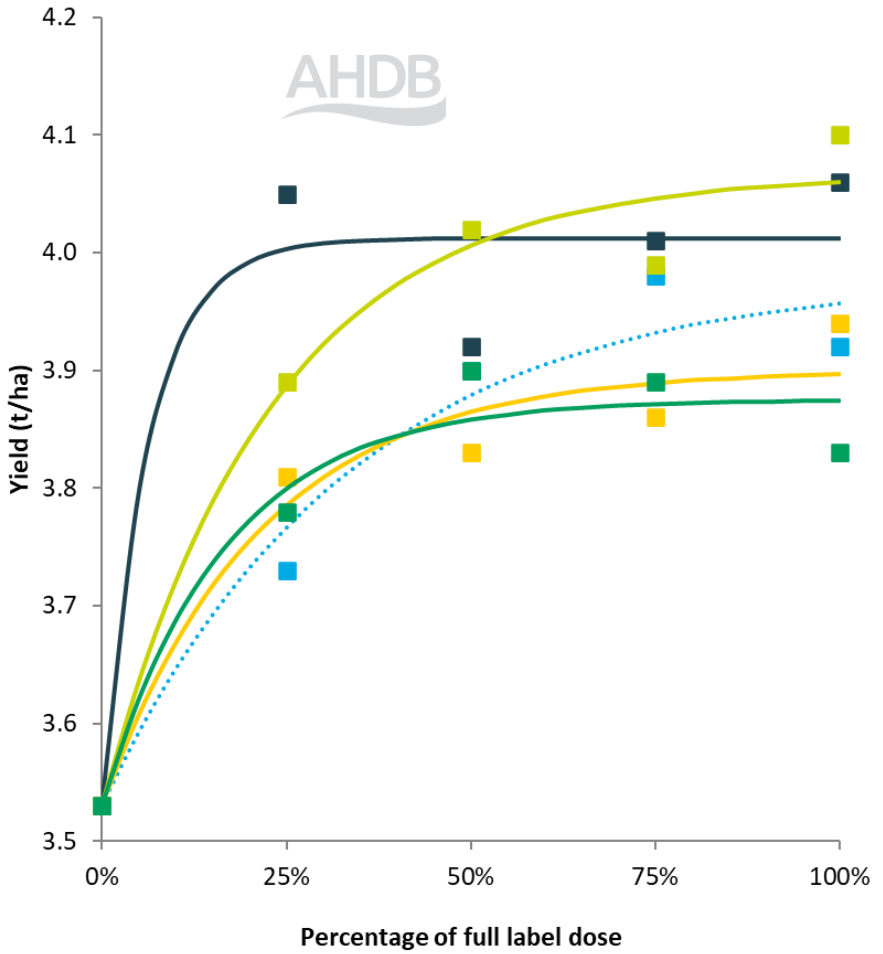
- Where rhynchosporium is the main risk prothioconazole is more effective than mefentrifluconazole
- A mix of actives (as in Ascra Xpro and Revystar XE) is more effective than straight products and is also an effective anti-resistance strategy
- Adding folpet improves disease control but doesn't always add to yield. Risk management?

Spring barley

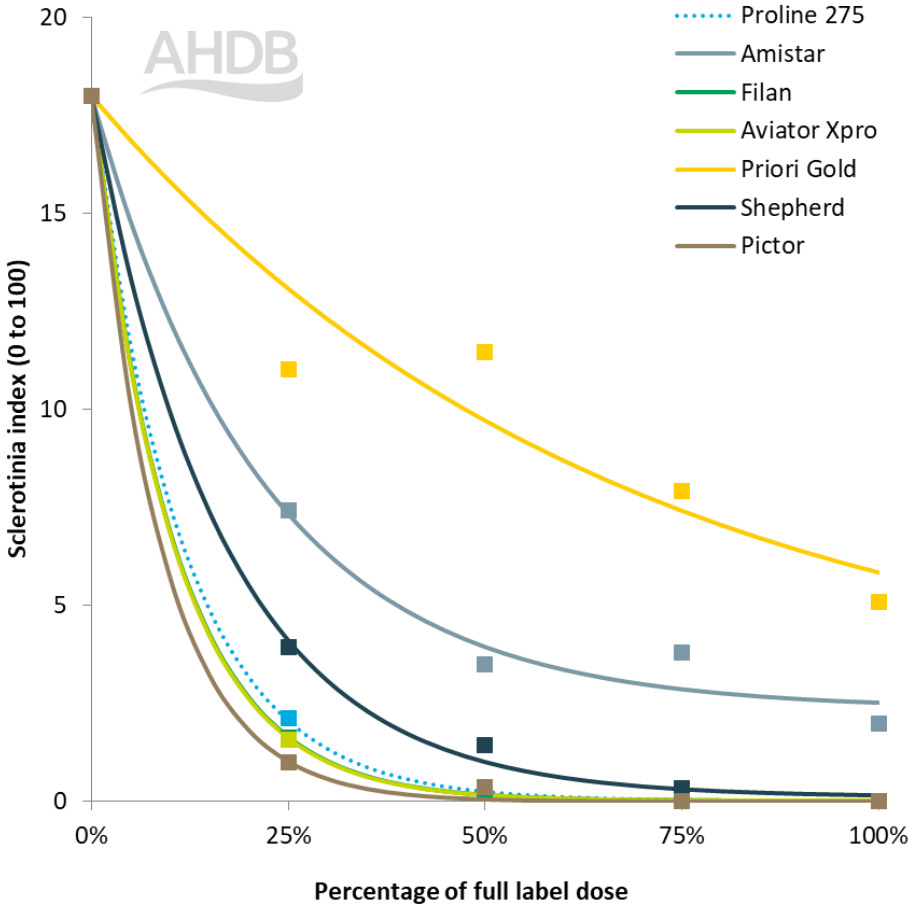
- Ramularia management is reliant on azoles: mefentrifluconazole is more effective than prothioconazole.SDHIs are less effective.
- Adding folpet helps reduce disease risk. Data suggests conventional timings / in mix with main actives is most effective. Yield benefits inconsistent.

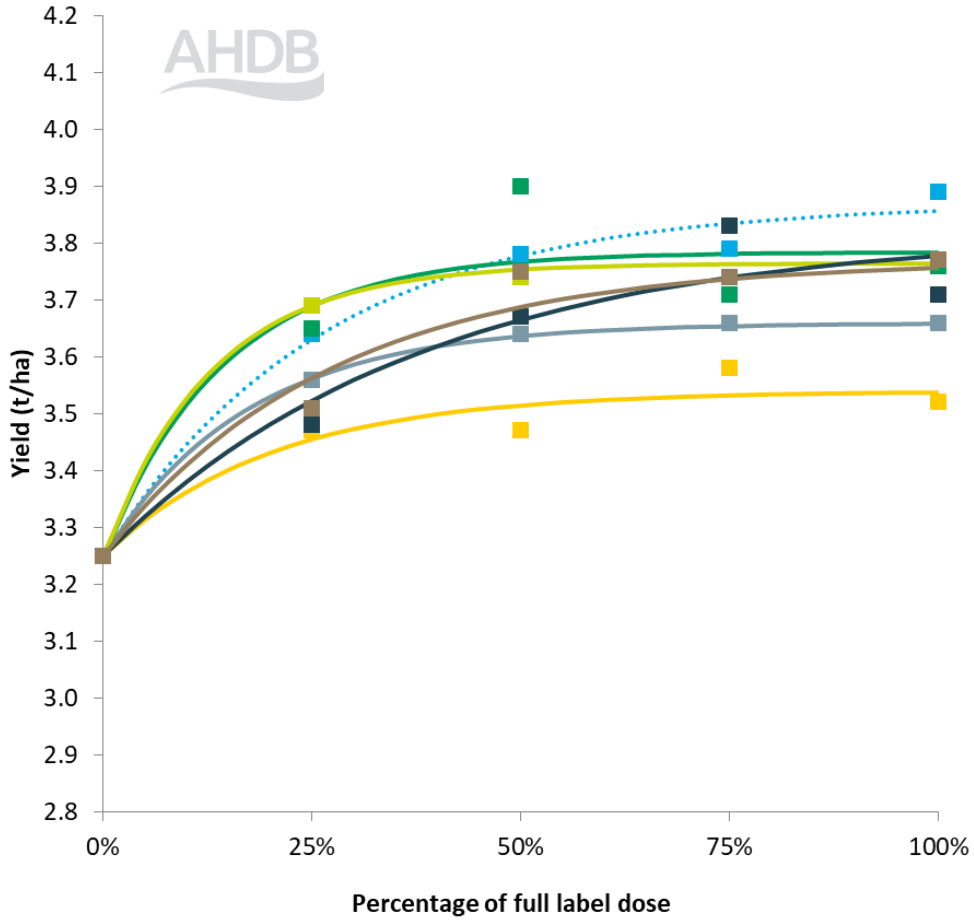
Light leaf spot disease and yield 2019–21 (5 trials)





Sclerotinia stem rot and yield 2015–17 (5 trials)





Oilseed rape summary

- **Light leaf spot**
  - Azoles and non-azoles providing similar levels of disease control and yield.
  - LLS risk is based on 2022 pod infection, wet and warm summer weather and early drilling (+location and variety)
  - Sprays work protectantly and the autumn vis spring vis both debate continues
  - For sclerotinia management, wide choice of products with evidence that newer actives like Pictor and Aviator improve efficacy.

Take home messages

- Dry springs are limiting the risk of some diseases
- Despite pesticide withdrawals we are in a relatively good position for choices of actives
- Critical we steward them and retain this
- Efficacy of actives varies significantly.
- Tailoring programmes brings obvious benefits
- But don’t over complicate – marginal timings are probably not the place for actives you may later rely on
- Multisites (folpet) remain key for reducing risk
- Much greater grower demand for resilient varieties

Acknowledgements

Jason Pole, Catherine Harries, Siobhan Hillman and Kristina Grenz, AHDB

Faye Ritchie, Jonathan Blake, Philip Walker and Rebecca Joynt, ADAS

Stuart Knight, NIAB

Fiona Burnett, SRUC

Simon Edwards, Harper Adams University

Nichola Hawkins, NIAB

Stephen Kildea, Teagasc


Thank you

Crop selection and variety performance

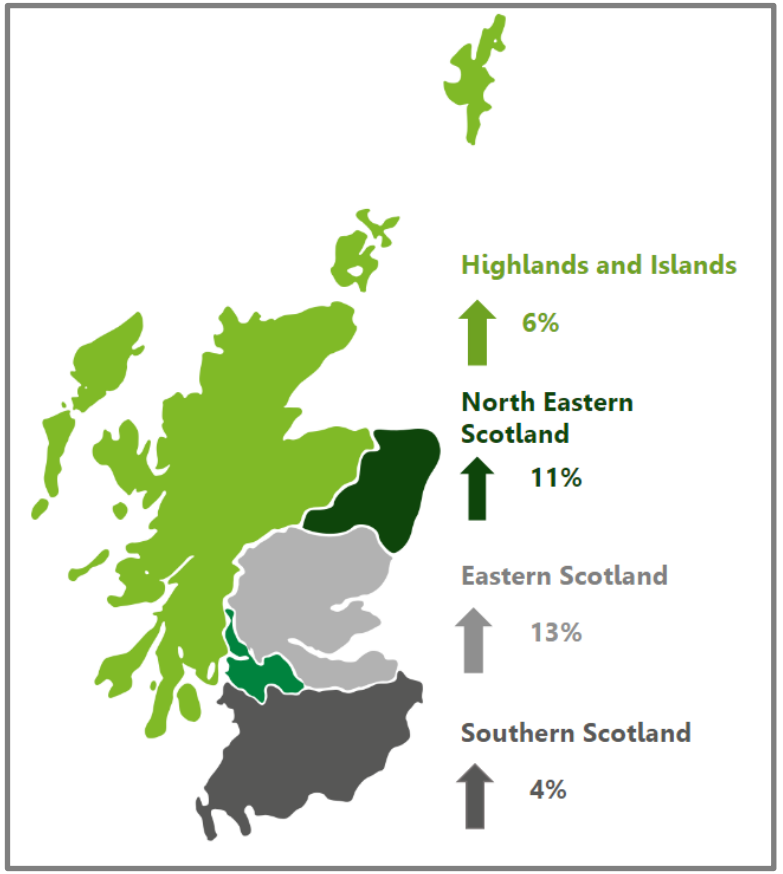
Steve Hoad
SRUC
steve.hoad@sruc.ac.uk

Outline

- Crop harvest: 2021/22 and trends
- Scottish Cereals List 2023/24: Review
  - Spring barley – established *versus* new varieties
  - Spring wheat and spring oats – yield and quality
  - Winter barley – take advantage of variety improvement
  - Winter wheat – Old varieties off and opportunity for new

Crop harvest: 2021/22 and trends

- https://www.gov.scot/publications/cereal-and-oilseed-rape-harvest-2022-final-estimates/
- Spring 2022 – crop potential looked good
- Summer 2022 – sustained heat and sun
- Yield and quality
- Production trends:
  - How does your farm compare?
  - What are your long term changes?



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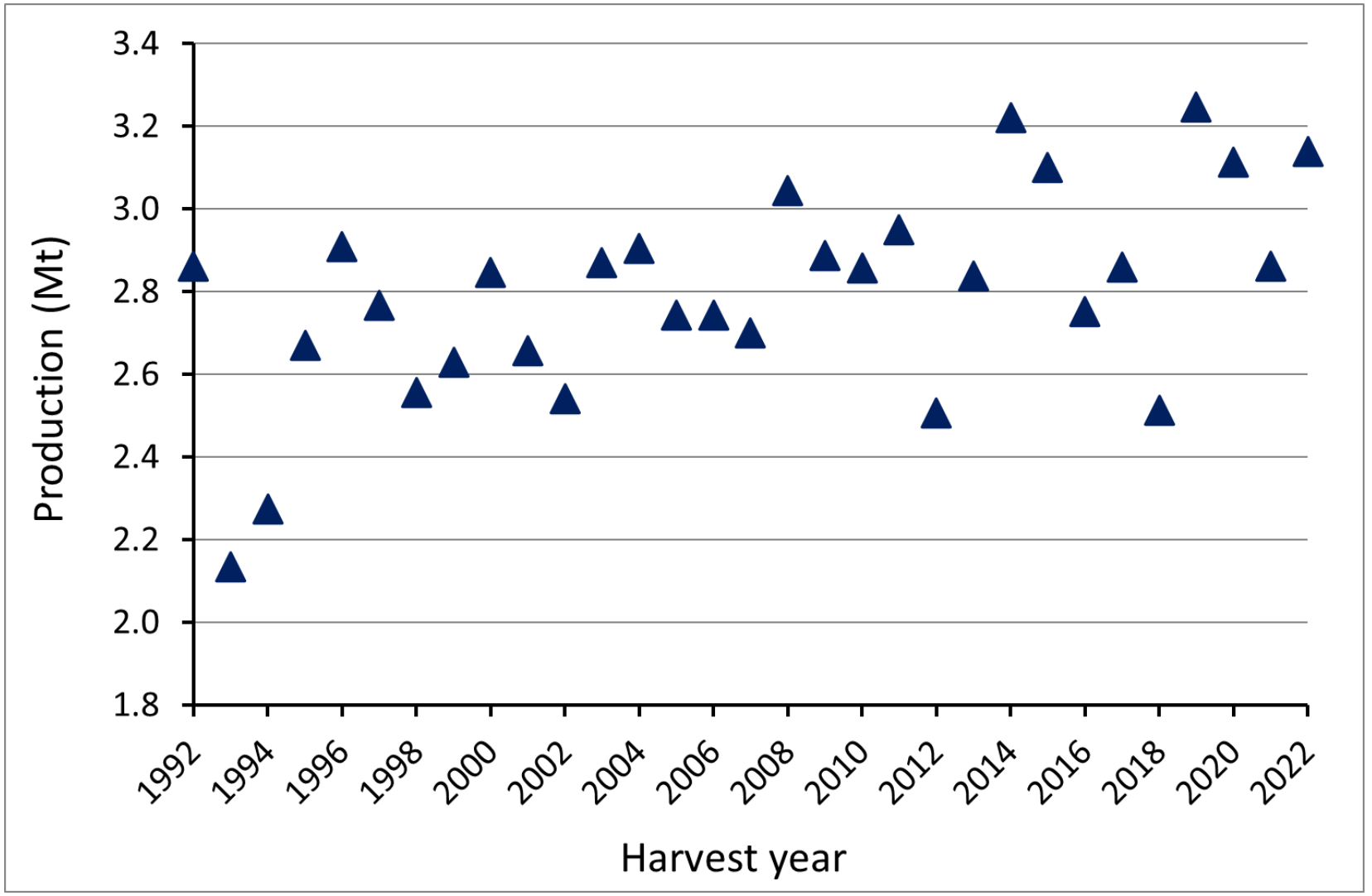
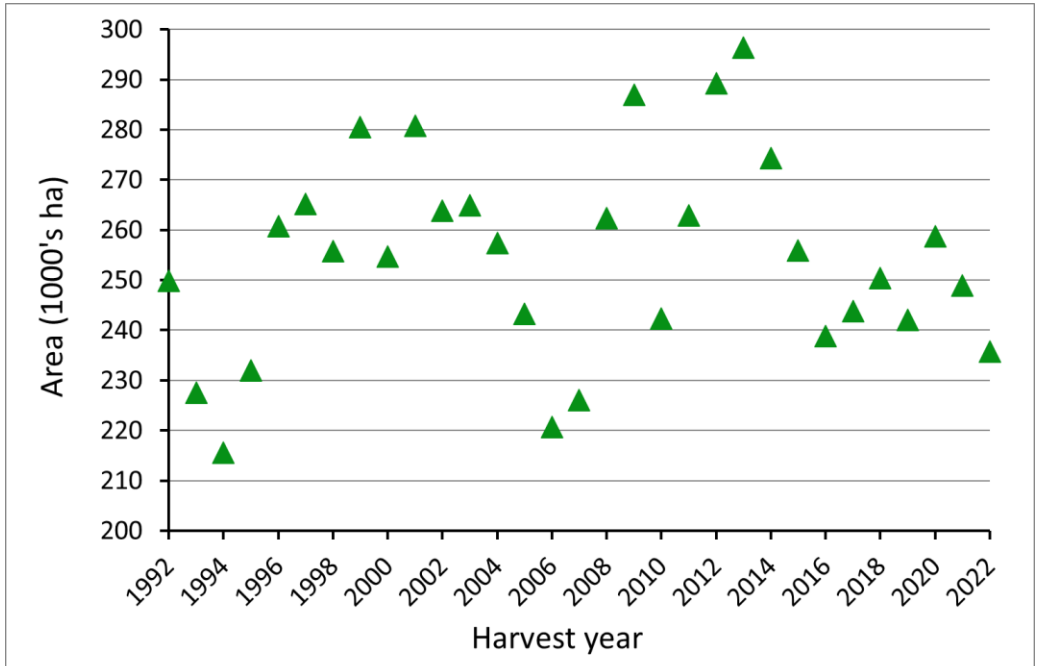
Total cereal production

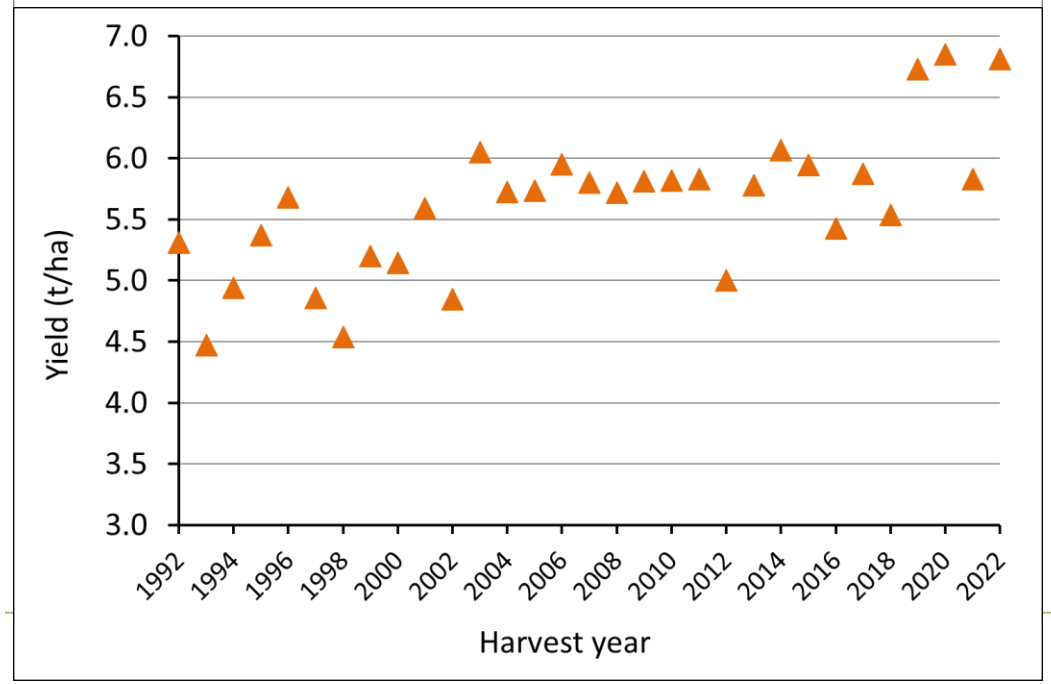


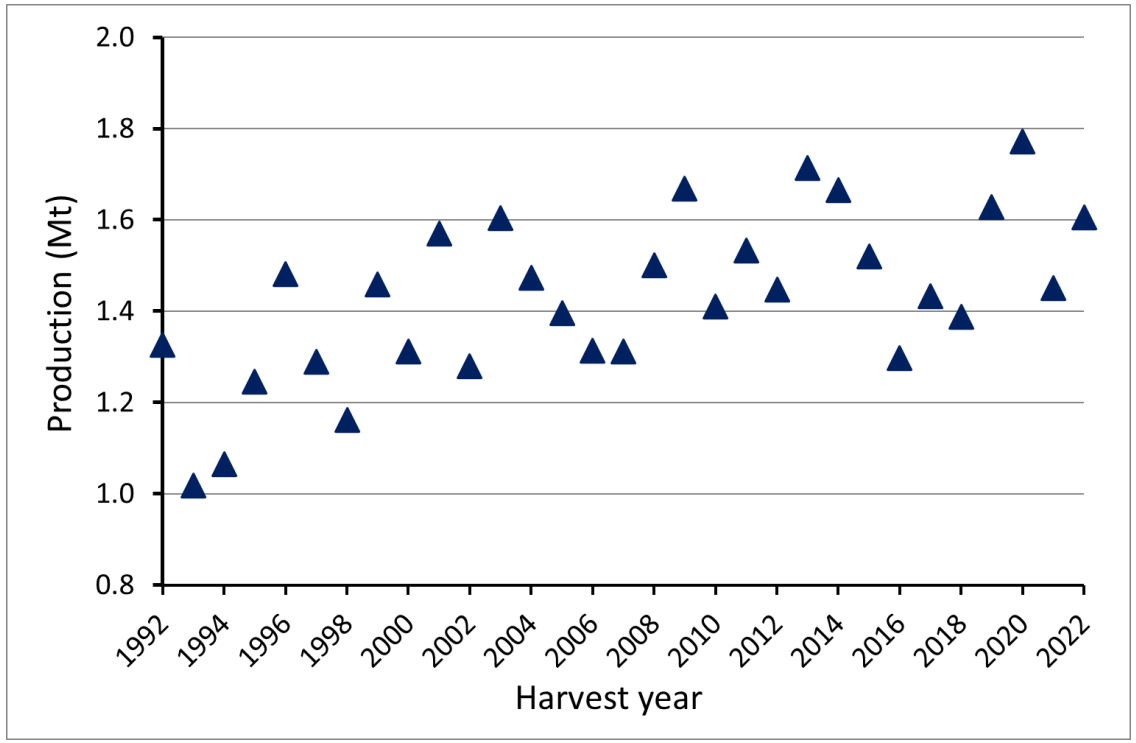
- Long term upwards trend
- Seasonal variation in areas sown and yield
- Improved yields (new varieties?)

https://www.gov.scot/publications/cereal-and-oilseed-rape-harvest-2022-final-estimates/

Spring barley production







- 2022 area below average
- Near record yield

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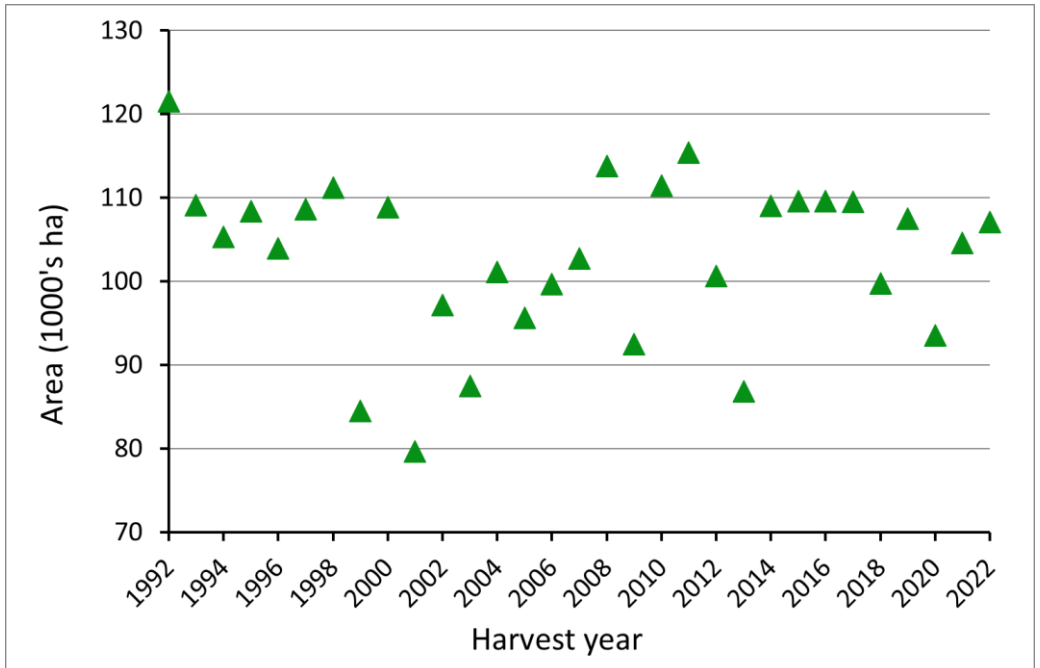
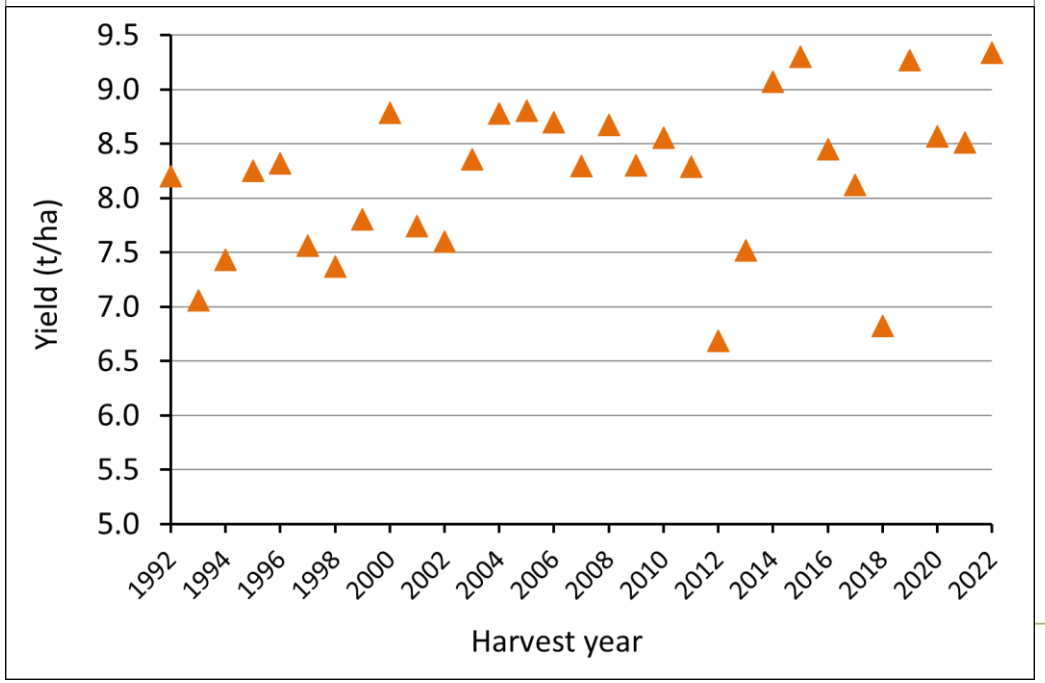
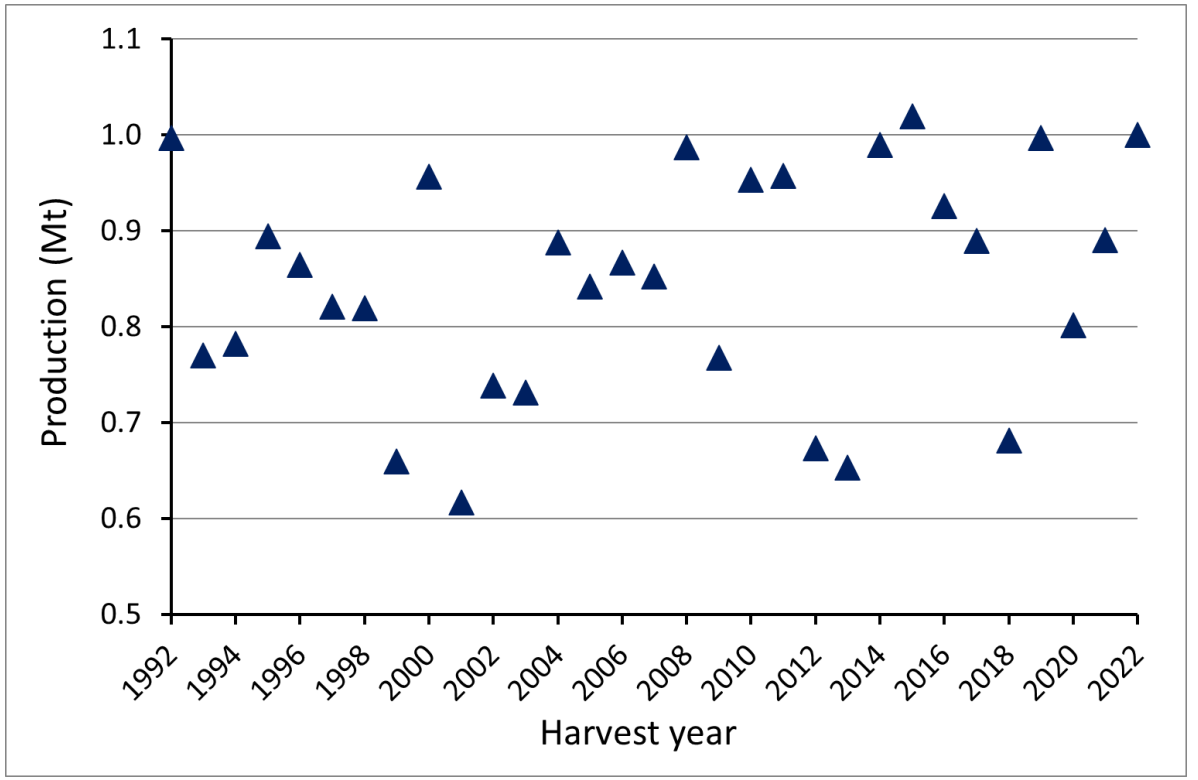
Winter wheat production







- Seasonal production swings
- 2021/22 = good area and high yield

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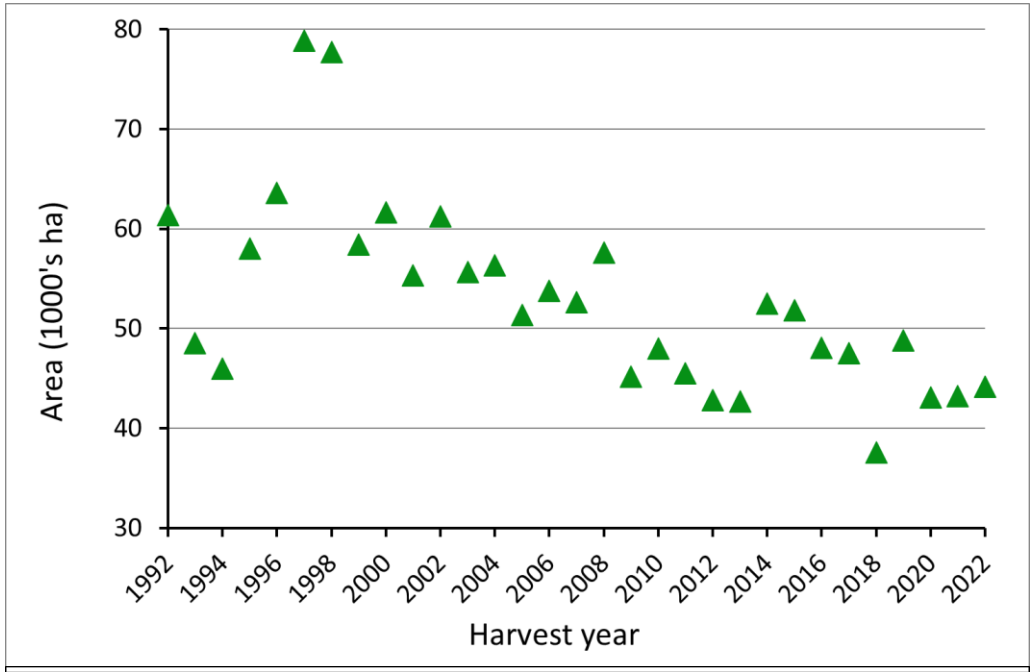
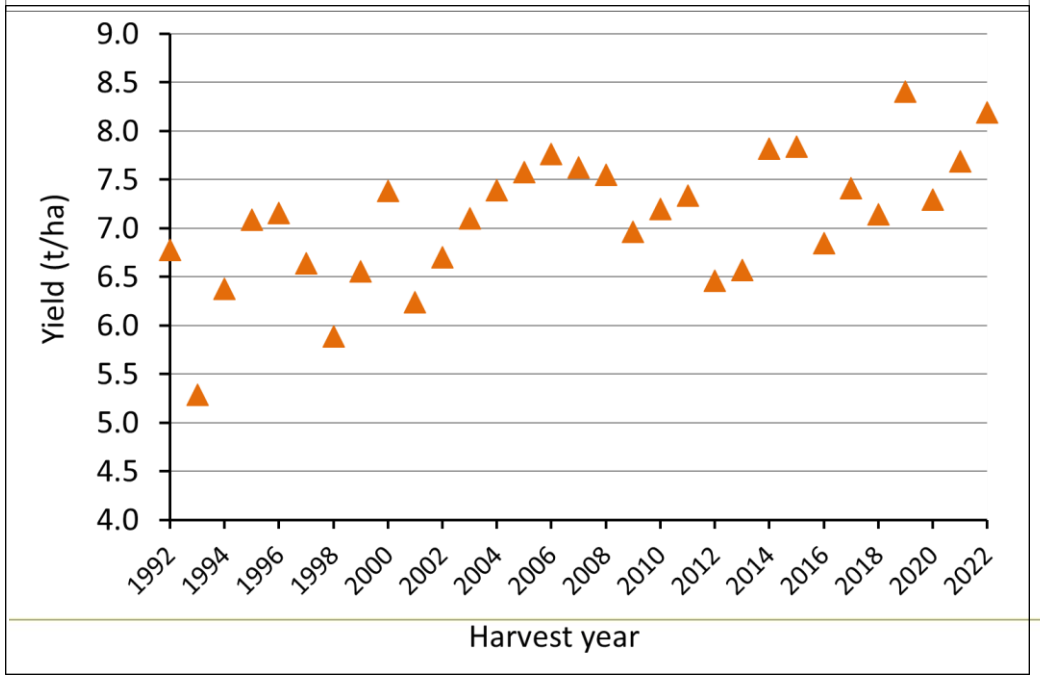
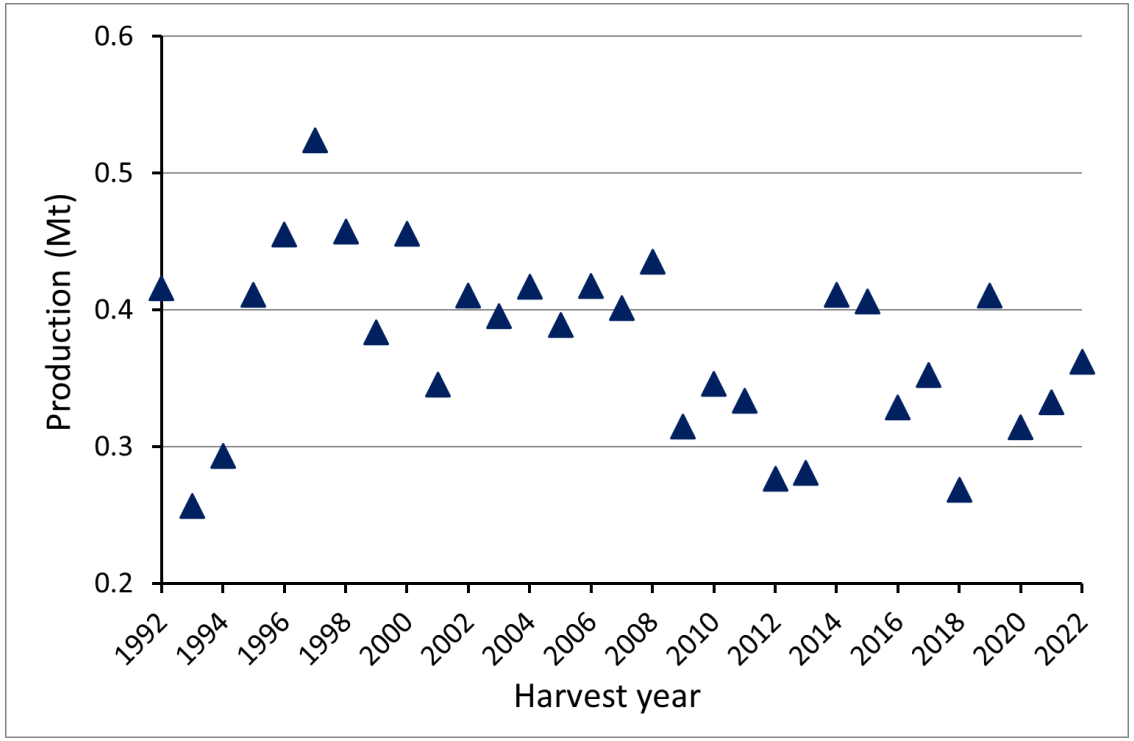
Winter barley production







- Average production
- High yield compensates for reduced area

Scottish Cereals List 2023/24: Review

- Spring barley
- Spring wheat and spring oats
- Winter barley
- Winter wheat

Spring barley Grain yield of 100 = 7.8 t/ha

Year First Listed	Recommendation		Grain yield as % of treated Control	Yield loss (%) if untreated	Malting market options and MBC† approval		
					Dist.	Brew	Grain
2023	P1	SY Tennyson	106	13	T	T	N
2023	P1	Diviner	105	12	T	N	N
2023	P1	KWS Curtis	103	11	T	T	N
2020	R	Firefoxx	103	11	F	N	N
2016	R	Laureate	102	9	F	F	N
2018	R	LG Diablo	102	9	F	F	N
2016	R	KWS Sassy	98	8	F	N	N
2016	S	Fairing	92	9	N	N	F

Spring barley: Main malting options

- 5 established varieties
- Three new entries

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Spring barley Grain yield of 100 = 7.8 t/ha

Year First Listed	Recommendation		Grain yield as % of treated Control	Yield loss (%) if untreated	Malting market options and MBC† approval		
					Dist.	Brew	Grain
2023	P1	SY Signet	105	9	N	T	N
2023	P1	Florence	104	10	N	T	N
2023	P1	Sun King	103	8	N	T	N
2021	P3	Skyway	102	11	N	P	N
2015	R	RGT Planet	99	9	N	F	N
2023	P1	Hurler	106	13	N	N	N
2020	R	Prospect	101	10	N	N	N

Spring barley: Other malting and feed

- Three more new varieties
- Brewing and feed uses

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Progress through the barley evaluation system:

Example of a new spring barley (candidate) from harvest 2022

NL and RL stage	MBC Status (autumn/winter)	Harvest data	Malting tests (MBC spring report)		MBC status (revised)
NL1	---	2020	Micro	2021	Under test
NL 2	Under test	2021	Micro	2022	Under test
RL Candidate	Under test	2022	Micro	2023	Provisional Approval 1
RL P1 (Year 1)	Under test	2023	Macro*	2024*	Provisional Approval 2 (or Full approval)
RL P2 (Year 2)	Provisional Approval 1	2024	Macro*	2025*	Full Approval (or Off)
RL Full Rec.	Provisional** Approval 2 or Full**	2025	In commercial use		

* Macro-scale tests can be reported in spring or autumn

** A duel-purpose variety can have provisional and full status

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Spring barley agronomics: Main malting choices

Year First Listed	Recommendation		Screenings <2.5 mm (%)	Specific weight (kg/hl)	Maturity days +/- RGT Planet	Straw strength 1 to 9; weak to stiff (without PGR)	Straw length (cm) without PGR
2023	P1	SY Tennyson	2.6	66.6	+1	[7]	[69]
2023	P1	Diviner	4.0	67.7	+1	[8]	[67]
2023	P1	KWS Curtis	5.2	67.5	+1	[8]	[69]
2020	R	Firefoxx	3.6	67.1	0	7	69
2016	R	Laureate	3.0	67.2	+1	6	70
2018	R	LG Diablo	3.2	67.8	+2	7	71
2016	R	KWS Sassy	2.2	69.1	+1	6	78
2016	S	Fairing	2.6	68.9	-2	8	70

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Spring barley agronomics: Main malting choices

Year First Listed	Recommendation		Brackling risk 1 to 9; low to high	Disease resistance; 1 susceptible to 9 resistant	
				Mildew	Rhyncho-sporium
2023	P1	SY Tennyson	7	9	[3]
2023	P1	Diviner	9	9	[3]
2023	P1	KWS Curtis	9	9	[7]
2020	R	Firefoxx	8	9	5
2016	R	Laureate	8	9	7
2018	R	LG Diablo	8	9	6
2016	R	KWS Sassy	6	9	6
2016	S	Fairing	8	8	8

- Good brackling resistance
- Variation in resistance to *Rhynchosporium*

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Spring barley agronomics: Other brewing and feed

Year First Listed	Recommendation		Screenings <2.5 mm (%)	Specific weight (kg/hl)	Maturity days +/- RGT Planet	Straw strength 1 to 9; weak to stiff (without PGR)	Straw length (cm) without PGR
2023	P1	SY Signet	3.1	67.4	+1	[8]	[71]
2023	P1	Florence	2.7	68.2	0	[8]	[69]
2023	P1	Sun King	2.5	67.7	+1	[8]	[72]
2021	P3	Skyway	2.4	69.4	+1	7	75
2015	R	RGT Planet	3.2	68.8	0	7	73
2023	P1	Hurler	4.4	66.2	+1	[9]	[65]
2020	R	Prospect	4.1	68.5	+1	7	70

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Spring barley agronomics: Other brewing and feed

Year First Listed	Recommendation		Brackling risk 1 to 9; low to high	Disease resistance; 1 susceptible to 9 resistant	
				Mildew	Rhyncho-sporium
2023	P1	SY Signet	8	9	[5]
2023	P1	Florence	9	8	[6]
2023	P1	Sun King	9	9	[4]
2021	P3	Skyway	7	9	7
2015	R	RGT Planet	8	8	6
2023	P1	Hurler	9	8	[6]
2020	R	Prospect	9	9	7

- Good brackling resistance
- Variation in resistance to *Rhynchosporium*

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Spring oats yield and quality

Spring oats Grain yield of 100 = 7.1 t/ha

Year first listed	Recommendation		UK Grain yield as % of treated control	Yield loss (%) if untreated	Kernel content (%)	Screenings <2.0mm (%)	Specific weight (kg/hl)
2022	P2	Merlin	103	5	71.3	1.8	51.2
2020	R	WPB Isabel	101	13	73.0	2.2	53.5
2011	R	Canyon	101	5	71.3	3.0	51.4
2014	R	Conway	98	10	71.8	2.4	49.6

- Well established varieties
- Check differences in quality

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Spring oats agronomics

Year first listed	Recommendation		Maturity days +/- WPB Isabel	Straw strength 1-9; weak to stiff	Straw length (cm)	Crown rust (1 to 9)	Mildew (1 to 9)
2022	P2	Merlin	-1	[7]	107	[3]	8
2020	R	WPB Isabel	0	7	109	5	5
2011	R	Canyon	-1	7	110	4	8
2014	R	Conway	-1	7	104	4	6

- Similar agronomic features
- Variation in mildew resistance

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Spring wheat yield and quality

Spring wheat Grain yield of 100 = 6.8 t/ha

Year first listed	Recommendation		UK Grain yield as % of treated control	UKFM Group	Hagberg falling number	Specific weight (kg/hl)
2022	P2	KWS Fixum	107	4	231	77.6
2023	P1	KWS Alicium	105	2	346	80.3
2021	R	WPB Escape	104	4	271	76.4
2019	R	KWS Talisker	103	4	295	79.0
2017	R	KWS Cochise	102	2	250	78.6
2022	P2	KWS Ladum	102	1	337	78.0
2023	P1	KWS Harsum	102	1	330	78.3
2023	P1	KWS Lightum	102	2	325	78.4
2011	R	Mulika	95	1	332	77.0

- UKFM Groups
- Good yield
- High grain quality

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Spring wheat agronomics

Year first listed	Recommendation		Maturity days +/- Mulika	Straw strength 1-9; weak to stiff	Straw length (cm)	Septoria tritici (1 to 9)	Mildew (1 to 9)
2022	P2	KWS Fixum	+1	---	79	[6]	[8]
2023	P1	KWS Alicium	-1	---	85	[7]	[8]
2021	R	WPB Escape	+1	---	73	[6]	8
2019	R	KWS Talisker	+1	---	80	[6]	8
2017	R	KWS Cochise	+1	---	78	6	8
2022	P2	KWS Ladum	0	---	75	[7]	[7]
2023	P1	KWS Harsum	+1	---	78	[7]	[7]
2023	P1	KWS Lightum	0	---	79	[6]	[8]
2011	R	Mulika	0	---	79	7	6

- Variation in straw length and maturity

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Winter barley Grain yield of 100 = 10.4 t/ha

Year First Listed	Recommendation		Grain Yield as % of treated control	Yield loss (%) if untreated	Soil type: Yield as % of control	
					Light soil	Heavy soil
2023	P1	LG Caravelle	[104]	17	103	[106]
2022	P2	Lightning	103	13	102	103
2021	R	KWS Tardis	102	18	102	107
2021	R	Bolton	102	17	103	105
2023	P1	Bolivia	[102}	15	104	[104]
2019	R	LG Mountain	101	19	102	102
2022	P2	LG Dazzle	101	13	102	104
2019	O	Valerie	100	21	99	[100]
2023	P1	Buccaneer	[102]	13	99	[99]
2016	S	Craft	94	15	95	95

Winter barley: two-rowed

- Strong list
- Some difference in untreated yield
- Check performance on soil type
- Good spec. weights

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Winter barley Grain yield of 100 = 10.4 t/ha

Year First Listed	Recommendation		Grain Yield as % of treated control	Yield loss (%) if untreated	Soil type: Yield as % of control	
					Light soil	Heavy soil
2017	O	Funky	103	14	102	102
2022	P2	KWS Feeris [1]	100	18	101	105
2019	R	SY Kingsbarn	107	21	105	105
2021	R	SY Kingston	106	18	106	104
2021	R	SY Thunderbolt	105	17	104	107
2022	P2	SY Canyon	105	15	105	105
2023	P1	SY Nephin	[105]	15	104	[104]
2016	O	Bazooka	104	20	103	105

Winter barley: six-rowed

- Conventional options limited
- Choice in hybrids
- Good spec. weights
- 6-row *v* 2-row yield gap is smaller

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Winter wheat: Soft Group 4

Winter wheat Grain yield of 100 = 11.3 t/ha

Year First Listed	Recommendation		Grain yield as % of treated Control	Yield loss (%) if untreated	Use as a 2nd cereal	Quality markets	
						Distill-ing	UK Milling
2022	P2	RGT Stokes	103	15	Good	Good	---
2022	P2	RGT Bairstow	103	16	Good	Good	---
2023	P1	LG Redwald	[103]	15	Good	Med	---
2019	R	LG Skyscraper	102	17	Good	Med	---
2020	R	RGT Saki	102	16	Mod	Poor	---
2023	P1	KWS Zealum	[102]	17	Good	Med	---
2018	O	Elation	101	20	Good	Good	---
2021	P3	Swallow	101	18	Mod	Good	---

- Main choices for autumn 2023
- Variation in T and UT yield
- Good 2nd wheat performance

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Winter wheat Grain yield of 100 = 11.3 t/ha

Year First Listed	Recommendation		Grain yield as % of treated Control	Yield loss (%) if untreated	Use as a 2nd cereal	Quality markets	
						Distill-ing	UK Milling
2016	O	KWS Barrel [1]	102	23	Poor	Poor	Biscuit
2021	R	LG Illuminate	100	13	Mod	Med	Biscuit
2022	P2	KWS Brium	100	17	Mod	Med	Biscuit
2022	P2	KWS Dawsum	105	9	Good	---	---
2020	R	SY Insitor	105	22	Good	---	---
2018	O	Gleam	103	19	Good	---	---
2022	P2	LG Typhoon	101	9	Good	---	---
2023	P1	KWS Ultimatum	[103]	8	Mod	---	Bread
2019	S	KWS Extase [2]	100	5	Mod	---	Bread
2022	P2	KWS Palladium	99	6	Mod	---	Bread

Winter wheat: Group 3 and hard wheats

- Check uT yield
- Other features e.g. maturity, stem strength and disease resistance

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Variety review: Take home messages

- Check your yield trends against Scottish Government crop data
- Evidence for improved farm yield in new varieties
- Spring barley list consolidates, with new varieties at early stage
- Spring oats and spring wheat options in yield and quality
- Winter barley is a strong (improved) list
- Winter wheat: new varieties to compete with market leader

Thank you

Further information:

www.sruc.ac.uk/cereals-list

https://ahdb.org.uk/rl

https://www.gov.scot/publications/cereal-and-oilseed-rape-harvest-2022-final-estimates/

https://www.thescottishfarmer.co.uk/ (Scottish list review – 14th Jan)

Are foliar N fertilizers more efficient than soil-applied ammonium nitrate?

