Agenda PGRO Roadshow - York

- 2018- Another Challenging Year – Syngenta Trials and Observations
  Simon Jackson and Max Newbert, Syngenta
- Pulses – threats and opportunities post Brexit
  Graham Redman, The Andersons Centre
- Integrated Pest Management (IPM)
  Becky Howard, PGRO
- Intercropping – the theory and experiences at PGRO
  Steve Belcher, PGRO
- Benefits of cover crops to soil health
  Lea Herold, PGRO

2018 - Another Challenging Year
Syngenta Trials and Observations

syngenta®

Introduction

Approval changes

2018 challenges and learns

Looking forward

- New products
- Trials 2019

Approvals Update

ALTO ELITE

Sales – 30th June 2019

Last use 30th June 2020

Diquat products

Sales – 4th May 2019

Last use 4th February 2020

Metalaxyl-M

Proposed vote April 2019

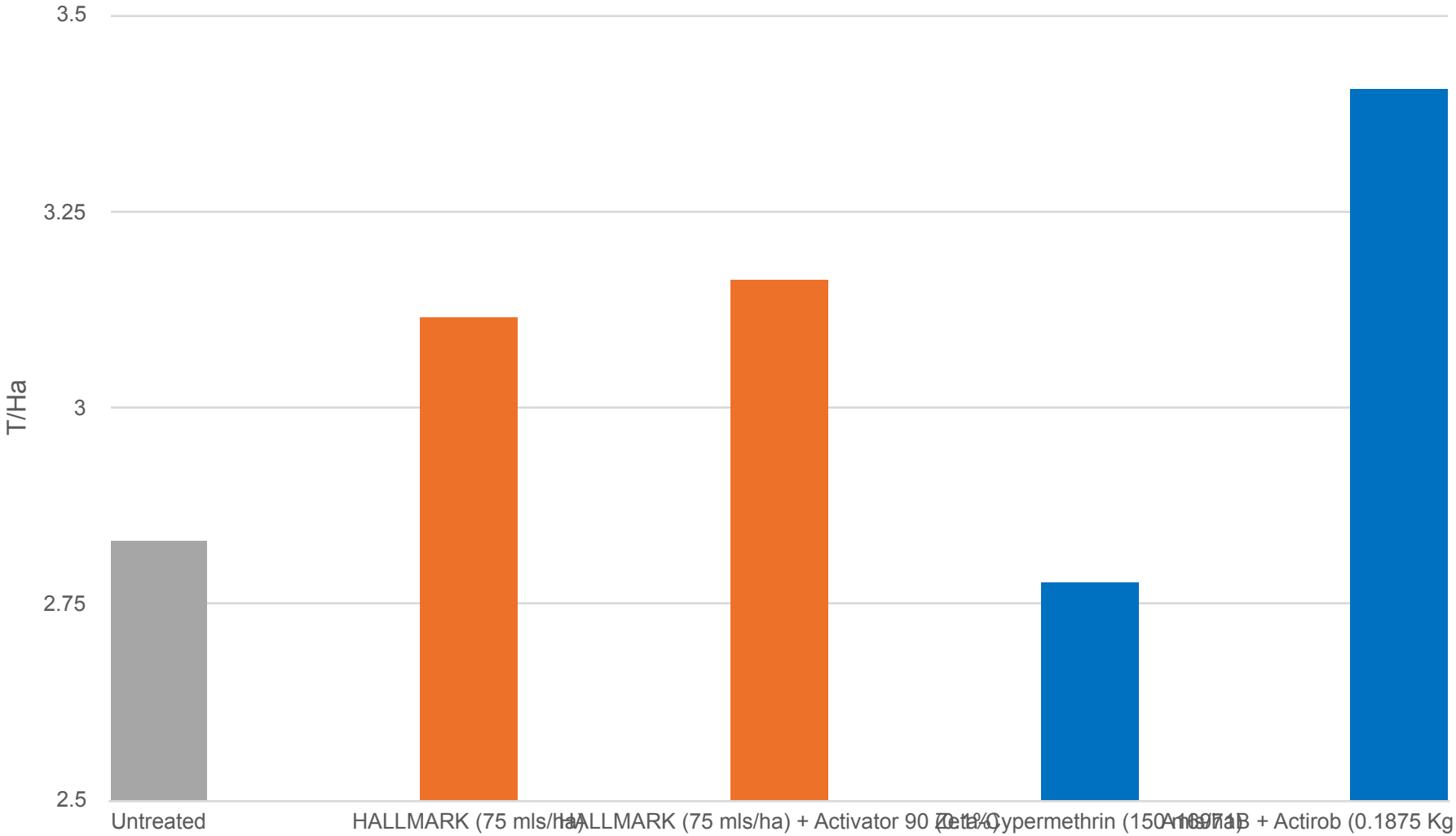
Main points

Justification – Backward or slow growing crop, potential yield loss from P&B weevil.

PGRO Technical Bulletin TU08, Use pheromone traps and spray at threshold.

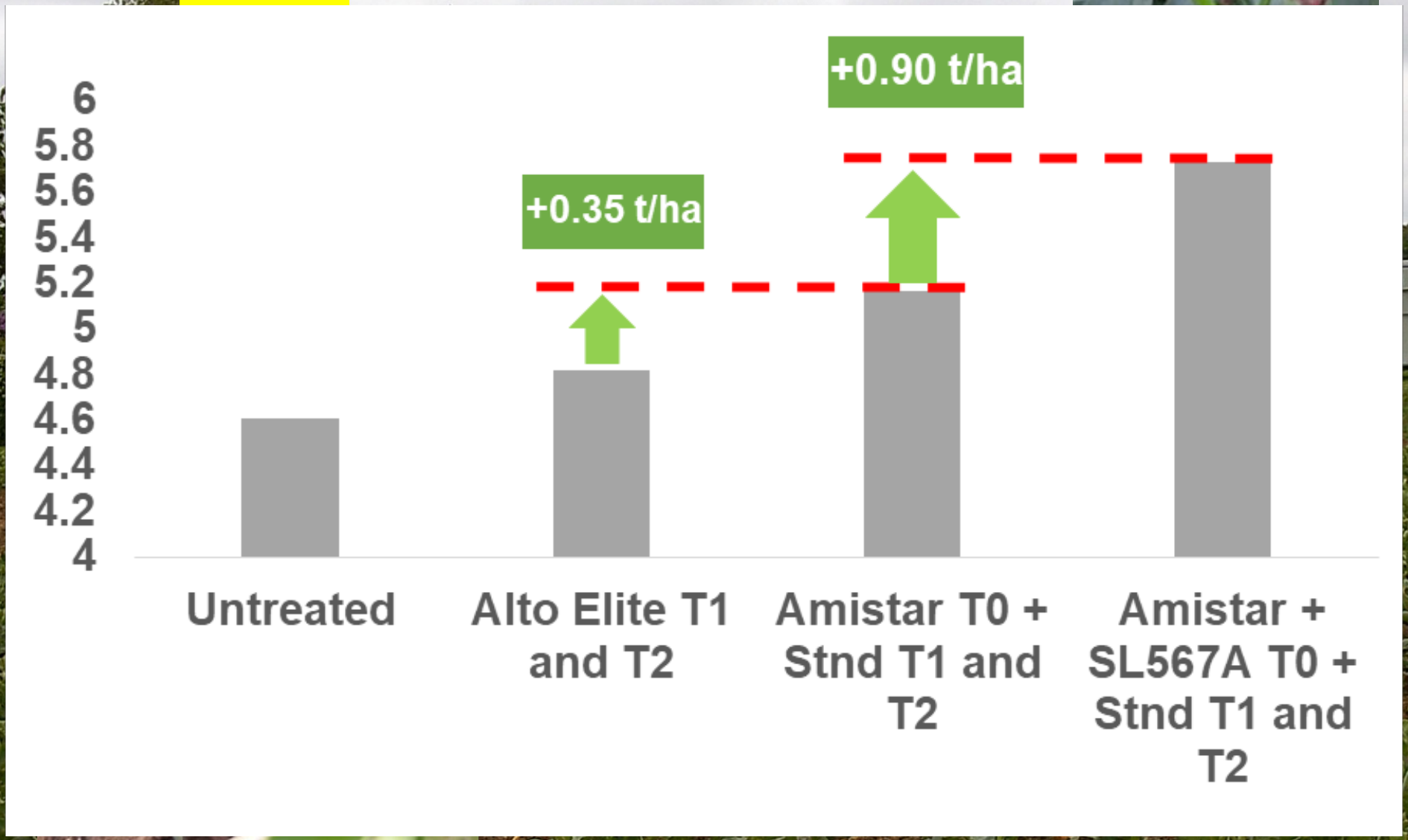
Bestok ◐ 17 °C 62 °F 2018/04/26 15:10:55

Pea and Bean Weevil control – Yield Results



Hallmark Zeon®

syngenta®

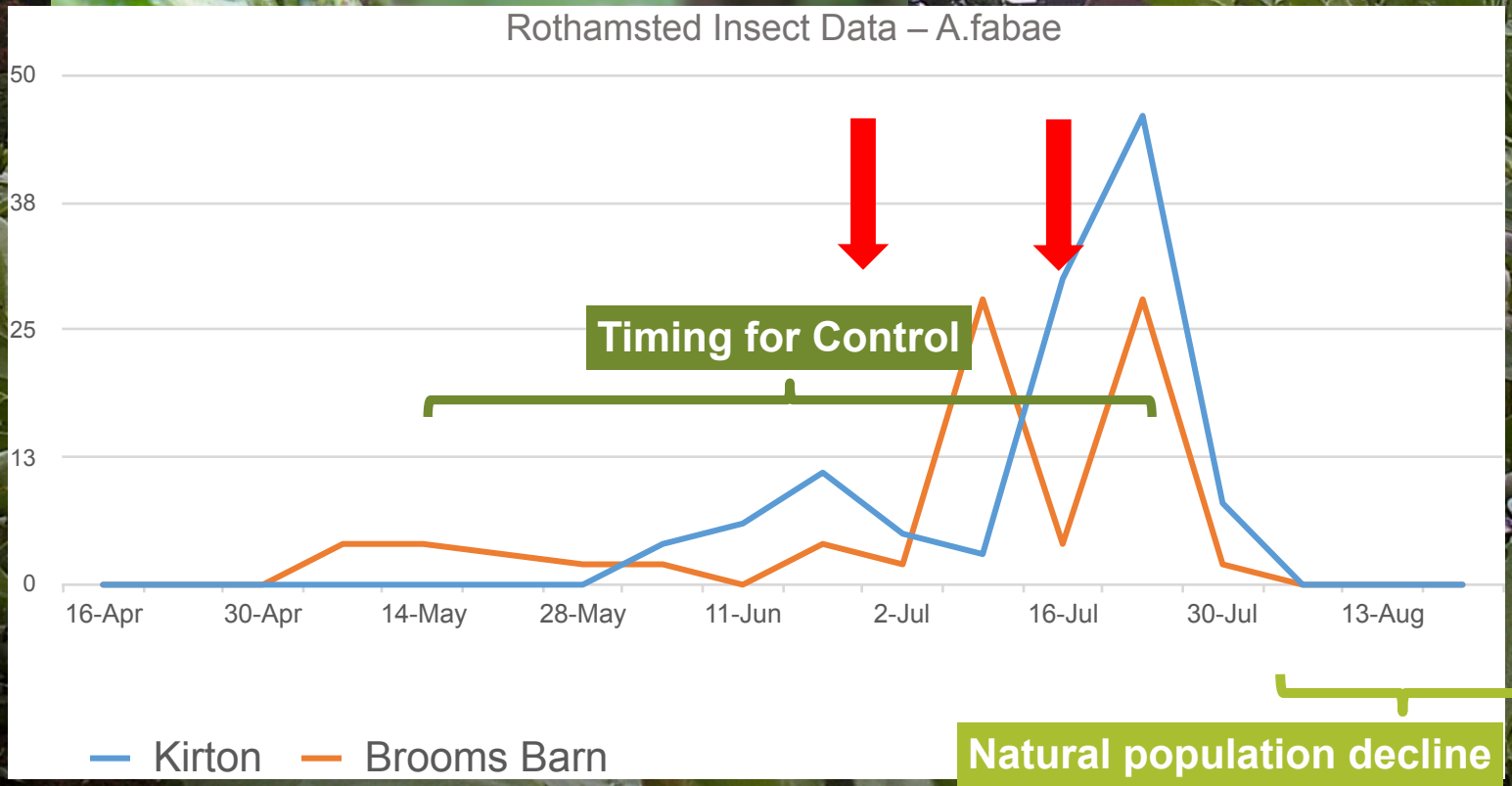


Bestok ● 16 ℃ 60 °F 2018/05/16 14:00:35


First Flowers
Bestok
26 °C
78 °F
2018/05/24
17:00:45

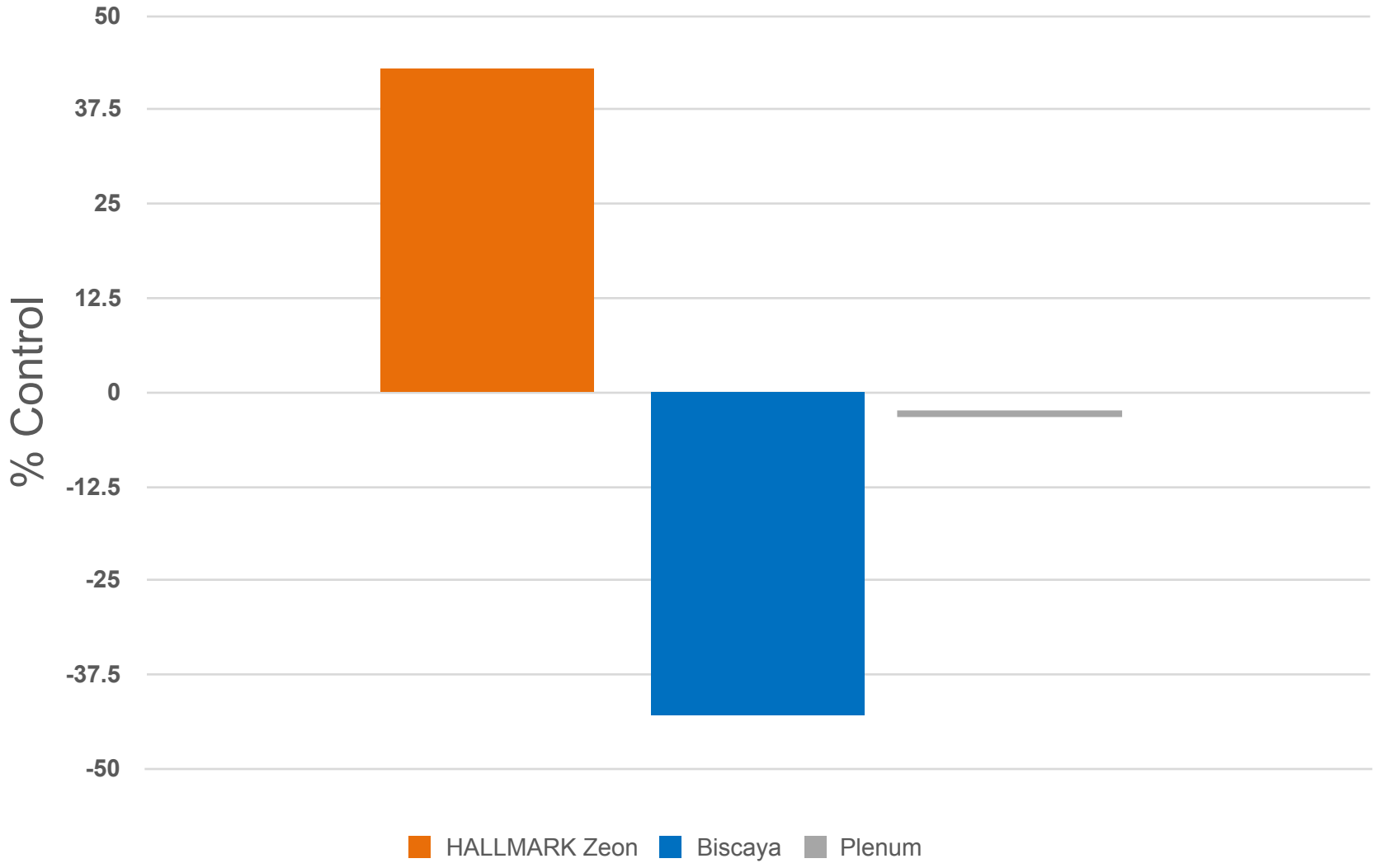
Black Bean Aphid

Growing Season 2018 – Black Bean Aphid
Catches from regional traps number of aphids/week



Bestok ◯ 17 °C 62 °F 2018/05/30 17:00:45

Non-persistent virus transmission control



Source: Brian Fenton (SRUC) 2017

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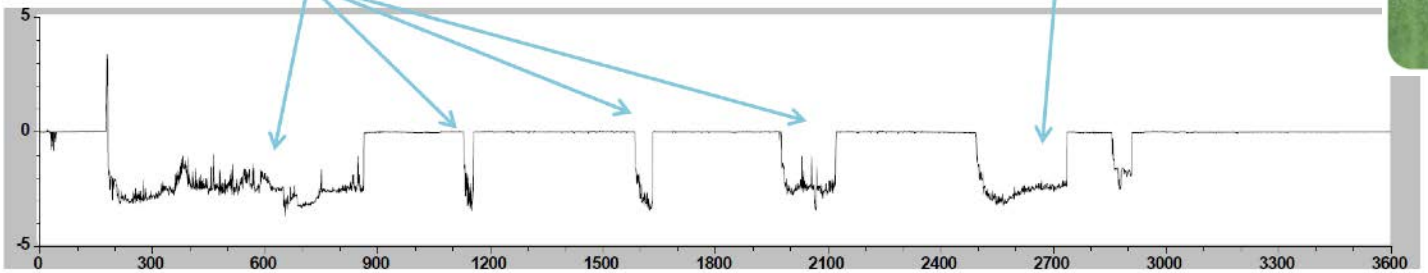
EPG Grain aphid feeding on a potato

