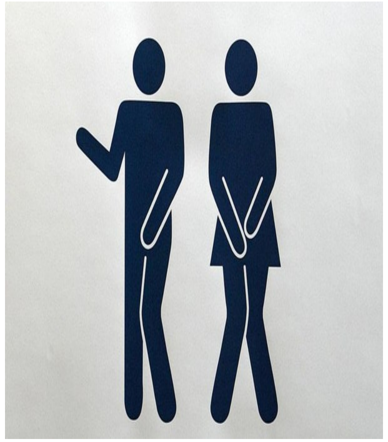

‘Inspiring our farmers, growers
and industry to succeed in a
rapidly changing world’

Housekeeping



@Cereals_NE

@potatoes_north


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

Improving Nitrogen Use Efficiency: Environmental Perspective

Dr. Sajjad Awan

Environment and Resources Scientist

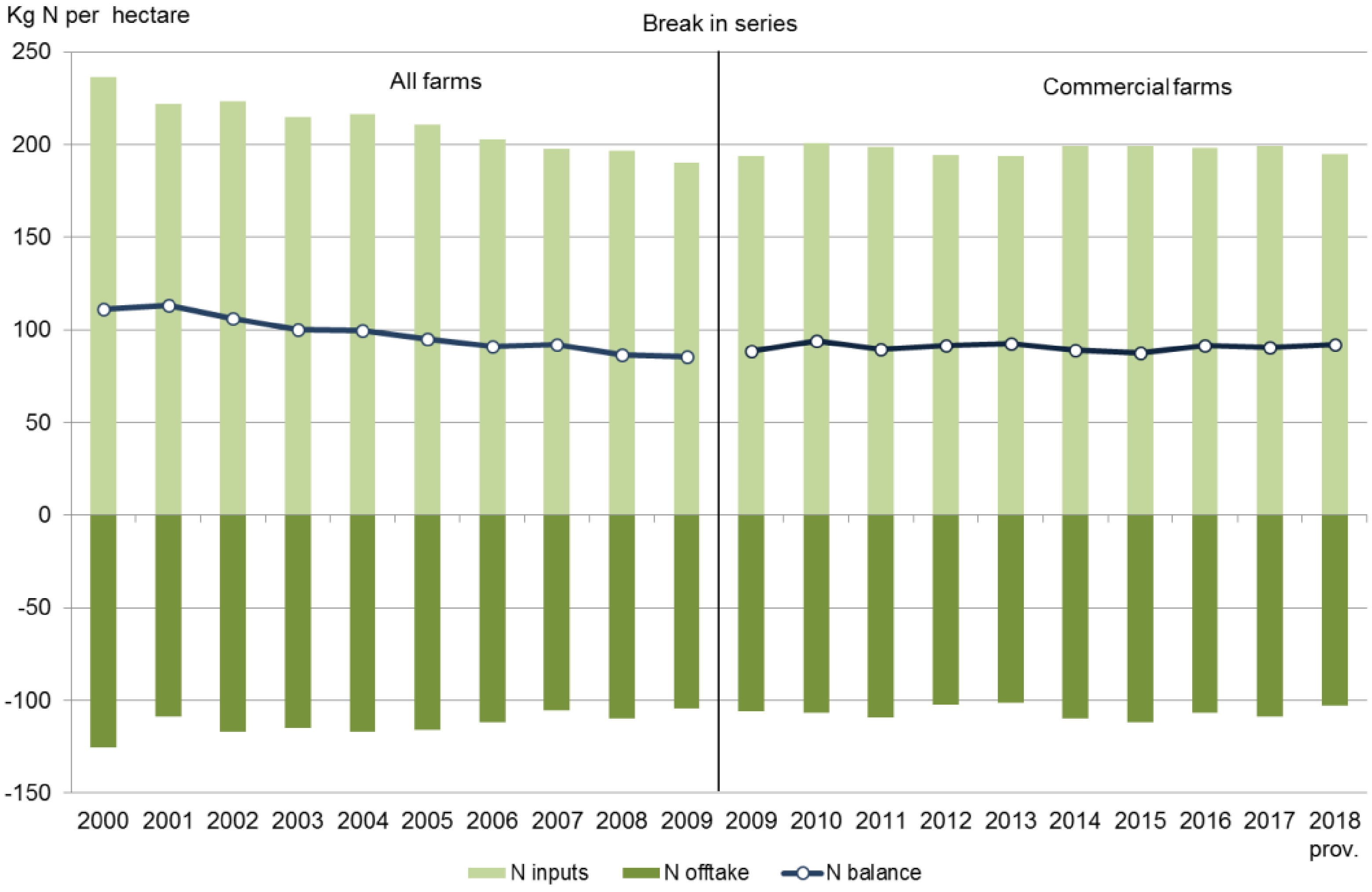
AHDB

CEREALS & OILSEEDS

Presentation Summary

- Nitrogen use in the UK agriculture
- How efficient is our Nitrogen use
- Measures to improve Nitrogen use efficiency
- Clean Air Strategy 2019; 25 year environment plan
- An update on RB209-New edition

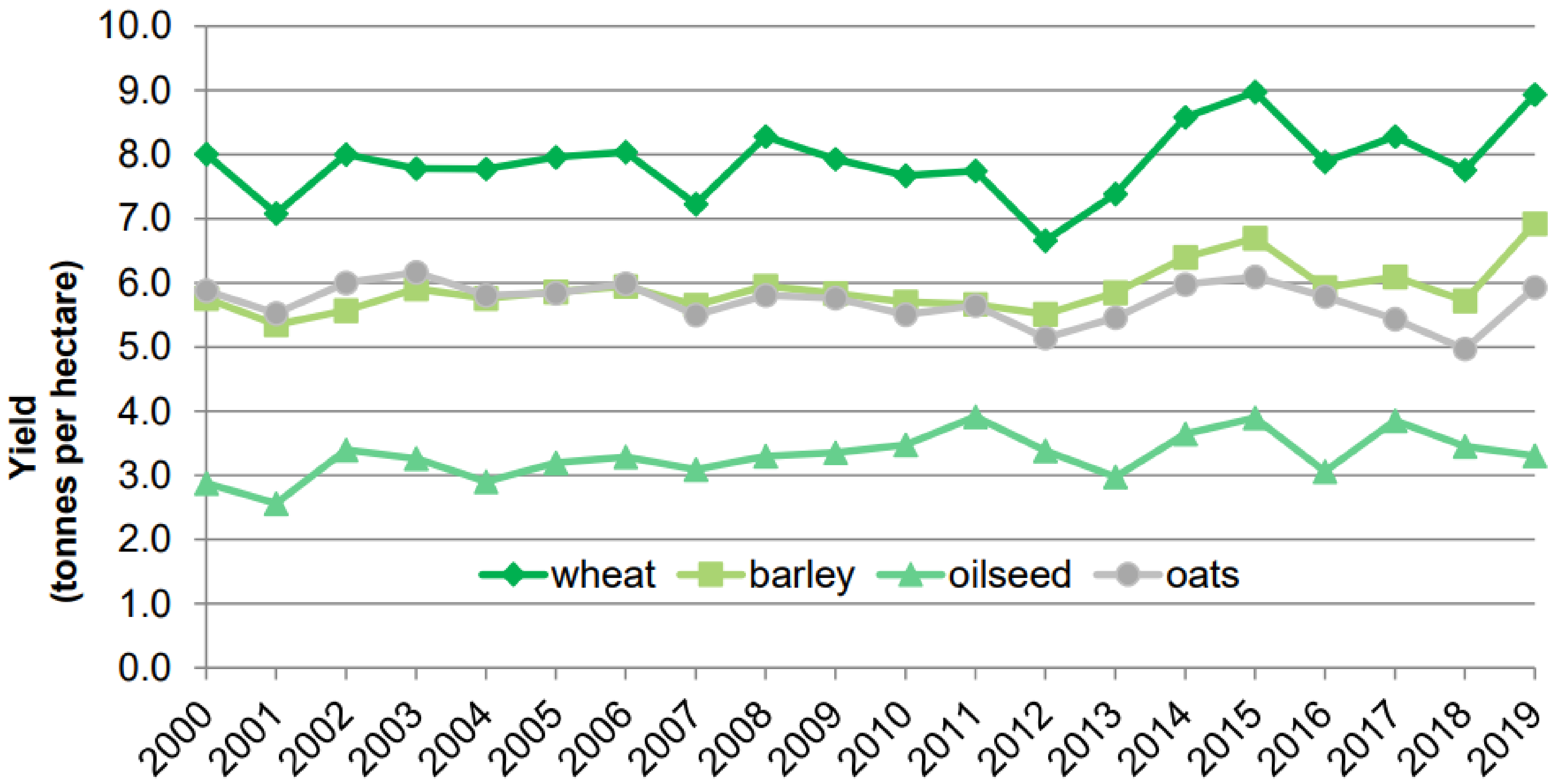
UK Farm Nitrogen Balance



A 17% decrease in the total N surplus (111 kg/ha to 92 kg/ha):

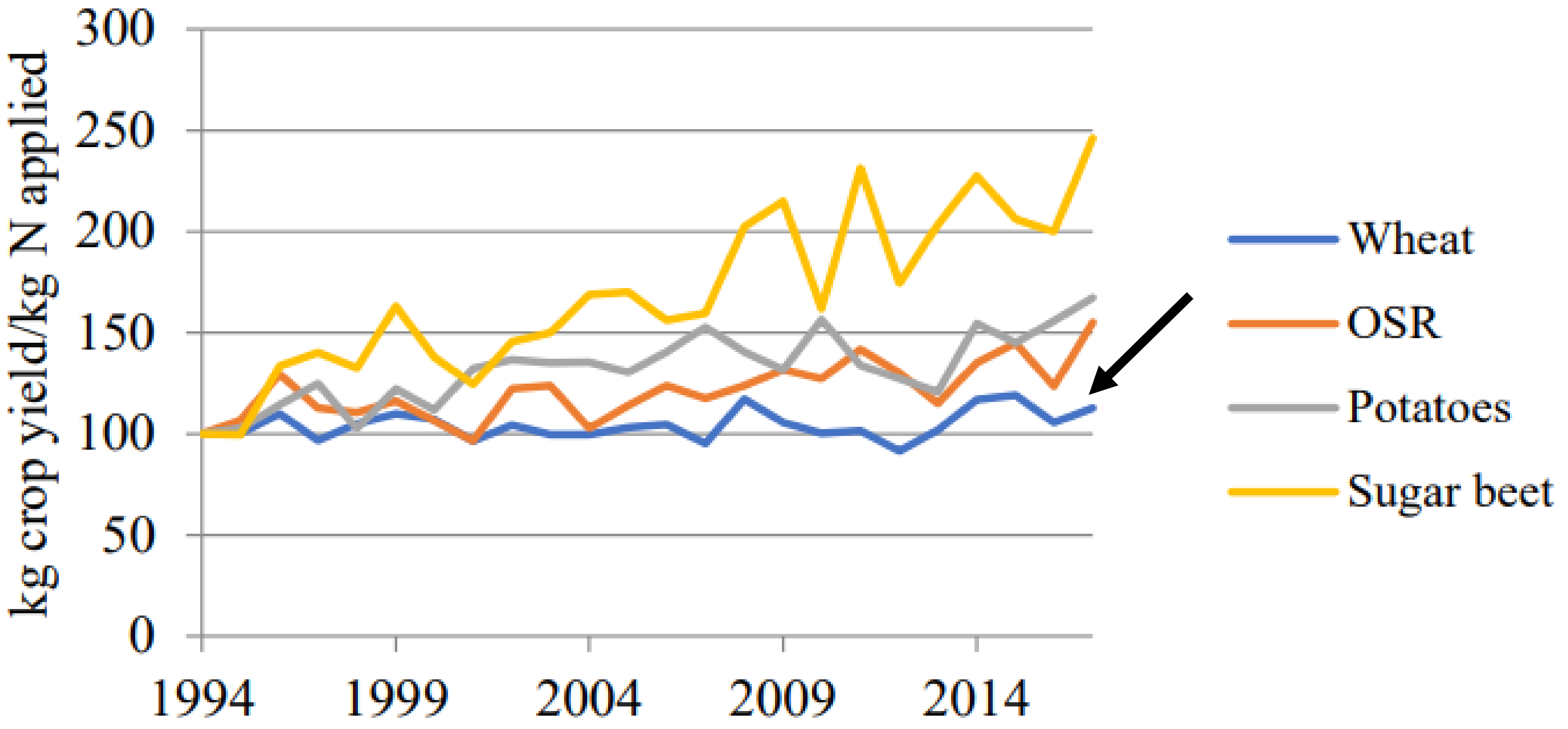
- **Lower inorganic (manufactured) fertilisers and**
- **Lower manure production (the result of lower livestock numbers)**

Long term crop yield (2000-2019)



Defra Statistics

Nitrogen Use Efficiency- arable crops



Defra Statistics

Can we improve Nitrogen Use Efficiency

1. Right source
2. Right rate
3. Right time
4. Right place

Nitrogen fertiliser sources

- **Organic;**
  - **Farmyard manure**
  - **Green manure**
  - **Slurries**
  - **Digestate**
  - **Biosolids etc**

- **Inorganic**
  - **Nitrate fertilisers**
  - **Urea**
  - **Sulphates etc**

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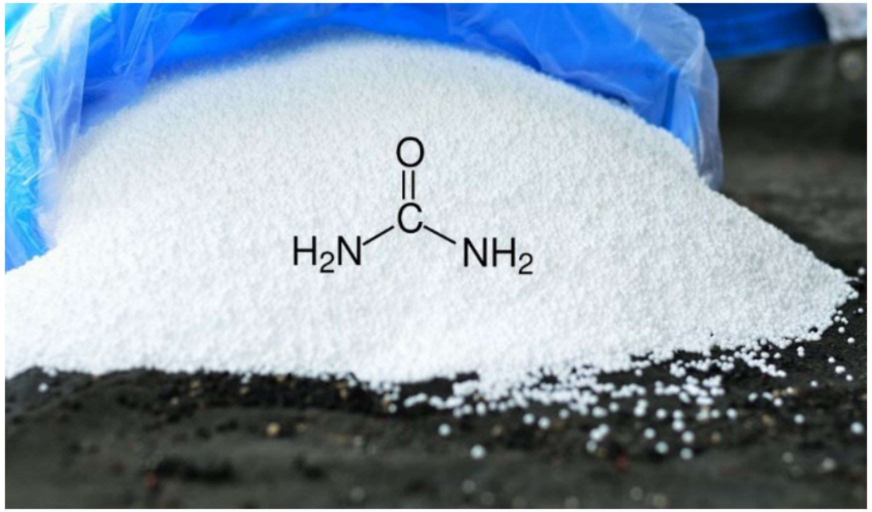
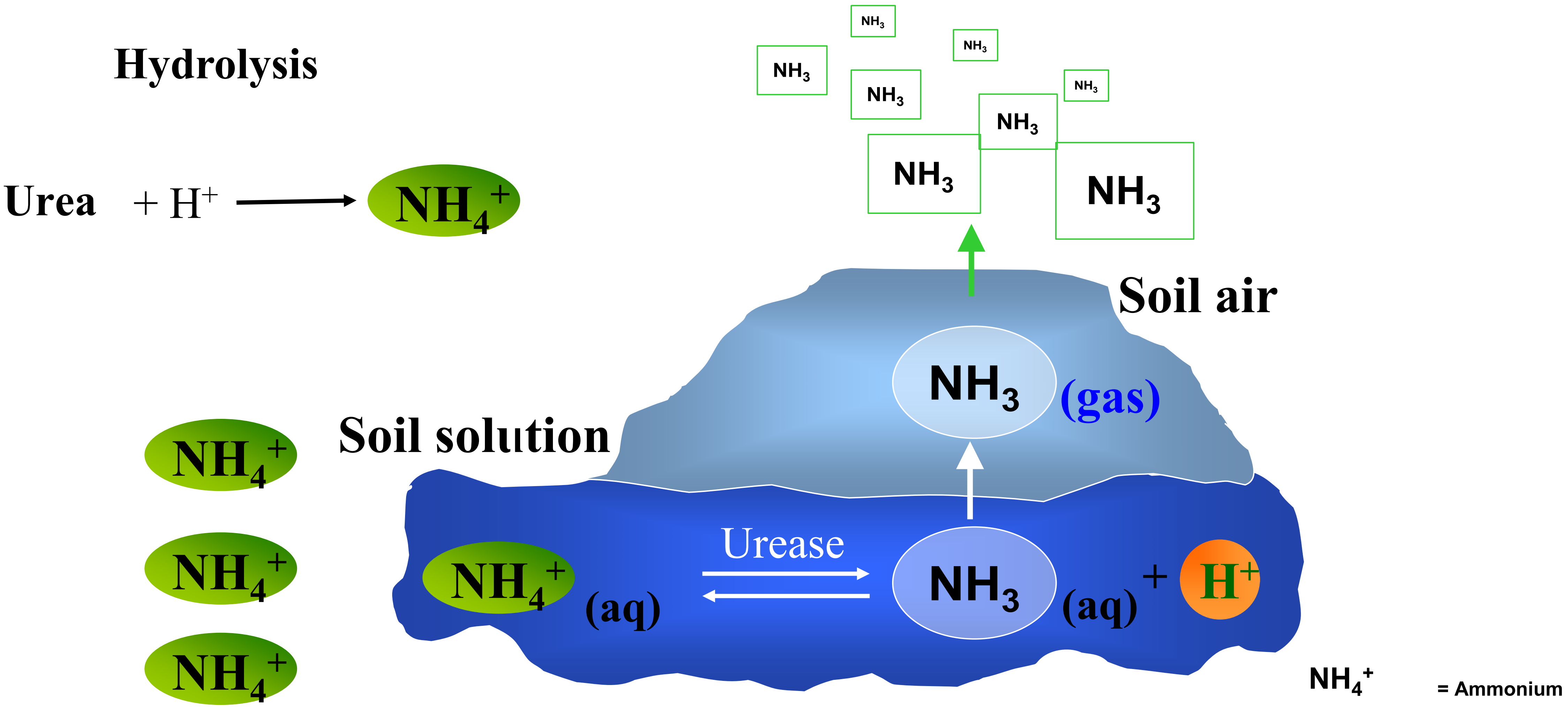
Urea fertiliser

- **Approximately 22% of N used as urea**
- **Concentrated N (46%)**
- **Easy to store and use**
- **Cheaper than other N sources**
- **Environment losses are higher compared to ammonium nitrate**



Credit: Tim Scirvener

Urea volatilisation



Urease Inhibitors

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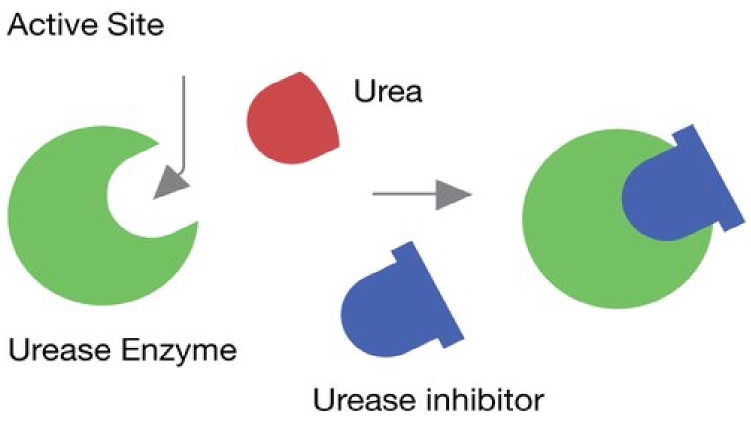
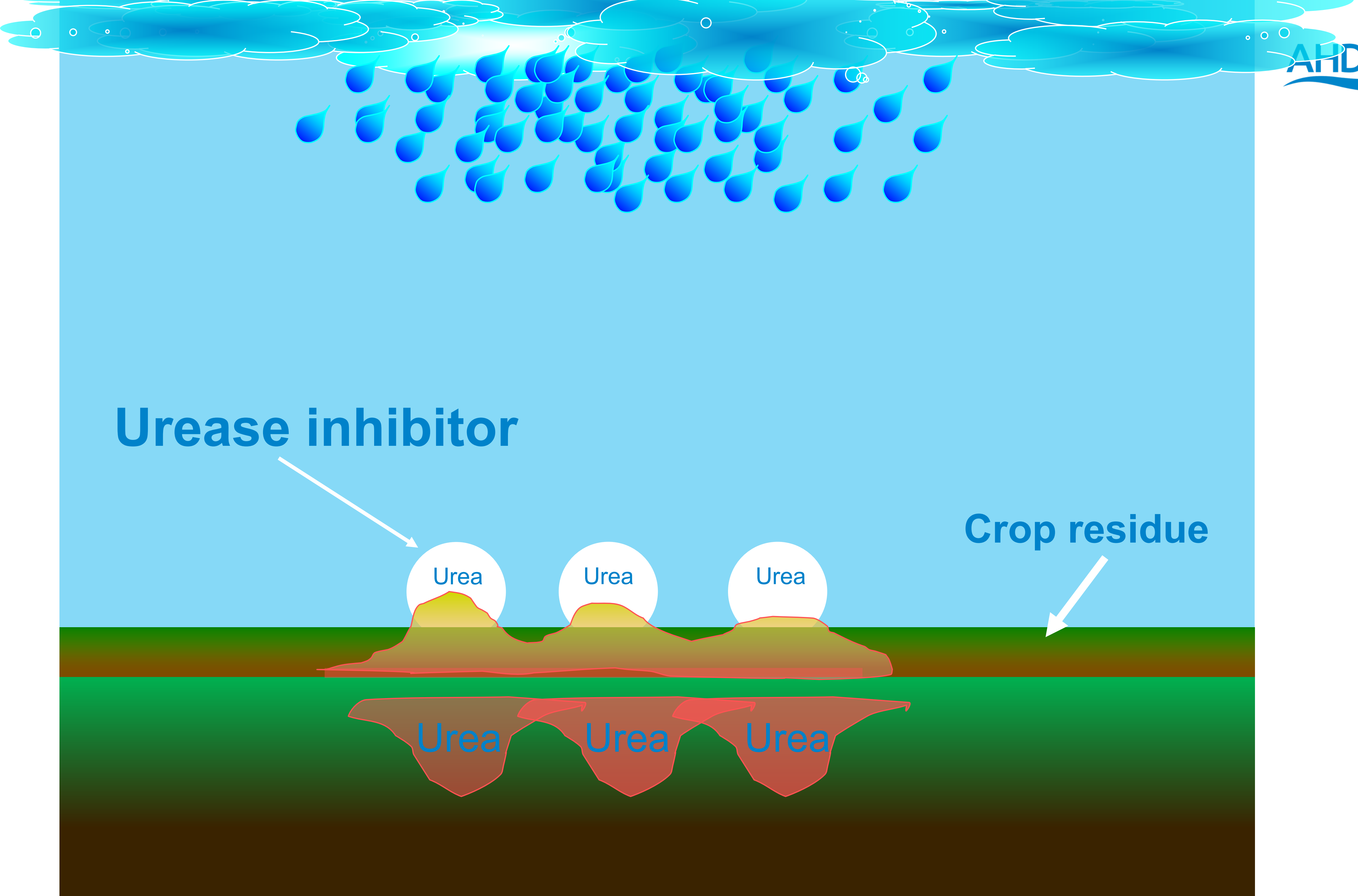
- Urease produced by plants and microbes in the soil

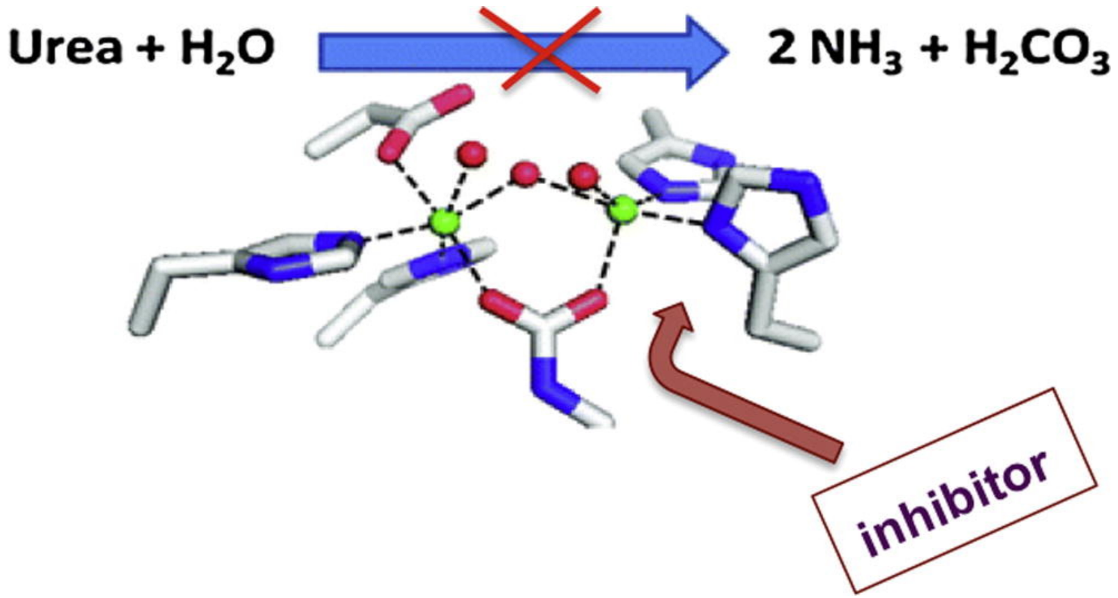
- Urease Inhibitors slow down the conversion of Ammonium to Ammonia
- Ammonium can stay in the soil for several weeks




Urease inhibitor
Crop residue
Urea
Urea
Urea
Urea
Urea
Urea

Urease Inhibitors

- **Phosphoramide compounds are extremely potent inhibitors**
  - NBPT (n-butyl thiophosphoric triamide) marketed as **Agrotain**
  - Phenyl phosphorodiamidate (PPDA) is also a strong UI
  - 2-NPT (2-nitrophenyl) phosphoric triamide is a mixture of NBPT and NPPT
  - Heavy metals
  - Nutrisphere™



Right time of application

- Apply when the crop is growing at its fastest rate!
- N recovery;
    - **Autumn applications ~ 10%**
    - **Spring applications ~ 55%**
- For inorganic fertilisers such as UAN and Urea, careful planning is essentials
- Nitrogen use efficiency for grain protein boost is around 12-15%

In NVZs highly readily available N should not be applied during close periods

Clean Air Strategy 2019

Why to focus on environment?

- Environment will be the cornerstone of agricultural policy in England
- Delivery of clean air, water and habitat ⟶ Environment Land Management Schemes (ELMs)
- Direct payment schemes to be replaced by ELMs
- Capital grants for land managers ;
  - to improve sustainability and
  - reduce negative environmental impacts


Industrial Strategy
Clean Air Strategy
25 Year Environment Plan
Clean Growth Strategy

AHDB

25 Year Environment Plan

Sustainable growth

Improve resource use efficiency

- (soil, water and air)

Improve environment & economy

- Working with farmers to use fertilisers efficiently

Provide clean air and water

1. Sustainable Growth for future generations

2. Improve resource use efficiency

Soil

Improve Soil Health

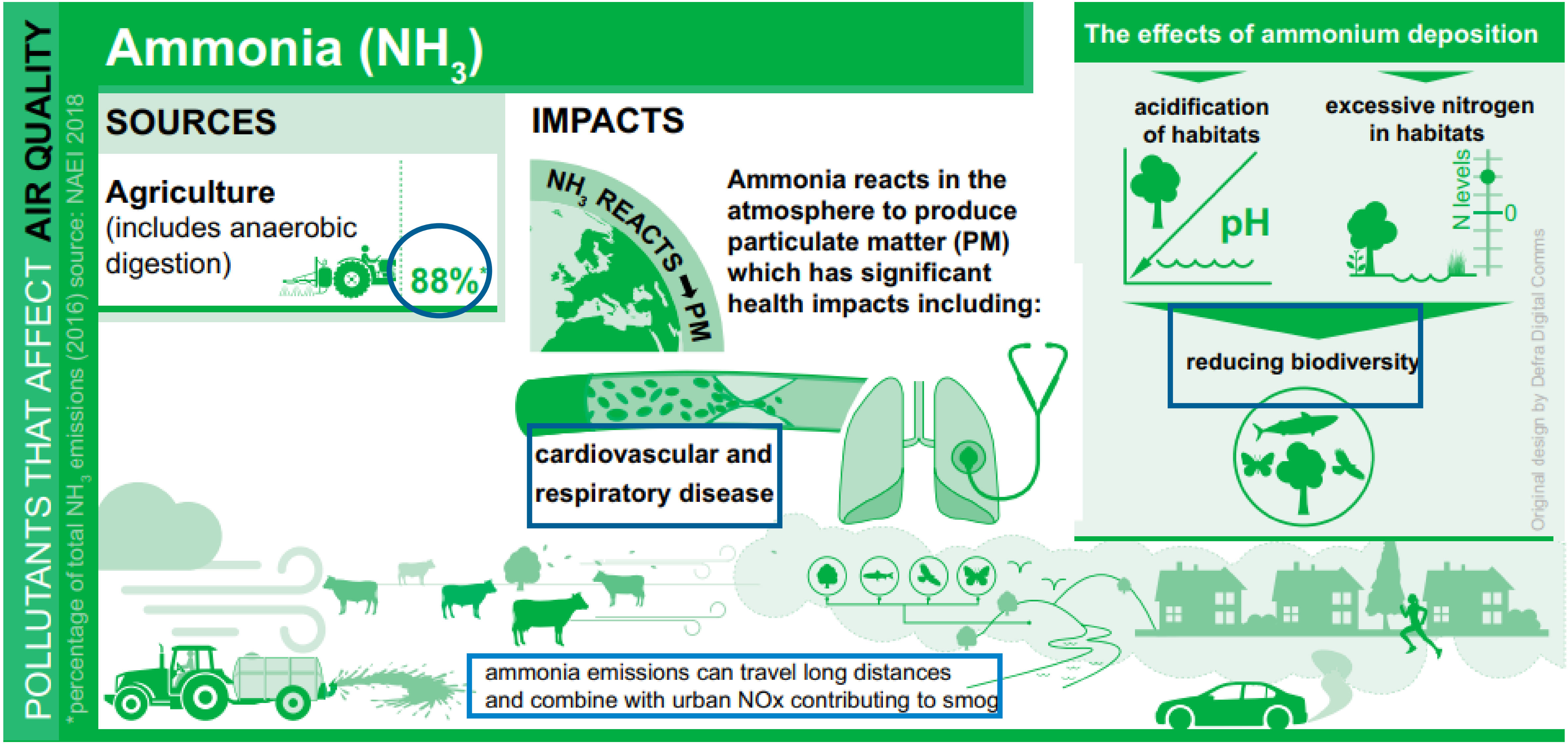
Water

Aquatic life/drinking water

Nutrients

Nutrient use efficiency

3. Clean Air and Water



3. Clean Air and Water

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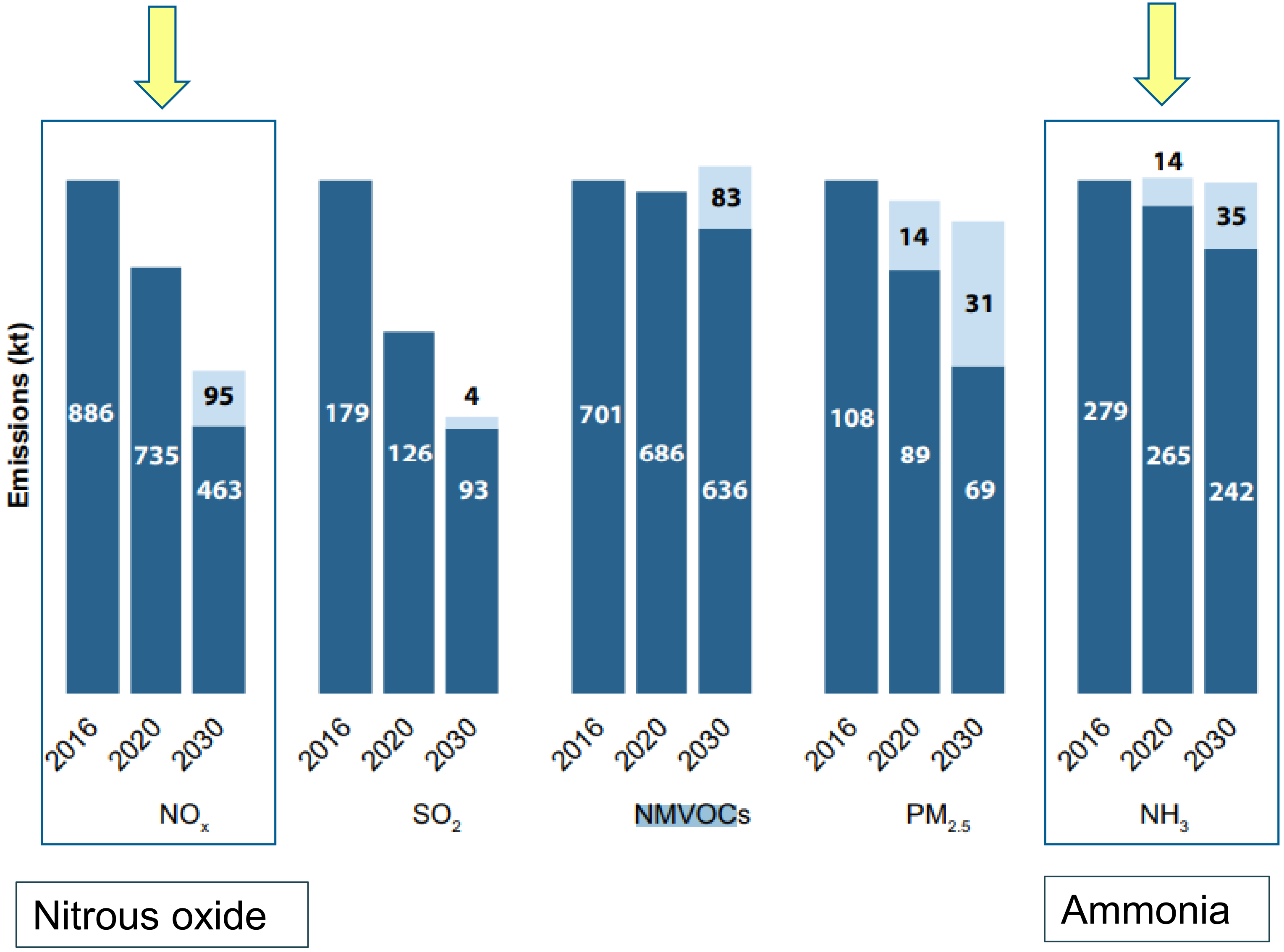
- **Methane from livestock:**
  - **51% methane from agriculture**
  - **14% NMVOC (**Non-methane volatile organic compounds)
  - **Both create ozone, harmful for humans/habitats**
  - **Ozone on average reduces yield by 5% in Cereals & oilseeds**