Ian Bingham, Zach Reilly & Peter Lindsay

SRUC & SAC Consulting

Reports in farming press

Foliar feed can help cut nitrogen use and emissions

A foliar fertiliser product can help cut overall nitrogen use on winter wheat and so help reduce ammonia emissions in line with the NFU's vision for net zero farming by 2040.

FW 25 February 2020

As featured in Arable Farming Magazine March 2021

ARABLE FARMING

A growing role for foliar N?

by Arable Farming

Using nitrogen more efficiently is one of the areas growers are increasingly focusing on and, with soil-applied products vying for position with newer foliar ones, it is important to explore options carefully. Marianne Curtis finds out more.

Traditionally ureabased foliar sprays have been applied at milky ripe stage to achieve higher grain protein but more recently, urea polymer foliar products have been developed for application, starting earlier in the season, with the aim of improving the efficiency of applied N.

As government agricultural policy moves to reducing on-farm emissions of greenhouse gases, protecting groundwater from contamination and regenerating soils, there is growing pressure on farmers to adopt more sustainable farming practices.

AF March 2021

Is foliar fertiliser better than compound fertiliser?

Applying liquid fertiliser to grass plant leaves can cut costs by £15/ha and double dry matter yields compared with conventional compound nitrogen, trials have shown.

FW 31 March 2020

SRUC AHDB CEREALS & OILSEEDS

Products and recommendations

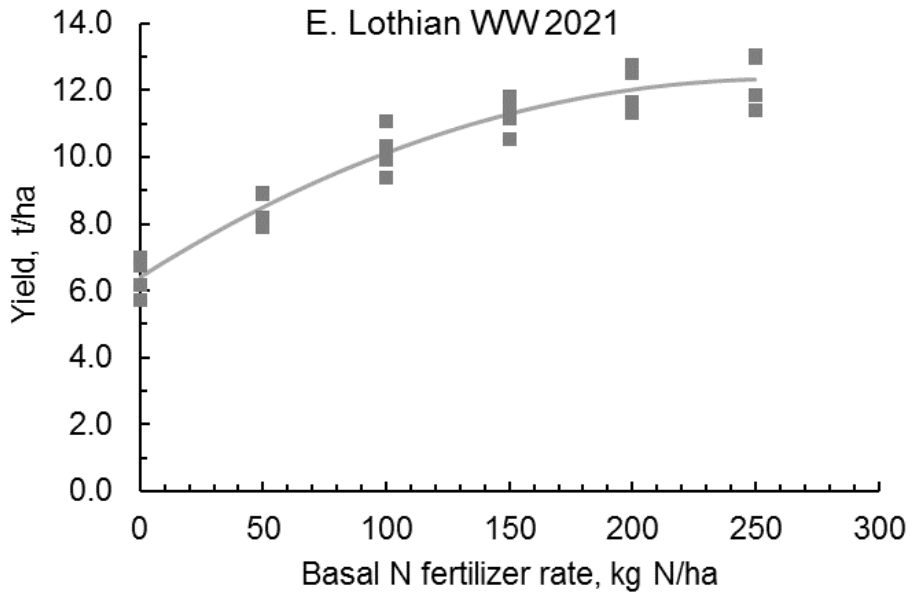
Composition	Use
Nitrate Ammonium Ureic N	Repeat applications 10-14 days ~6 kg N/ha GS22-77
Polymers of urea; variable chain length Micronutrients Sulphur	Apply with fungicides at T1, T2, T3 ~9 kg N/ha to replace 40 – 60 kg soil applied AN
Polymers of urea; variable chain length	Apply with fungicides at T1, T2, T3 ~7 kg N/ha to replace 40 kg soil applied AN

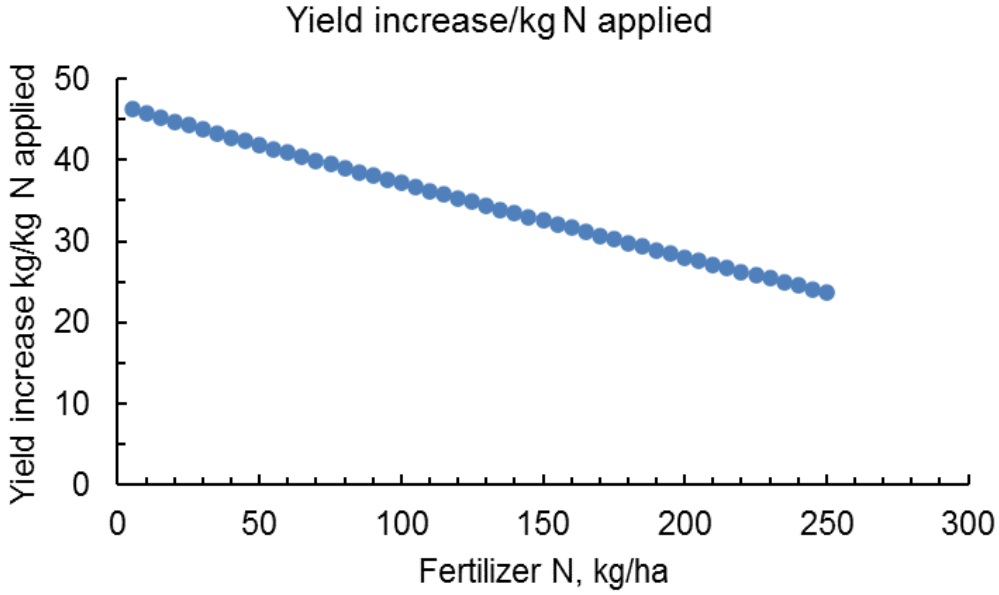
How credible are the claims?

“Foliar N is 4-5 x more efficient than soil-applied N”

“9 kg foliar N can replace final 50 kg of standard N with no loss in yield”

“Relacing 40 kg soil applied N with 7 kg foliar N @ GS31 on spring barley increased yield/kg N applied”





SRUC AHDB CEREALS & OILSEEDS

Mains of Loirston project

2 years each with WW and SB

Year 1 – Effects of application no. Single foliar N product.
Year 2 – Comparison of products. Fixed no. applications.

Key features of experimental design:

- Knowing where we are on the N response curve
- Measurements of yield response & crop N content

Experimental design

2 sites WW cv Barrel

1 site SB cv Laureate

Basal soil applied N ± foliar N

Base fertilizer rate: kg/N

Total N	Tillering	GS30
0	0	0
50	17	33
100	33	67
150	50	100
200	67	133
250	83	167

	Foliar N kg/ha			Total foliar N
Foliar trt	**Tillering**	**GS31/2**	**GS39**	
F0	0	0	0	0
F1	5	0	0	5
F2	5	5	0	10
F3	5	5	5	15

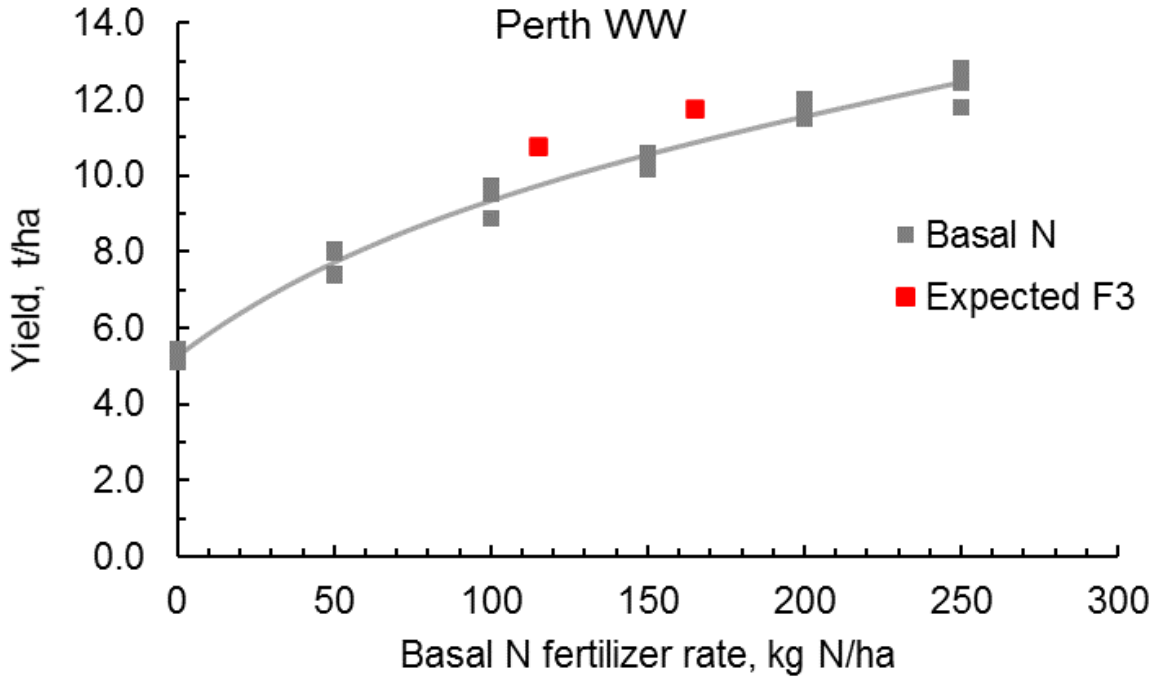
	Foliar N kg/ha			Total foliar N
Foliar treatment	**Tillering**	**GS31/2**	**GS39**	
None	0	0	0	0
Yara Safe N 300	6	6	6	18
Poly N Plus	6	6	6	18
Efficie-N-t 28	6	6	6	18

SRUC AHDB CEREALS & OILSEEDS

Expected and observed grain yield 2021

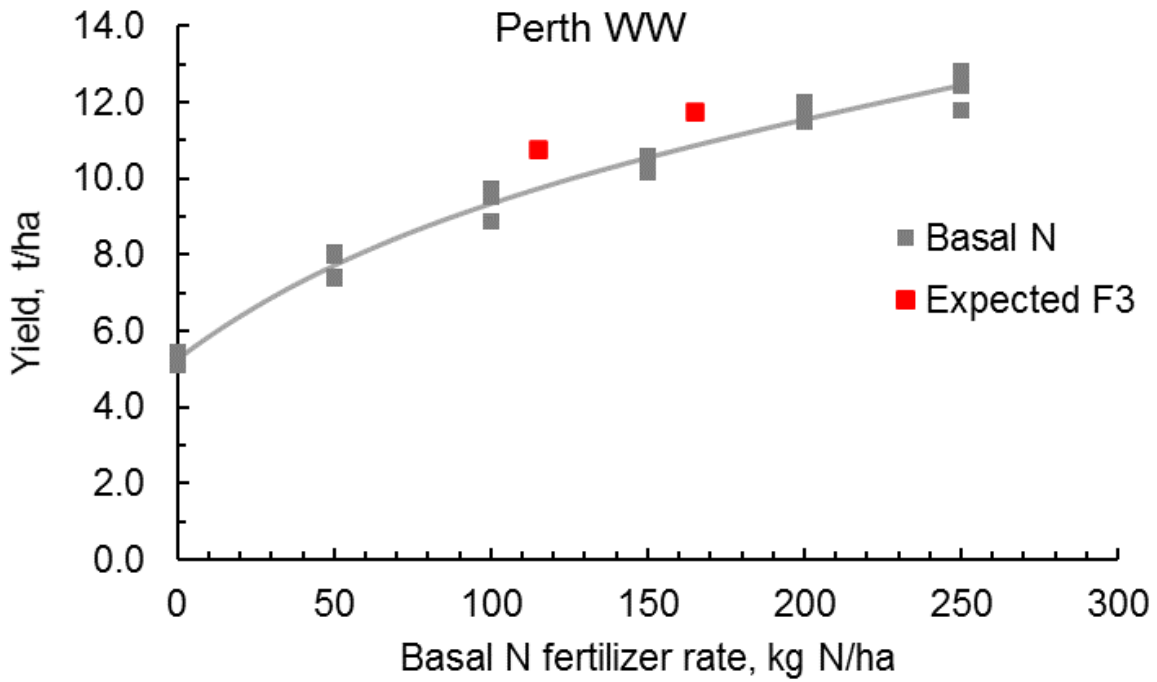
Expected

Observed

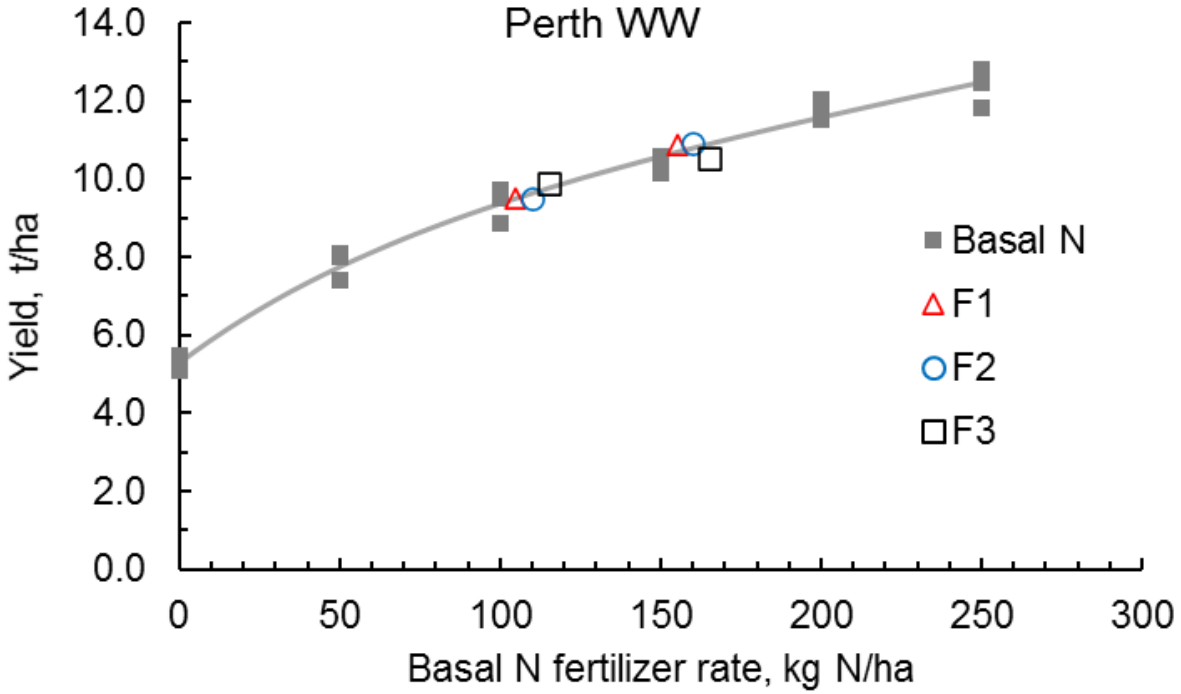


Expected and observed grain yield 2021

Expected



Observed



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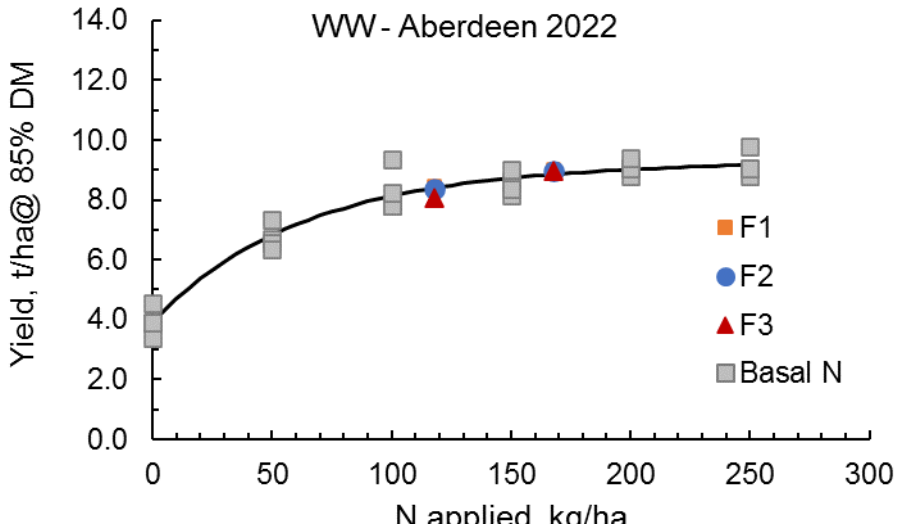
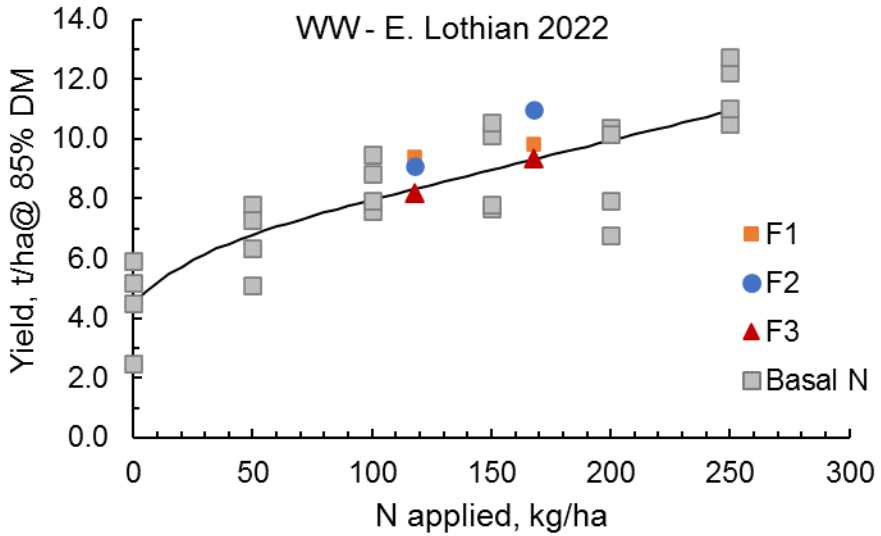
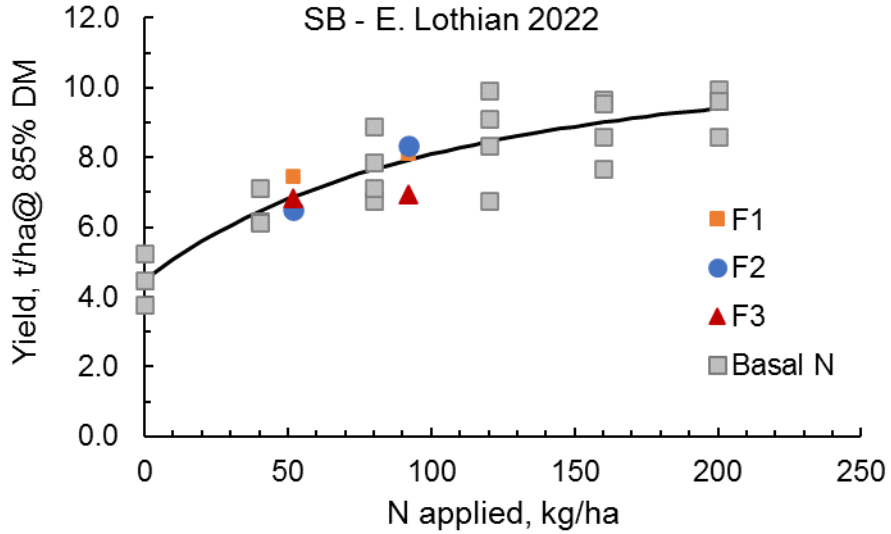
Comparison of products 2022 - Grain yield







F1	Yara Safe N
F2	Poly N Plus
F3	Efficie-N-t 28

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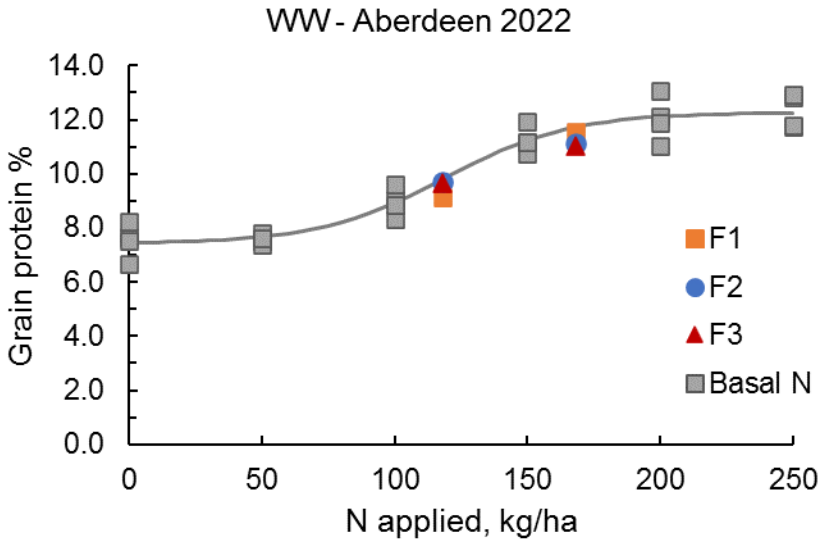
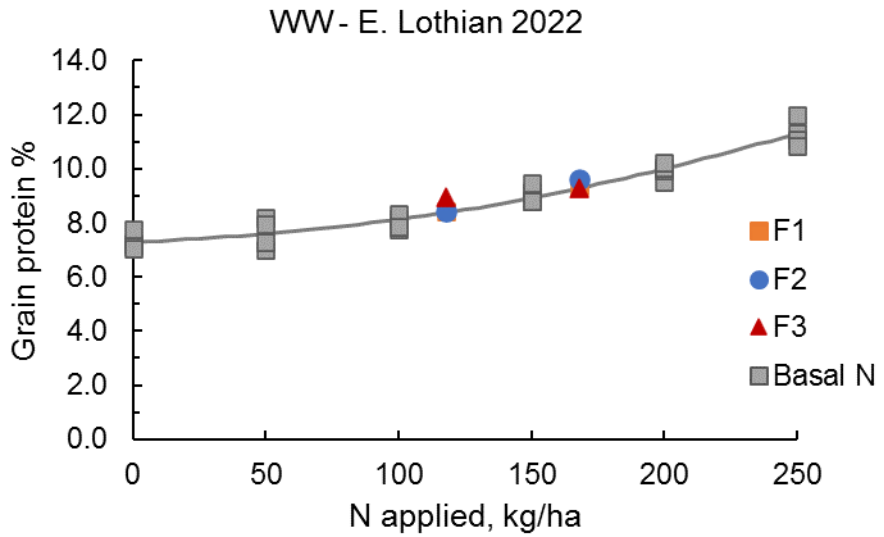
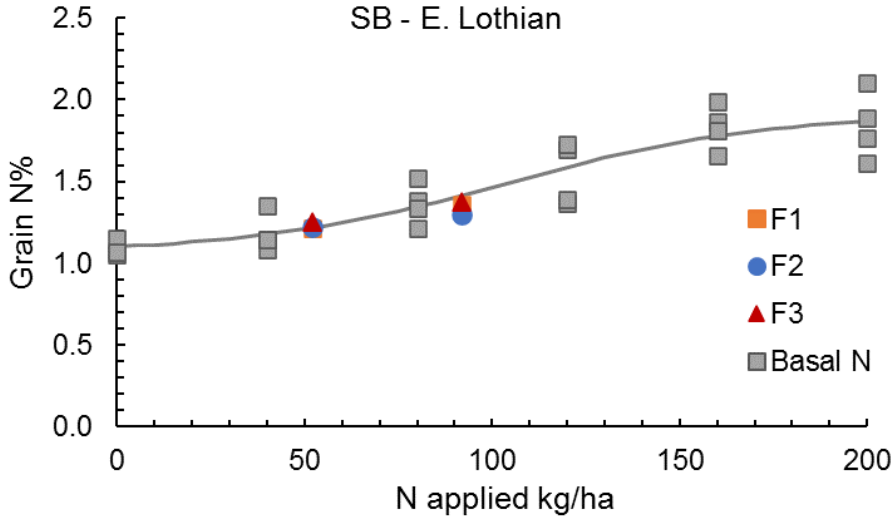
Grain protein and N%







F1	Yara Safe N
F2	Poly N Plus
F3	Efficie-N-t 28

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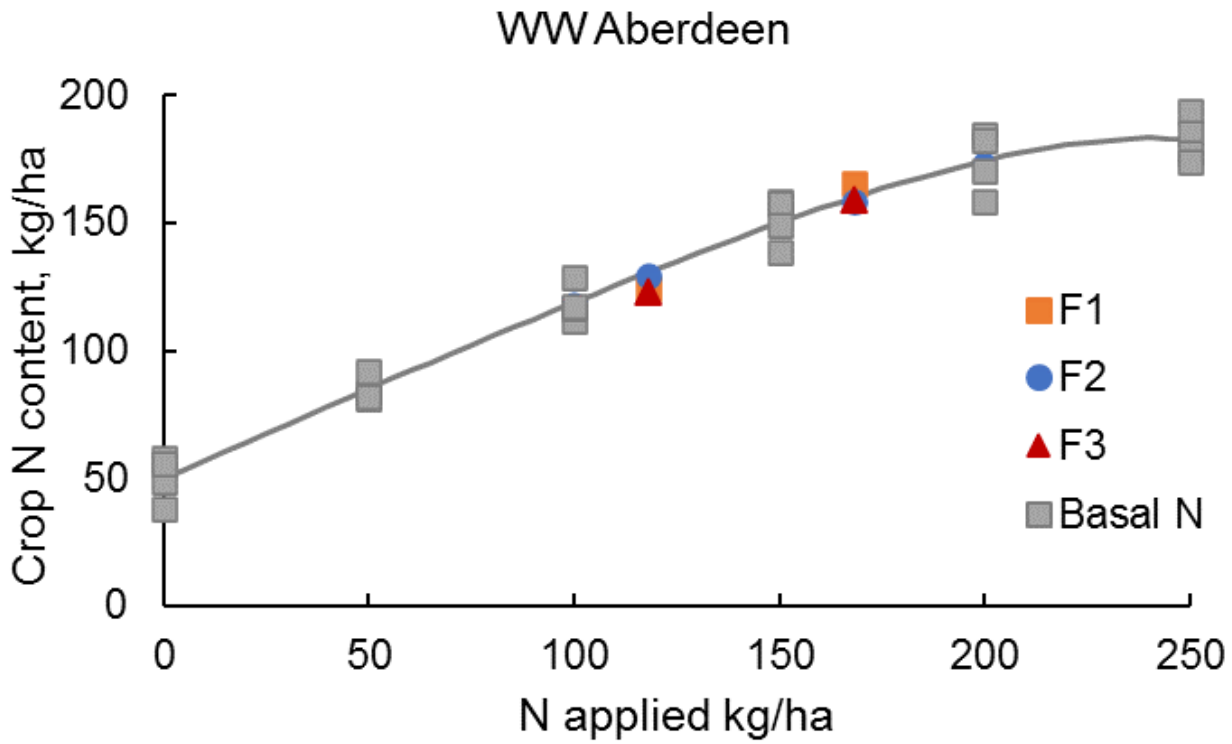
Crop N content & fertilizer recovery



Type	Fertilizer recovery, %
Soil-applied	62
Foliar-applied	56

F1	Yara Safe N
F2	Poly N Plus
F3	Efficie-N-t 28

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Take home messages

- Little evidence of greater yield responses from soil + foliar N *cf* soil N applications alone across 2 sites & 2 years
- Foliar N is taken up by the crop
- Measures of N use efficiency by soil and foliar N are comparable
- Costs of foliar N products are 3 to 5x greater per kg of N

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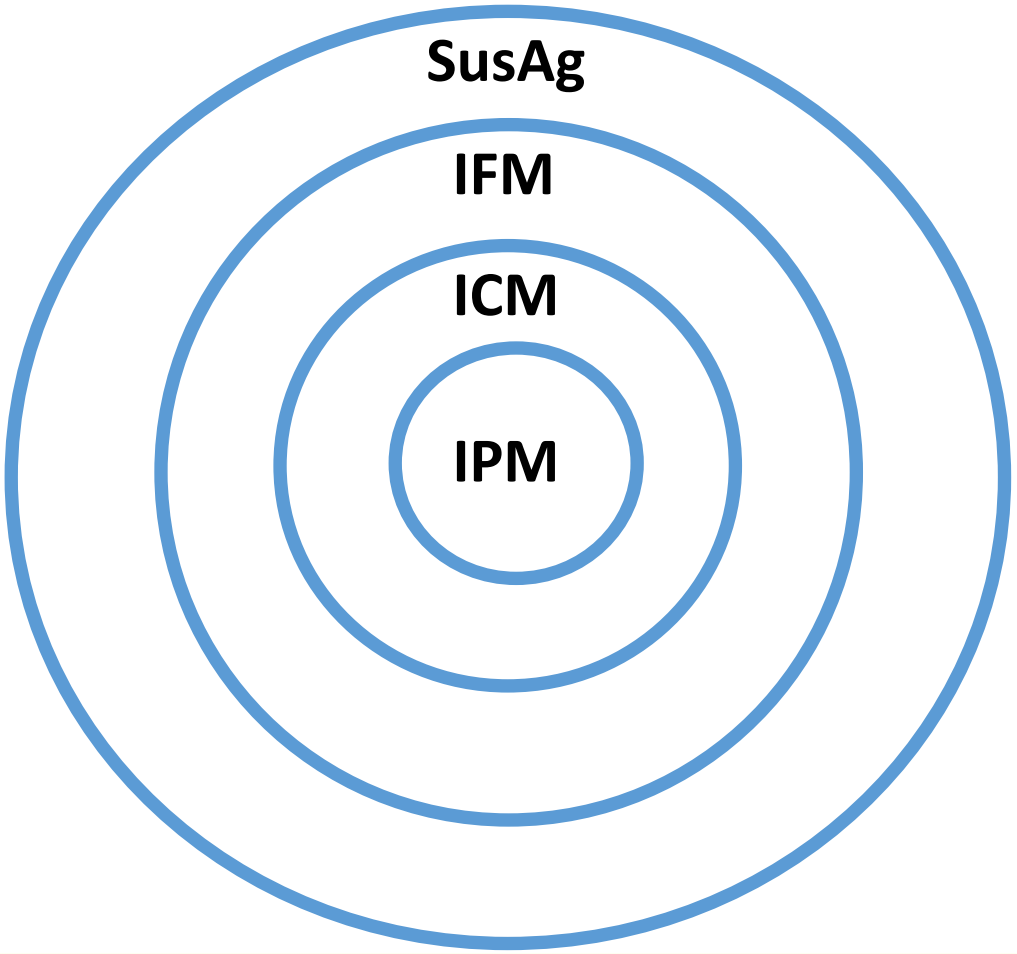
IPM Planning – New tools and options

Neil Havis

Plant Pathologist

SRUC

Sustainable Agriculture components – IPM has a role to play



IPM Principles

- Principle 1—Prevention and suppression (Combinations of tactics and multi-pest approach: Rotation: Crop management and ecology)
- Principle 2—Monitoring
- Principle 3—Decision based on monitoring and thresholds
- Principle 4—Non-chemical methods
- Principle 5—Pesticide selection
- Principle 6—Reduced pesticide use
- Principle 7—Anti-resistance strategies
- Principle 8—Evaluation

Rotation – new crops

- Hemp project
- Hemp is a good break crop for soil structure, N fixation, Carbon sequestration, weed competition, nematicidal properties on root know nematodes
- Where does it fit in rotations?
- Are there any disease and pests carry over?
- 1 day workshop planned for early 2023 to prioritise research areas –SRUC Barony campus

Image: Scottish press association

Alternatives to conventional pesticides

- **Biostimulants**
  - Non-microbial e.g. seaweed extracts, chitin
  - Microbial e.g. non-pathogenic fungi (*Trichoderma* spp. etc.), AMF
- **Elicitors**
  - Mimic action of natural elicitors e.g. Chitosan),
  - Generate natural elicitors e.g. phosphite
  - Signal mimic e.g. BION
  - Pathogens
- **Biofungicides**
  - Bacteria e.g. *Bacillus* spp.
  - Fungi e.g. *Trichoderma* spp.

What's on the label!

Bacillus amyloliquefacien…

Bacillus subtilis Products

Trichoderma Based

Year one field trials (3 varieties x 18 treats)

Treatment	T0 (GS 24)	T1 (GS 31)	T2 (GS45)
1	Untreated	Untreated	Untreated
2	Laminarin	Laminarin	Untreated
3	Amino Flo 2.5 l/ha	Amino Flo 2.5 l/ha	Untreated
4	Bion	Bion	Untreated
5	AQ10	AQ10	Untreated
6	B subtilis	B subtilis	Untreated
7	Microthiol	Microthiol	Untreated
8	Phosphite	Phosphite	Untreated
9	Chitosan	Chitosan	Untreated
10	Laminarin	Laminarin + Amistar (0.25)	Revystar 0.4 + Folpet 0.5
11	Amino Flo 2.5 l/ha	Amino Flo 2.5 l/ha + Amistar 0.25	Revystar 0.4 + Folpet 0.5
12	Bion	Bion + Amistar 0.25	Revystar 0.4 + Folpet 0.5
13	AQ10	AQ10 + Amistar 0.25	Revystar 0.4 + Folpet 0.5
14	Serenade	Serenade + Amistar 0.25	Revystar 0.4 + Folpet 0.5
15	Microthiol	Microthiol + Amistar 0.25	Revystar 0.4 + Folpet 0.5
16	Phosphite	Phosphite + Amistar 0.25	Revystar 0.4 + Folpet 0.5
17	Chitosan	Chitosan + Amistar 0.25	Revystar 0.4 + Folpet 0.5
18	Untreated	Amistar 0.25	Revystar 0.4 + Folpet 0.5

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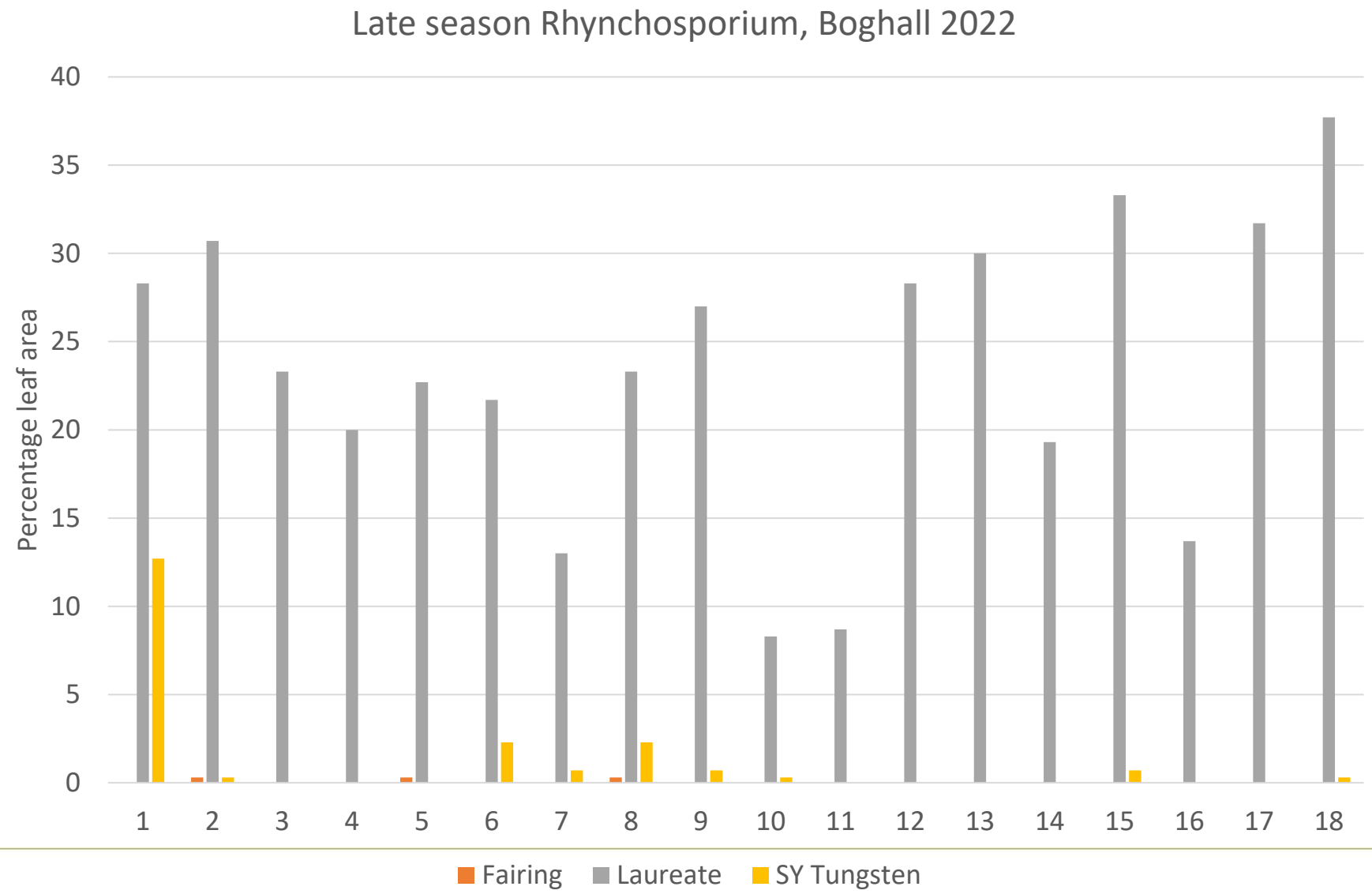
Boghall, 2022



Yielded trials – Year One (IPM progs)

	T0 (GS 24)	T1 (GS 31)	T2 (GS45)
Treatment One	Untreated	Untreated	Untreated
Treatment Two	Untreated	Amistar (0.25)	Revystar 0.4 + Folpet 0.5
Treatment three	Laminarin (0.75)	Laminarin (0.75)	Untreated
Treatment Four	Laminarin (0.75)	Laminarin (0.75) + Amistar 0.25)	Revystar (0.4) + Folpet 0.5
Treatment Five	Serenade (5l)	Serenade (5l)	
Treatment Six	Serenade (5l)	Serenade (5l) + Amistar (0.25)	Revystar (0.4) + Folpet 0.5
Treatment Seven	Amino Flo (2.5l)	Amino Flo (2.5)	Untreated
Treatment Eight	Amino Flo (2.5l)	Amino Flo (2.5) + Amistar (0.25)	Revystar (0.4) + Folpet 0.5

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Spring barley 2022 Cv. Laureate

untreated

reduced rate

biological+ red rate

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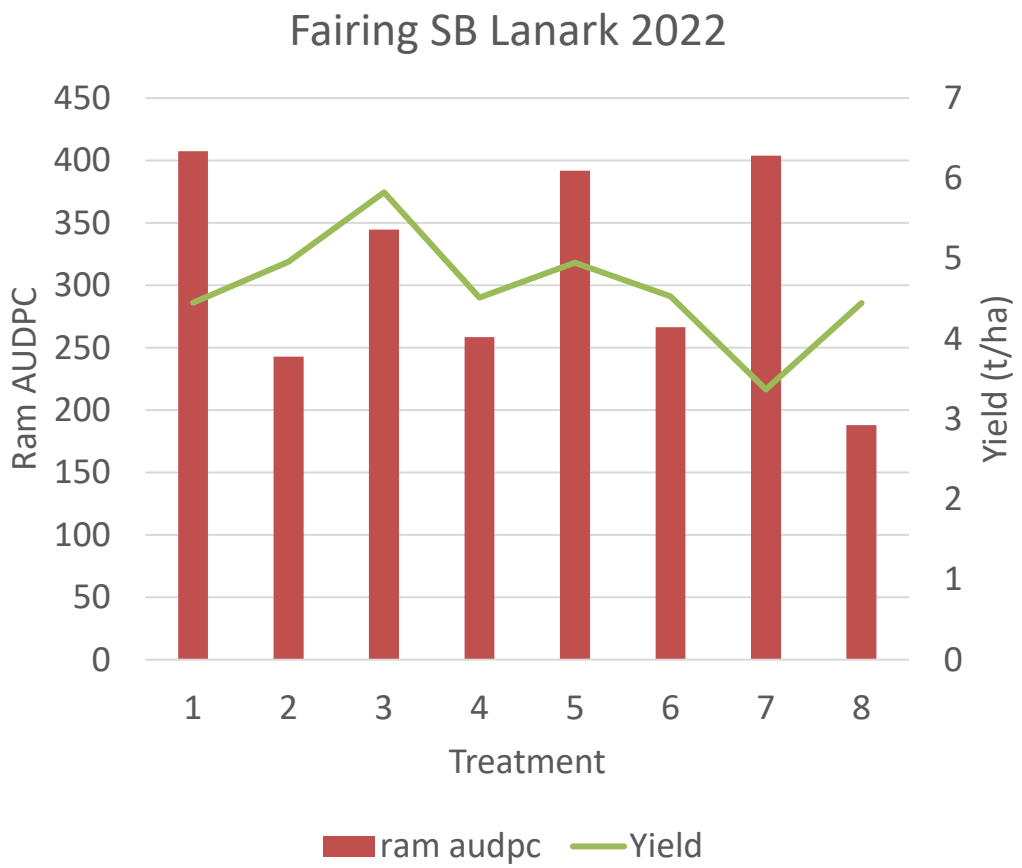
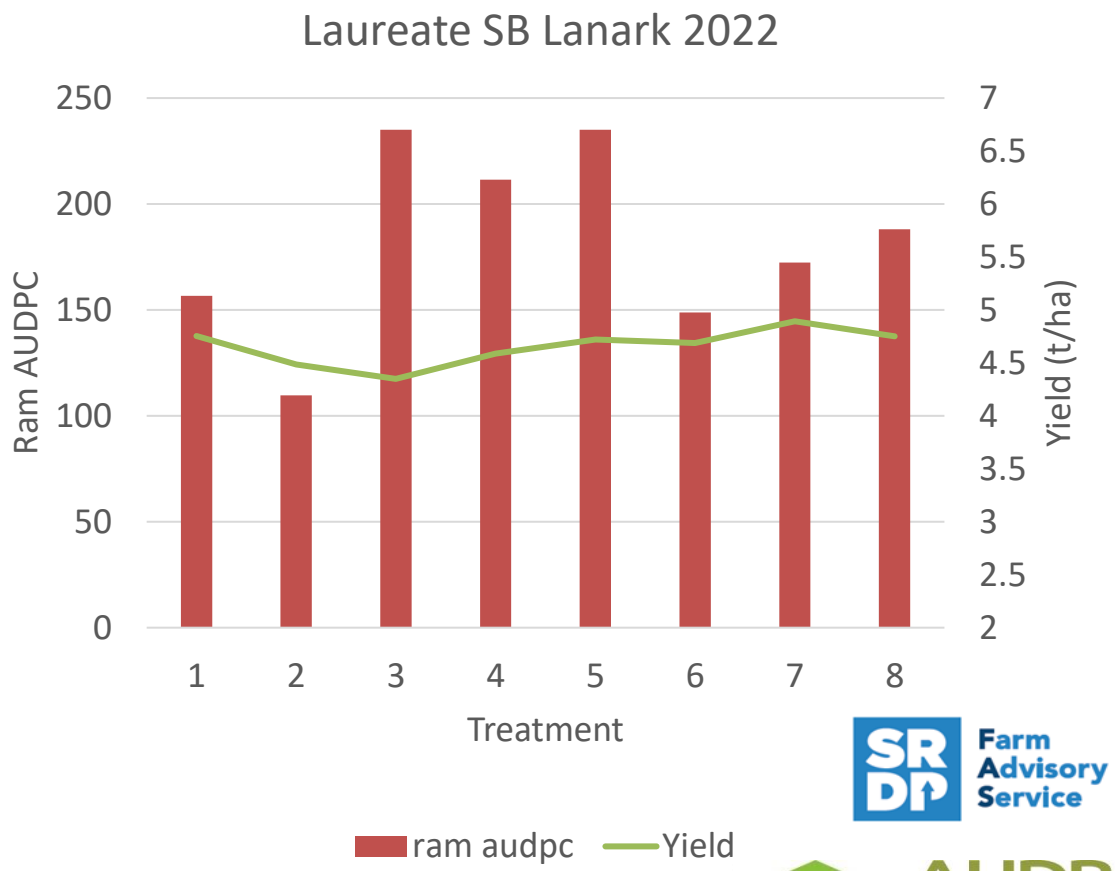
New programmes in spring barley (Lanark, 2022)





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Potential changes in disease threat under non-inversion tillage

- Soil borne disease decline due to extended rotation
- Carry over effect of cover crops, increased microbial activity
- But cooler, wetter soils

Potential changes in disease threat under non-inversion tillage

- Increase in crop residue/trash borne diseases if not rotated
- Eyespot, Septoria (wheat), Rhynchosporium (barley)
- Carry over of disease via Green bridge
- Weed control, Volunteers
- Damping off increase is soils not warm enough at start
- Possible reduction in biotrophic fungi
- e.g. rusts and mildews?

Potential changes in disease threat under non-inversion tillage

- Which diseases increase/decrease?
- Variety performance?
- Fungicide requirement?

Can we optimise variety and fungicide choice according to the main pathogens present and level of risk predicted in each tillage system?