Long periods of non-probing, interspersed with short probes

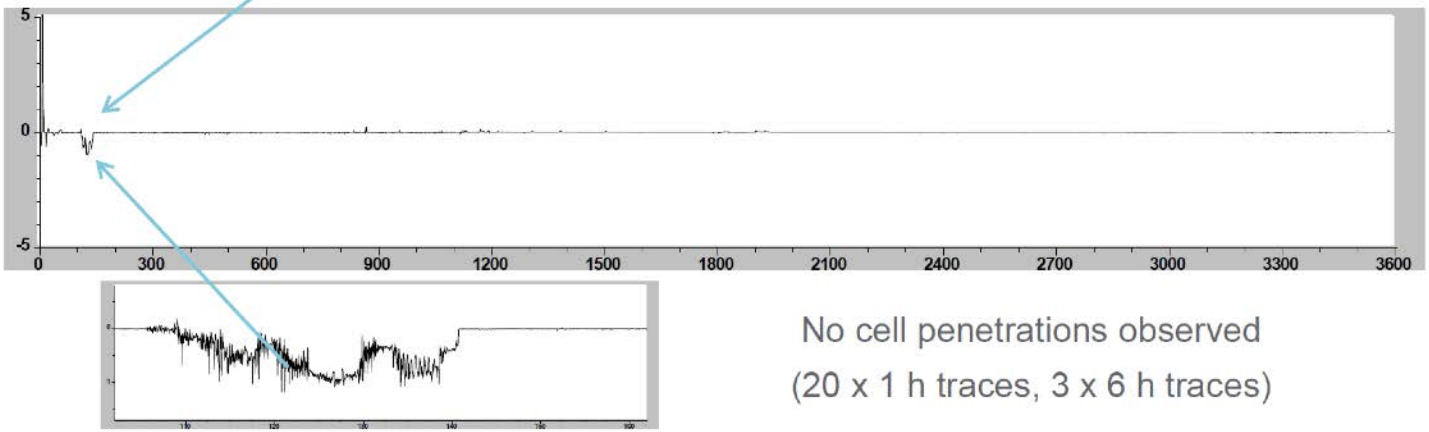
Never reaches the phloem



Very low numbers of cell penetrations

EPG Grain aphid feeding on a potato after HALLMARK ZEON application

Usually one short probe at start, then long period of non-probing



No cell penetrations observed

(20 x 1 h traces, 3 x 6 h traces)

Source: Biokinetics Lab Jealotts Hill

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Potency and persistence of 4 Pyrethroids on aphids in a laboratory study

(HALLMARK ZEON 7.5g ai/ha)

Control of aphids = >50% mortality

Hallmark Zeon®

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T1

Alto Elite 1.5 – 2.0 l/ha

Bestok ○ 19 °C 66 °F 2018/06/02 10:00:20

Bruchid

Application Advice

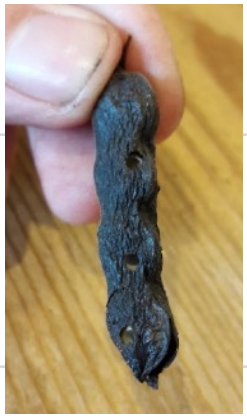
Dense developing canopy and tall plant.

Bruchid activity towards the bottom of the canopy.

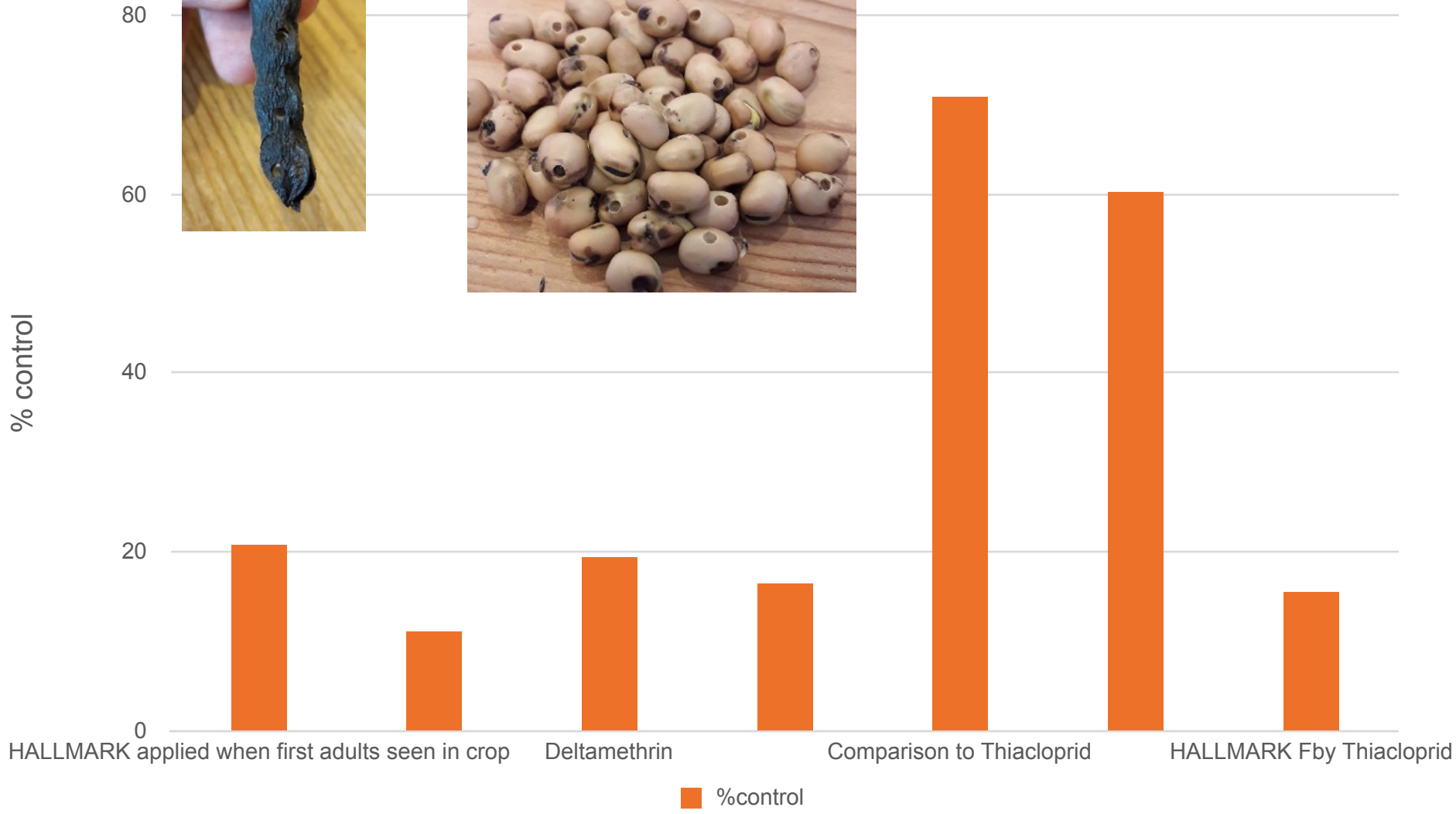
Water volume – 200 l/ha.

Coarse droplet – AMISTAR Nozzle.

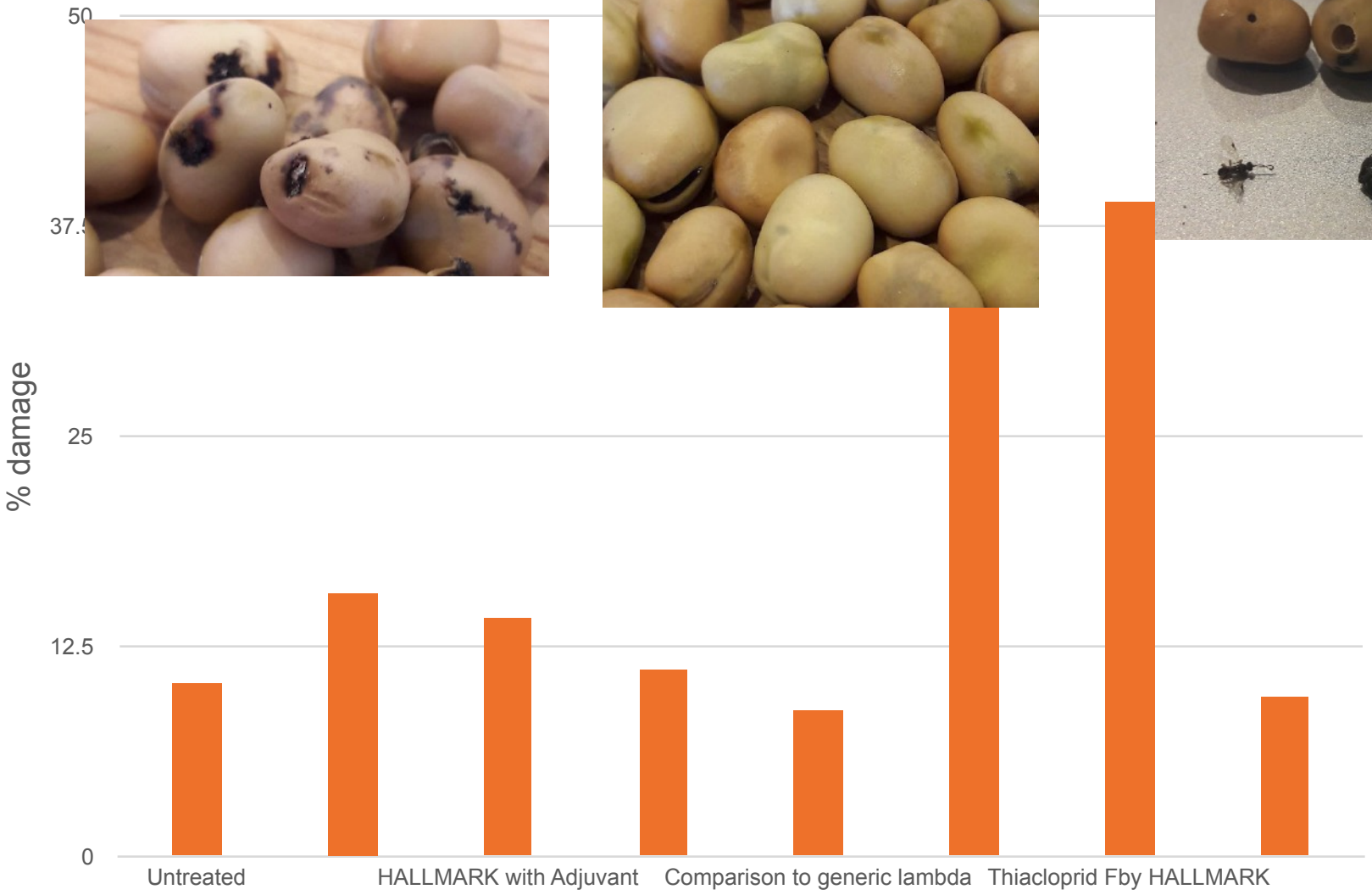
Bestok ○ 19 °C 66 °F 2018/06/02 10:00:20



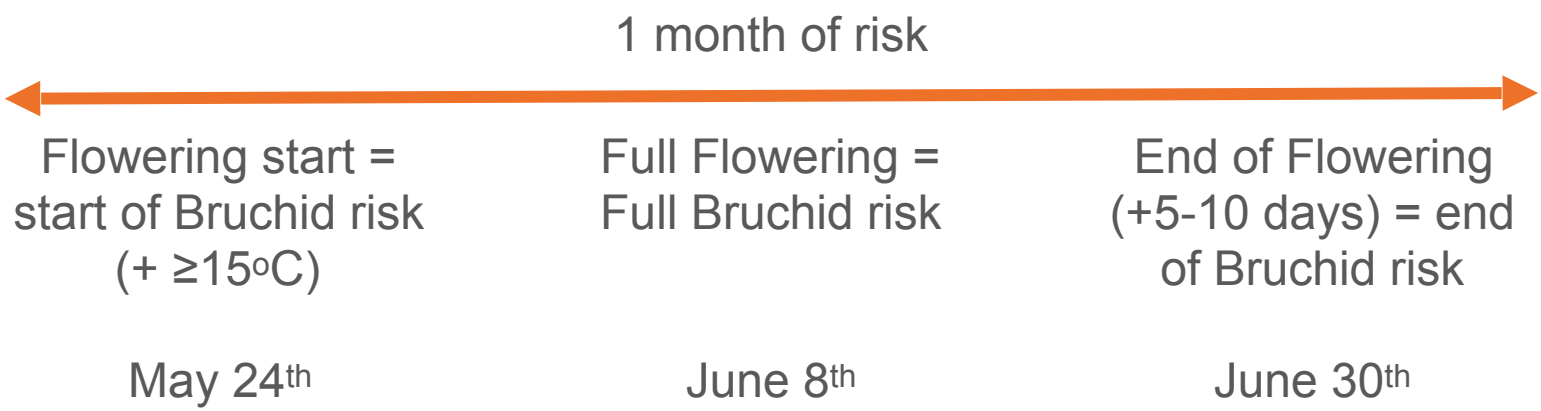
Bruchid Beetle control



% of beans with larvae entry damage



Bruchid Control – what have we learnt?



Bruchid Control – what have we learnt?

BruchidCast

Inspect crops regularly

IMPORTANT – Spray when bees are **inactive**

Alternate products to improve control, and as a resistance strategy use HALLMARK ZEON and Biscaya

Risk stage for crops starts at 50% plants with pods on the lowest trusses

Are beetles present?


BruchidCast 01/06/2017
NG34 7HH.
Sleaford Weather Station, ,67 m asl, 8km W from NG34 7HH
5 Day Forecast 1 June 2017 - 5 June 2017
syngenta
The bruchid trigger is 2 consecutive days at 20 ° C. Podset must have started.
FOR PRODUCT INFORMATION PLEASE GO TO
http://www.syngenta.co.uk/vegetables
BRUCHIDCAST IS SPONSORED BY
HallmarkZeon
Bruchid Risk
Thu 01/06 | Fri 02/06 | Sat 03/06 | Sun 04/06 | Mon 05/06 | Tue 06/06 | Wed 07/06
Spray for Bruchid: X | X | Y | Y | X | X |
Bruchid Risk Legend
X Don't Spray
Y Spray for Bruchid