CEREALS & OILSEEDS

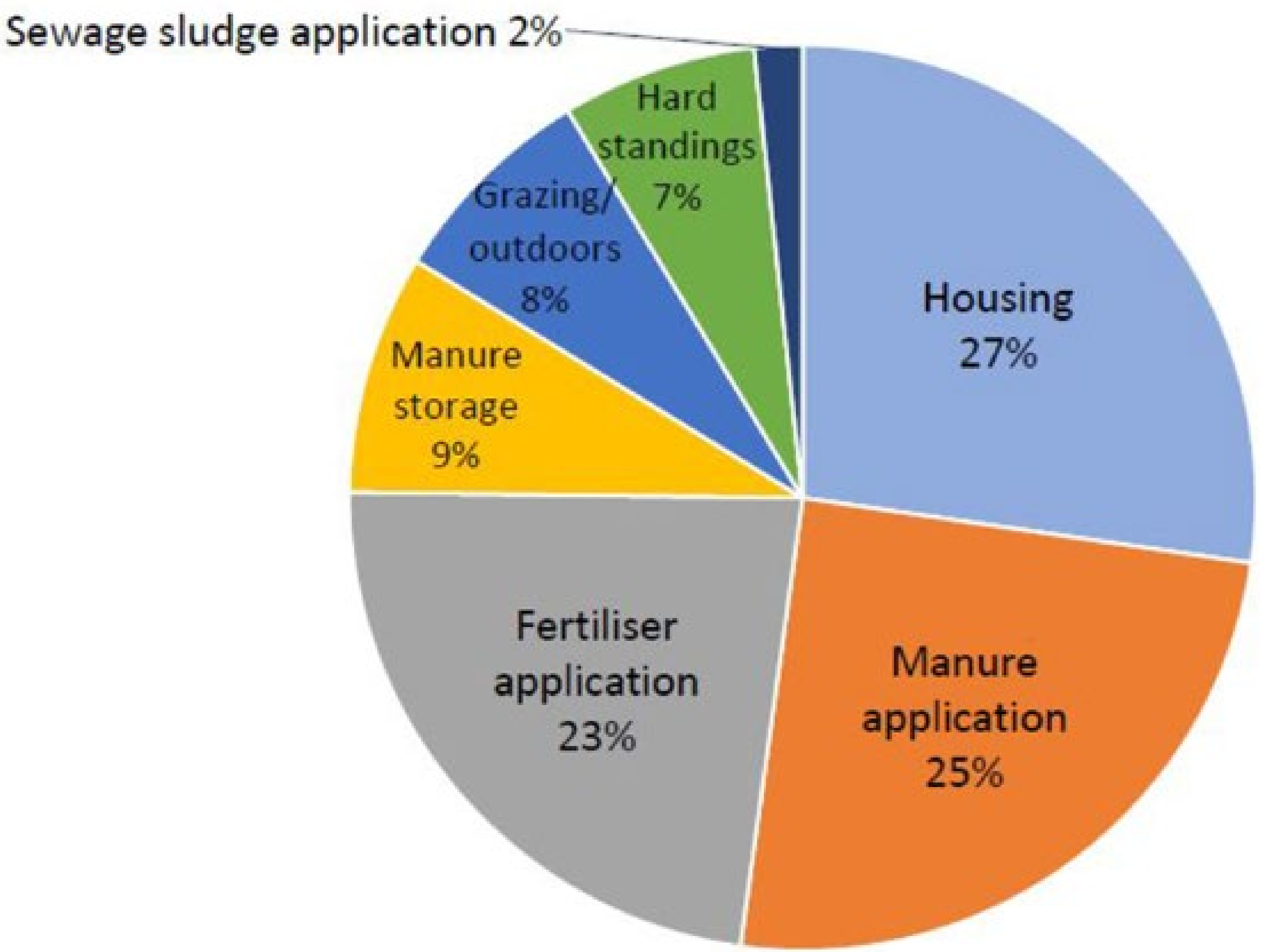
Emissions of key pollutants



Dark blue = Ceiling
Light blue = Above ceiling

Not much reduction in ammonia emission

Ammonia emissions (2016): Management Category



Reduction of ammonia emissions from farming

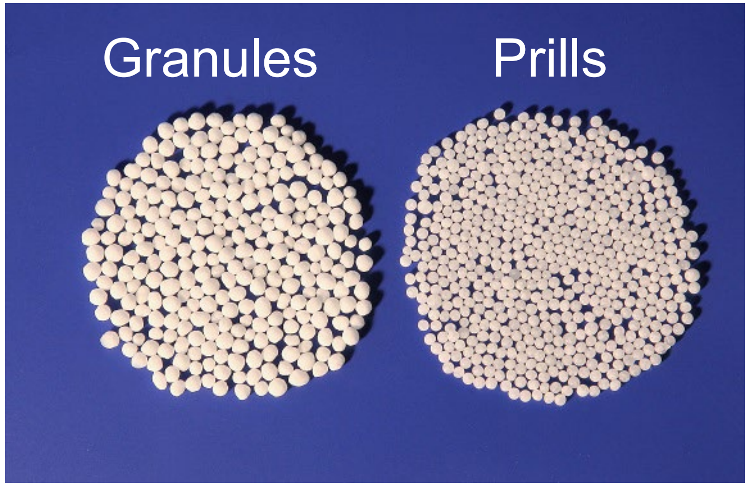
1. Introduce rules on specific emissions

- Reduce emissions from urea-based fertilisers (ASAP)
- Solid manure/digestate spread to bare land- incorporate within 12 hours, except no-till land (ASAP)

28% ammonia

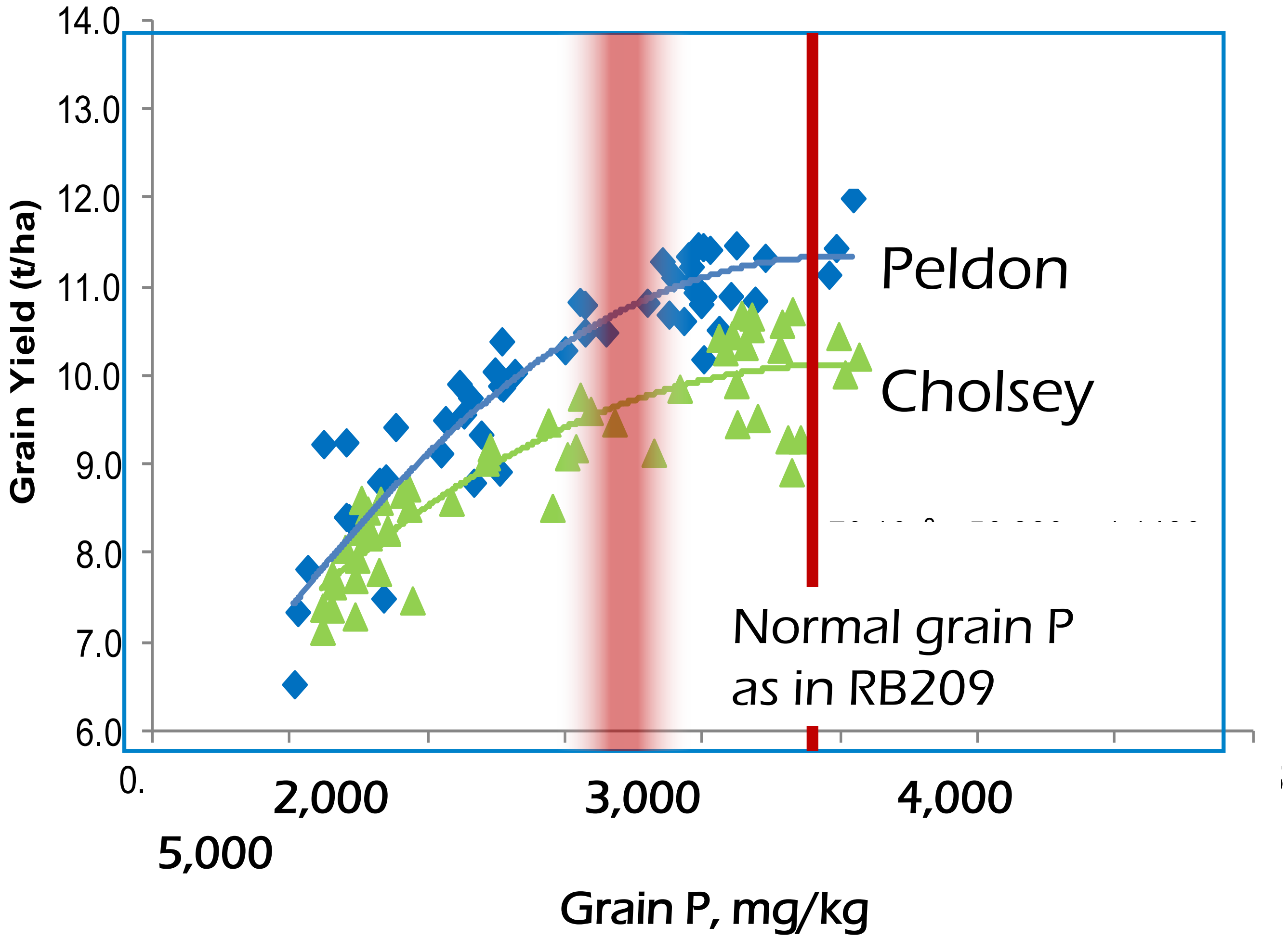
2. Regulation to minimise pollution from organic and inorganic fertiliser use

- Introduce limits on N rich fertilisers
- Consultation is proposed with growers, agronomists, scientists, academics



Updates on RB209

2020 revision of RB209



Olsen-P and grain-P tests, better indicators of soil P availability
Recommendation to test grain and soil

One more message!
Sulphur for optimum yield and proteins

High sulphur deficiency in lighter soils with high rainfall

Thanks for your attention!

Questions

For further queries contact;
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02476 47 8787
07815505800


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

A clear solution for farmers
CATCHMENT SENSITIVE FARMING

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CEREALS & OILSEEDS

The Potential for Intercropping in the UK

Reducing Our Reliance on Herbicides

by Andy Howard

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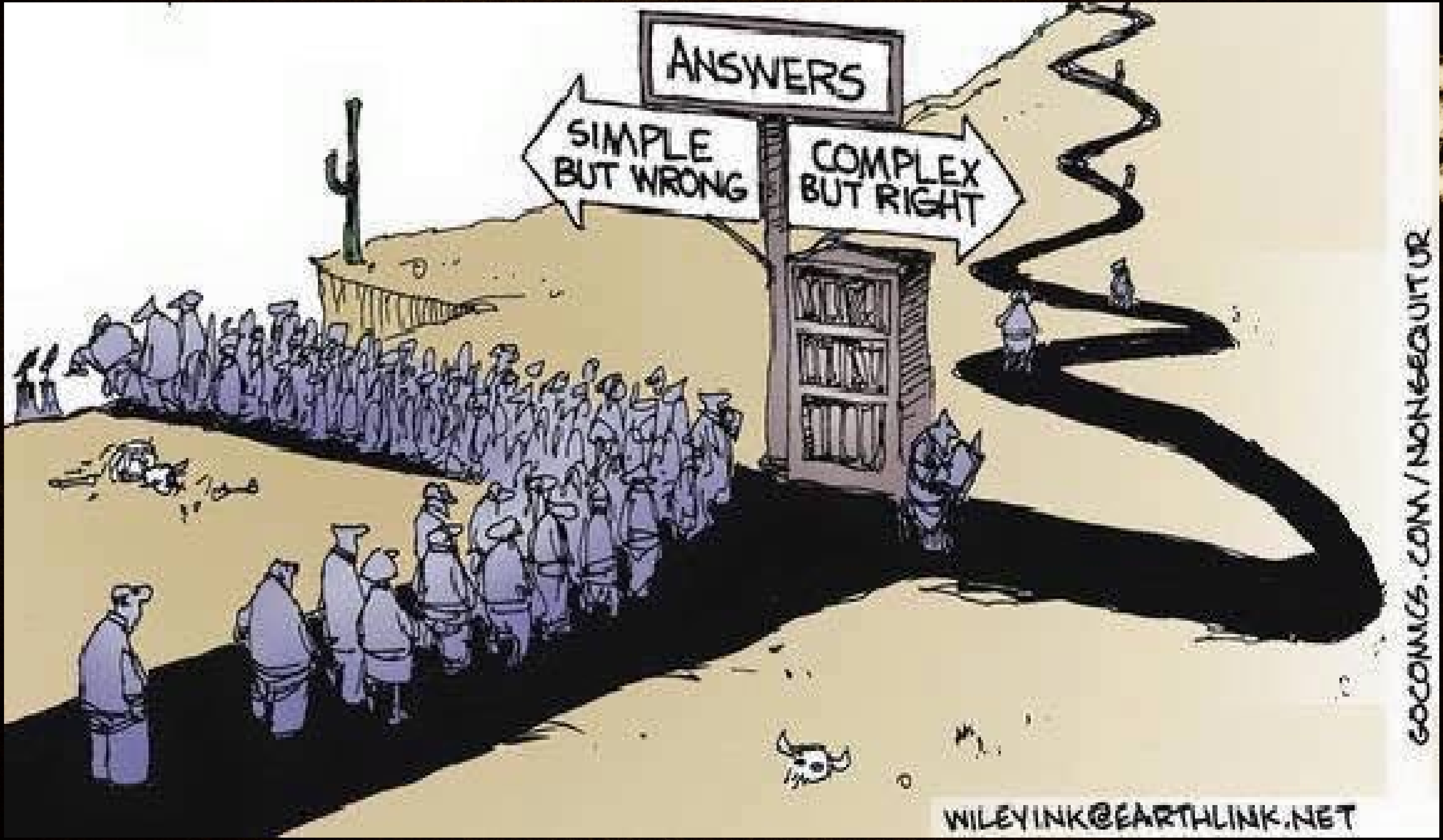
advice that counts


ANSWERS
SIMPLE BUT WRONG
COMPLEX BUT RIGHT
GOCOMICS.COM/NONSEQUITUR
WILEYINK@EARTHLINK.NET


A clear solution for farmers
CATCHMENT SENSITIVE FARMING
AHDB
CEREALS & OILSEEDS
• 300 ha Family Farm
• No-Till Since 2011
• Soil Type –varied
• Rainfall - 700-800ml
• Topography: rolling, small, irregular shaped fields, wooded
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Cropping 2019

- Winter Wheat
- Herbage Seed
- Winter Beans
- Spring Barley
- Spring Bean/Oats
- Spring Linseed
- Lentils
- Marrowfat Peas/SOSR
- Stewardship Legume Fallow
- 11 ha Solar Farm

Cropping 2020

- Winter Wheat
- Herbage Seed
- Spring Beans
- Winter Barley
- Spring Bean/Oats
- Spring Oat/Beans
- Lentils/ Oats
- Marrowfat Peas/ ?
- Stewardship Legume Fallow
- 11 ha Solar Farm

Long Term Goal

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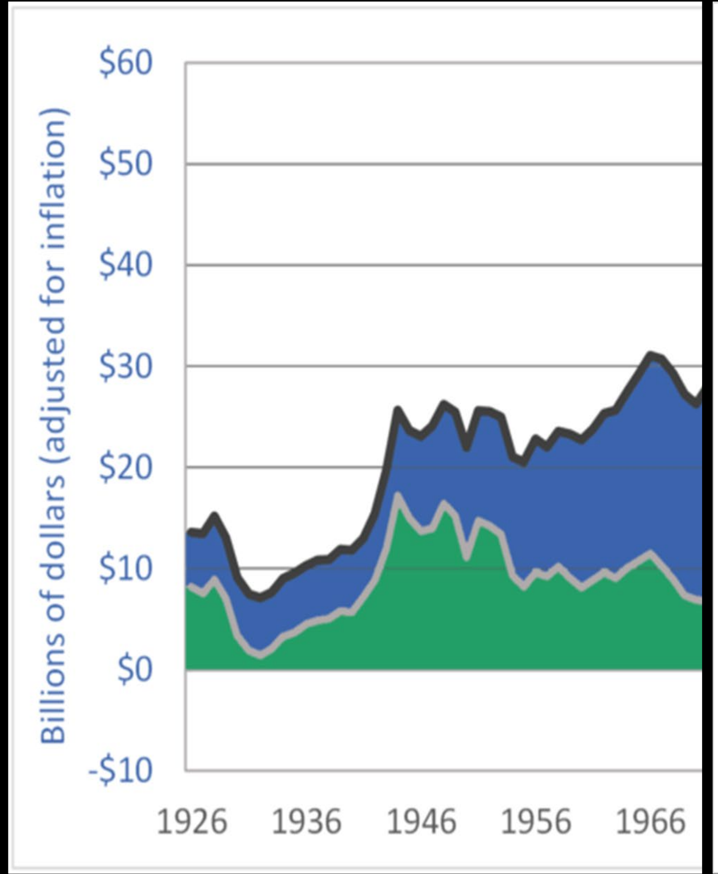
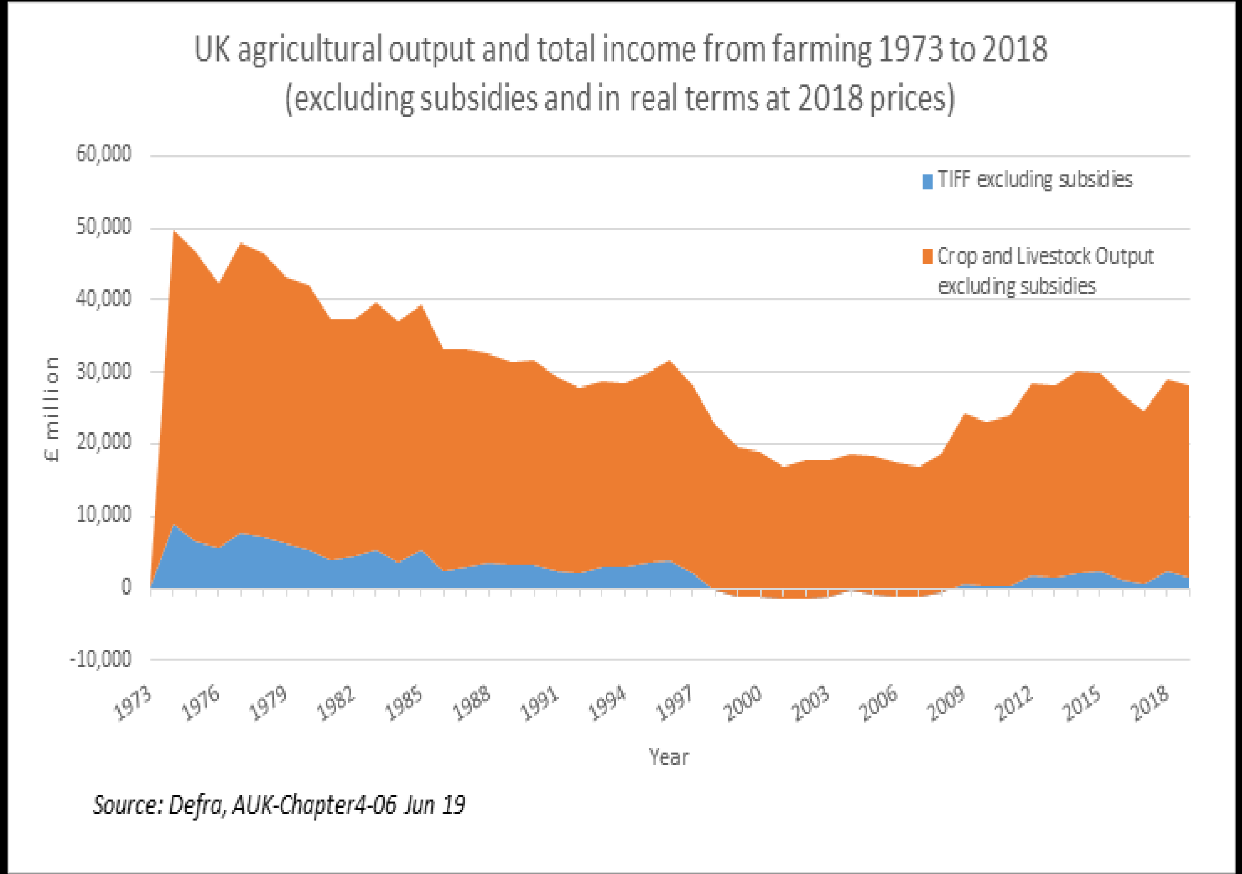
DIVERSITY

Design a Farm system that can thrive with minimal human and outside inputs

5 Year Plan: reduce inputs by 50%

- Reduc
- Reduc
- Elimi
- Holist






It all starts with the soil!!
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Definition of Intercropping

"The growing of two or more crop species where part or all of their crop cycle overlaps temporally and/or spatially, where one or more of the component species is taken to harvest"

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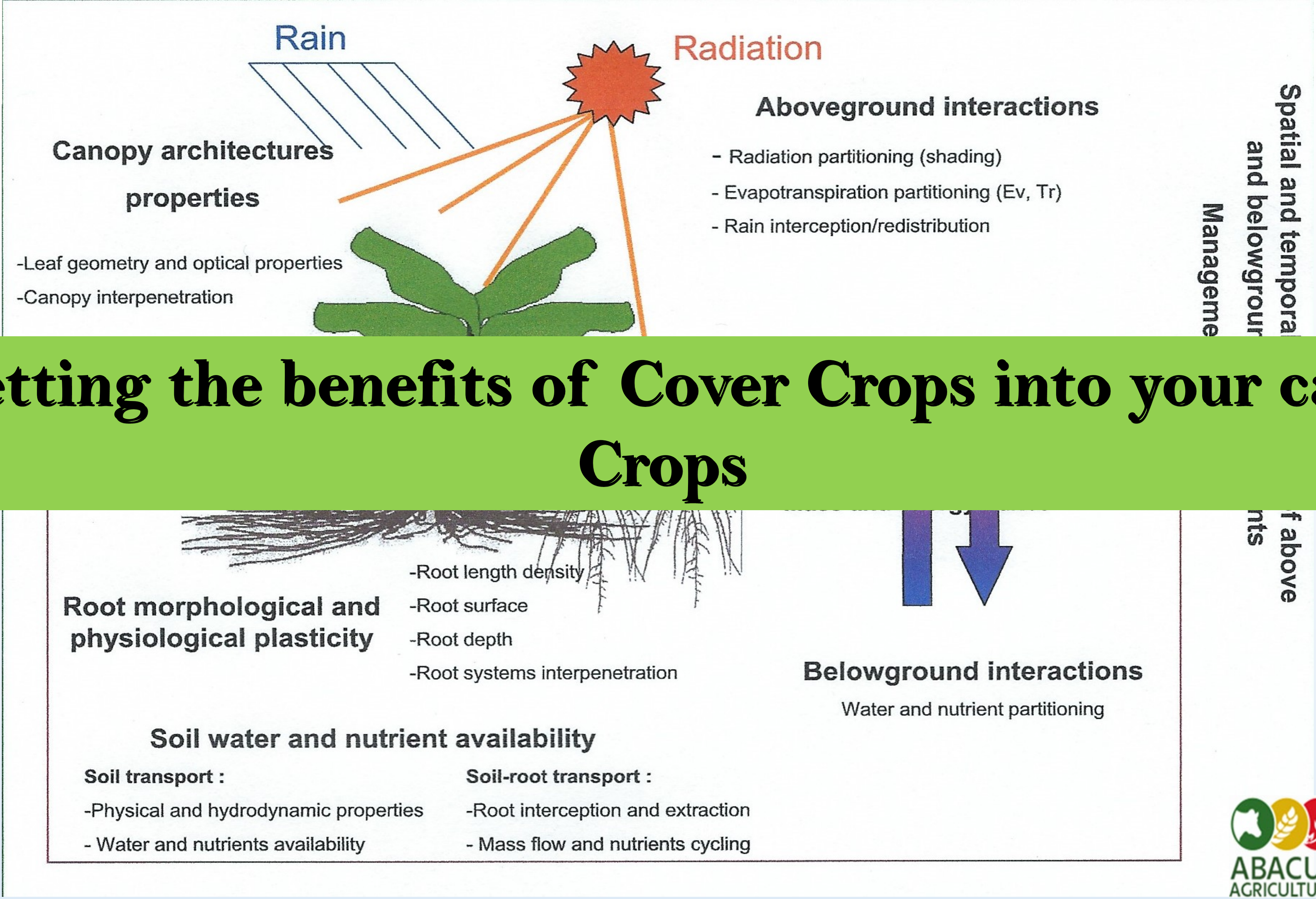
Getting the benefits of Cover Crops into your cash Crops



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Pasture Cropping

East Sussex:

Crop Species
Black Oats
Crimson Clover
Buckwheat
Early English Vetch
Yellow Trefoil
Forage Pea
Berseem Clover
Stubble Turnip
Fodder Radish
White Millet
Westerwold Rye Grass
Hairy Vetch


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Full Season Intercrop

Peola

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INDEPENDENT SOIL SERVICES

Soil Audit Reports and Nutrient Management

Difficult Soils a Speciality
Fertilisers Advisory Service
Toxic Residue Testing
Soil Health Problems
Environmental Testing

ISS BIO-LOGICAL FARMING SOLUTIONS

Analysis Results (LEAF)

Customer BOCKHANGER FARMS LTD
OAKLANDS FARM
HOTHFIELD
ASHFORD
KENT
TN26 1ER

Distributor INDEPENDENT SOIL SERVICES
HARVEST HOUSE
NEW ROAD
CRIMPLESHAM
DOWNHAM MARKET
NORFOLK
PE33 9FH

Sample Ref GODINGTON
Sample No E229306/04
Crop OILSEED RAPE

Date Received 06/06/2017
Area 10

Analysis	Result	Guideline	Interpretation	Comments
Nitrogen (%)	4.31	4.00	Normal	Adequate Level.
Phosphorus (%)	0.47	0.35	Normal	Adequate Level.
Potassium (%)	1.55	2.80	Low	PRIORITY FOR TREATMENT.
Calcium (%)	1.99	1.00	Normal	Adequate Level.
Magnesium (%)	0.19	0.25	Slightly Low	Consider foliar applications of MAGNESIUM
Manganese (ppm)	35.7	30.0	Normal	Adequate Level.
Boron (ppm)	44.8	30.0	Normal	Adequate Level.
Zinc (ppm)	36.3	25.0	Normal	Adequate Level.
Iron (ppm)	48	30	Normal	Adeqate Level.
Copper (ppm)	4.2	5.0	Slightly Low	Low priority. See comments below.
Molybdenum (ppm)	1.66	2.00	Slightly Low	Consider foliar applications of MOLYBDENUM.
Sulphur (%)	0.55	0.40	Normal	Adequate Level.

Additional Comments

Please note: Any indicated guidelines are intended for early to mid-season sampling.For any product applied, always refer to manufacturers advice for rates and timing of application. PLEASE NOTE : The guideline levels quoted should be regarded as the absolute minimum at which crop yield or quality may be affected. Treatment of deficient low priority nutrients may be beneficial if all sensitive nutrients are adequate.

Please Note

Whilst every care is taken to ensure that the Results from Analysis are as accurate as possible, it is important to note that the analysis relates to the sample received by the laboratory, and is representative only of that sample. No warranty is given by the laboratory that the Results from Analysis relates to any part of a field or growing area not covered by the sample received. It is important to ensure that any soil, leaf, silage or fruitlet sample sent for analysis is representative of the area requiring analysis and that samples are obtained in accordance with established sampling techniques. A leaflet containing instructions on how to take soil, leaf, herbage, silage and fruit samples for analysis is available from the laboratory on request.

AMMONIA EMISSIONS

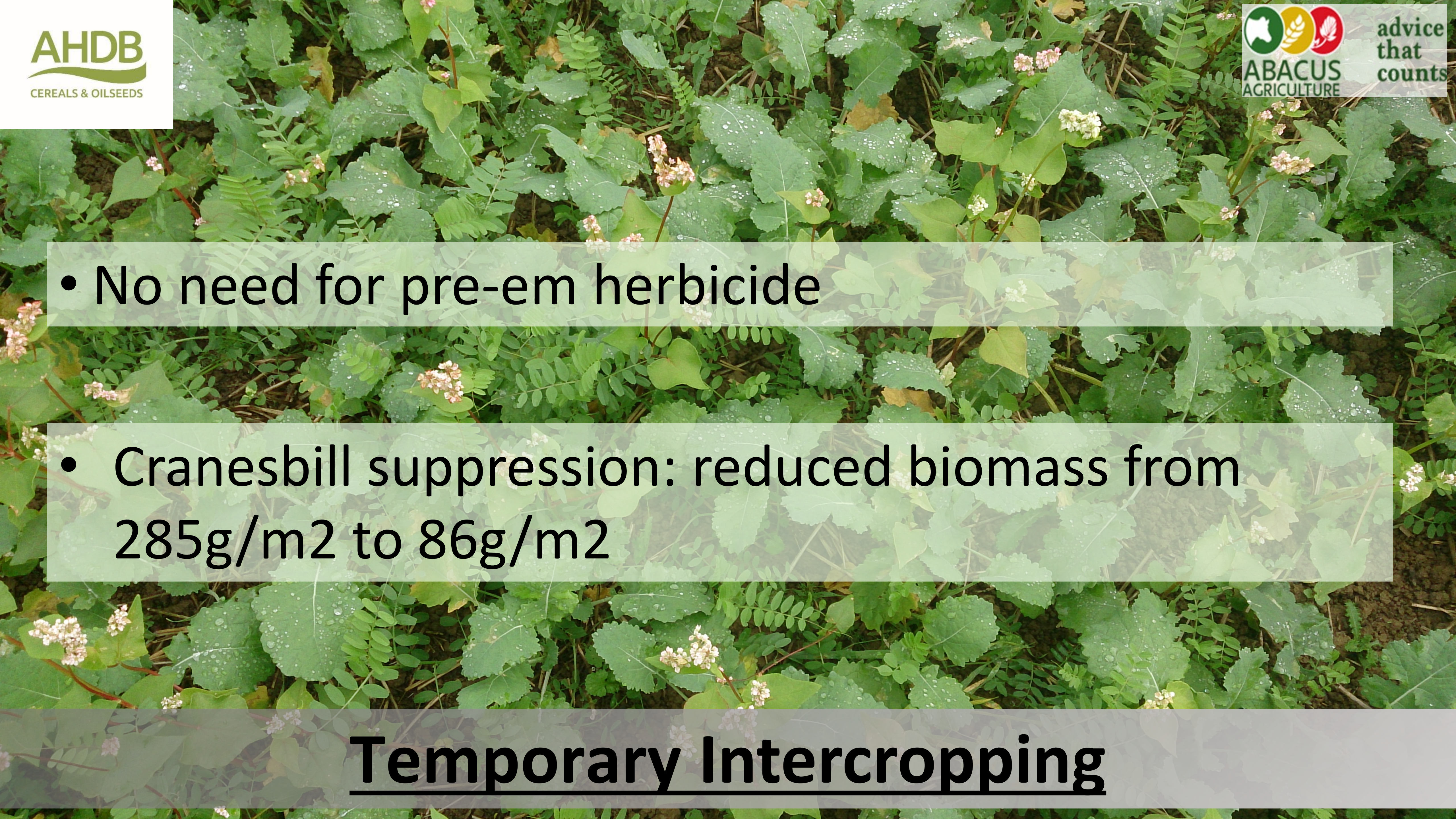
Independent Soil Services, Harvest House, New Road, Crimplesham, Norfolk. PE33 9FH
TEL: 01366 384899 * FAX: 01366 380205 * E mail: info@independentsoils.co.uk * Website: WWW.independentsoils.co.uk

Companion Cropping Wheat

Reasons:

- Aphid confusion
- Scavenge Nitrogen (~ 15kg/ha)
- Increase Yield
- Increase Protein Content
- Weed Suppression?
- Improve rooting
- Add Diversity

Plot	Species	Seed Rate (kg/ha)	Seeds per M2
	Crimson Clover	2	87
	Radish	5	42
3	Winter Linseed	5	71
4	Mix (CC, R, WL, CV)	8.1 (0.6, 1.5, 1.25, 5)	66 (26,12,18,10)
5	Common Vetch	15	28
6	Spring Beans	80	15



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- No need for pre-em herbicide
- Cranesbill suppression: reduced biomass from 285g/m2 to 86g/m2

<u>Temporary Intercropping</u>

CSFB

Costs £/Ha

Seed	£30

Savings £/Ha

Herbicide	£35
Fertiliser	£25
Insecticide	£5

Net Benefit £35/Ha

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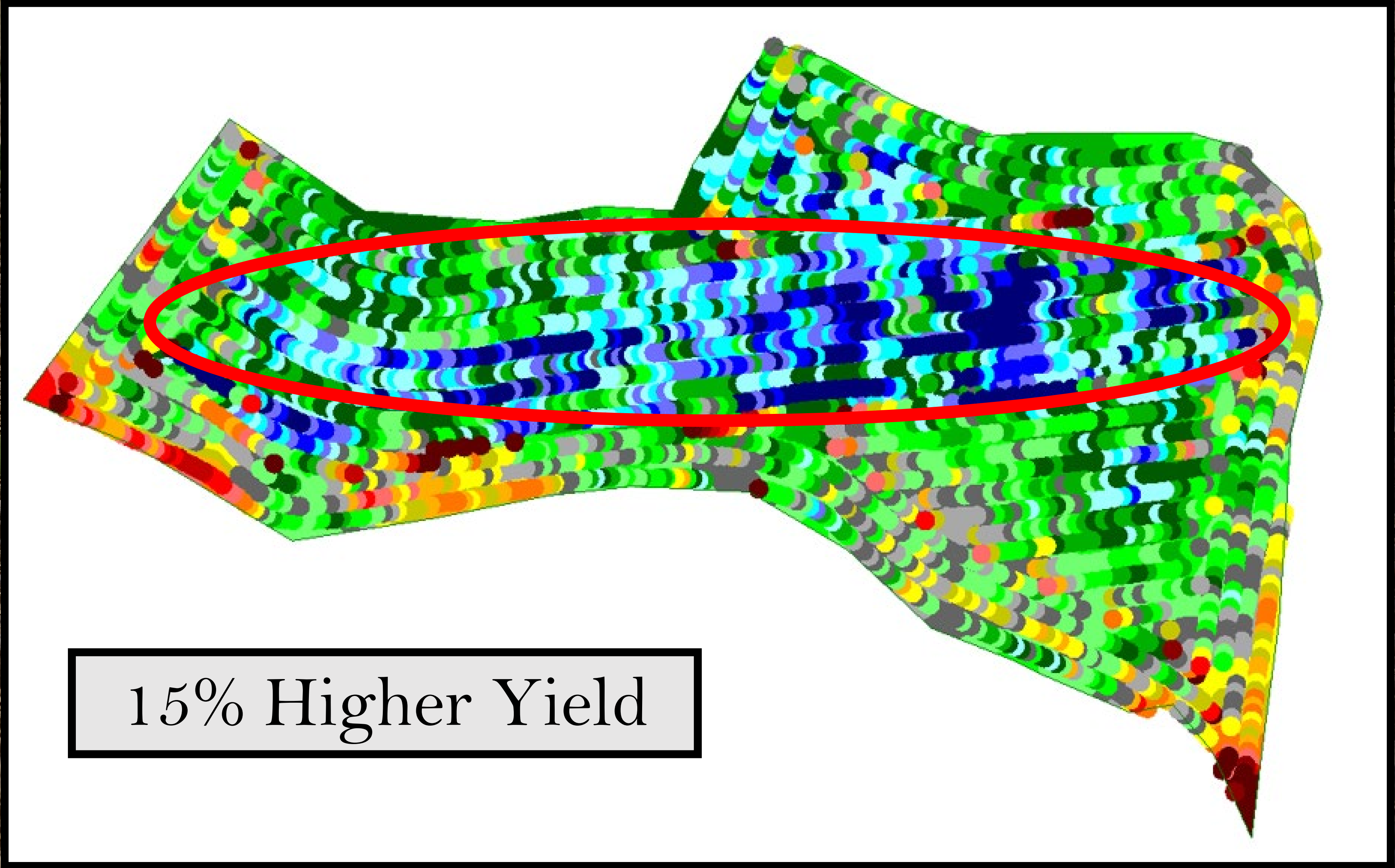
Courtesy of Jake Freestone

Flax Flea Beetle Trial in Linseed

Treatment	Avg. Yield as a percentage of control
Linseed Only	100 %
Linseed plus Oats (70 plants/m2)	118.3%
Linseed plus Oats (140 plants/m2)	119.4%

9 (0.54)	700	140 (76kg/ha)



FAB-Oats

Bean Oat trial 2019

Plot	Mix	Area (ha)	Beans (seed per m2)	Oats (seeds per m2)
1	Bean mono	0.83	50 (256kg /ha)	0
2	Bean Oats	0.76	45 (230kg /ha)	70 (38kg/ ha)
3	Oats	0.67	0	300 (163kg /ha)
4	Bean Oats	0.58	50 (256Kg /ha)	50 (27/kg /ha)
5	Bean Oats	0.50	35 (180kg /ha)	125 (68kg/ ha)

LER

(Sown 29th of March 2019)	Plants Established per M2				
Treat	Gross output Beans £190/t	Gross output Oats £140/t	Total Gross output £	Variable cost £	Gross output-variable £
1. SB50	902.50	0.00	902.50	240.63	661.87
2. SB45 SO 70	528.20	649.60	1177.80	241.41	936.39
3. SO 250	0.00	905.80	905.80	245.00	660.80
4. SB45 SO45	556.70	539.00	1095.70	247.25	848.45
5. SB35 SO125	307.80	826.00	1133.80	232.36	901.44

Living Mulch

Carlin Peas and Triticale, Green Acres Farm, Shropshire

Spring Carlin Peas and Triticale, Green Acres Farm

Peas 250kg/ha 1ha, 12m strips	Peas 250 Trit 5% RD (12.5kg/ha)	Peas 250 Trit 10% RD (25kg/ha) Drilled 25th April in two passes	Peas Trit 20% RD (50kg/ha)	Peas Trit 30% RD (75KG/HA)

Motivations – structural support for peas, pea quality, weed suppression, triticale for animal feed (possibly human consumption)