- Other factors to consider:
- Rotational effect on diseases
  - Previous crop
  - Cover crop
  - Previous / cover crop management
- Tillage / system maturity stage
- Local disease pressure

Winter barley: Tillage*Variety*Fungicide

- 3 Tillage type
  - Direct Drill (+straw)
  - Direct Drill (-straw)
  - Plough
- 2 Varieties
  - Surge (res)
  - KWS Tower (sus)
- 4 fungicide programmes:
  - 0/1/2/3 sprays
- 2 sites:
  - Durie farm (Leven)
  - Mylnefield (Dundee)

Winter barley: Tillage*Variety*Fungicide

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  - KWS Tower (sus)
- 4 fungicide programmes:
  - 0/1/2/3 sprays
- 2 sites:
  - Durie farm (Leven)
  - Mylnefield (Dundee)

Trts	T0 GS 25-30	T1 GS 31	T2 GS 39-45
0	Untreated	Untreated	Untreated
1	Untreated	Siltra Xpro 0.6l/Ha	Untreated
2	Untreated	Siltra Xpro 0.6l/Ha	Siltra Xpro 0.4l/Ha
3	Cyflamid 0.3l/Ha + Comet 0.4l/Ha	Siltra Xpro 0.6l/Ha	Siltra Xpro 0.4l/Ha

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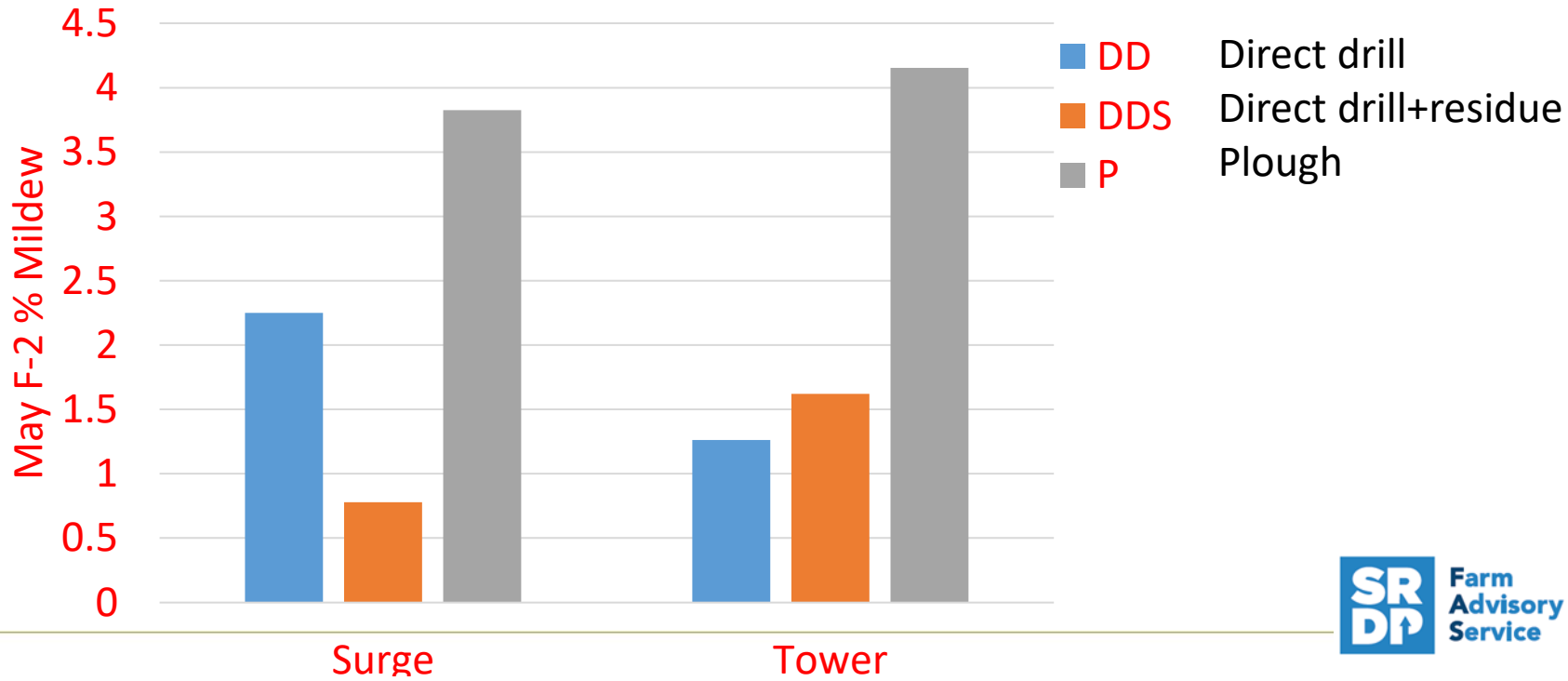
AHDB CEREALS & OILSEEDS

Winter barley Tillage trial 2021+2022
Powdery Mildew – May

- More early disease (mildew) in ploughed plots
- More accessible N?
- *AHDB RL rating Tower 5/9, Surge 6/9.*



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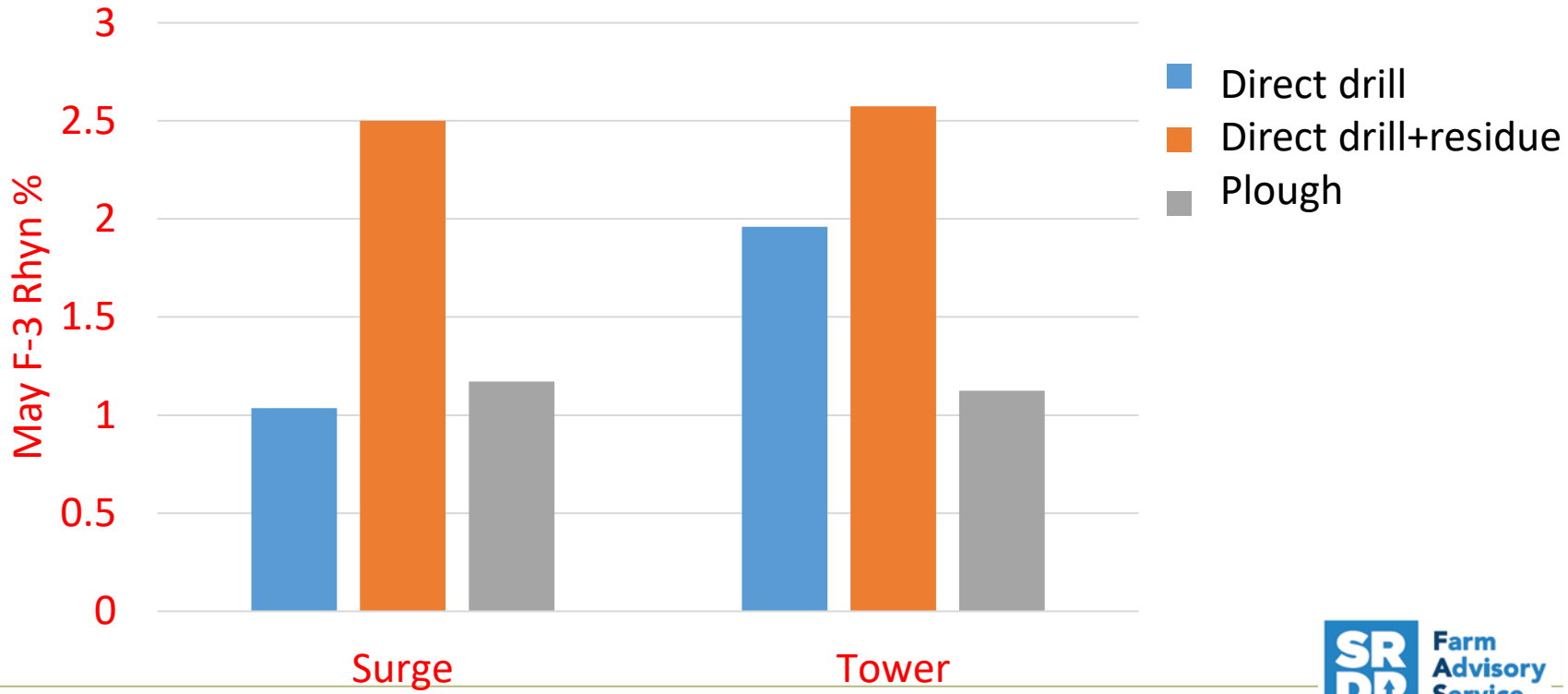
Winter barley Tillage trial 2021+2022 Rhynchosporium – May

- More trash borne disease (Rhyncho) in direct drilled plots + infected crop residue
- *More initial inoculum*



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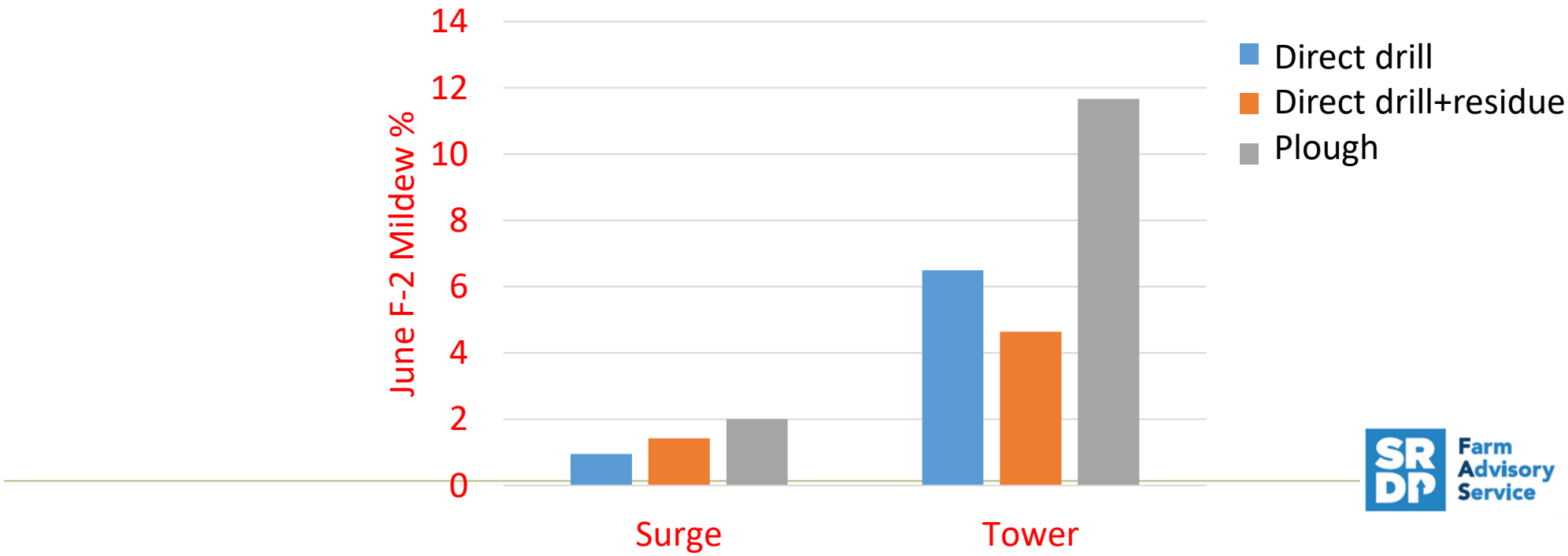
Winter barley Tillage trial 2021+2022
Powdery Mildew – June

- More mildew in ploughed plots of susceptible cv. (Tower)
- AHDB RL rating Tower 5/9, Surge 6/9.
- More N, thicker canopy, higher humidity= Mildew



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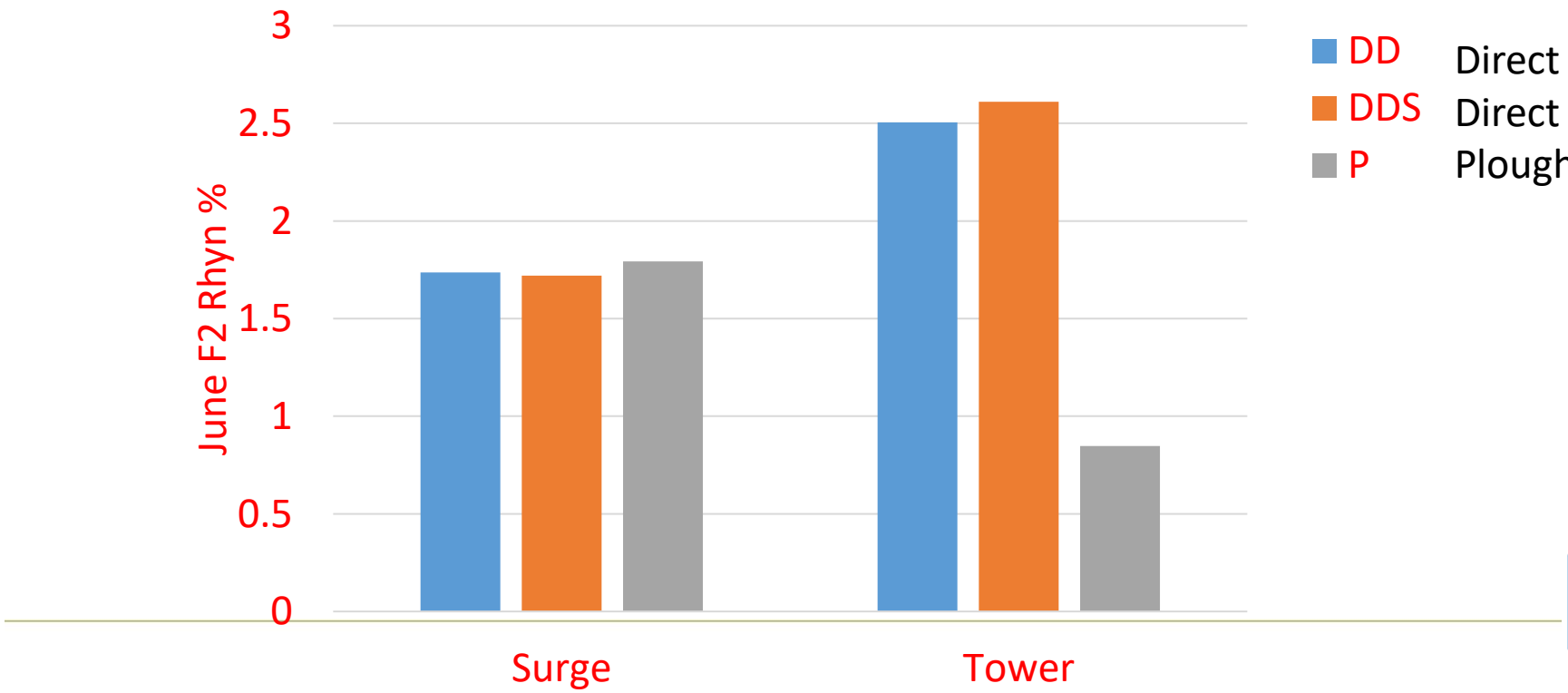
Winter barley Tillage trial 2021+2022 Rhynchosporium- June

- More trash borne disease (Rhyncho) in direct drilled plots of susceptible variety (Tower)
- AHDB RL rating Tower 5/9, Surge 7/9.
- More initial inoculum in direct drilled plots



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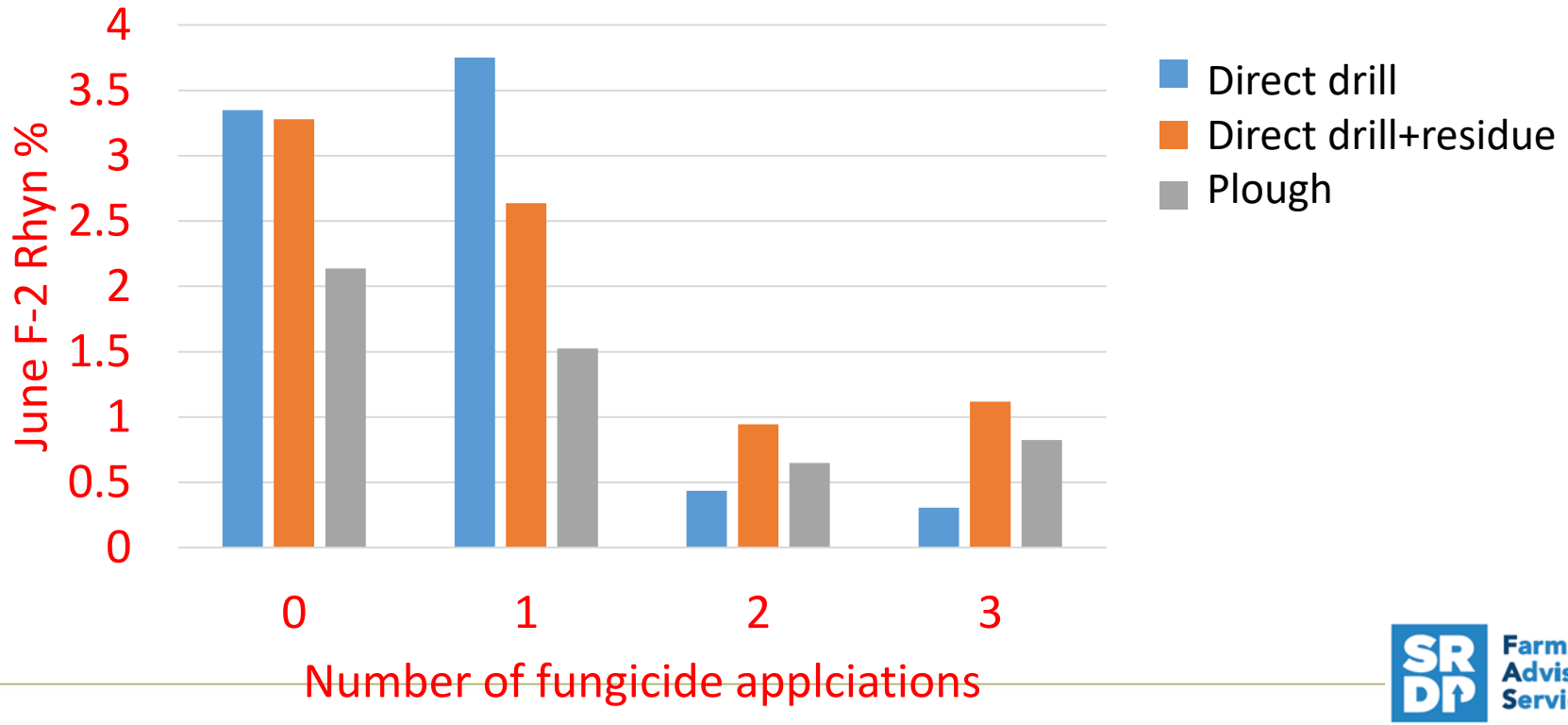
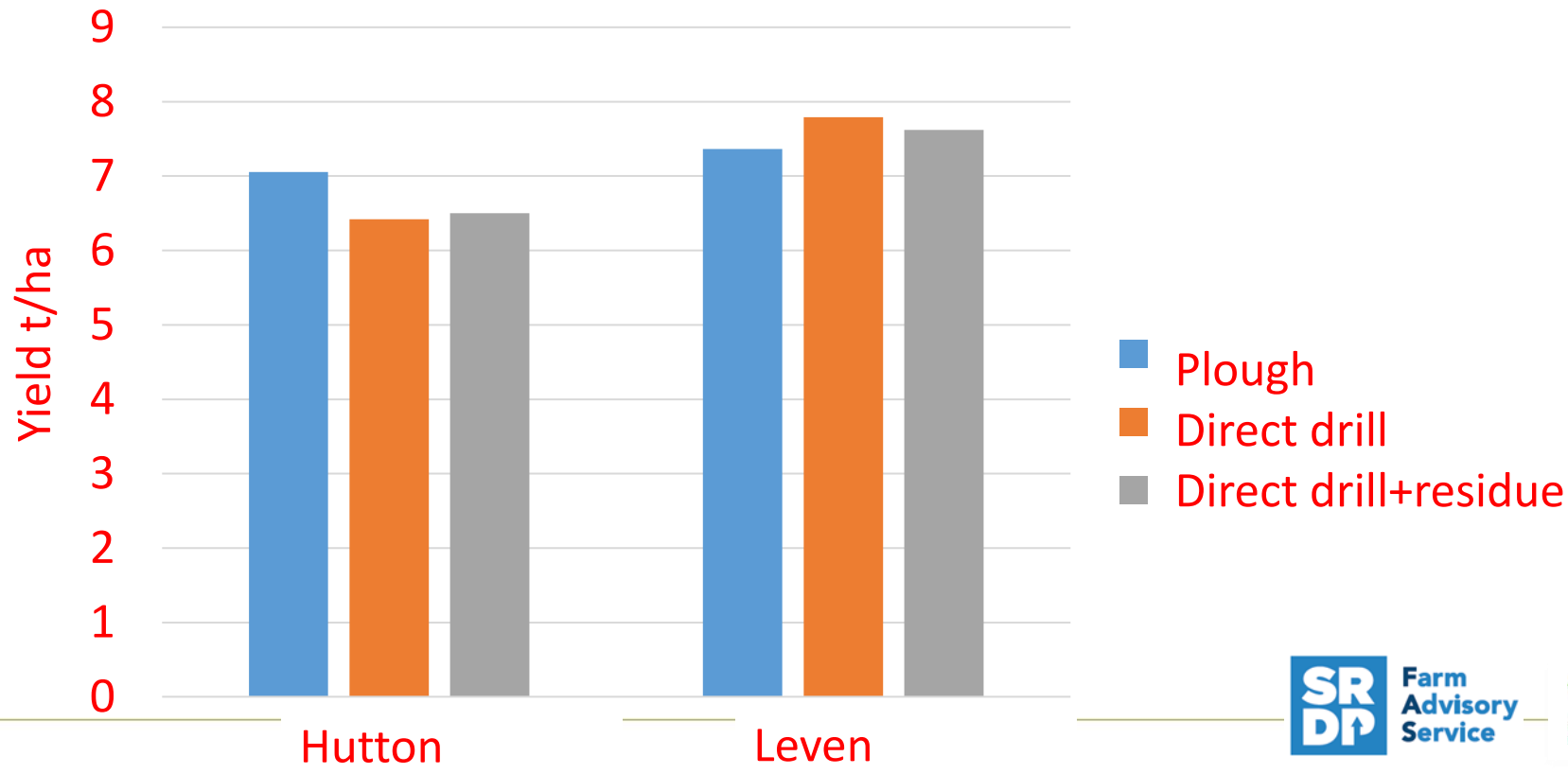
Winter barley Tillage trial 2021+2022 Rhynchosporium- June

- No value of third (T0) spray
- *more disease in cv. Tower



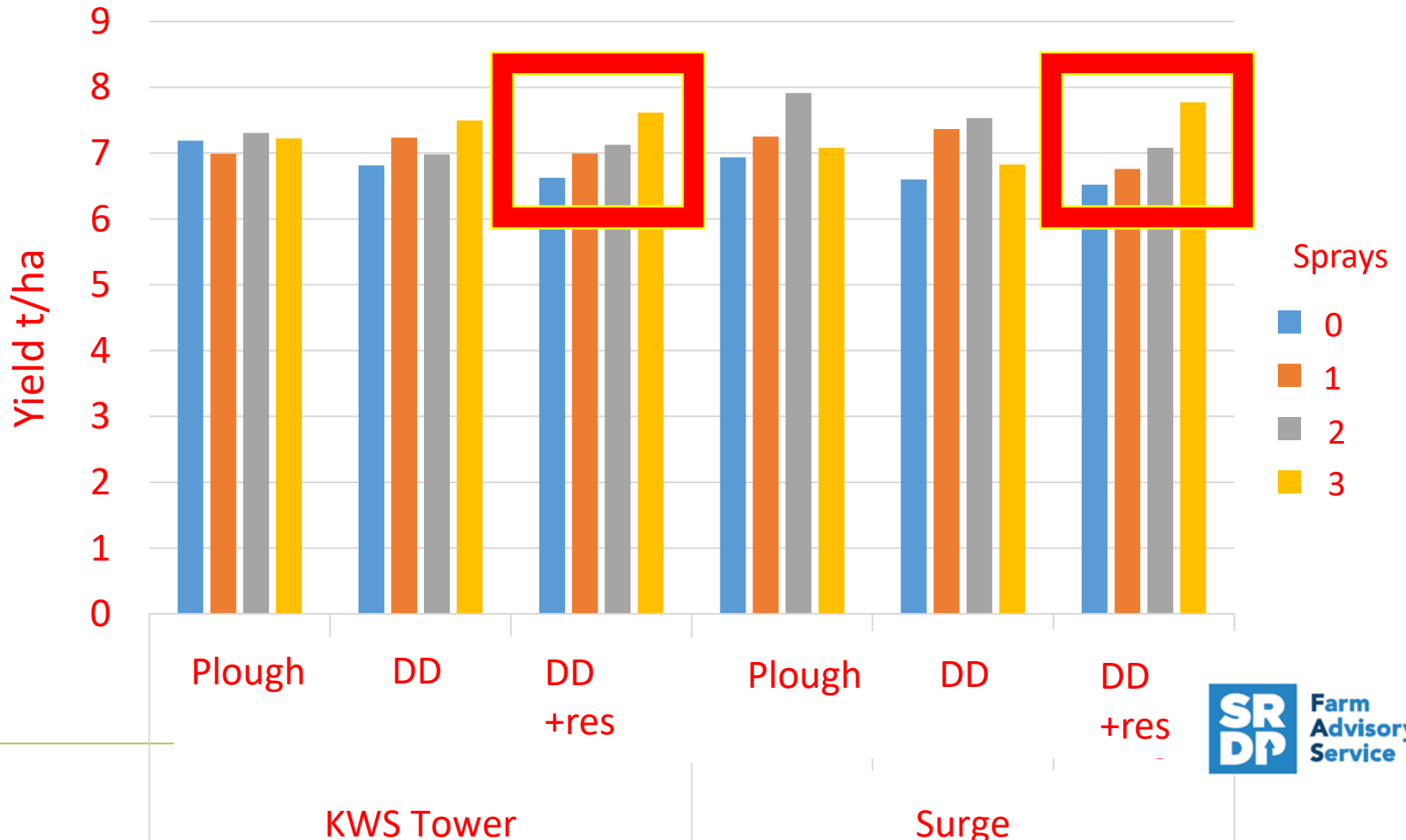
Winter barley Tillage trial 2022 yields

- Best yields under plough at Hutton (immature site, ploughed for last 20+ years)
- Best yields under direct drill at Leven (mature site under direct drill for 20+ years)



Winter barley Tillage trial 2022 yields

- Additional spray increased yield in high disease pressure direct drill + infected crop residue plots



Take home messages

Consider all the factors that will influence plant health when you design your IPM programme

Variety choice and cultivation and rotation will all influence your IPM programme

More alternatives to conventional fungicides are coming to market and this will not just be a passing fashion

Justify all of your inputs into the crop and evaluate their success at the end of each season

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Cereal markets – international drivers, local opportunities

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Julian Bell, SAC Consulting, SRUC, January 2023

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Global events just keep getting more important in determining your farm price – be aware of what's happening

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SRUC trip to Argentina in November – winter barley after 6 months with little rain, maize and soy plantings stalled / reduced due to drought

Source: AHDB, SAC Consulting

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Scottish grain prices in last year – wheat +£22/t, rapeseed -£84/t, feed barley -£4/t, malting barley + £105/t

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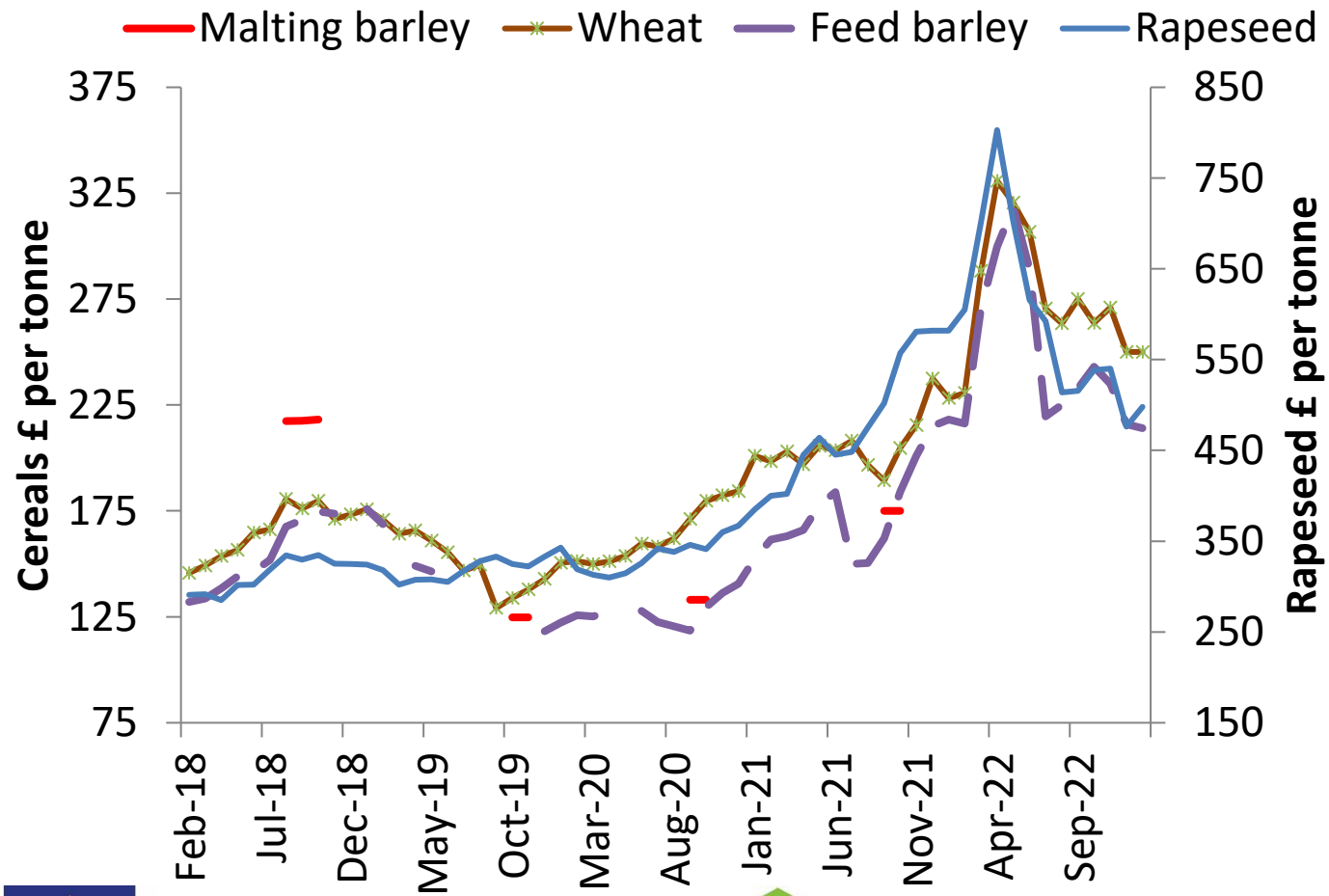

Source: AHDB, SAC Consulting

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5th world harvest < consumption
- crop -42mt, use -29mt, stock -35mt

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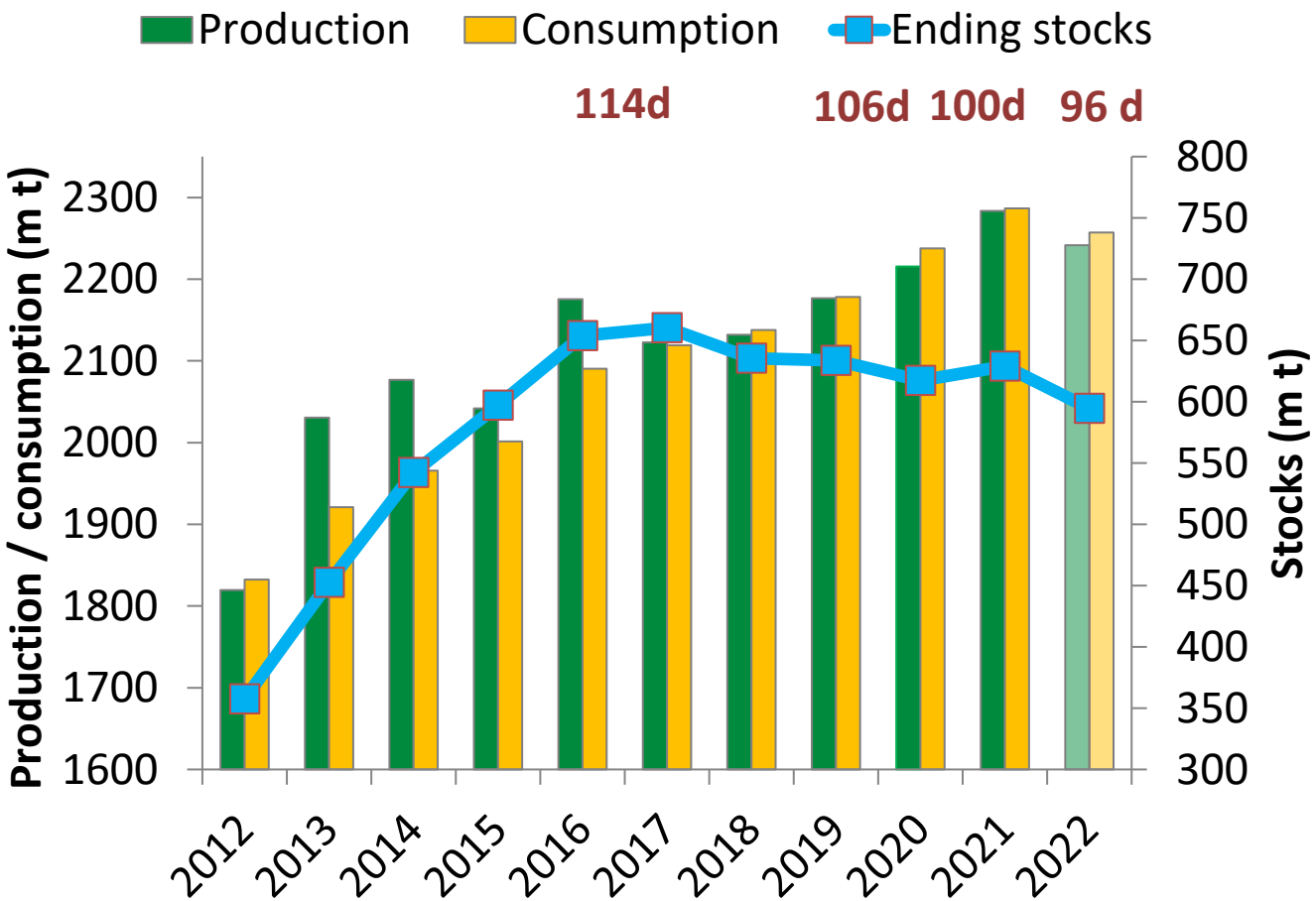
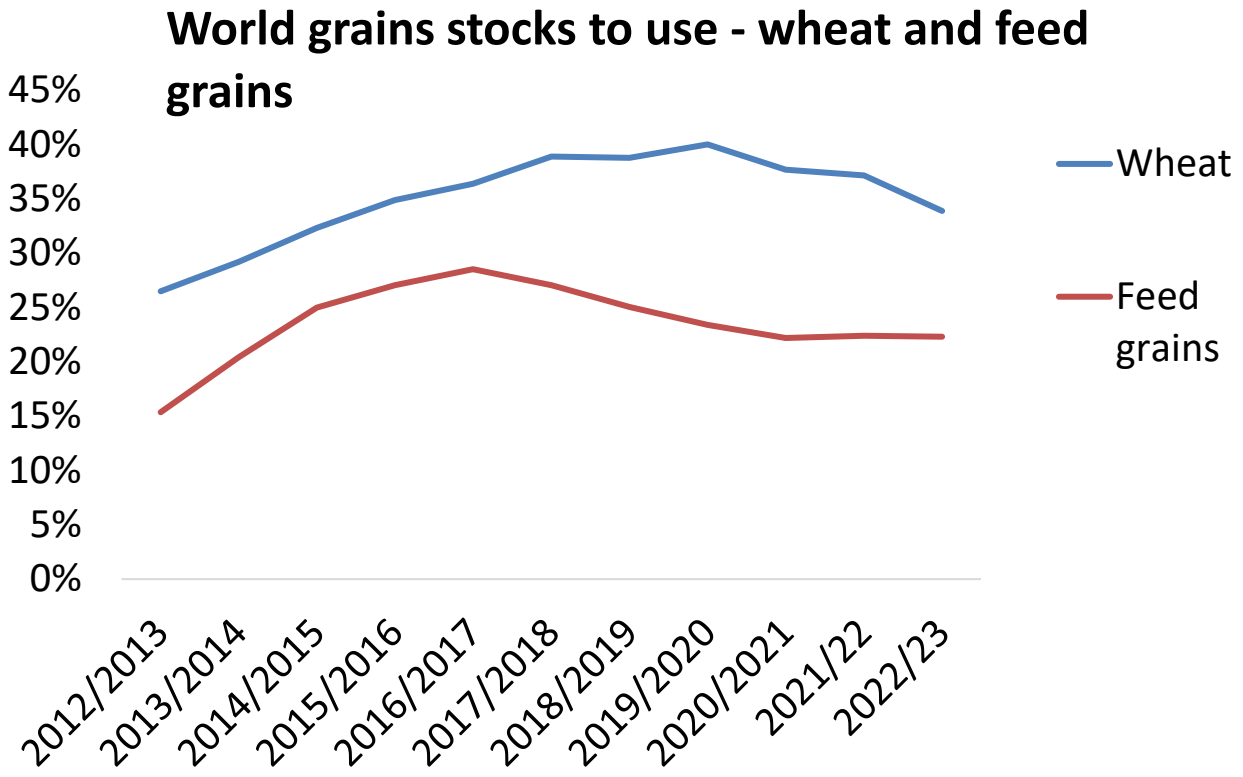


2022-23
Crop -42mt
Demand -29mt
Stocks -35mt
Stock to use -4 days

Source: USDA

Stocks to use - wheat sees sharpest Drop, coarse grains low but stable

- Stocks to use;
- Feed grains lowest in 10yrs, wheat in 8yrs



Source: USDA, SAC Consulting

World maize prices up £29/t in last year underpins world market

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Source: AHDB, SAC Consulting

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Grain market outlook

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Positive factors

- World stock to use ratios falling – feed grains lowest in 10 years
- War in Ukraine – no resolution in sight, crop output severely reduced
- Drought in Argentina to slash grain and soybean output in 2023
- High oilseeds at the same time as high cereal prices – expected to create battle for acres this spring in US / world
- High Nitrogen fertiliser and fuel prices favour planting soya over maize and make farmers less likely to plant where weather outlook uncertain

Possible risk factors

- 2022 harvest has been good in Australia, Russia has a large wheat surplus
- Next year UK and European crops looking good – UK and EU cereal output to increase
- High maize prices likely to spur increase in US and world maize sowings in 2023 but high soya prices may limit this
- World economic slowdown curtailing demand growth

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Source: AHDB, SAC Consulting

UK and Scotland – good autumn boosts winter sowings for 2023

- AHDB Early Bird Survey

	Wheat	Wint. Barley	Spr. Barley	Total Barley	Oats	Total Cereals	OSR
UK	***Area ('000's ha)***						
2022	1,809	433	671	1,104	174	3,156	364
2023	1,821	450	632	1,082	166	3,133	416
Chng.	***12***	***17***	*-39*	*-22*	*-8*	*-23*	***52***
Chng.	***1%***	***4%***	*-6%*	*-2%*	*-5%*	*-1%*	***14%***
Scot.	***Area ('000's ha)***						
2022	107	44	236	280	27	466	35
2023	116	38	225	263	29	468	43
Chng.	***9***	*-6*	*-11*	*-17*	***2***	***2***	***8***
Chng.	***8%***	*-14%*	*-5%*	*-6%*	***7%***	***0%***	***23%***

- More winter wheat and oilseed rape – especially in Scotland
- Cut in spring barley area in England and Scotland

Source: AHDB Early Bird survey and DEFRA

UK 2022 wheat crop rebounds ~ 15.7mt - + higher op. stocks/ small rise demand* mean big surplus – but gen. good export demand – 2023 – surplus similar / lower?*

Barley surplus higher in 2022, brewing use rising – 2023 – surplus lower?*

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UK wheat balance sheet			SAC
'000 t	2021/22	2022/23	2023/24
Open Stocks	1,416	1,846	1,500
Production	13,988	15,664	15,750
Imports	*1,994*	*1,225*	*1,000*
Available	*17,398*	*18,735*	*18,250*
Domestic Use	14,710	14,982	15,000
Exports / avail	511	2,252	1,750
End Stocks	1,846	1,500	1,500
Net trade	- 1,483	1,027	750
Source: AHDB, SAC			

UK barley balance sheet			SAC
'000 t	2021/22	2022/23	2023/24
Open Stocks	1,058	961	800
Production	6,961	7,190	7,000
Imports	*89*	*75*	*80*
Available	*8,108*	*8,226*	*7,880*
Domestic Use	6,309	6,138	6,100
Exports	764	1,288	980
End Stocks	961	800	800
Source: AHDB, SAC			

* Depending on export pace this year and yields next

Source: AHDB, SAC Consulting

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High imported maize prices boost Scottish wheat use in distilling

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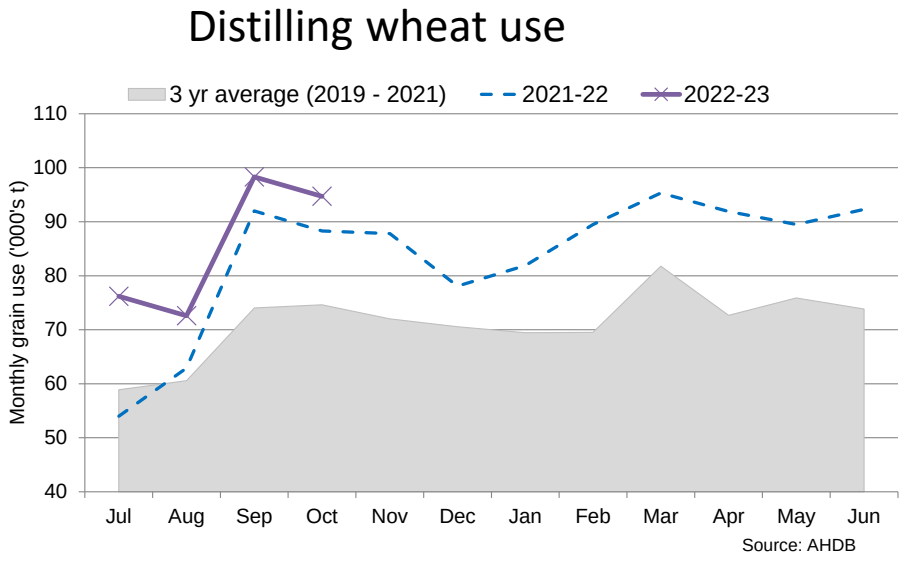

Distilling wheat use UP 44kt / 15% in 1st 4 months of 2022/23 On top of big increase in use in 2021/22

Scottish wheat very competitive vs imported maize.

Scottish wheat Premium over English Rebounds English shortfall

- **2018/19 = + £5.70**
- **2019/20 = + £5.00**
- **2020/21 JAN = - £2.00**
- **2021/22 JAN = + £12.00**
- **2022/23 Jan = + £15.00**

Scottish wheat remains cheaper than imported maize.

Delivery date	Jan'21	Aug'21	Jan '22	Jan '23
Wheat – delivered	212	205.0	228.00	270.00
French Maize delivered	230	260.00	260.00	290.00
Scottish wheat vs Imported	- 18.0	- 55.0	- 32.0	- 20.0

UK malting barley use up 5% in 1st 4 months of 2022/23

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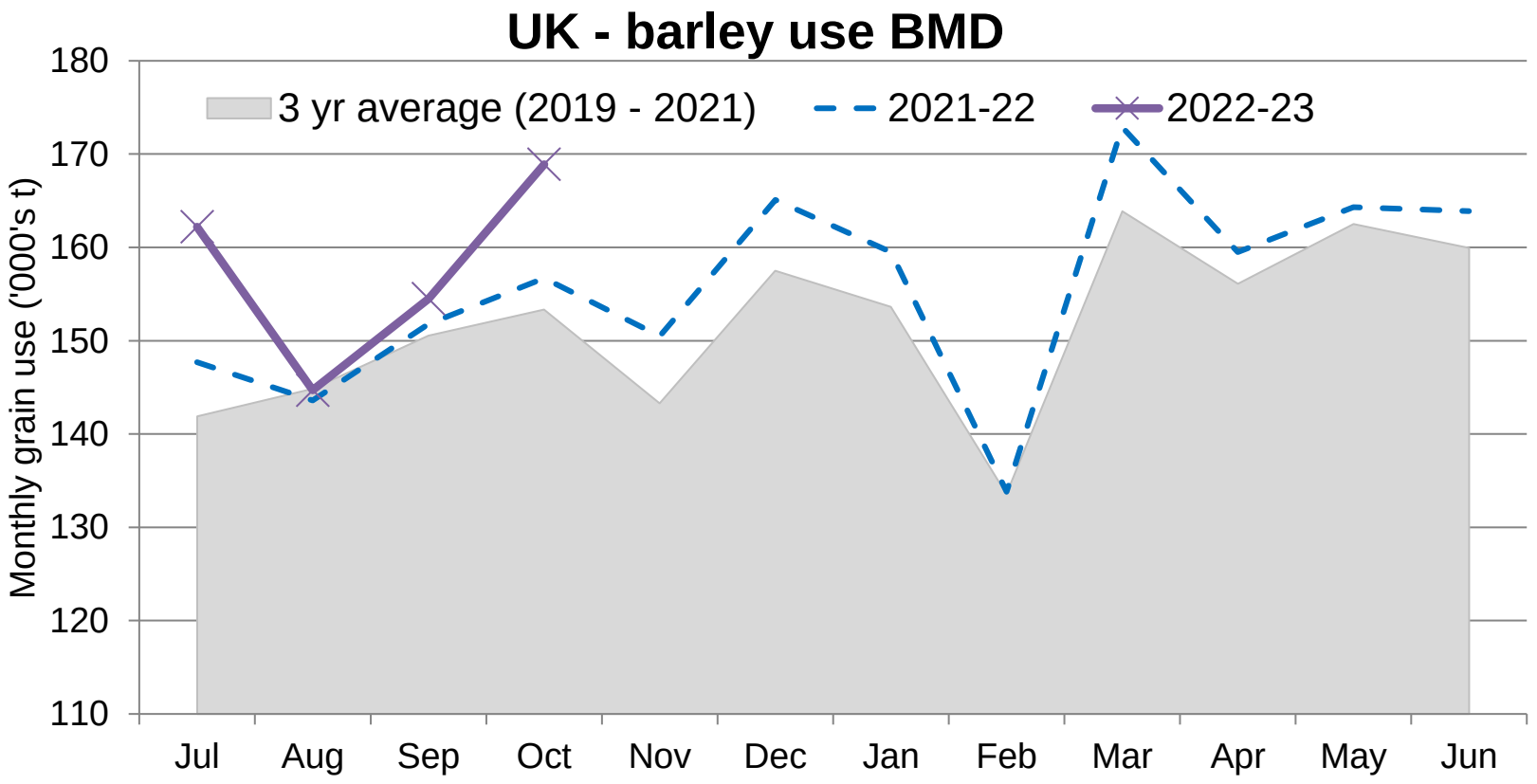
Barley use in Brewing, Malt. & Distil.



Source: AHDB

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Scottish malting barley crop good in 2022 - but demand up = £50+/t premium /feed

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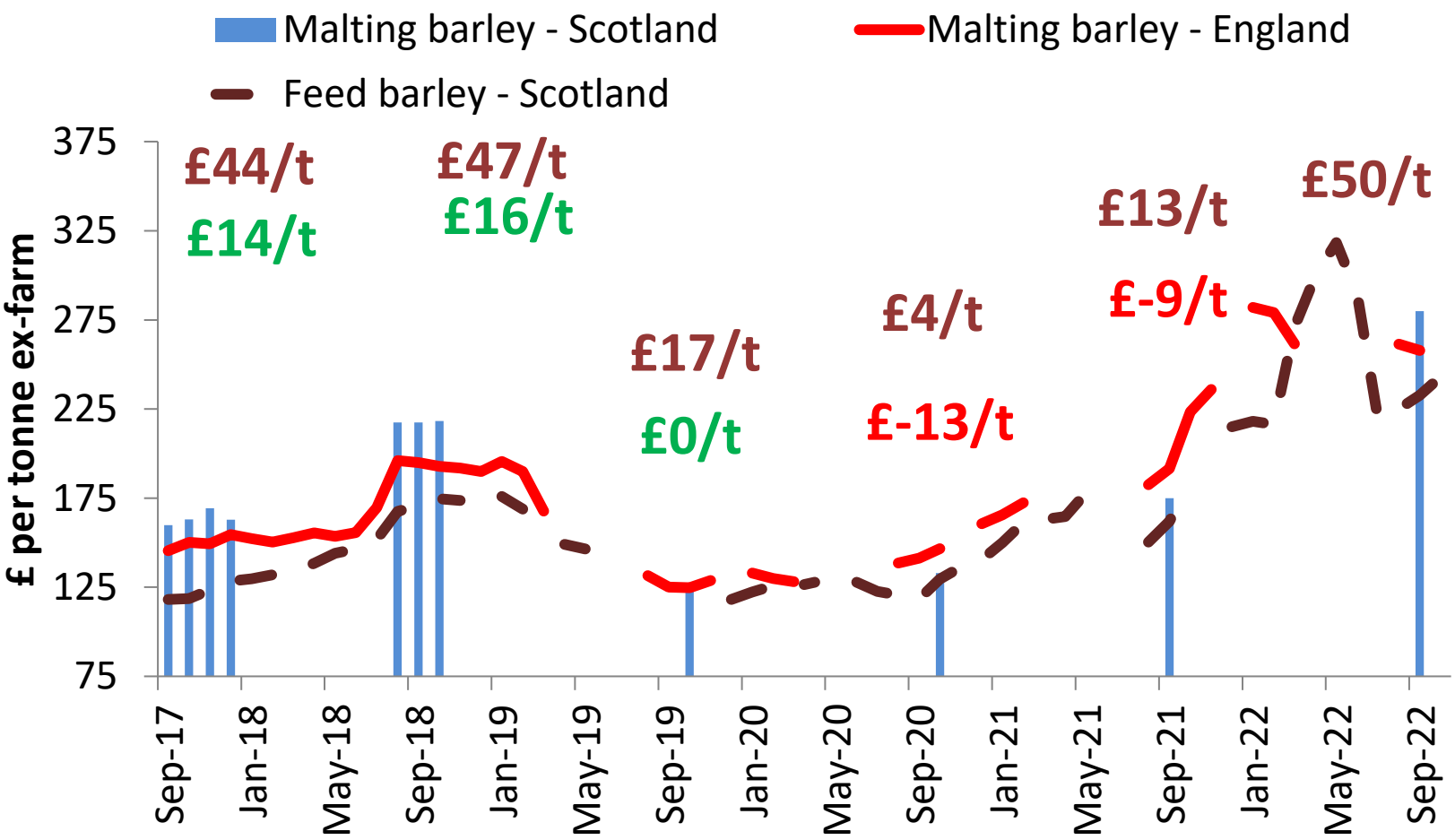

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Malting barley use in Scotland

New maltings, 5% lower area in 2023
Looks very tight without good yields and quality- higher premium?