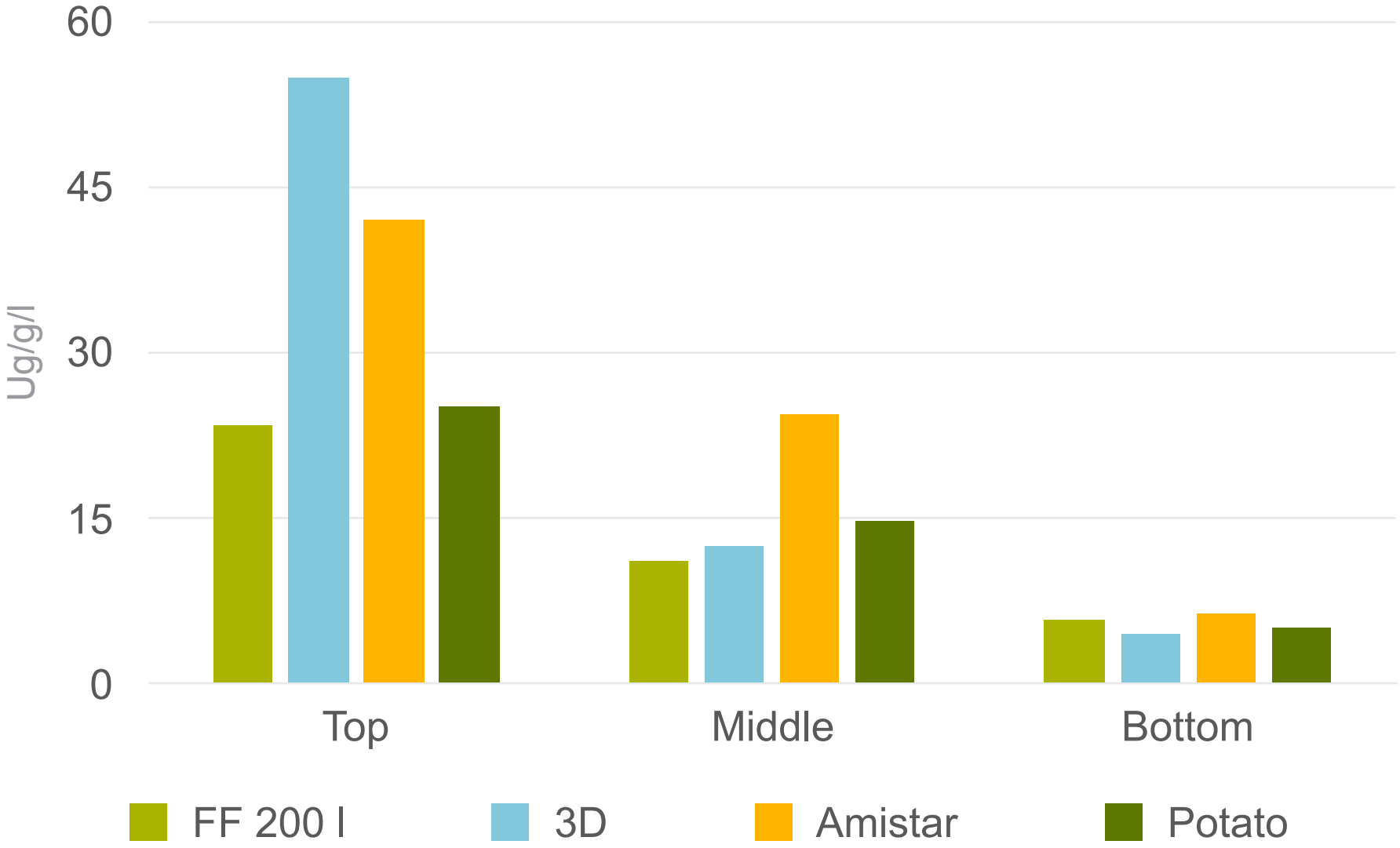
Spray to forecast

Biscaya is a trademark of Bayer CropScience

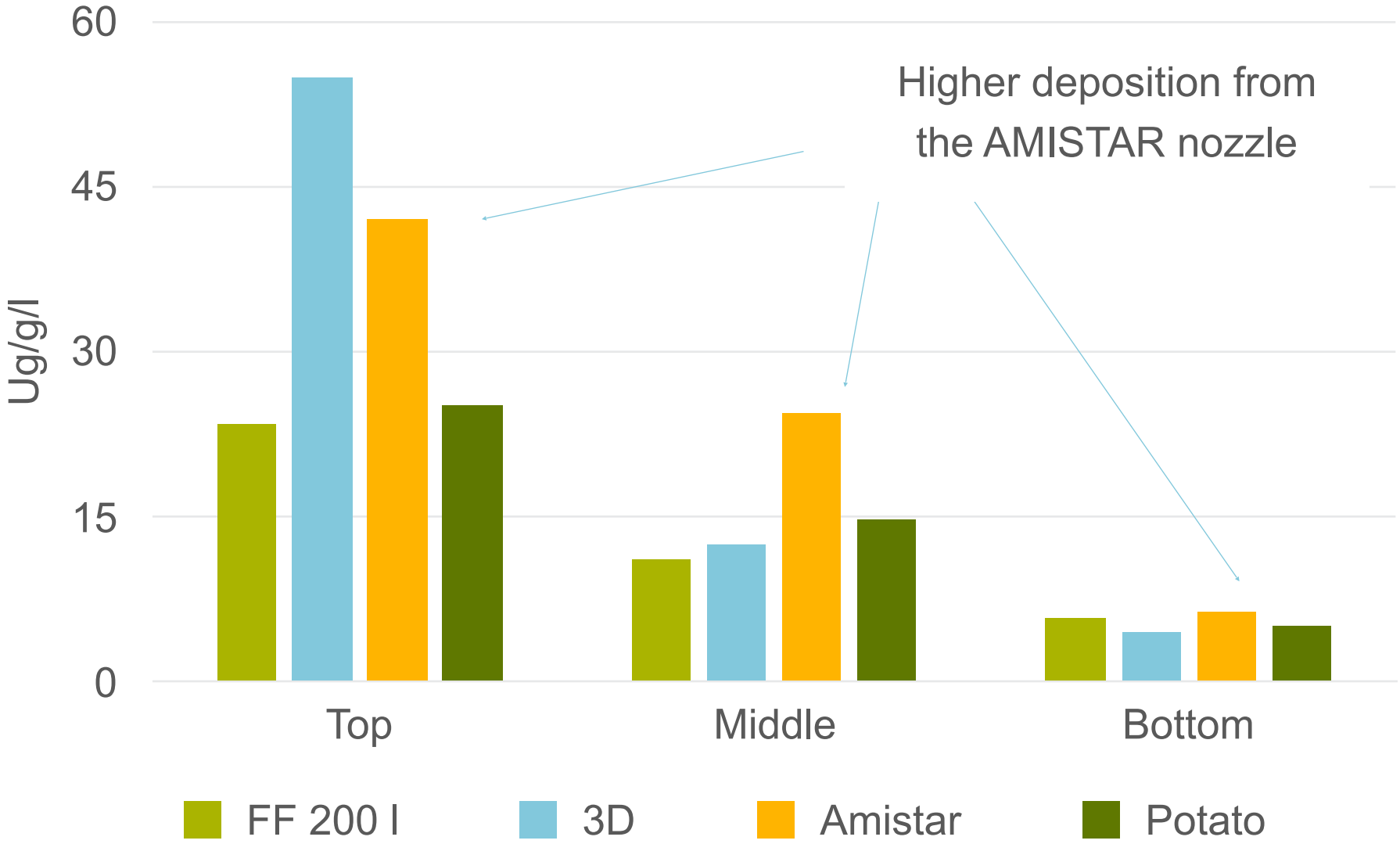

Full Flower
Bestok
14 °C 57 °F 2018/06/08 09:00:17


T2
Alto Elite 1.5 – 2.0 l/ha
Bestok
24 °C 75 °F 2018/06/21 15:00:38

Application Results – Field Beans



Application Results – Field Beans




Bestok
40 °C 104 °F 2018/06/26 12:00:26


Bestok
40 °C 104 °F 2018/07/19 12:00:27


Bestok
37 °C
98 °F
2018/08/05
16:00:42


4.14 t/ha
5.58 t/ha
4.05 t/ha
5.66 t/ha
4.29 t/ha
5.55 t/ha
4.06 t/ha
6.28 t/ha

New Approvals and Future Developments

- New Fungicide Approvals – ALTO ELITE replacement
- OLYMPUS – Vining peas and edible podded peas
  One per crop – 14 day PHI
- MINECTO ONE – Vining Peas

MINECTO ONE

PEAS

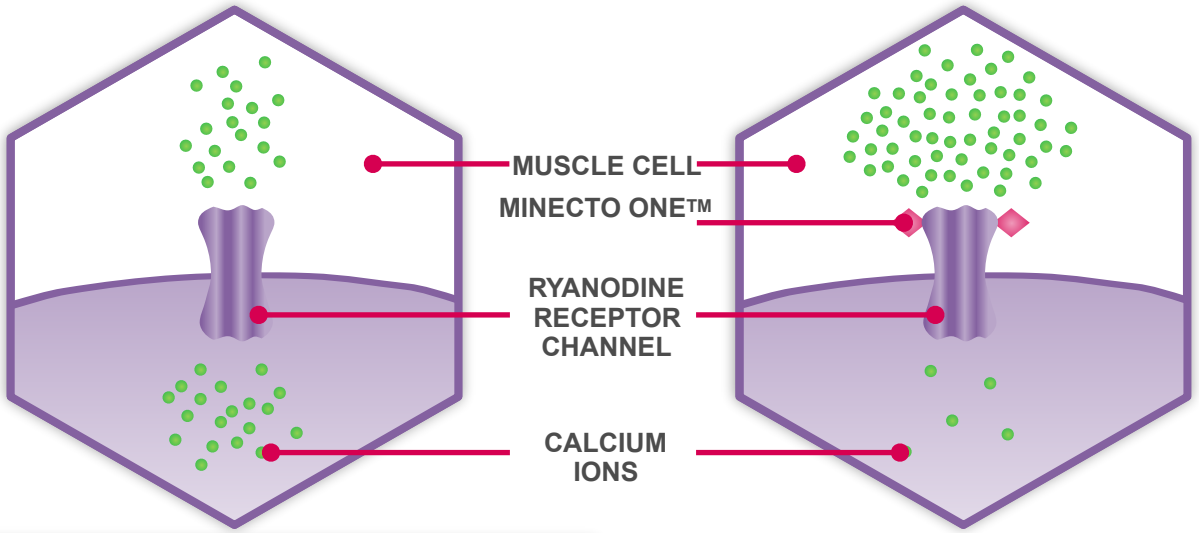
Minecto™ One

syngenta

™

NEW MODE OF ACTION FOR SUCKING PEST CONTROL

CALCIUM IS RELEASED, MUSCLE CONTRACTS



Cyantraniliprole is a ryanodine receptor modulator. It binds to the insects ryanodine receptor in muscle cells and causes the channel to open.
This results in a flow of calcium ions from internal stores to the cytoplasm causing...

Muscle paralysis, cessation of feeding and **ultimately insect death**

MINECTO ONE PEA LABEL

Crop	Pests	Product rate	AI rate	Growth stage	No. of app.	Interval	PHI
Edible podded pea, Vining pea	Pea moth *(Cydia nigricana)*	0.185 kg/ha	75 g/ha	GS 69-79	2	7	3

Minecto One has a **5m buffer zone**

Thank you – Any Questions?

PULSES - THREATS AND OPPORTUNITIES POST BREXIT

Graham Redman

January 2019

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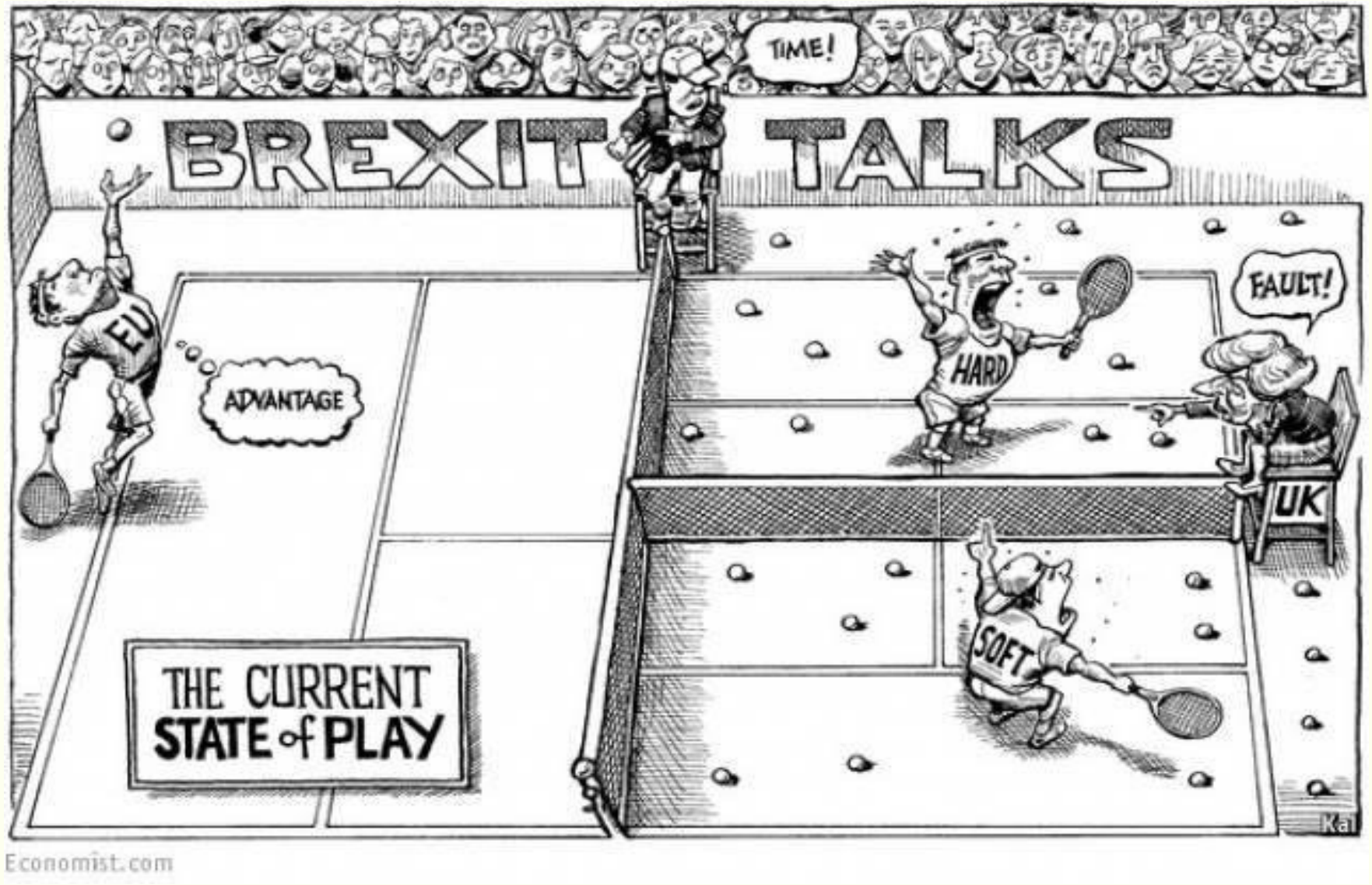
BREXIT: STATE OF PLAY



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Source: The Economist

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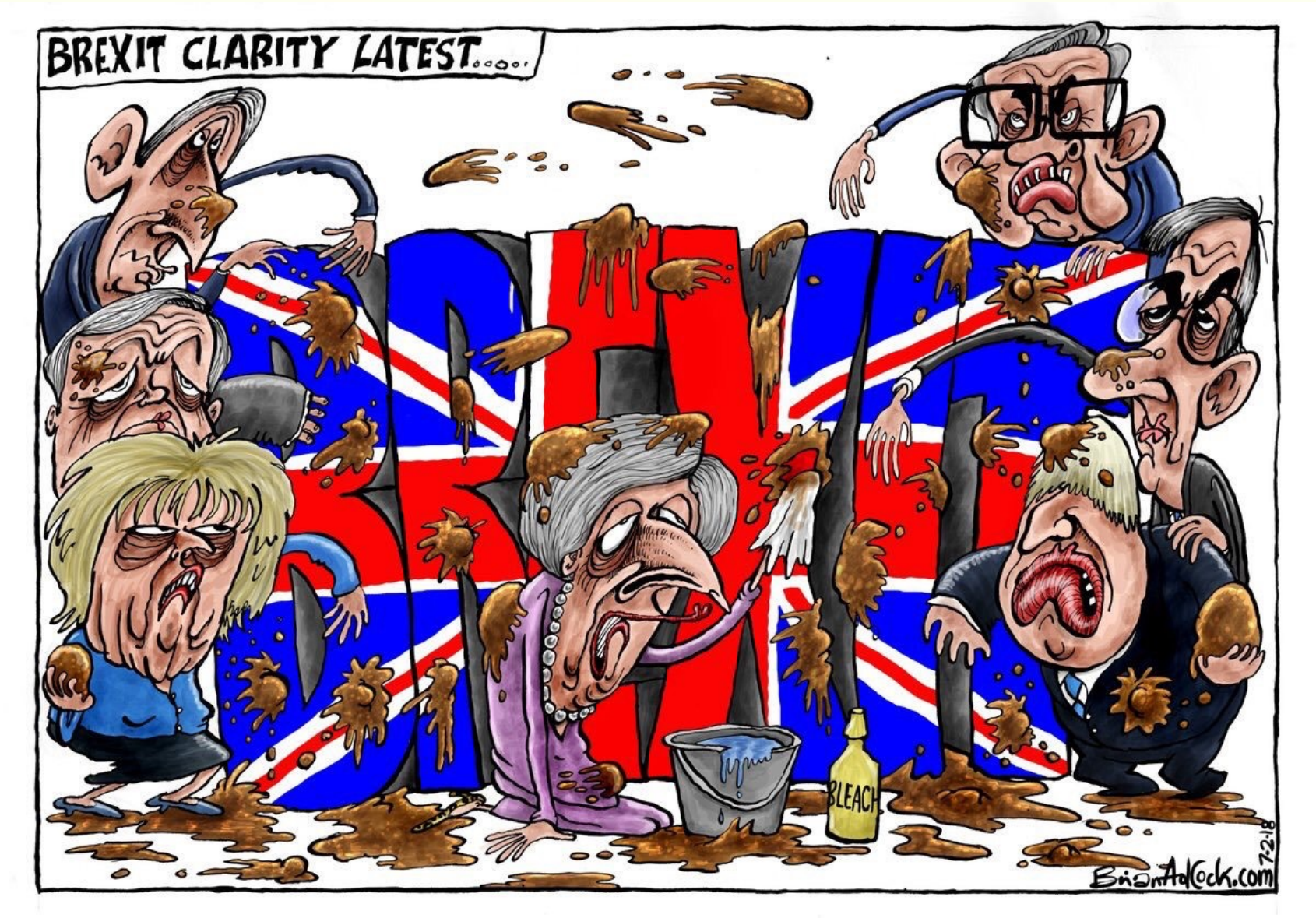
BREXIT: STATE OF PLAY



Source: Brian Adcock

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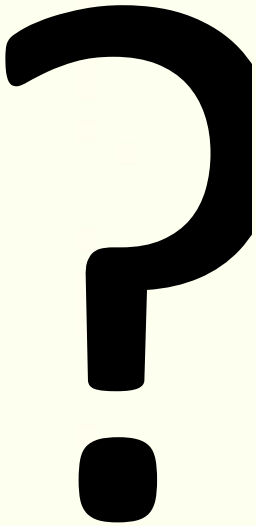
POSSIBLE OUTCOMES

DEAL BREXIT

NO-DEAL BREXIT

NO BREXIT



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BENEFITS OF PULSES IN FARM BUSINESS

- **Low tariffs**
- **Most exports already third country (Egypt)**
- **Non-GM marketing ~Trade with EU**
- **Trade balance (UK/EU protein deficit)**
- **Fish Food ~ a major growth industry**
- **Weed Control**
  - Spring cropping,
  - Lower ag-chem inputs
- **Less overhead (labour) required**
- **Nitrogen fixing**
- **Inclusion into ELMS (Deiter Helm's new rural policy)?**

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TARIFFS – ARABLE SECTOR

Commodity	Standard Tariff (€ per t)	Tariff Rate Quotas② (tonnes)	Erga Omnes TRQ (t)	In-TRQ Tariff (€ per t)	EU Market Price* (€ per t)
Feed Wheat	€95	3.1mt	0.1mt	€12	€165
Quality Wheat	①	300,000	All	-	€170
Feed Barley	€93	307,105	All	€12	€160
Oilseeds	none	n/a	n/a n/a	€370	
Beans & Peas	3.2%	n/a	n/a	n/a	€250
Sugar (raw cane)	€339	780,925	253,977	€0	€360
Potatoes	11.5%	4,295	All	€0	≈€280
Onions	9.6%	12,000 (dried)	All	€0	≈€300
Apples	€1,379	696	All	€0	≈€1,000

① Complicated formula based on US price ② TRQs are complex (EU has over 120 separate ones). Some are available to all countries 'Erga Omnes', some are for specific exporters (e.g. NZ 228,254 t of lamb)

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Source: EU Commission / Andersons * July