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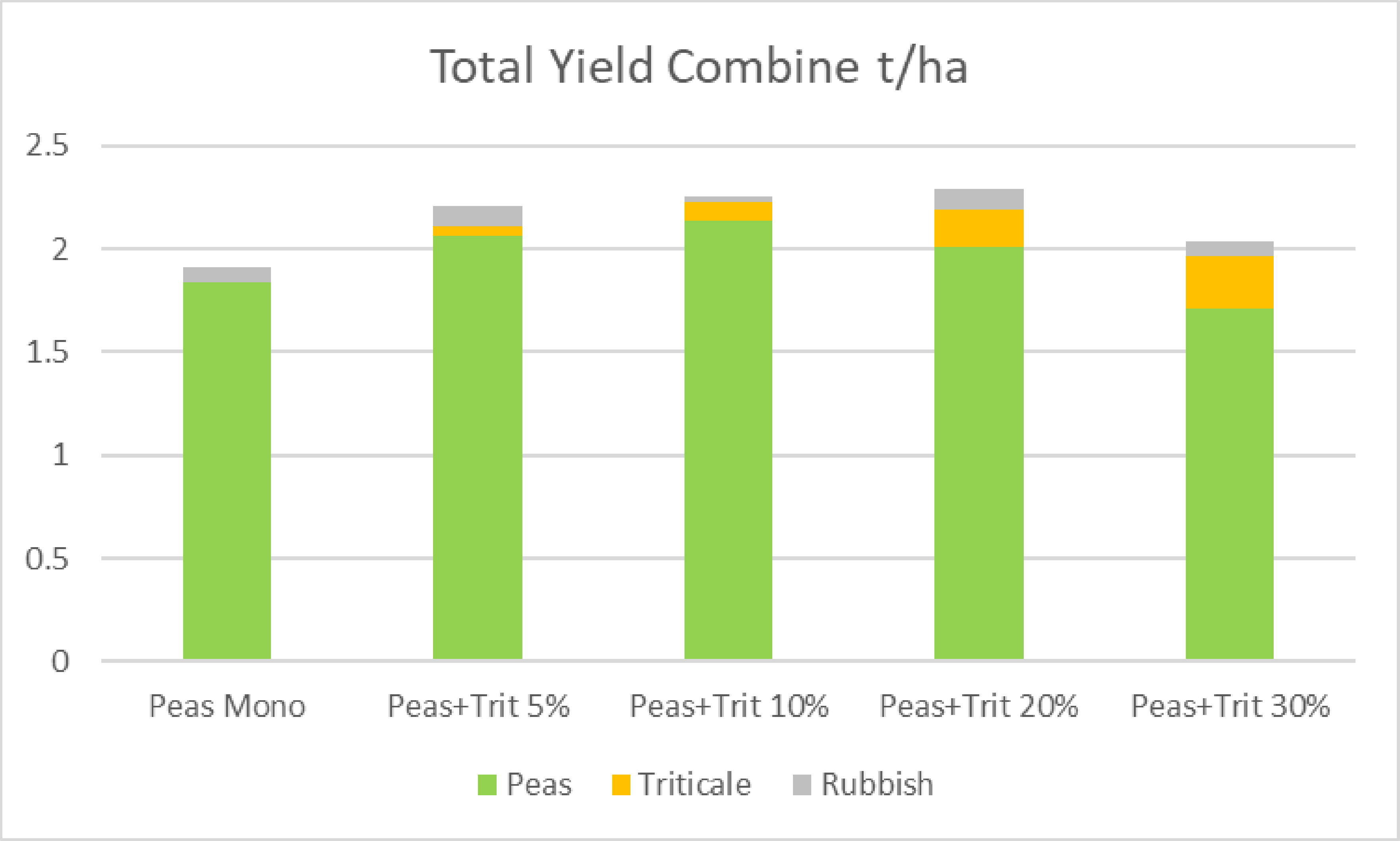

Total Yield Combine t/ha
2.5
2
1.5
1
0.5
0
Peas Mono
Peas+Trit 5%
Peas+Trit 10%
Peas+Trit 20%
Peas+Trit 30%
Peas
Triticale
Rubbish

Wheat-Beans, James Hares, Roundhill Farm, Wilts

Wheat and Beans, Roundhill Farm, Wilts

Wheat 175kg/ha
Beans 125kg/ha

Beans 125kg/ha

Motivations: Weed control (organic), mixed higher protein animal feed, use up left over wheat, wheat not too competitive

1ha

1ha

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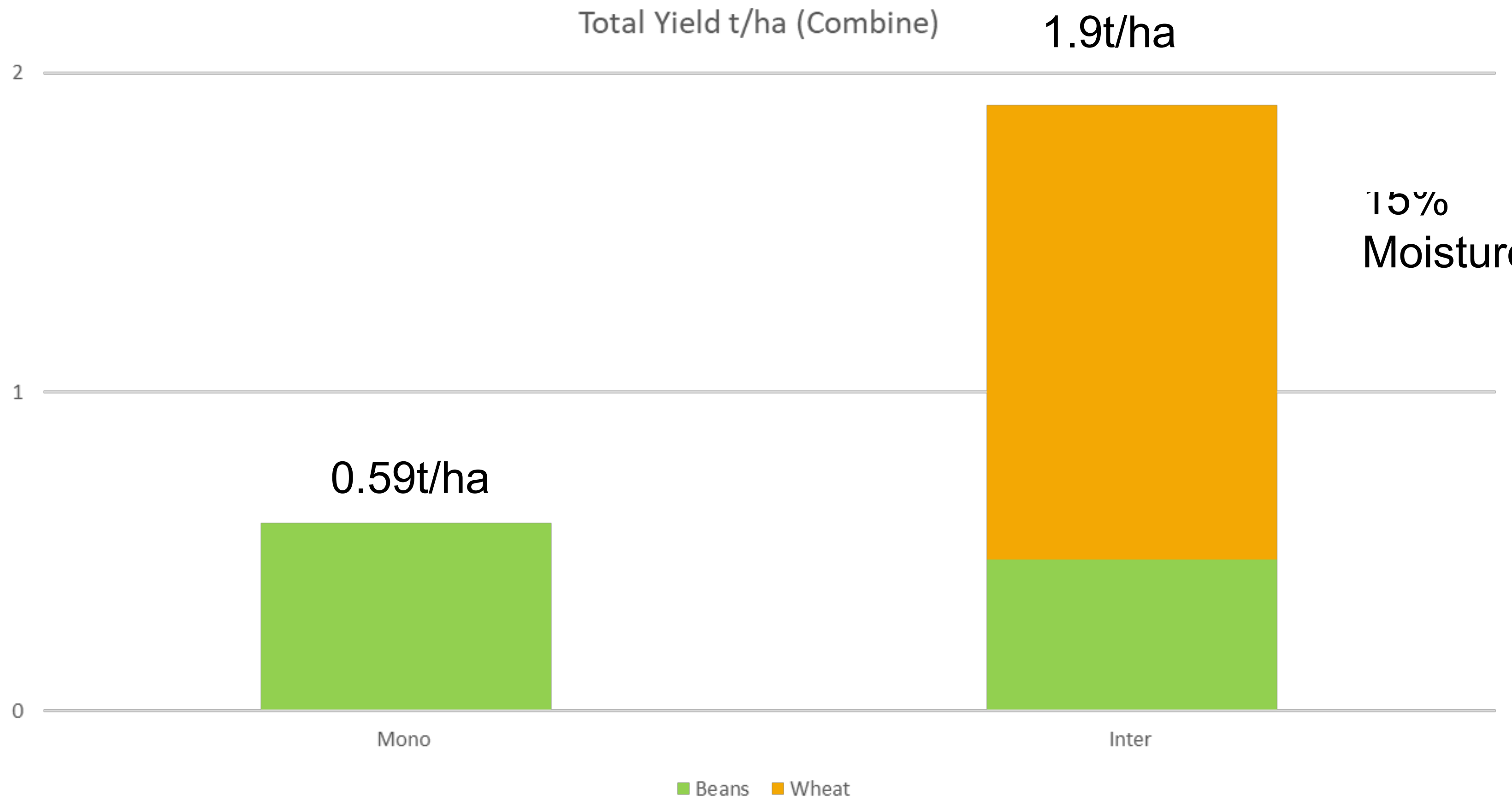
Total Yield Combine – 24th August

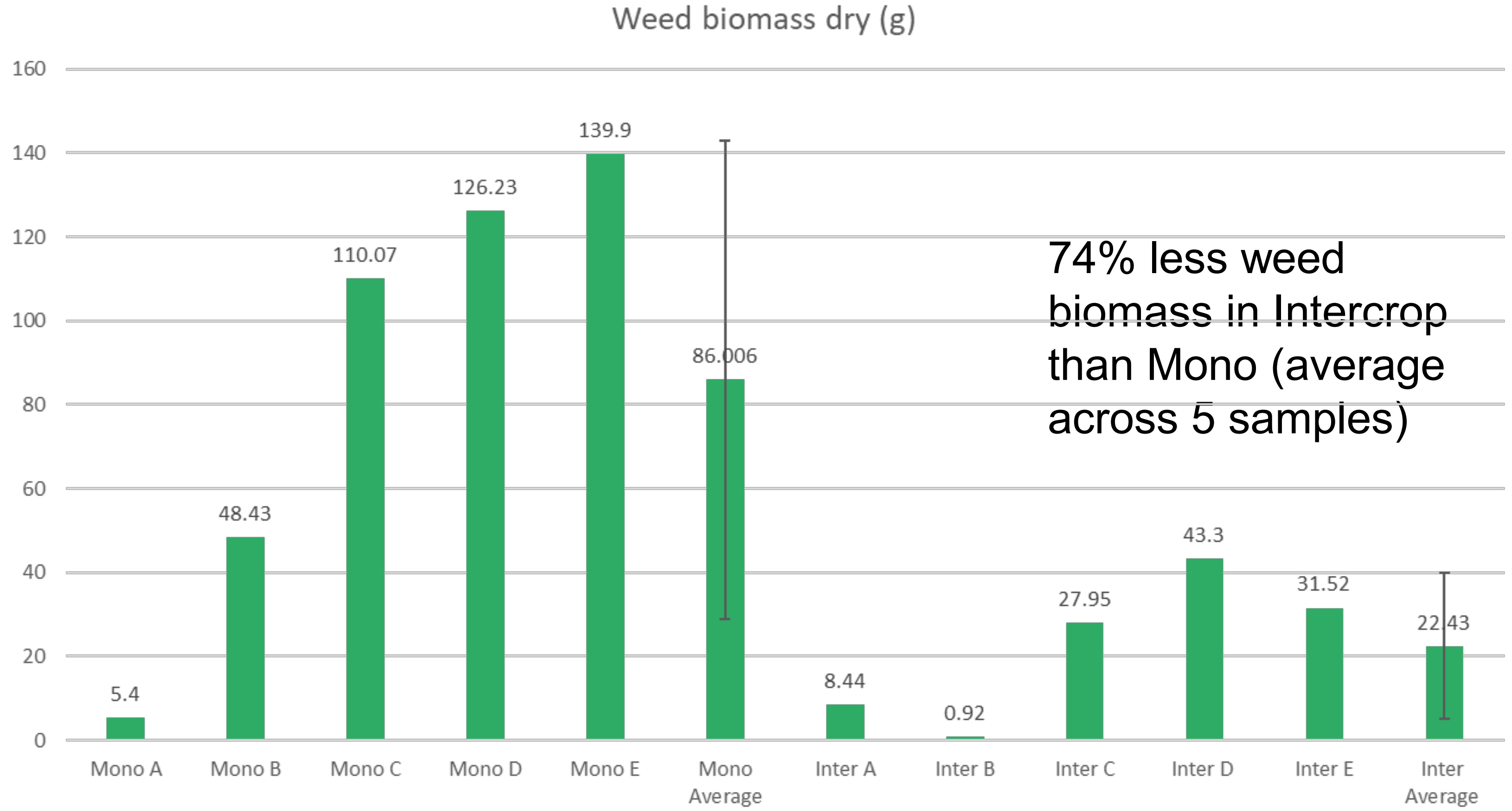
222%
increase in
total yield



15%
Moisture

WEEDS

Weed biomass – 0.5m quadrat cuts, June 18



74% less weed biomass in Intercrop than Mono (average across 5 samples)

Reflects findings in previous studies

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Companion Cropping
Potatoes

A clear solution for farmers
CATCHMENT SENSITIVE FARMING

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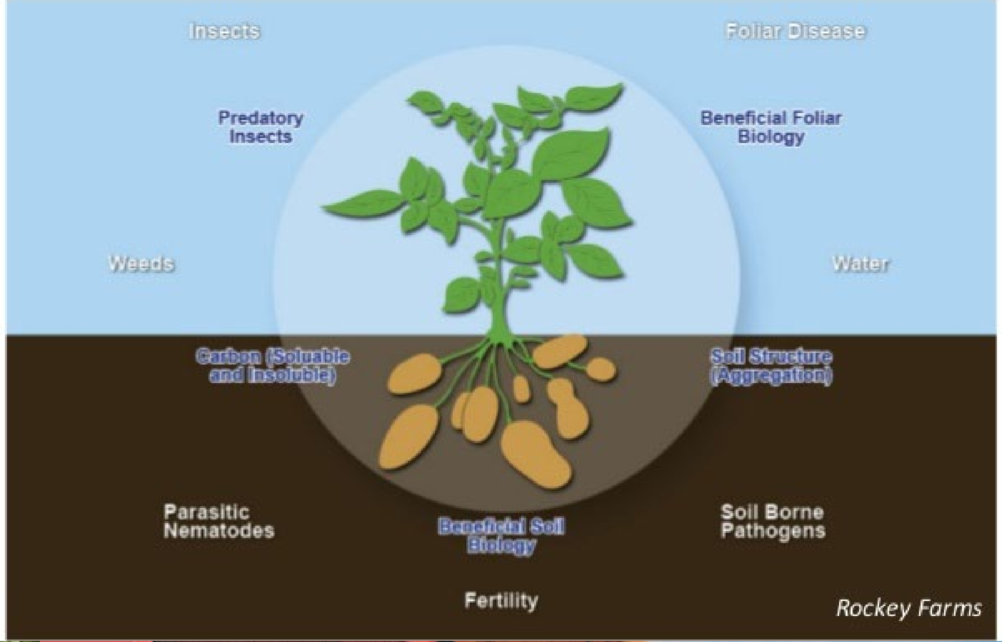
Rockey Farms Pro-Biotic Approach



Intercrops and Weeds

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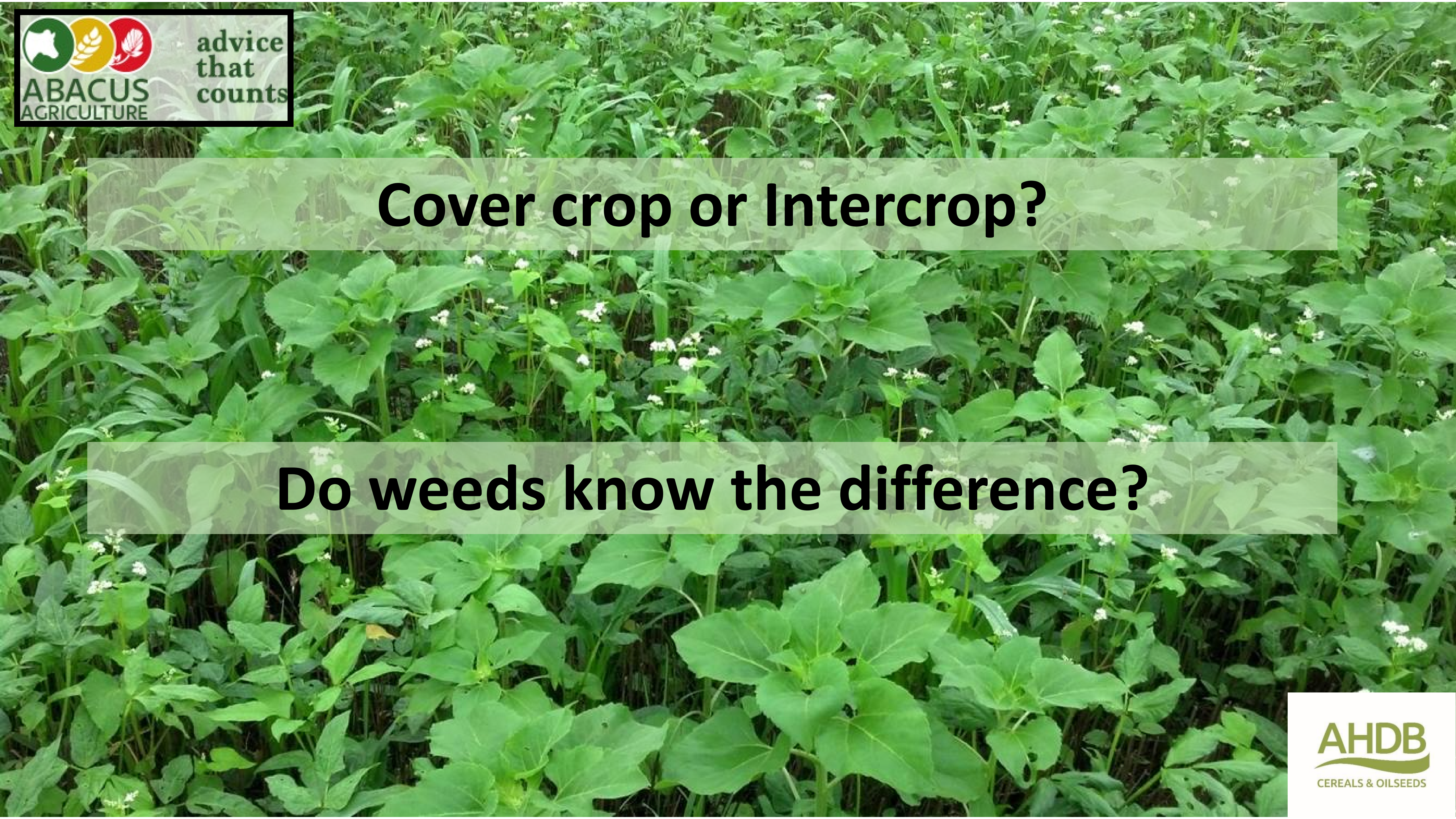

Cover crop or Intercrop?

Do weeds know the difference?

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How do Cover Crops and Companion Crops affect Weeds?

- Allelopathy
- Shading (competition for radiation) reduce amount reaching the soil by 30%
- Competition for nutrient and water
- Encourage/protect weed seed predators (increase predators x3)
- Improve soil characteristics (change microbial communities)

- Undersowing Mammoth Red Clover in wheat reduced brome by 98%
- Some weed species only germinate when nitrate levels are around 50ppm
- 20% inclusion of barley in a legume/cereal intercrop reduces weed pressure by 90%
- Weeds were x3 worse in pea sole crop compared to pea/barley intercrop
- Weed diversity reduces in intercrops (filling niches)
- Can use herbicides, mowing and grazing to prevent mulches becoming weeds

RECENT RESEARCH

Effect of drought on weed emergence and growth vary with the seed burial depth and presence of a cover crop – Stephane Cordeau et al (2018)

- Tested eight different weed species
- Unburied seeds had 26% lower emergence
- Cover crop reduced emergence by 17% overall
- Unburied seeds under drought stress had 45% less emergence compared to buried seeds with no drought stress
- All weed growth measurements decreased in the presence of a cover crop

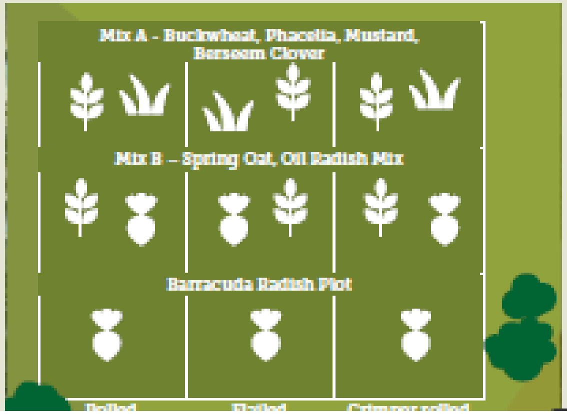
Are there practical alternatives for terminating cover crops?

David White, Hawk Mill Farm

Why

A growing body of evidence is showing the benefits of cover crops for both soil health and productivity. But currently there are limited tools for destroying them prior to establishing a cash crop. The options are generally ploughing if farming organically, or glyphosate for non-organic and no-till farmers. Now, a group of organic and non-organic arable farmers are looking to add to the toolbox by assessing a range of alternative methods, including flailing, roller crimping, grazing and rolling, and comparing how effective they are against their normal practices.

Trial Design



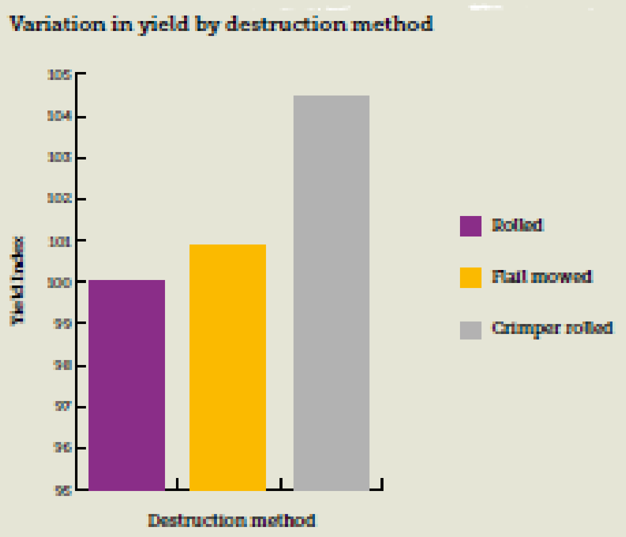
7 farms took part in the trial. Each using a range of cover crop mixes and destruction techniques.

At Hawk Mill Farm:

- Cover crops drilled early and destroyed on 25 November to take advantage of frost.
- A second field of beans and phacelia was rolled and flailed.
- After destruction a crop of spring barley was sown.

AHDB	5	Soil Association	£9,600	ADAS
Sponsor	Number of triallists	Coordinator Liz Bowles	Amount invested	Researcher Helen Holmes

The Results



- The yield data are indicative of the potential for other destruction methods. However, they also reflect in-field variation as well as the success of the different techniques. Yield assessments could have been affected by some areas of the field that were waterlogged at establishment due to the wet spring of 2018.
- The group reported that they learned significantly more about cover crop selection, establishment and destruction methods from doing the trial – both in relation to their own farms, and from each other.
- "The main conclusion from this trial for this season is that there is scope to destroy cover crops in a variety of ways and not impact on yields of the following spring crop." – **Helen Holmes**

David's Analysis

"As a group, we've learned a lot this year about cover crops. There are so many variables, and good destruction is all about getting the species and the timing right. Destroying on 25 November felt a little early, but we wanted to take advantage of the effects of the frost plus the mustard was starting to set seed.

When it comes to the different destruction methods, it was a case of the right tool for the right crop. The Cambridge roller was pretty consistent though, and as we've already got one on the farm, that's what I'd be most likely to use in the future. At a field scale I'd give it two passes, the first along the tramlines and the second at a 30 degree angle. **If I had the right cover crops in, this would mean I could halve my**

Options for Maize


ABACUS AGRICULTURE
advice that counts
NUFFIELD FARMING SCHOLARSHIPS TRUST
AHDB
CEREALS & OILSEEDS

Catch Crops

ABACUS AGRICULTURE advice that counts

NUFFIELD FARMING SCHOLARSHIPS TRUST

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ABACUS AGRICULTURE
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AHDB
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Questions?
@FarmerAndyH
ABACUS AGRICULTURE
advice that counts

Thank you

ABACUS AGRICULTURE

advice that counts


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

North East Agronomy Day – 19 Feb 2020

Cereal and Oilseed market outlook

James Webster, Senior Analyst

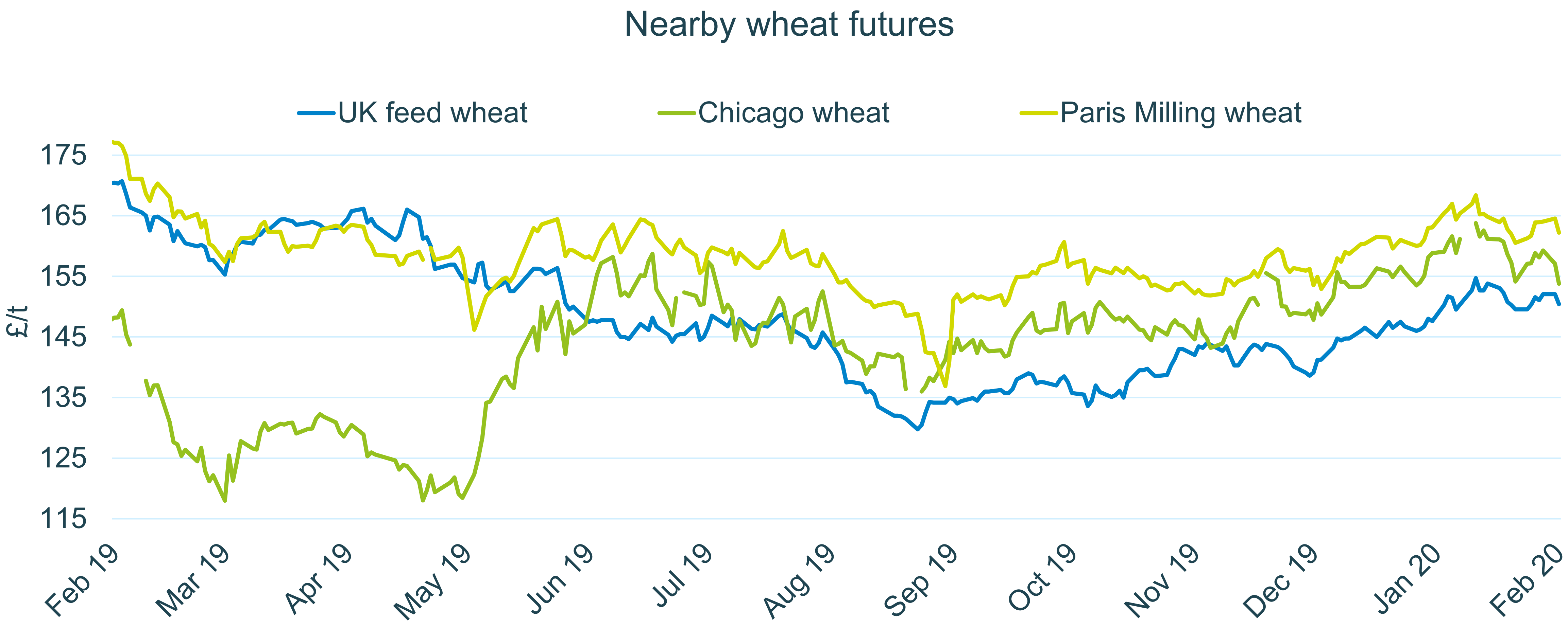
CEREALS & OILSEEDS

Global market

The global drivers for the rest of this season and beyond.