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	Scottish / Berwick malting Spring barley purchases ('000's t)	Scottish Spring Barley Crop ('000's t)	Est. Malting varieties (%)	Est. Malting varieties ('000's t)	Scottish malting purchases as % of malting var	Malting premium over feed £/t
2017	**775**	1,433	57%	815	**95%**	**41**
2018	**810**	1,338	72%	963	**84%**	**47**
2019	**840**	1,543	72%	1,111	76%	**17**
2020	**873**	1,772	72%	1,275	68%	**0-4**
2021	**930?**	1,451	72%	1,045	**89%**	**0-13**
2022	**1,000**	1,512	72%	1,089	**92%**	**50**
2022	**1,000**	1,436	72%	1,005	**99%!**	**40+**

MAGB, Scottish Government,

New crop forward grain prices

- the same as current prices – very unusual
- and high historically even with higher production costs

FARM ADVISORY SERVICE

	2020 hvst	2021 Jan	2022 Hvst	2023 hvst	Annual
	Nov-20	Jan-21	Jan-22	Nov-23	*Change*
	(£/t)	(£/t)	(£/t)	(£/t)	*(£/t)*
Wheat (ex-f)	185	201	250	250	~
Feed barley (ex-f)	135	150	214	215	~
Malt. B (distil) Sco	150*	-	-	250	-
Malt. B (brew) Eng*	152	170	245	-	-
OSR (ex-f)	~340	~366	498	~505	***+£7***

~ £20/t over wheat futures, ~ nominal values excluding oil bonus

The European Agricultural Fund for Rural Development: Europe investing in rural areas

SAC Consulting

Scottish Government Riaghaltas na h-Alba gov.scot

Key points

1) Global market more important than ever -

- World stocks have been declining steadily for 10 years then……. Russia invaded Ukraine, weather problems made it 5th yr where production<use, accelerating stock decline, price down from peaks but remain firm

2) What factors may be important in the year ahead?

+ - No quick way out for Ukraine – 30mt lost in 2022, more likely in 2023

-ve - Demand destruction – demand is price sensitive and ability to pay / buy meat in question at high prices in developed world/ poorer rich world – demand stagnant

-/+ve/ - UK sees higher wheat crop and stocks, exports required but so far ok

-/+ve/ - High grain prices should spur 2023 global output BUT high fert, fuel pxs, oilseeds and grain tight at SAME time

+/ - Scot new maltings come on line, spring barley area down – premiums enough?

+/ Scots distill wheat use very strong - future use depends on world maize price

+/-ve - Good potential crop margins at current price despite high fert and fuel prices but current crops cost a lot more to grow - sell grain forward when buying inputs

The European Agricultural Fund for Rural Development
Europe investing in rural areas
SAC CONSULTING
Scottish Government
Riaghaltas na h-Alba
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AHDB Market Update

Megan Hesketh, Senior Analyst – Cereals and Oilseeds

CEREALS & OILSEEDS

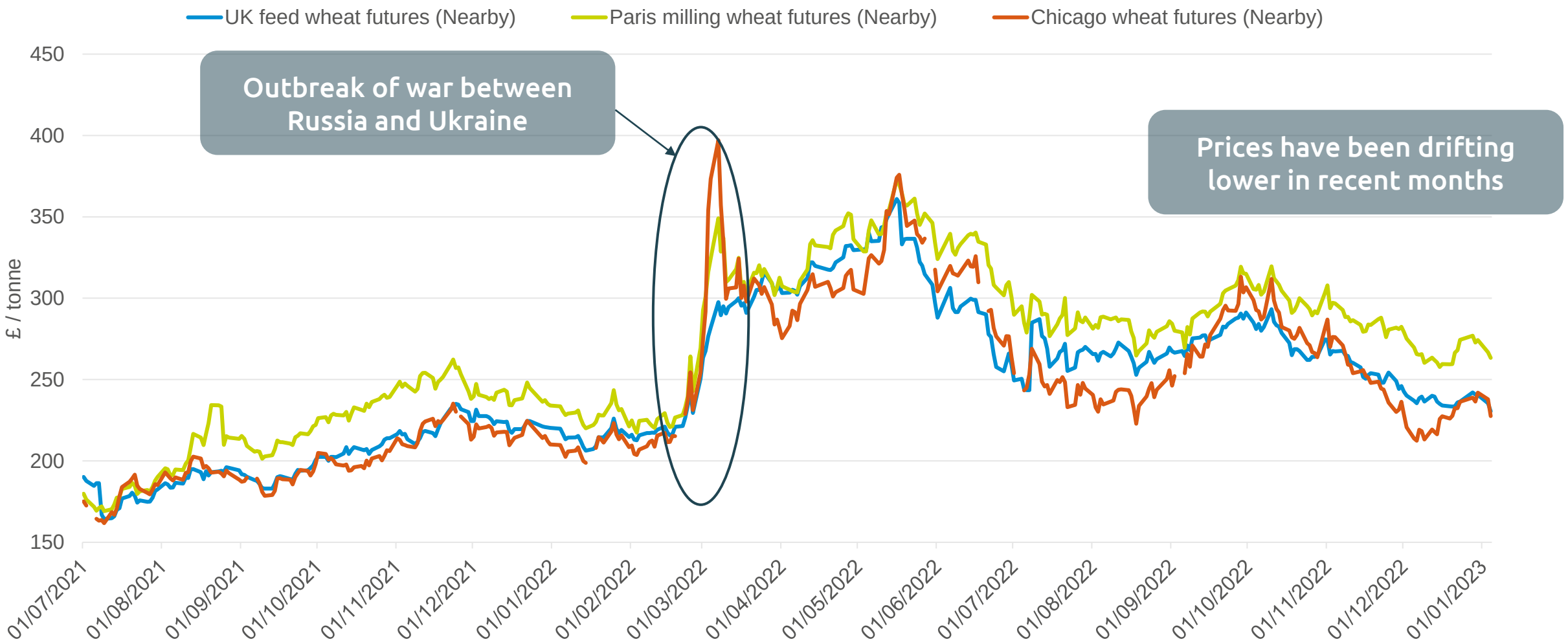
What we will discuss today:

Global market drivers

How is the Black Sea conflict impacting trade?

Domestic outlook

Wheat prices feeling pressure over recent months



Key global factors driving grain prices

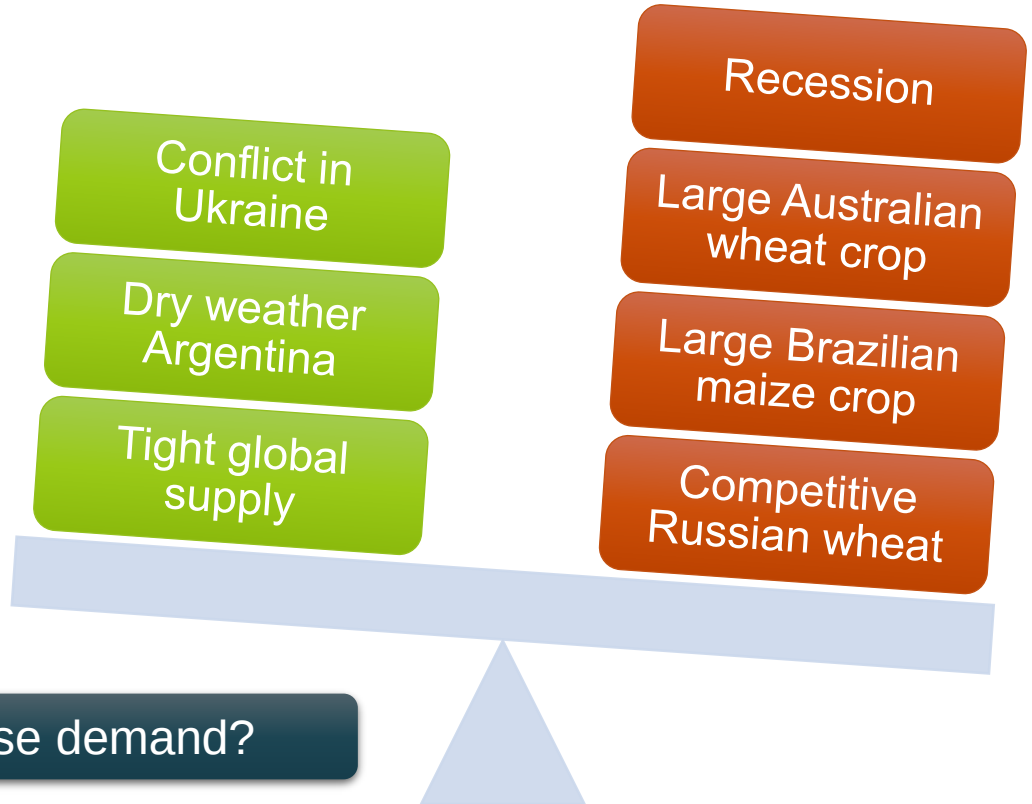
War in Ukraine key factor keeping volatility in wheat markets particularly

Dry conditions for Argentinian maize BUT Brazil favourable weather

Extreme weather impact on major export production in previous seasons

Bullish factors

Bearish factors



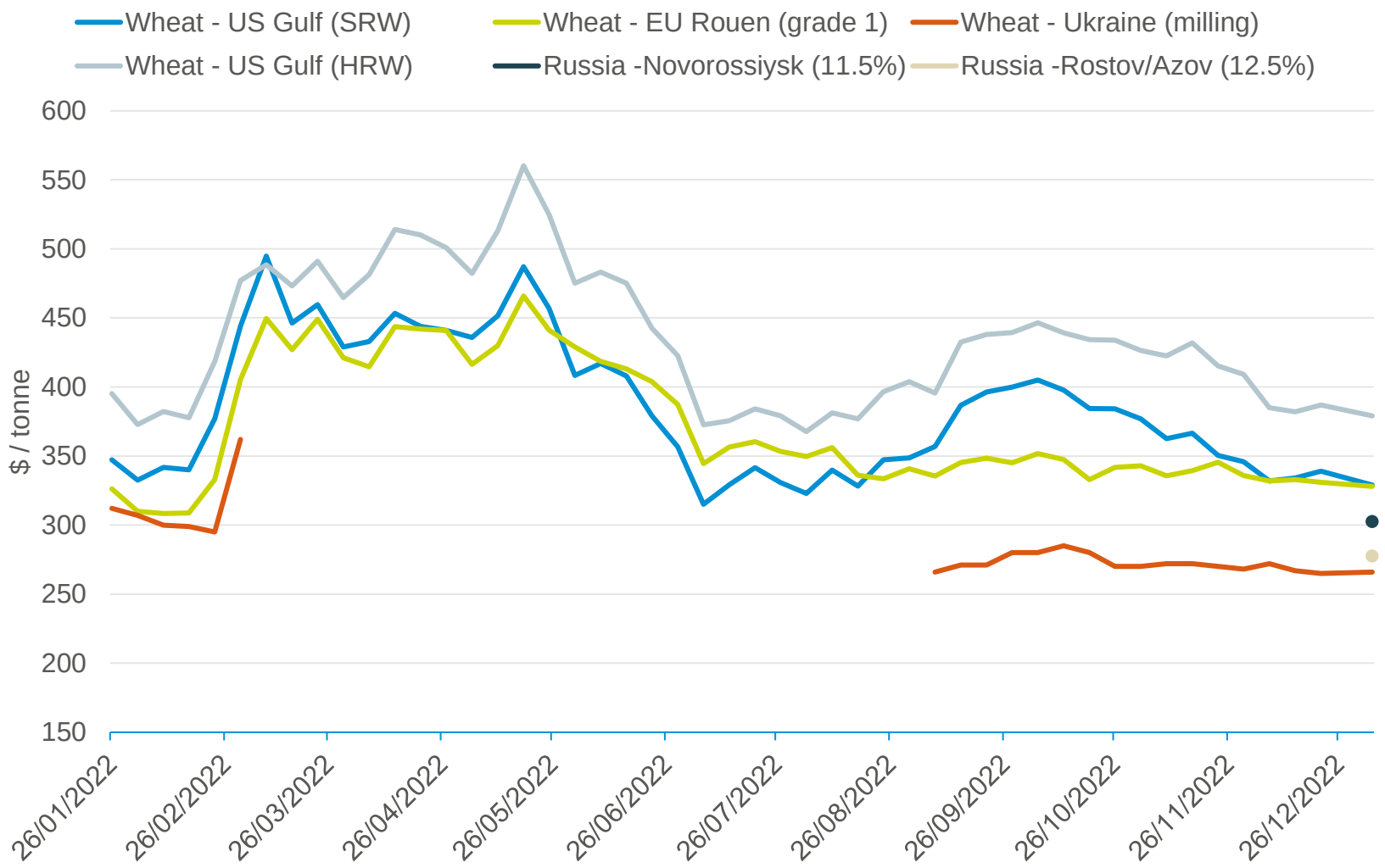
Recession impact – hard to gauge

BUT confidence is key

Generally rain was beneficial for crop despite flooding in areas

Competitive Black Sea key factor pressuring global price

Competitive Russian wheat pressuring global price



Source: International Grains Council, European Commission, USDA.

As at: 05 Jan

Wheat origin	$ / tonne
US	$378
Argentina	$373
EU	$326
Ukraine*	$266
Russia*	$303

Source: International Grains Council, UkrAgroConsult.

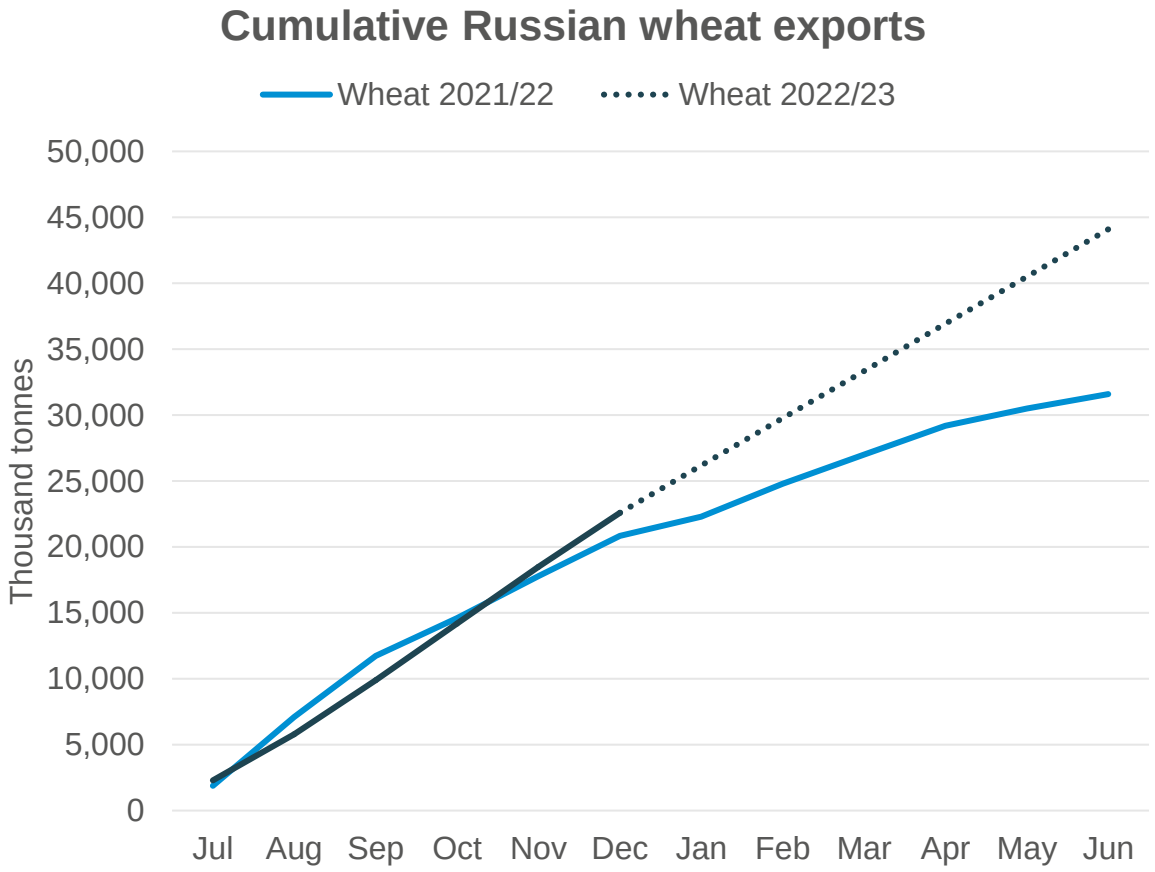
*Notes on FOB prices: Argentina 12.0%, up river; Russia – milling Novorossiysk, 11.5%; EU- France grade 1, Rouen; US- HRW 11.5% Gulf. Ukraine (milling).

*Ukraine as at 04 Jan.

Black Sea conflict update

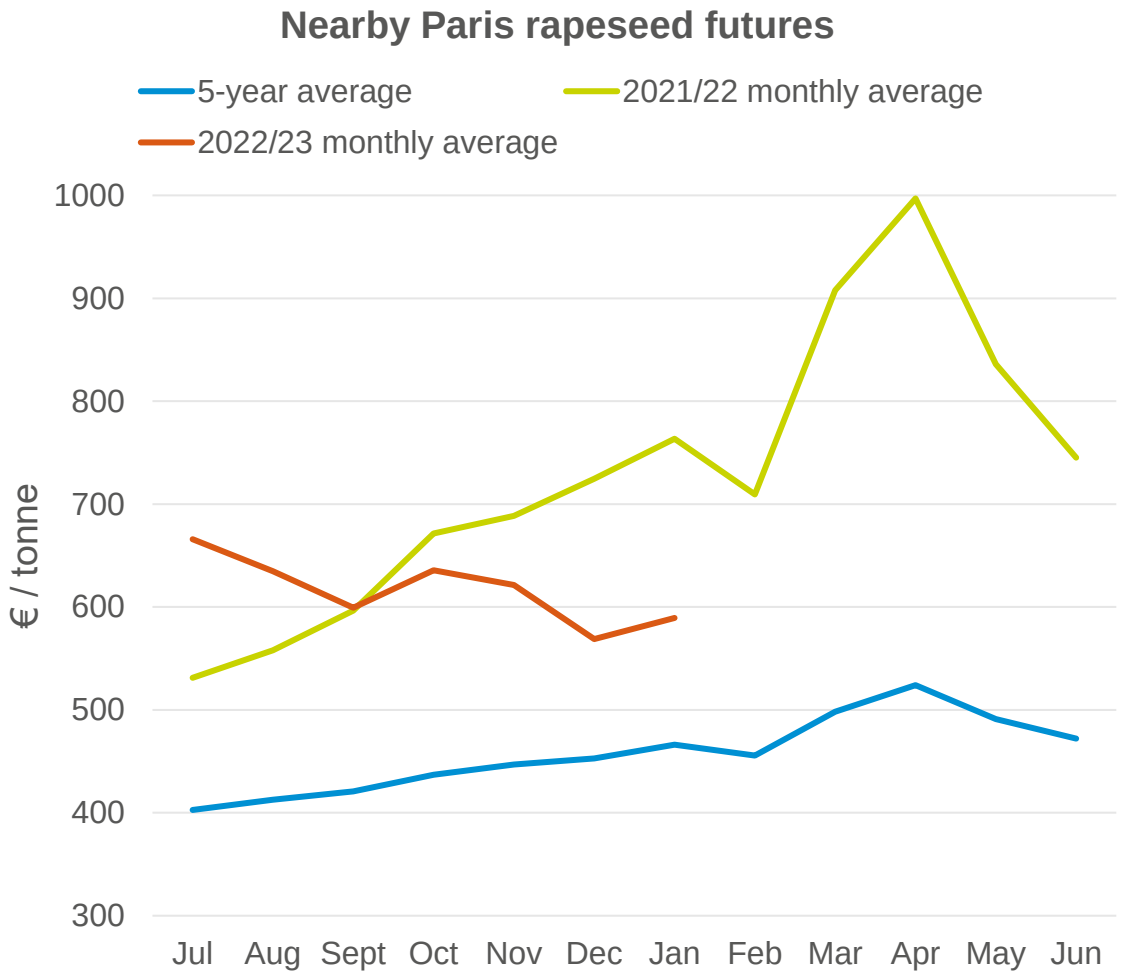
Update on corridor: Black Sea corridor extended for another 120 days from 18 Nov.

Source: UkrAgroConsult.

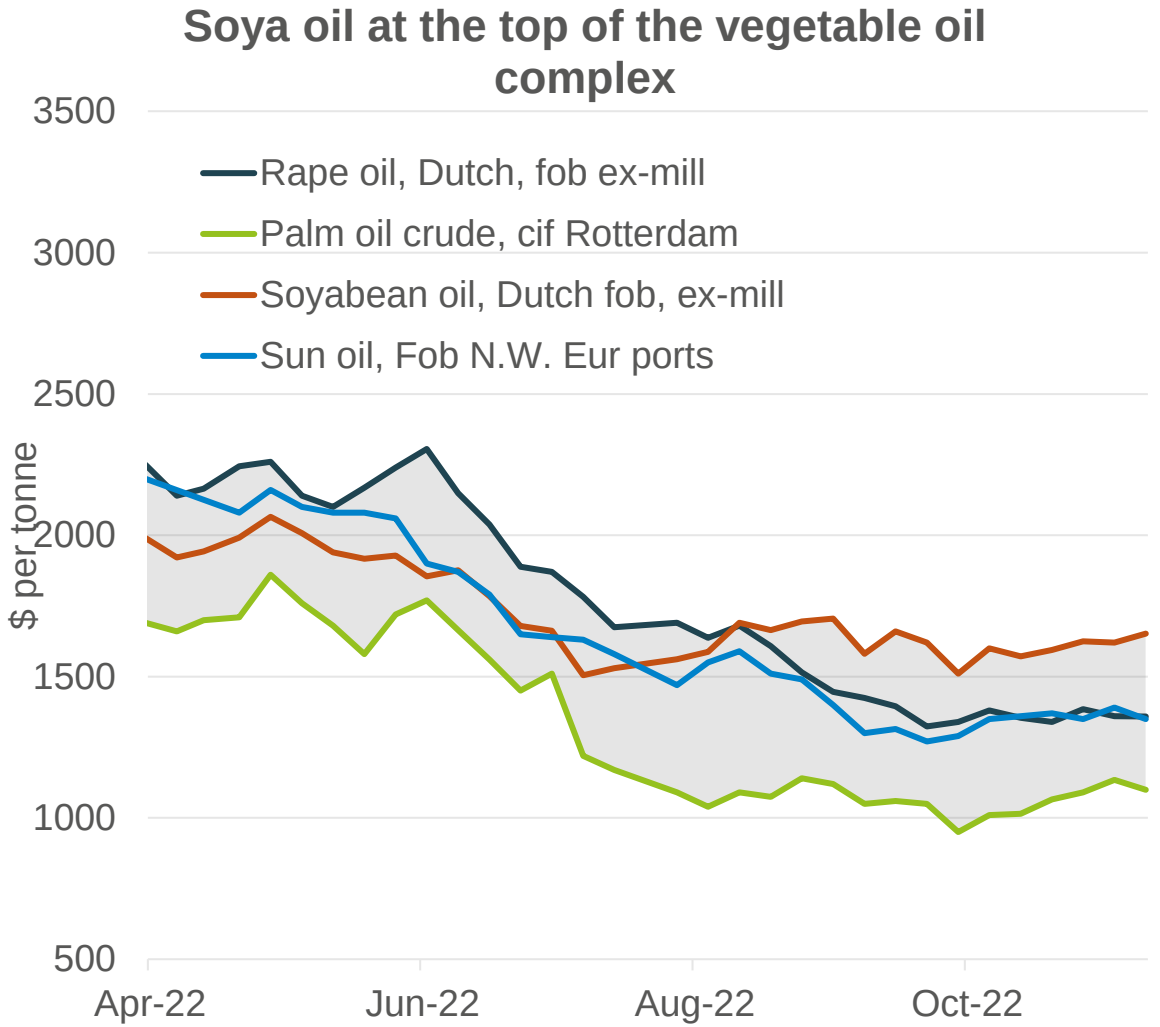


Source: SovEcon.

Rapeseed price update



Source: Euronext - Refinitiv



Source: oilworld.biz

Global drivers for oilseeds

War in Ukraine key factor too – rapeseed and sunflower especially

Chinese demand something to watch considering easing restrictions but case numbers rising

Bullish factors

- Indonesia and Malaysia now in low palm production (Jan – Mar)
- Chinese demand?
- Dry weather Argentina impact on soy crop

Bearish factors

- Recession impact on veg oil demand
- Easing oil price
- Large Brazilian soy crop
- Increased global rapeseed supply this season

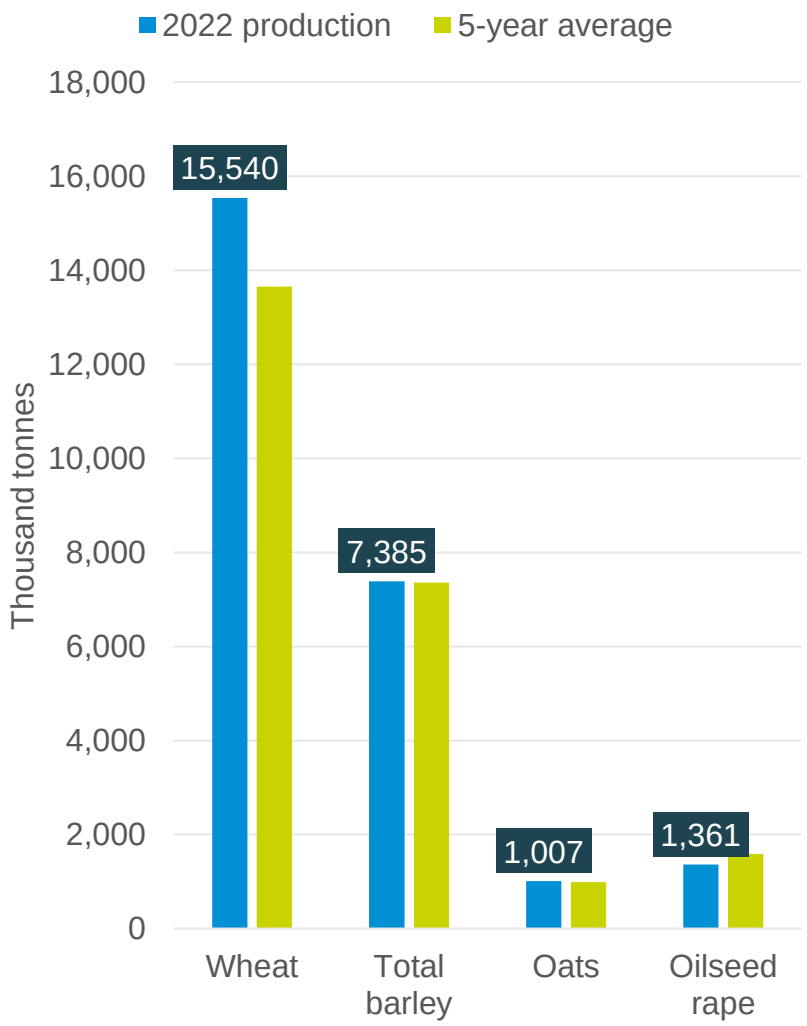
Recession impact key underlying factor

Crush margin impact

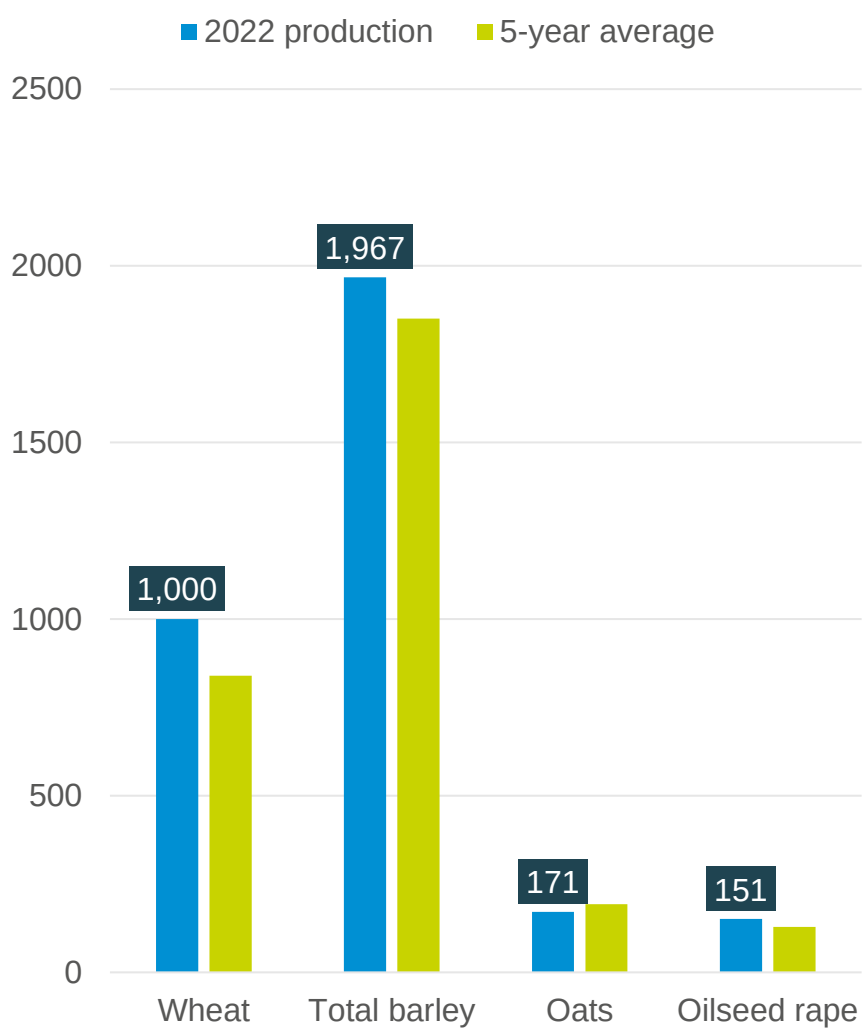
Key factor to watch is South American production

Domestic focus: supply vs demand

UK results



Scotland's results



Source: Defra.

Looking ahead to harvest 23

UK results

Thousand hectares	Defra June Survey 2022	EBS Forecast 2023	% Year-On-Year Change
All wheat	1,809	1,821	1%
Winter barley	433	450	4%
Spring barley	671	632	-6%
Oats	174	166	-4%
Other cereals*	69	64	-7%
OSR	364	416	14%
Other oilseeds**	34	42	24%
Pulses	269	275	2%
Arable fallow	265	290	9%
Other crops on arable land***	734	700	-5%
TOTAL	**4,822**	**4,855**	

*crops included rye, triticale and mixed grains
**crops included linseed and borage
***crops included sugar beet, potatoes, vegetables, maize (33%) and temporary grass (20%)
Source: Defra, The Andersons Centre for the AHDB

Scotland's results

Thousand hectares	Defra June Survey 2022	EBS Forecast 2023	% Year-On-Year Change
Wheat	107	116	8%
Winter barley	44	38	-13%
Spring barley	236	225	-4%
Oats	27	29	6%
OSR	35	43	22%

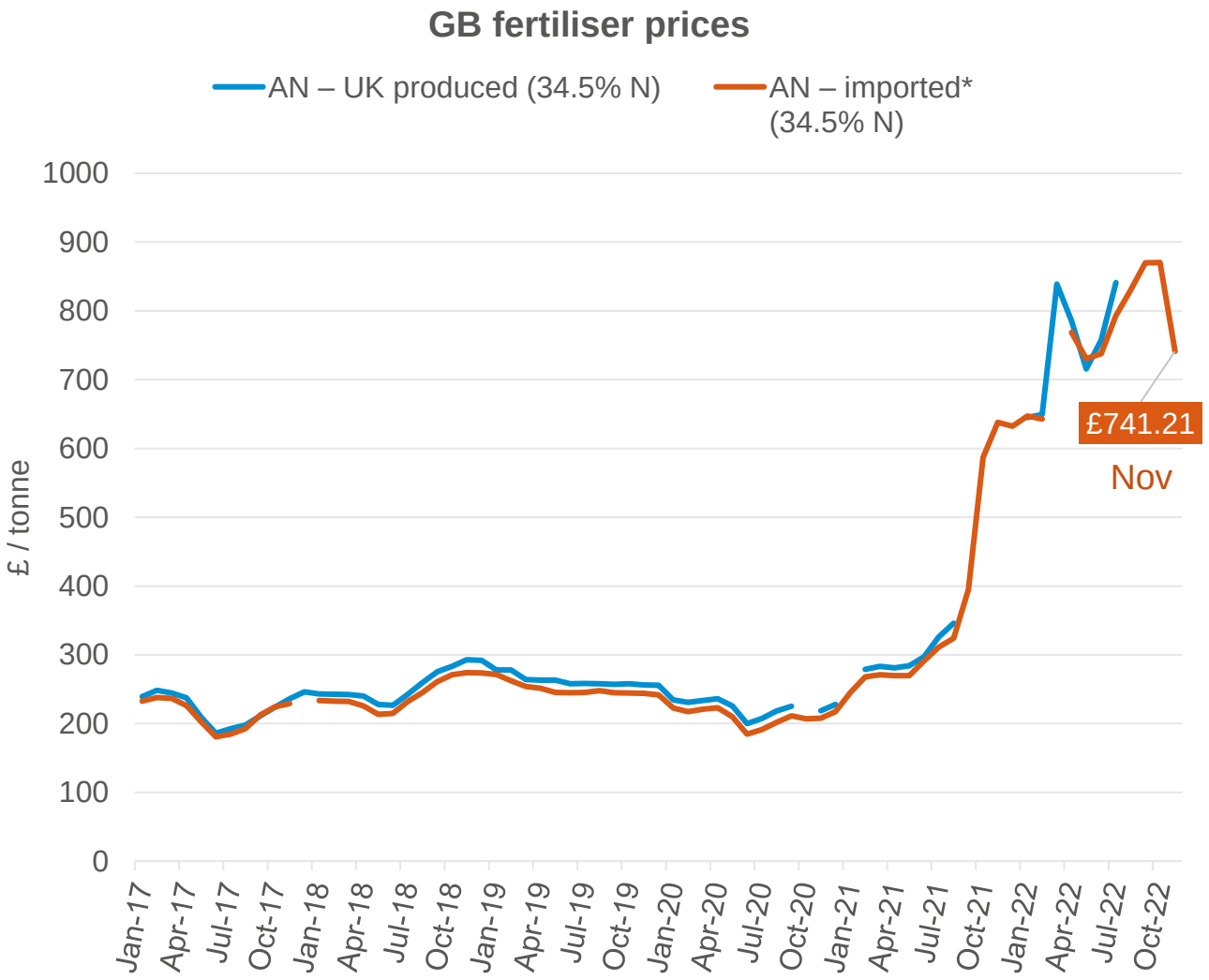
Source: Defra, The Andersons Centre for the AHDB

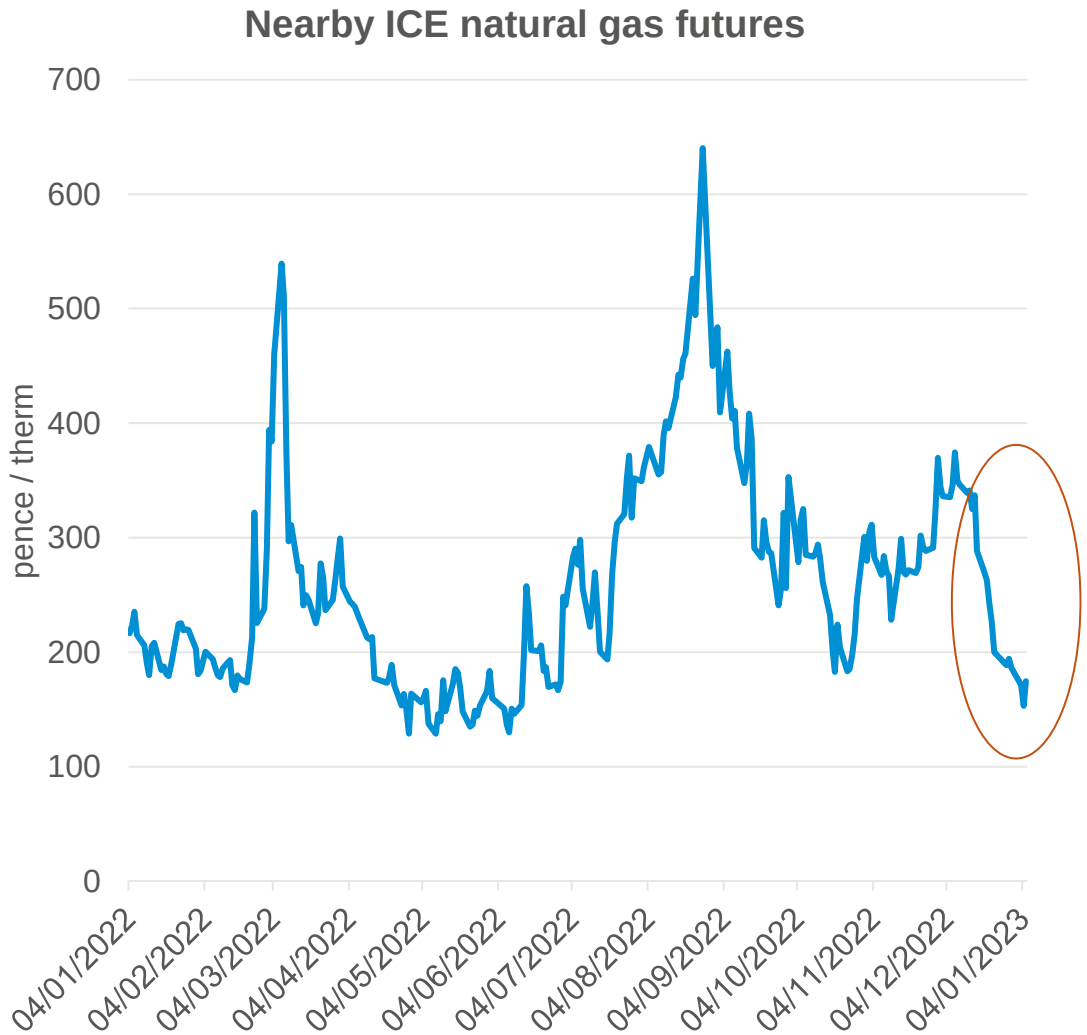
Scottish wheat area similar to 2019

OSR number up but a lot of growing time

Spring barley area would be smallest since 2006 if realised

Input cost update



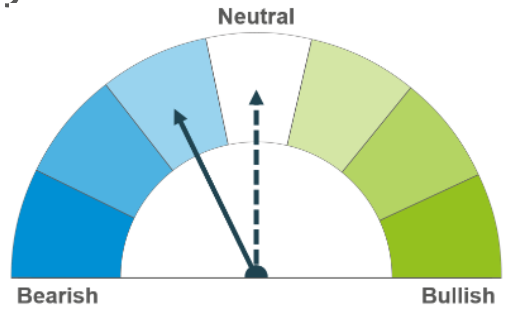


Source: AHDB

Where next?

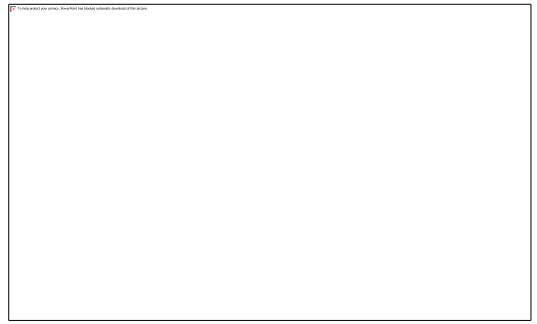
Grains

- Competitive Russian wheat, recession, China key factors causing ST pressure
- Supply and demand remain tight
- Volatility to continue, but will not reach highs
- Domestic wheat surplus
- As we move through this season, prices will become increasingly focused on next season.
  - War in Ukraine
  - US dry/cold weather
  - EU cold weather



Rapeseed

- South American weather key factor soyabean crop
- Recession large watchpoint – oil prices, veg oil demand, crush margins
- Australian crop coming to market
- Despite palm oil volatility expected, bearish market.
- Rapeseed supply boosted this season – what about harvest 23?
  - EU
  - Canada
  - War in Ukraine



Independent analysis and insight you can trust

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CEREALS & OILSEEDS

The website has a wealth of resources available from our markets homepage including a daily update on grain markets. The supply and demand section is a key resource for the market whilst the latest surveys detail planting and variety trends.

DAIRY

The Dairy markets homepage will signpost you to the industry data, analysis and insights from the dairy sector to help inform your business decisions. Our industry experts will guide you through the market movements and provide a clear, impartial view on what it all means.

PORK

The latest pig prices, and industry essential trade data, are the cornerstones of the Pork market website pages. There is also the latest analysis and insight to provide you with a clear and impartial view.

AHDB

Our trade and policy resources focus on the future changes in domestic policy and trading relationships to help farmers and growers explore how these will affect their business. There is also a dedicated Consumer and Retail Insight team who look at the needs of the modern consumer as well as their attitudes towards cooking, buying and eating food.

Any questions?

AHDB

CEREALS & OILSEEDS

Grain marketing strategies

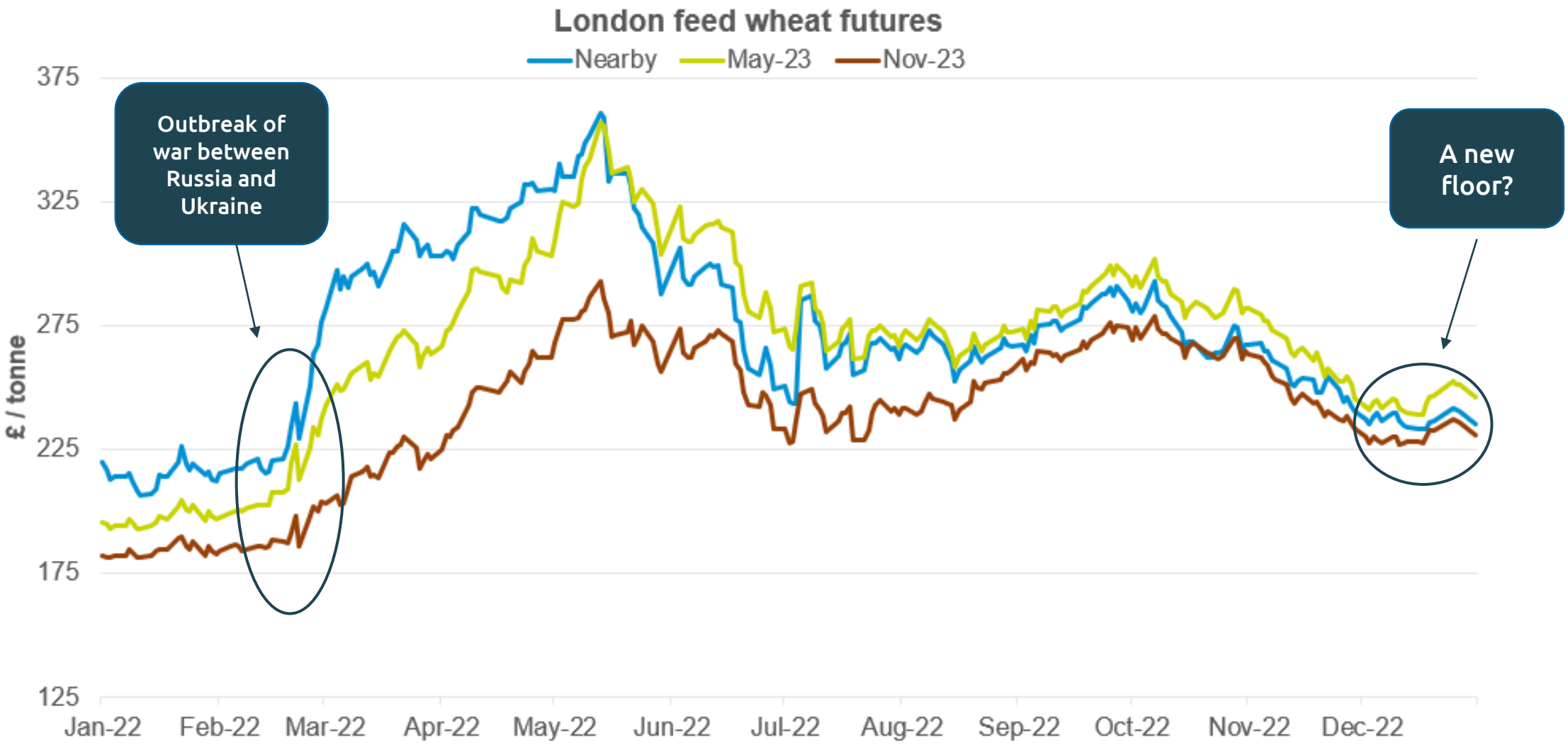
Olivia Bonser, Analyst – Cereals and Oilseeds

CEREALS & OILSEEDS

What are we going to talk about?

- Where are prices now?
- To store?
- To sell?
- Where are prices heading?
- What do higher input costs mean for margins?
- Breakeven point

Where are prices now?



To store?