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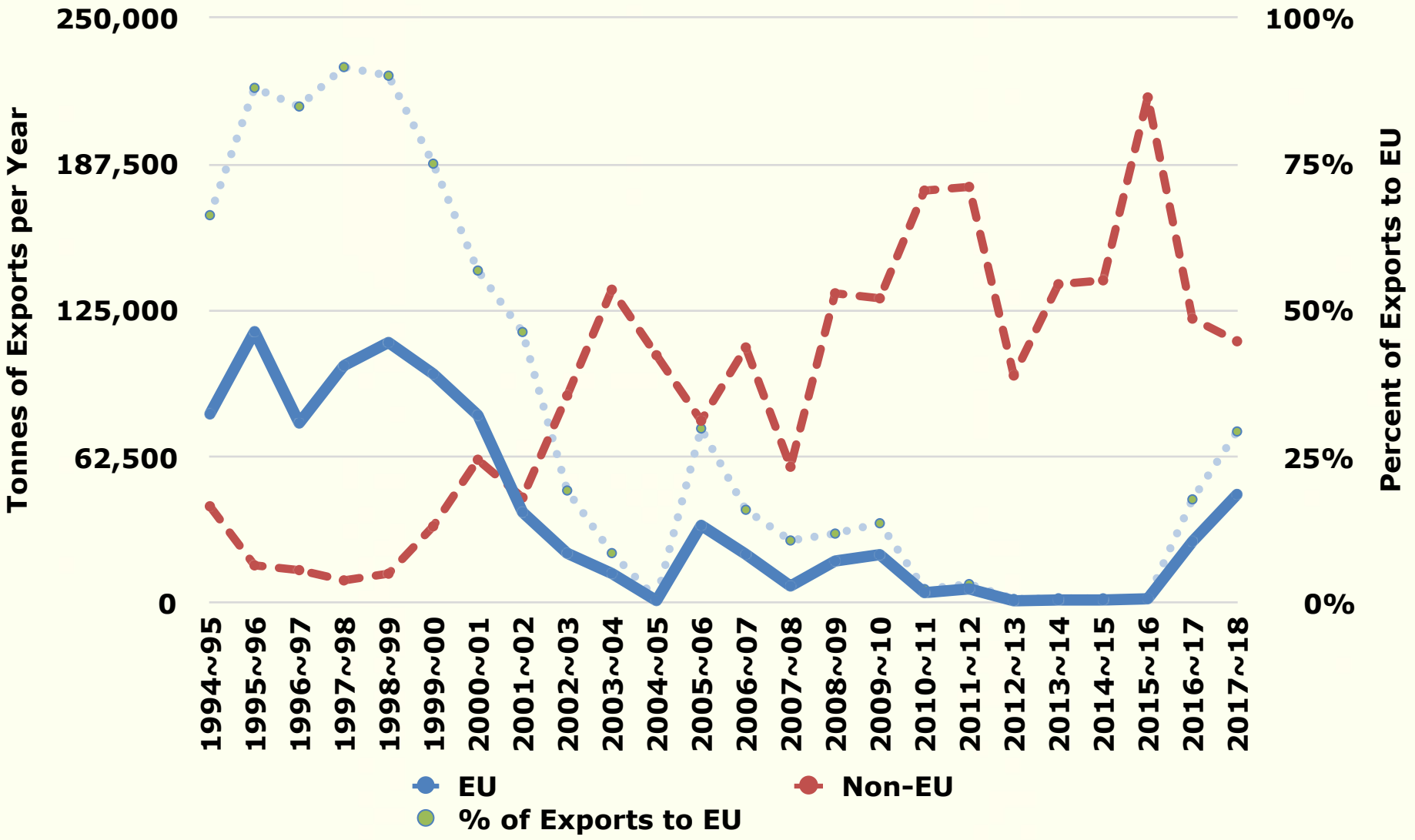
UK EXPORTS OF BEANS



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Source: HM Customs / AHDB / Andersons

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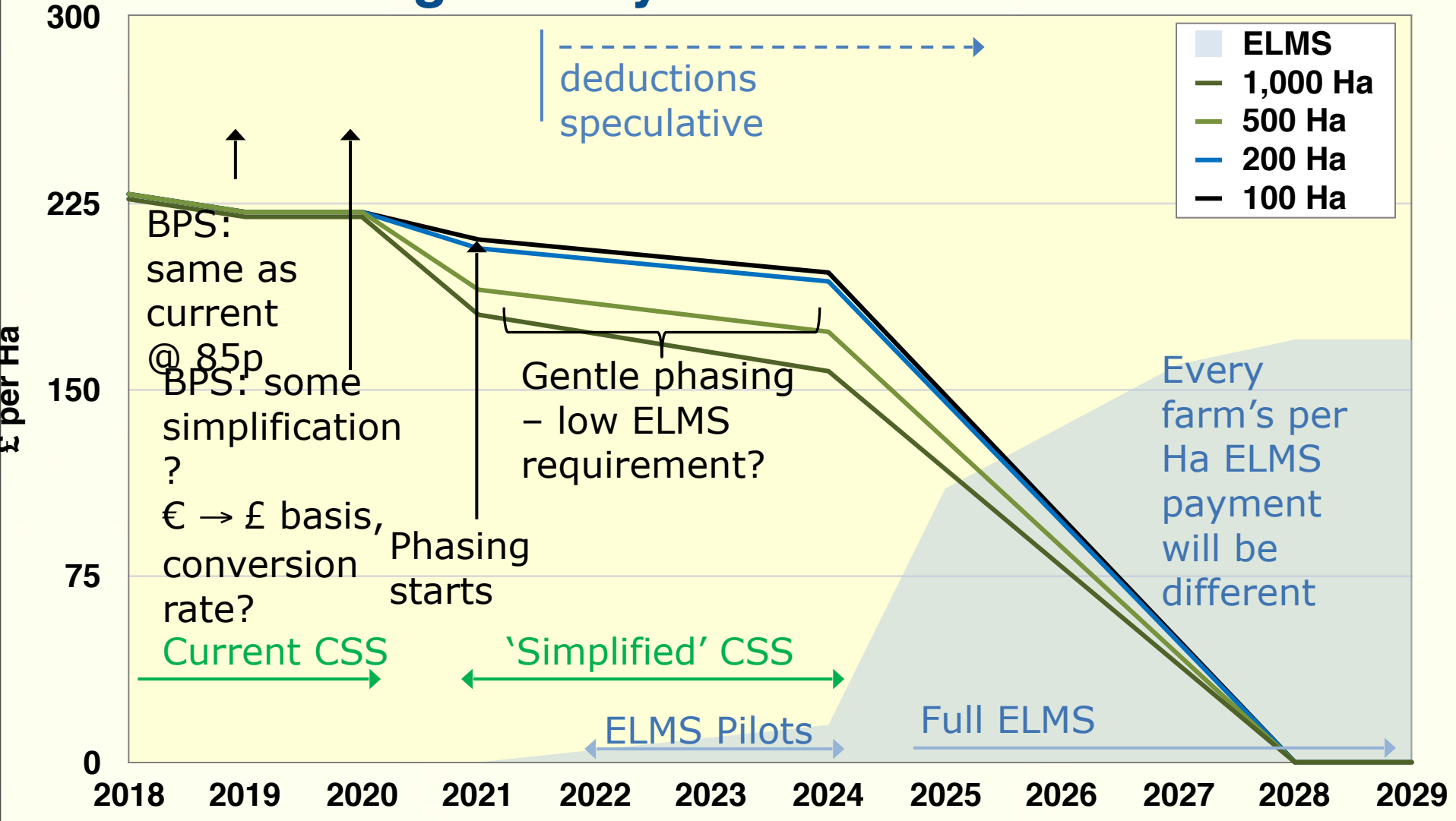
FUTURE SUPPORT SUMMARY

Possible English Payment Rates – 2018 to 2029



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Source: Andersons

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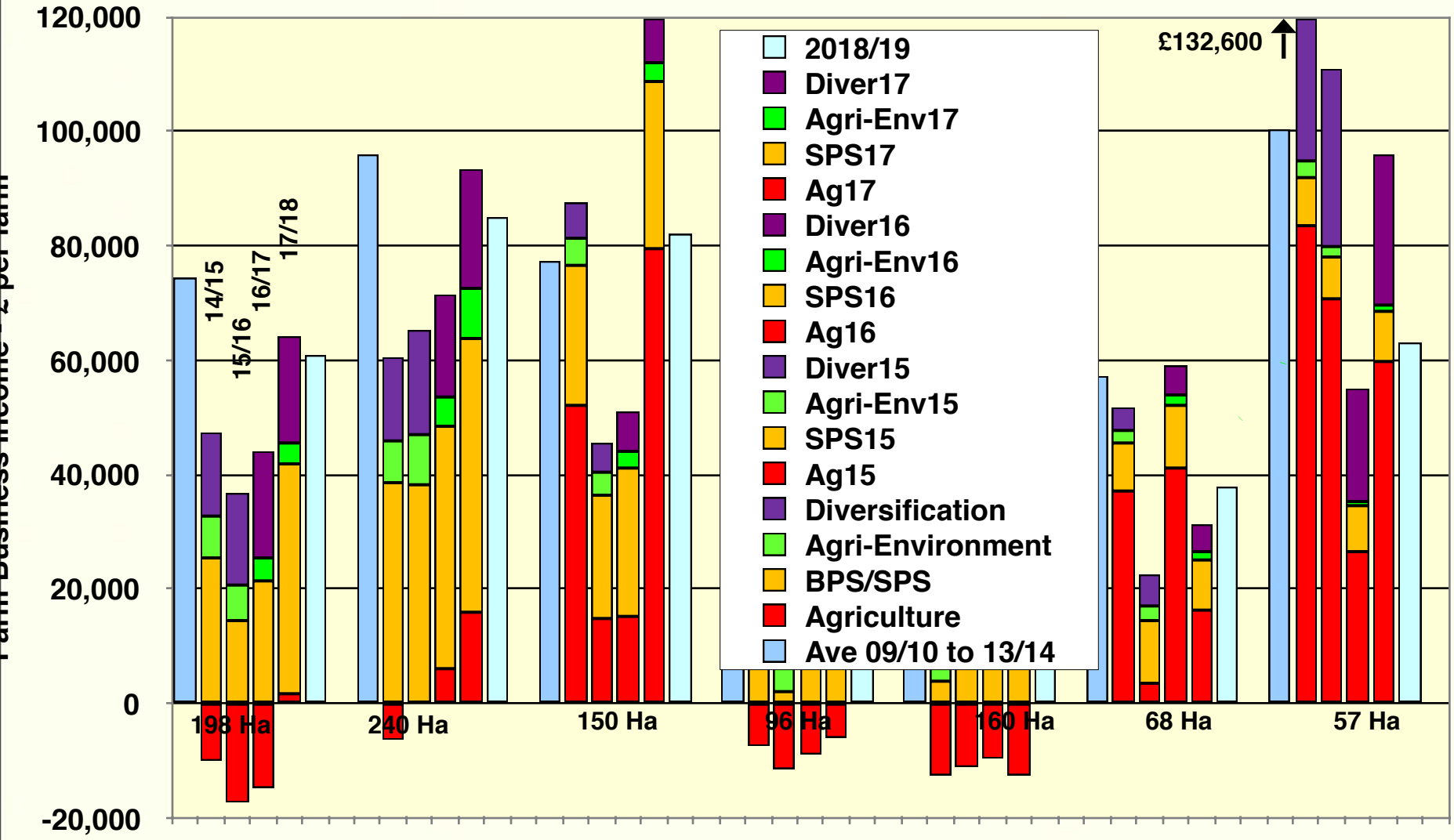
SECTOR PROFITABILITY

Farm Business Income*, England - 2009/10 to 2018/19



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Source: Defra / Andersons * real terms, 17/18

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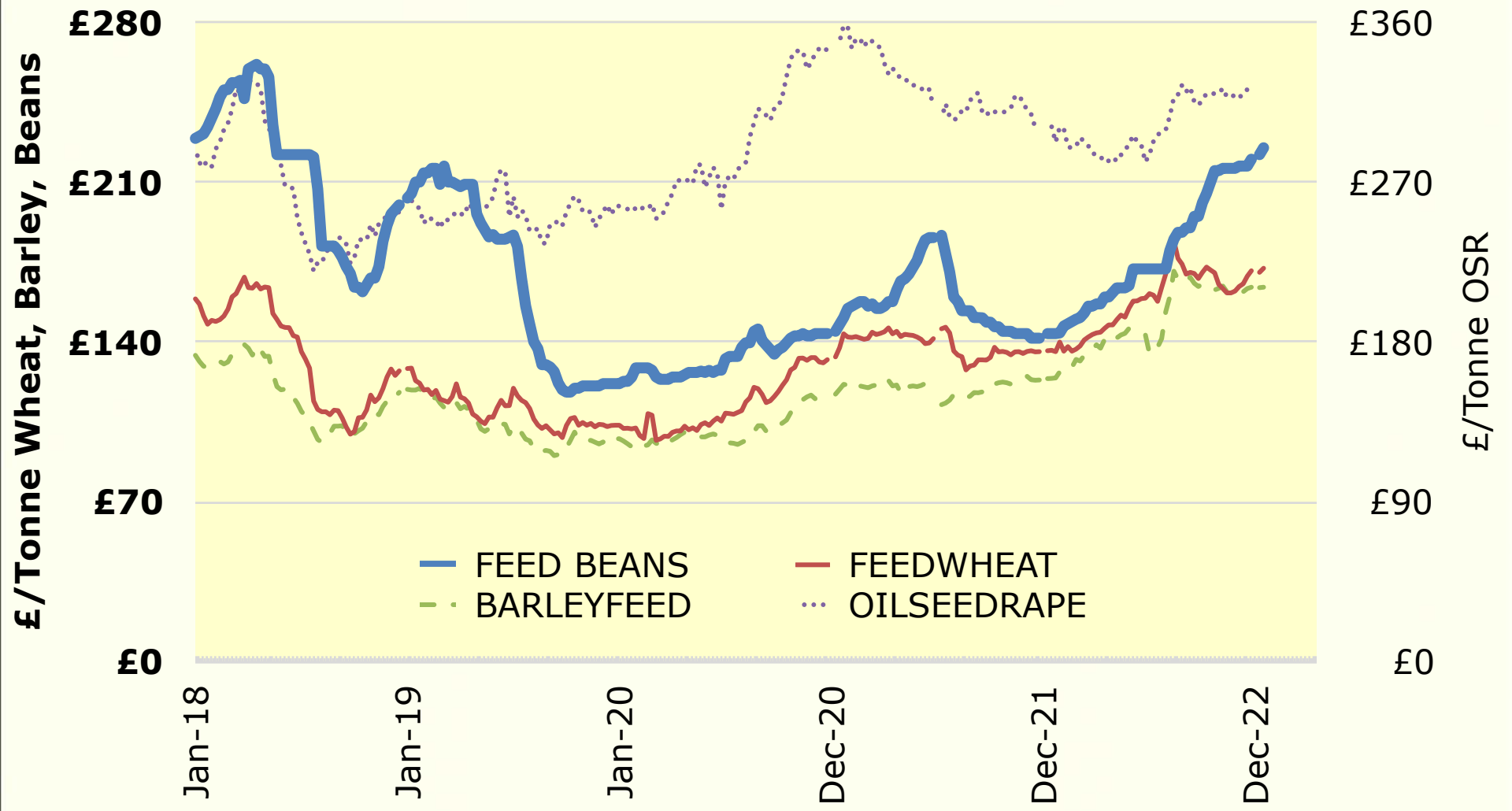
HARVEST 2018: PRICES

Ex-Farm Values – 2012 to 2019



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Source: DEFRA / AHDB / Andersons

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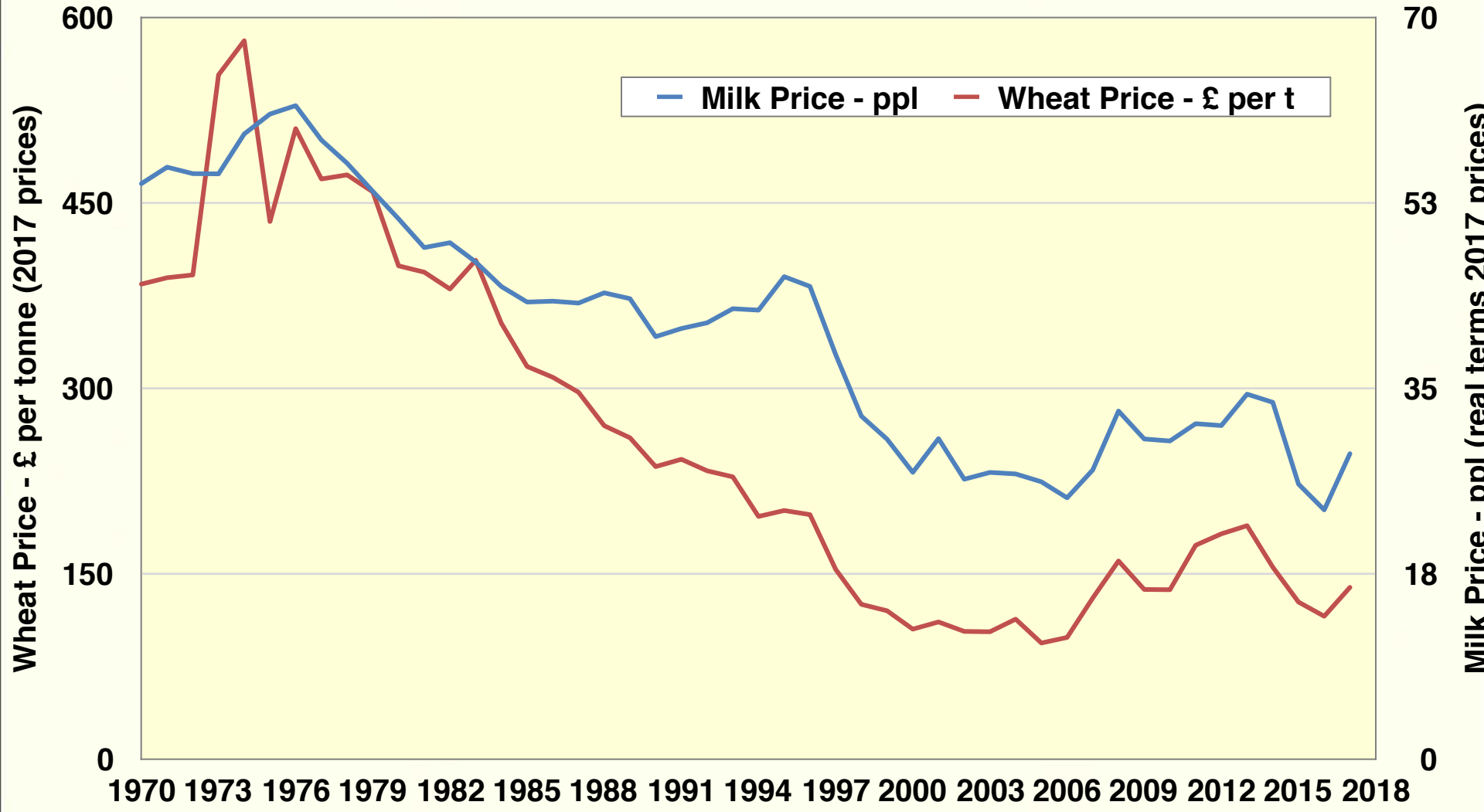
WHY DO FARMS CHANGE (GROW)?

Milk and Wheat at 2017 Values - 1970 to 2017



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Source: DEFRA / Andersons

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WHAT DO THE BEST DO?