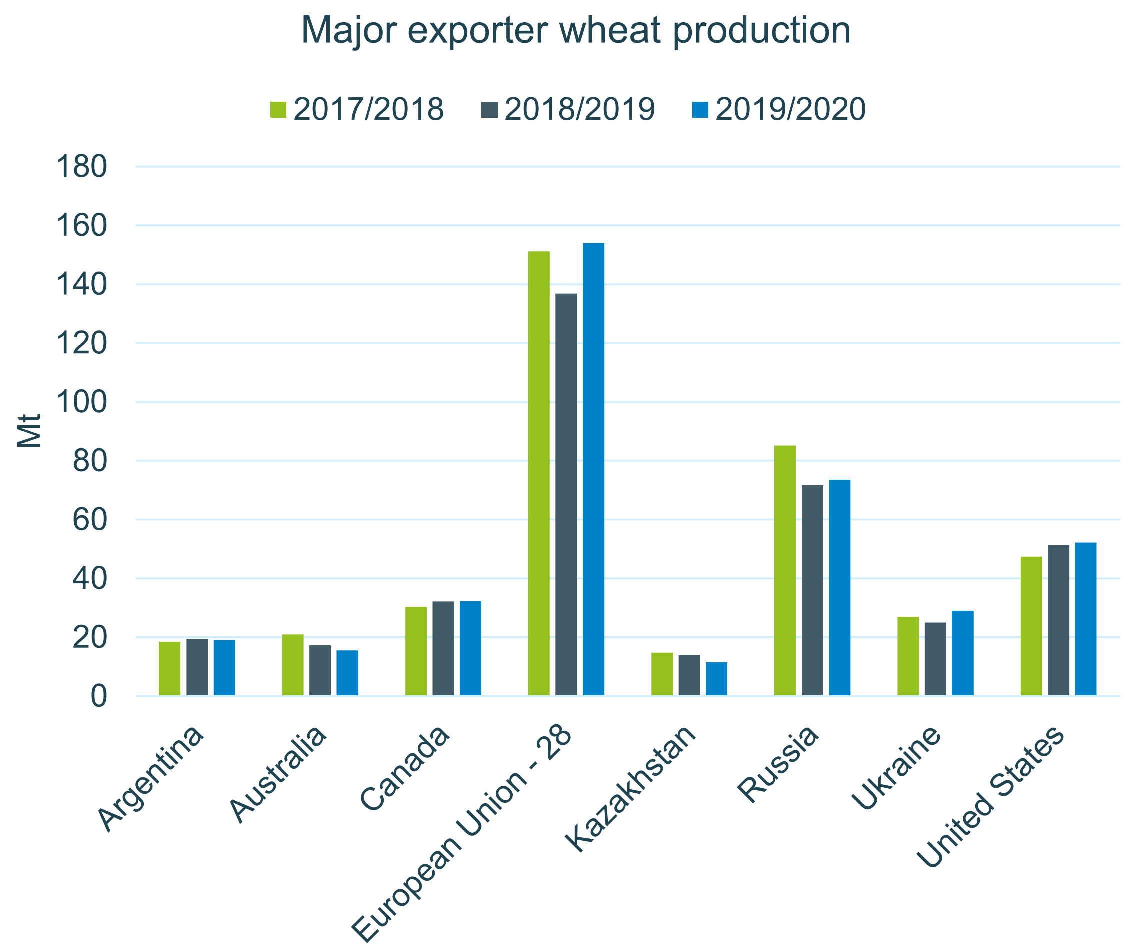
CEREALS & OILSEEDS

Early signs of large crops giving way to new crop concerns

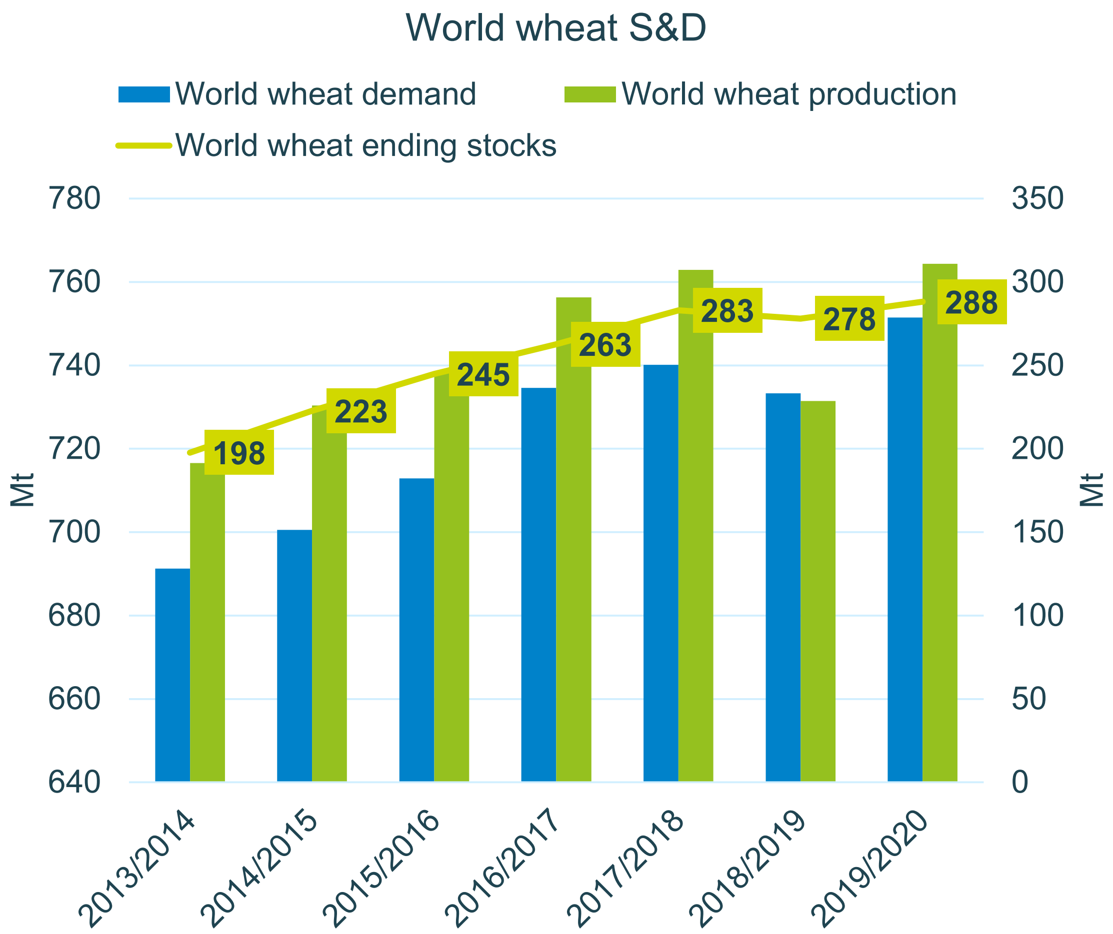


Source: Refinitiv

Major exporter production up in 2019/20, stocks grow again

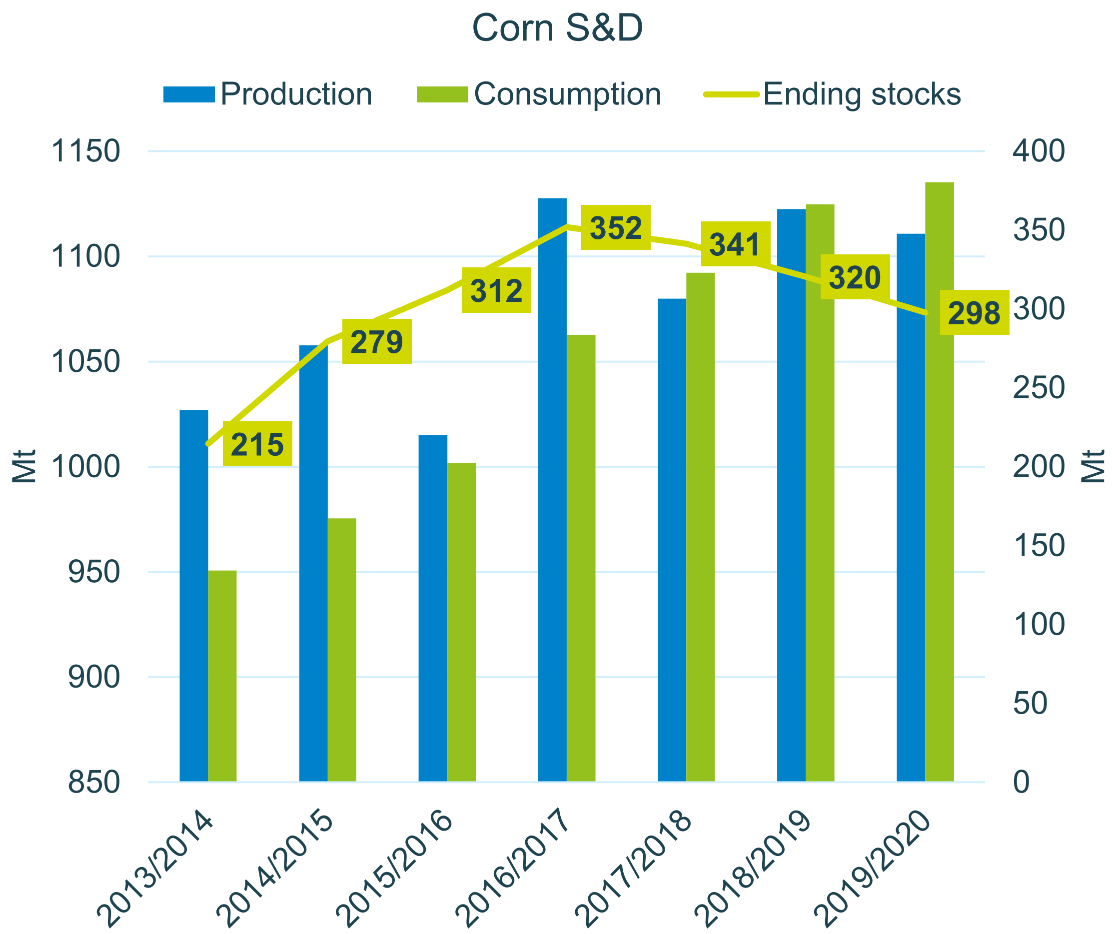


Source: USDA



Source: USDA

Tighter maize picture, still comparatively huge stocks



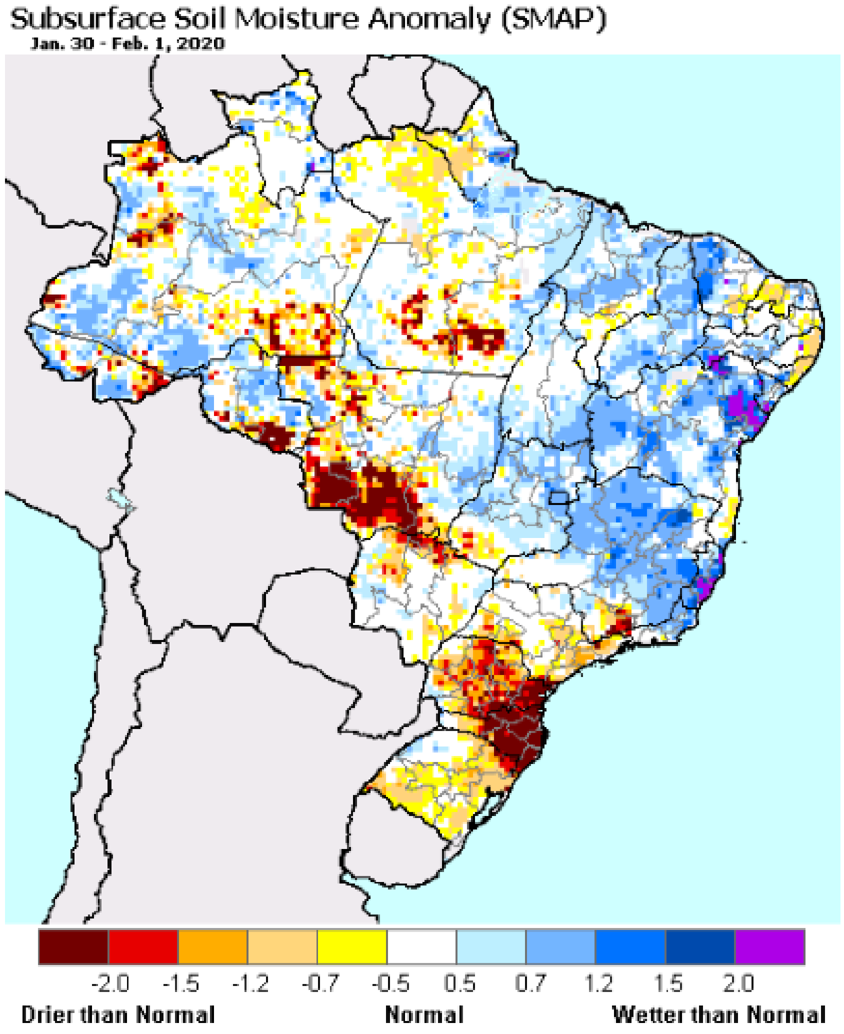
Source: USDA

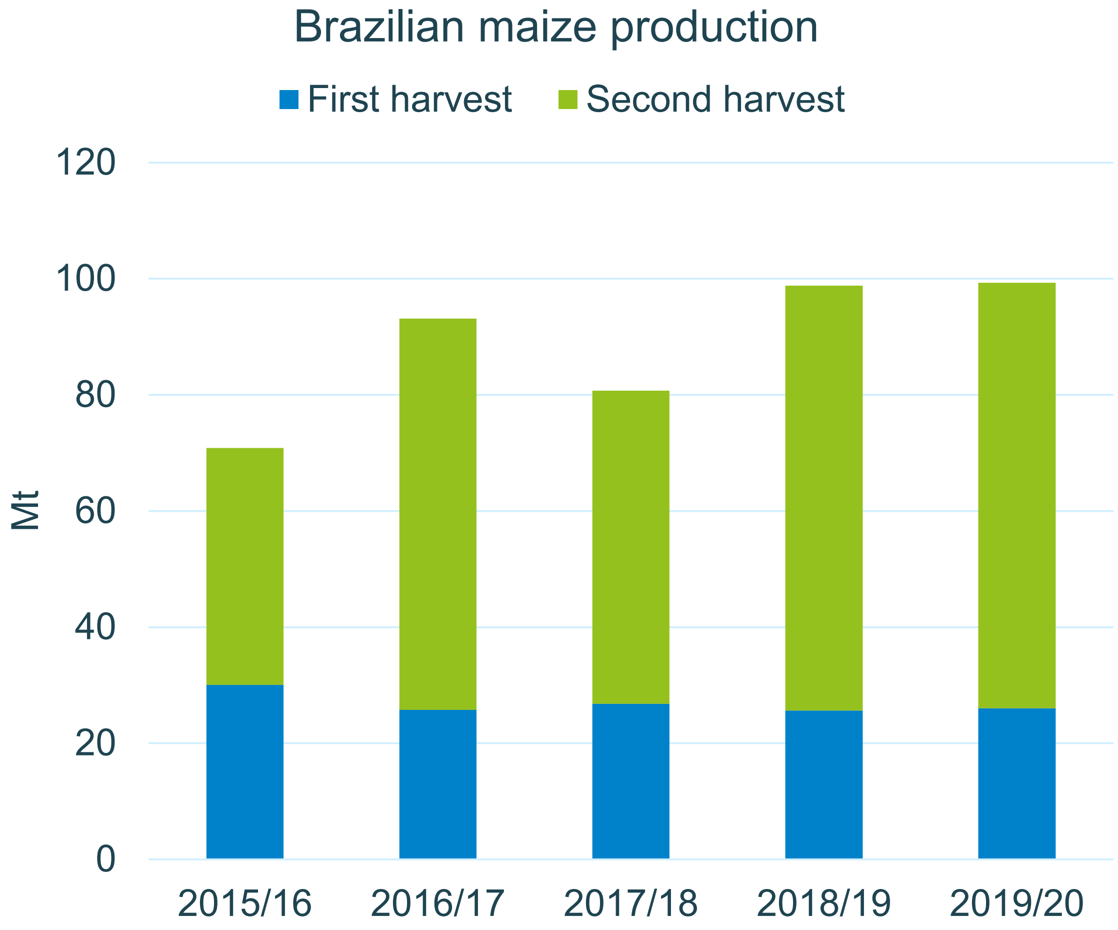
Source: Refinitiv

We are in a weather market

		J	F	M	A	M	J	J	A	S	O	N	D
Argentina	Winter	H				P	P	P	P			H	H
Australia	Winter	H	H		P	P	P	P			H	H	H
Canada	Winter				P	P	P	P	H	H	H	H	H
	Spring				P	P			H	H	H		
EU	Winter						H	H	H	P	P	P	P
	Spring		P	P	P	P		H	H	H			
Kazakhstan	Spring					P			H	H			
Russia	Winter							H	H	P	P		
	Spring				P	P			H	H			
Ukraine	Winter							H	H	P	P		
	Spring		P	P	P			H	H				
USA	Winter						H	H		P	P	P	
	Spring				P	P			H	H			

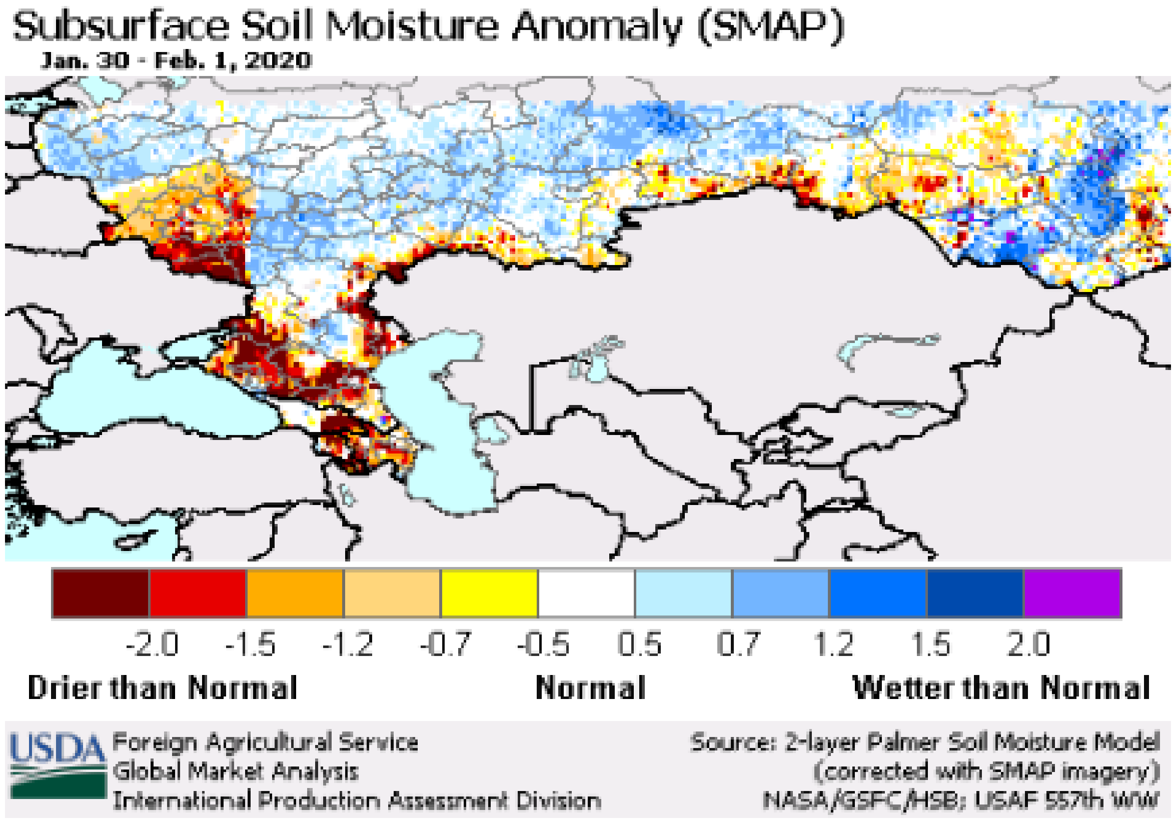
Weather in South America a key watch point





Source: Conab

Russian weather and trade important



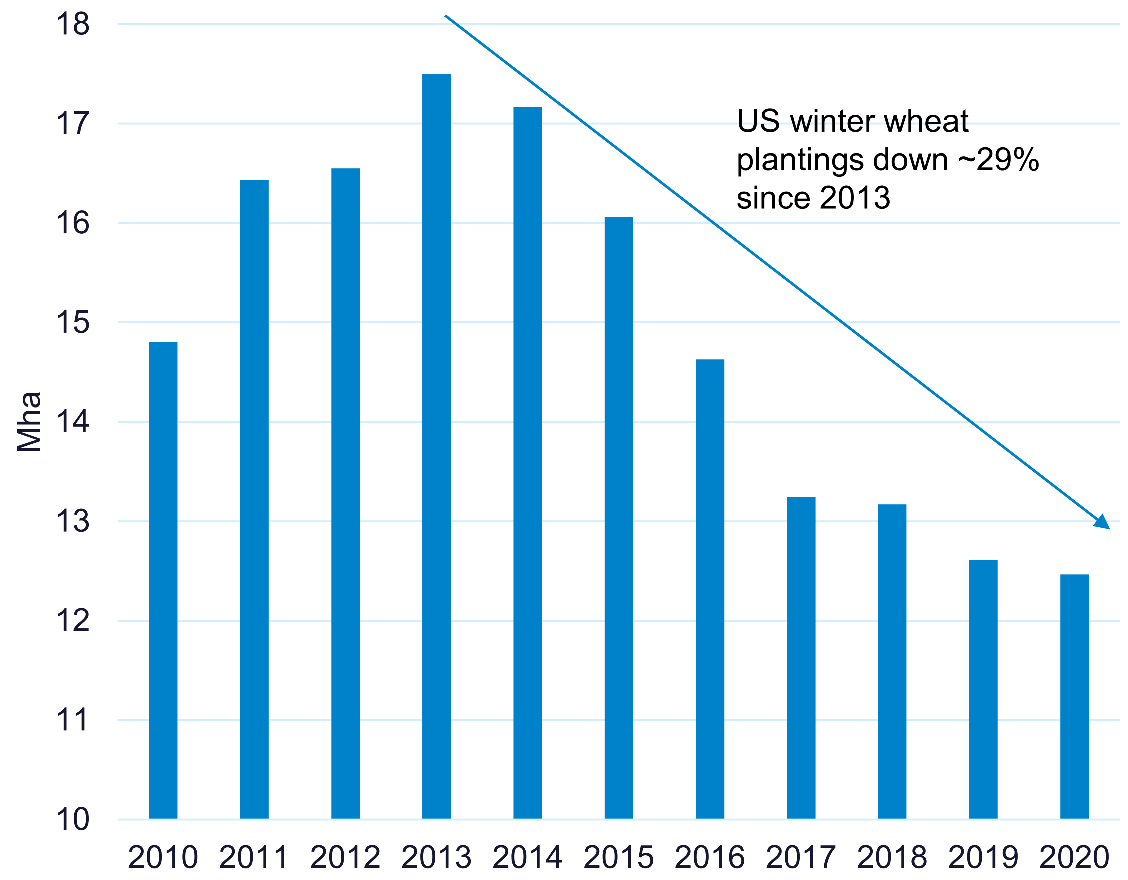
Source: Refinitiv

Global new crop

What do we know so far?

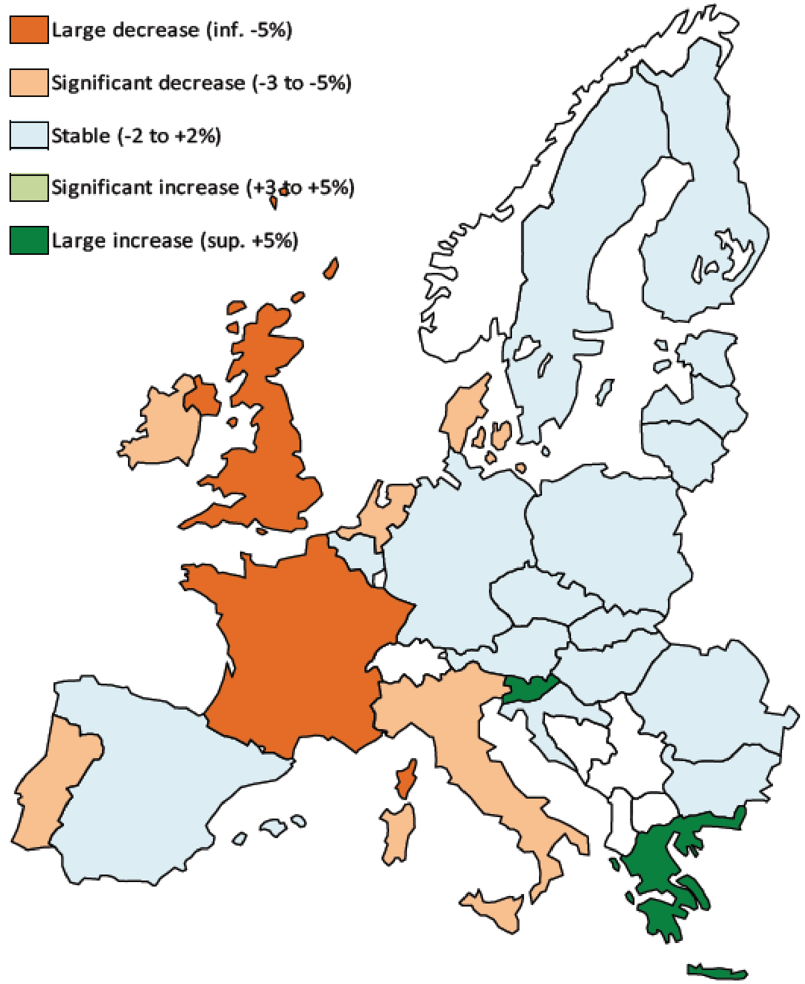
CEREALS & OILSEEDS

Further signs of potential tightness for US and EU



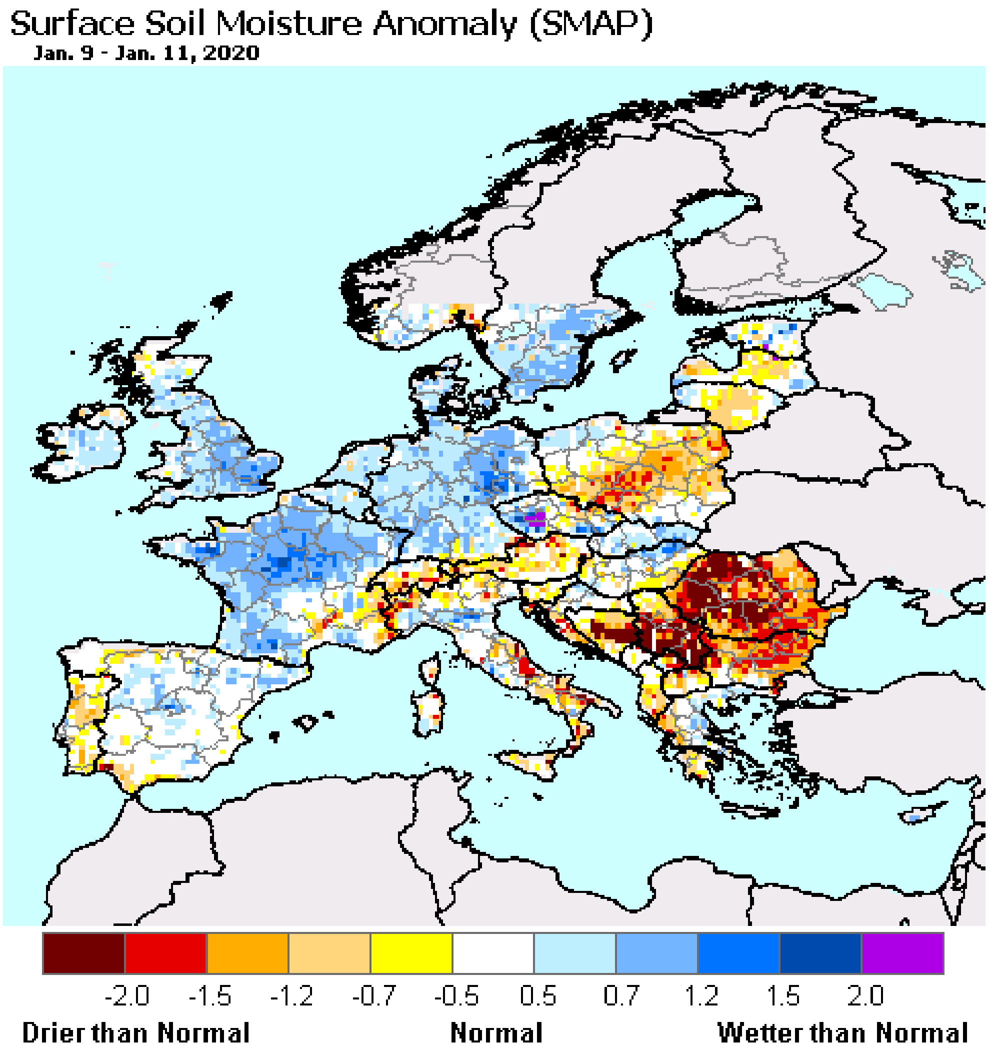
Source: USDA

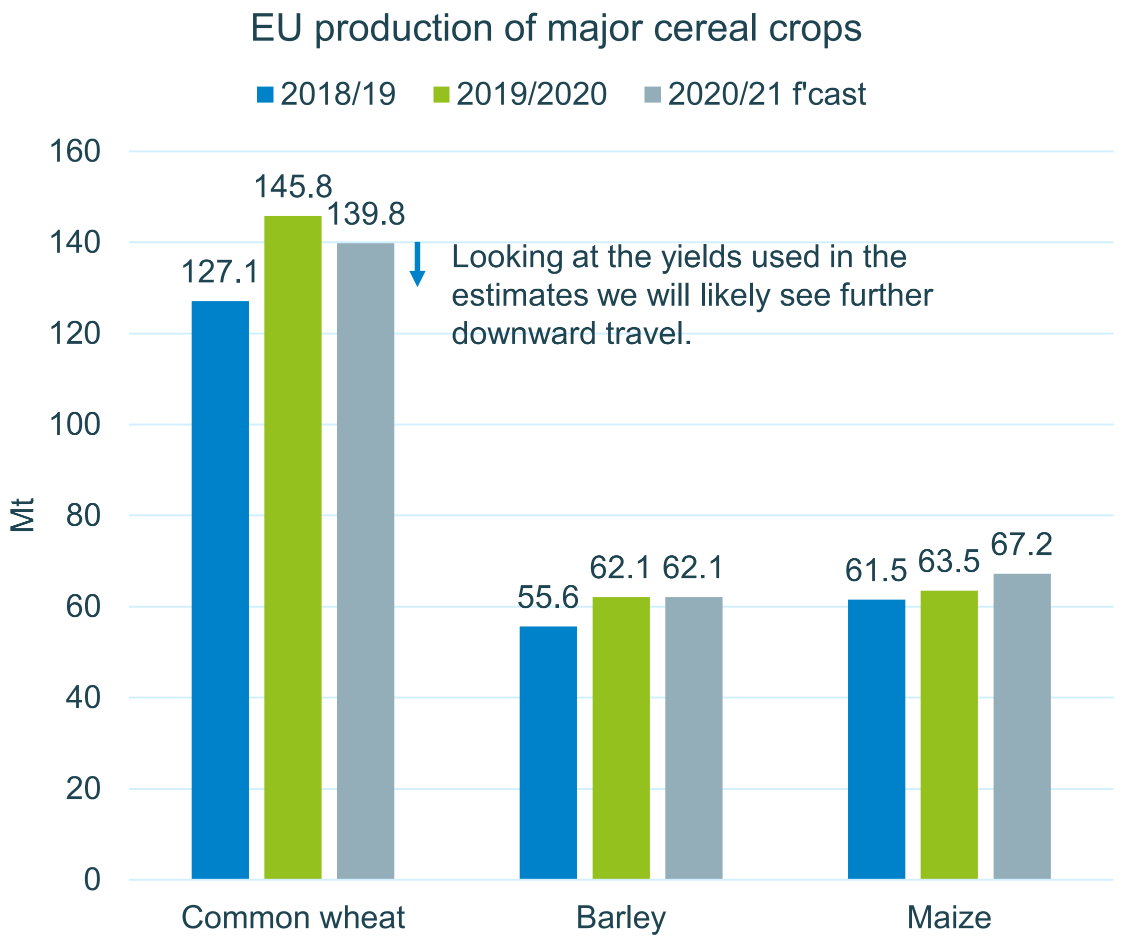
Change in wheat acreage - 2020 v 2019



Source: Stratégie Grains

EU 2020/21 outlook





Source: Stratégie Grains

Global summary

Large supplies pressured early market, before giving way to new crop concerns

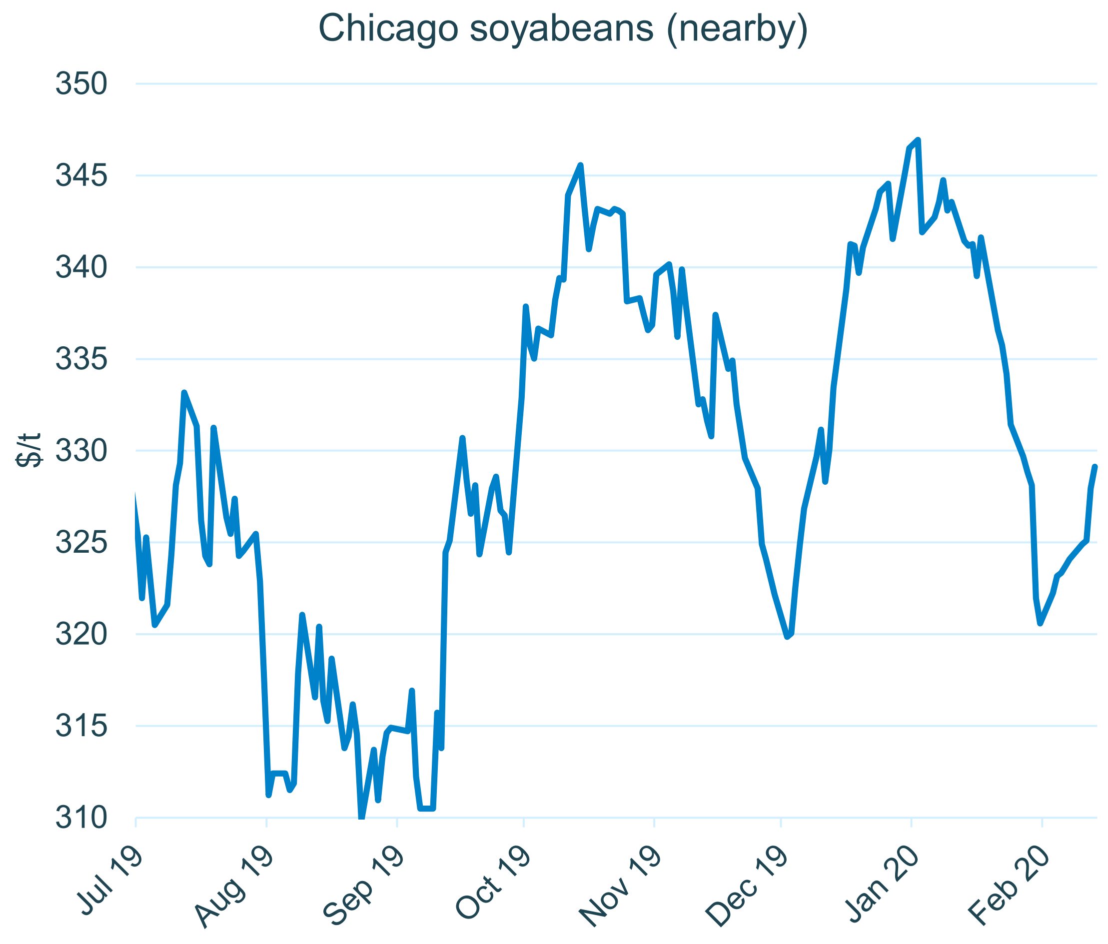
We are in the midst of a weather market, with a focus on South America and Russia.

Winter wheat area down in the US and EU. Stronger areas in the Black Sea Region.