Greater income potential can be made from selling over storing

Grain stored	18-Aug-22
Sale date	31-May-23

Sale	ex-farm price	Storage	Return on interest	Return
		Central store		£ per tonne
Sell for May-23	£243.50	£17.96	-	£225.54
		On-farm shed		
Sell for May-23	£243.50	£12.26	-	£231.24

Grain stored	18-Aug-22
Sale date	01-Dec-22

		Central store	2.47%	£ per tonne
Sell for Dec-22	£237.00	£10.20	£2.41	£229.21
			2.90%	
Sell for Dec-22	£237.00	£10.20	£2.90	£229.70

		On-farm shed	2.47%	£ per tonne
Sell for Dec-22	£237.00	£4.50	£2.41	£234.91
			2.90%	
Sell for Dec-22	£237.00	£4.50	£2.90	£235.40

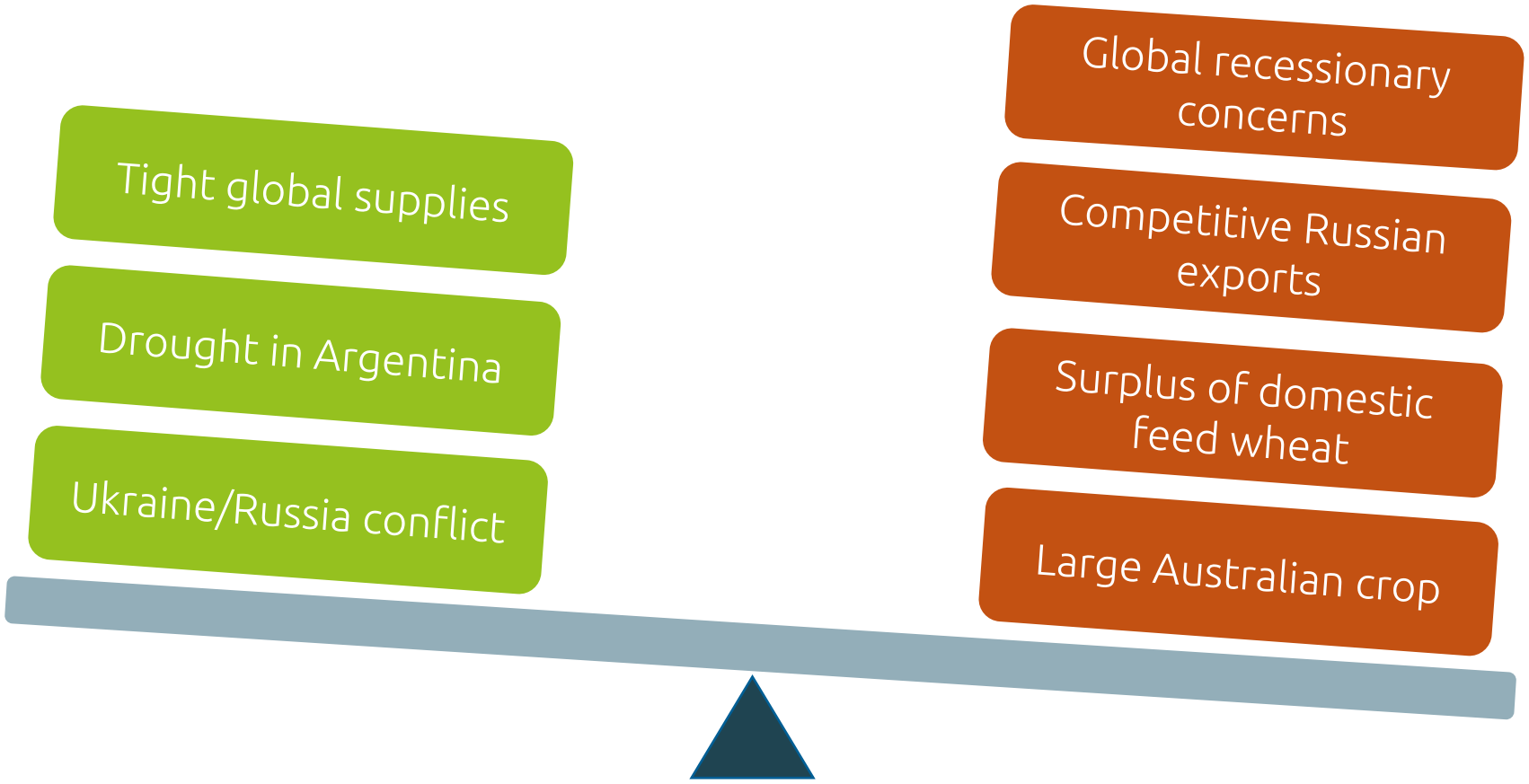
Source: AHDB analysis, AHDB delivered survey, Money Saving Expert
Note: all figures are in £ per tonne.

- Current high interest rates
- Greater income opportunity from selling grain over continuing to store using data

To sell?

- Split grain sales into three parts
- Spread risk
- Avoid selling total tonnage post-harvest when prices could be lower
- Consider trading ‘call’ or ‘put’ options or putting grain into pools

Direction of prices – volatility challenge

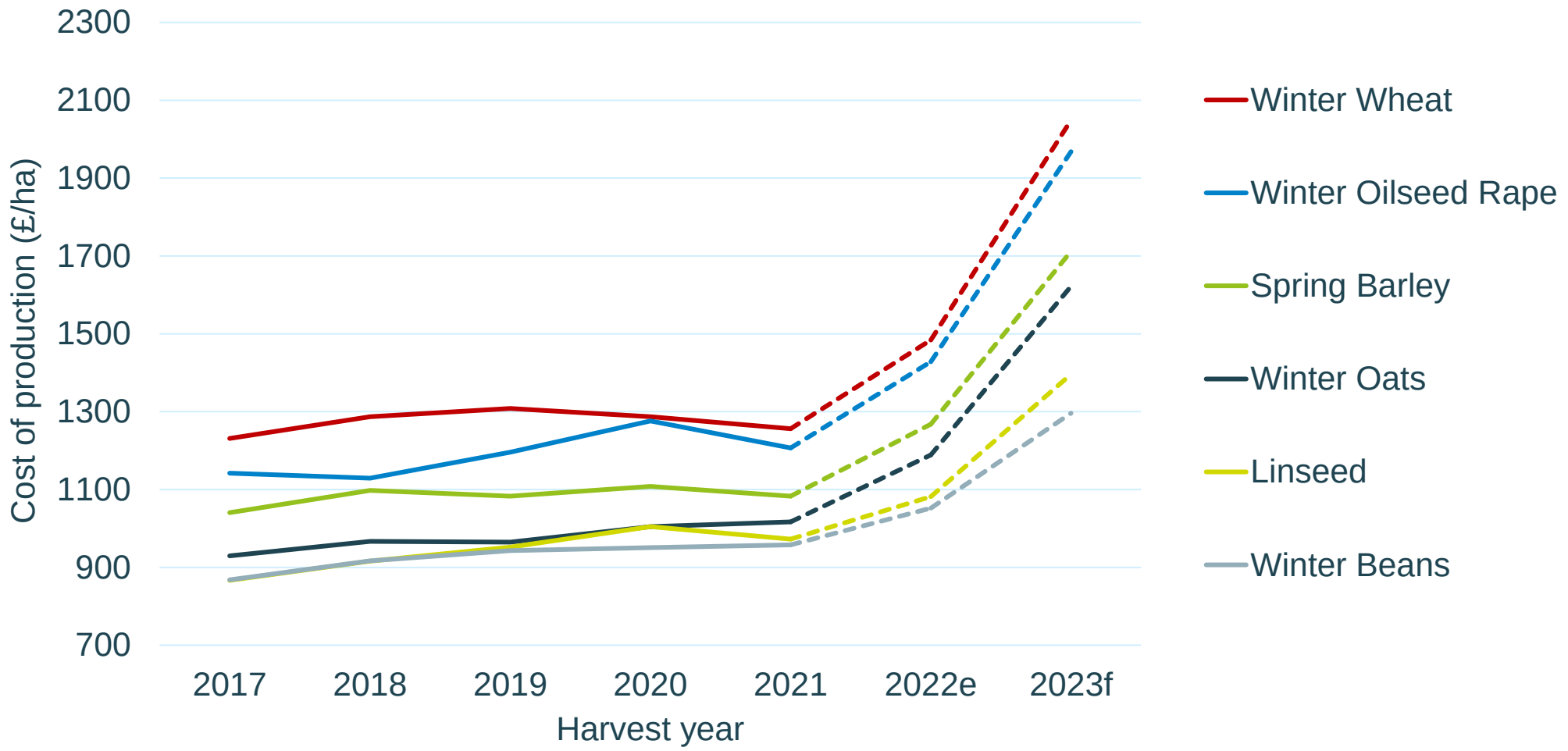


Impact of higher costs – Farmbench results

- COP has on average increased over the **five years to 2021**
  - **Middle 50%** of performers = **6% rise**
- Crop costs in **2022** are estimated to be **15% higher**
- **Up another 32%** for **2023** harvested crops
- Farmbench winter wheat net margins could **increase by 80% in 2022** but then **fall by two thirds in 2023** for middle 50% performers

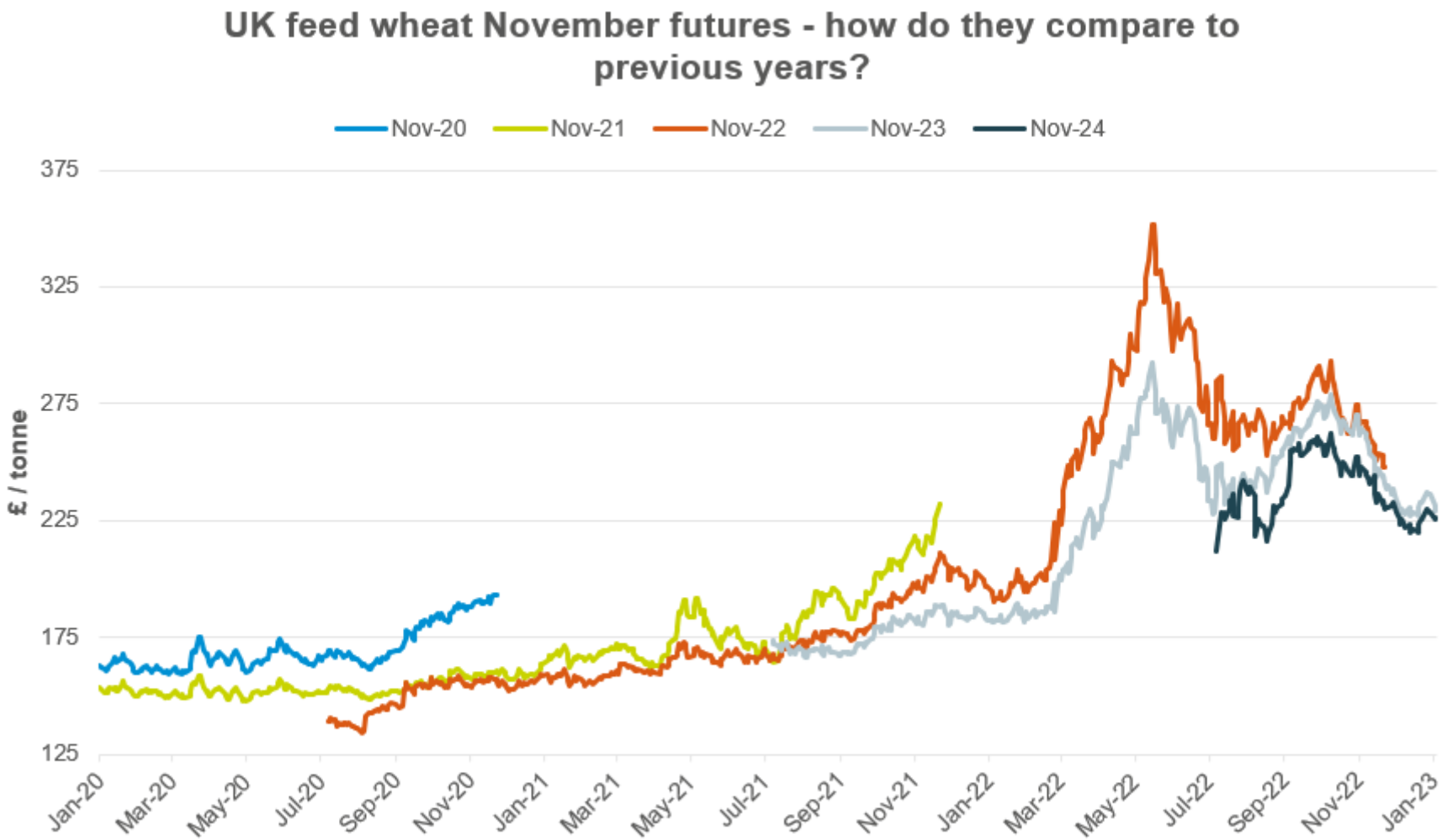
Knowing your costs will be crucial!

Average costs up 6% in five years, 15% in 2022 and 32% in 2023



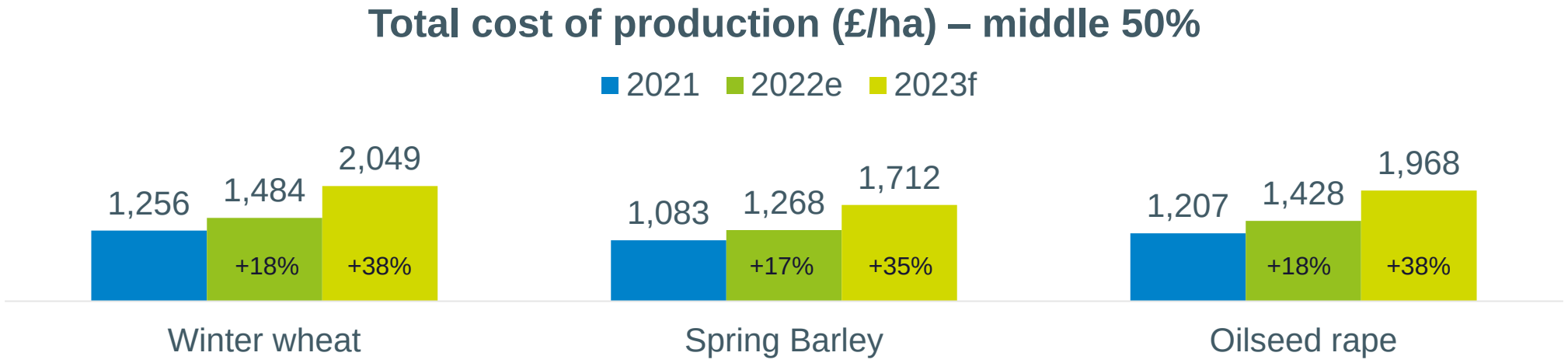
Middle 50% performers – ranked by net margin

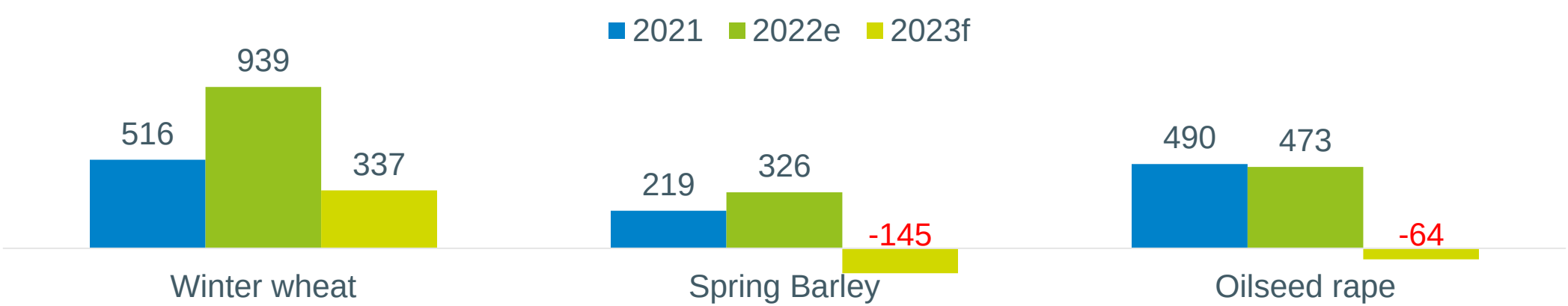
Forward prices



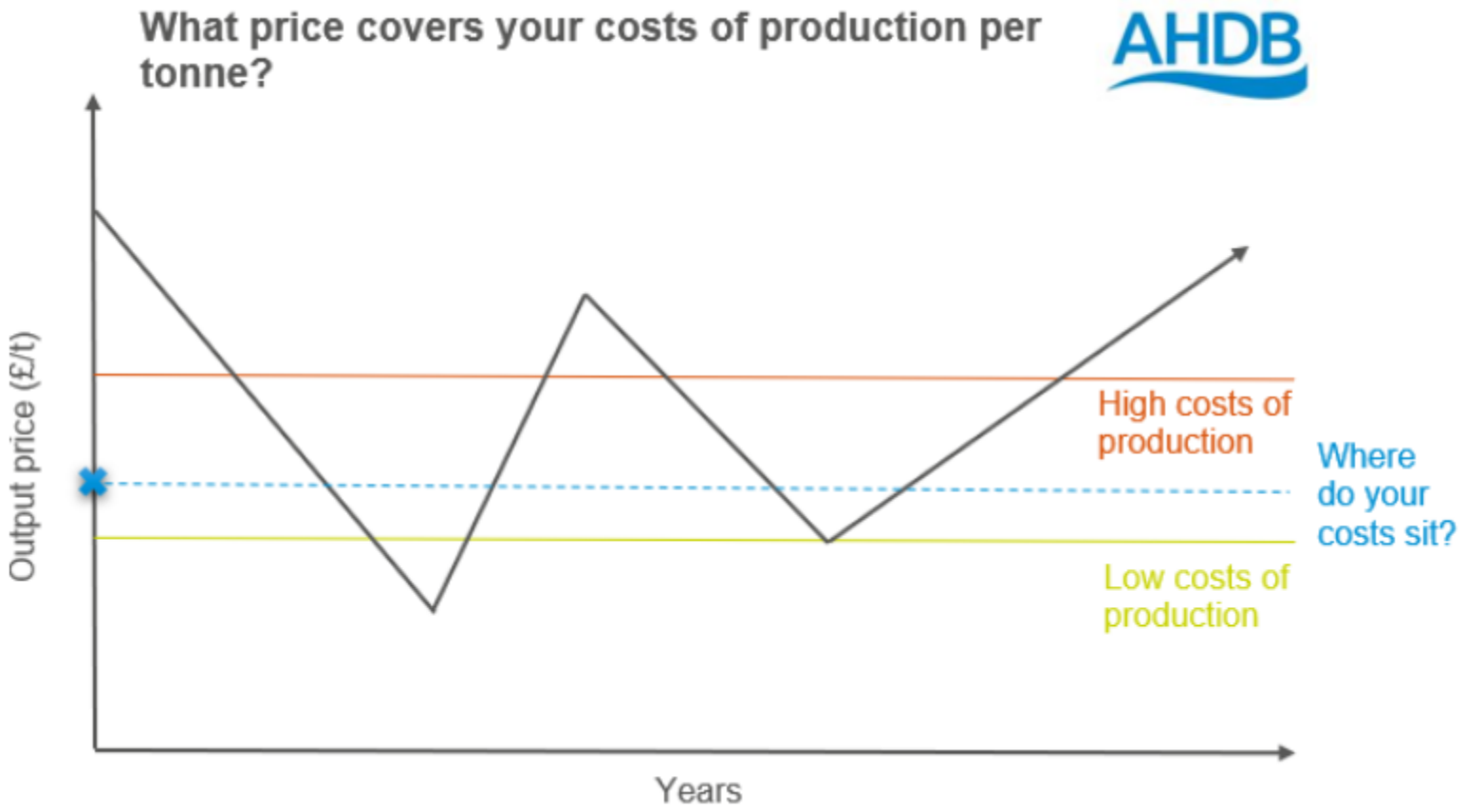
Historically high Nov-23 and Nov-24 contracts

What do higher input costs mean for you?





Breakeven point



- 2023 expected to be more challenging than 2022
- High grain prices have eased
- Input costs remain high

Support can be found at ahdb.org.uk/tools

FARMBENCH

Farmbench helps you to understand and compare your full costs of production at both enterprise and whole-farm level.

MACHINERYCOSTING CALCULATOR

Calculate the cost of farm machinery, per hectare or per hour, with this simple calculator.

FARMBUSINESS REVIEW

The Farm Business Review Tool can help you assess your business and get ready for a world without BPS payments.

Also:
ahdb.org.uk/integrated-pest-management-ipm-hub

Nitrogen fertiliser adjustment calculator

Use this tool to establish the economic optimum amount of nitrogen to apply to cereal and/or oilseed crops.

Mycotoxin rainfall risk tool

Calculate rainfall-related mycotoxin risk assessment scores automatically with this tool

BYDV management tool

Time your cereals insecticide sprays for aphid/BYDV control with greater accuracy.

Light leaf spot forecast

Temperature and rainfall information is used to simulate disease development.

Phoma leaf spot forecast

Temperature and rainfall information is used to simulate disease development.

Sclerotinia infection risk tool

See the extent of risk of Sclerotinia infection of oilseed rape crops in your area.

Any questions?

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Farmbench: farm business management tool

Julie Clark

Senior Knowledge Exchange Manager – Benchmarking

CEREALS & OILSEEDS

Plan for today

- Introduction to Farmbench
- Group work across Scotland & the UK
- Scottish Results from Harvest 2022
- Farmbench: past present and future – 5 years

AHDB Farmbench Benchmarking Tool

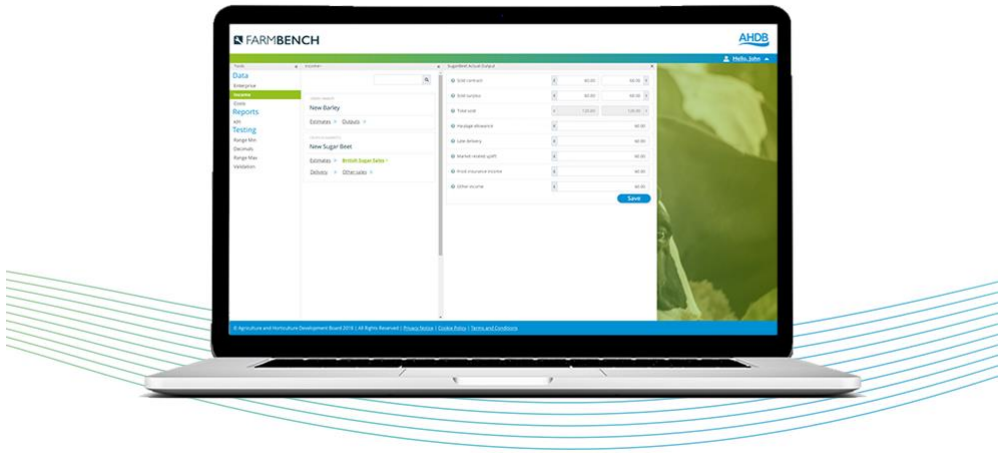
Farmbench is an easy to use online benchmarking tool that helps to identify where strengths and weaknesses lie within a farm business.

Multi enterprise tool: crops, forages, sugar beet, beef & sheep

Farmbench is;

- Confidential
- Fully Validated
- Easy to Use
- Safe and Secure
- Detailed and Accurate Reports
- Fully Supported by Regional Knowledge Exchange Managers

The ultimate aim of Farmbench is to provide you with a better understanding of your own business and put you in control of your future.



Scotland Farmbench activity

- 10 ABG groups
- AHDB groups, Scottish Agronomy and SAOS
- SAC groups (former FFF)
- Various individual users across the country
- SRUC workshops

UK C&O Farmbench activity

- Variety of groups – MF groups, ABG groups, Stakeholder groups
- Annual Farmbench feedback session
- Anonymised reports produced for each group member – group reports exclude rent and finance
- Group members can only attend if they have uploaded their data
- Jointly facilitated by AHDB KEM's/ Stakeholders
- What's discussed in the group, stays in the group
- Farmer led, farmer driven

Map shows AHDB run groups

Benefits of being in a Farmbench group

- Learn from and alongside your peers
- Shared experiences
- Team building
- Personal development
- Acceptance of the need for change
- Break down the barriers
- Adopting best practice

Grower comments…

"The more powerful aspect is being able to go to a benchmarking group to see where your neighbours and peers are against all of your costs. The bottom line is key, otherwise you do not have money to reinvest."

Tom Rees, Dudwell Farm, Pembrokeshire Monitor Farmer

"The arable business group has been very good. So, rather than being an insular farmer sitting on the top of a hill, I can see into other people's businesses and compare and contrast to see what situation I am in."

Donald Ross, Rhynie Farm, Black Isle Business Group

FARMBENCH

AHDB

Harvest 2022…the story so far

CEREALS & OILSEEDS

Scottish Benchmarks - Harvest 2022

FARMBENCH

taken 8/1/23	Spring Barley			Winter Barley		
Per Ha	Top 25%	Middle 50%	Bottom 25%	Top 25%	Middle 50%	Bottom 25%
Technical Performance						
Total area grown (ha)	81	101	73	52	46	64
Total production (t)	648	711	497	550	400	498
Yield (t/ha)	7.97	7.06	6.80	10.61	8.76	7.83
Price (£/t)	279	269	249	255	244	223
Income (Per hectare)						
Total income (£/ha)	2,303	1,952	1,730	2,807	2,219	1,790
Variable costs (Per hectare)						
Total seed costs (£/ha)	88	89	82	74	82	90
Total fertilisers (£/ha)	255	247	269	265	274	313
Total crop protection (£/ha)	84	86	79	143	124	142
Total other variable costs (£/ha)	11	10	22	10	13	10
Total variable costs (£/ha)	438	432	452	492	494	557
Gross margin (£/ha)	1,865	1,520	1,278	2,315	1,725	1,233
Overheads (Per hectare)						
Total labour (£/ha)	117	149	169	187	153	177
Total machinery and equipment (£/ha)	251	262	347	308	357	336
Total property and energy costs (£/ha)	72	94	123	112	107	108
Total administration costs (£/ha)	43	43	54	53	48	38
Total overheads exc. rent & finance (£/ha)	483	548	694	660	664	660
Cost of production and margins (Per ha) exc rent & finance						
Full economic cost of production (£/ha)	921	980	1,146	1,152	1,158	1,217
Full economic net margin (£/ha)	1,382	972	584	1,655	1,061	573

Scottish Benchmarks - Harvest 2022

FARMBENCH

taken 8/1/23	Winter OSR			Winter Wheat		
Per Ha	Top 25%	Middle 50%	Bottom 25%	Top 25%	Middle 50%	Bottom 25%
Technical Performance						
Total area grown (ha)	56	62	28	79	88	91
Total production (t)	285	280	121	832	872	842
Yield (t/ha)	5.13	4.52	4.31	10.53	9.93	9.24
Price (£/t)	589	573	530	284	258	225
Income (Per hectare)						
Total income (£/ha)	3,023	2,596	2,284	3,038	2,607	2,122
Variable costs (Per hectare)						
Total seed costs (£/ha)	68	62	85	90	79	78
Total fertilisers (£/ha)	268	352	368	313	322	290
Total crop protection (£/ha)	169	165	146	175	186	174
Total other variable costs (£/ha)	11	13	11	13	16	11
Total variable costs (£/ha)	515	592	610	591	603	553
Gross margin (£/ha)	2,508	2,003	1,674	2,447	2,004	1,568
Overheads (Per hectare)						
Total labour (£/ha)	133	140	217	117	175	196
Total machinery and equipment (£/ha)	266	284	402	277	348	396
Total property and energy costs (£/ha)	112	101	96	72	107	113
Total administration costs (£/ha)	50	37	75	40	48	51
Total overheads exc. rent & finance (£/ha)	561	562	790	505	678	756
Cost of production and margins (Per ha) exc rent & finance						
Full economic cost of production (£/ha)	1,076	1,155	1,400	1,095	1,281	1,310
Full economic net margin (£/ha)	1,947	1,441	883	1,942	1,326	812

Farmbench combinable crop results: past, present and future

CEREALS & OILSEEDS

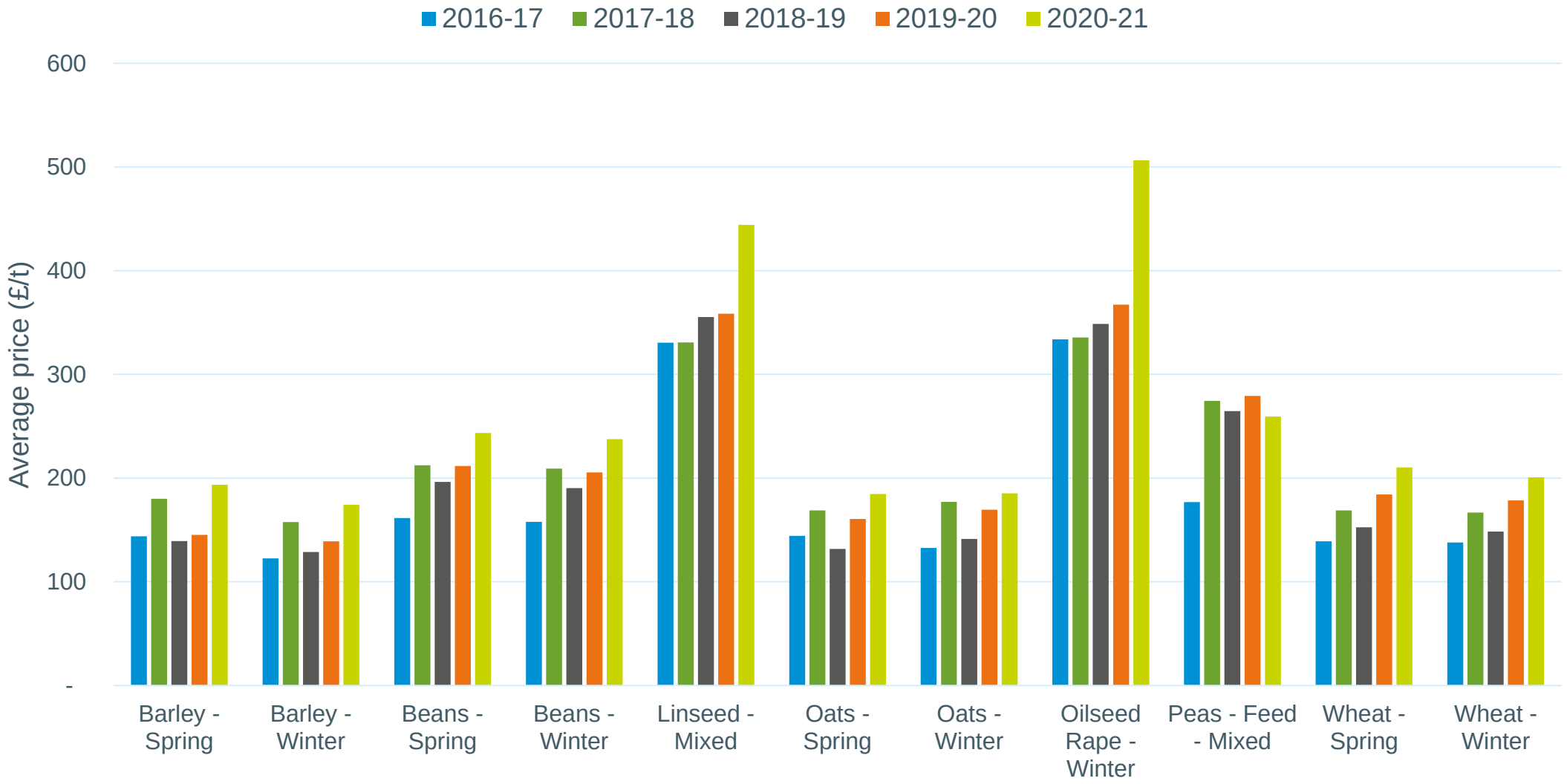
Impact of higher costs

- COP has on average increased over the **five years to 2021**
  - **Middle 50%** of performers = **6% rise**
- Crop costs in **2022** are estimated to be **15% higher**
- **Up another 32%** for **2023** harvested crops
- Farmbench winter wheat net margins could **increase by 80% in 2022** but then **fall by two thirds in 2023** for middle 50% performers

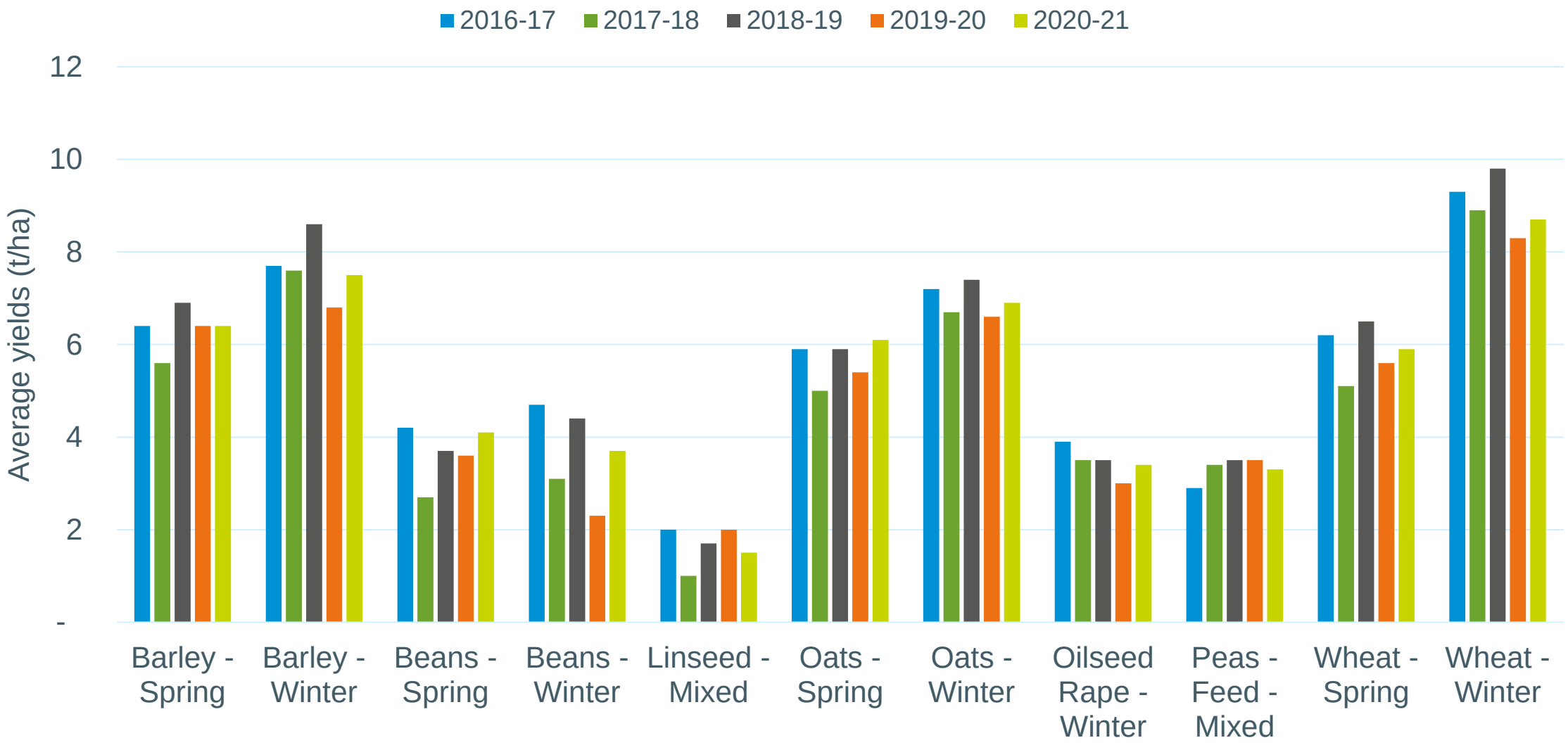
The analysis

- Over 11,000 conventional combinable crop enterprise performance results for 2017 to 2021 harvest years – performance groups ranked by net margin
- 2022 estimated figures based on changes in Defra agricultural price indices applied to the 2021 results. 10% fertiliser usage reduction is assumed
- 2023 forecast figures based on a full crop year at current inputs inflation rates sense checked with some monitor farmers

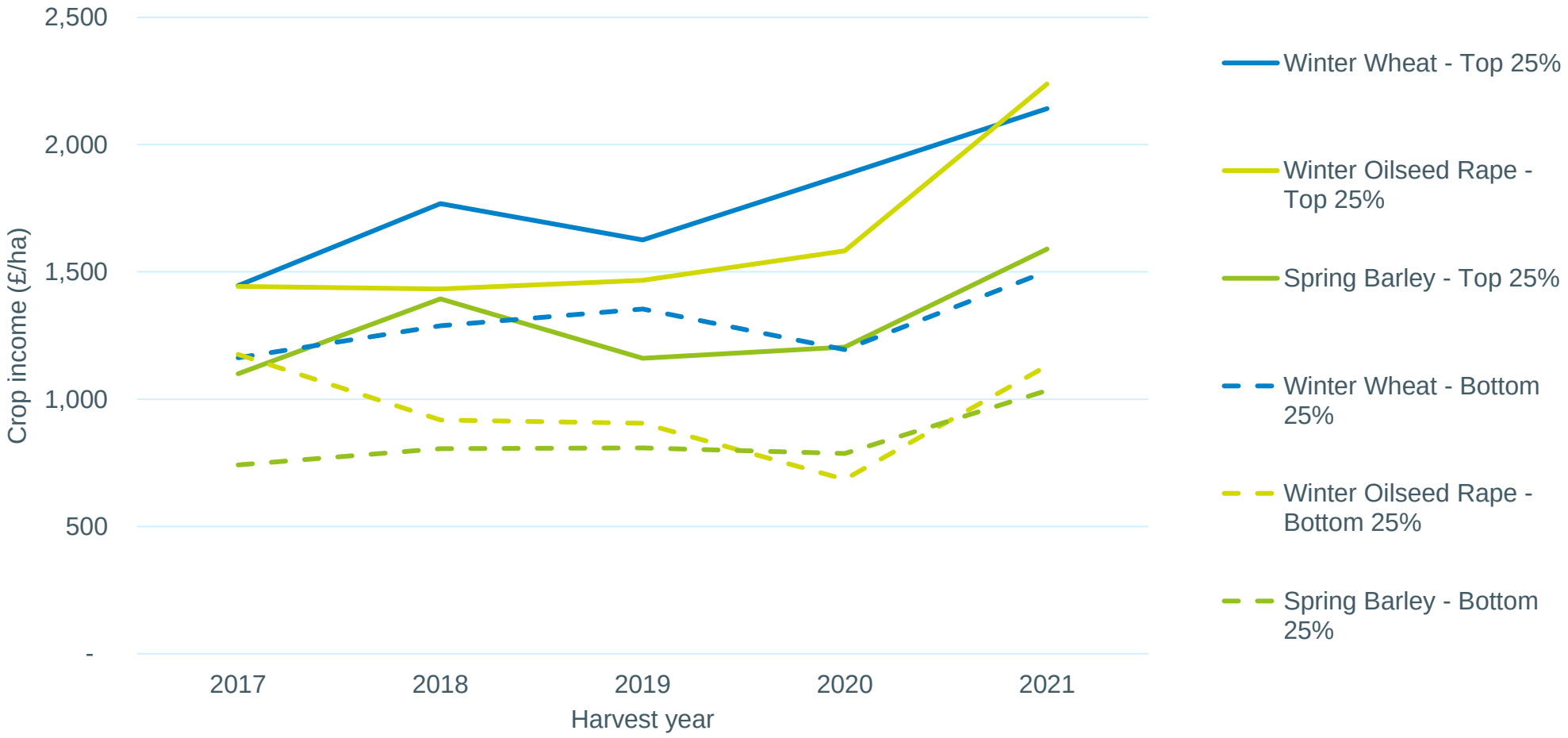
Upward prices trend for most crops since the 2019 harvest year



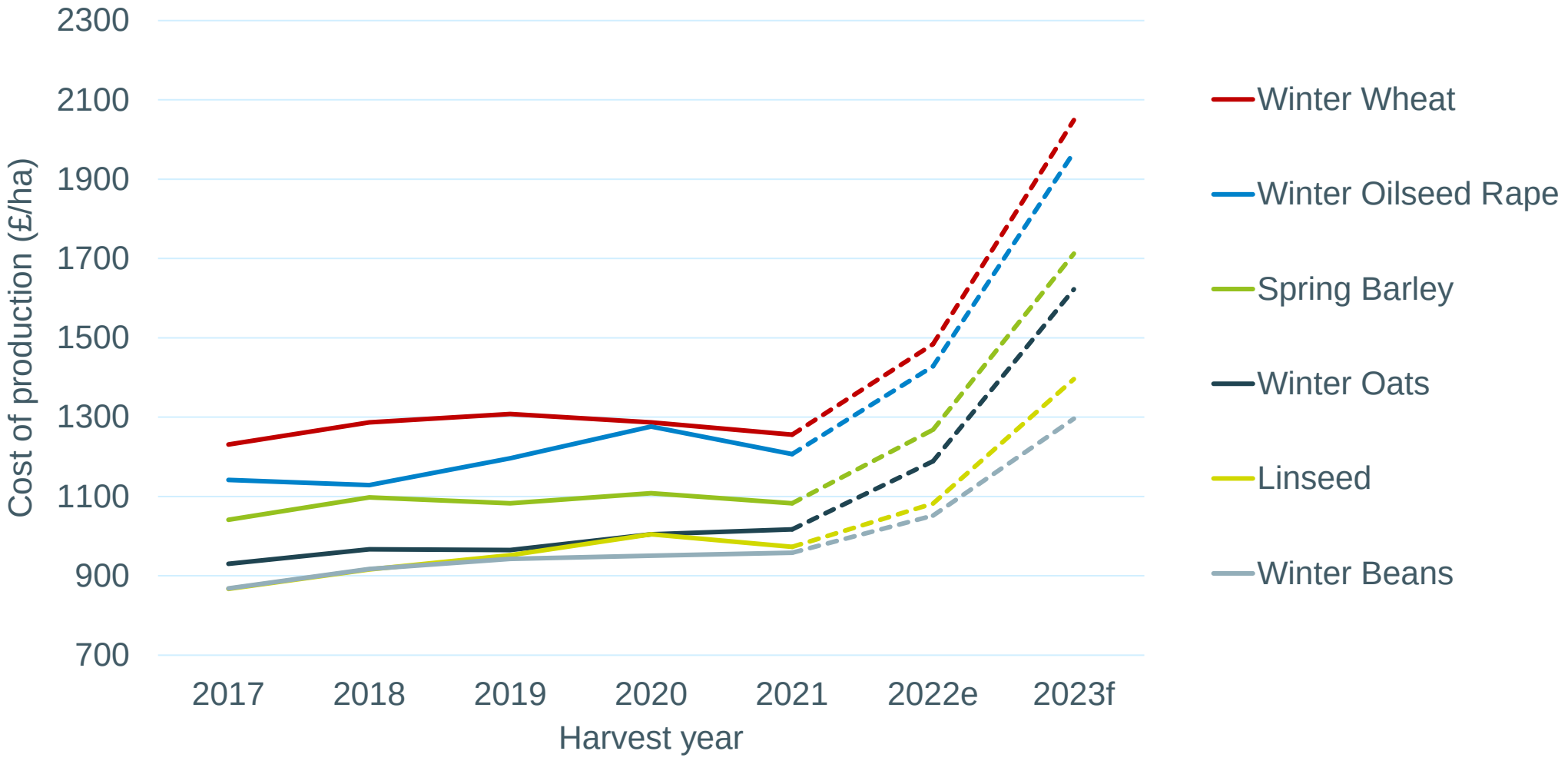
A roller coaster of a journey for crop yield trends



Top 25% income increased by around £500 to £800/ha over the five years

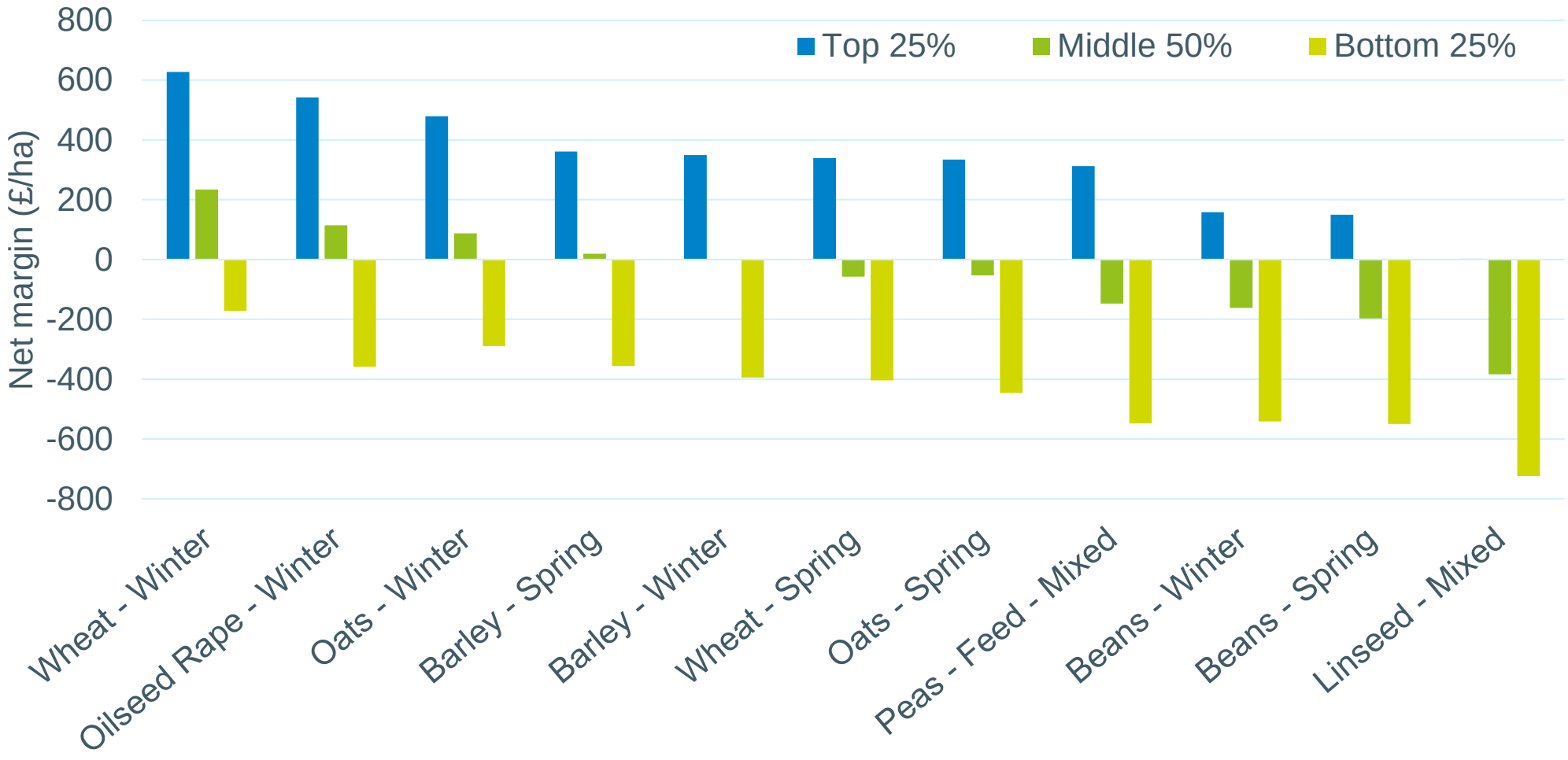


Average costs up 6% in five years, 15% in 2022 and 32% in 2023



Middle 50% performers – ranked by net margin

Winter wheat, OSR and winter oats top 5 year average net margins



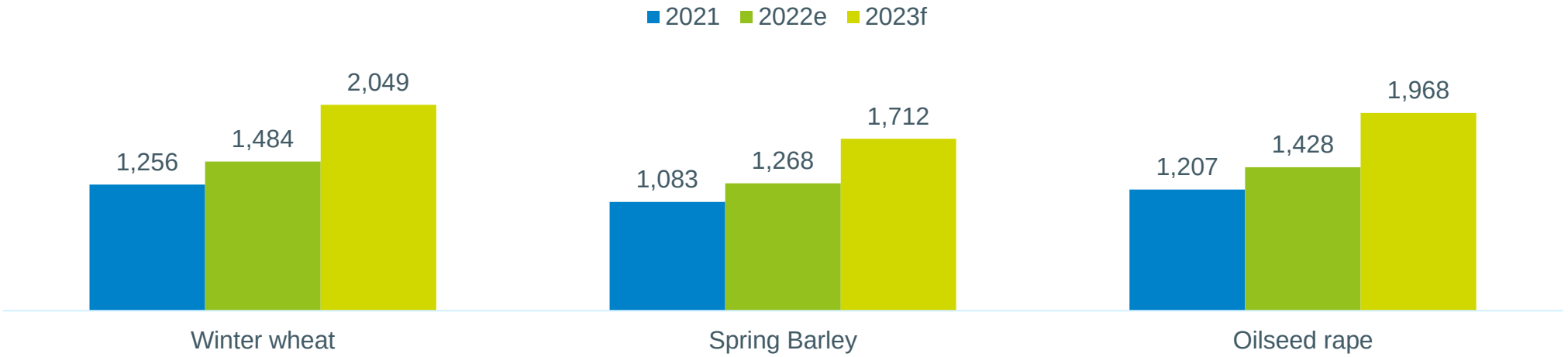
Prices will have a greater impact than in previous years

	Middle 50%	Forward crop prices[1]	
£/t	2021 (based on prices received)	2022 (based on Nov-22)	2023 (based on Nov-23)
Feed wheat	196	265	261
Feed barley	190	240	236
Oilseed rape	499	559	560

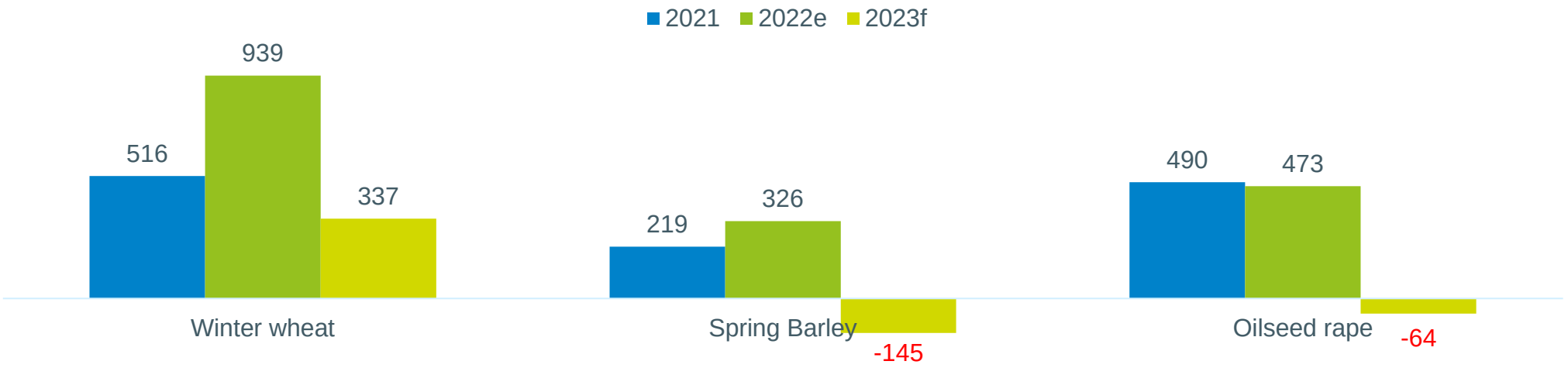
[1]as at 4/11/22

	Yields for the middle 50%	
t/ha	2021	5-year average
Winter wheat	8.8	8.9
Spring Barley	6.5	6.3
Oilseed rape	3.4	3.4

Total cost of production (£/ha) – middle 50%



Net margin (£/ha) – middle 50%



Key results

2017 to 2021

- Prices had kept pace with gradual cost increases
- Winter wheat still the best cash crop

2022

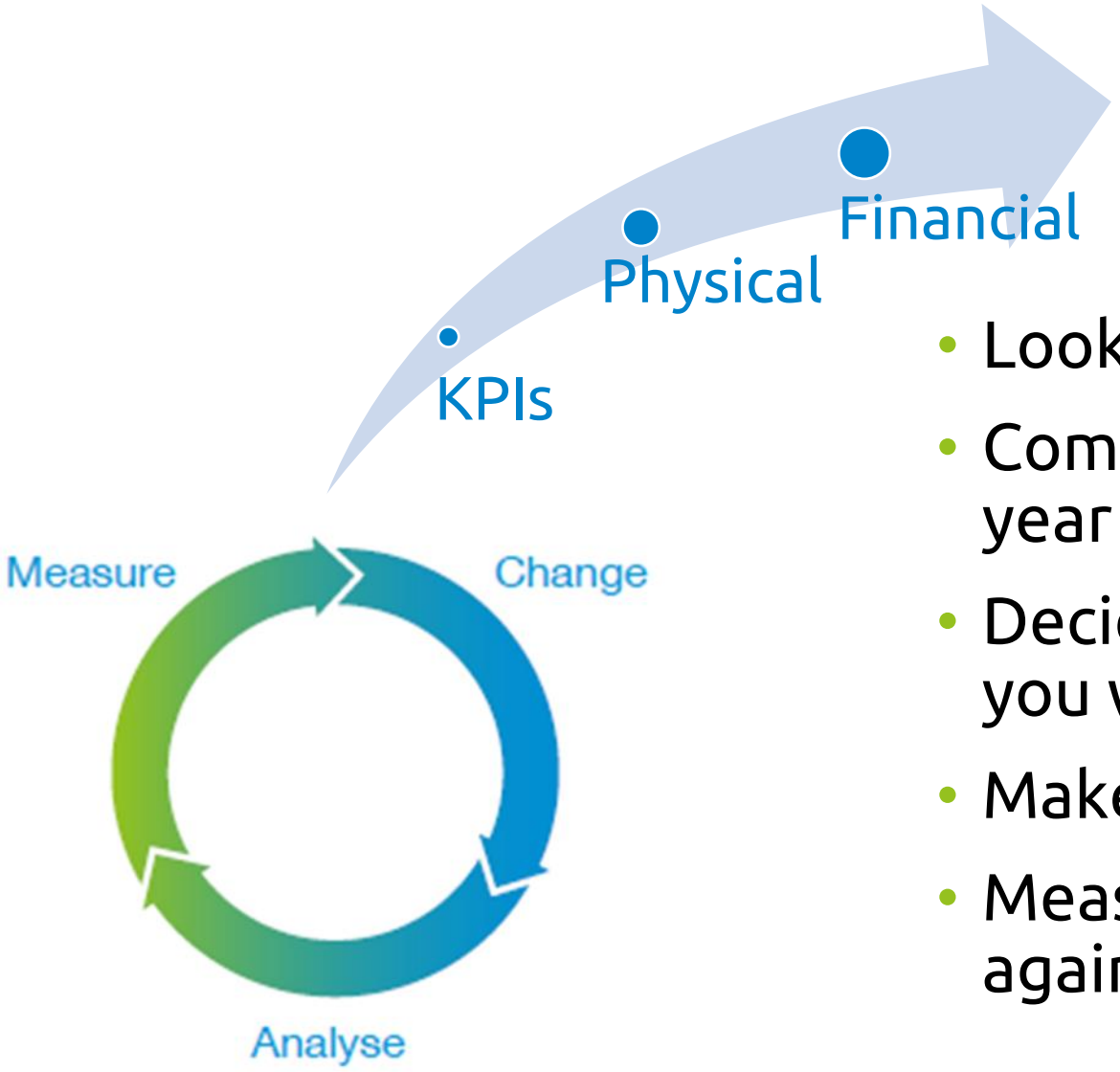
- The influence of higher prices could rise COP by 15% but margins could rise by up to 80%

2023

- Full impact of cost rises
- COP up 32%
- Net margins down by up to 65% in wheat but still positive

The full article can be found at Farmbench results: past, present and future

If you don't measure it, you can't manage it



FARMBENCH

- Look at your current performance
- Compare yourself to others and yourself year on year
- Decide what you need to do to get where you want to go
- Make changes to improve
- Measure and compare your performance again

Any questions?