Features of Top-Performing Farms

- **Have a clear business strategy, shared with partners**
- **Set goals and budgets with timelines and values**
- **Compare yourself with others, not just in your sector, and gather information**
- **Minimise overhead costs**
- **Know who your market is, listen to them and meet their requirements**
- **Focus on the details that matter but retain a view of the big picture**
- **Have a mindset for change and innovation**
- **Remain disciplined and stick to your strategy**

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Source: AHDB / Andersons

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Integrated Pest Management

Becky Howard

Crops

People

Environment

Site and condition specific

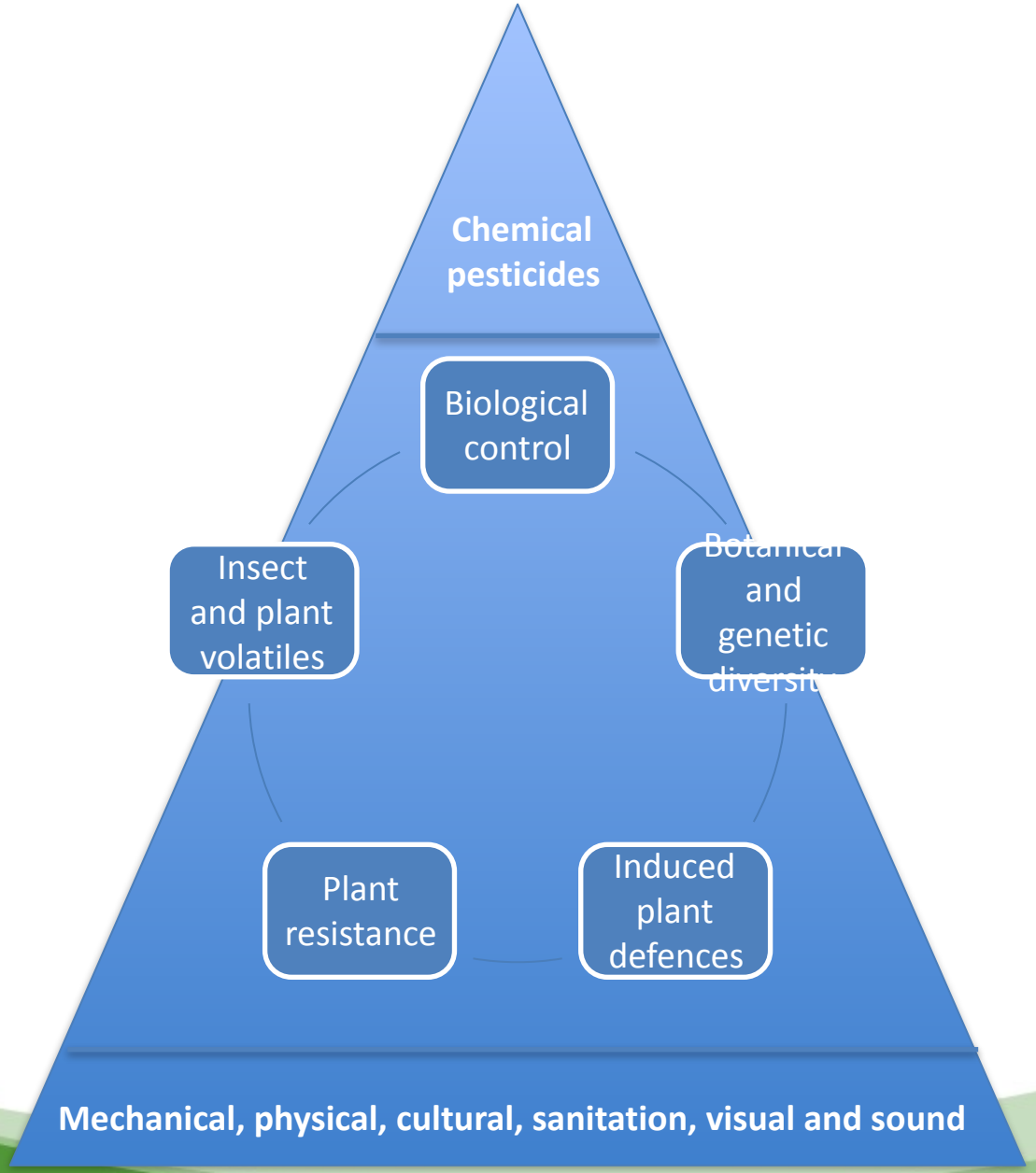
Location

Soil type

Weather

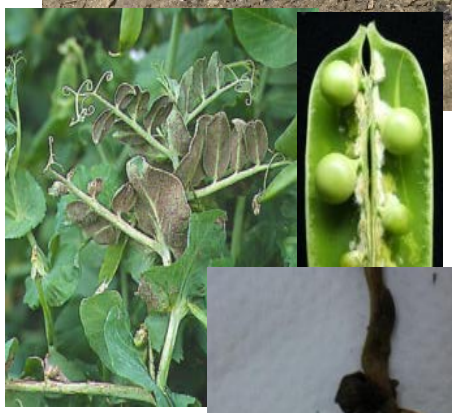
Rotation

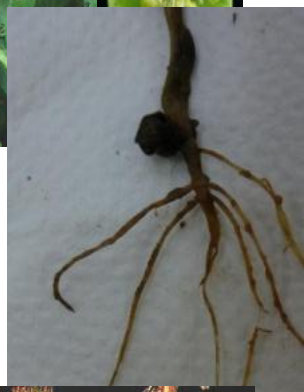
Crop history


Chemical pesticides
Biological control
Insect and plant volatiles
Botanical and genetic diversity
Plant resistance
Induced plant defences
Mechanical, physical, cultural, sanitation, visual and sound

Crop husbandry

- Soil structure and health
- Rotation – 1 in 5 at most – short rotations lead to build up of soil-borne pests and diseases
- Cropping history – a long history of pulse producti may lead to higher disease burden
- Test soils for pathogens, pests and nutrients
- Wait for the right establishment conditions
- Conditions during the season – high levels of plant stress lead to greater disease pressure
- Soil-borne pests and diseases – prevention is the best or only solution





www.pgro.org

PGRO Agronomy App

The PGRO Recommended List is published each year using data from multiple sites with good geographic spread

SPRING BEANS - PGRO Recommended List 2019

The control for yield comparisons is the mean of Fuego and Vertigo. Yield differences of less than 5.0%(p=0.05) should be treated with caution.

Variety / type	Pale hilum						Pale hilum LVC		Black hilum Tic
	Lynx	Fanfare	Vertigo	Mallory	LG Cartouche	Fuego	NEW Victus	NEW Tiffany	Maris Bead
	R	R	R	P2	R	R	P1	P1	R
UK Agent	LSPB	LSPB	LSPB	LSPB	LUK	LUK	LSPB	LSPB	WAC
Yield as % control (5.24t/ha) 5 year mean	104	103	101	101	99	99	104	100	82
Agronomic characters									
Flower colour (C=coloured)	C	C	C	C	C	C	C	C	C
Earliness of ripening	5	6	7	6	7	7	8	6	4
Shortness of straw	6	5	6	7	6	6	6	5	4
Standing ability at harvest	8	6	6	7	8	7	7	6	5
Resistance to Downy mildew	7	5	6	7	5	5	6	5	7
Seed characters									
Thousand seed weight (g)(@15%mc)	532	548	575	558	527	563	554	516	392
Protein content (%dry)	26.9	27.5	26.9	26.4	29.1	27.3	27.2	27.8	28.6
Year first listed	2016	2013	2013	2018	2017	2005	**2019**	**2019**	1964

Recommendation categories: R=Recommended, P1,P2=1st & 2nd year provisional recommendation, O=Becoming Outclassed.

A high figure indicates that the variety shows the character to a high degree.

The scales of characters of spring beans do not necessarily correspond with those for winter beans. The export market usually requires pale hilum types.

LVC = Low Vicine & Low Convicine. © PGRO 2018

Seed hygiene and quality

PGRO

Pest and disease monitoring and forecasting

CropMonitor™

Area	2014 Season Summary
Area 1	View
Area 2	View
Area 3	View
Area 4	View
Area 5	View
Area 6	View
Area 7	View
Area 8	View
Area 9	View
Area 10	View
Area 11	View
Area 12	View
Area 13	View
Area 14	View
Area 15	View

PGRO

https://insectsurvey.com/aphid-bulletin

www.cropmonitor.co.uk

Pest and disease monitoring and forecasting

BruchidCast 05/06/2014
CB5 9DA.
Cambridge Weather Station, Distance: 6km W from CB5 9DA, elevation 15 r
5 Day Forecast 5 June 2014 - 9 June 2014

The bruchid trigger is 2 consecutive days at 20 ° C **Podset must have started**.

FOR PRODUCT INFORMATION PLEASE GO TO
http://www.syngenta.co.uk/

BRUCHIDCAST IS SPONSORED BY

Hallmark Zeon

Bruchid Risk

	Thu 05/06	Fri 06/06	Sat 07/06	Sun 08/06	Mon 09/06	Tue 10/06	Wed 11/06	
Spray for Bruchid	X	X	X	Y	Y			

Bruchid Risk Legend

X	Don't Spray	Y	Spray for Bruchid

Spray Window Opportunity

Hours of the Day:	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
Thursday 05/06	R	R	R		R				W	W	W	W	W	W	W	W	W							
Friday 06/06																								
Saturday 07/06															D	D	X	X	X	W				
Sunday 08/06	R																							
Monday 09/06																								

Restrictions Legend

A	Leaf Surface too wet	B	Risk of Surface Wetness	C	Risk of Washoff
D	Temperature too High	E	Excessive Evaporation	F	Evaporation Risk
G	Risk of Heat	H	Heat	R	Rain
T	Temperature too Low	U	Risk of Wind	V	Windy
W	Excessive Wind	X	Multiple Risks		

Colours Legend

Night time	Day time	
		Spraying Recommended
		Restricted Recommendation
		Not Recommended

https://www.syngenta.co.uk/bruchidcast

Crop management

- Use the best product for the purpose and only when necessary
- Loss of active substances means that development of cultural and biological systems is more urgent
- Resistance – there is increased incidence of resistance to plant protection products in the UK and alternative strategies must be used
- Future effort must be in plant breeding, cultural management, soil health and biological products and systems (Integrated Management)

Thank you

- For further information go to www.pgro.org
- becky@pgro.org
- Or call 01780 782585
- We run an advisory service, plant clinic and seed testing laboratory for diagnosis of crop problems
- All publications and updates are available on the website

syngenta

Intercropping Peas: A way to improve standing ability?

January 2019

Why Intercropping?

- Several Horizon 2020 Projects around intercropping. PGRO involved, but not practical work.

- Grain legumes (Pulses) subsidiary crop

- Treat pulse as primary crop & intercrop as subsidiary

PGRO

What is Intercropping

- Means lots of different things to different people.

- *Farmer & Nuffield Scholar Andrew Howard gives a simple definition of intercropping as "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".*

Why Intercropping?

- Diversity and stability of fields.

- Reduction in chemical/fertilizer application.

- A complementary sharing of plant resources, such as Nitrogen from N fixing plants.

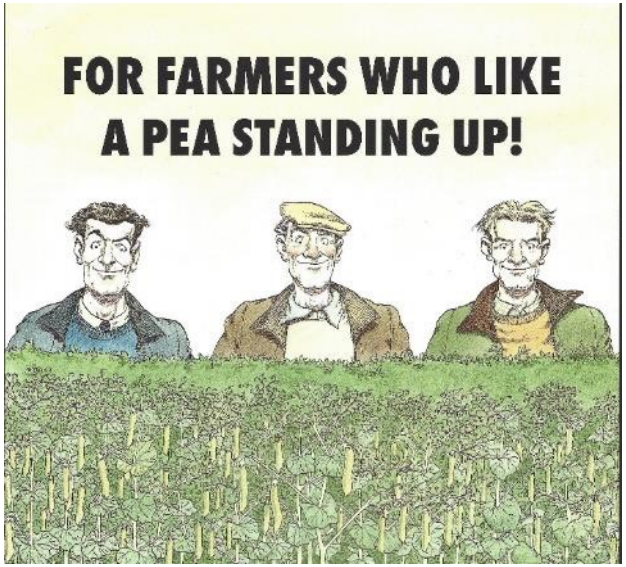
- Weed suppression, and a reduction in susceptibility to insects and disease.

Types of Intercropping

- Variety mixes
- Strip cropping
- Relay cropping
- Temporary
- Full season
- And others.

Why Intercropping?

- Peas & standing ability
- Use companion crop to aid SA in peas?
- A new concept?



PGRO Intercropping

- Standing ability in peas.
- 2017 – look see
- 2018 replicated 9 treatment trial
- Sole crops & mixes of peas/s.oats and peas/s.beans, sown as complete mix.

Pea/S.Oat/S.Bean Intercropping 2018

	Species / plants/m²	
1	P 70	
2	SO 250	
3	SB 50	
4	P 70	SO 70
5	P 70	SO 35
6	P 70	SO 18
7	P 70	SB 50
8	P 70	SB 25
9	P 70	SB 13

4 replications, RB design
Additive not replacement
INPUTS No herbicide, insecticide and a fungicide

Pea/S.Oat/S.Bean Intercropping 2018

Treatment	SA Means	
1. P70	3.25	b
2. SO 250	8.50	a
3. SB 50	9.00	a
4. P70 SO70	4.75	b
5. P70 SO35	4.25	b
6. P70 SO18	4.25	b
7. P70 SB50	8.50	a
8. P70 SB25	8.00	a
9. P70 SB13	7.50	a

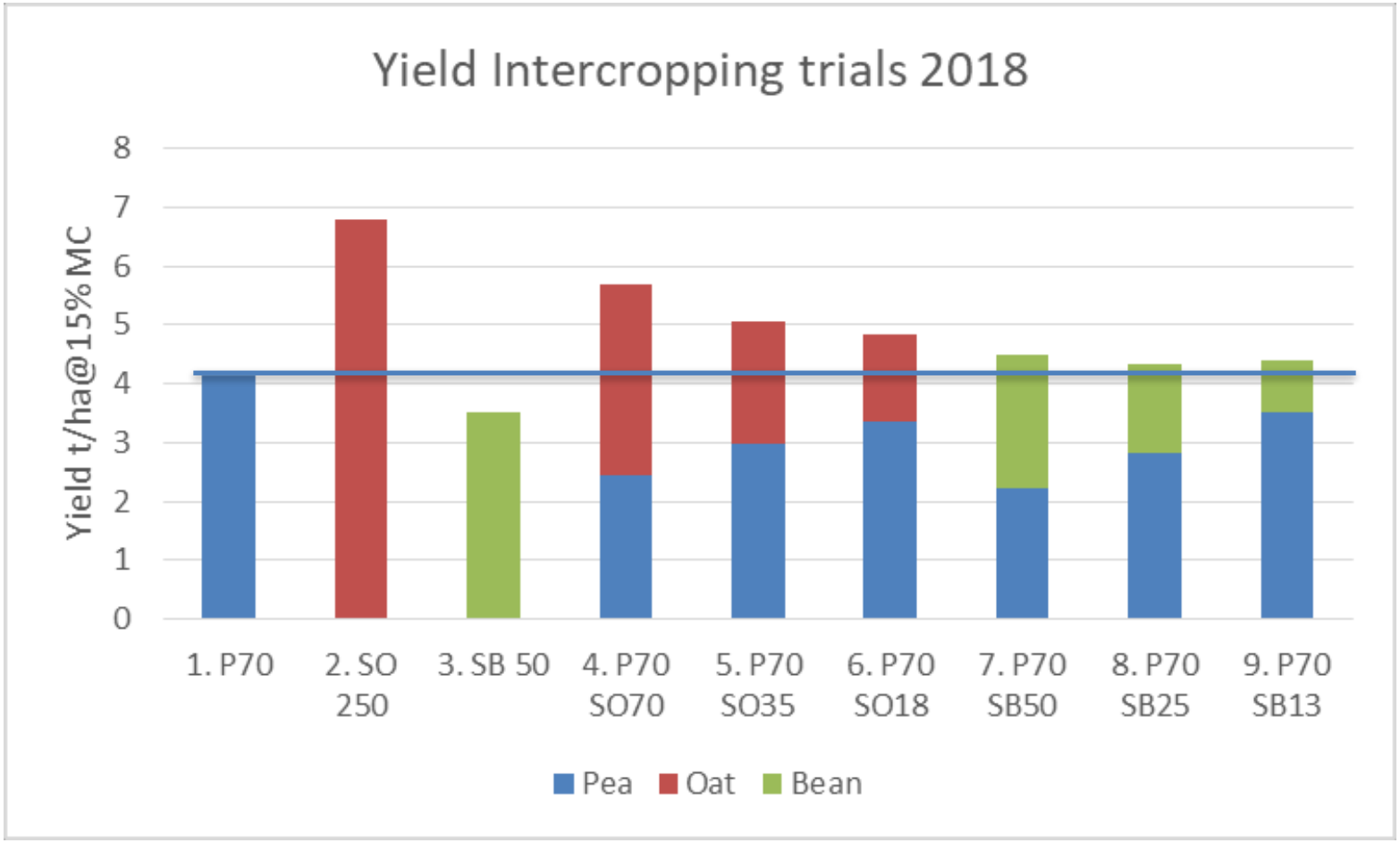
Means with the same letter are not significantly different

Pea/S.Oat/S.Bean Intercropping 2018

Treatment	Yield means t/ha	
1. P70	4.13	e
2. SO 250	6.81	a
3. SB 50	3.51	f
4. P70 SO70	5.68	b
5. P70 SO35	5.05	c
6. P70 SO18	4.85	c d
7. P70 SB50	4.49	d e
8. P70 SB25	4.34	e
9. P70 SB13	4.39	e

Means with the same letter are not significantly different

Pea/S.Oat/S.Bean Intercropping 2018



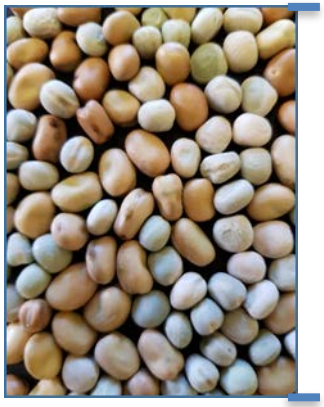
Pea/S.Oat/S.Bean Intercropping 2018

- Land Equivalent Ratio (LER)
  - Compares the benefits of growing two or more crops together with yields from growing same crops as monocrops