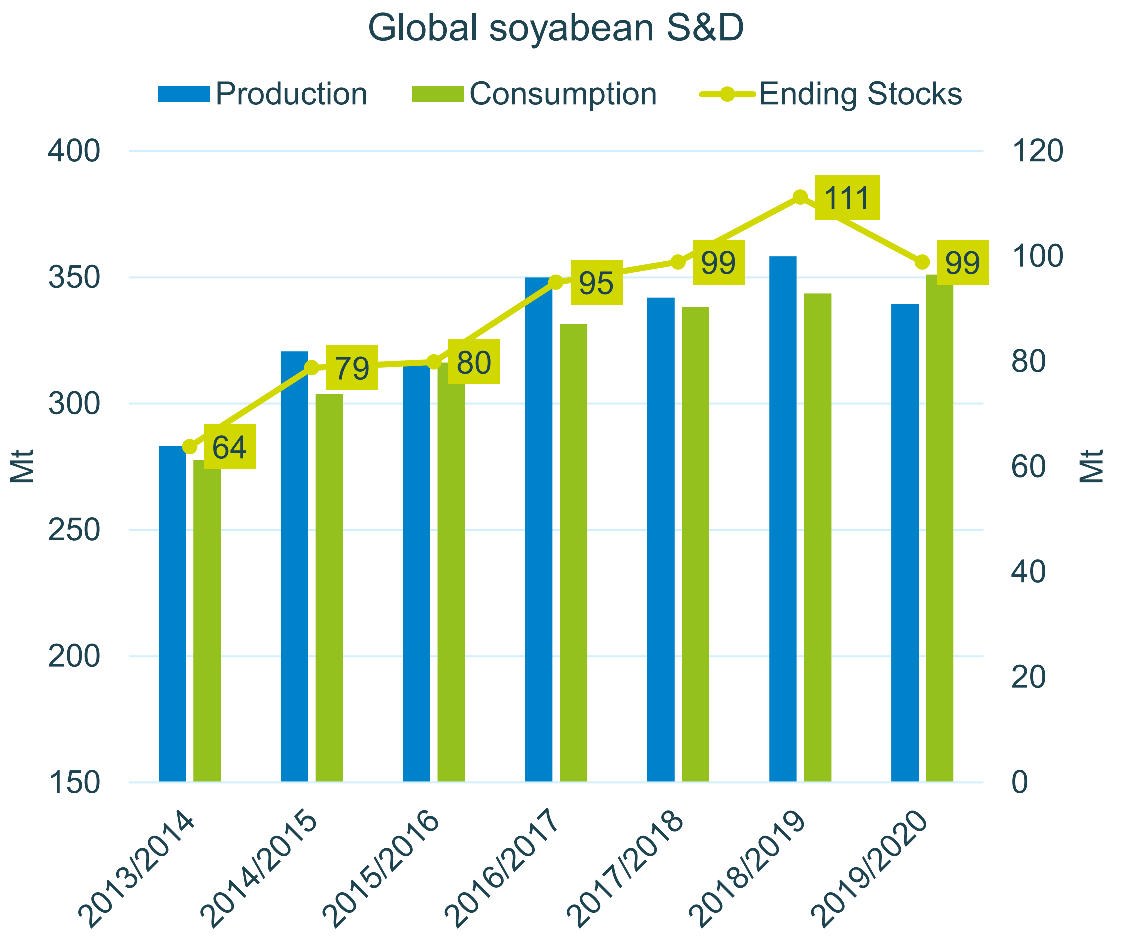
Oilseed volatility

CEREALS & OILSEEDS

Soyabeans tighter year-on-year but China key

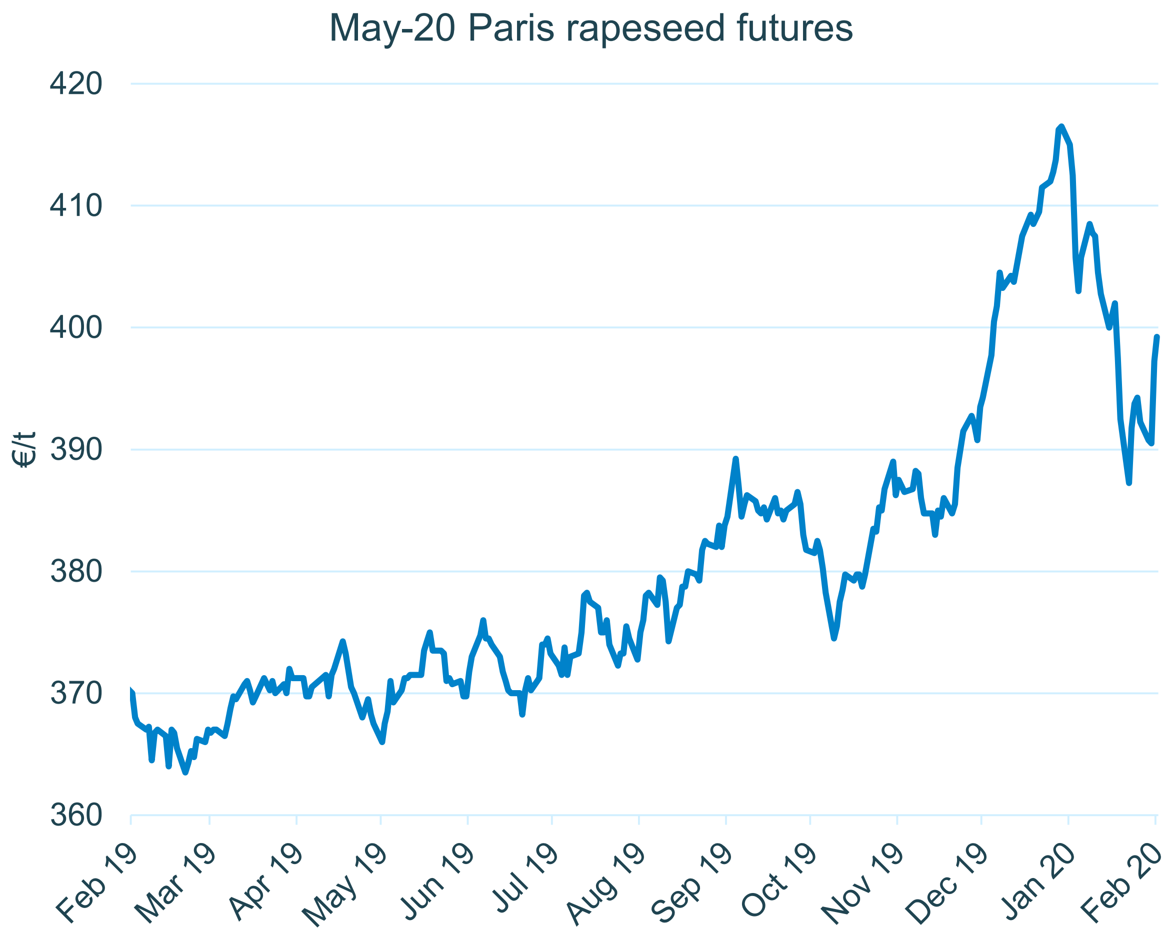


Source: Refinitiv

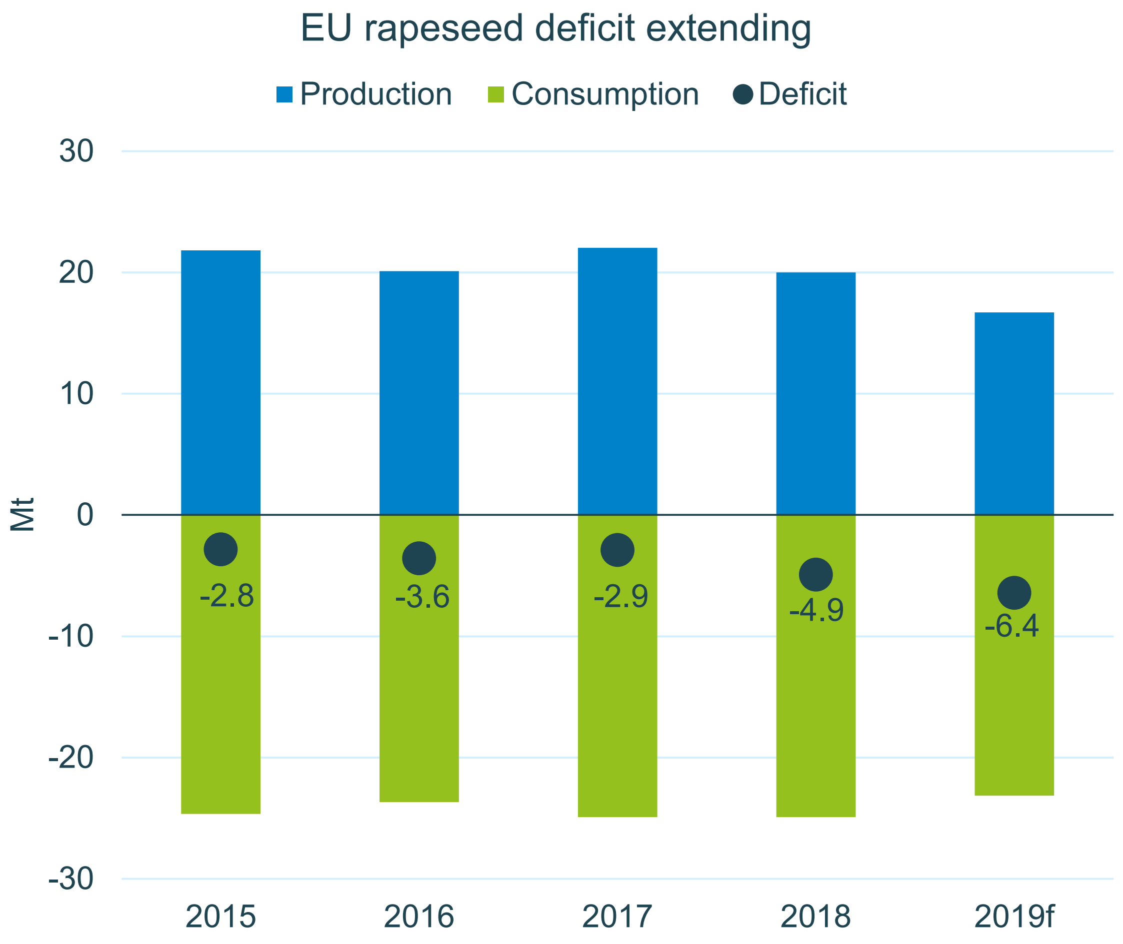


Source: USDA

EU rapeseed deficit growth continues

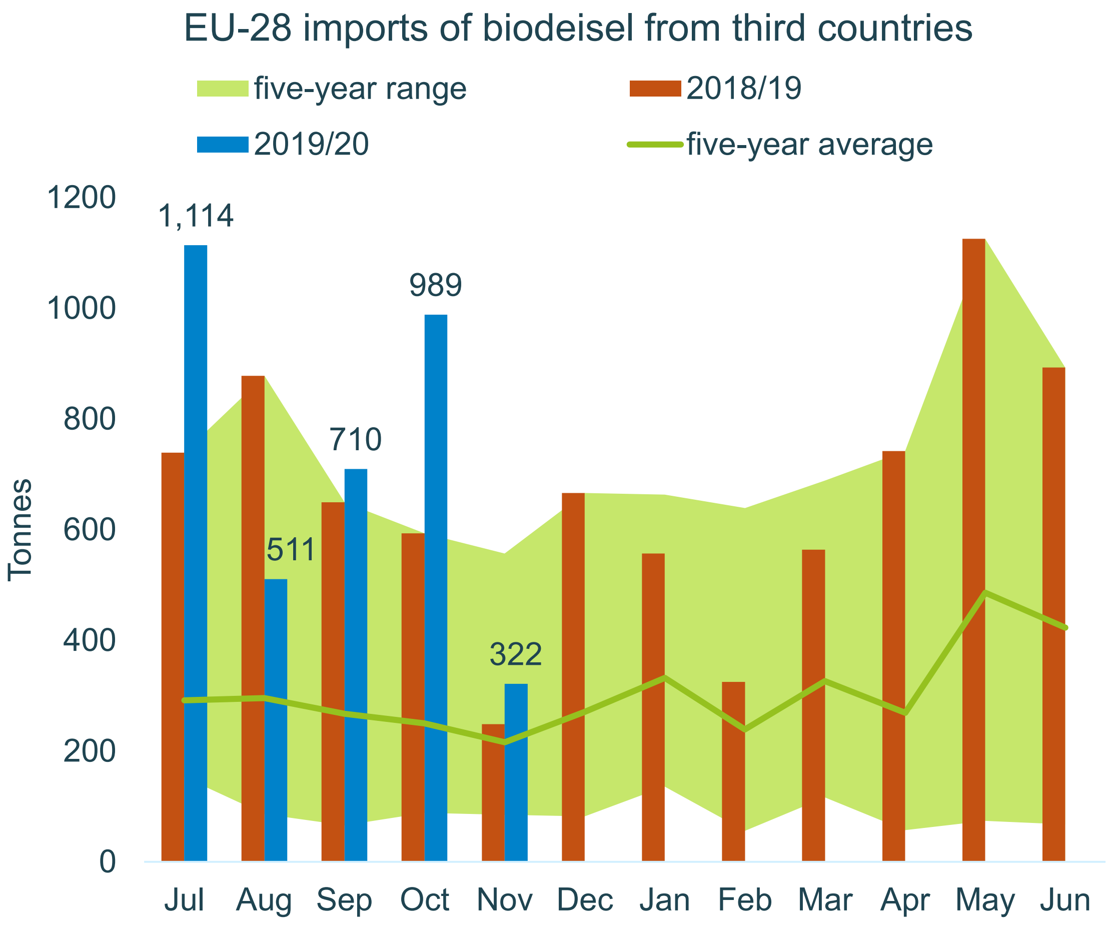


Source: Refinitiv

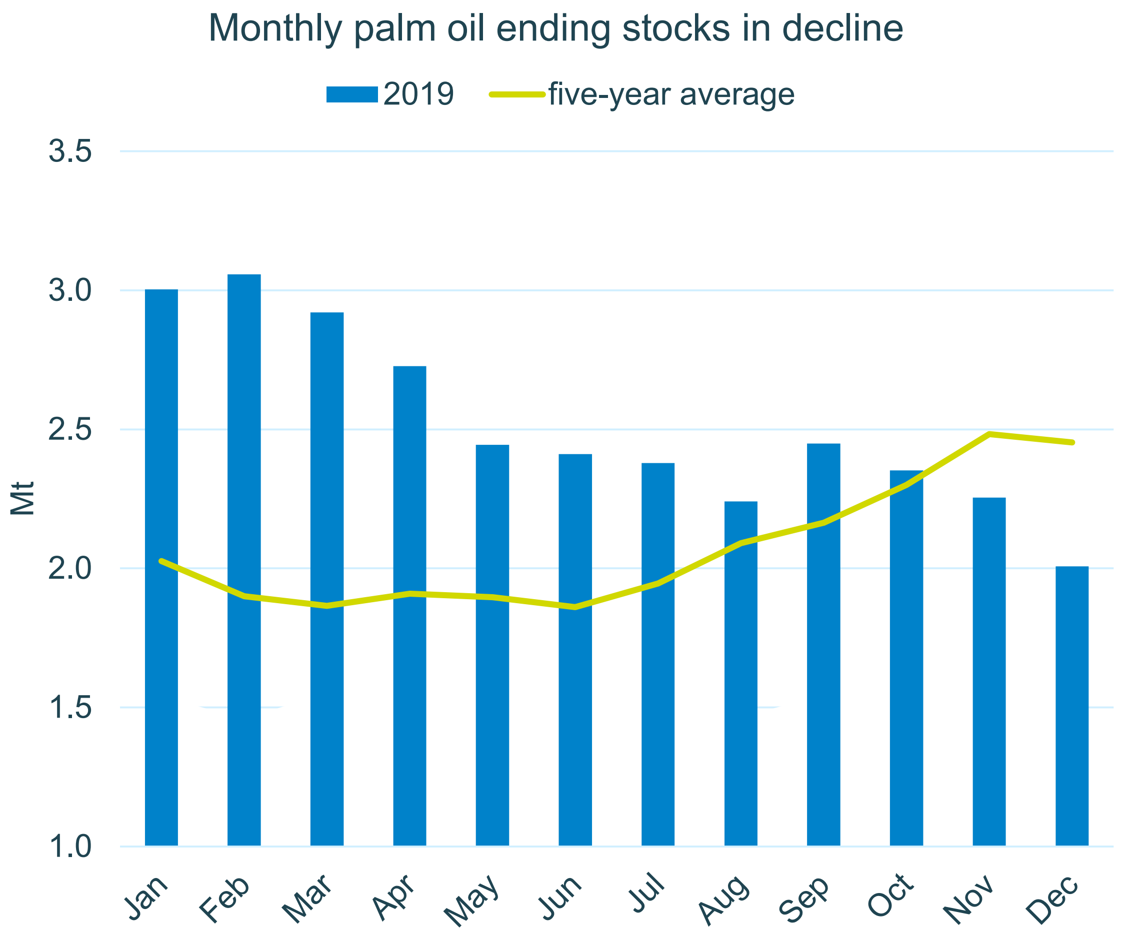


Source: EU Commission

Vegetable oil and biodiesel market trends



Source: Eurostat



Source: Malaysian Palm Oil Board

Oilseed summary

Soyabeans have been volatile on the back of Chinese demand and coronavirus concerns.

.EU oilseed defecit continues to grow, however, market now heavily dictated by import prices

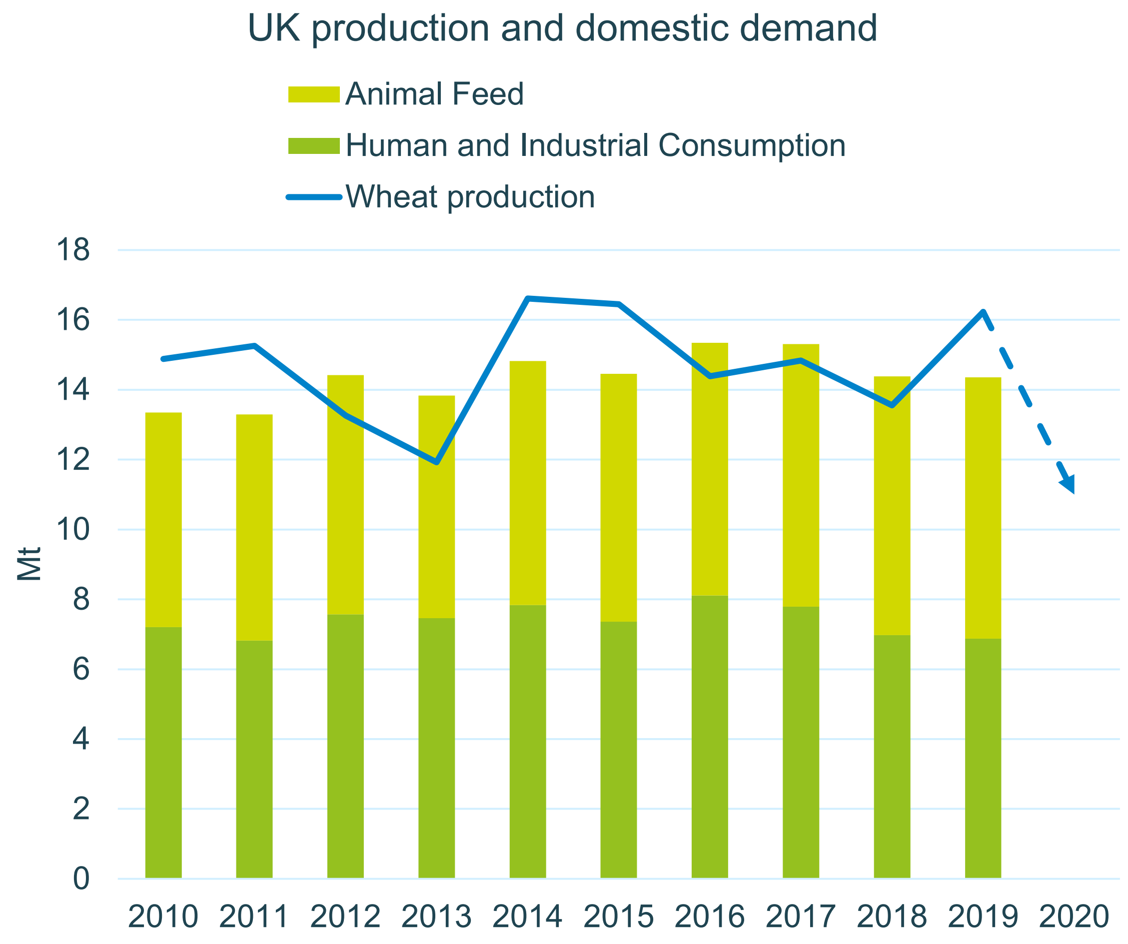
Vegetable oil prices and imports of biodesiel will be crucial to markets going forward.

Domestic market

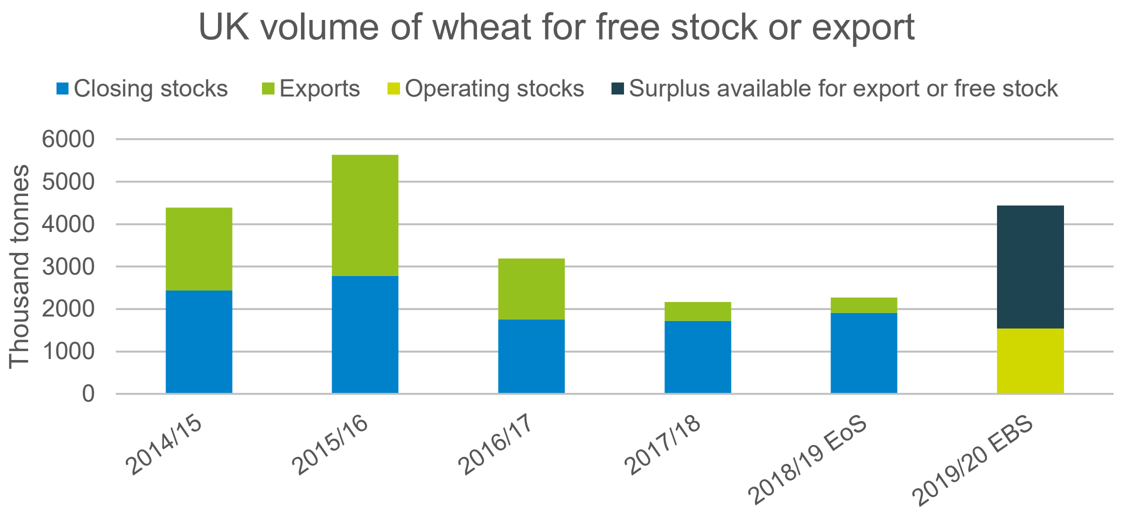
What can we expect in domestic markets over the next 12 months?

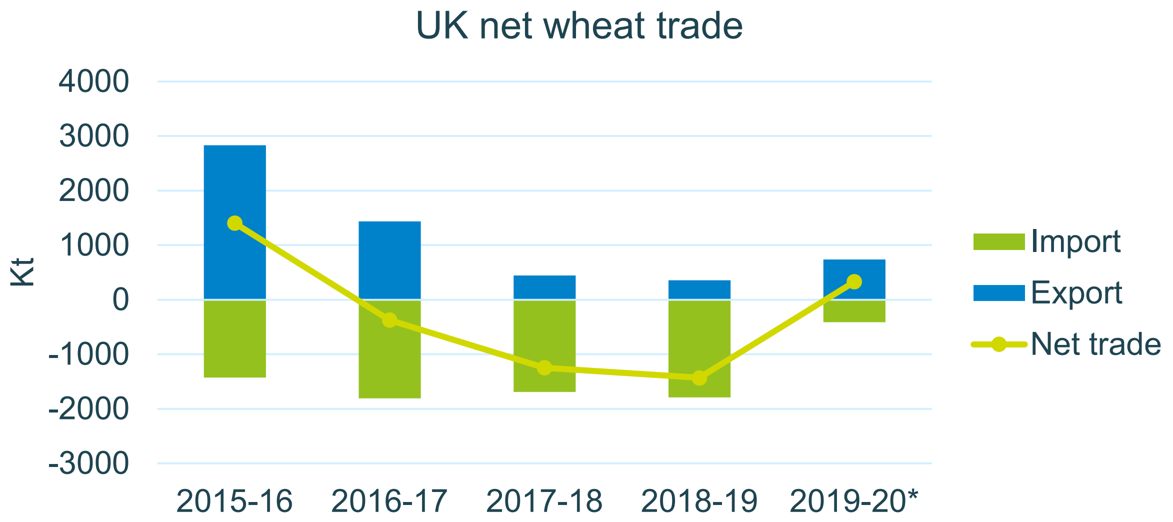
CEREALS & OILSEEDS

UK Wheat S&D

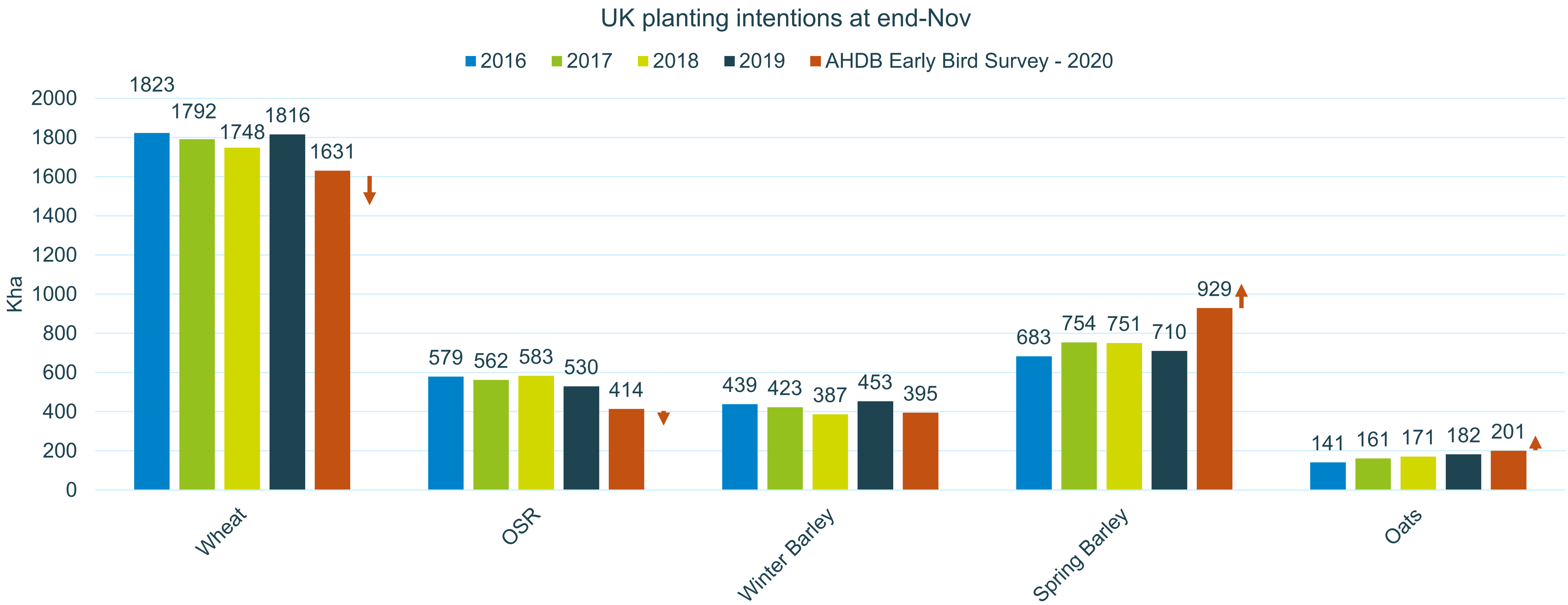


Source: AHDB



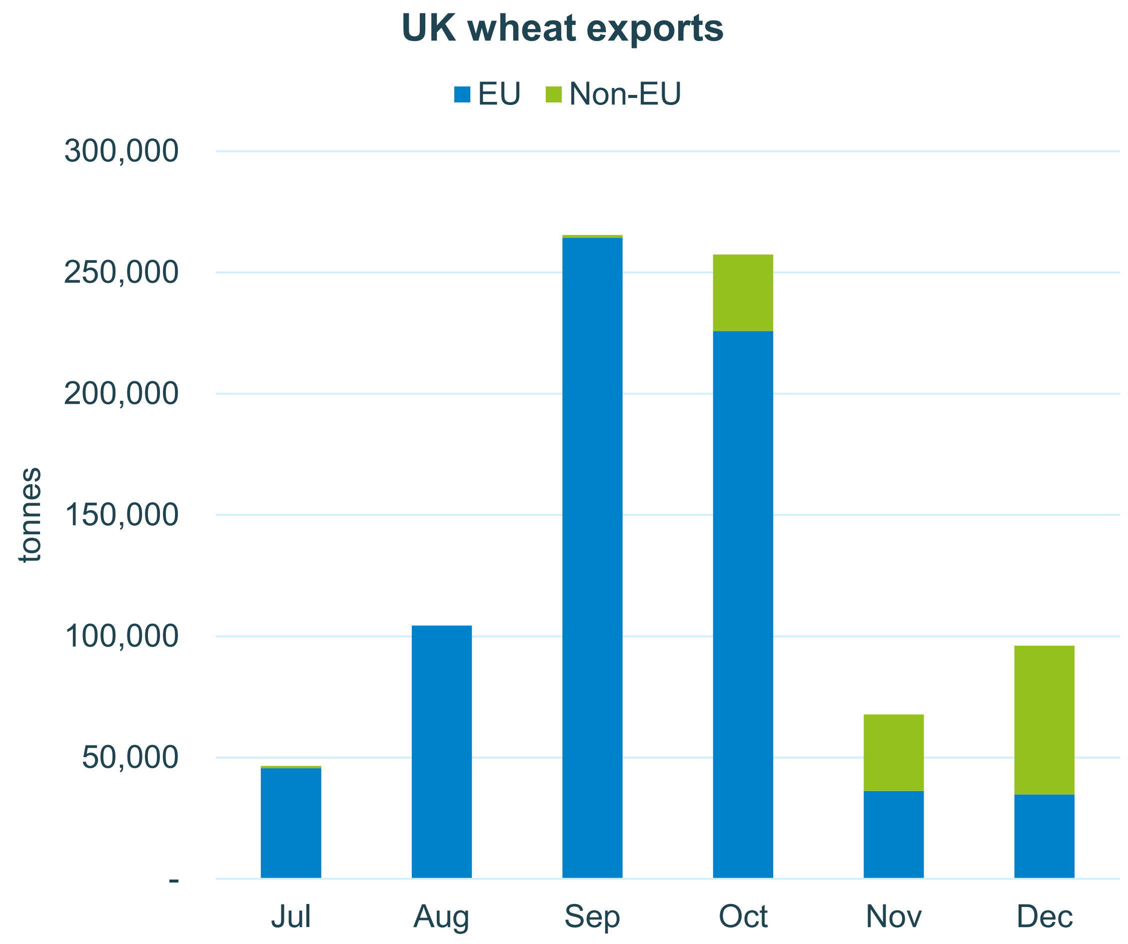


UK Early Bird Survey results

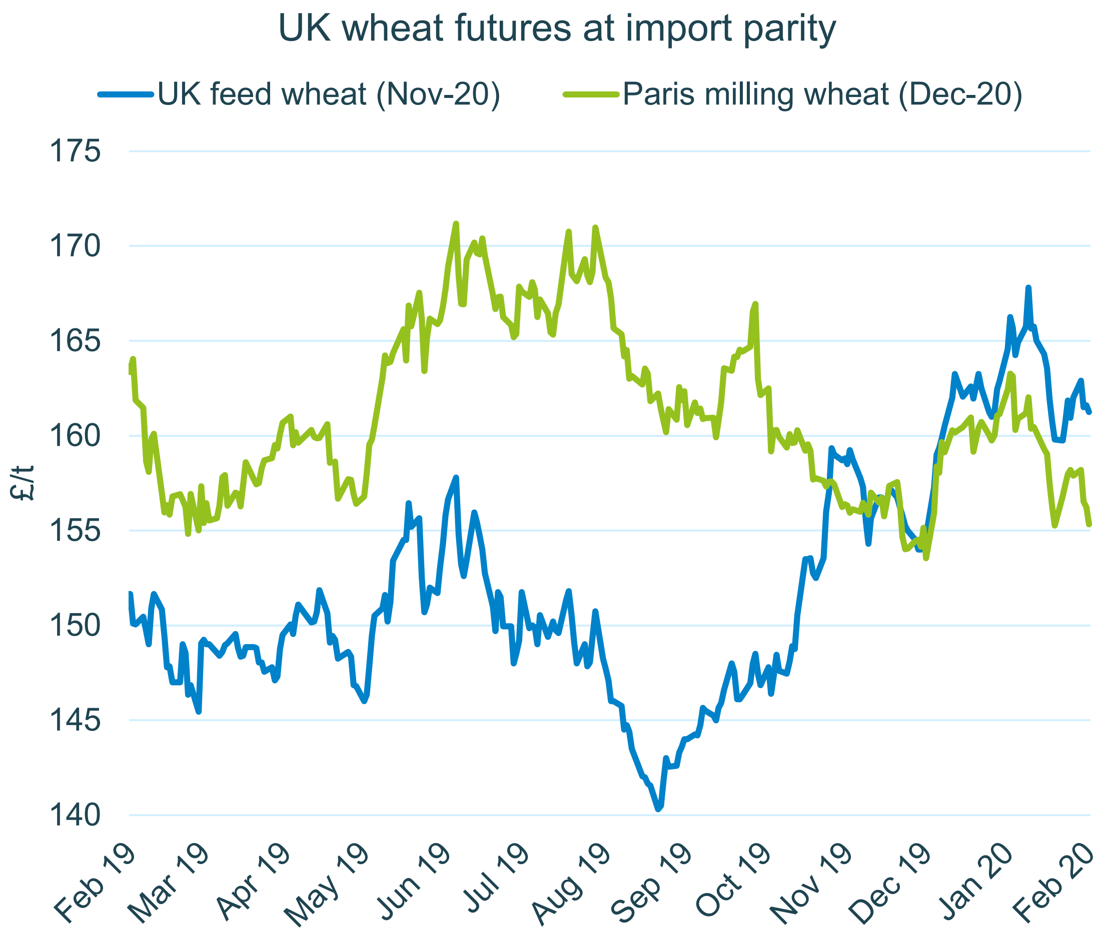


Source: AHDB Early Bird Survey, Defra

Is the UK market already reaching it's peak?



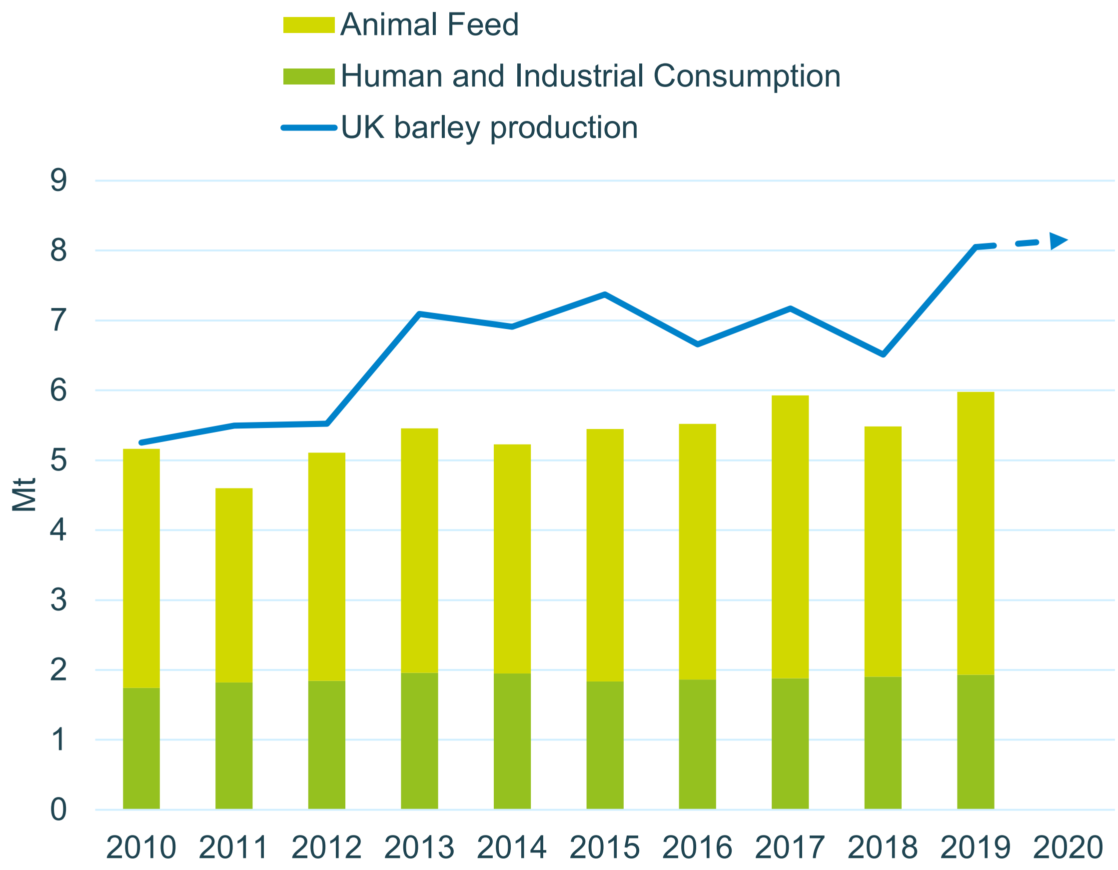
Source: HMRC



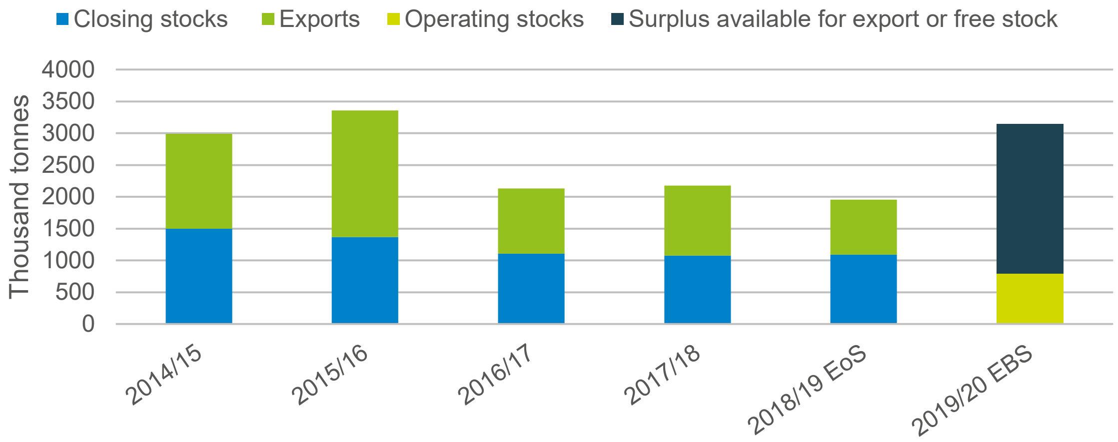
Source: Refinitiv

UK barley S&D

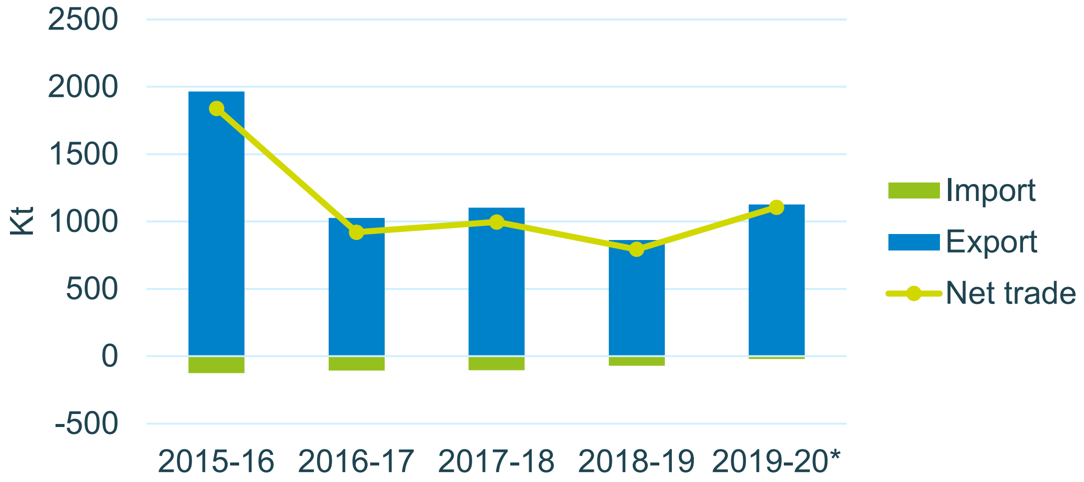
UK barley production and domestic demand



UK volume of barley for free stock or export

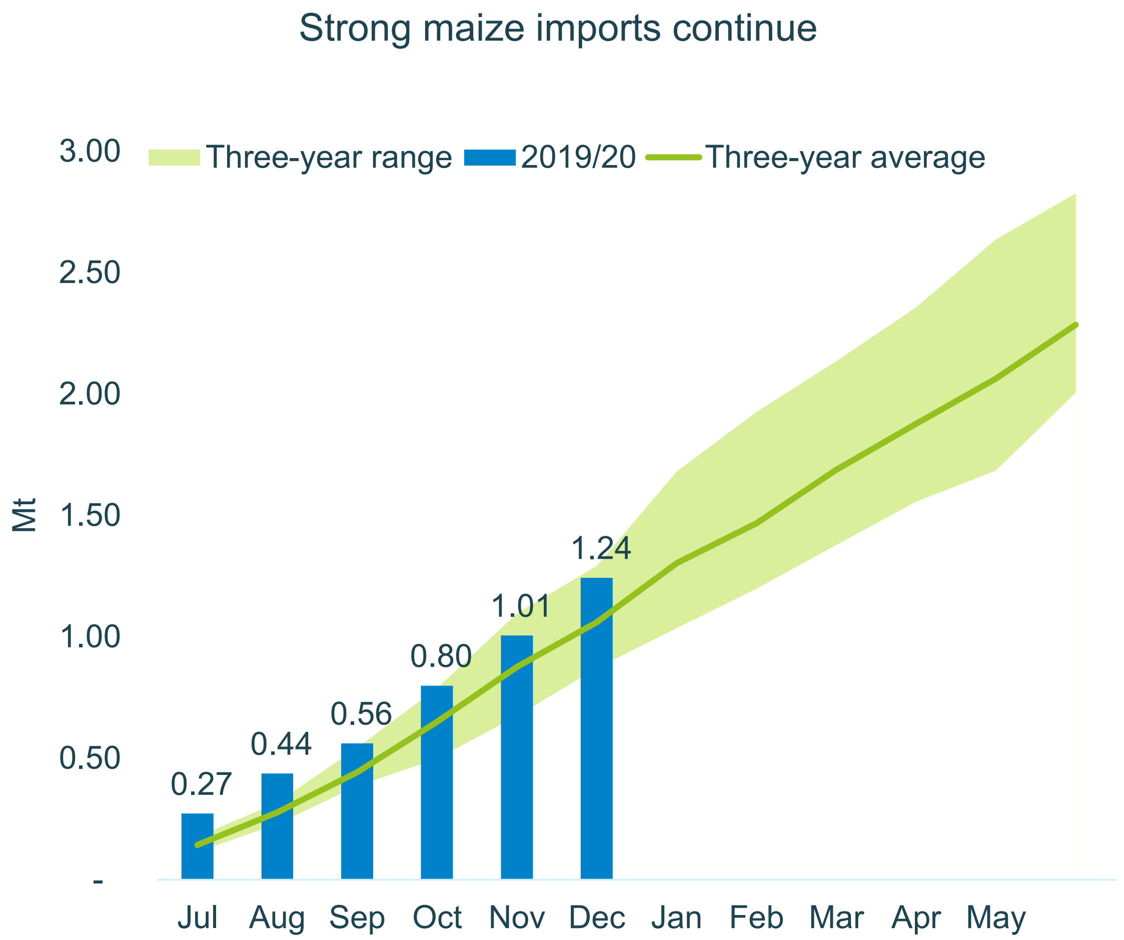


UK net barley trade

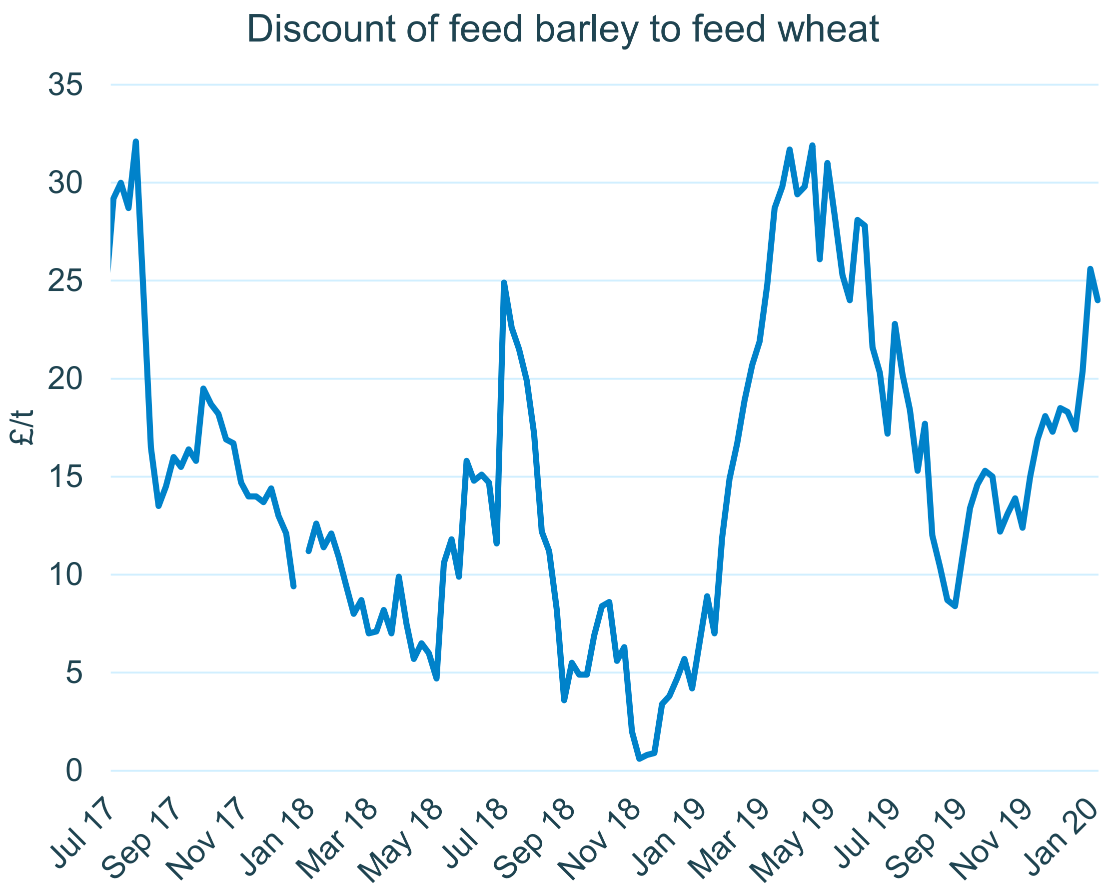


Source: AHDB

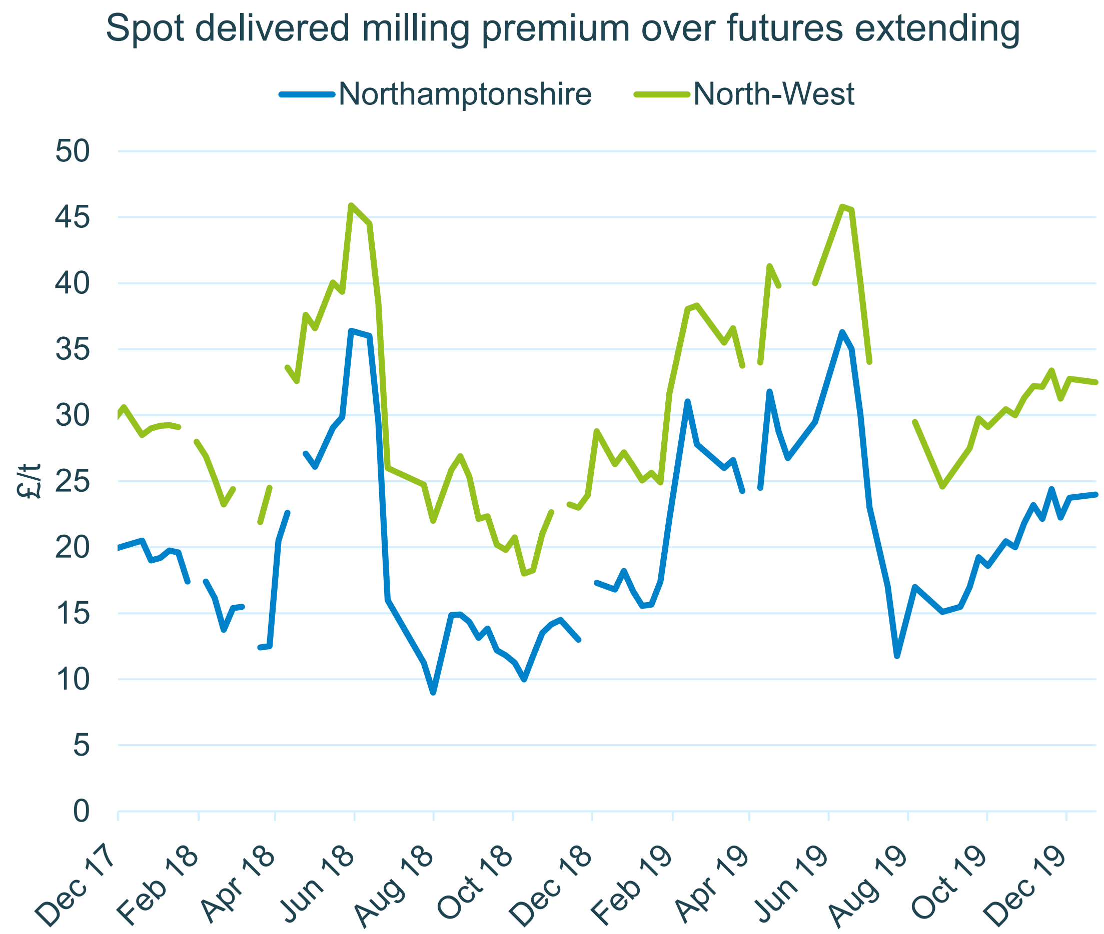
Discount of barley growing with maize also a pressure



