WELCOME!

Pulse Potential Event 2025

AGENDA

Welcome and Introductions
Rebecca White, Portfolio Manager, Specialty, Root & Veg Disease & Insect Control
Syngenta

Boosting Pulse Nutrition
Becky Howard, R&D Manager
PGRO

Mixed Cropping Developments
Chris Judge, Senior Technical Manager
PGRO

Filling The Nitrogen Gap, Improving Crop Certainty
Simon Jackson, Field Technical Manager
Syngenta

Crop Protection Findings
Erin Matlock, Research Agronomist
PGRO

Wrap-up
Roger Vickers, Chief Executive
PGRO

Ask An Expert & Pie Supper

Pulse crop nutrition and sustainable pulse production

Becky Howard

Importance of key nutrients

- More P and K removed than returned in arable rotation
- P and K applications have declined by ~50-65% since the 1980's (Defra)
- P and K indices are below target in 25% of soils tested in the UK
- P and K levels may impact on nitrogen fixation
- S applications have increased by around 90% since 2004 (Defra)

Importance of key nutrients

- Potash – N fixation/ production of sugars and proteins/ water transfer in cells/ photosynthesis/ nutrient use, particularly N.
- Phosphate – energy transfer/ production of sugars and proteins/ root and nodule development/ photosynthesis/ respiration/ needs efficient mycorrhizal networks/ disease tolerance/ standing ability.
- Manganese – photosynthesis/ biotic and abiotic stress tolerance/ N metabolism.
- Sulphur – protein and amino acid production/ chlorophyll formation/ N fixation/ must be absorbed in sulphate form/ easily leached.

✓*Uptake of all nutrients is dependent on soil health, organic matter content, biological action, soil structure and aeration, and pH*