Don’t hesitate to get in touch

Julie Clark – Senior KEM Benchmarking

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07778 144273


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

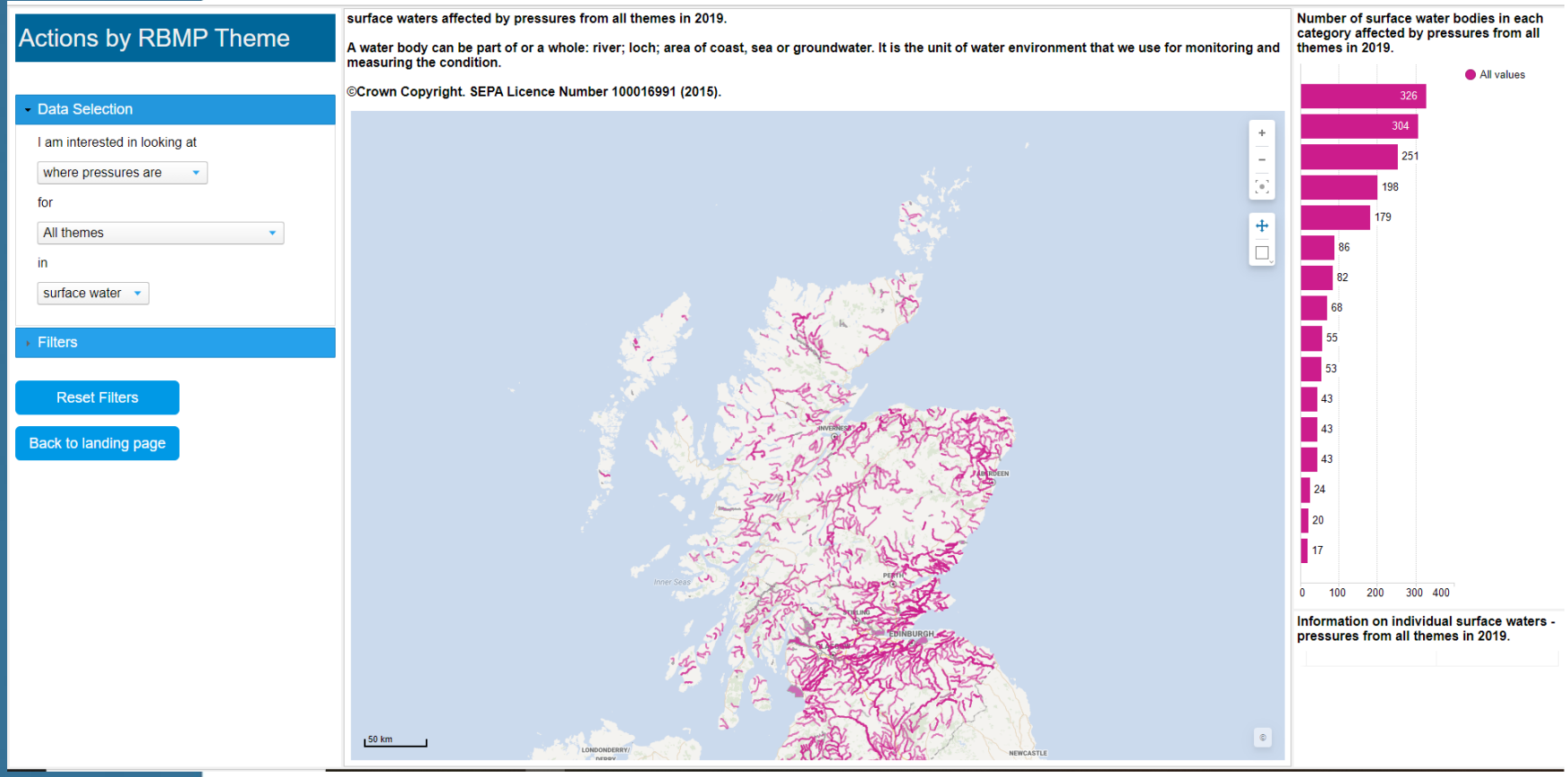
SEPA and the Arable Sector

Outline of presentation

- Why we regulate the arable sector
- How we regulate the arable sector
- The importance of soil health
- Why it matters to YOU!

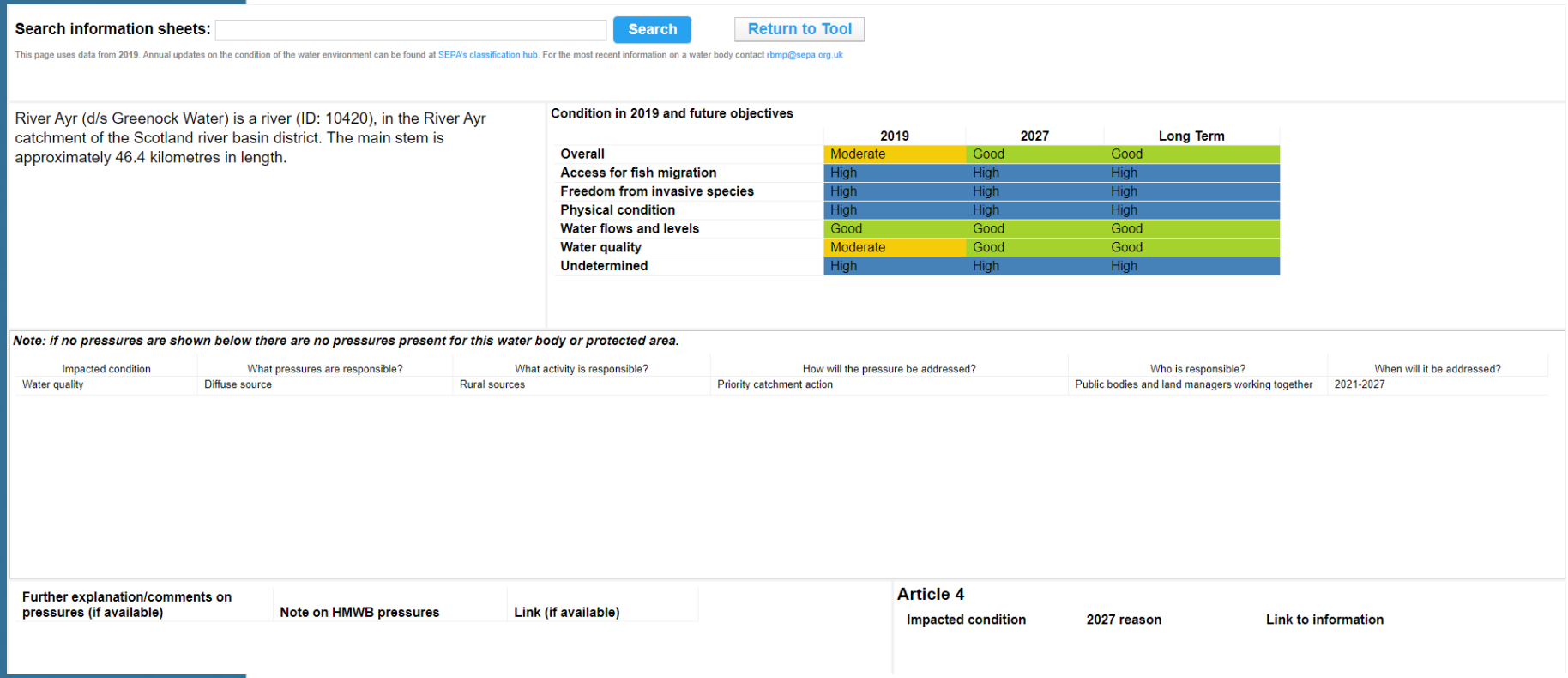
River Tweed 27th December 2015

Spotfire – detailed information



https://informatics.sepa.org.uk/draftRBMP3hub/

Spotfire detailed information



Search information sheets: Search Return to Tool

This page uses data from 2019. Annual updates on the condition of the water environment can be found at SEPA's classification hub. For the most recent information on a water body contact rbmp@sepa.org.uk

River Ayr (d/s Greenock Water) is a river (ID: 10420), in the River Ayr catchment of the Scotland river basin district. The main stem is approximately 46.4 kilometres in length.

Condition in 2019 and future objectives

	2019	2027	Long Term
Overall	Moderate	Good	Good
Access for fish migration	High	High	High
Freedom from invasive species	High	High	High
Physical condition	High	High	High
Water flows and levels	Good	Good	Good
Water quality	Moderate	Good	Good
Undetermined	High	High	High

Note: if no pressures are shown below there are no pressures present for this water body or protected area.

Impacted condition	What pressures are responsible?	What activity is responsible?	How will the pressure be addressed?	Who is responsible?	When will it be addressed?
Water quality	Diffuse source	Rural sources	Priority catchment action	Public bodies and land managers working together	2021-2027

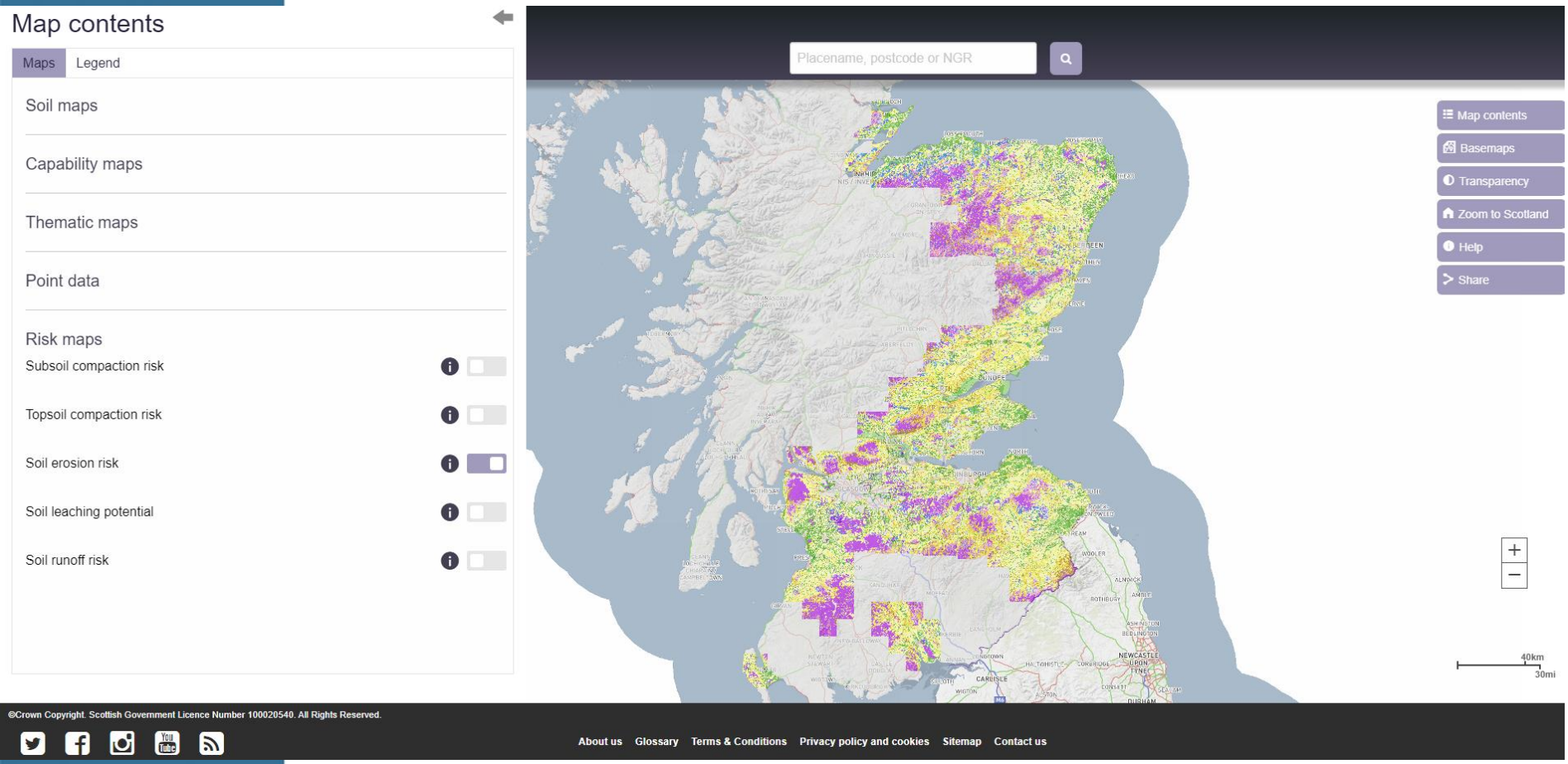
Further explanation/comments on pressures (if available) | **Note on HMWB pressures** | **Link (if available)**

Article 4

Impacted condition | **2027 reason** | **Link to information**

https://informatics.sepa.org.uk/draftRBMP3hub/

Soil risk maps



https://map.environment.gov.scot/Soil_maps/

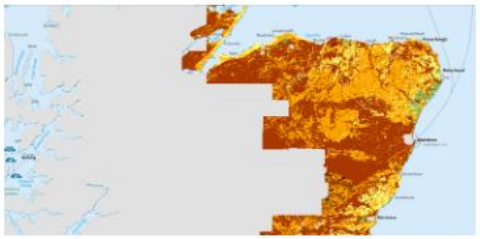
SEPA
Scottish Environment Protection Agency

Scotland's soils part of Scotland's environment

Search Scotland's soils GO

Home Soils in Scotland Maps Resources About us News

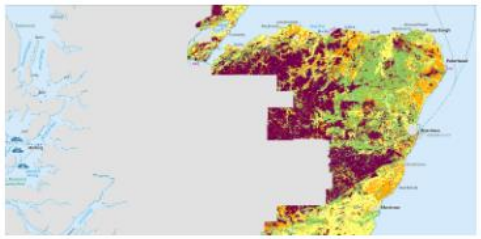
Home / Maps / *Risk maps*



Map of subsoil compaction risk (partial cover)

The map shows the vulnerability of subsoils to compaction by traffic. It covers most of Scotland's cultivated agricultural land area.

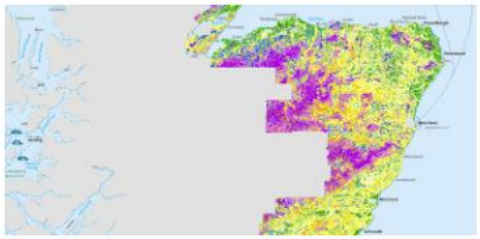
View the map



Map of topsoil compaction risk (partial cover)

The map shows the risk of topsoil becoming compacted by traffic. It covers most of Scotland's cultivated agricultural land area.

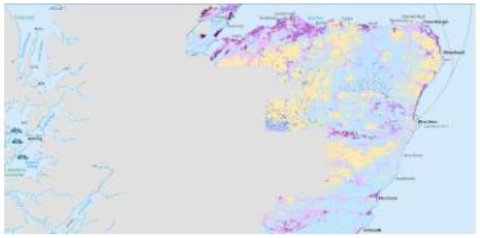
View the map



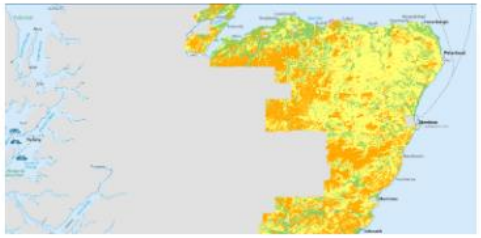
Map of soil erosion risk (partial cover)

The map shows the risk of a bare soil being eroded by water under intense or prolonged rainfall. It covers most of Scotland's cultivated agricultural land area.

View the map



Map of soil leaching potential (partial cover)



Map of runoff risk (partial cover)

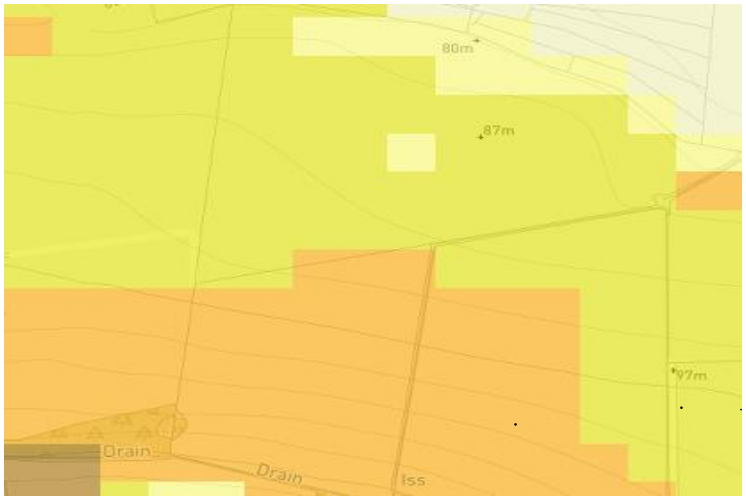
Erosion risk

Map contents

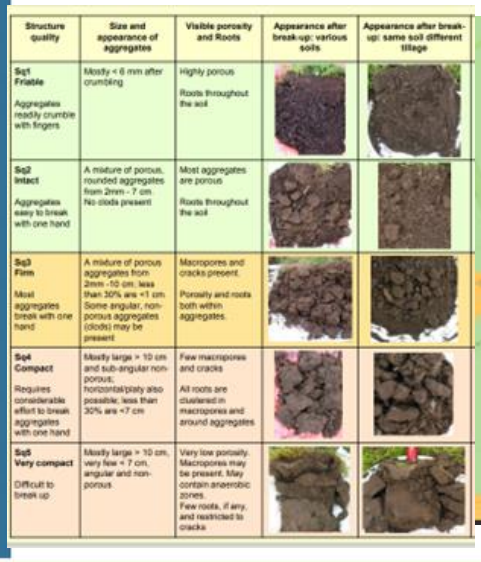
Maps | Legend

Soil erosion risk

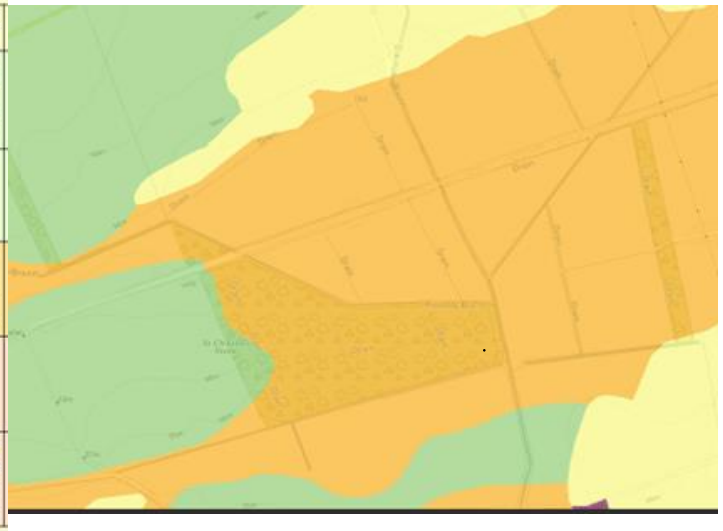
- L2
- L3
- M1
- M2
- M3
- H1
- H2
- H3



Topsoil compaction risk



Structure quality	Size and appearance of aggregates	Visible porosity and Roots	Appearance after break-up: various soils	Appearance after break-up: same soil different tillage
Sq1 Friable Aggregates readily crumble with fingers	Mostly < 6 mm after crumbling	Highly porous Roots throughout the soil		
Sq2 Intact Aggregates easy to break with one hand	A mixture of porous, rounded aggregates from 2mm - 7 cm No clods present	Most aggregates are porous Roots throughout the soil		
Sq3 Firm Most aggregates break with one hand	A mixture of porous aggregates from 2mm -10 cm; less than 30% are >1 cm. Some angular, non-porous aggregates (clods) may be present	Macropores and cracks present Porosity and roots both within aggregates		
Sq4 Compact Requires considerable effort to break aggregates with one hand	Mostly large > 10 cm and sub-angular non-porous; horizontal/platy also possible, less than 30% are >7 cm	Few macropores and cracks All roots are clustered in macropores and around aggregates		
Sq5 Very compact Difficult to break up	Mostly large > 10 cm, very few < 7 cm, angular and non-porous	Very low porosity. Macropores may be present. May contain anaerobic zones. Few roots, if any, and restricted to cracks		



Map contents

Maps | Legend

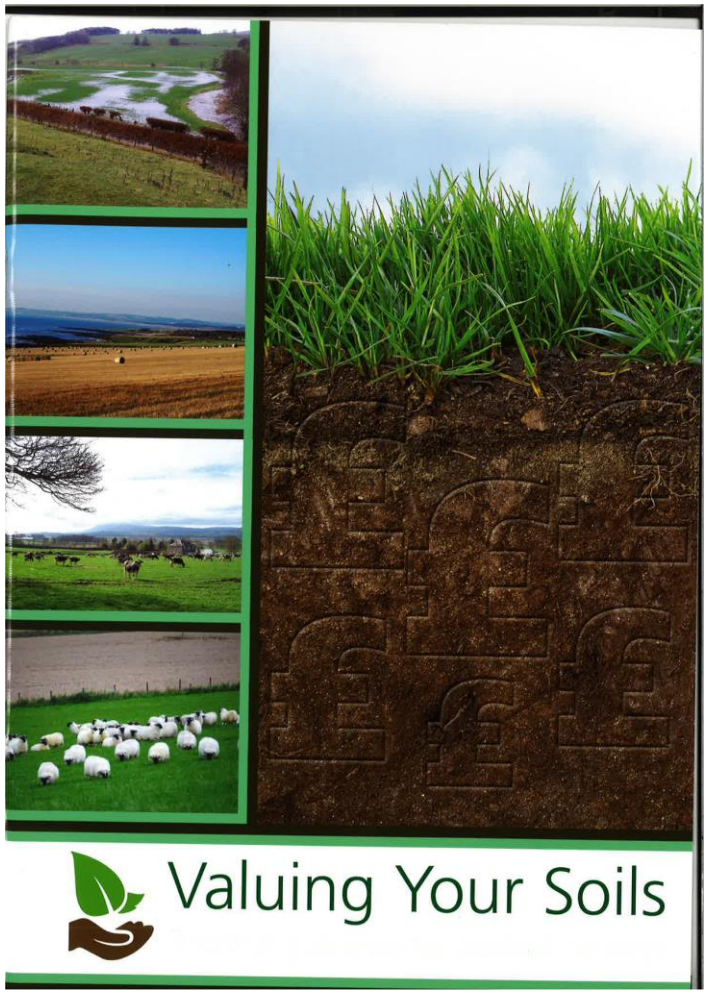
Topsoil compaction risk

- Low
- Moderate
- High
- Organic
- No data

Go to about maps

Soil- keep what you've got and get the best out of it

- Reduce/remediate compaction- sub-soiling, sward lifting, tyre choice
- Know what you've got-pH, nutrient levels-put on what crop needs, take into account manures and slurries applied
- Think about soil organic matter- muck is magic!
- Cultivation techniques- conventional ploughing vs min till or no till?
- Cover crops
- Precision farming/controlled traffic farming
- Tramline management
- Field drainage management



Soil problems…..

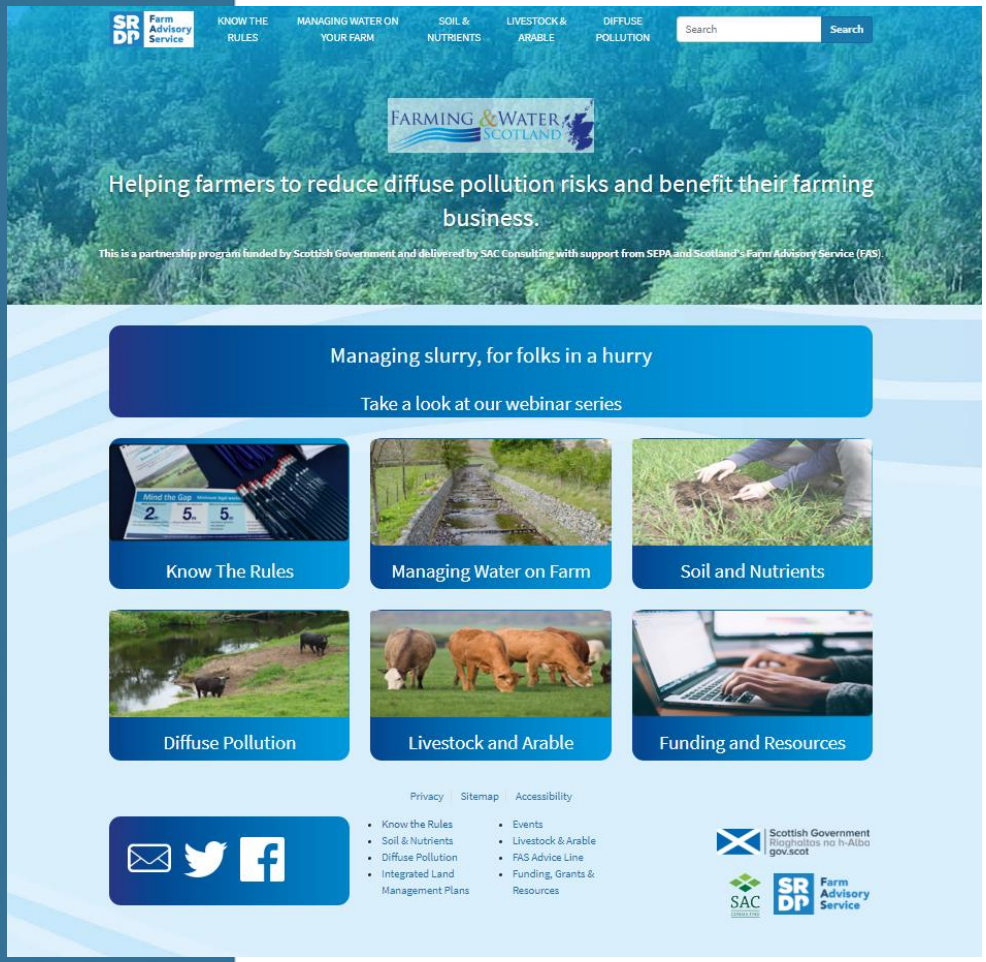
SEPA
Scottish Environment Protection Agency

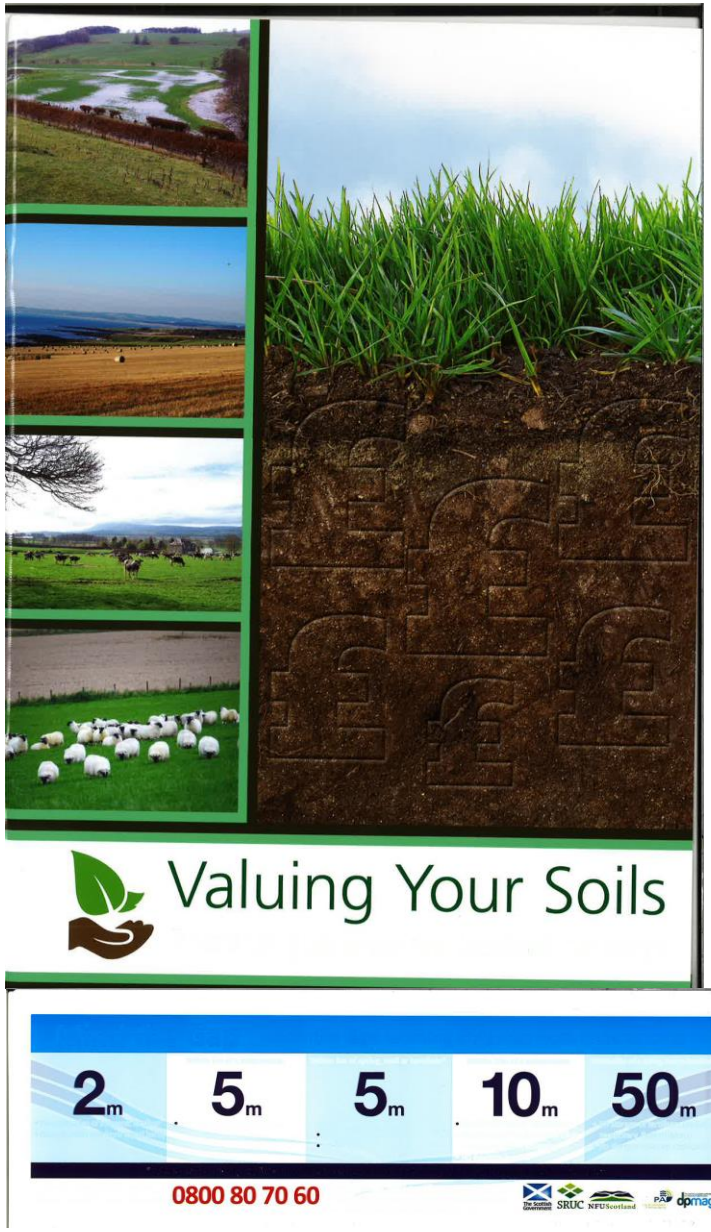
End results…

SEPA
Scottish Environment Protection Agency

SEPA
Scottish Environment Protection Agency

FARMING & WATER SCOTLAND





SEPA
Scottish Environment Protection Agency

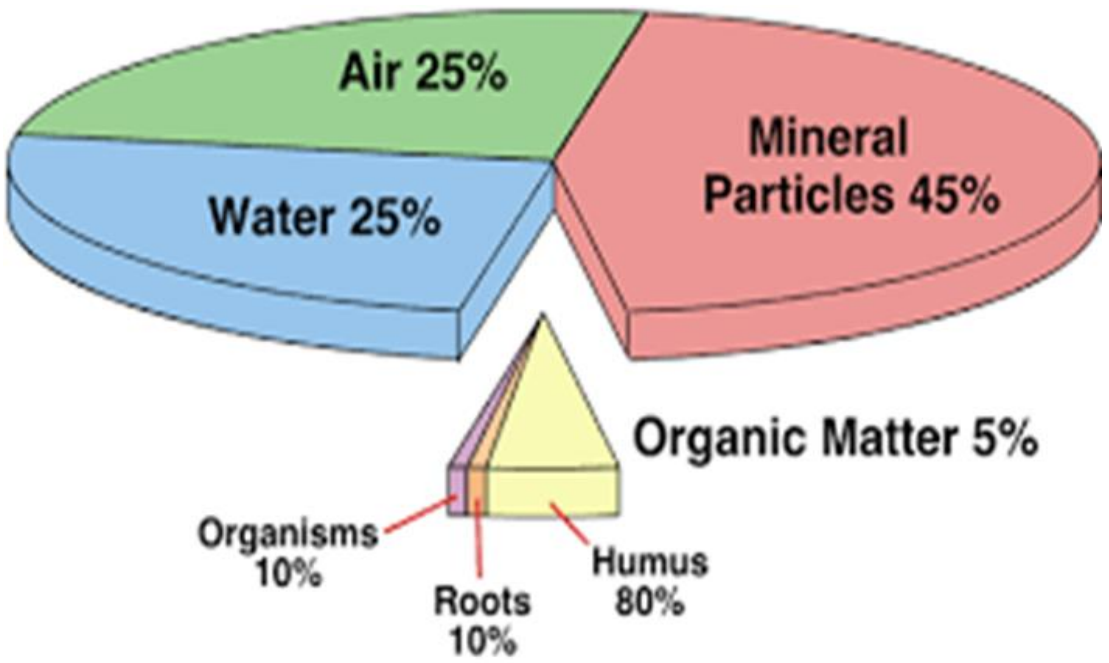
"Wull's Law"

Soil, nutrients and pesticides going down a river aren't doing anyone any good….

Fundamentals of Soil Carbon

Sarah Buckingham
SAC Consulting, SRUC

Soil composition



Soil Inorganic Carbon:
weathering of C-based bedrock material; liming
(E.g. calcite or chalk - calcium carbonate);

Soil organic matter (SOM) = Living organisms & decomposing organic matter
(E.g. residues/litter, root material & exudates, microbes & fungi, manures).

SOM = Approx. 58% carbon (SOC)

After the world's oceans, soil is the largest C store;
3x amount held in the atmosphere

Typically, **agricultural soil C content < 5%**
Peatlands can be ≥50%

SRDP Farm Advisory Service SRUC AHDB

Soil carbon cycle

Key Inputs:

Photosynthesis, root material, root exudates, leaf litter, vegetation residues, manure additions

Key processes:

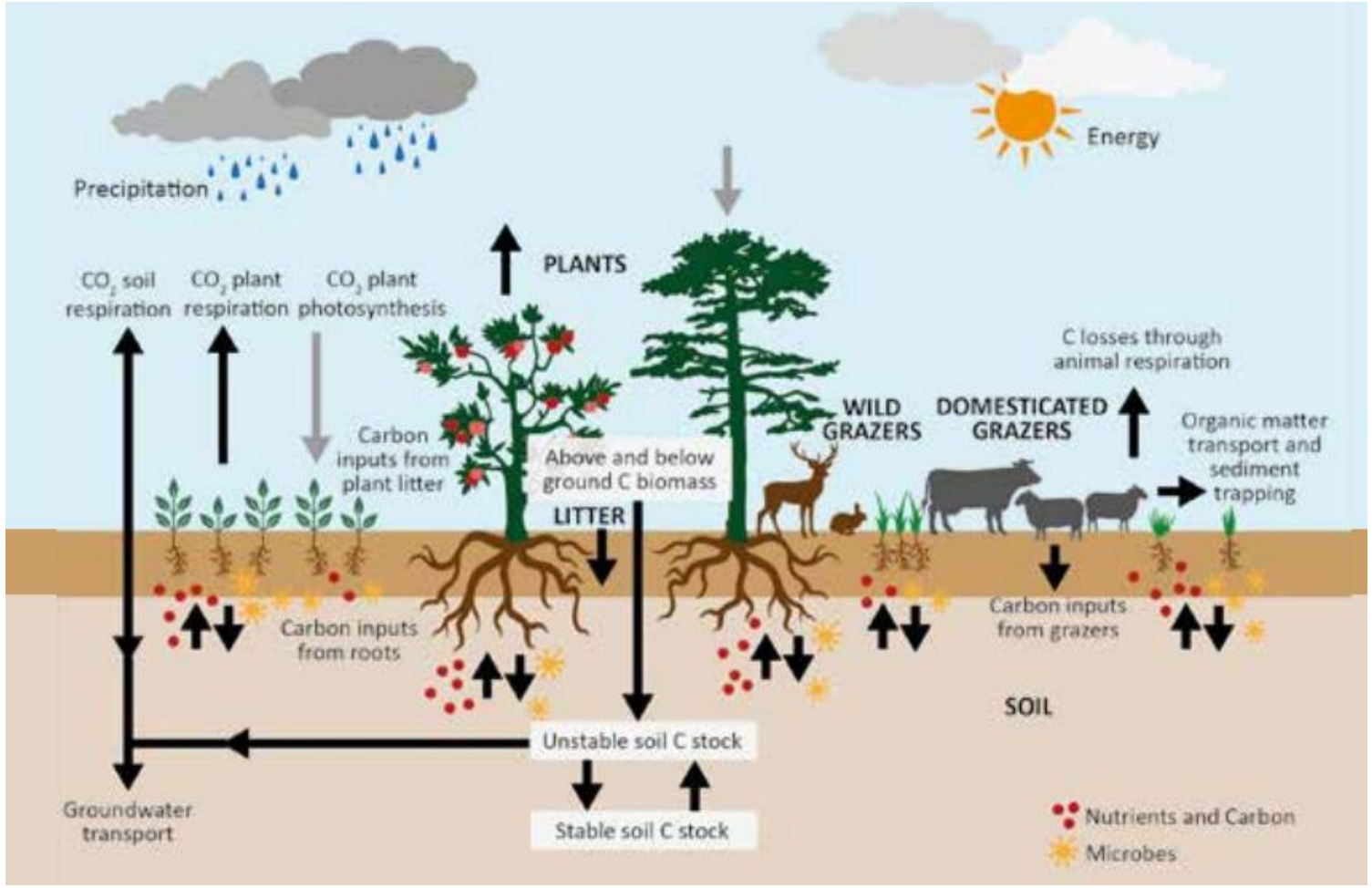
Decomposition and mineralization

Key storage mechanisms:

Physical protection, chemical binding, within the biological pool

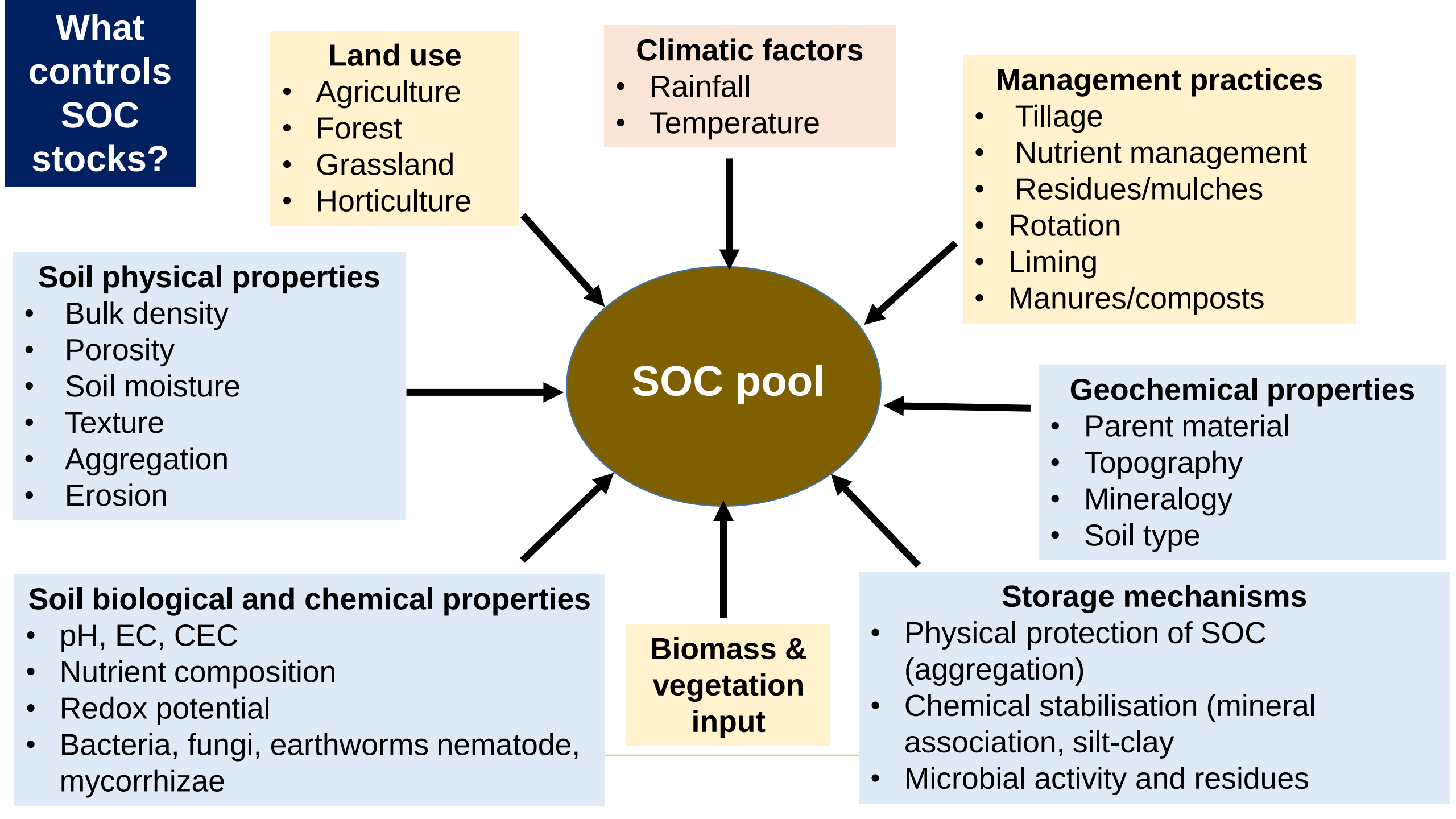
Key outputs:

Gas emissions (CO_2 *or* CH_4), leached *(dissolved / particulate organic carbon),* physical loss *(erosion)*



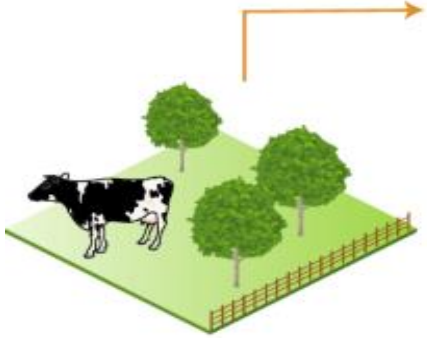
BSSS Science Note Soil Carbon (adapted from Garnett et al., 2017

What controls SOC stocks?