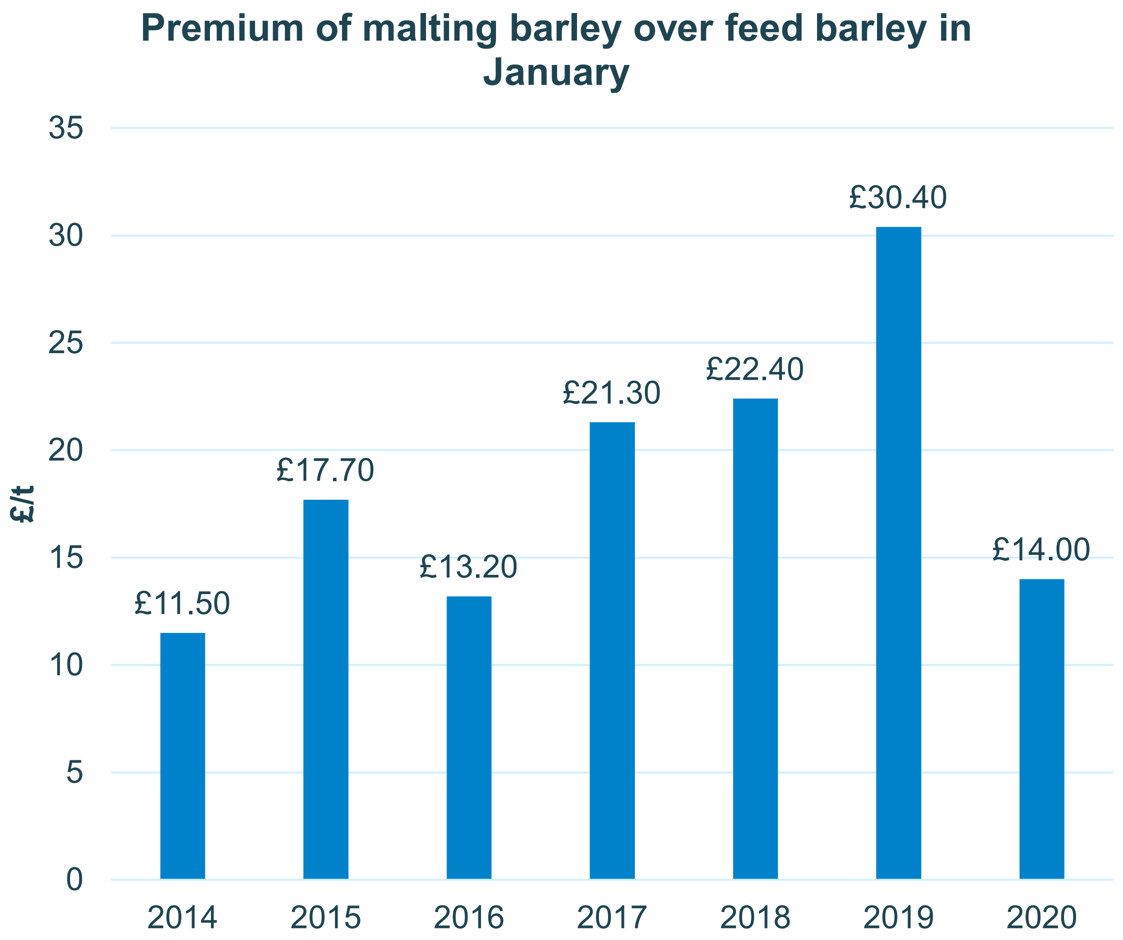
Source: HMRC



What about premium markets?

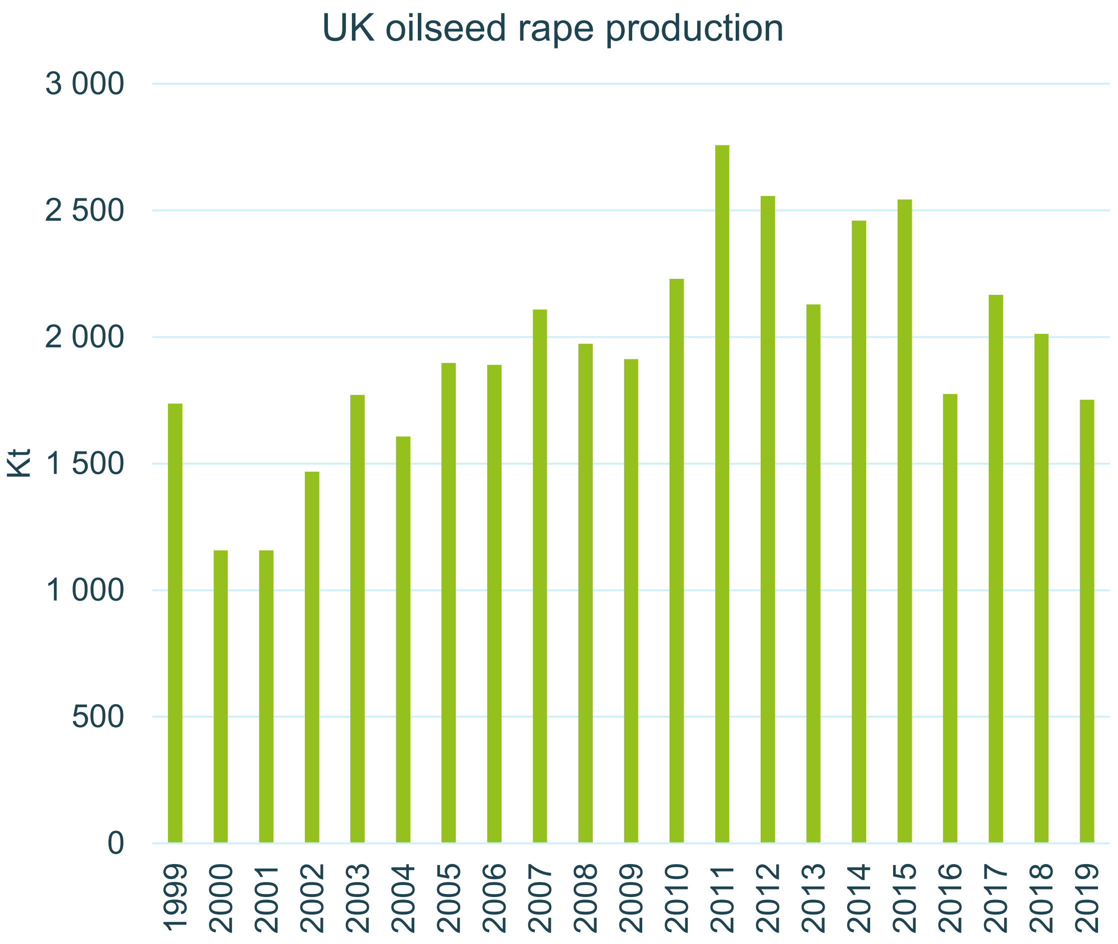


Source: AHDB Delivered prices

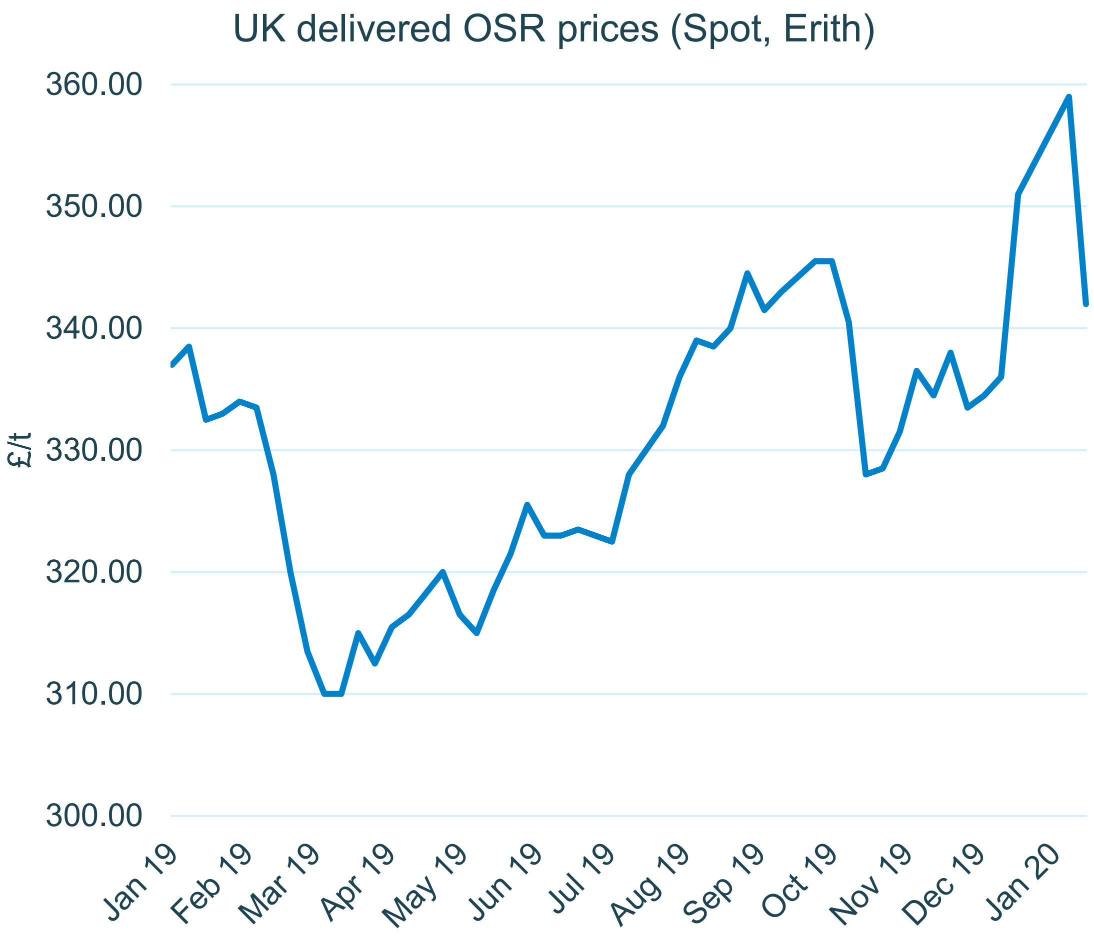


Source: AHDB Corn Returns

Domestic oilseed rape deficit, prices dictated by the global market.



Source: Defra



Source: AHDB Delivered Survey

UK summary

UK prices for the remainder of this season to be heavily influenced by the global picture.

Winter crop production and yield potential down, but by how much?

Tighter production to be supported by carryout.

Diverging picture in market for premium crops. With more uncertainty for milling wheat and potentially large spring barley supplies.

Questions?

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02476 478 844
@James_R_Webster

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rapidly changing world’

Agronomy North East

Variety selection as the basis of IPM

Bastiaan Brak (AHDB)

CEREALS & OILSEEDS

- Demo of new RL Variety Selection Tool(s)

- Demonstrate the value of *‘treatment benefit’* (yield response to fungicide) when considering varieties and fungicide input

- Corroborate with field-based results from AHDB Strategic Farm East (data courtesy of Brian Barker)

Scenario for WW Variety Selection Tool demonstration

- End-use group: Group 4 wheat
- Yellow Rust rating: at least 7.5
- Latest safe sowing date: mid / end Feb

Note: Least Significant Difference for Yield, scale of Agronomic Merit

https://ahdb.org.uk/vst

CEREALS & OILSEEDS

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Filter varieties [1] | **Calc. Agronomic Merit on X-axis** [2]

End-use group	All	
Variety	All	
Septoria tr. rating	4.3	8.2
Yellow rust rating	4.5	8.9
Brown rust rating	2.8	8.4
Mildew rating	2.8	8.2
Fusarium rating	5.2	7.0
Eyespot rating	3.2	7.1
Lodging (+) rating	6.4	8.1
Lodging (-) rating	6.0	7.6
Sprouting rating	4.0	7.2
Yield (early drilled)	91	109
Yield (late drilled)	94	110
Yield (light soils)	92	108
Yield (heavy soils)	96	105
Yield (2nd cereal)	93	104
HFN	151	321
Specific weight	73.8	80.7
Protein (milling) %	11.2	13.5
UK distilling suitability	All	
Export suitability	All	
Ripening days	All	
Latest safe sowing date	All	
Height (-PGR)	80	92
OWBM resistance	All	

Clear all filters

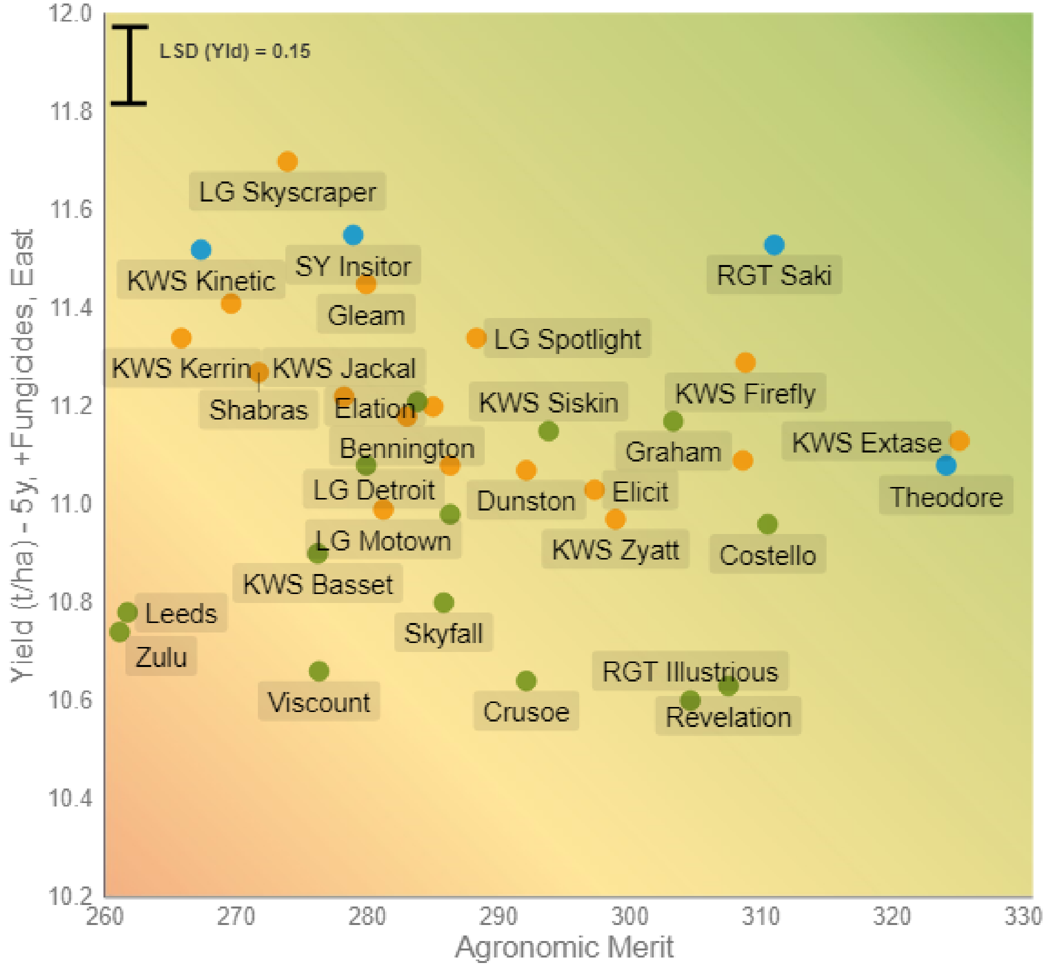
Select regional yield measure on Y-axis [4]

5 year data: UK (+F) | **East (+F)** | North (+F) | West (+F) | UK (-F) | UK (TB)

Last year data: UK (-F) | UK (TB)

Distinguish variety points in graph by [5]

Years on RL — ●NEW ●2-4 ●5 or more



Hover for more info

CEREALS & OILSEEDS

Filter varieties [1] **Calc. Agronomic Merit on X-axis** [2]

End-use group: Multiple selections	Variety: All	
Septoria tr. rating: 4.3 – 8.2	Yellow rust rating: 5.4 – 8.9	Brown rust rating: 4.2 – 8.2
Mildew rating: 2.8 – 8.2	Fusarium rating: 5.4 – 6.5	Eyespot rating: 3.2 – 7.1
Lodging (+) rating: 6.4 – 8.0	Lodging (-) rating: 6.0 – 7.3	Sprouting rating: 4.0 – 7.2
Yield (early drilled): 96 – 109	Yield (late drilled): 97 – 110	
Yield (light soils): 95 – 108	Yield (heavy soils): 96 – 105	Yield (2nd cereal): 95 – 104
HFN: 151 – 321	Specific weight: 73.8 – 80.7	Protein (milling) %: 11.2 – 12.7
UK distilling suitability: All	Export suitability: All	
Ripening days: All	Latest safe sowing date: All	
Height (-PGR): 80 – 92	OWBM resistance: All	Clear all filters

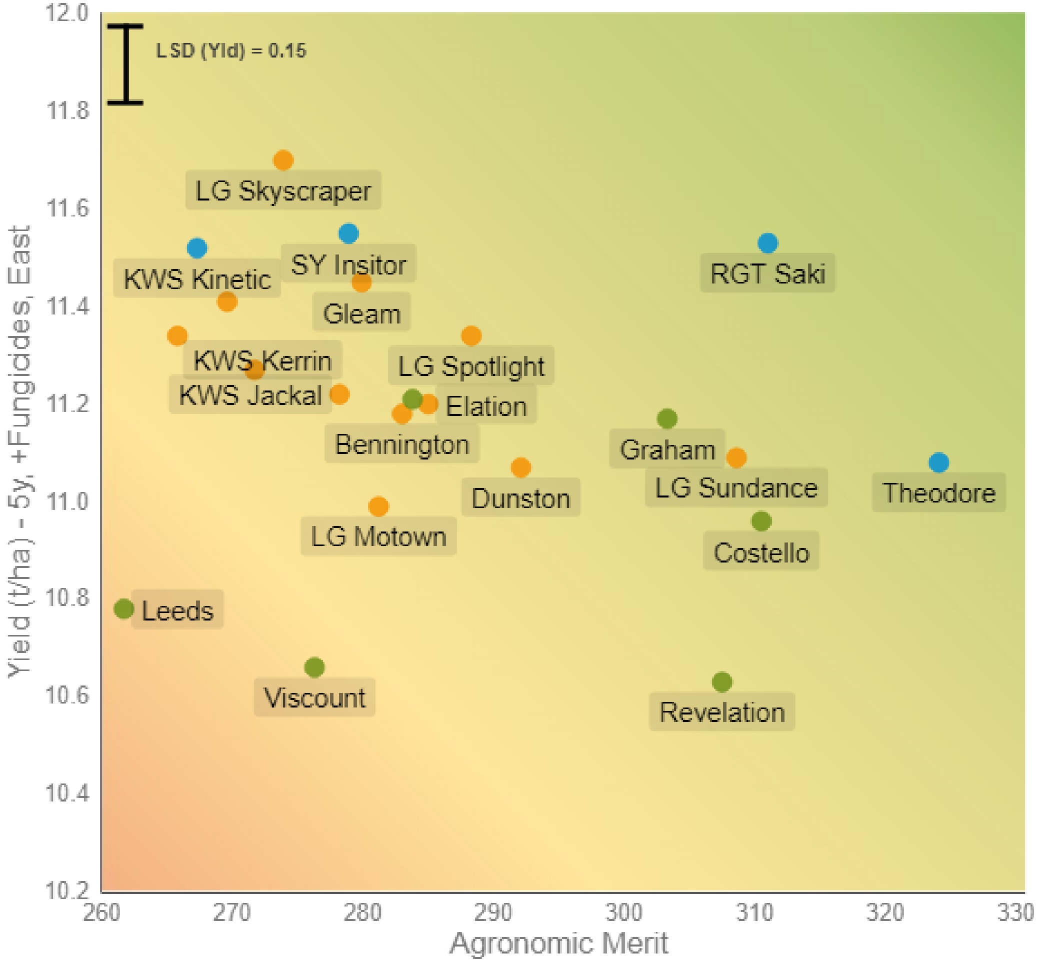
Select regional yield measure on Y-axis [4]

5 year data: UK (+F) | East (+F) | North (+F) | West (+F) | UK (-F) | UK (TB)

Last year data: UK (-F) | UK (TB)

Distinguish variety points in graph by [5]

Years on RL — ● NEW ● 2-4 ● 5 or more



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CEREALS & OILSEEDS

Filter varieties [1] | **Calc. Agronomic Merit on X-axis** [2]

End-use group: Multiple selections	Variety: All	
Septoria tr. rating: 4.3 – 8.2	Yellow rust rating: 7.5 – 8.9	Brown rust rating: 4.9 – 7.9
Mildew rating: 4.4 – 8.2	Fusarium rating: 5.4 – 6.5	Eyespot rating: 3.2 – 7.1
Lodging (+) rating: 6.4 – 8.0	Lodging (-) rating: 6.0 – 7.3	Sprouting rating: 4.0 – 7.2
Yield (early drilled): 96 – 103	Yield (late drilled): 97 – 107	
Yield (light soils): 95 – 105	Yield (heavy soils): 96 – 105	Yield (2nd cereal): 95 – 104
HFN: 175 – 321	Specific weight: 73.8 – 80.7	Protein (milling) %: 11.9 – 12.7
UK distilling suitability: All	Export suitability: All	
Ripening days: All	Latest safe sowing date: All	
Height (-PGR): 82 – 92	OWBM resistance: All	Clear all filters

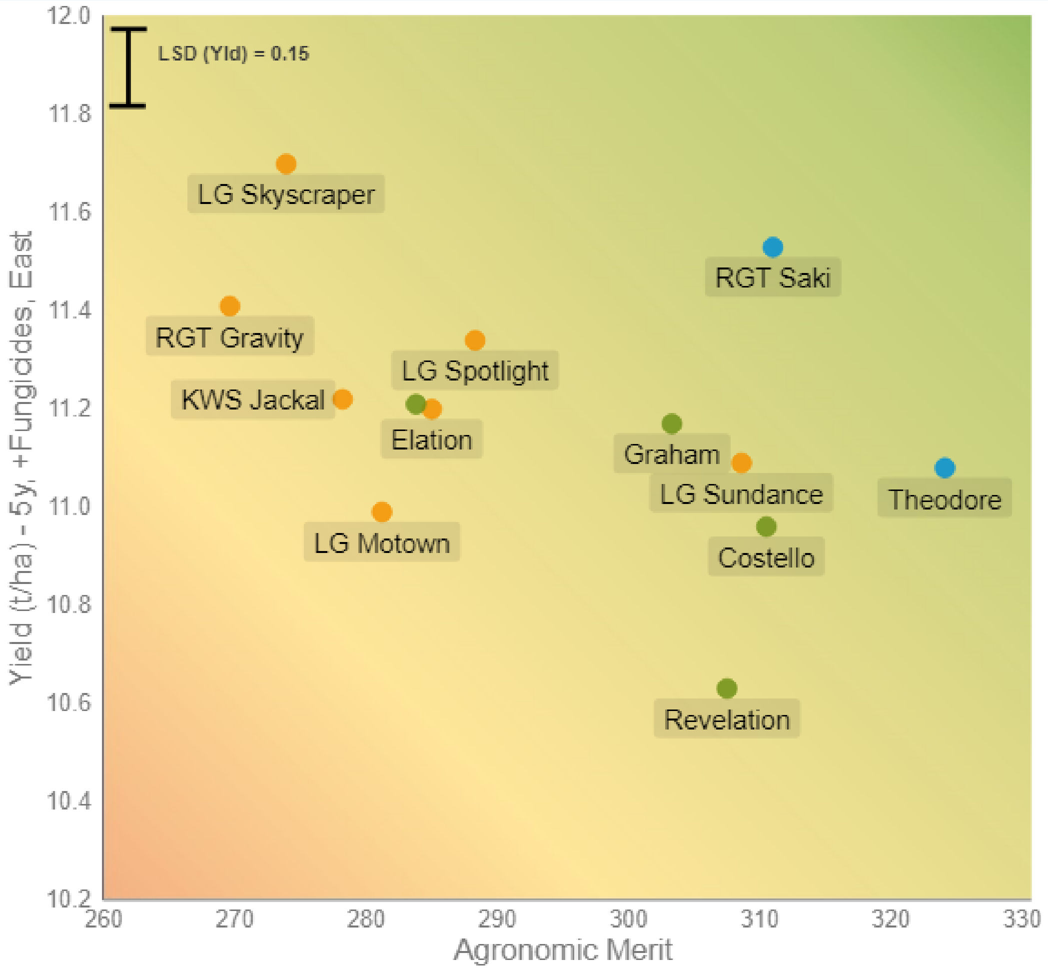
Select regional yield measure on Y-axis [4]

5 year data: UK (+F) | East (+F) | North (+F) | West (+F) | UK (-F) | UK (TB)

Last year data: UK (-F) | UK (TB)

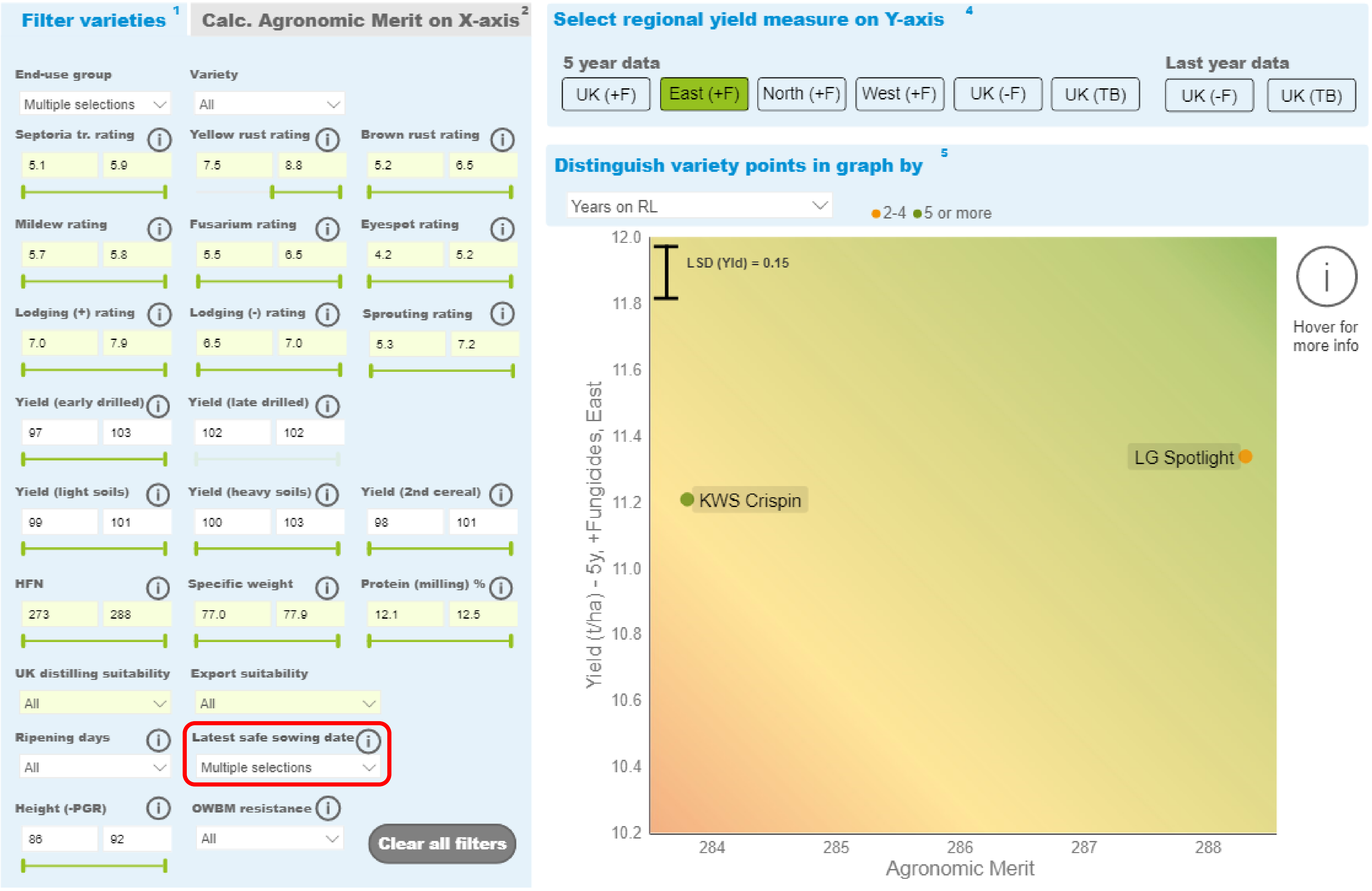
Distinguish variety points in graph by [5]

Years on RL — NEW, 2-4, 5 or more



Hover for more info

CEREALS & OILSEEDS



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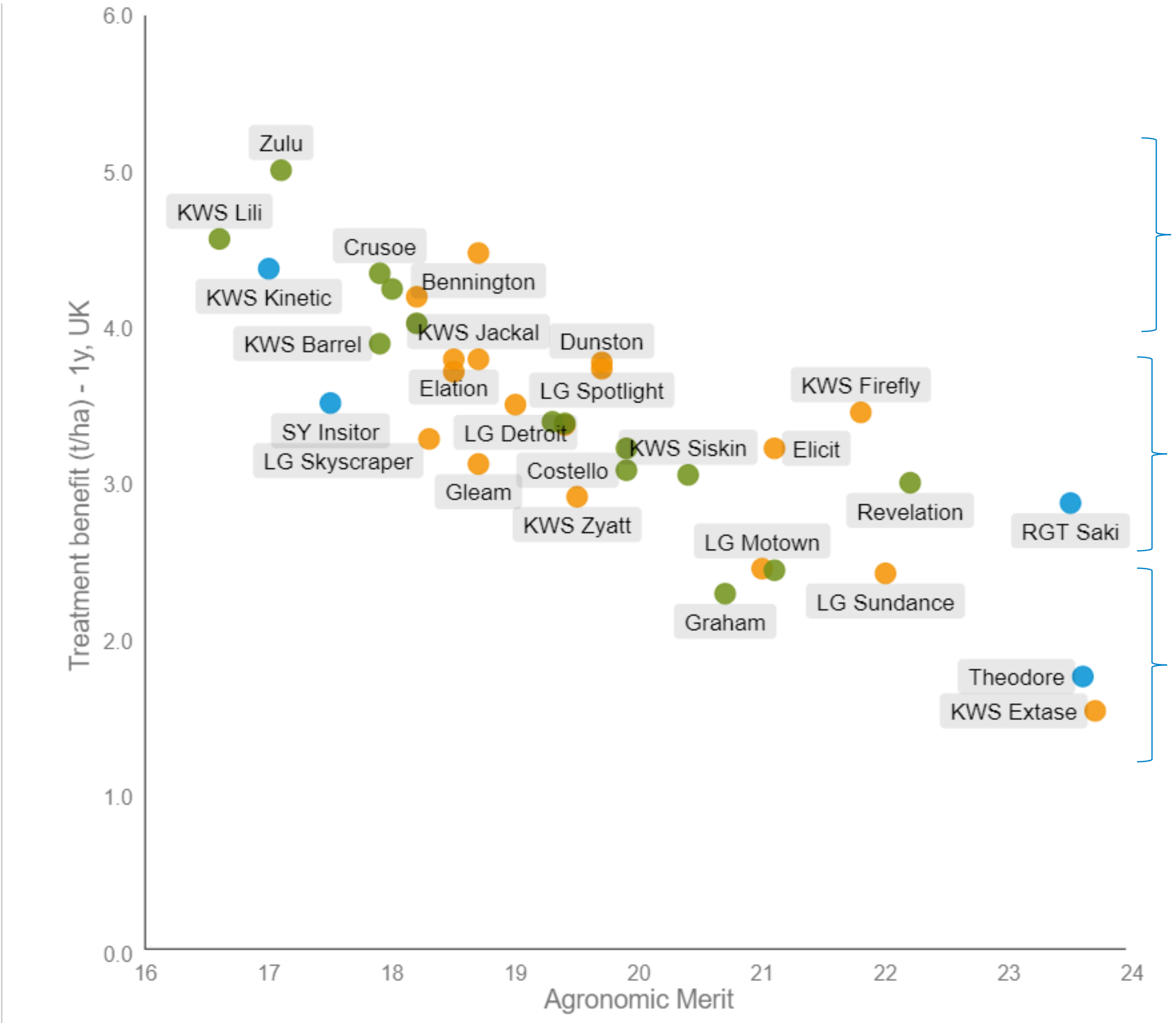
Treatment benefit: Yld (+F) – Yld (-F)