Determining critical levels of P in peas

Low P index 1

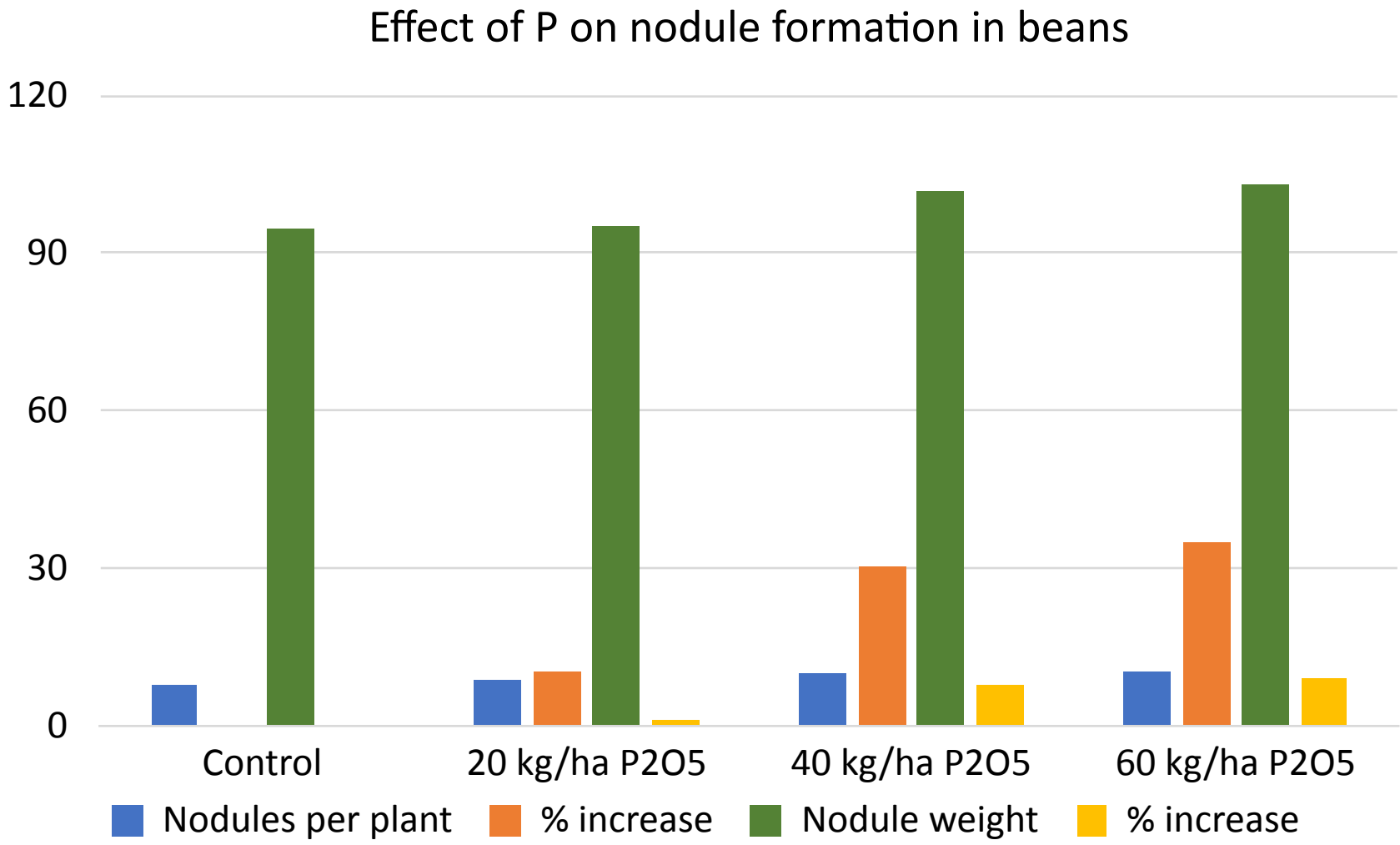
High P index 3

Maintaining soil phosphate in vining pea crops

- Yield losses are likely at soil P Indices of 0 or 1 on most soils – up to 7% in vining peas at index 1.
- Maintain soil Olsen P at Index 2 for optimum yield in most situations. In high yield potential situations an Index 3 could be more appropriate in vining peas, giving a 4% yield benefit.
- Consider the risk of soil P losses to water – eutrophication.
- To raise Olsen P index could take between 1 and 4 cropping years, taking into account economic return.
- Relatively small doses of fresh P as TSP can give a yield benefit in some cases.