SOM residence time

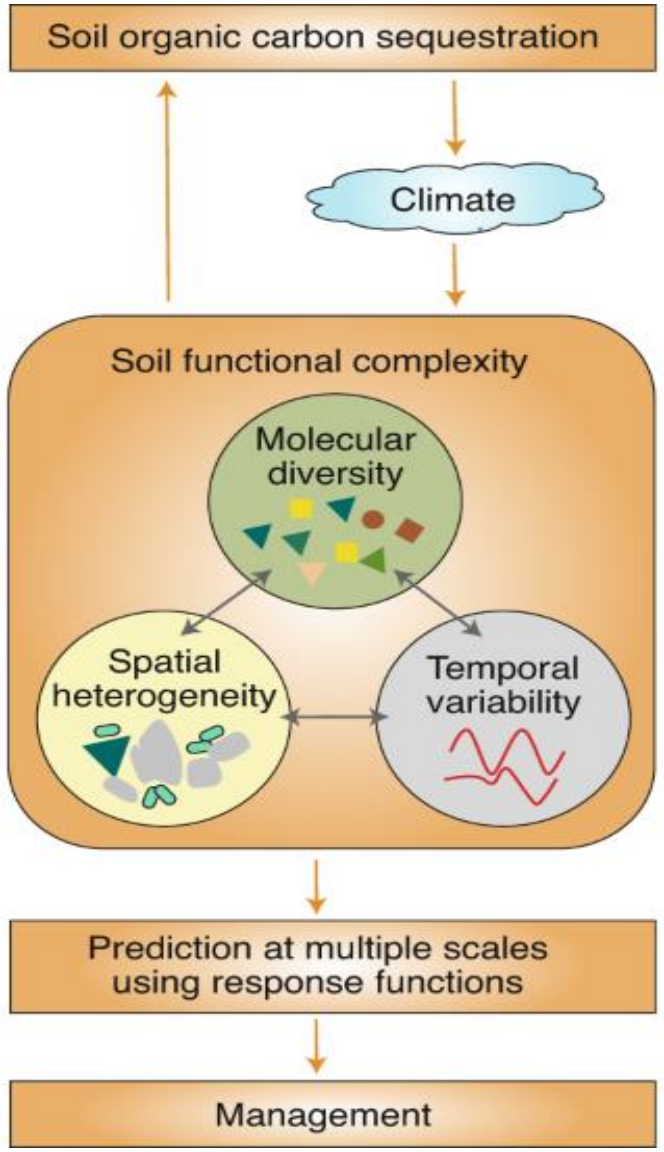
Mixture of material with variable composition and at different stages of decomposition.



days - years

decades - centuries

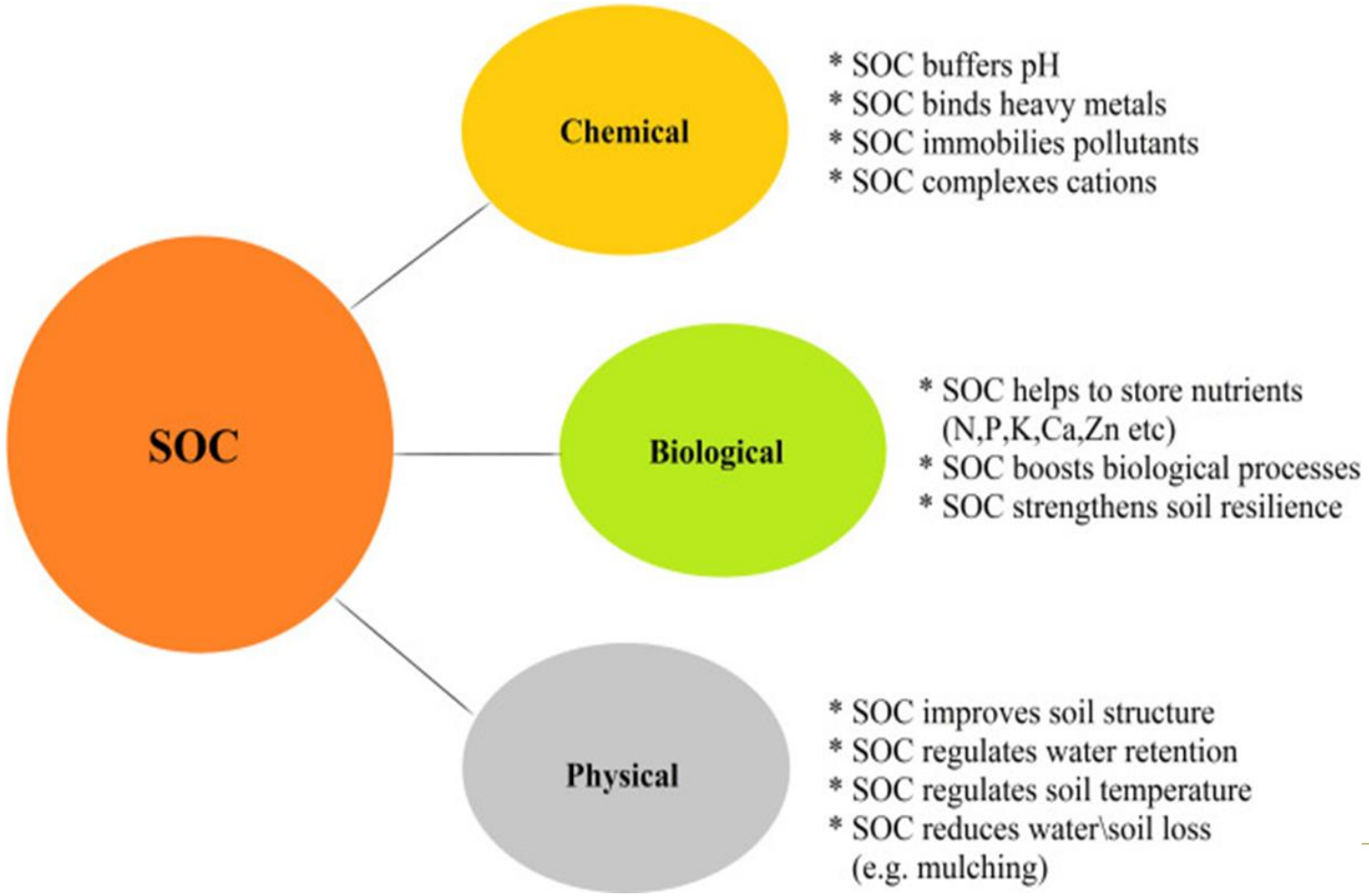
centuries - millennia



Lehmann et al (2020) Nat. Geosci. 13, 529–534

SOM composition & function

Complex pool of material, different size, composition and functions



- Contains nutrients
- Soil structure
- Influences water holding capacity; infiltration, storage and drainage
- Buffer capacity
- C storage

SOM adds to soil fertility and overall soil health by enhancing biological, chemical & physical properties

SRDP Farm Advisory Service SRUC AHDB

Areas of research

Soil health
Defining and measuring soil C as a primary indicator for soil health in sustainable soil management and food production efficiency

SOC functions
Chemical nature of SOC and relationship to other parameters

SOC measurement
Refinement of SOC measurement (field and lab) and interpretation

Land use practices.
Conventional and regenerative agriculture, nature-based solutions

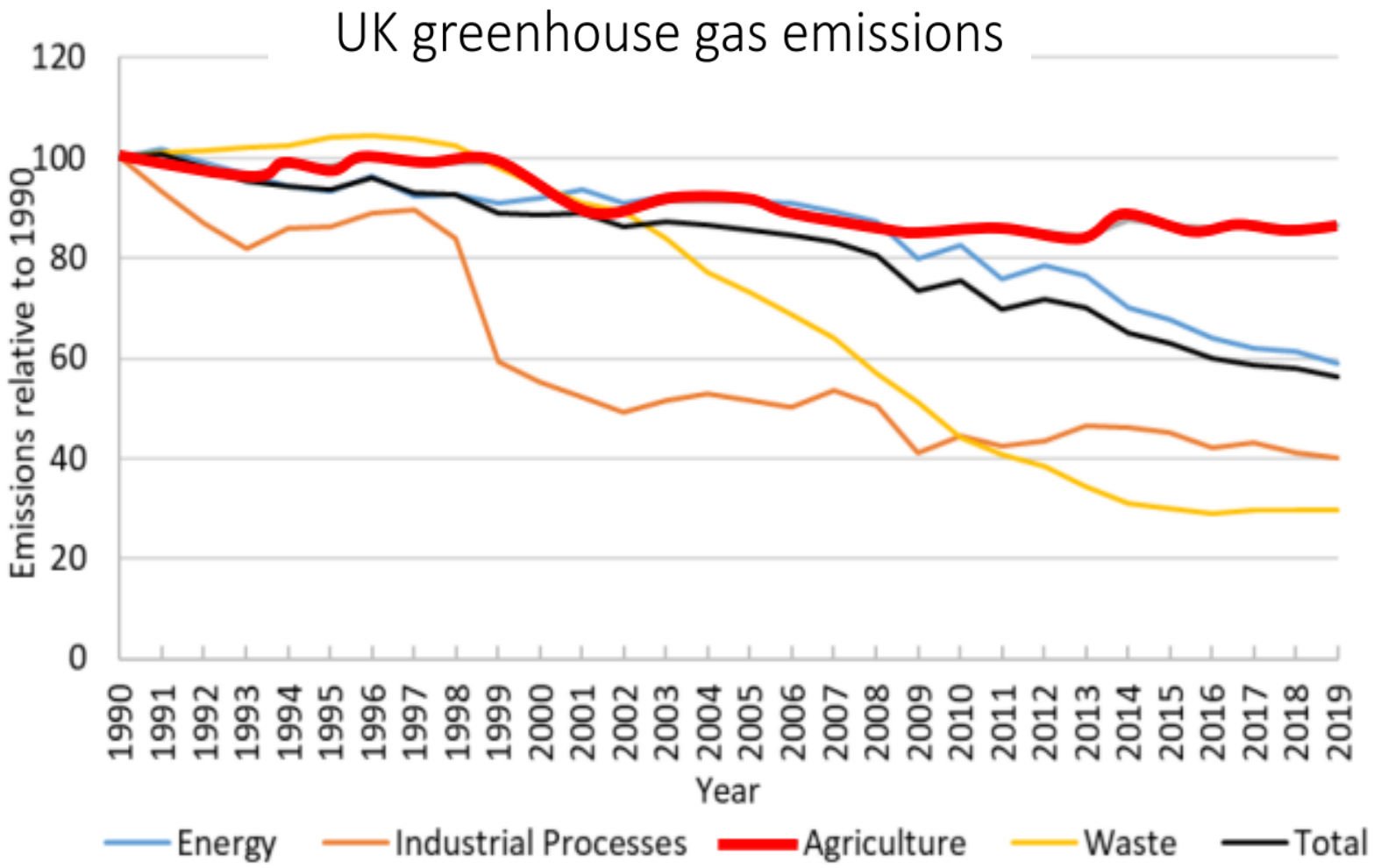
Climate change mitigation
Often a sizeable carbon deficit relative to historical levels (50-60yrs ago), potential for them to re-store large amounts of carbon

GHG Reduction.
Reduce losses of soil C and GHG associated with land use practices

GHG Removal.
Sequestration as a GHG removal & climate change mitigation strategy

Soil C retention
Mechanisms of C storage, residence time within the soil matrix and profile

Soil carbon and climate change mitigation



Trends in emissions by sector relative to 1990

Committee on Climate Change 2020

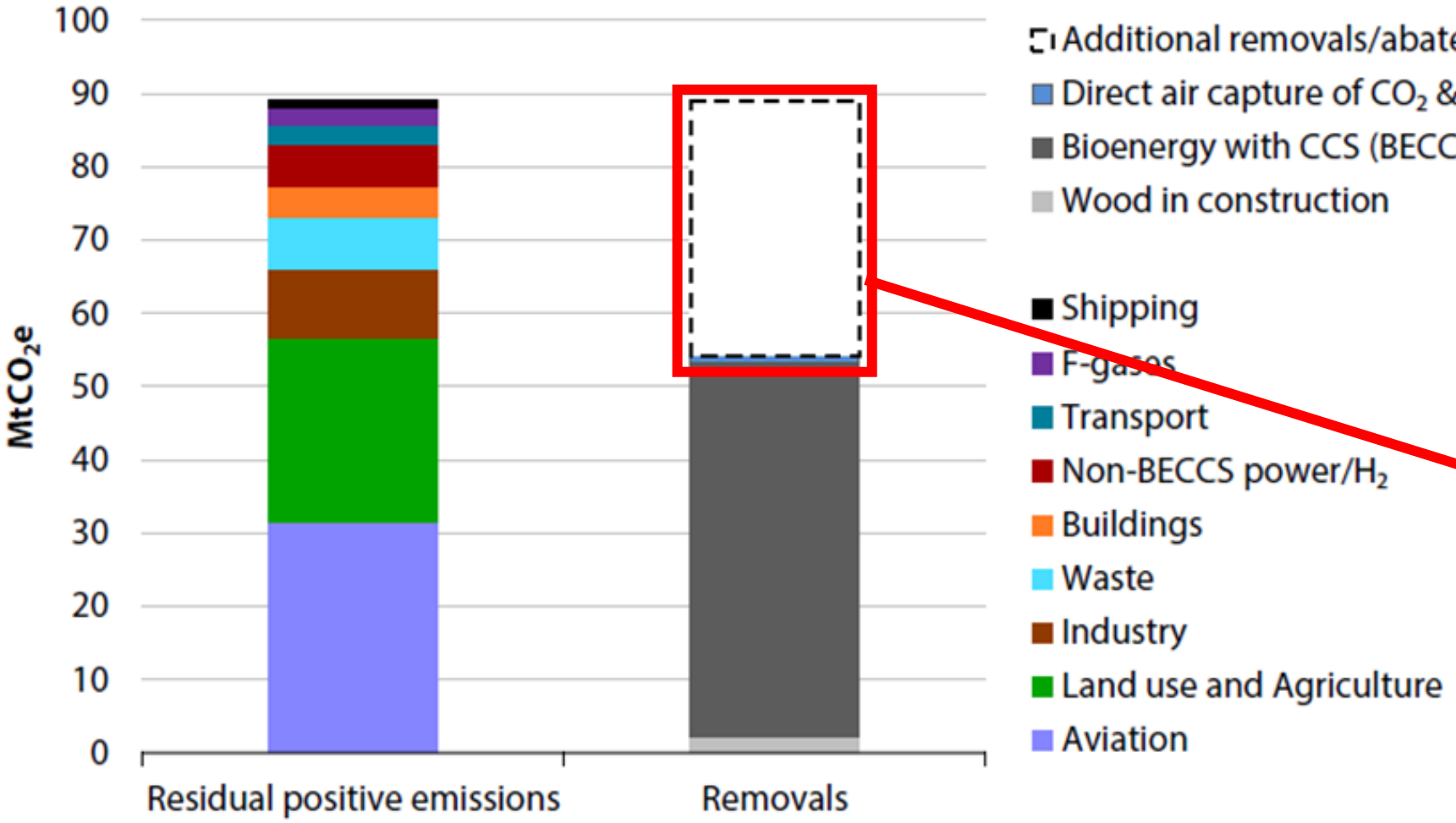
Difficult to reduce GHG in agriculture

No biological process 100% efficient

Food security & production demands

SRDP Farm Advisory Service SRUC AHDB

Soil carbon and climate change



Further efforts needed to reduce/offset GHGs

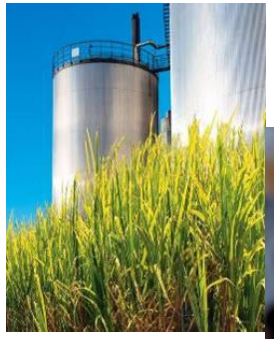
SOILS?

Committee on Climate Change 2020

Soil carbon and climate change mitigation

Suggested management strategies

- Increase soil carbon sequestration *'Biological Negative Emission Strategy'*
- Increase wooded areas. Afforestation, reforestation, agroforestry and silvopasture, hedgerows and riparian zones
- Restoration of peatlands



COP21 (2015) 4 per 1000 initiative: "An annual growth rate of 0.4% in the soil carbon stocks (or 4‰ per year) in the first 30-40 cm of soil,."

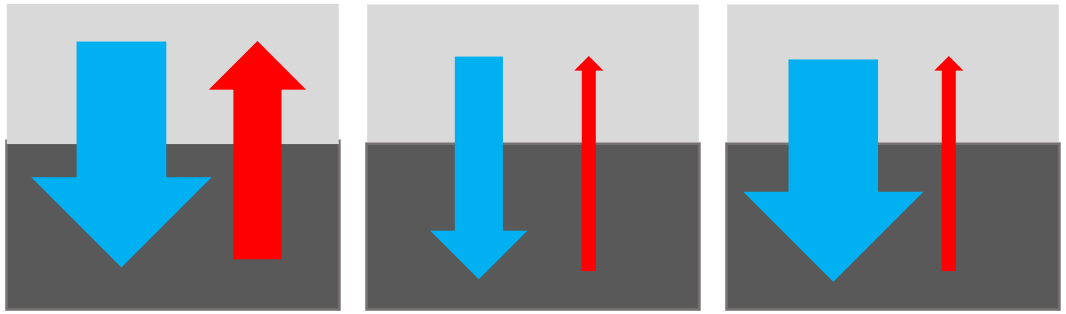
Novel applications

- Biochar
- Bioenergy crops
- Enhanced weathering
- Direct air carbon capture

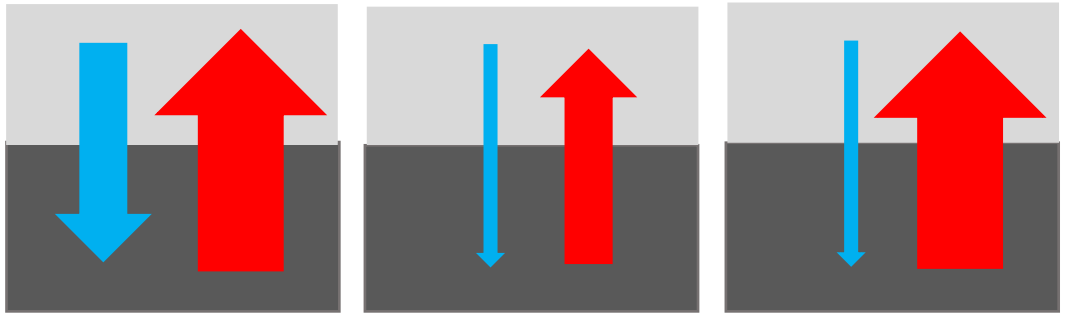
SRDP Farm Advisory Service SRUC AHDB

Soil carbon sequestration

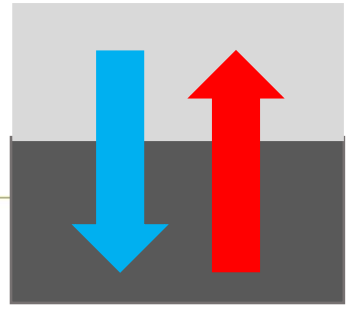
Generally, soil C stocks can be increased by:
(a) increased rate of C addition, which removes CO_2 from the atmosphere, and/or
(b) reducing the relative rate of loss (as CO_2) via decomposition, which reduces emissions to the atmosphere that would otherwise occur.



CARBON SINK
Net gain in soil C stock
C inputs > C outputs



CARBON SOURCE
Net loss of soil C stock
C outputs > C inputs

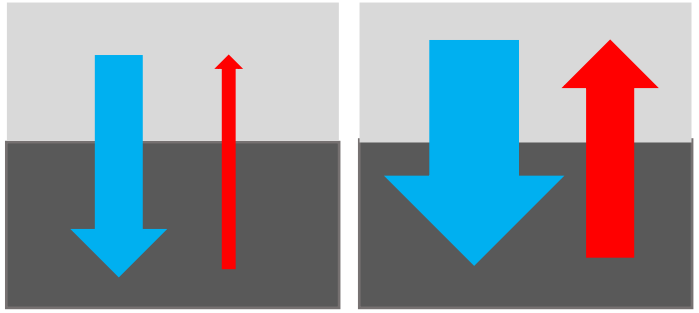


EQUILIBRIUM
No change in soil C
C inputs = C outputs

Soil carbon sequestration

Management practice	Increased C inputs	Reduced C losses
Improved crop rotations and increased crop residues	✓	
Cover crops	✓	
Conversion to perennial grasses and legumes	✓	✓
Manure and compost addition	✓	
No-tillage and other conservation tillage		✓
Rewetting organic (i.e., peat and muck) soils		✓
Improved grazing land management	✓	

Paustian et al 2019 Front. Clim



CARBON SINK

Net gain in soil C stock

C inputs > C outputs

Soil carbon sequestration potential

However……

- What is our baseline?
- Pattern of soil C gains or losses - depend on soil, properties, climatic regimes and management practices applied.
- Soil C balance is governed by biotic processes - changes in management that lead to C gains are potentially reversible

Compounding factors controlling C sequestration & storage. Difficult to control, isolate, quantify and predict C changes

How much more C can be realistically stored?

- Practices leading to increased C inputs and/or decreased decomposition rate – potentially lead to new equilibrium of soil C stocks
- Mineral soils (i.e., non-peat soils) have an upper limit or “saturation level” of soil C

What are the implications for other nutrients and GHG emissions associated with land management?

What is the true long-term contribution of soil management tin climate change mitigation?

How does this translate into action – future policy, regulation, and private investment schemes (C markets)?

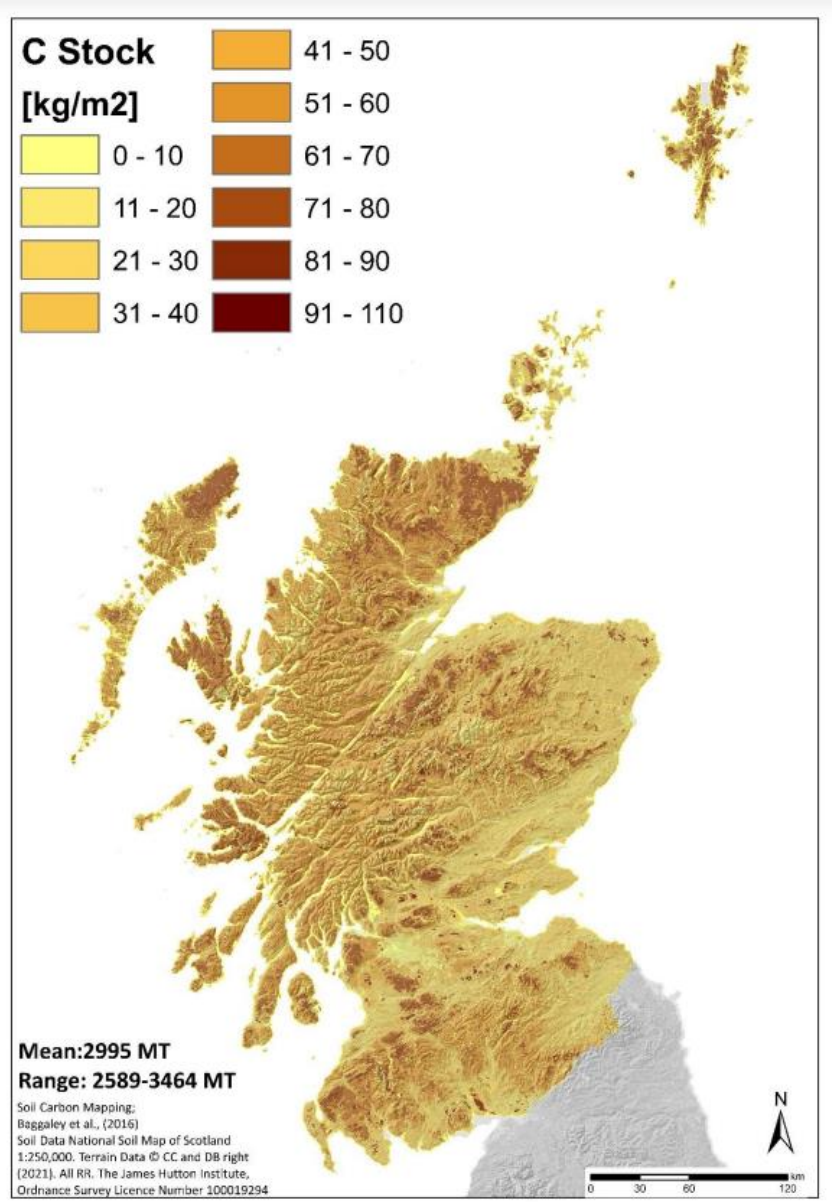
Can we store more carbon in Scottish soils?

SOC stock (100cm)
= approx. 3000 Mt C

Only land cover type to show an increase in soil organic carbon stocks was woodland

Land cover	t C / ha
Arable	112
Improved grassland	138
Semi-improved grassland	185
Woodland	268
Moorland	291
Peatland/bog	528

No statistical change for arable, improved grassland, semi-natural grassland, moorland and bog.



Lilly & Baggaley 2021 Scoping study to identify current soil organic carbon stocks and the potential for increasing carbon sequestration in Scottish soils

Can we store more carbon in Scottish soils?

Scottish soils generally have high soil organic carbon contents

Lilly & Baggaley 2021

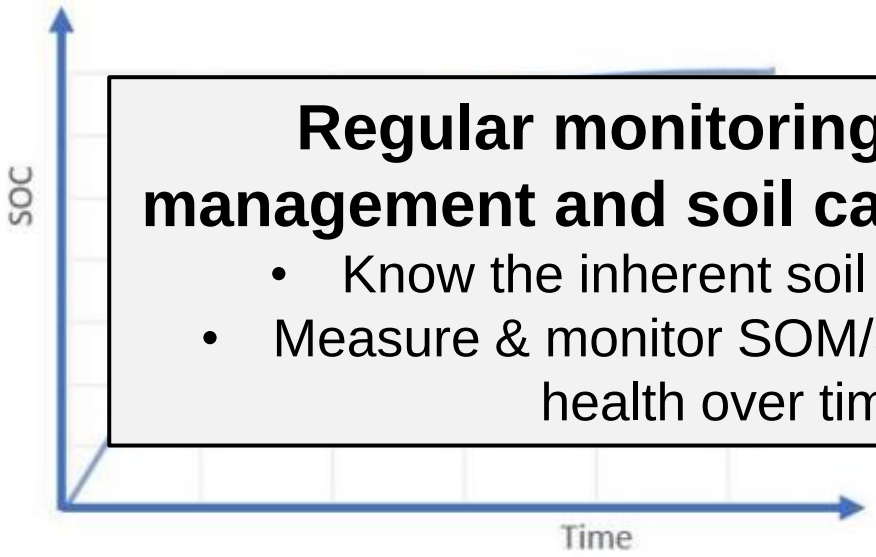
Sequestration potential:

- 60 Mt C Scottish grassland topsoils
- 88 Mt C Scottish arable topsoils

Future loss risk:

- 112 Mt C of stored soils organic carbon

Annual rate of carbon accumulation declines as concentrations increase



Regular monitoring of soil management and soil carbon stocks

- Know the inherent soil properties
- Measure & monitor SOM/SOC and soil health over time

Equilibrium / saturation?

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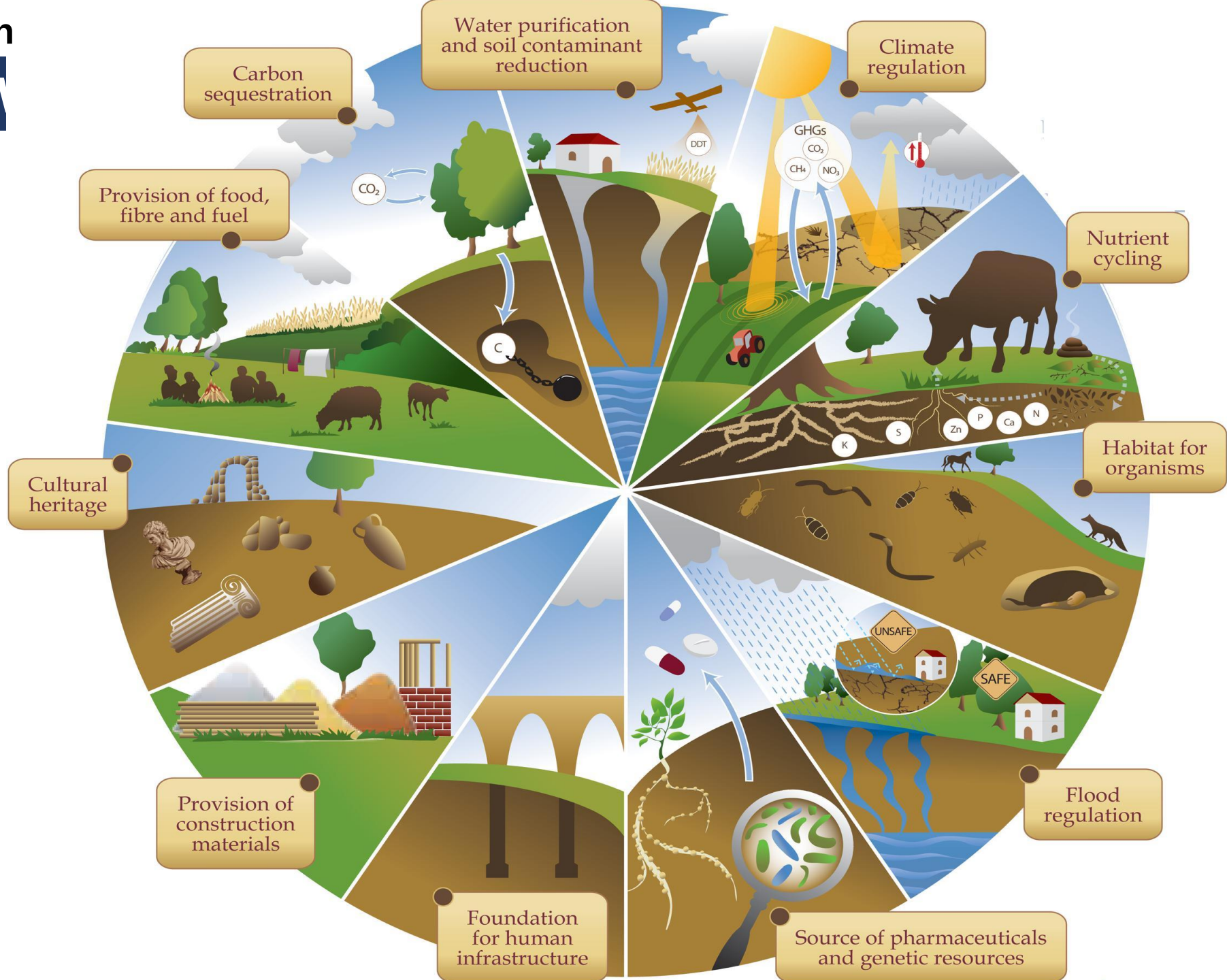
Fundamentals of soil carbon

Soil carbon is just <u>ONE</u> indicator of good soil health

Holistic view:

- Conservation of SOM
- Overall soil health for resilience & sustainable food production

- Contribution to wider ecosystem functions: *(Flood management, ecosystem biodiversity)*



Soil carbon sequestration

Take home messages

1. Complex and varied systems

- Mechanisms of litter decomposition, SOM turnover and carbon retention (storage) are complex
- Difficult to measure and monitor (particularly over time!)
- Spatial variability: Land use, soil type, climate, management
- Soil carbon stores can be lost quicker than it can be replaced

2. Holistic view

- Soil C is just one parameter of soil health
- Wider focus on enhancing SOM for overall soil & ecosystem health and co-benefits

3. More soil data and knowledge!

- Measure/monitor soil C stocks over time alongside management practices
- Relate to business needs to match management practices that promote soil health alongside profitability

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Thank you

Enhancing biodiversity: Arable

Arable Roadshows: January 2023

Dr Lorna Cole

Senior Ecologist

SAC Consulting

What are the inputs and how can we optimise them?

Farm Advisory Service
SRUC
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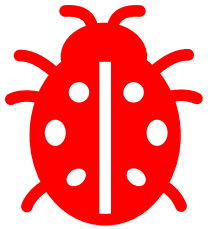
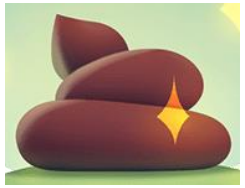
What are the inputs and how can we optimise them?

CO_2





What are the inputs and how can we optimise them?

CO_2

Free inputs!
Agroecology?
Regenerative Agriculture?
Farming with Nature?

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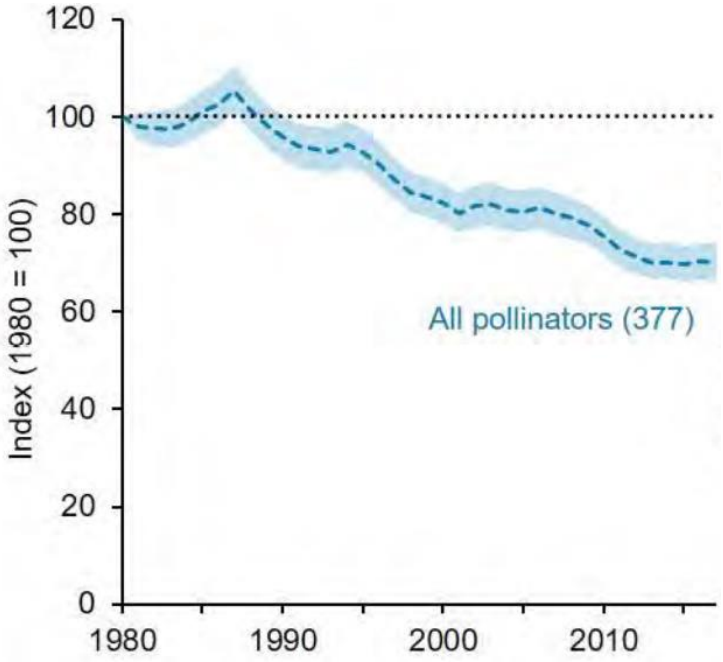
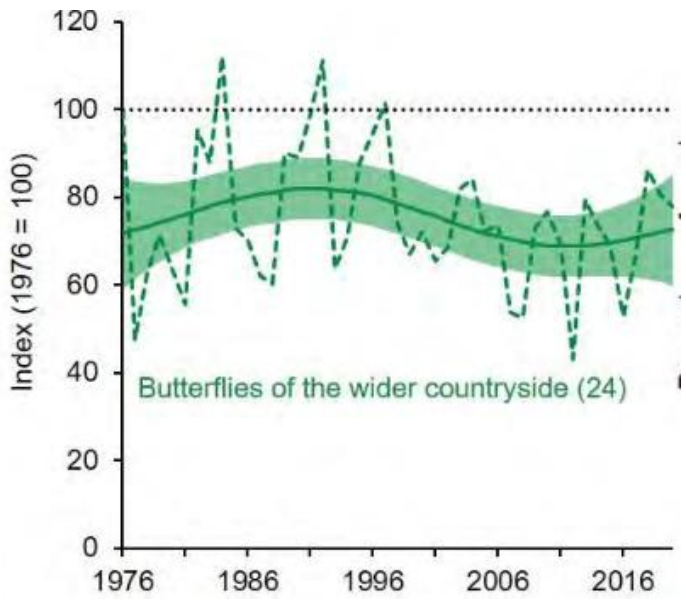
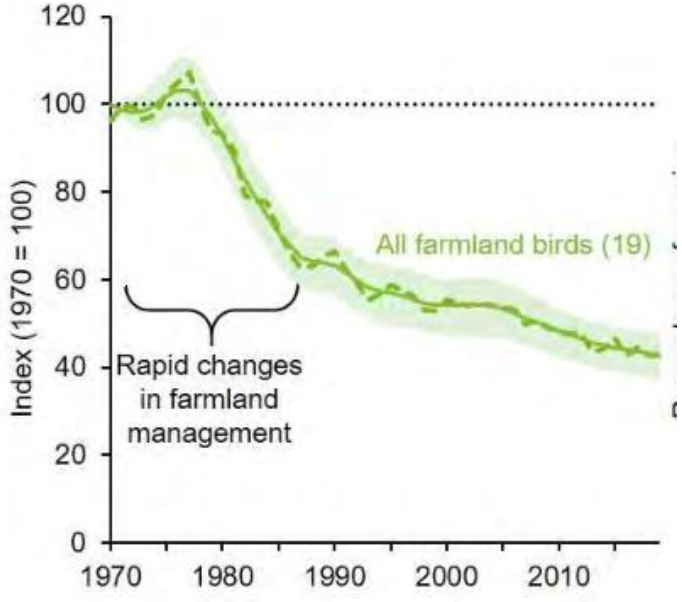
Biodiversity Crisis



Pollinators



Butterflies of the wider countryside



Farmland birds

Drivers of decline

Negative Drivers

Intensive agriculture
Loss of semi-natural habitats
Urbanisation
Parasites and pathogens
Invasive species
Climate change

Voluntary initiatives
IPM
Innovation
Diversification
Certification
Policy
- AECS
- Compliance

Positive Drivers

National Library of Scotland
Leabharlann Nàiseanta na h-Alba

Map images

Map Finder | Explore Georeferenced Maps | Side by Side

Swipe OFF | Swipe ON

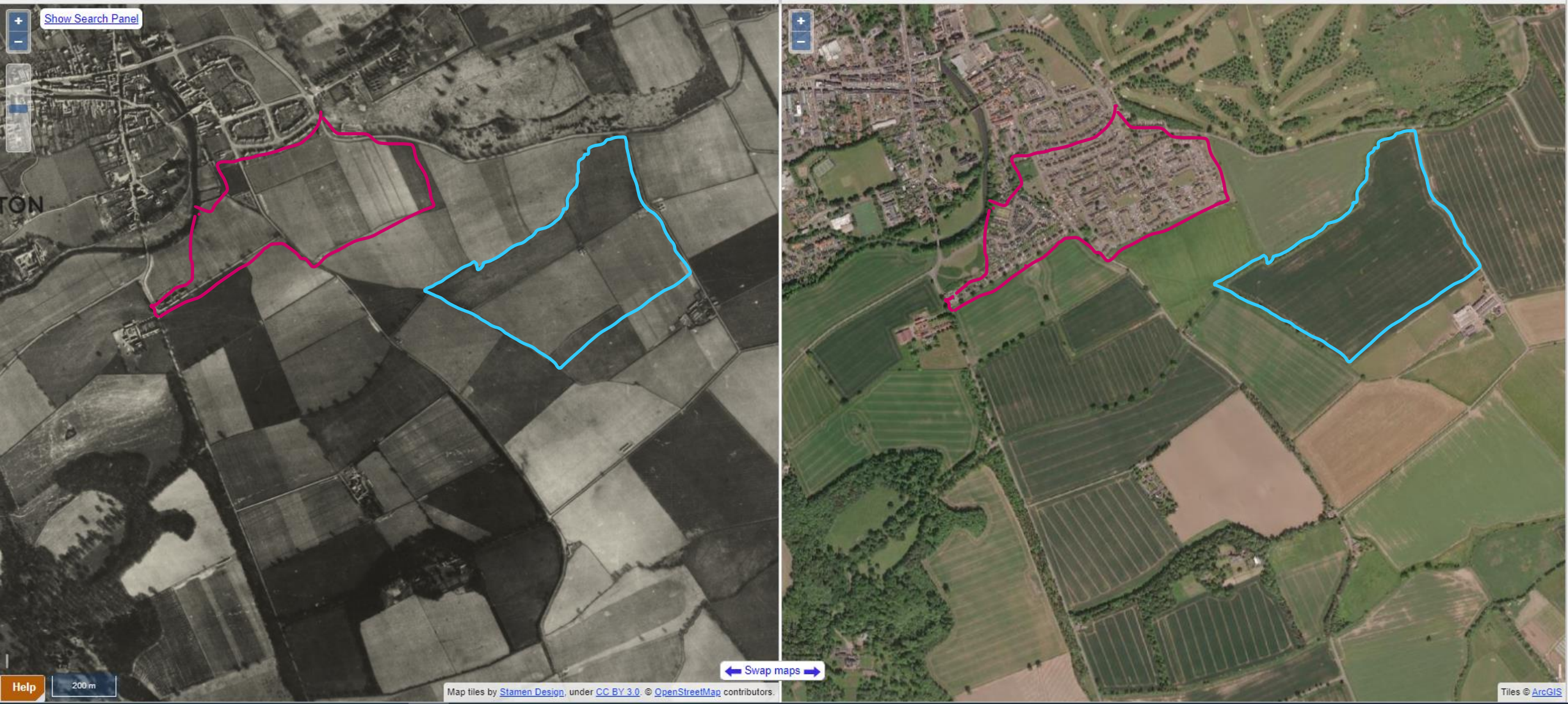
Search:

1. Select a category: Great Britain
2. Select a map series: OS 1:10,560 Air Photos, 1944-1950

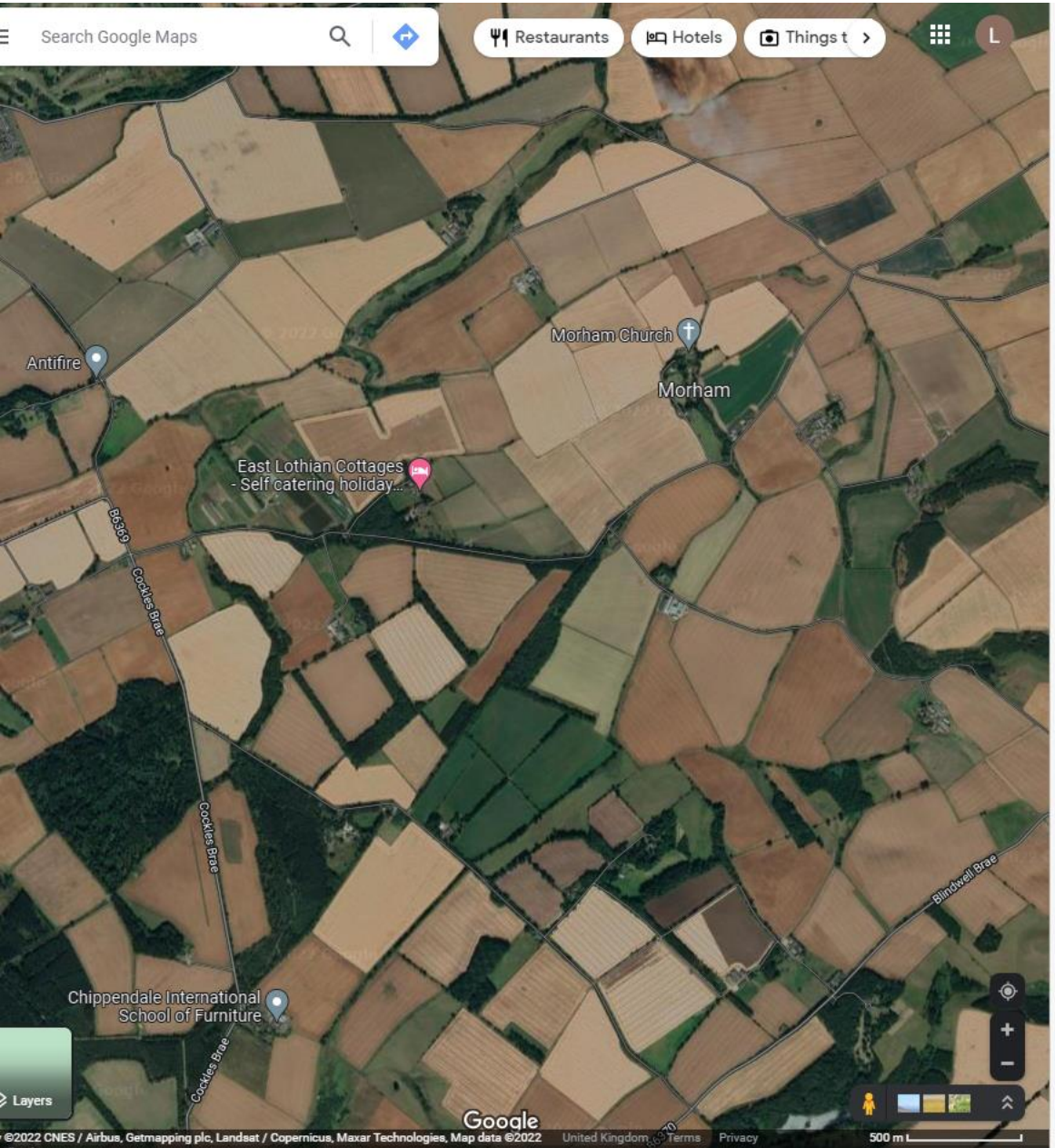
Only show maps with more detail than the current zoom level - (15)
Zoom to extent

1. Select a category: Bing / ESRI / OSM / LiDAR
2. Select a map series: ESRI World Imagery

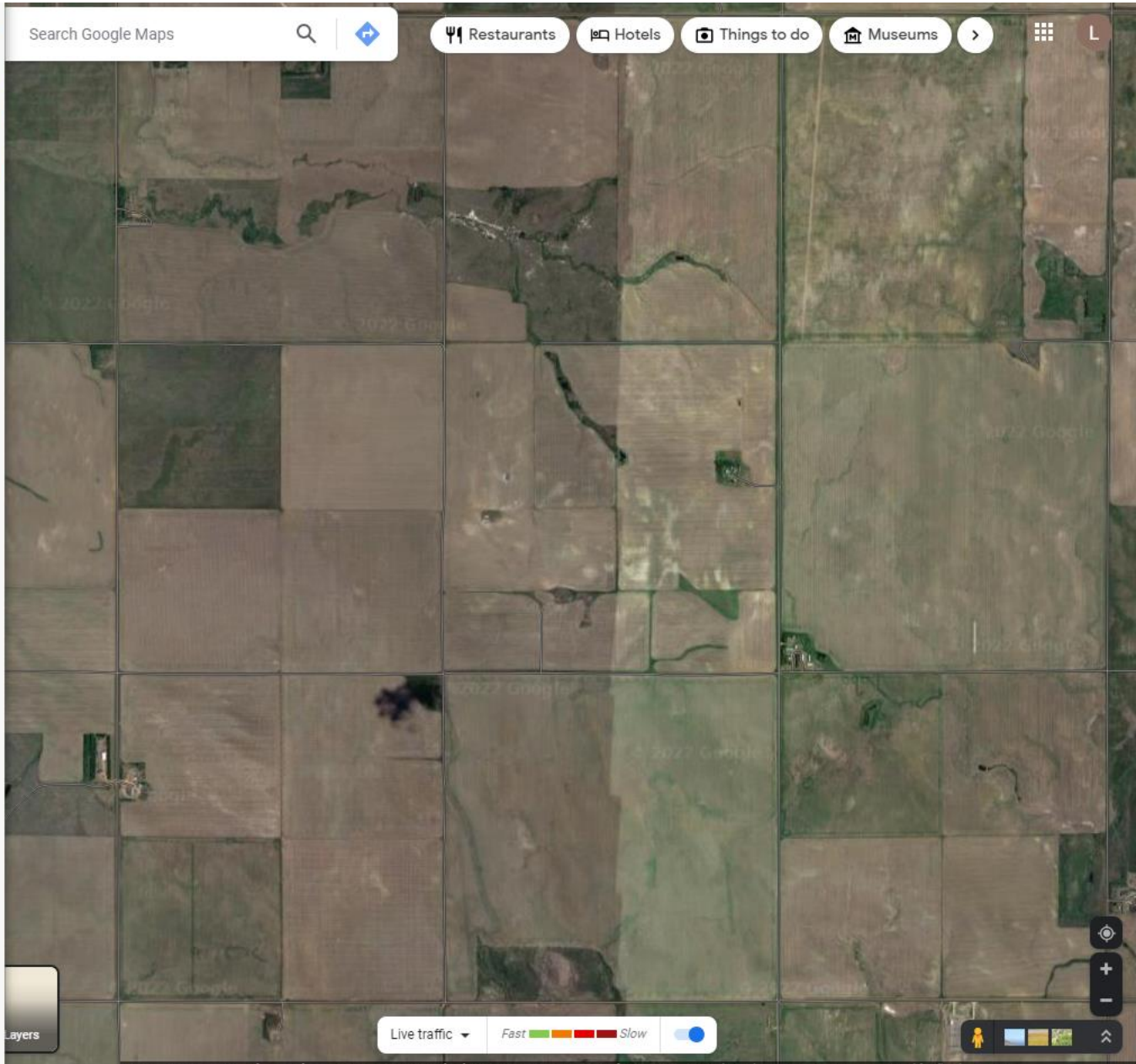
Only show maps with more detail than the current zoom level - (15)
Zoom to extent



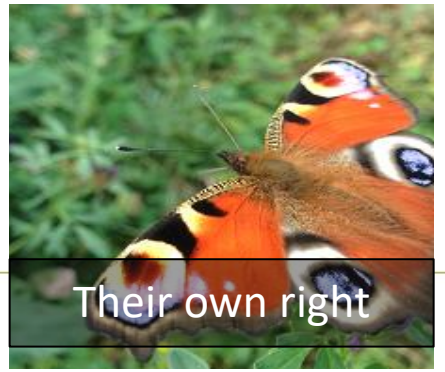
East Lothian



North Dakota



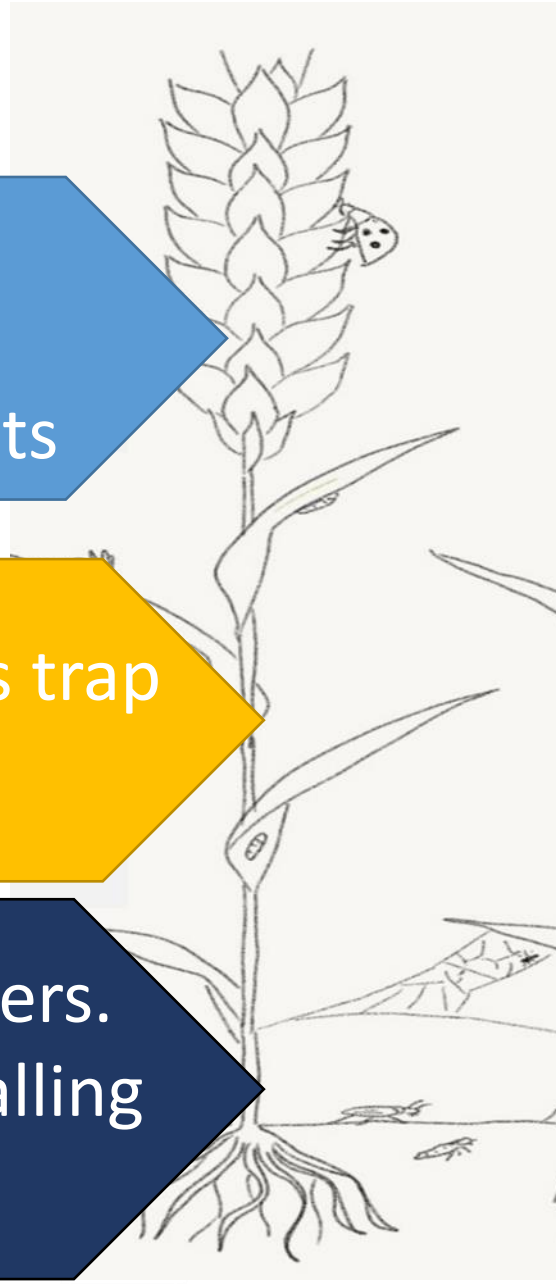
Biodiversity: What is it good for?