  - LER is a ratio that indicates the amount of land needed to grow both crops together compared to that for the monocrops
  - 1.0 No Change

Grown separately

1ha Mix



=

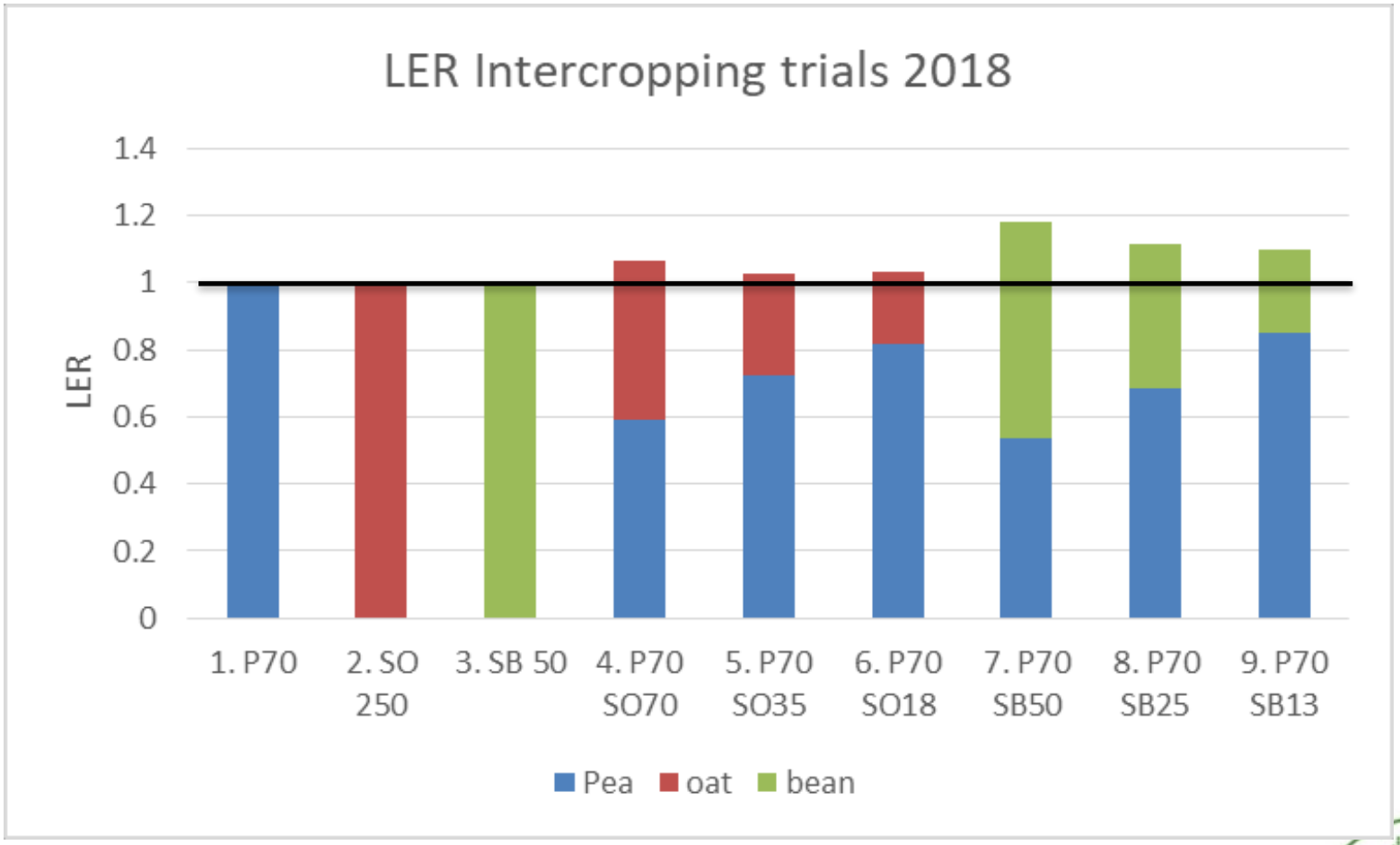
LER=1.18

0.59ha

0.59ha

1ha of mix produces as much as 1.18 ha individual crops

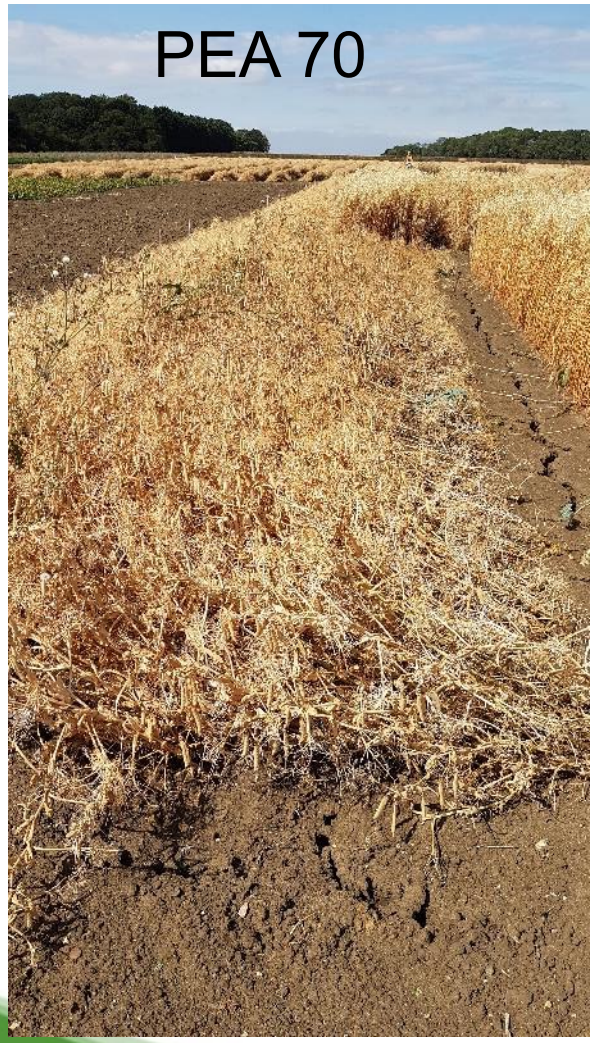
Pea/S.Oat/S.Bean Intercropping 2018

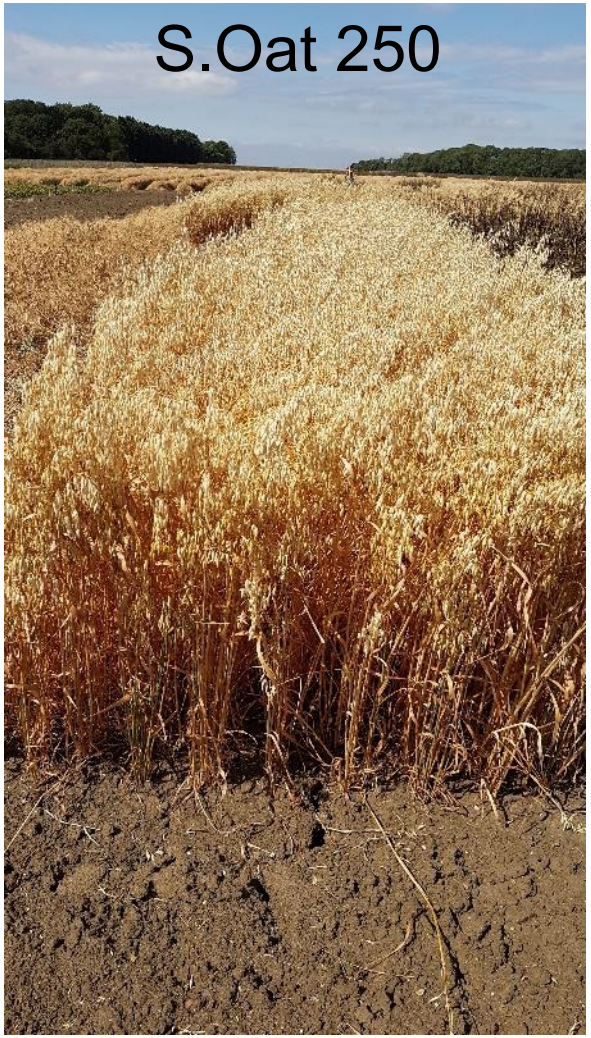


Pea/S.Oat/S.Bean Intercropping 2018

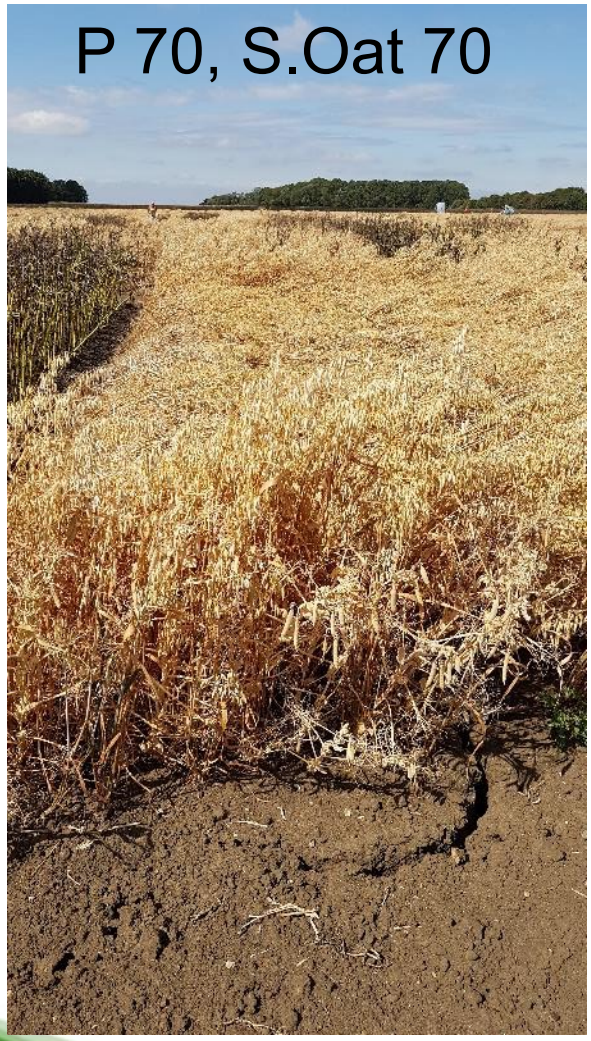
- Improvement in Standing Ability of peas
- Improved harvestability
- Maturity
- Mix
- Indications of weed suppression (2017)
- Reduction in pests/disease? – better suited to large scale trials
- Increased land use efficiency
  - Available arable area
- For the future, Strip or barrier cropping could become important
  - Integrated management

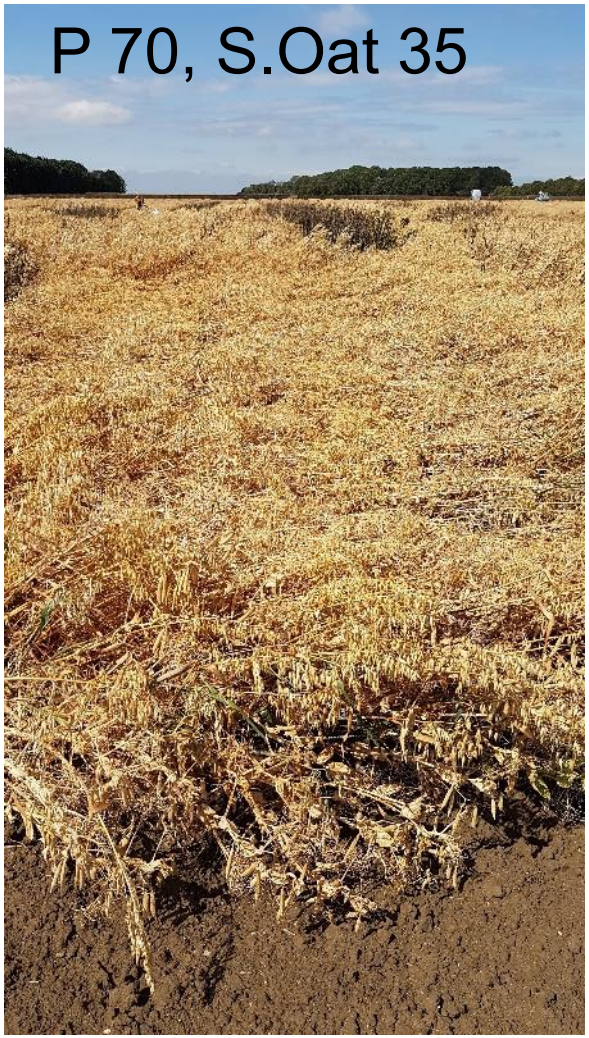
Pea/S.Oat/S.Bean Sole Crops Intercropping 2018