NIAB TAG

Effects of fertiliser phosphate on nodulation



Source: PDA

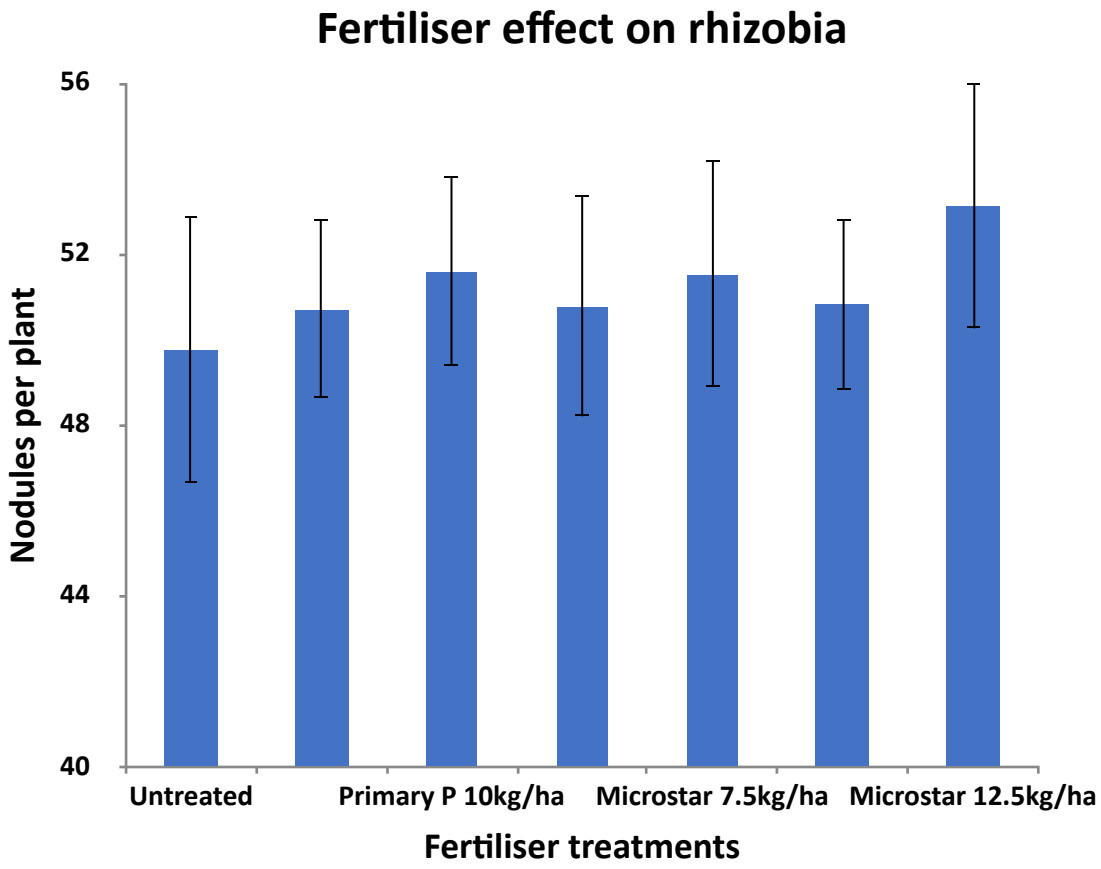
The effect of P starter fertilisers on rhizobial populations and crop yield

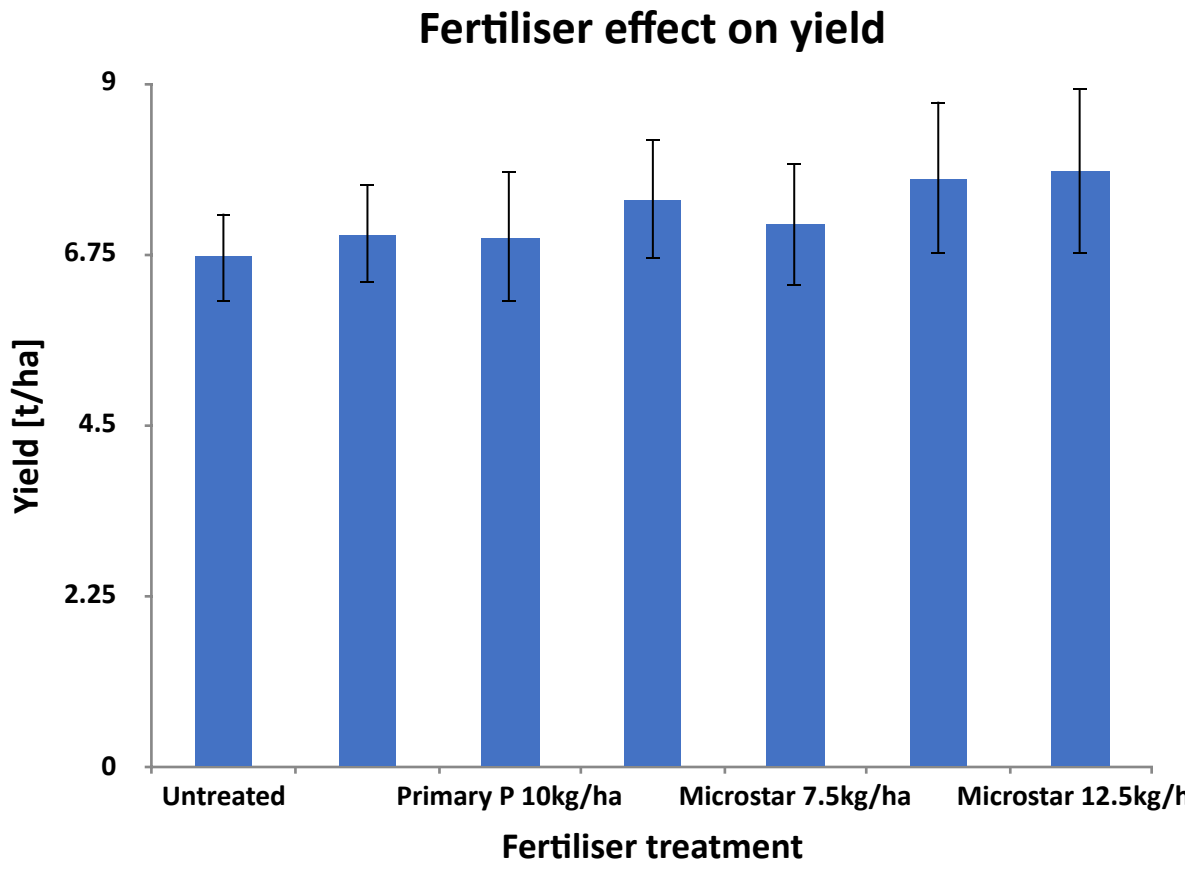
- We investigated the influence of P starter fertilisers on pea yields and rhizobial populations in soils.
- Some starter fertilisers contain N which may reduce nitrogen fixation potential in the pea crop.