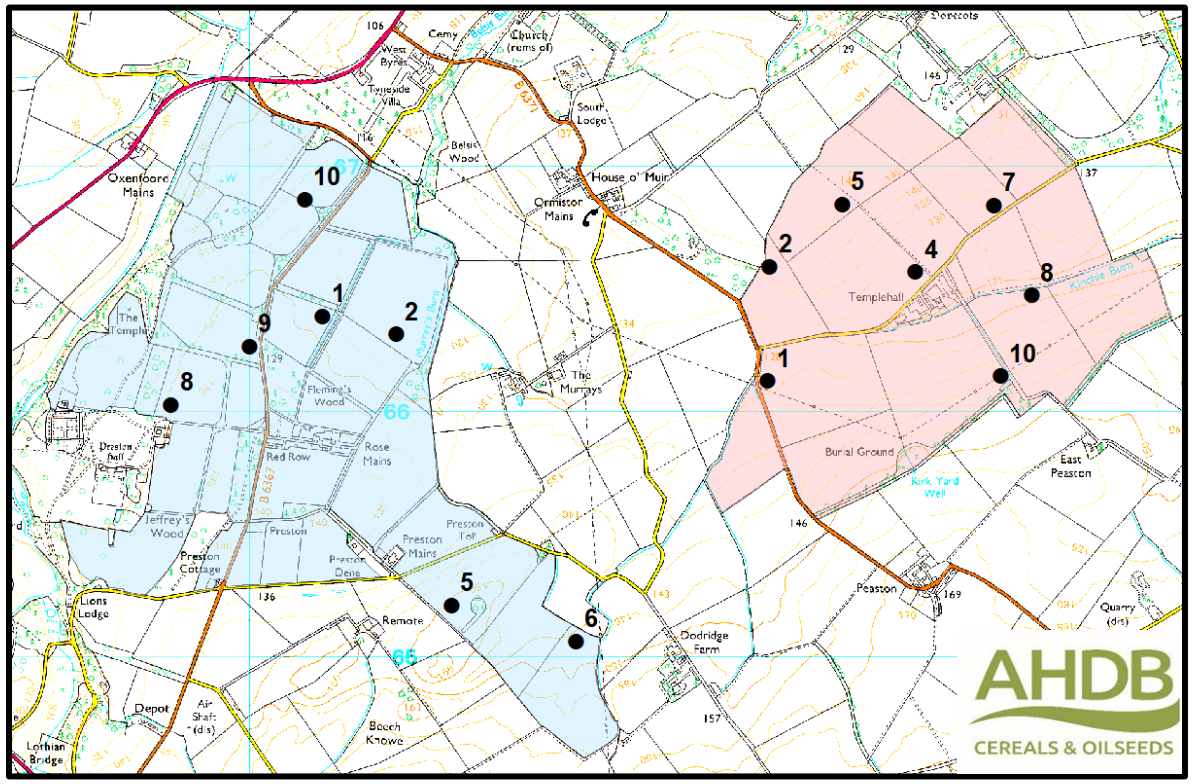


Ladybirds
Parasitic wasps
Feed on crop canopy pests

Money spiders' sheet webs trap falling prey

Ground beetles, wolf spiders.
Feeding on slugs, pupae, falling canopy pests





Environmental improvement

Business as usual

Does improving environmental performance increase natural enemies?

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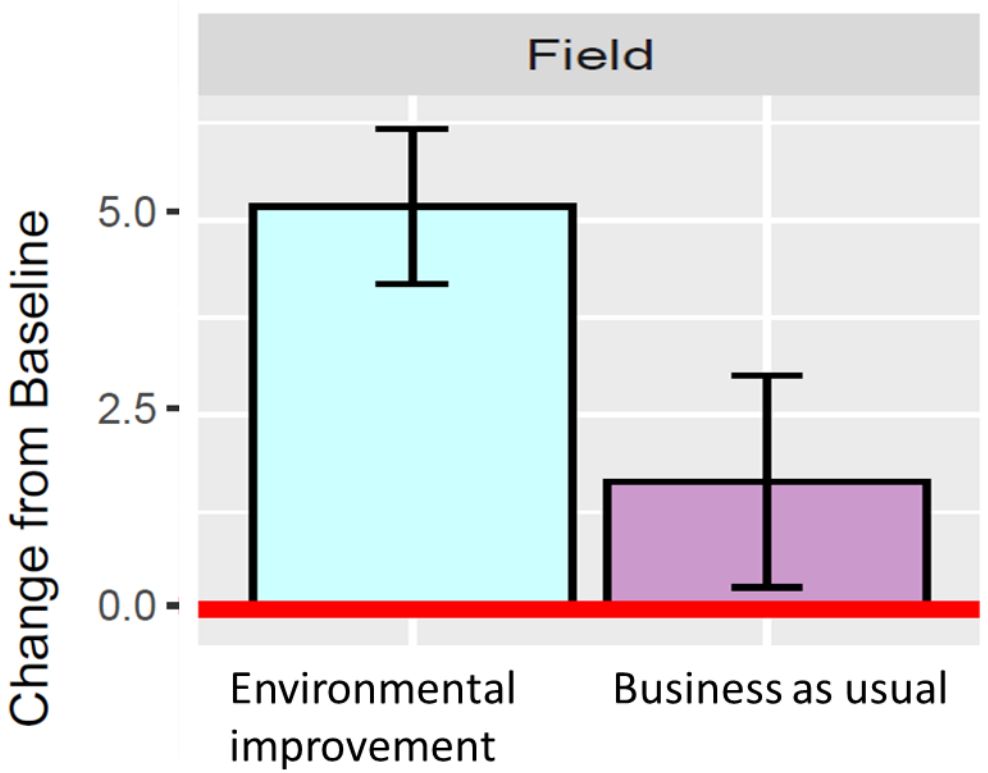
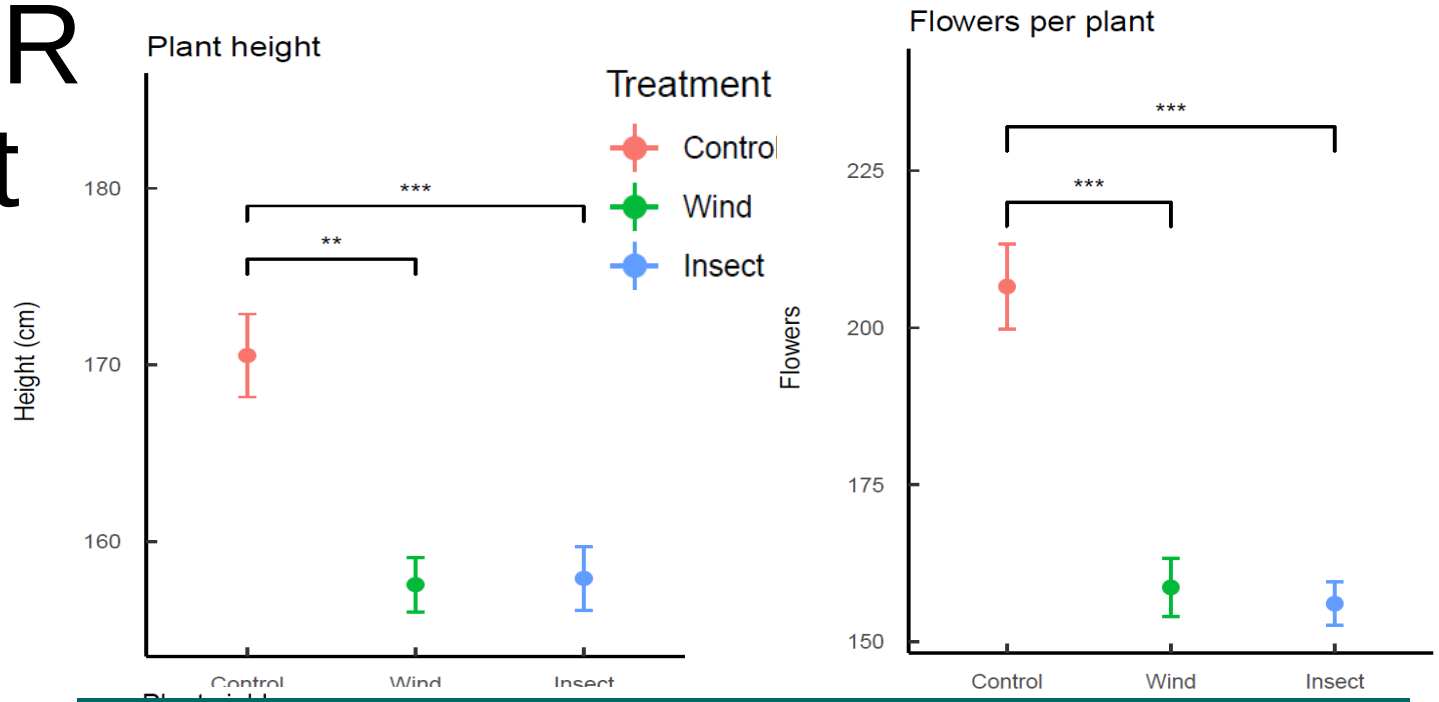
Natural enemy predation rate

Monitored the number of aphids eaten by predators Baseline 202

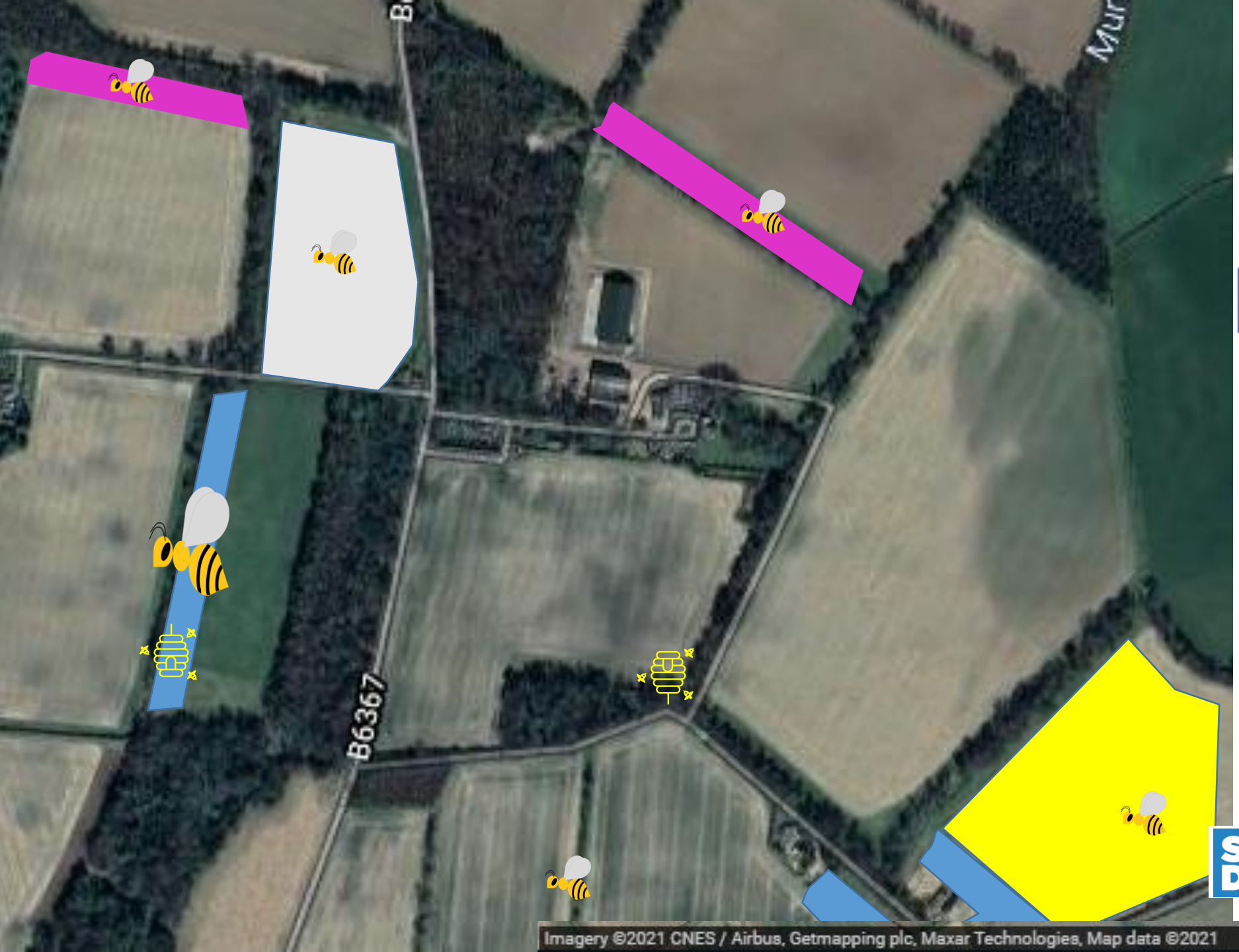


Pollination: OSR
Stace Fairhurst

- Insect pollination
- Wind
- Control (not disturbed)



- Plants show early warnings of pollination deficits
- Wind and pollinators complement each other
  - Different weather
  - Parts of the crop
- Stace is not a bee!



MIND THE GAP

- Tussocky grass
- Field beans
- Oilseed rape
- Wildflower margin

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SRUC

AHDB CEREALS & OILSEEDS

Diverse landscapes

- Provides all resources species need
- Supports more species
- Landscape scale initiatives

Land is finite

- Innovation
  - Efficient use of resources
    - Agrochemicals
    - Land
  - Optimise yield - sustainably

Optimise habitat quality

- Optimise benefits from land taken out of production
- Outcome based AECS payments

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INSPIRE Innovate INTEGRATE

SRDP Farm Advisory Service

The Scottish Government
Riaghaltas na h-Alba

National Advice Hub
T: 0300 323 0161
E: advice@fas.scot
W: www.fas.scot

McGregor FARMS

Tom Hoggan : Colin McGregor : David Fuller

AHDB Scottish Roadshows January 2023

McGregor FARMS

Who are McGregor Farms ?

- Contract Farmers based in Scottish Borders
- Total Farmed Area 3446 ha
- Core Family Business of 304 ha
- Contract Farming 3142 ha – 15 separate businesses
- 15 mile operating radius from Coldstream Mains
- 5 Full-time + placement student (+2 Part-time) employees
- Management Team – Colin & Jill McGregor, Farm Manager & Assistant Manager
- In-house CFA Accounts & Agronomy

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McGregor Farms – Cropping 2023

• Winter Wheat	1635 ha
• Winter Barley	243 ha
• Spring Barley	162 ha
• Oilseed Rape	763 ha
• Spring Oats	31 ha
• Spring Beans	16 ha
• Potatoes	204 ha
• Vining Peas	392 ha

Vining Peas & Potatoes : 1 in 8 year rotation

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Investment : Machinery

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Commercial CTF – Controlled Traffic Farming

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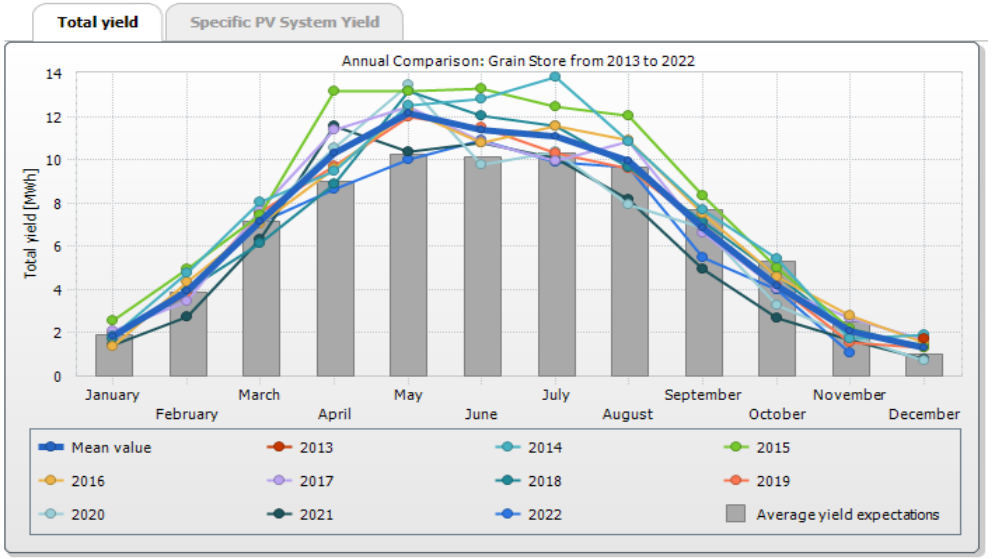
Self-Storage & PV Panels



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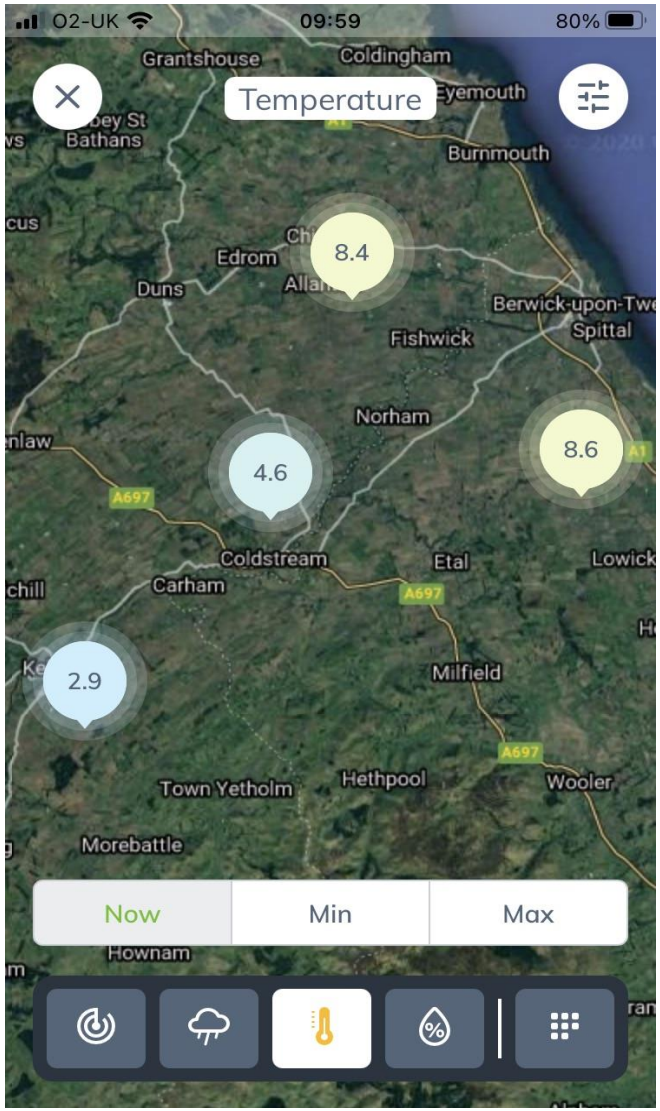
Challenges !



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2023 TRIALS :

- Frontier WW Demo Site
- BAYER Fieldview Assessment & PriDiMa
- BAYER OSR Field Scale Trials
- Agrii WW Variety Trials
- Mercury Crop Yield & Carbon Forecasting
- YEN WW & OSR

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Precision Farming Technologies used :

- Variable Application of P, K, Lime
- VR Seed Drilling
- Variable Targeted Application of Nitrogen
- Greenstar RTK Steering Systems
- Auto shut off- sprayers, drills, spreaders
- Sprayer Boom Levelling & PWM (Pulse Width Modulation)
- Yield Mapping
- Machinery Telematics
- Office to Machine Connectivity

JOHN DEERE Precision Ag Technology

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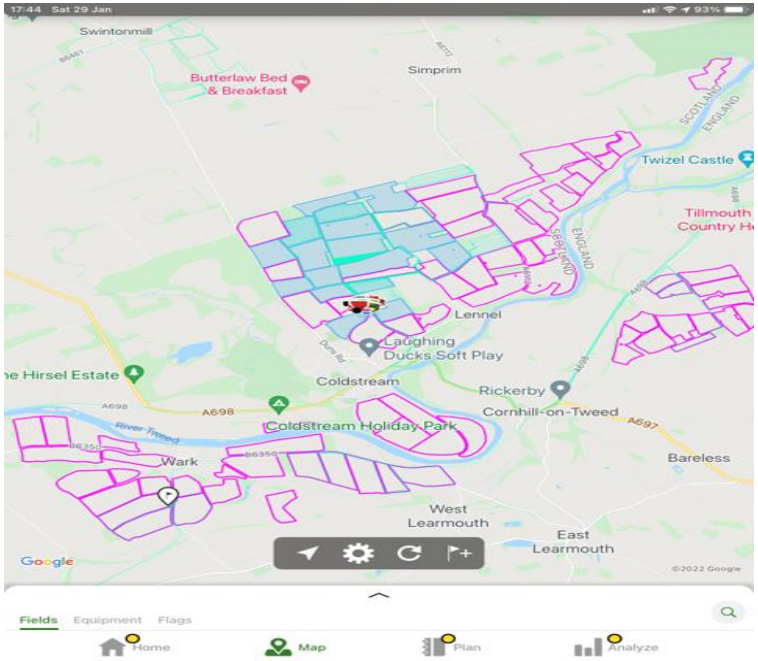
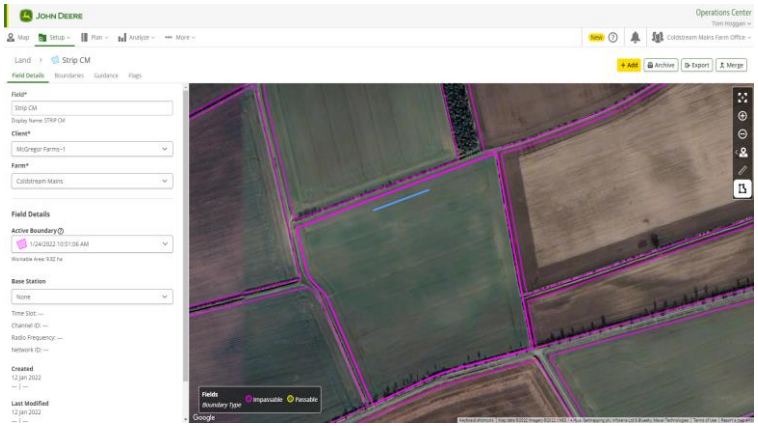
JD Operation Centre & Greenstar

- 10 Greenstar RTK steering systems
- All fields mapped = Electronic field boundaries & fixed guidance lines- CTF
- Tramlines in the same place year on year +/-2.5cm
- Yield Mapping
- Machine to office connectivity- Data analysis, machinery performance and location



JD Greenstar Benefits

- Utilising full width of implements
- Guidance lines and tramlines +/-2.5cm
  - CTF
  - Reduces compaction
  - Improves crop establishment
- Electronic Boundaries
  - Headland steering
  - Drill Headlands inside out
  - Auto Shut off
  - Spray body of field first > efficacy
- Variable Rate Applications
- Yield Mapping
- Data Analysis
  - As applied maps
  - Unproductive areas of land
- Operator fatigue
- ROI?- Time saving, less passes, reduced input use



JD Greenstar Challenges

- Getting used to how the system operates
- Time- Mapping fields takes time and man power = £
- Getting the Team on board

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Yield Map From JD Operations Centre

2022 RAPE SEED (EUROPE OIL) HARVEST: YIELD (WEIGHT)

View in Analyze

Haig Hill LH

McGregor Farms~1 | Lennel Farming

Start	27 Jul, 2022 17:28
End	27 Jul, 2022 20:37

WORK TOTALS

Area Harvested	23.7 ha
Yield	5.1 t/ha
Total Yield	120 t
Moisture	9.5 %
Wet Weight	5.1 t/ha
Total Wet Weight	121 t

PERFORMANCE

Speed	4.1 km/hr
Productivity	4.8 ha/hr
Working Time	4 hrs 59 mins
Throughput (Dry)	24.1 t/hr
Throughput (Wet)	24,342.2 kg/hr

VARIETIES

EQUIPMENT

1234567891011 1234567891011

Edit

Delete

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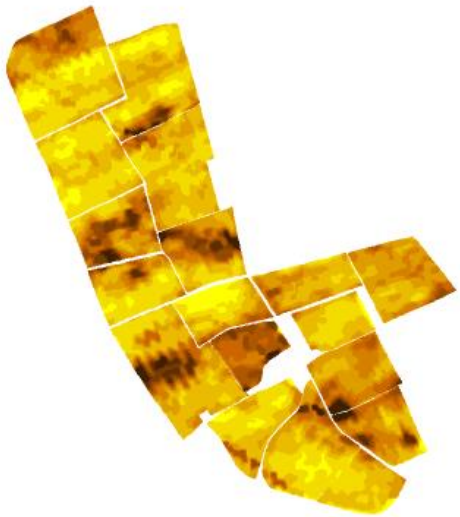
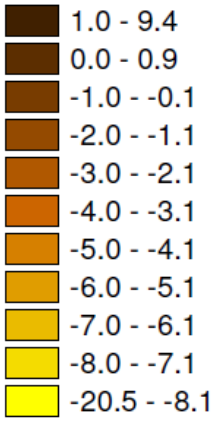
SOYL- Soil Conductivity Mapping

- Soils are scanned with conductivity scanner
- Variation is due to soil type and water holding capacity
- Soil zones then ‘truthed’
- Electronic boundaries are created around zones
- Creates VR drilling plan
- Cost: C.£12.50/ha





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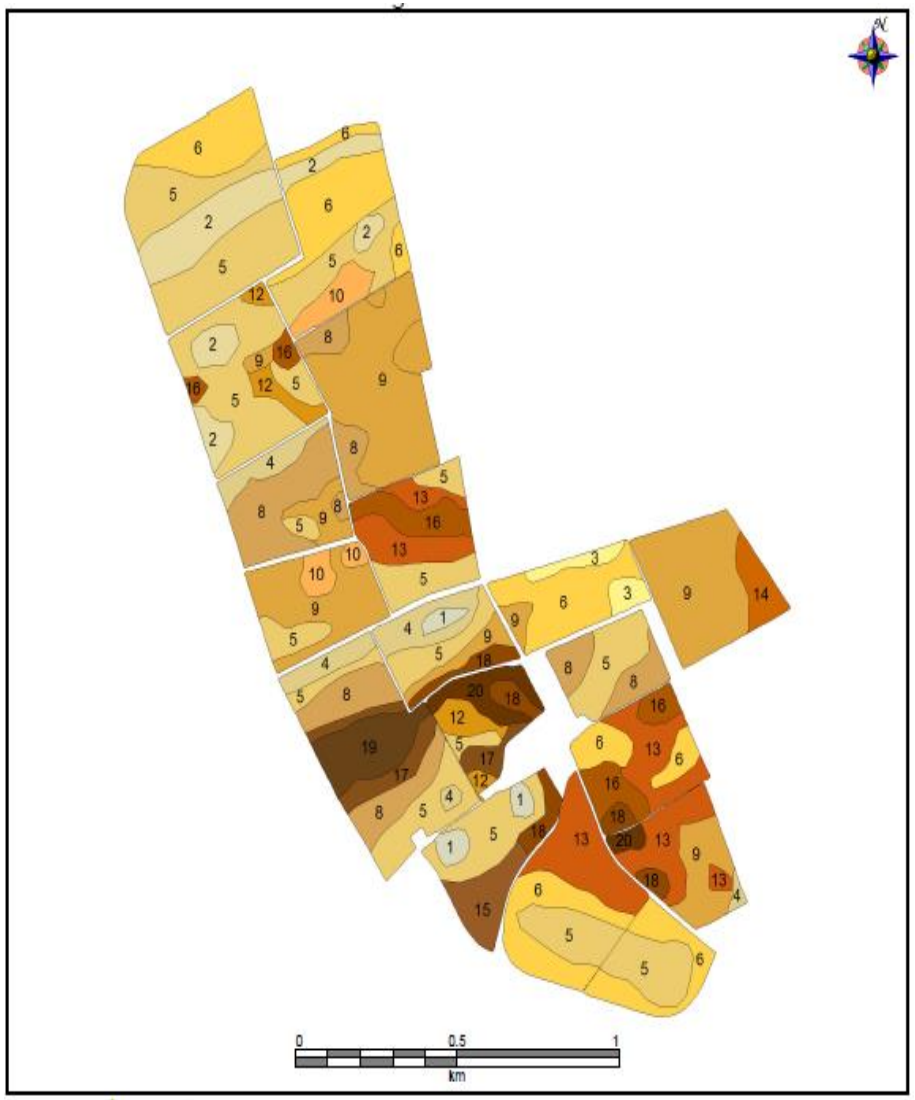

- 20 heavy loamy
- 19 heavy loamy & stoney
- 18 med/heavy loamy
- 17 med/heavy loamy & stoney
- 16 med/heavy sandy
- 15 med/heavy sandy & stoney
- 14 medium & stoneless
- 13 medium & slightly stoney
- 12 medium & stoney
- 11 light/med silty
- 10 light/med & stoneless
- 9 light/med & slightly stoney
- 8 light/med & stoney
- 7 light & stoneless
- 6 light & slightly stoney
- 5 light & stoney
- 4 light & very stoney
- 3 very light & slightly stoney
- 2 very light & stoney
- 1 very light & very stoney

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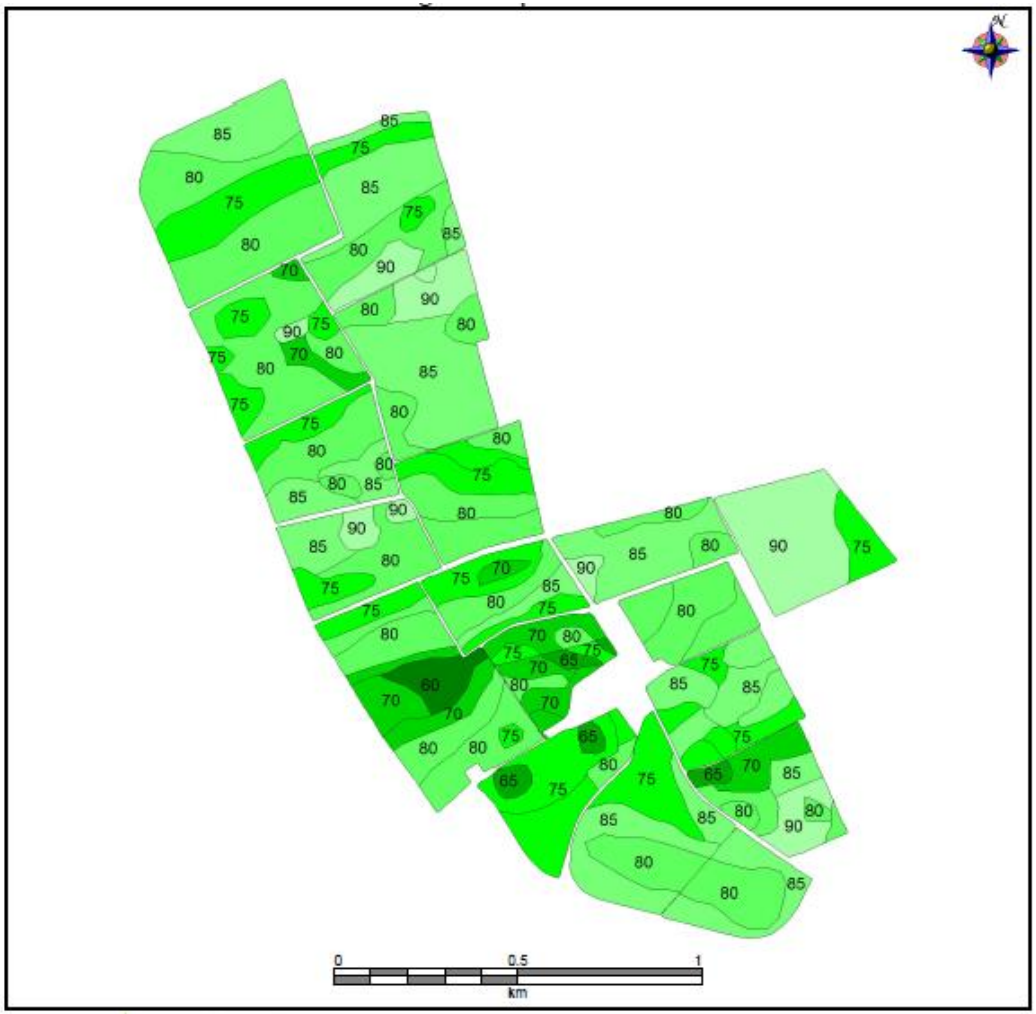
Expected % Establishment



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Why VR Drilling?

- Fields merged over years- now have more variation
- Not relying on operator to change rate- automatic >accuracy
- Achieve a more even plant stand
- Reduce lodging
- Increase output from poorer performing areas
- Makes crop management easier
- Using same amount of seed- varying where necessary
- = Better use of inputs
- Gaining knowledge of fields on unknown farms

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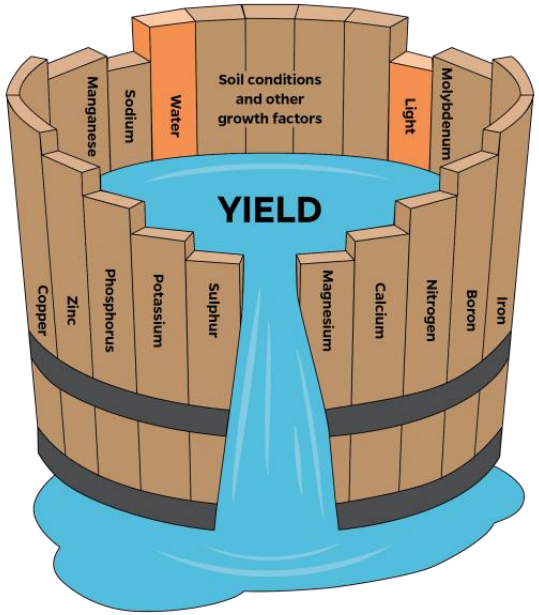
SOYL

SOYL Soil Sampling

- Fields sampled every 4 years P, K Mg, pH & OM
- One sample/ha & 16 sub samples
- GPS Logged
- ~£20/ha = £5/ha/Year + £15/field for OM
- Saving on lime pays for sampling
- Due to soil sampling and variable rate application: 2011-2022 Reduced lime usage ~1.5t/ha = c.£37/ha
- Only applying nutrients where required
- +VE for environment and bottom line



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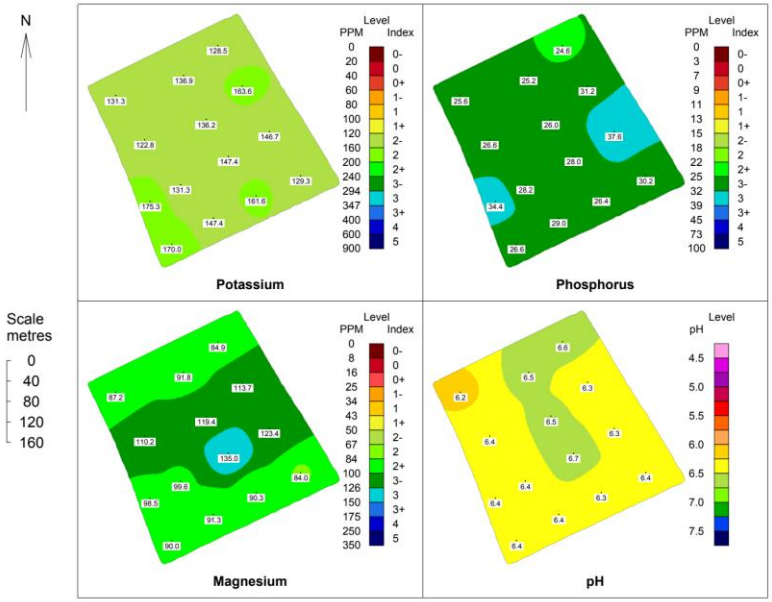
SOYL

Soil Nutrient Level Field Summary

Field Name: **Elbow** Area: **13.63 Ha**



Client:	**J. & I. McGregor (Master)**	Agent:	**SOYL**
Farm:	**Coldstream Mains**	Ref. No.:	**PF1738**
Short Code:	**COLDST-ELBO21**		
Eastings:	**383030**		
Northings:	**641646**	Date Sampled:	**10/08/2021**

Created by SOYL-EQUI SOYL SOYL (c) 2021

SOYL SOILlifeORGANIC MATTER frontier

Client:	J. & I. McGregor (Master)
Farm Name:	Coldstream Mains
Address:	Coldstream Mains
	Coldstream
	Berwickshire
	TD12 4ES
Report Date:	05/10/2021

Soil Organic Matter

Lab Ref. No	Field Name	OM (LOI) % w/w	Index	OM (Dumas) %	Index
522931	Elbow	5.6	Normal	3.8	Normal
524783	Flat Field	5.0	Normal	4.5	Good
524797	Lees A	3.5	Normal	2.2	Low
522932	North Hill	4.1	Normal	2.9	Low
524785	Quarry Park	4.5	Normal	3.3	Normal
524784	South Bank	4.1	Normal	2.8	Low
526292	South Hill	3.8	Normal	2.7	Low

There are a number of methods for analysing OM at the laboratory. The important element is to monitor the OM of soil over time. It is the net changes in OM that should be assessed, particularly making sure that OM levels do not go down. The Dumas method measures the CO2 given off from a soil sample after combusting and is a measure of soil carbon, which is a fixed proportion of organic matter content. The Dumas method is, in our opinion, the more accurate measurement of soil organic matter. LOI (Loss On Ignition) is provided here to allow comparison with previous analysis and for use with benchmarking schemes that use this method.

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N Sensor

- Hire 2x YARA N-Sensors ALS 2 version
- £4750/yr. Each
- Used for all N application since 2009
- Measures light reflectance to determine Chlorophyll & Biomass
- OSR- Absolute N Programme
- Cereals- Target Rate Programme
- Alters N rate much more than an operator would
- Applying optimum amount of N to whole field
- More even canopy- levelling up uneven crops
- Less lodging
- YARA: “Cereal yields increased 3.5%, OSR by 3.9% & N savings of 14%”

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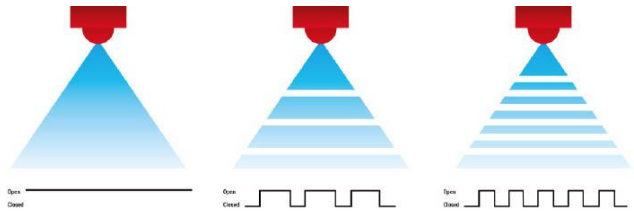
Pulse Width Modulation

agrifac

- Agrifac's 'StrictSprayPlus'
- £20,500 in 2018
- Uses electronic solenoid valves to control pressure and flow rate rather than a diaphragm valve
- Means pressure can be set at a constant
- Faster you travel = more pulsing
- Consistent spray quality
- Individual nozzle control
- Turn compensation
- Spot spraying?
- Nozzles- two sizes up, PWM nozzles

StrictSprayPlus



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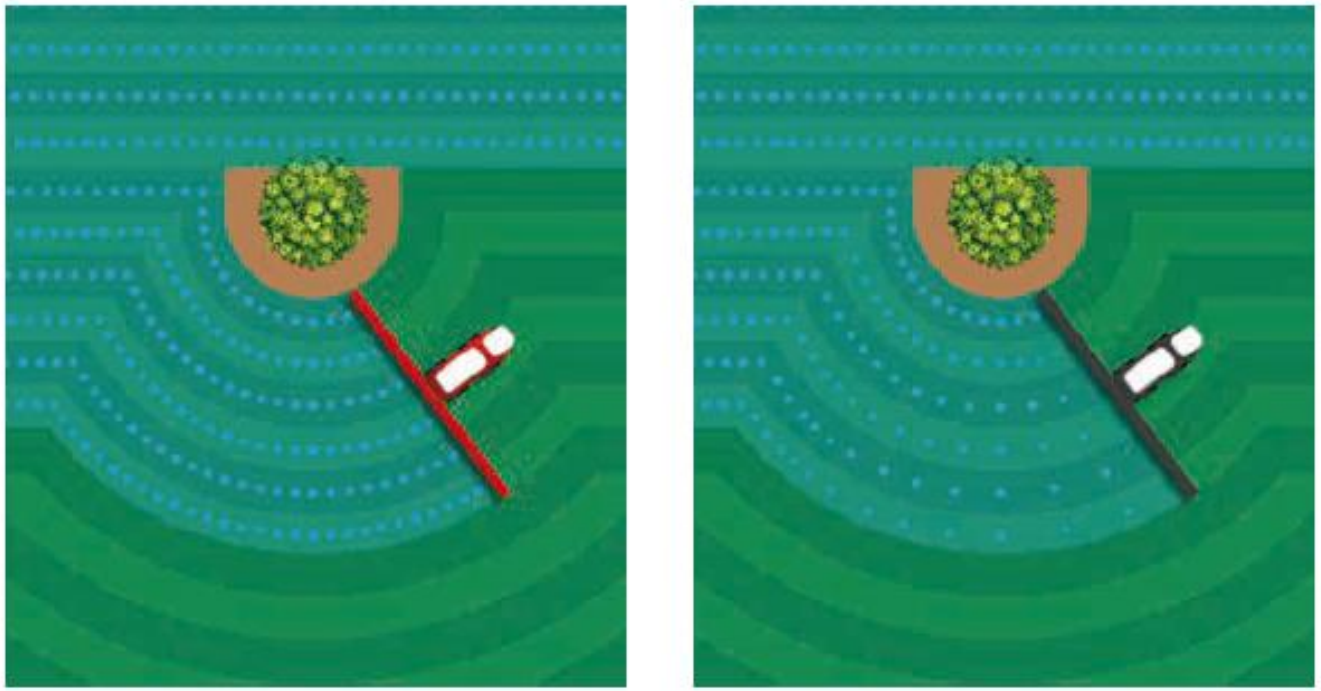
Turn Compensation



Turn compensation ***Agrifac StrictSpray****Plus vs Conventional spraying*

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PWM Benefits

- Improved accuracy
- Better efficacy- Weed & disease control on sweeping corners & consistent spray quality
- Fields spraying out smaller due to individual nozzle control = reduced inputs
- Ability to spray in more adverse weather conditions
- Ability to spot spray in the future

PWM Challenges

- Cost
- Nozzles
- Inability to use air induction nozzles
- However, PWM nozzles are now more common

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Why do we use these PF Technologies?

- Improve efficiency- less passes
- Target inputs to where they are required and reduce input use
- Better accuracy of application
- Improve historically poorer areas of fields
- Offer clients technology they couldn't individually justify
- Operators like using it- makes their life easier, attracts good operators
- Helps to improve the bottom line
- We see it as an investment rather than a cost

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What next ?

- **Spot Spraying?**
  - Technology dependant
  - Green on brown already there
  - Green on green tricky
  - Cost?
- **VR Fungicides and VR PGR**
  - Sprayer capacity?
  - Direct injection? £?

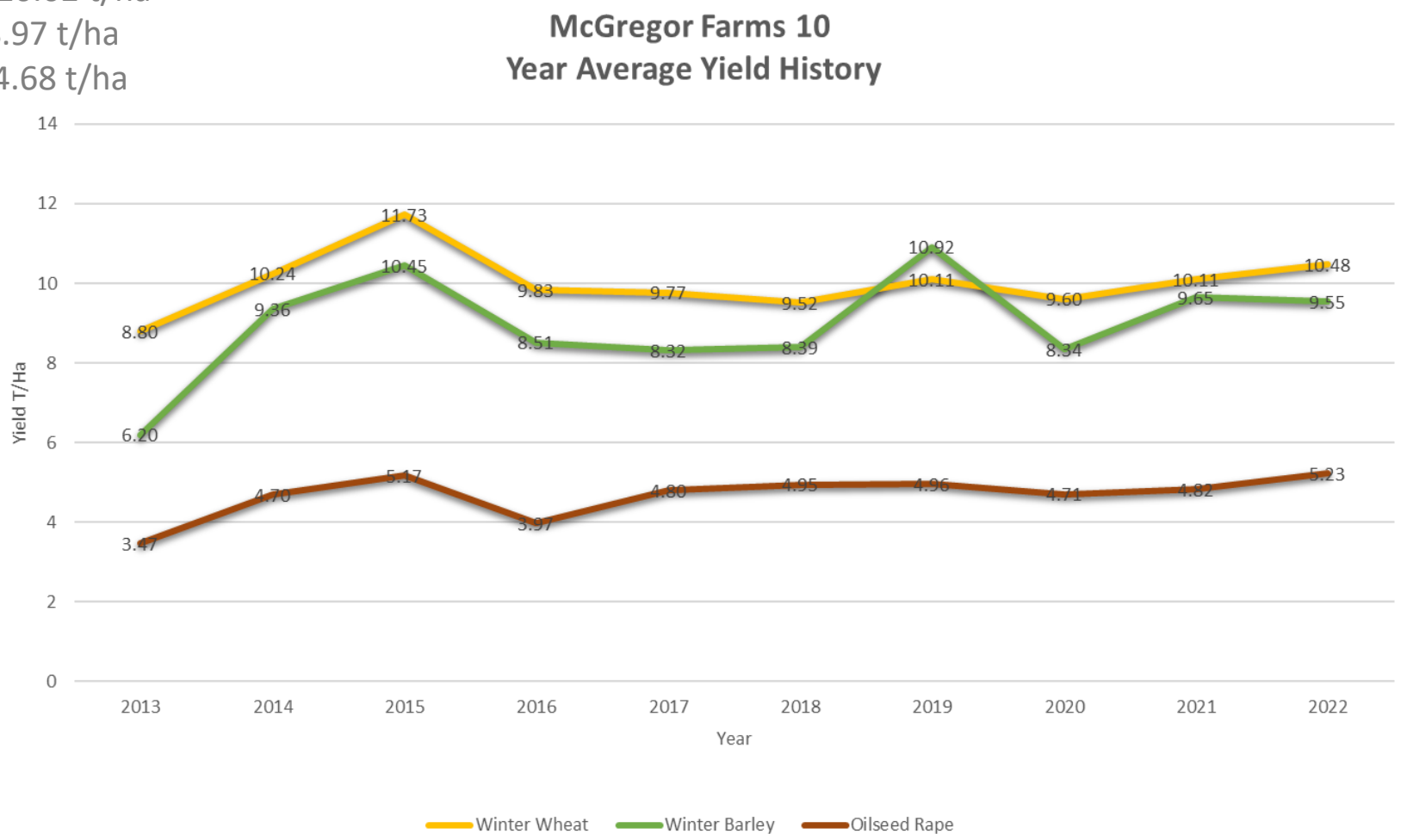
McGregor FARMS

10 Year Average

WW : 10.02 t/ha

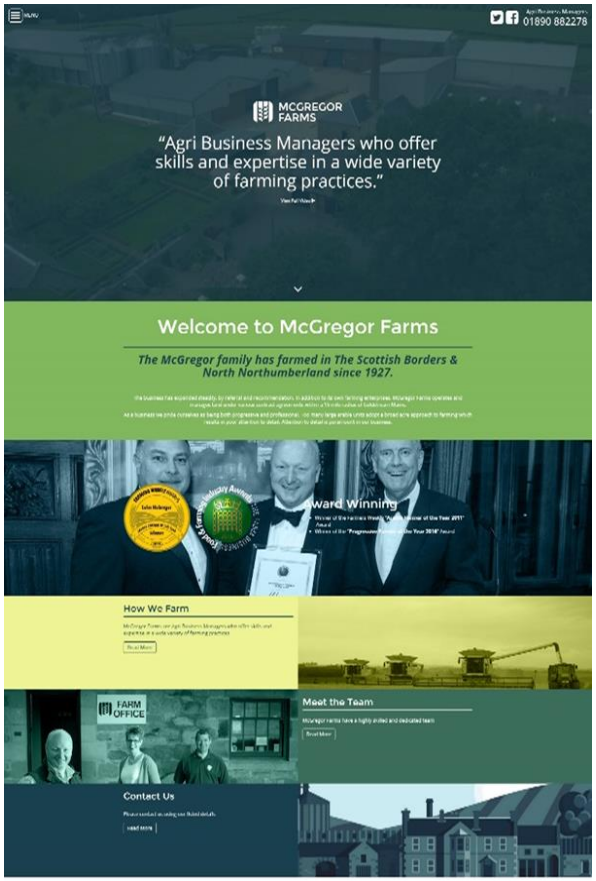
WB : 8.97 t/ha

OSR : 4.68 t/ha



McGregor FARMS

Questions?



NATIONAL ARABLE & GRASSLAND AWARDS 2022

OSR Grower and Grower of The Year 2022

www.mcgregorfarms.co.uk