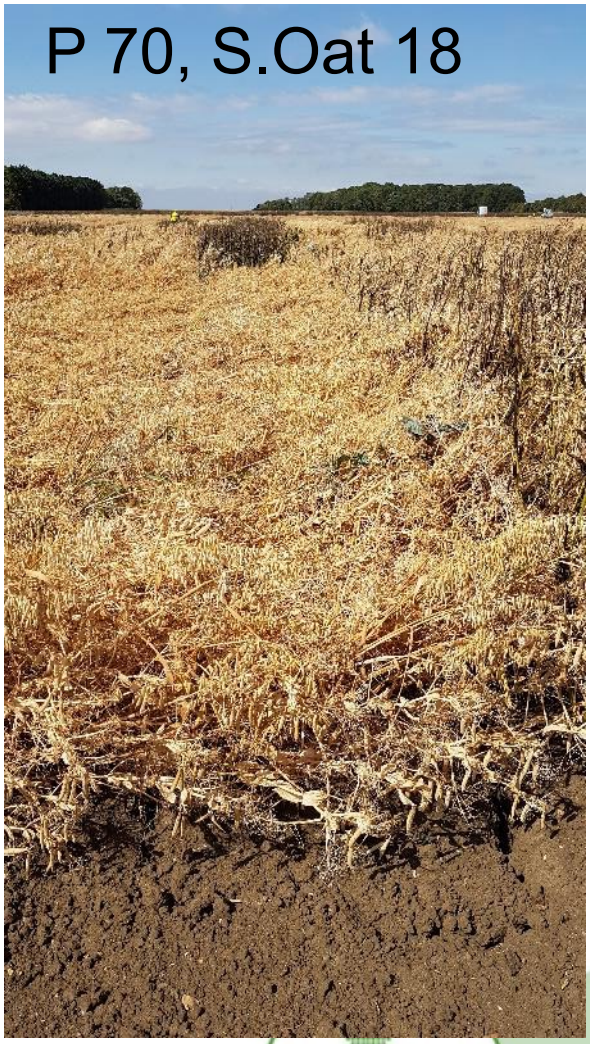




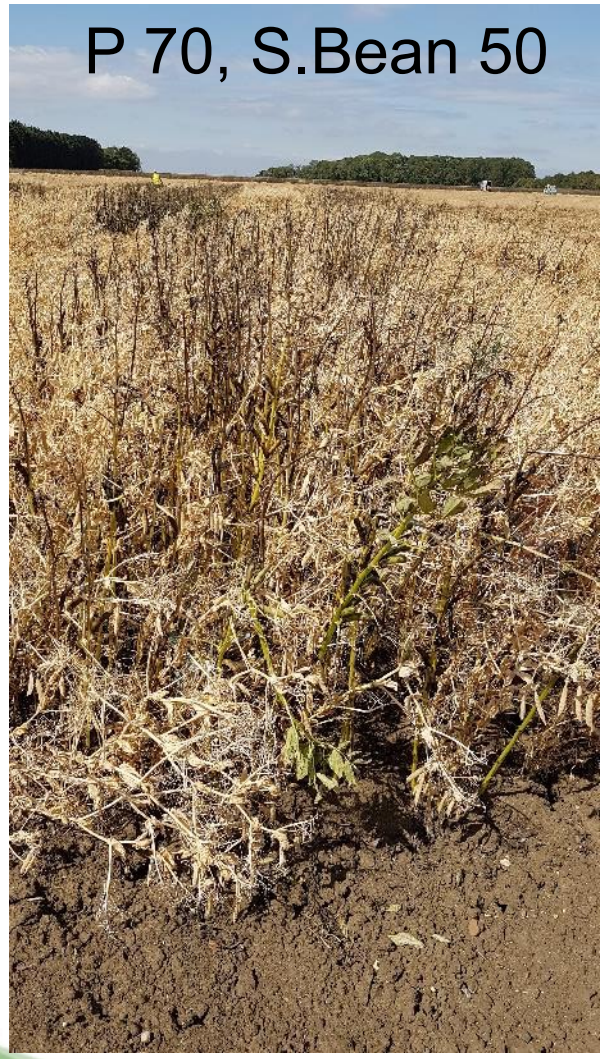
Pea/S.Oat Intercropping 2018

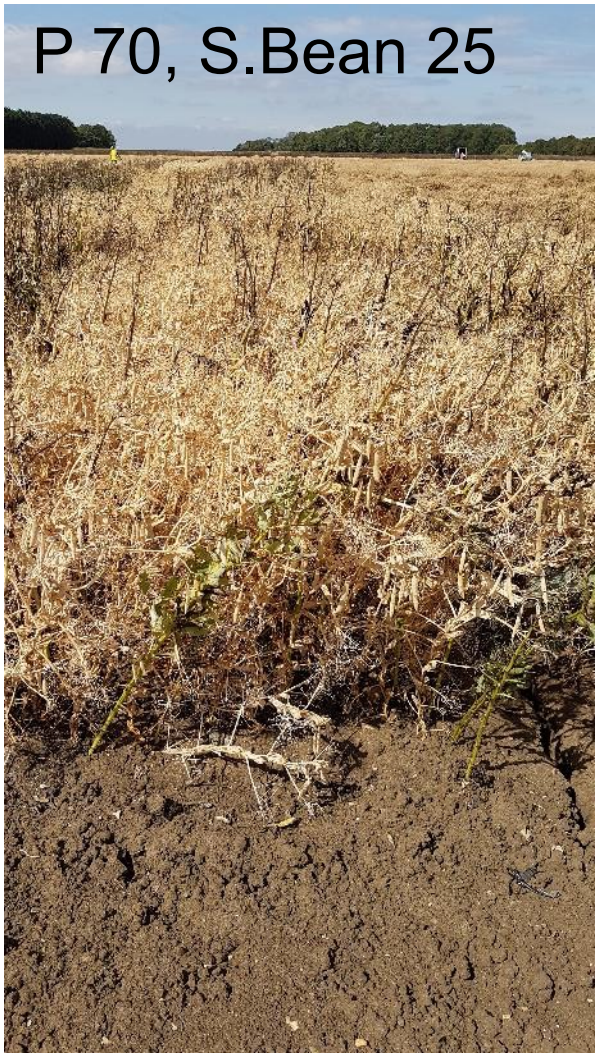


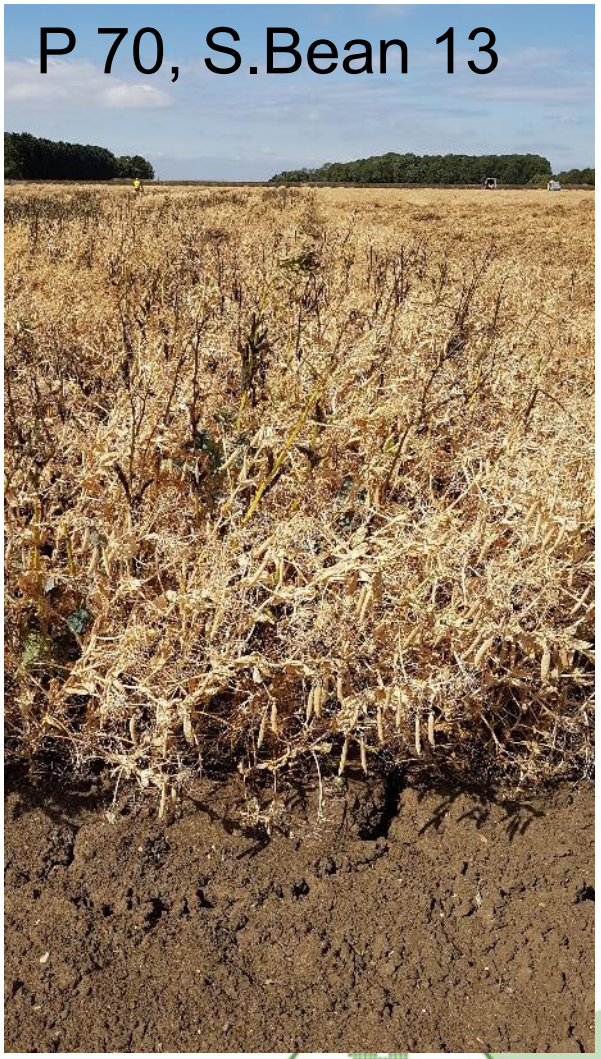




Pea/S.Bean Intercropping 2018







Pea/S.Oat/S.Bean Intercropping 2018

Thank you

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Benefits of cover crops to soil health

Lea Herold
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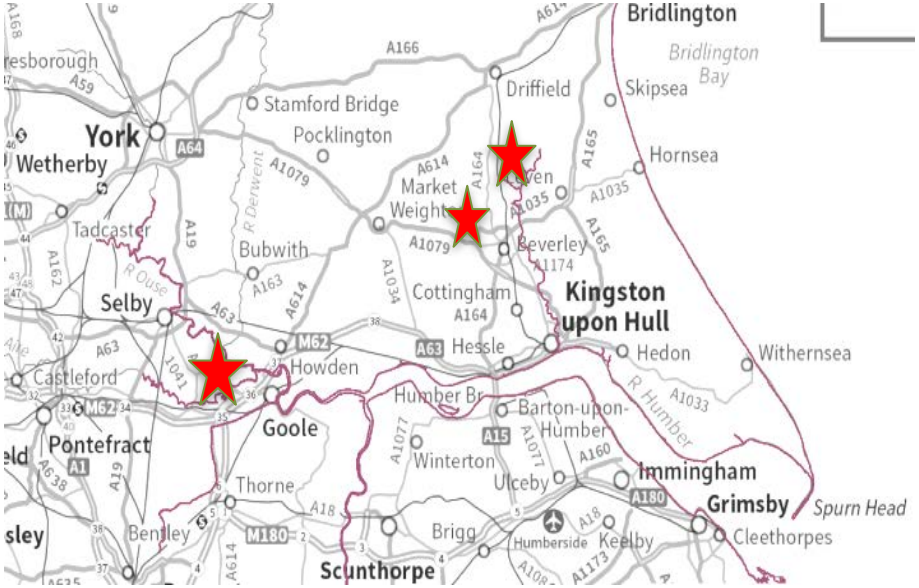
Advantages of cover crops

- Improved soil structure by increasing soil organic matter content and earthworm activity
- Reduction of nitrogen leaching, soil erosion and phosphorus losses to water courses
- Reduction in levels of soil-borne pathogens
- Benefits to wildlife and beneficial microbes

Trials

- Early autumn to late winter: Cover crops
  - Oat mixtures with phacelia, radish or clover; vetch
- Spring: Vining peas
- Summer: Catch crops
  - Phacelia mixtures with buckwheat, radish or clover
- Autumn: Winter wheat



Three sites in East Yorkshire

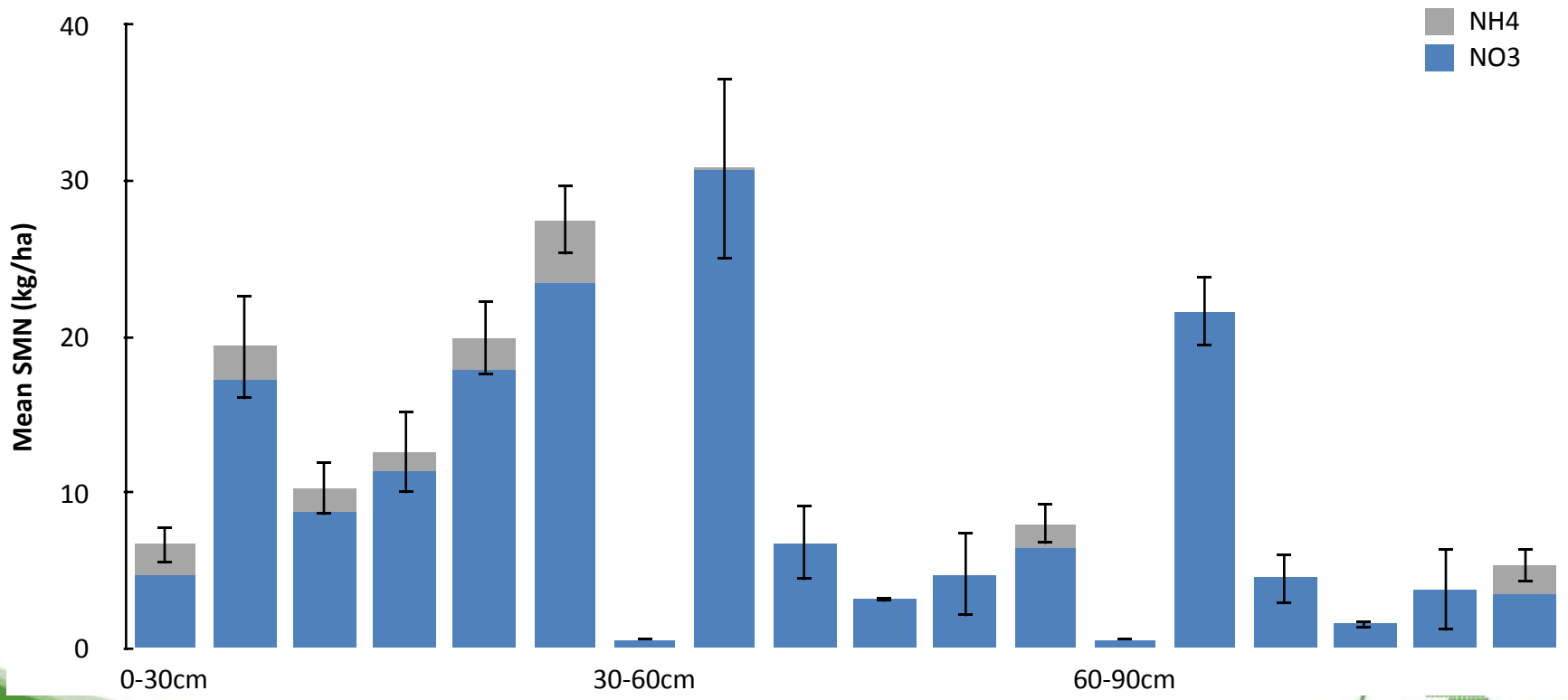
Eastfield – Sandy Clay Loam (min-till)
Vicarage or Bubwith – Sandy Loam
Molescroft – Clay Loam

Elsoms

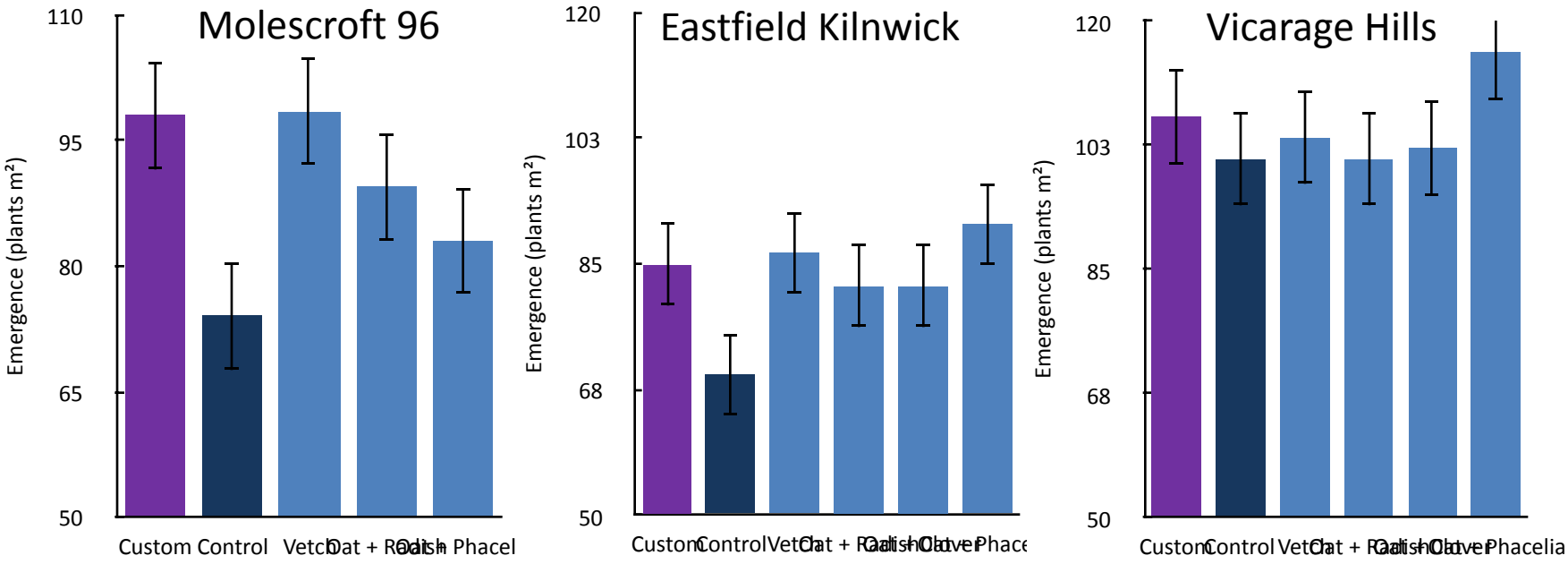
PGRO

Nitrogen

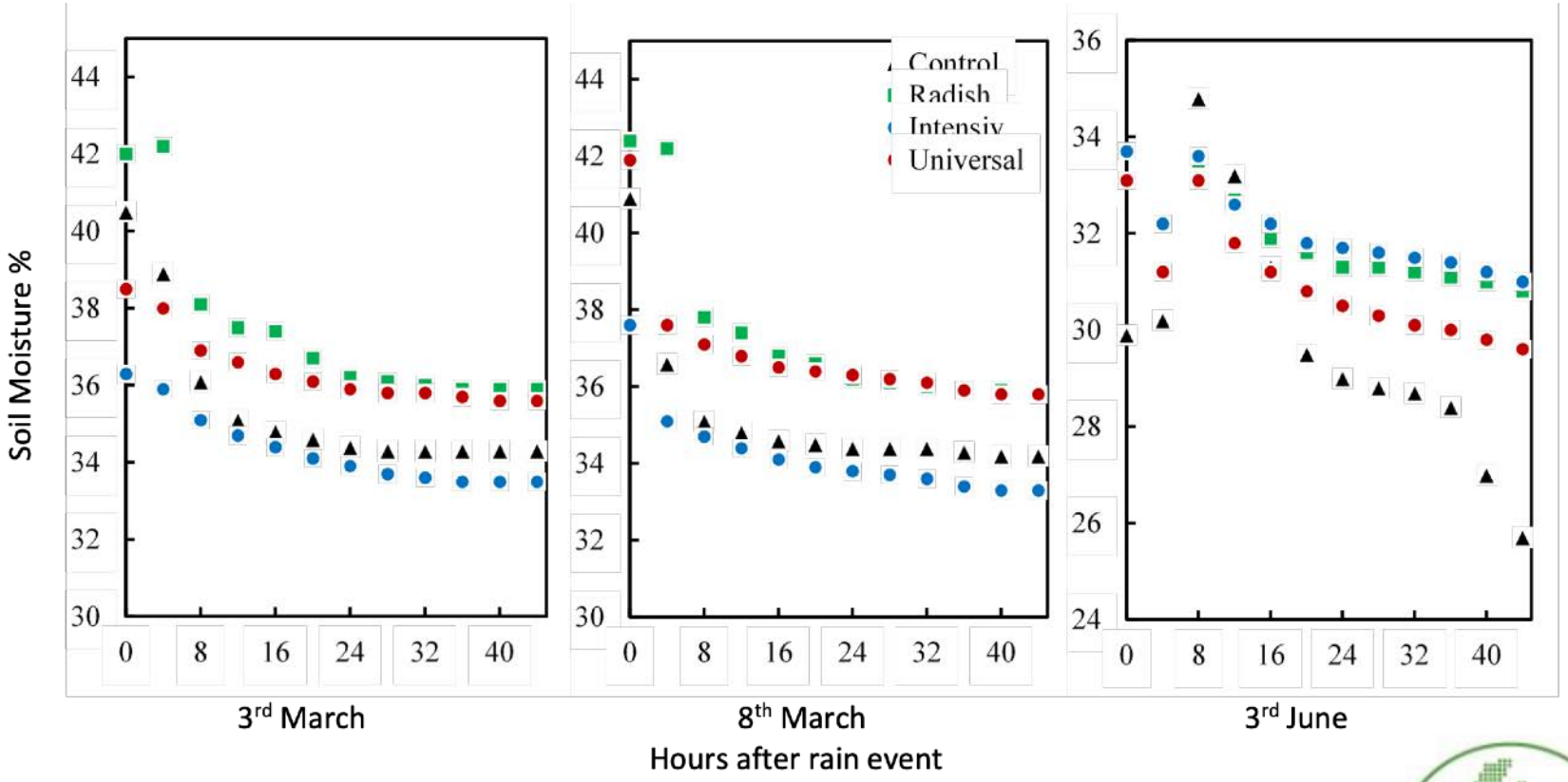
Nitrogen Leaching (Eastfield AR, SCL)