Primary P	**10:40:0 (40% phosphorus, 11% sulphur oxide, 10% nitrogen, 2% manganese, 2% zinc)**
Microstar	**0:45:0 (45% phosphorus pentoxide, 3% magnesium oxide, 0.5% copper, 0.5% manganese)**

- Both at 75, 100 and 125% of recommended rate

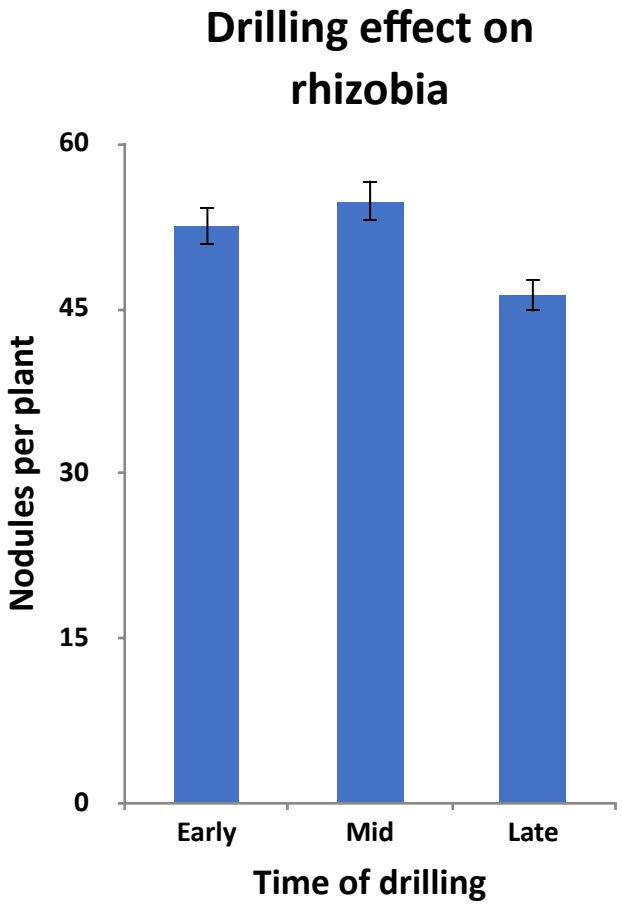
Starter fertiliser effects on nodulation and yield