"High fungicide input" varieties

"Medium fungicide input" varieties

"Low fungicide input" varieties

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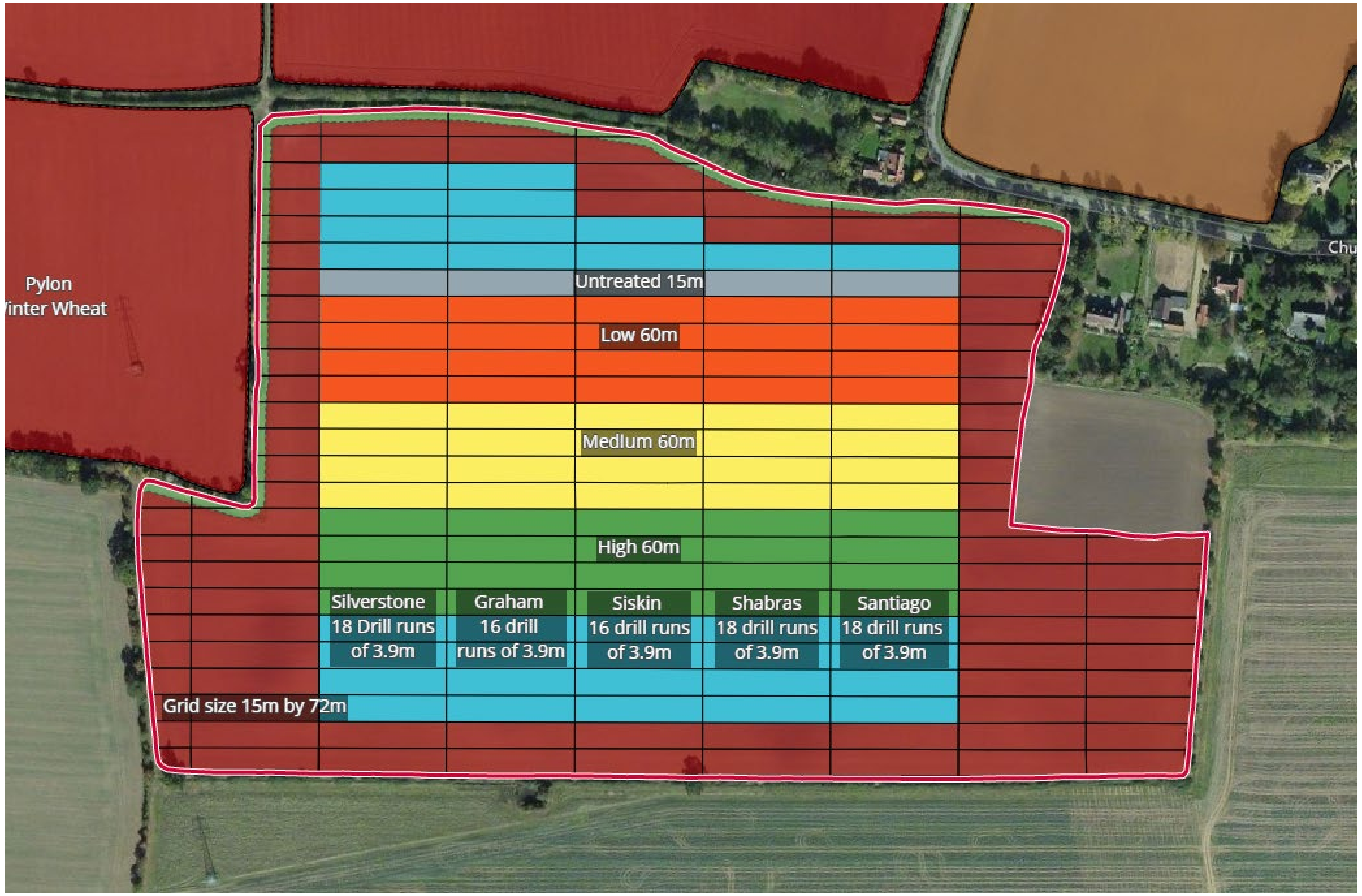
Demonstration layout

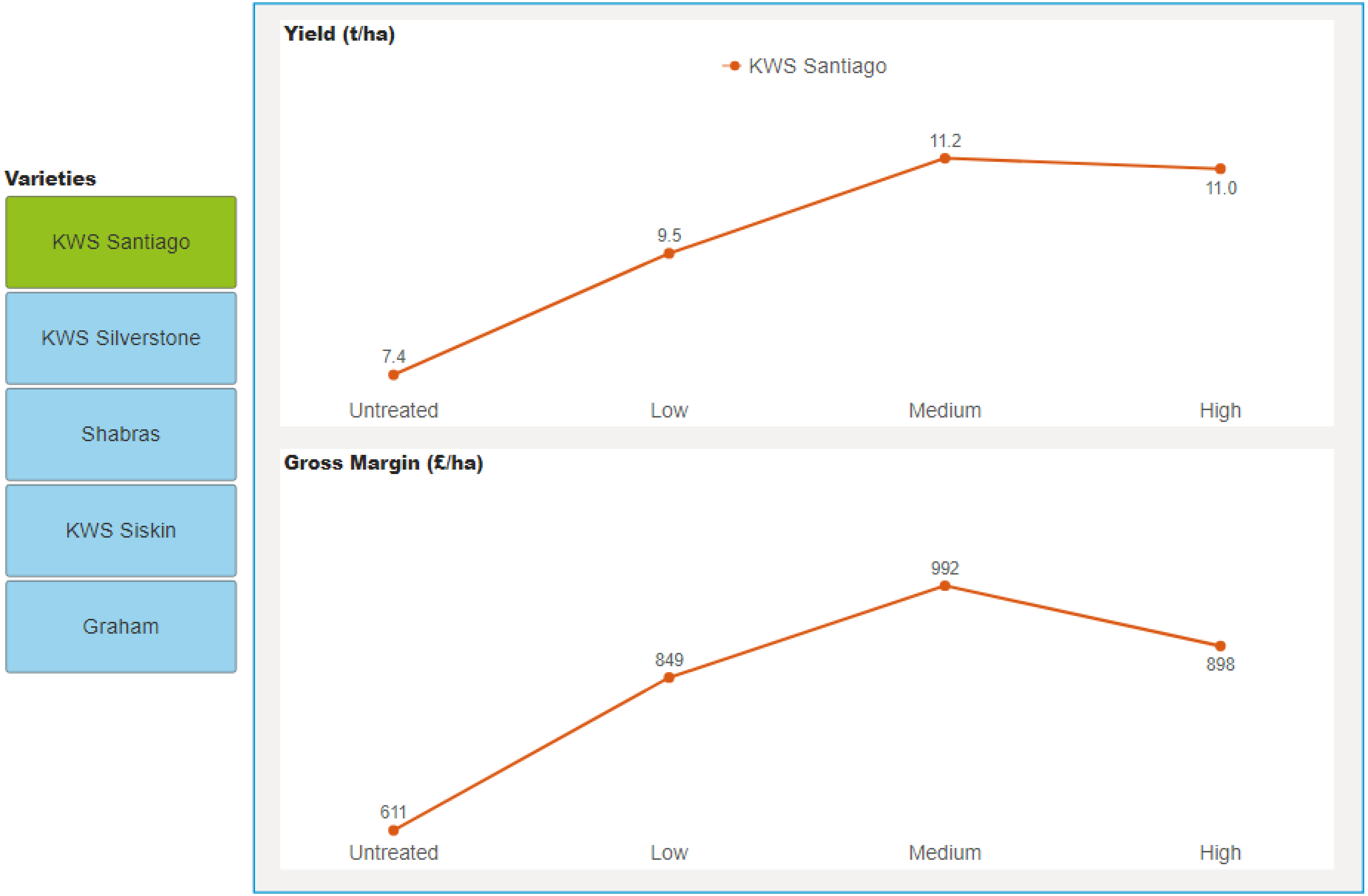


Input costs: fungicides, PGRs & micronutrients

	Untreated	Low	Medium	High
T0	-	£6.99	£17.32	£17.32
T1	-	£27.31	£29.73	£42.18
T2	-	£9.00	£36.12	£53.90
T3	-	-	£9.20	£29.00
Total input costs	**£0.00**	**£43.30**	**£92.37**	**£142.40**

Required yield increase (£129 / tonne): 0.34 t / ha 0.38 t / ha 0.39 t / ha

IPM: Yield optimum vs Gross Margin optimum

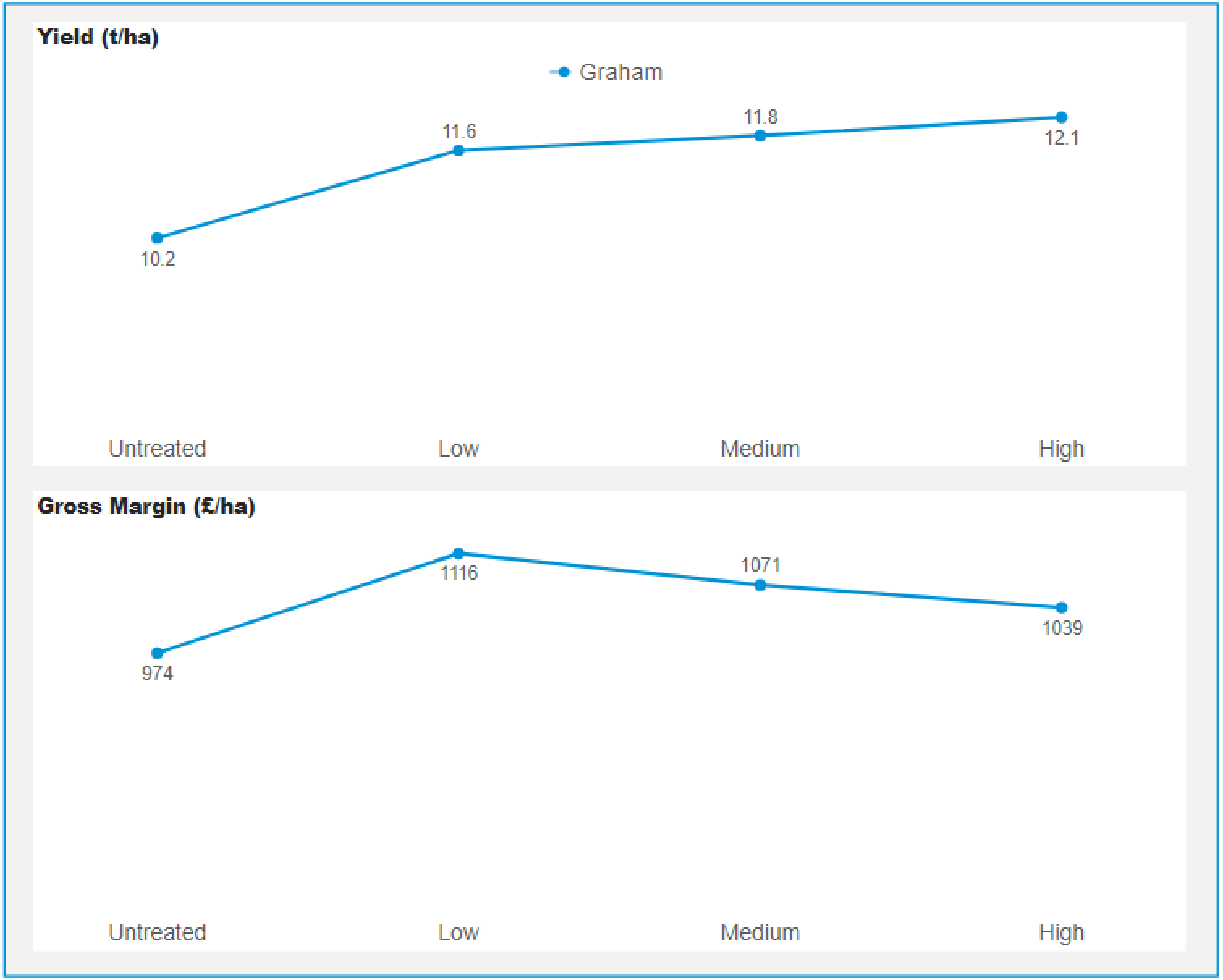


https://bit.ly/2sA9J85

IPM: Yield optimum vs Gross Margin optimum

Varieties

- KWS Santiago
- KWS Silverstone
- Shabras
- KWS Siskin
- Graham



https://bit.ly/2sA9J85

IPM: Yield optimum vs Gross Margin optimum

Varieties

- KWS Santiago
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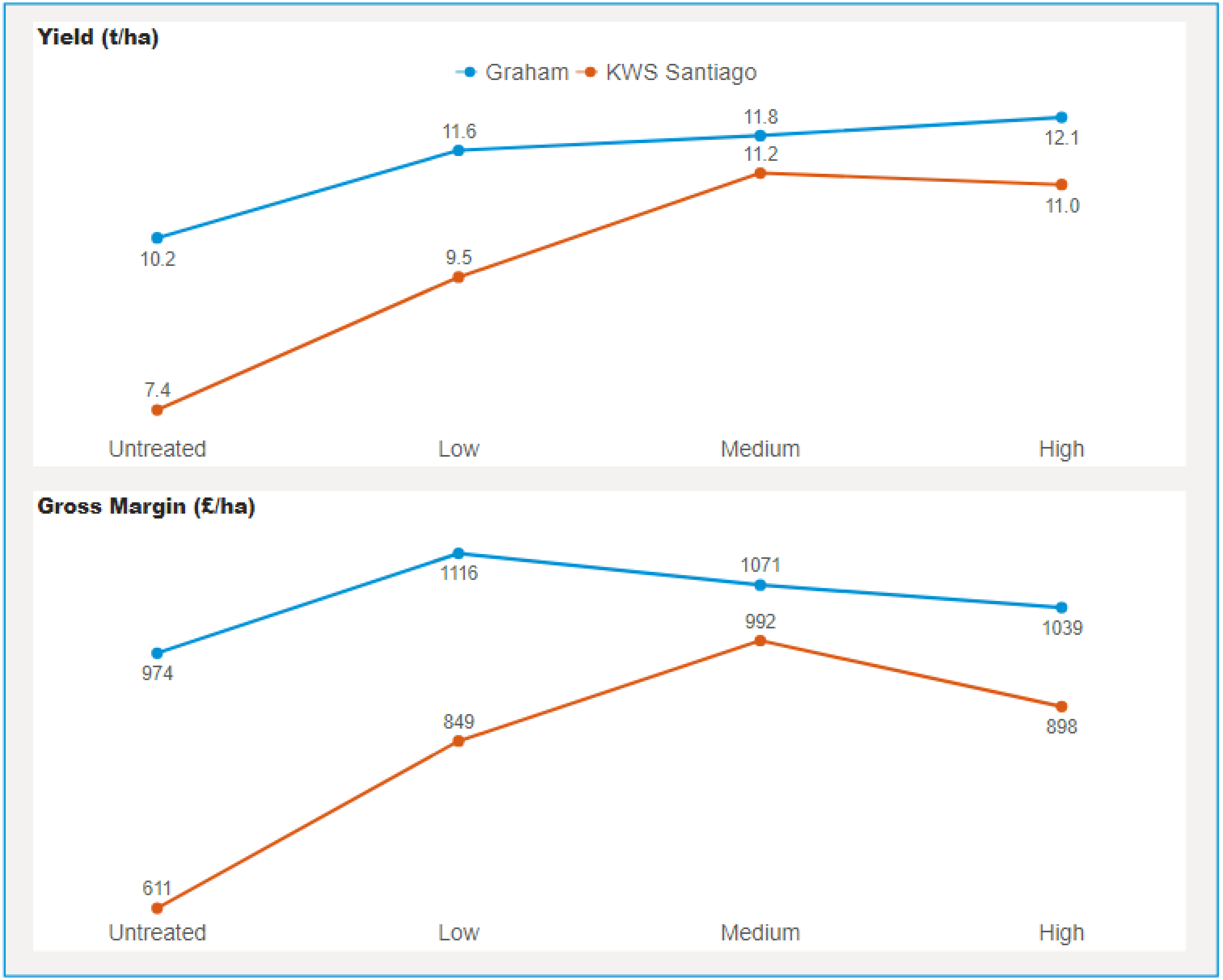
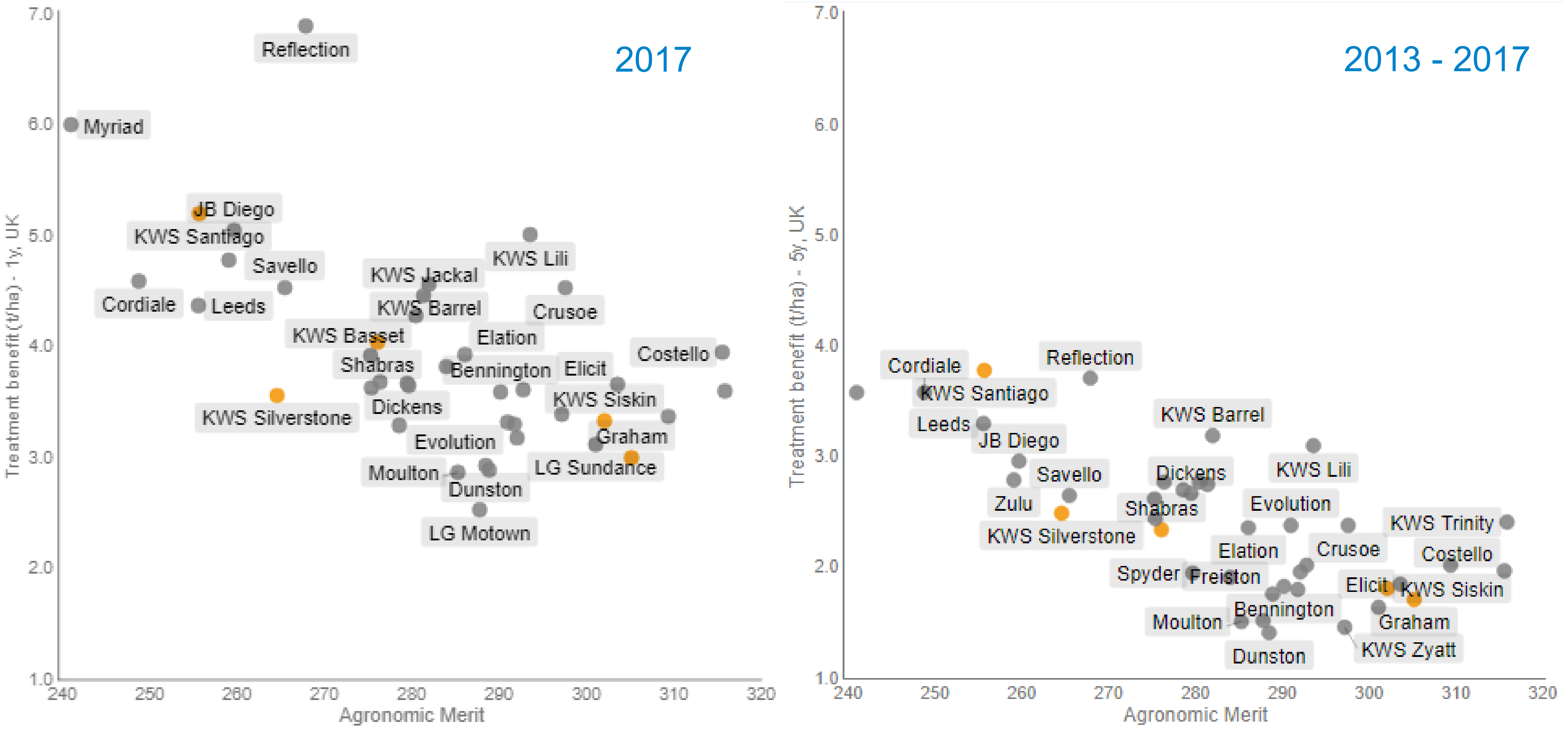


https://bit.ly/2sA9J85

Treatment benefit



Take home message

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

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rapidly changing world’

The role of plant breeding in ICM

John Miles KWS UK

Genetics, one spoke in the wheel?

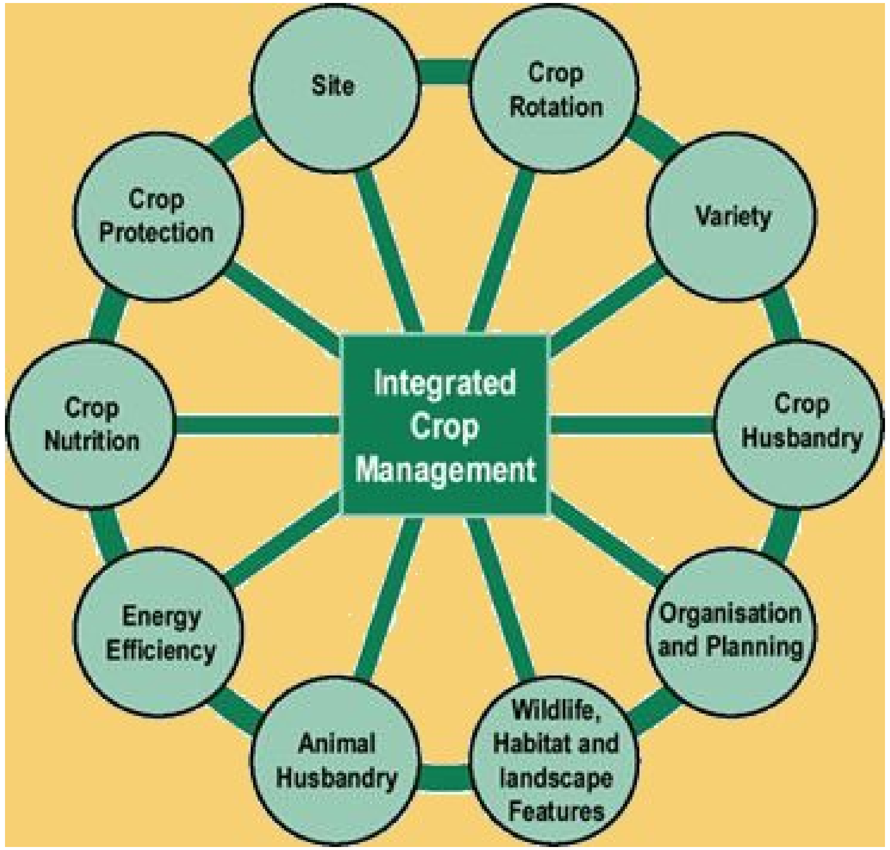
- crop & variety site suitability

- Cropping options
- Sustainable rotations

- Protection
- Sustainable use

- Utilisation
- sustainable use

- Water use efficiency
- Different species



- Variety and crop scheduling
- Cost of production

- Variety and crop scheduling

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IPM: what's it all about?

Tuesday, 23 July 2019

Integrated pest management (IPM) is a hot topic, but it's not a new idea.

In this podcast episode we find out who's doing what, and why, along the road towards integrated pest management. We hear from Warwickshire arable farmer Rob Fox, AHDB's Jon Knight, Emma Hamer from the NFU and Alison Stewart, all the way from New Zealand's Foundation for Arable Research.

Image: Natural enemy Asilidae Diotctria rufipes, by Ian Andrews. The larvae predate the larvae of other insects and the adults predate other insects on the wing. Find out more in the Encyclopaedia of pests and natural enemies

View AHDB resources on IPM

- Sustainable use Directive sets out the principles of IPM
- Varieties have an important part to play
- A greater role for genetics moving forward

What does IPM mean?

'Integrated Pest Management' is the careful consideration of all available plant protection methods and subsequent integration of appropriate measures that discourage the development of populations of harmful organisms and keep the use of plant protection products and other forms of intervention to levels that are economically and ecologically justified and reduce or minimise risks to human health and the environment. *SUD 2009*

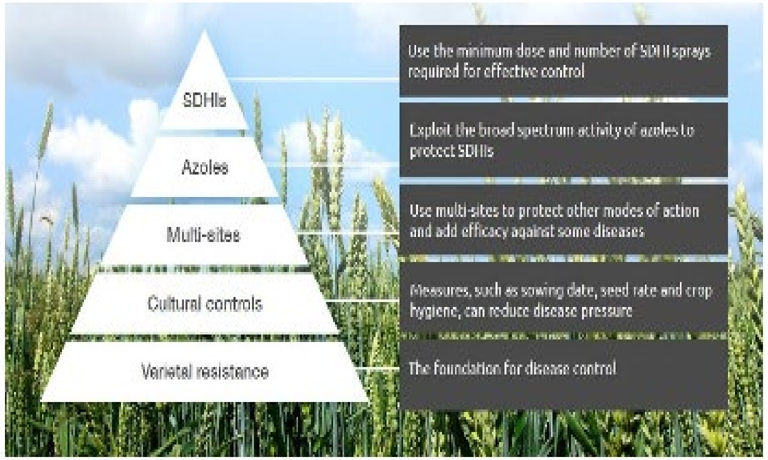
Q What is Integrated Pest Management (IPM)?

A The Sustainable Use Directive defines IPM under the following 8 headings the VI believes that most UK growers will be implementing some if not all of these measures depending upon the farm enterprise.

Source https://voluntaryinitiative.org.uk/schemes/integrated-pest-management/

- crop rotation,
- cultivation techniques,
- use of resistant/tolerant cultivars and standard/certified seed/planting material,
- use of balanced fertilisation, liming and irrigation/drainage practices,
- hygiene measures (e.g. cleansing of machinery)
- protection and enhancement of important beneficial organisms,
- Monitoring of Harmful organisms
- Application of plant protection based on monitoring data
- Use of biological, physical and other non-chemical methods must be preferred to chemical methods if they provide satisfactory pest control.
- Application of pesticide should be as Targeted as possible.
- The professional user should keep the use of pesticides and other forms of intervention to levels that are necessary and that do not increase the risk for development of resistance in populations of harmful organisms.
- Anti-resistance strategies should be applied to maintain the effectiveness of the products.
- Review the success of plant protection measures.

Integrated pest management (IPM)

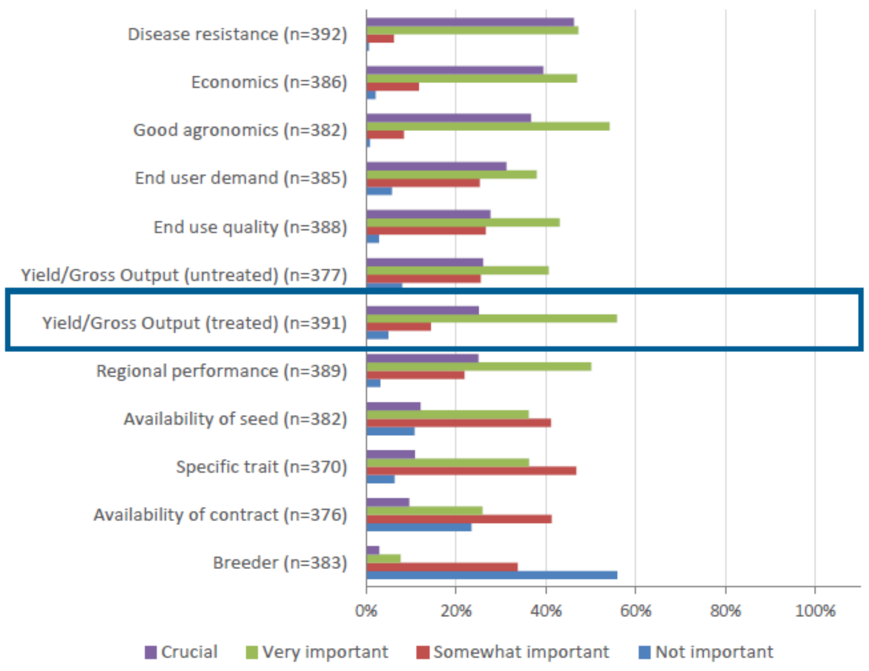


Use a pyramid of control measures to manage disease. An appropriate variety (to resist the main diseases present) and a well-designed rotation (to minimise disease pressure) are at the heart of IPM

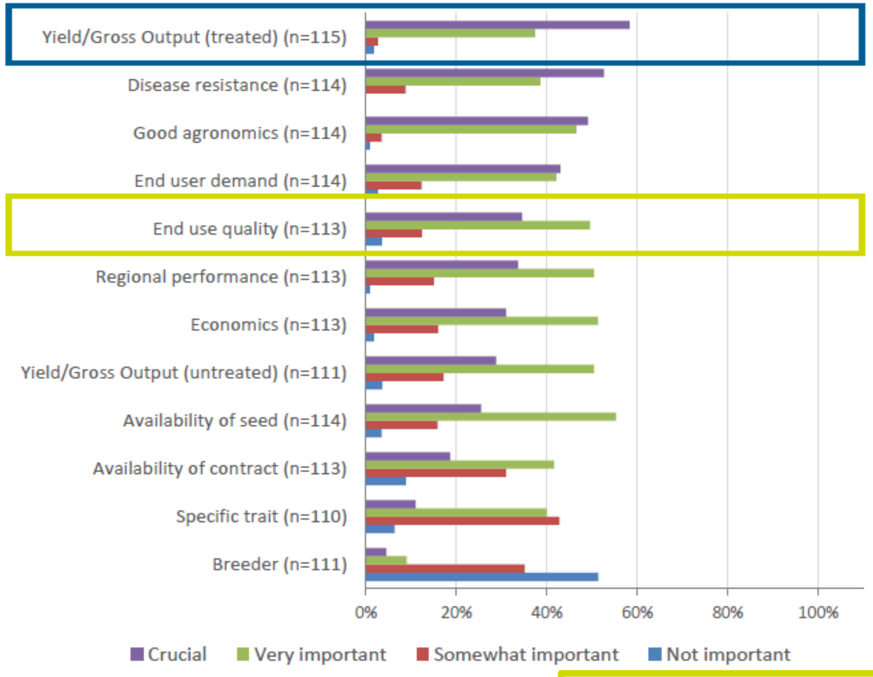
Source https://ahdb.org.uk/cereal-dmg

What characteristics are important to growers?

Grower & Agronomist response



Other stakeholder response



Most crucial for millers

Principles

- Resistance genetics allow plant to withstand levels of infection from a pathogen

- Mechanisms of resistance will work in a number of ways
  - restricting pathogen growth- methods by which may not clearly known
    - Septoria
    - Light leaf spot
  - Interrupting a life cycle
    - OWBM

- RL varieties have differing levels of disease resistance
  - None are immune but some show very few symptoms.

- Two types of Resistance:
  - Genetic
  - Adaptive resistance (Avoidance)

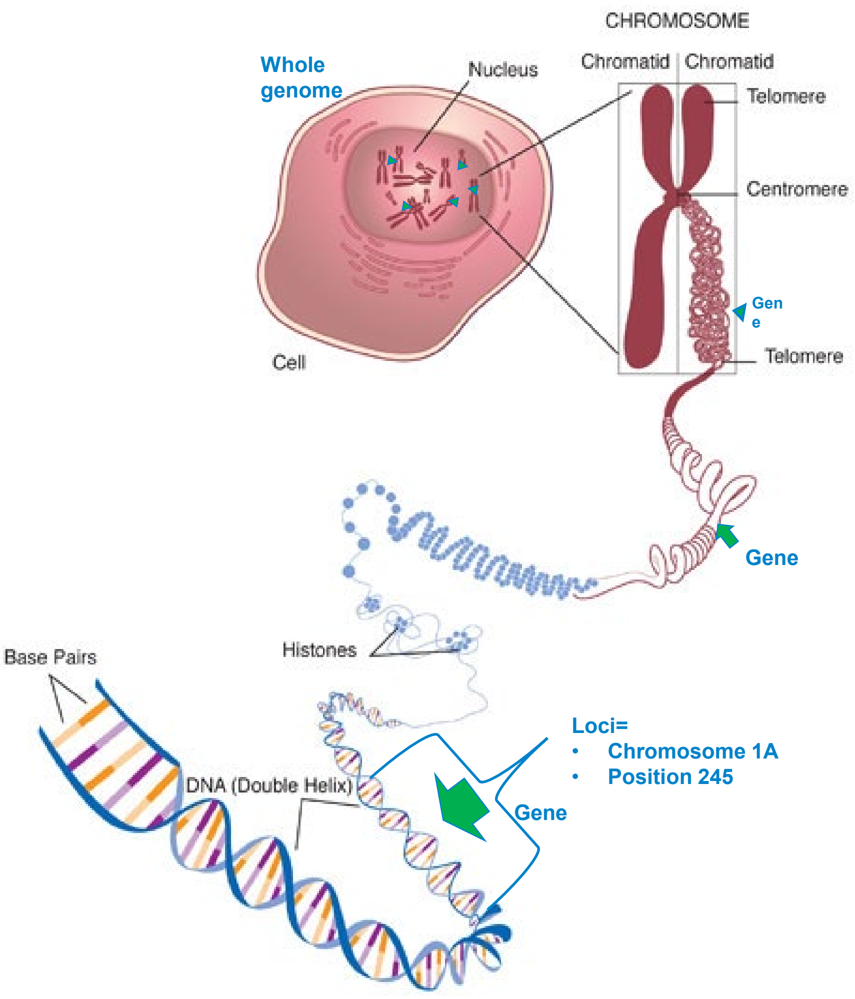
Resistance through adaptation (*Zymoseptoria tritici*)

- Septoria is dispersed through water droplets. Rain splashes move Septoria up the plant.

- Taller lines show less disease symptoms.
  - Speed of movement in the spring
  - Proximity of early leaf layers

- Leaf morphology is also indicated in disease avoidance
  - Smaller leaves
  - Lower stomatal density
  - Altered stem to leaf angle

Why is genetic Resistance complicated

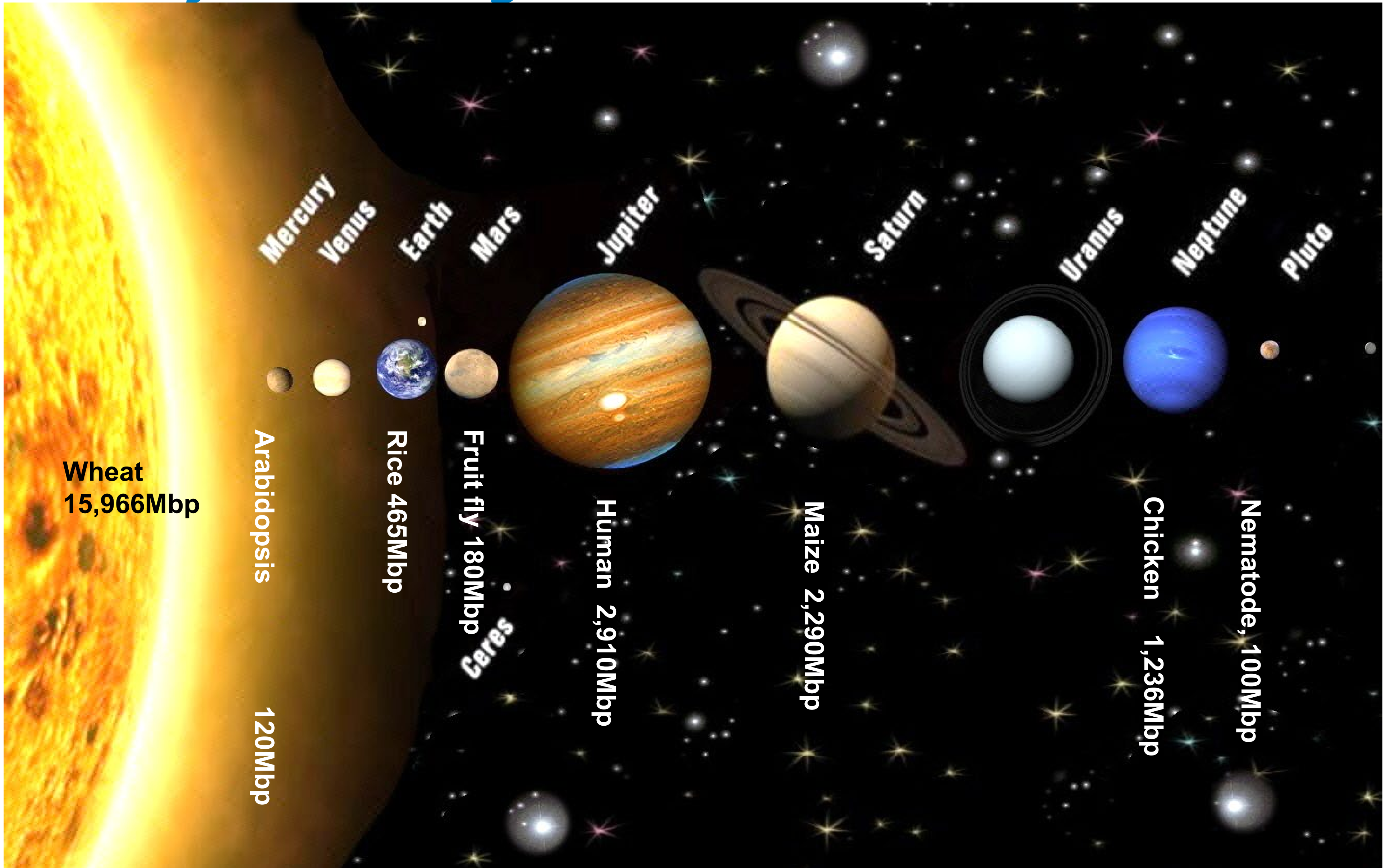


- Genes are situated on specific locations in the genome – **loci**.