Pea emergence



Soil moisture



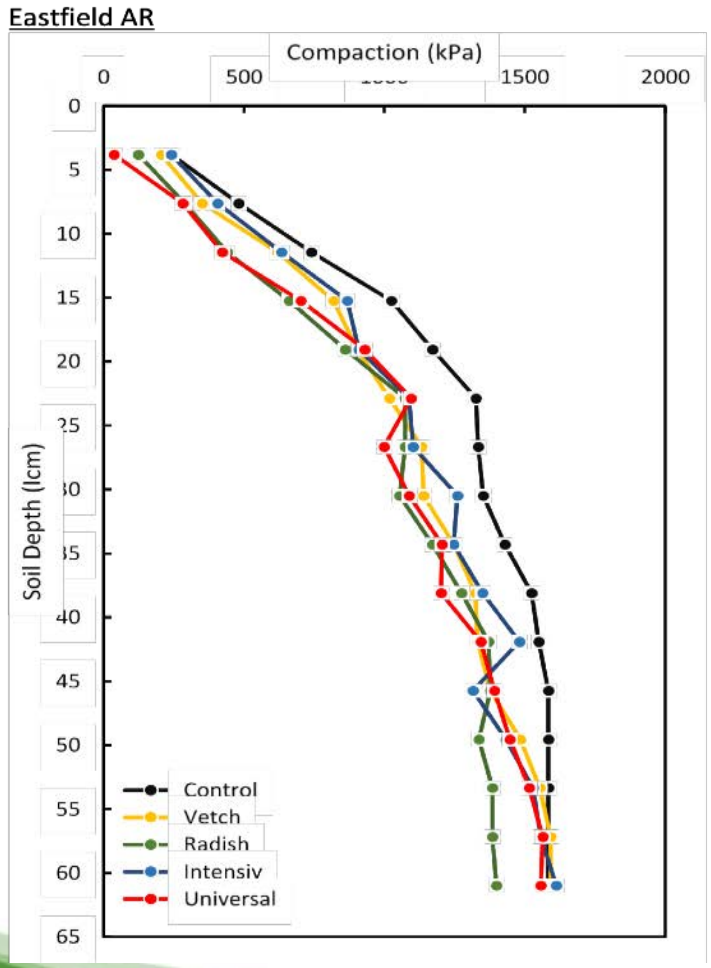
Boxtree Bubwith, SL

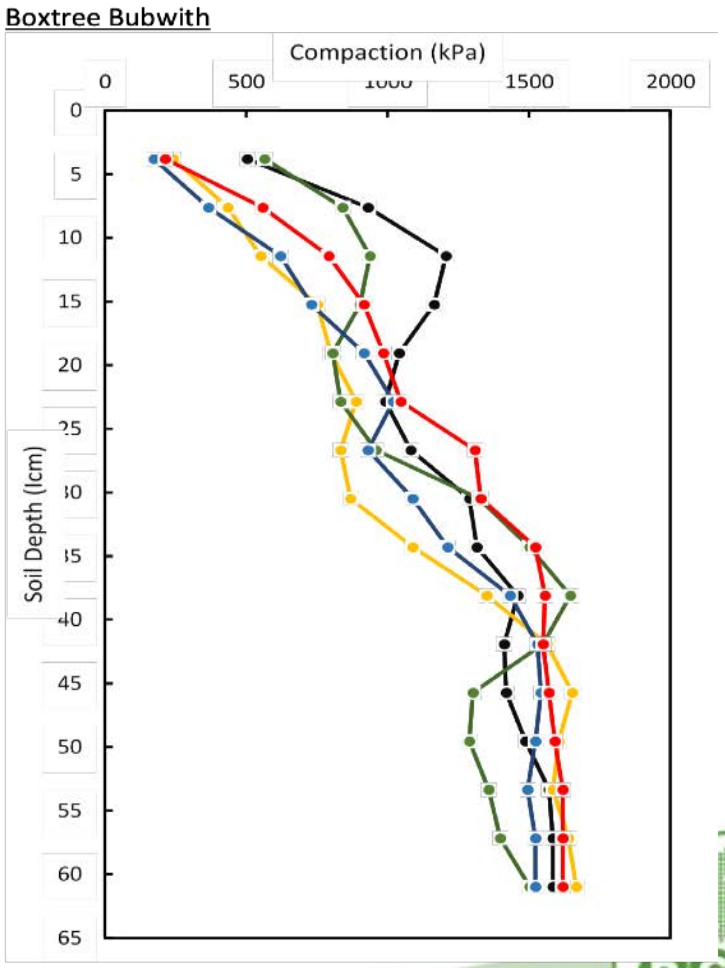
Soil structure in sandy loam

Boxtree Bubwith Control

Boxtree Bubwith Universal

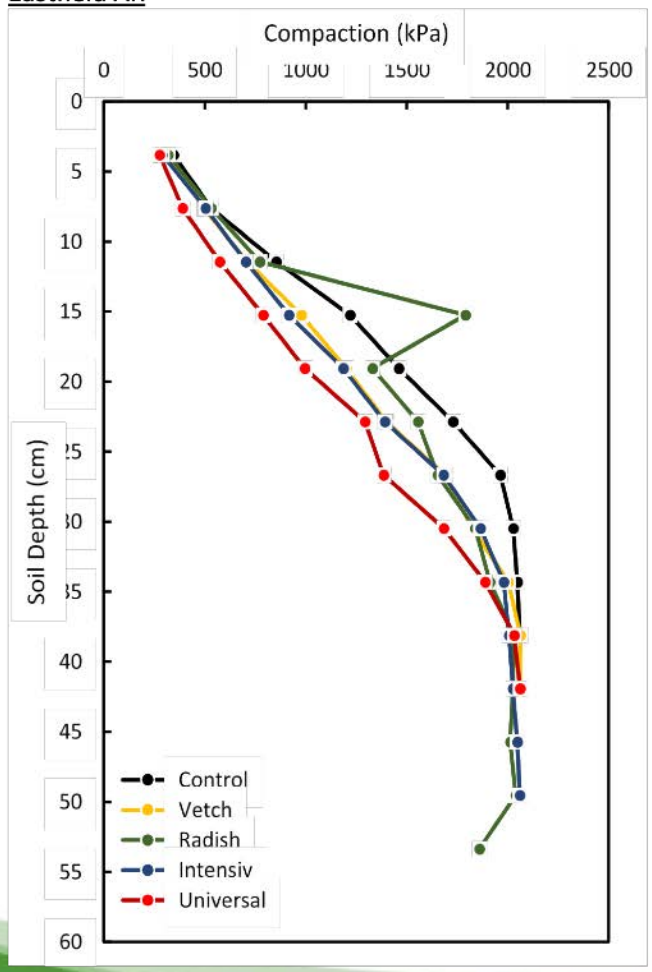
Soil compaction (Winter 2017)



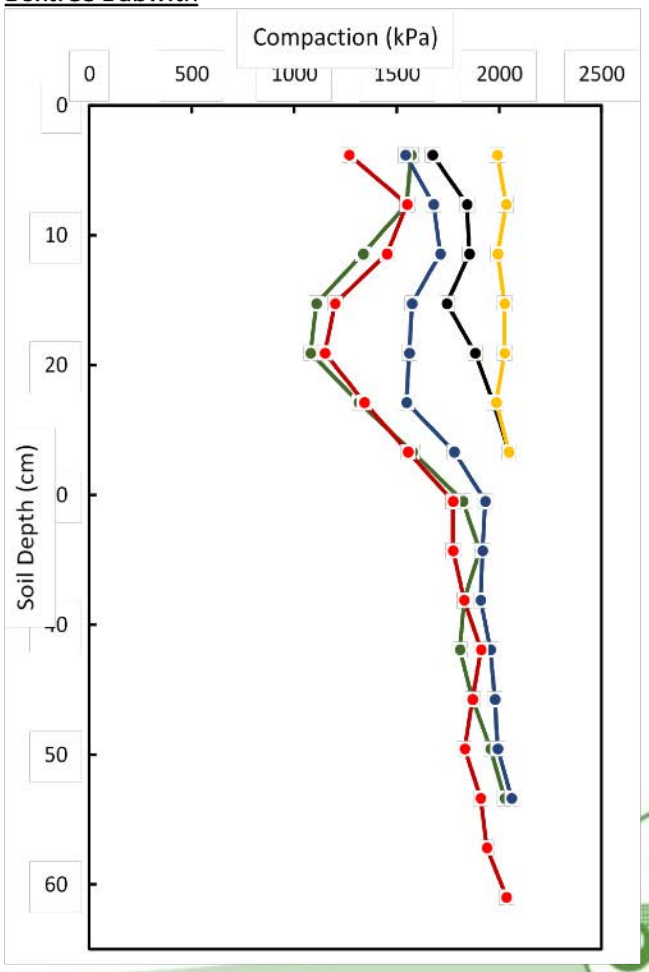


Soil compaction (Summer 2017)

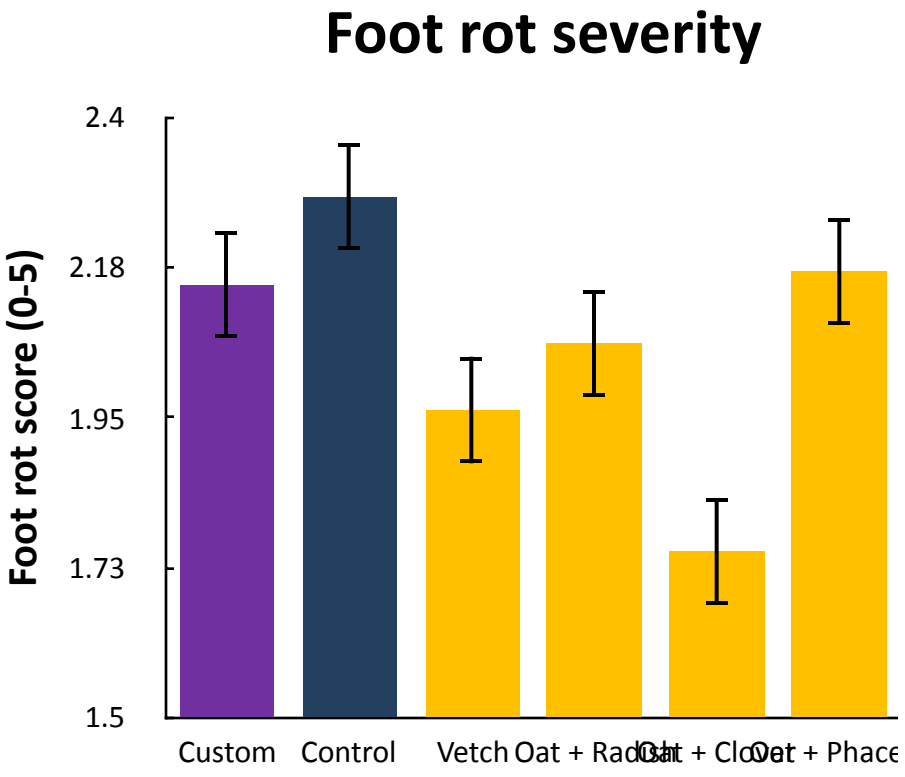
Eastfield AR

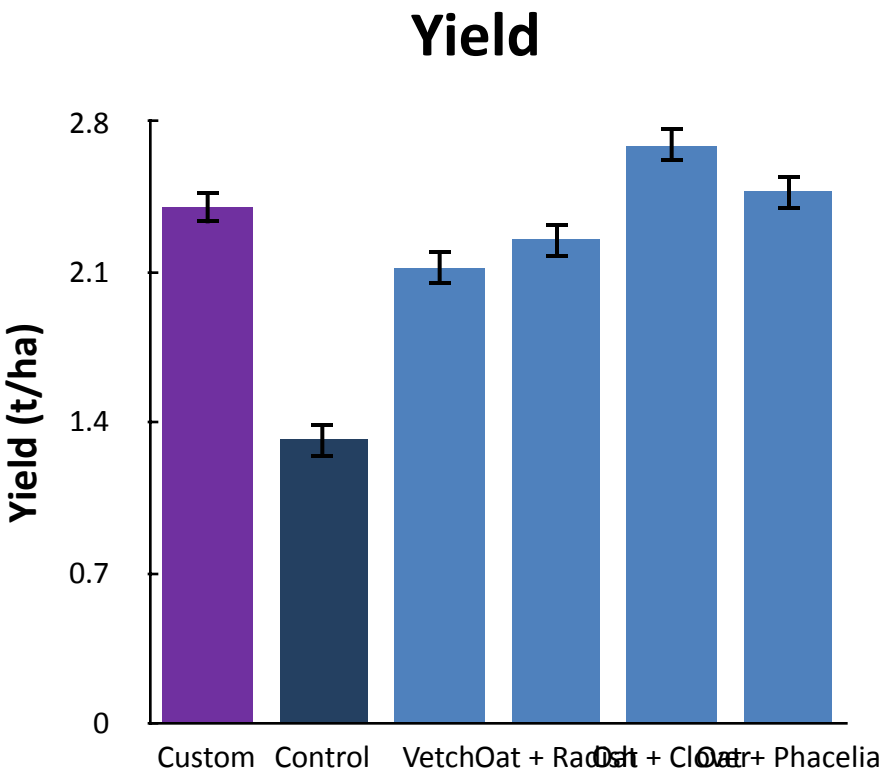


Boxtree Bubwith



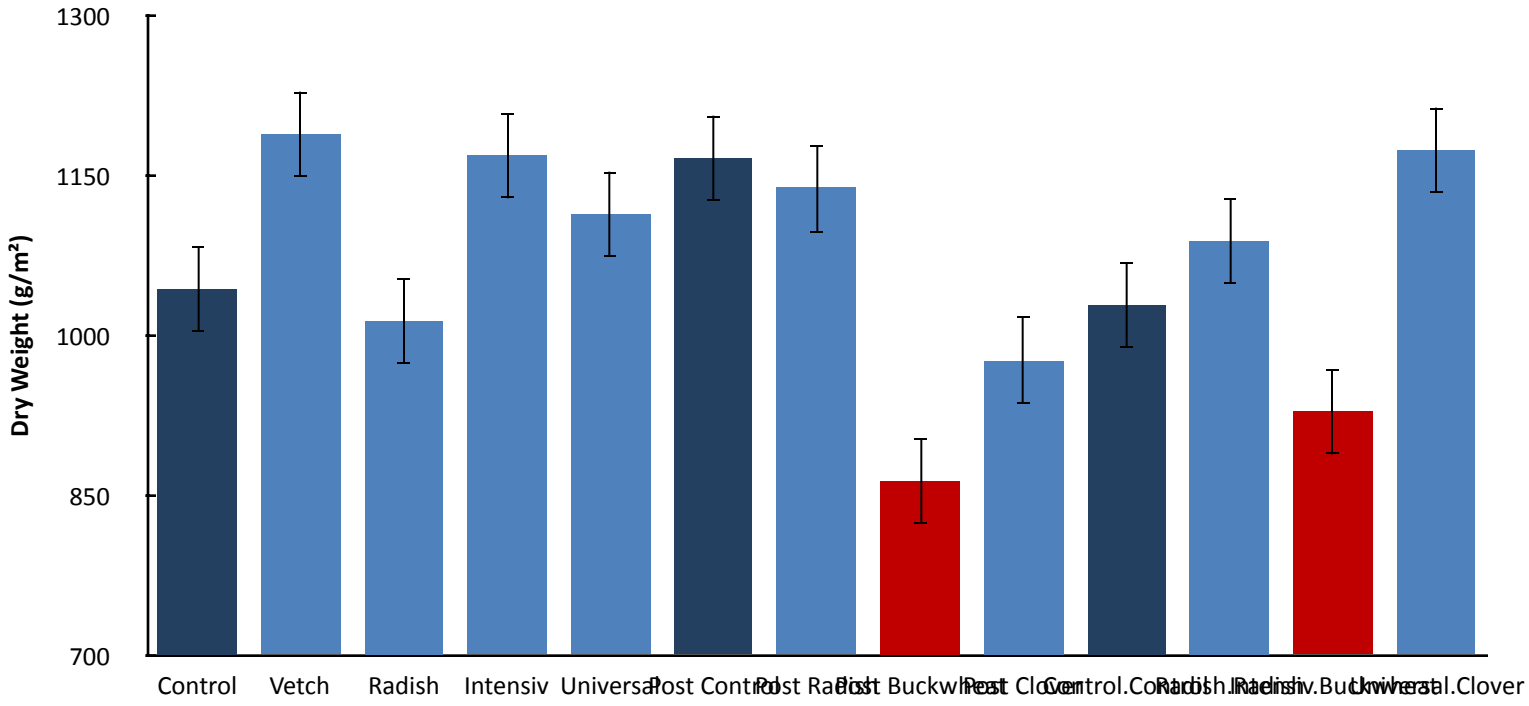
Pea yield



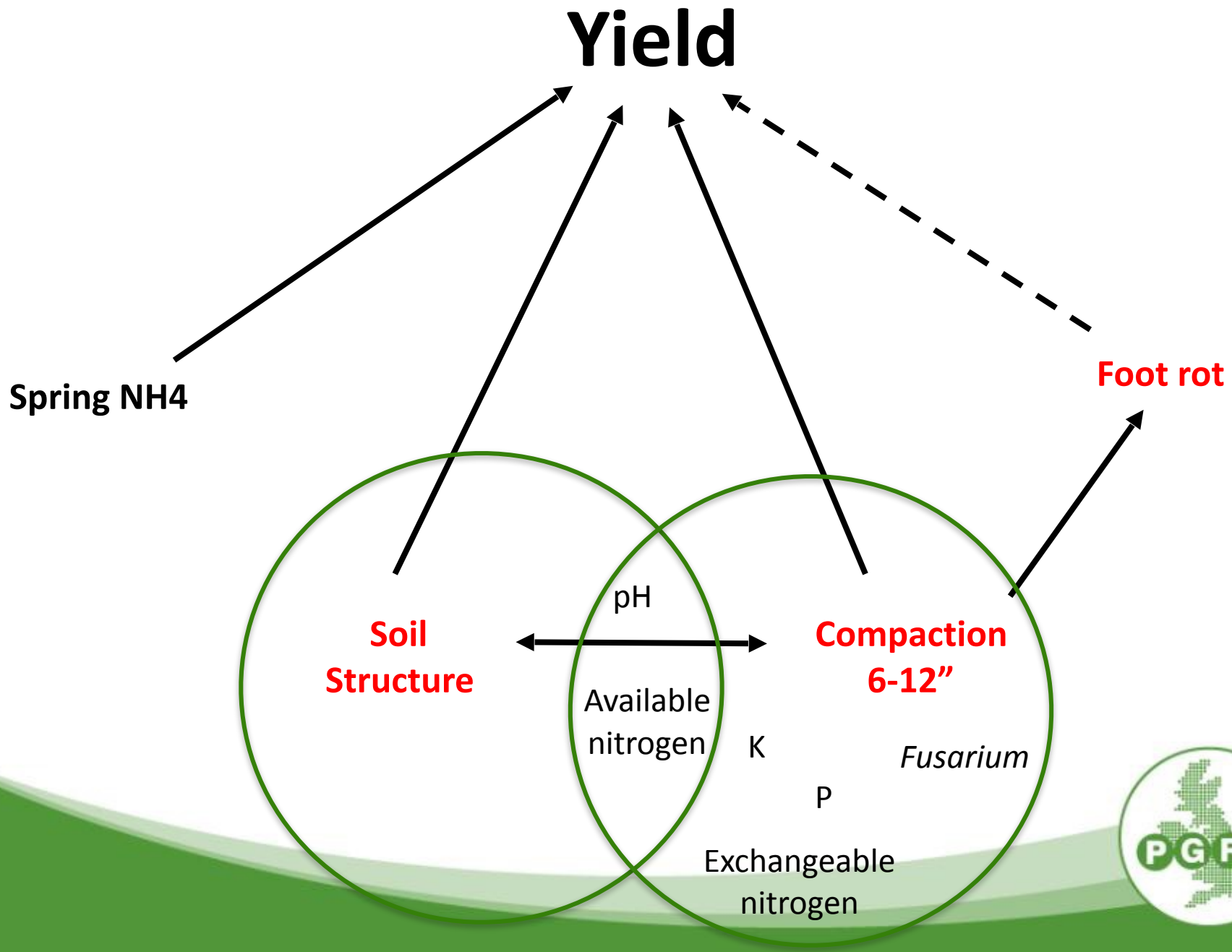


Vicarage Hills, SL

Winter wheat



Eastfield AR, SCL


Yield
Spring NH4
Foot rot
Soil Structure
pH
Compaction 6-12”
Available nitrogen
K
Fusarium
P
Exchangeable nitrogen

Cover crops…

- Reduced nitrogen leaching
- Improved pea emergence
- Improved moisture retention in sandy soils
- Improved soil structure
- Reduced soil compaction – an effect still seen at pea harvest
- Reduced foot rot disease development
- Improved pea yields

Thank you

- Tom Jelden (PGRO)
- Paul Hayward, Martin Riggall, Tamara Hall, Chris Byass, Richard Boldan, Andrew Falkingham (GPC)
- Andrew Whiting (BE)
- George Goodwin (Elsoms)
- Mechteld Blake-Kalff (Hillcourt)

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