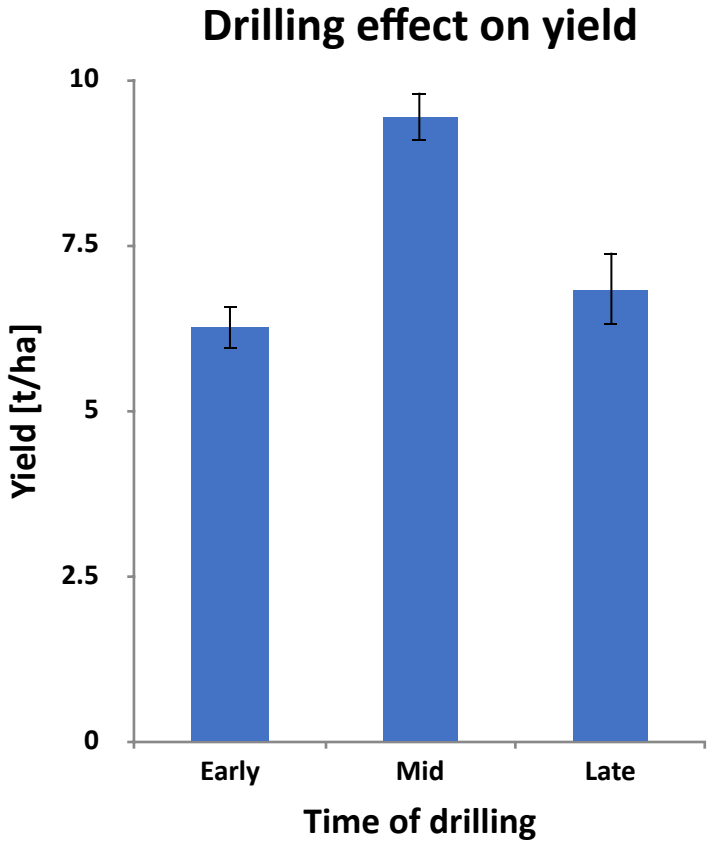


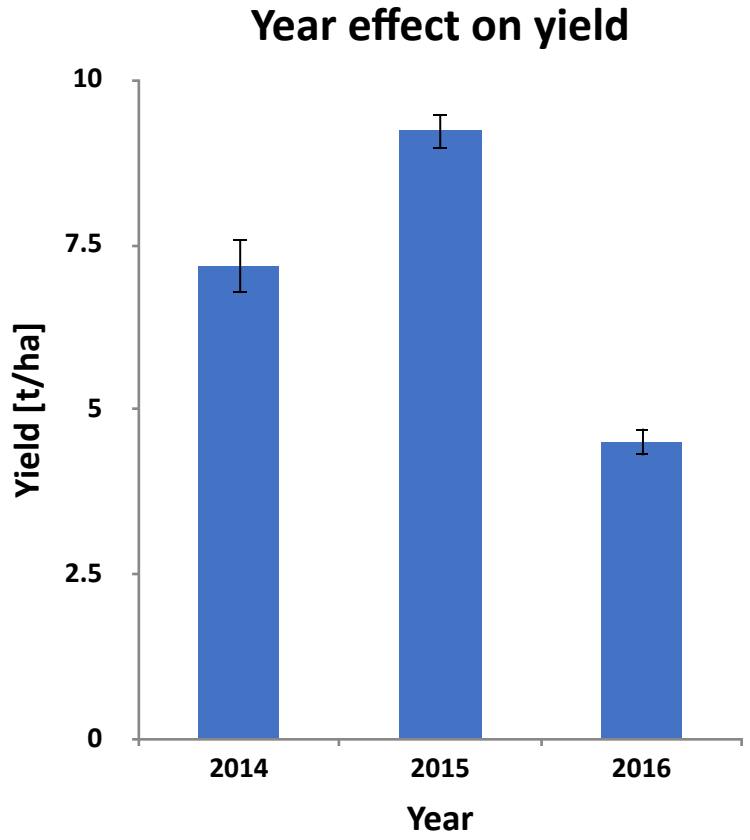


No statistically significant effect of treatment on nodulation or yield