- **Single gene Traits (Major gene)** are traits that often show big phenotypic effects
- e.g. yellow rust genes, OWBM, RLM 7
  - Controlled by one gene at a single loci
  - Simpler to breed for, clear phenotypical differences

- **Quantitative Traits (Minor gene)** are traits that show small effects singularly if found, strength is in the sum of parts
- e.g. Yield, Septoria
  - Controlled by many genes at different loci
  - Difficult to breed for, needles in haystacks

The difficulty in working with wheat



Genetic disease Resistance (*Zymoseptoria tritici*)

- 20 major resistance genes have been mapped
- Many genes have been identified over the years conferring isolate specific resistance

- Major genes can be risky
  - They work very well providing strong resistance
  - Often breakdown after ‘short’ period of time with potentially severe consequences.

- Partial resistances have much smaller effects but are additive.
- Most RL varieties are relying on partial resistance.
- One study identified over 50 genes involved directly in either resistance or susceptibility.
- Adult and Juvenile resistance genes

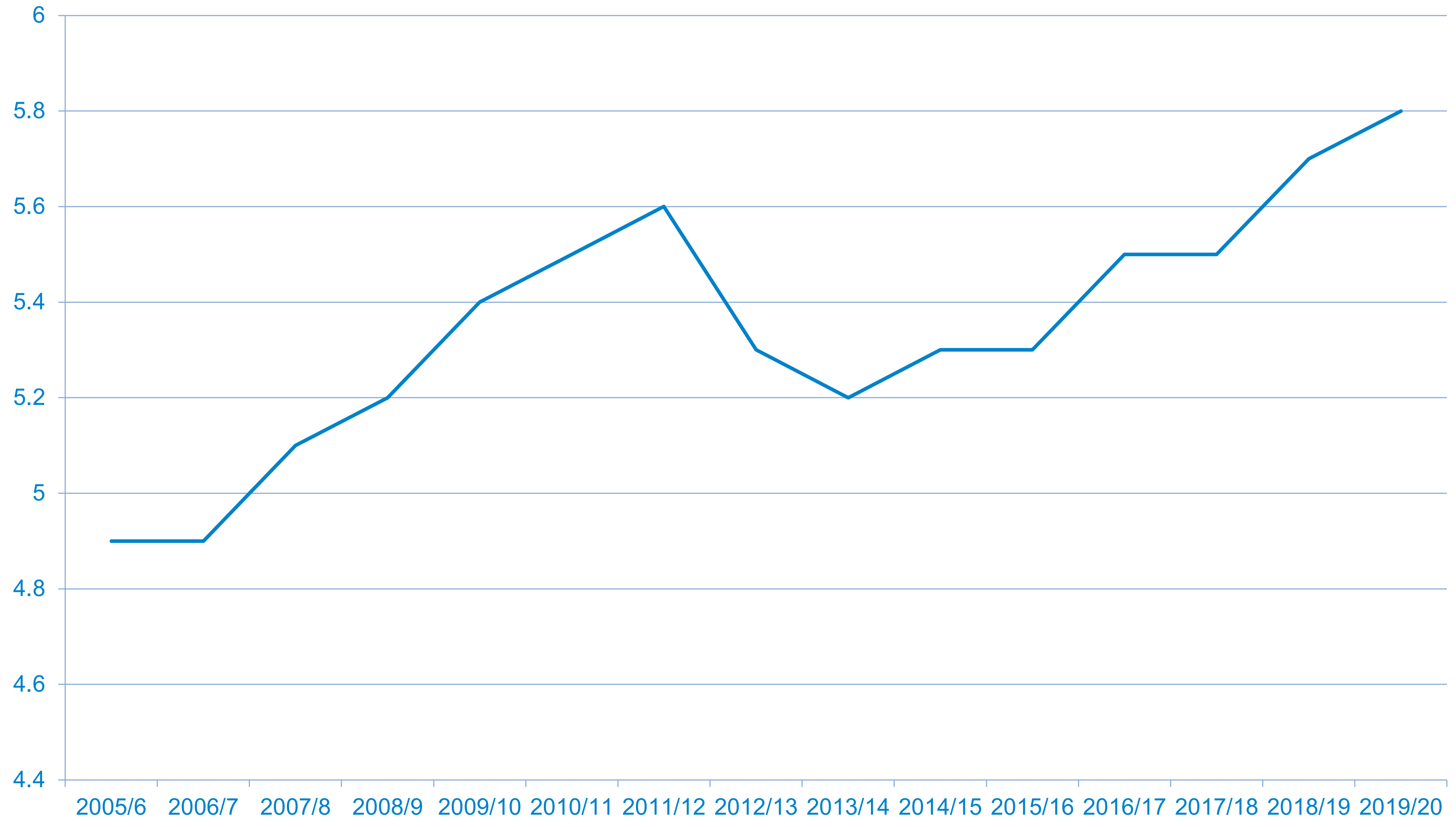
Current status

- Currently overall ratings for Septoria are as high as they have been in the last 15 years
- Much more of a focus area for breeding community

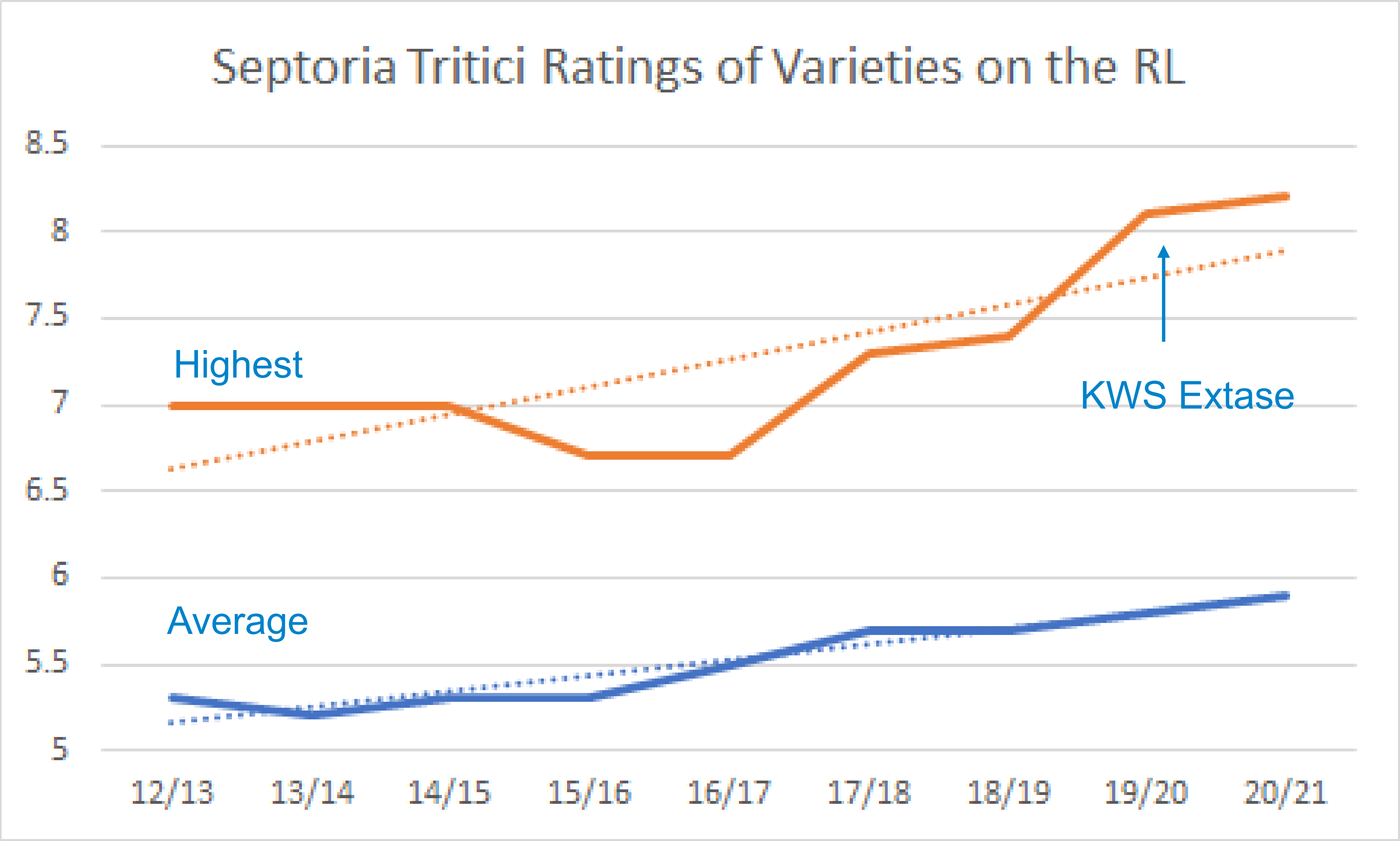
- Major gene resistances are present in current RL varieties but history shows these major genes can breakdown
- Protecting and utilising current genetic resistances is of extreme importance

- Adequate fungicide control can assist with longevity of effectiveness
- In most cases major genes are identified after field resistance breakdown has started

Recommended list average Septoria score



The Highest resistances available



RL response to fungicides

Variety	Untreated (T/Ha)	Treated (T/Ha)	*Septoria tritici score*	Yield difference (T/Ha)
Theodore	10.1	11.2	8.2	1.1
KWS Extase	10.6	11.3	8.1	0.7
LG Sundance	9.5	11.2	7.9	1.7
KWS Firefly	9.4	11.4	7	2.0
RGT Saki	9.6	11.6	6.8	2.0
Graham	9.9	11.4	6.8	1.6
KWS Siskin	9.3	11.3	6.6	2.0
SY Insitor	9.2	11.8	6.6	2.6
KWS Zyatt	9.3	11.1	6.4	1.8
Gleam	9.4	11.5	6.3	2.1
Crusoe	8.0	10.8	6.2	2.8
Costello	9.1	11.1	6.1	2.0
KWS Crispin	9.3	11.3	5.9	2.0
Skyfall	8.7	10.9	5.8	2.1
KWS Parkin	9.1	11.4	5.5	2.4
LG Skyscrapper	9.3	11.8	5	2.5
KWS Barrel	8.1	11.2	4.3	3.1

Combining agronomy, variety and chemistry to maintain control of septoria tritici in wheat

Start date:01/08/2015, End date: 31/03/2019

Factors being investigated:

- Varieties: 3 with different Septoria susceptability

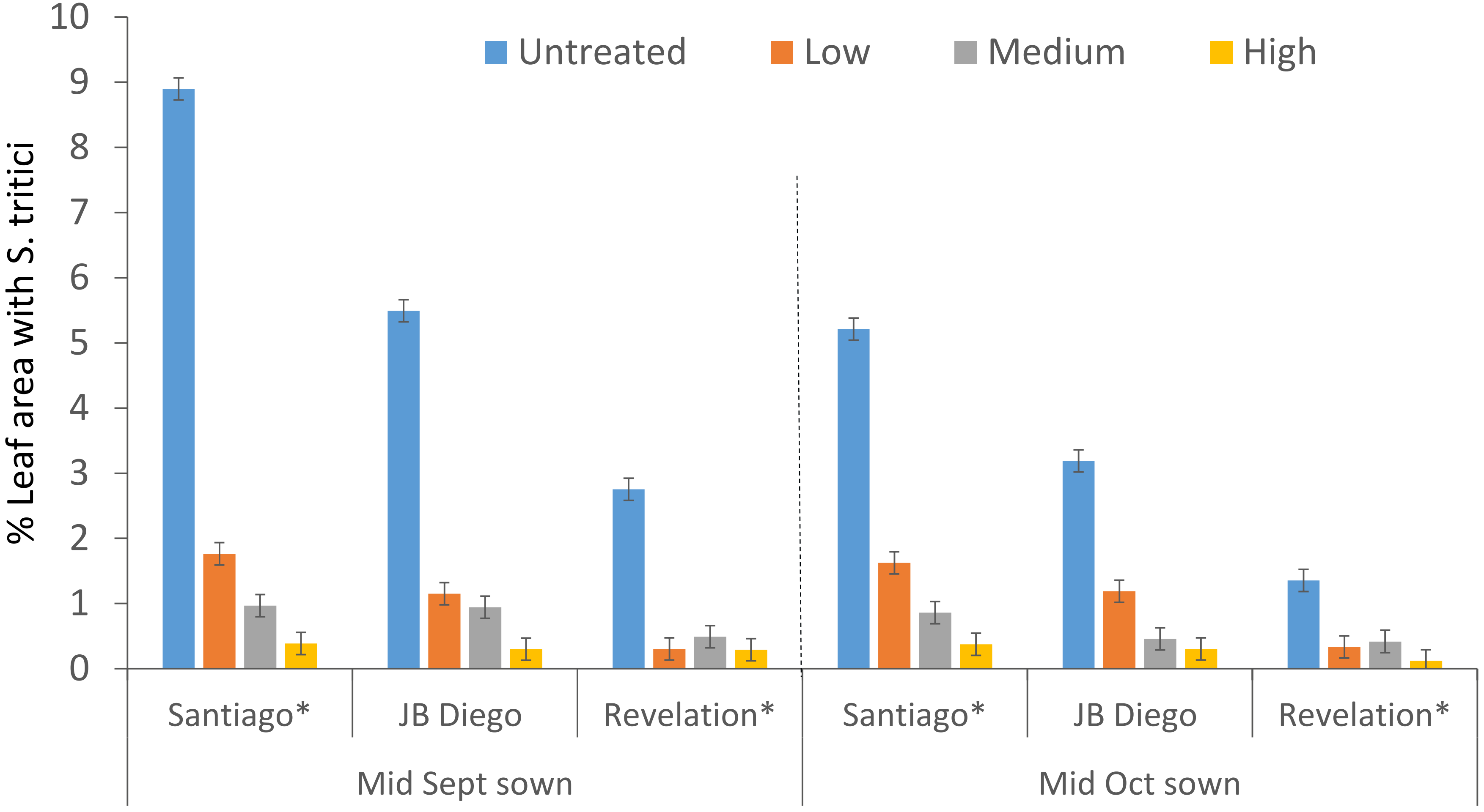
- Two sowing dates and seed rates targeting:
- 80 or 160 plants/m^2 (mid Sept)
- 160 or 240 plants/m^2 (mid Oct sown)

- Four fungicide treatments:

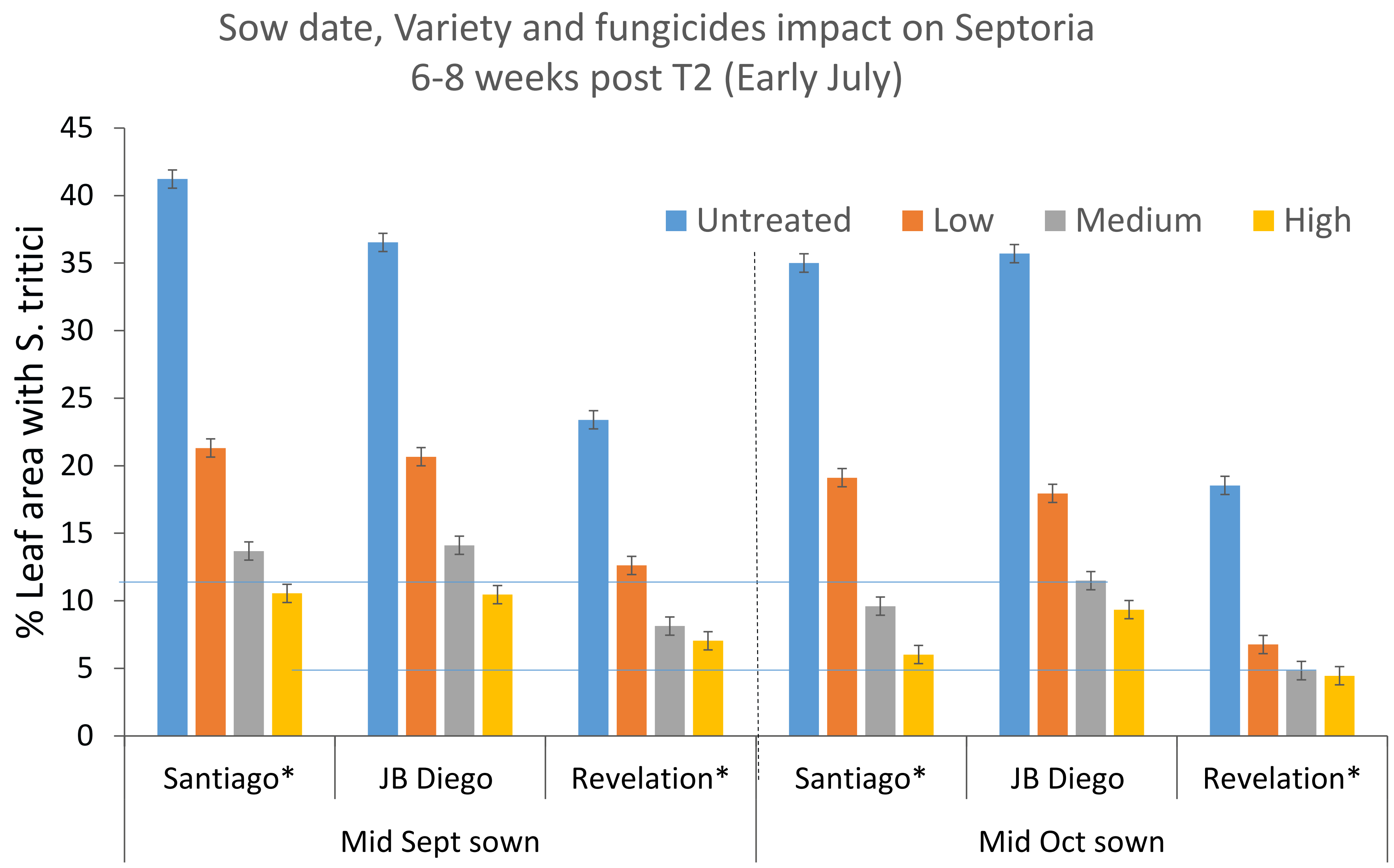
Treatment	T1 – GS32	T2 – GS39
Nil	Untreated	Untreated
Low	CTL 1.0	CTL 1.0
Medium	Brutus 1.5 + CTL 1.0	Brutus 2.25 + CTL 1.5
High	Brutus 1.5 + CTL 1.0 + Imtrex 1.0	Brutus 2.25 + CTL 1.5 + Imtrex 1.5

Brutus = epoxiconazole + metconazole   Imtrex = fluxapyroxad   CTL = chlorothalonil
Low, Medium and High input strategies also received T0 – CTL 1.0, and T3 – Folicur
Additionally to control rusts, strobilurins were applied across all plots when rust was detected

Sowing date, Variety and fungicide impact on Septoria
3-4 weeks post T2 (Mid June)

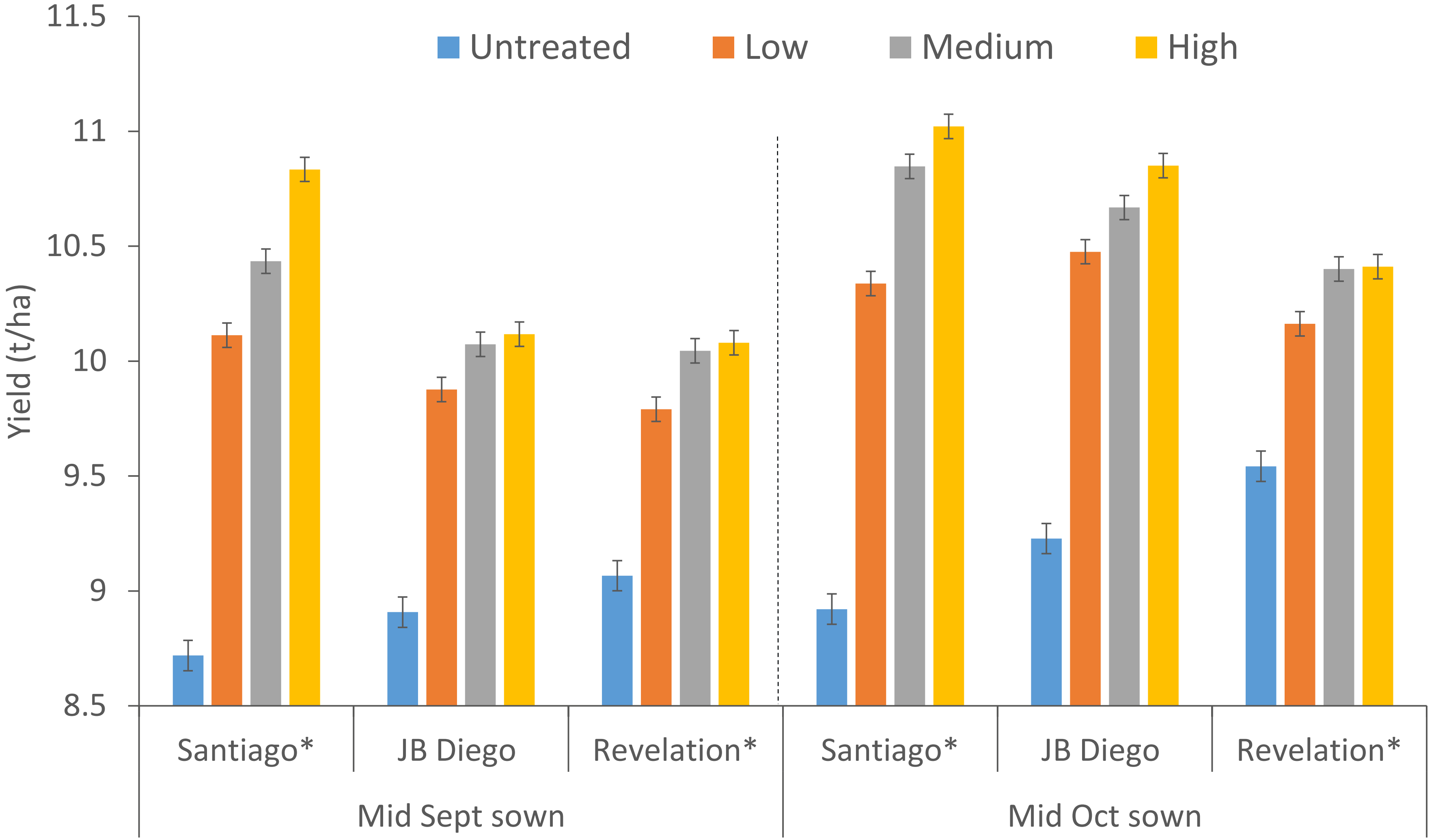


Mean levels of Septoria on leaf 2 at T2 + 3-4 weeks2016 and 2017 total of 10 sites)



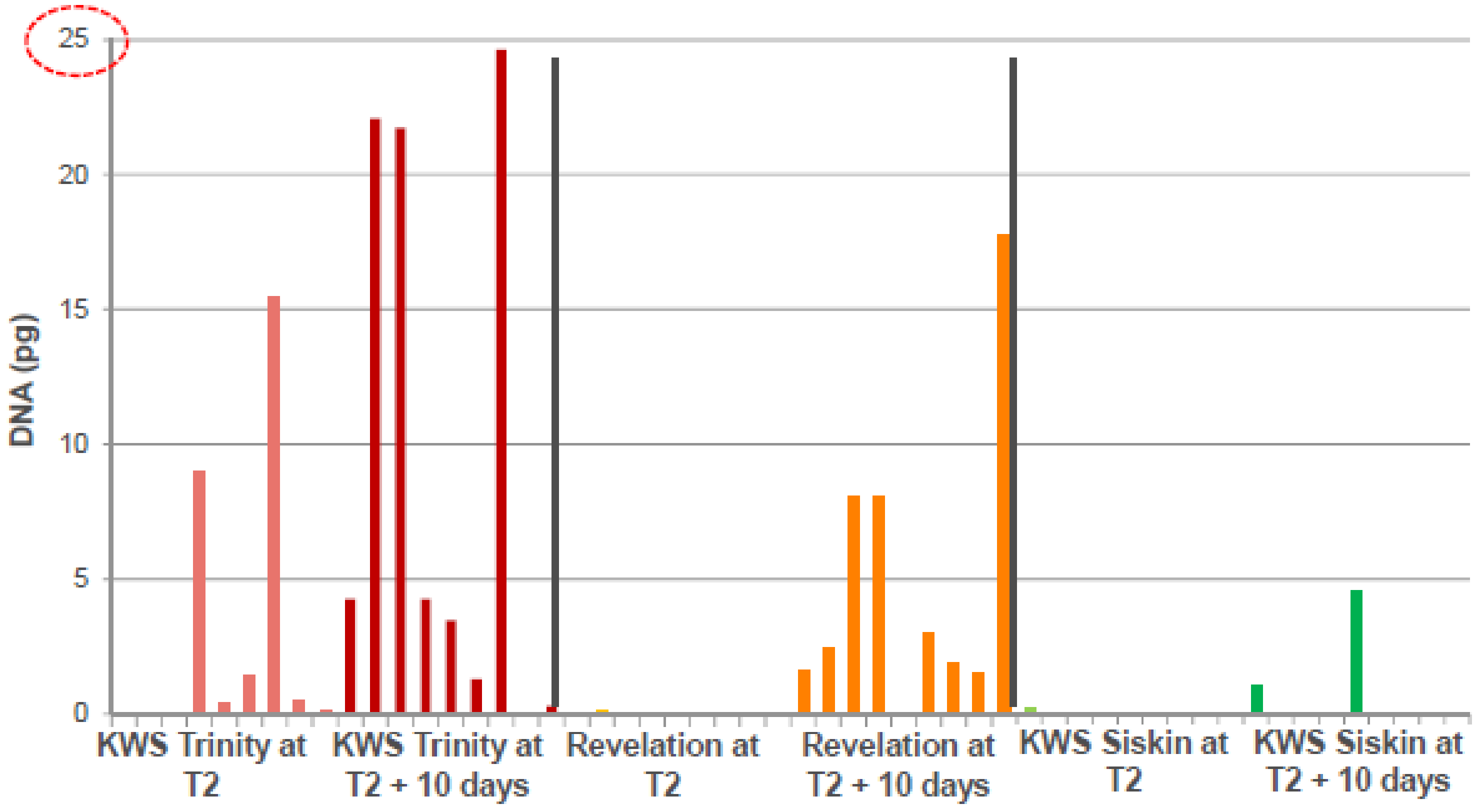
Mean levels of Septoria on leaf 2 at T2 + 3-4 weeks 2016 and 2017 total of 10 sites)

Yield response t/ha by agronomic factor (9 sites) 2016 &2017



Progression of Septoria in 2017

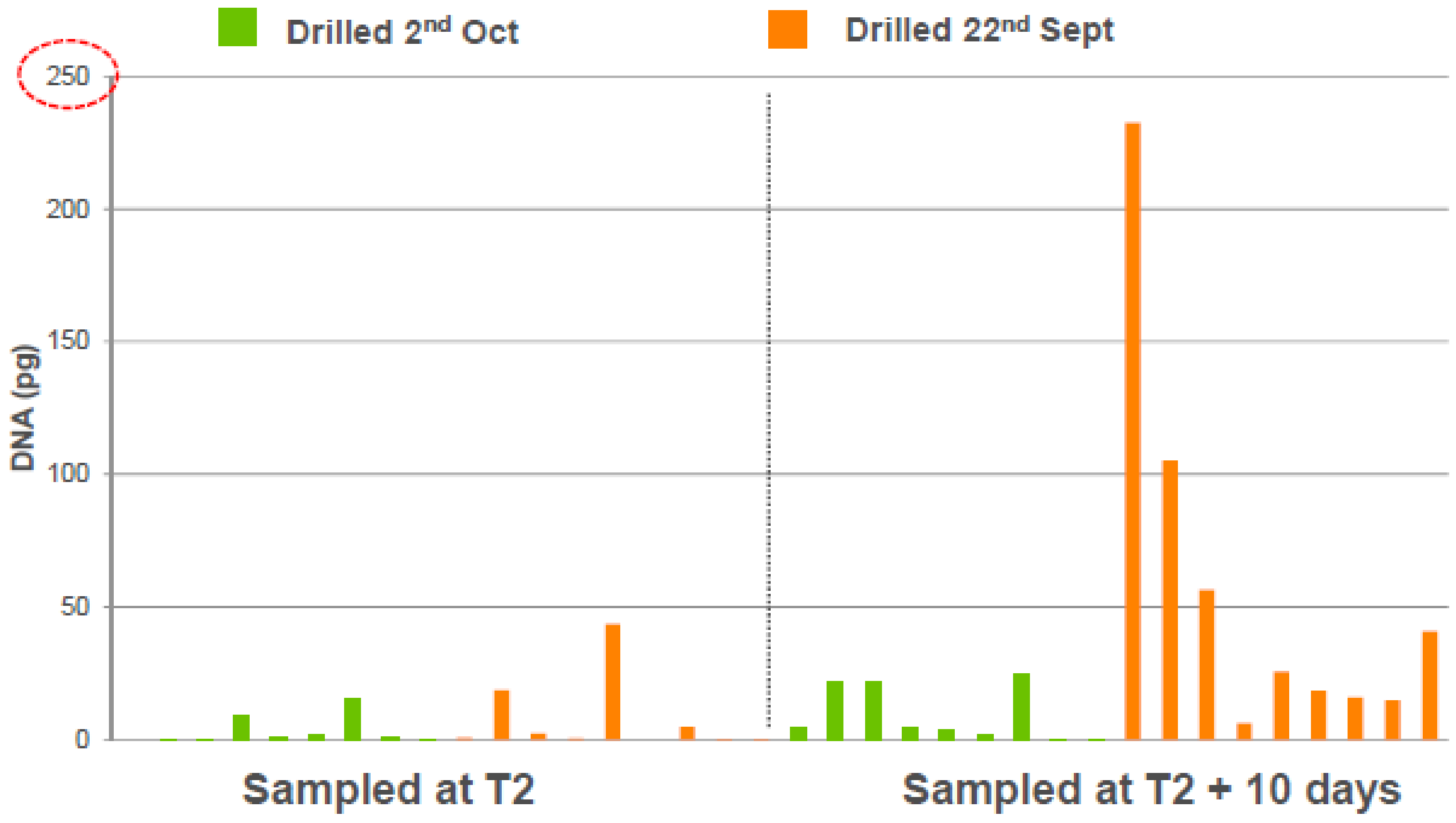
…How much time does varietal resistance buy you



Callow. Leaf 2 sampled from untreated plots immediately prior to T2 application and 10 days later

Wheat

Impact of drilling date and the latent period on disease pressure in 2017
KWS Trinitiy Septoria rating 5.3



Callow. Leaf 2 sampled from untreated plots immediately prior to T2 application and 10 days later

Wheat

2021 Septoria control and role of more resistant varieties

- More choice with exciting new levels of resistance (6-8)
- Varieties with resistance of 6 and above offer opportunities to save some fungicide costs especially in lower risk seasons and localities, later drillings.

- Help deliver effective disease control in high disease seasons when critical fungicide timings might be compromised
- Variety resistance will help fill the role of lost multisite chemistry
- Don’t forget rusts!

Barley Yellow Dwarf Virus

- Challenges
  - Aphid resistance
  - Loss/restriction of chemistry
  - Need to start sowing in September
- Solutions
  - Varieties
    - Tolerance
  - Delay drilling

Yd2 -BYDV tolerance

- Discovered in several Ethiopian spring barley accessions in 1950's.
- Been used for the past 50 years in many varieties

- True 'tolerance'. BYDV virus grows and multiplies in plant just as in a susceptible line.
- No (or very little) effect on plant growth and yield
- Any yield penalty is disappearing with new material

Amistar- early sown natural infection trials, Thriplow 2018

2018	+ Insecticide	- Insecticide	% yield secured
ORWELL REDIGO DETER	11.6	10.6	91.6
FUNKY REDIGO DETER	11.3	10.6	93.6
AMISTAR REDIGO DETER	11.3	10.9	96.6
ORWELL SINGLE PURPOSE RAXIL	11.5	9.6	83.8
FUNKY SINGLE PURPOSE RAXIL	11.1	9.9	89.2
AMISTAR SINGLE PURPOSE RAXIL	11.1	10.6	95.6

- Very little visible infection, located next to breeding nursery
- Large amounts of BYDV nearby in breeding material

Amistar- early sown natural infection trials, Thriplow 2019

2019	+ Insecticide	- Insecticide	% yield secured
Orwell (Redigo Deter)	10.2	10.2	99.2
Orwell (SPD)	10.4	10.1	97.4
Amistar (SPD)	10.7	10.6	99.1

- No visible infection
- BYDV present in nearby in breeding material

- In three years of naturally infected field trials with low infection levels
  - KWS Orwell has lost on average 9% yield without Insecticide protection.
  - Amistar has lost 3% yield.
  - Tolerance offers protection for 6% of yield

Gross margins

Gross Margin Analysis -								
	Amistar	**Amistar**	**Orwell**	**Orwell**		**Orwell**	**Orwell**	**Orwell**
Price (£/t)	£135	£135	£135	£135		£135	£135	£135
Yield (% controls)	98	100	100	100		98	96	94
ave controls (t/ha)	10	10	10	10		10	10	10
	9.80	10.00	10.00	10.00		9.80	9.60	9.40
Total Output / ha	£1,323.00	£1,350.00	£1,350.00	£1,350.00		£1,323.00	£1,296.00	£1,269.00
Variable costs	1 x spray	1 x spray	2 x spray	3 x spray		2 x spray	2 x spray	2 x spray
Seed SPD	112	112	87	87		87	87	87
Sprays Insecticides	13	13	26	39		26	26	26
Total Variable Costs	584	584	572	585		572	572	572
Gross Margin / Ha	**£739.00**	**£766.00**	**£778.00**	**£765.00**		**£751.00**	**£724.00**	**£697.00**
Margin over input	£1.27	£1.31	£1.36	£1.31		£1.31	£1.27	£1.22

How do we use BYDV Tolerance

Aphids control will be required in :

- High risk sites and seasons
- Aphid numbers are likely to create significant 2nd generation wingless offspring
- Over wintered aphid numbers are likely to create a significant generation of winged aphids.

BYDV Tolerance offers an option to reduce insecticidal inputs in some situations

BYDV Tolerance is a risk reduction tool for aphid prone areas such as headlands beside margins or areas of application difficulties such as water courses

BYDV Tolerance offers growers the opportunity to drill earlier or continue with traditional September sown by mitigating risk


‘Inspiring our farmers, growers
and industry to succeed in a
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CFE

Championing the Farmed Environment

Fraser Hugill – Northern Area Co-ordinator

Agronomy North East

CFE is supported by major agricultural unions and trade bodies, government agencies, environmental and wildlife organisations.

CFE Championing the Farmed Environment

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Department for Environment Food & Rural Affairs

aic agricultural industries confederation

Game & Wildlife Conservation Trust

tfa Tenant Farmers Association

- AICC
- AHDB
- BASIS
- Bumblebee Conservation Trust
- CAAV
- Catchment Based Approach
- Catchment Sensitive Farming
- Environment Agency
- FWAG
- Hedgelink
- LEAF
- British Grassland Association
- Natural England
- Water UK
- The Woodland Trust

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