Other effects on yield and nodulation







Significant effects of date of sowing and year on yield

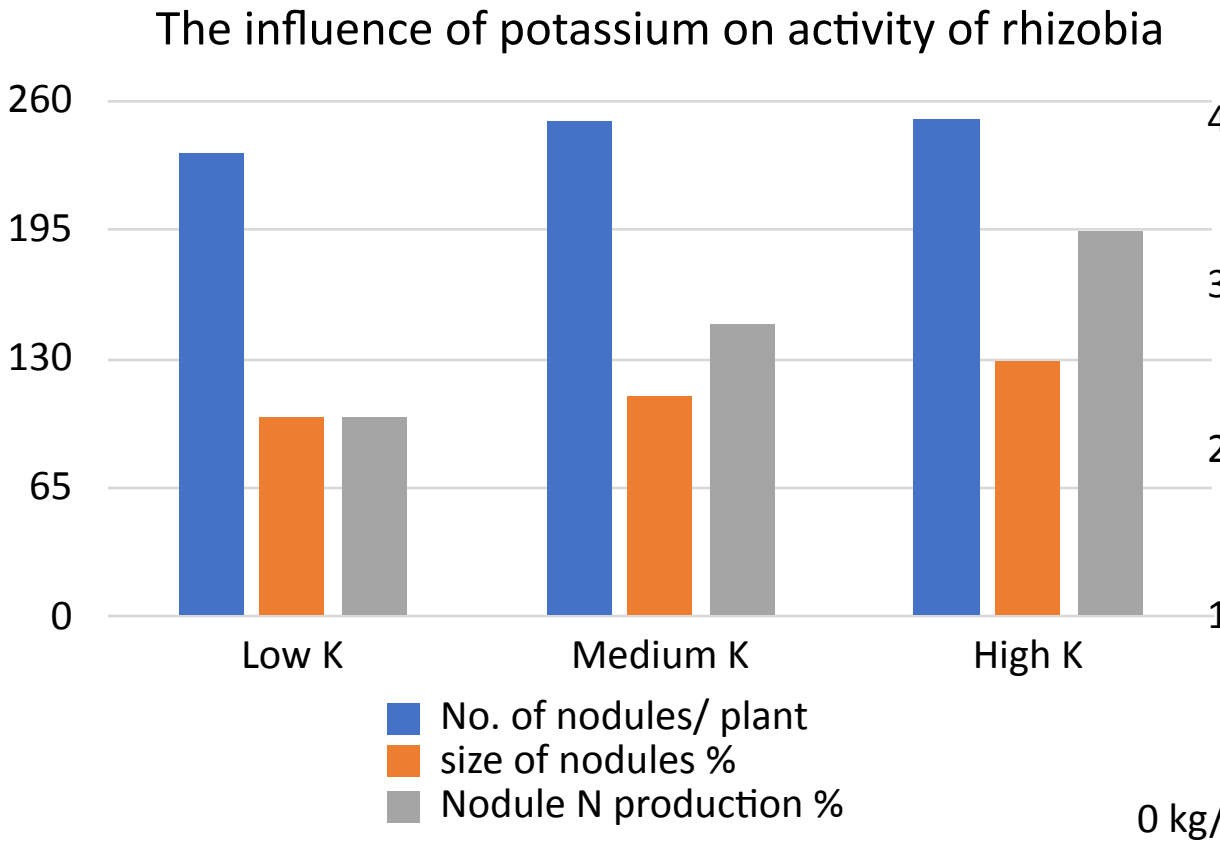
- *Potassium deficiency*

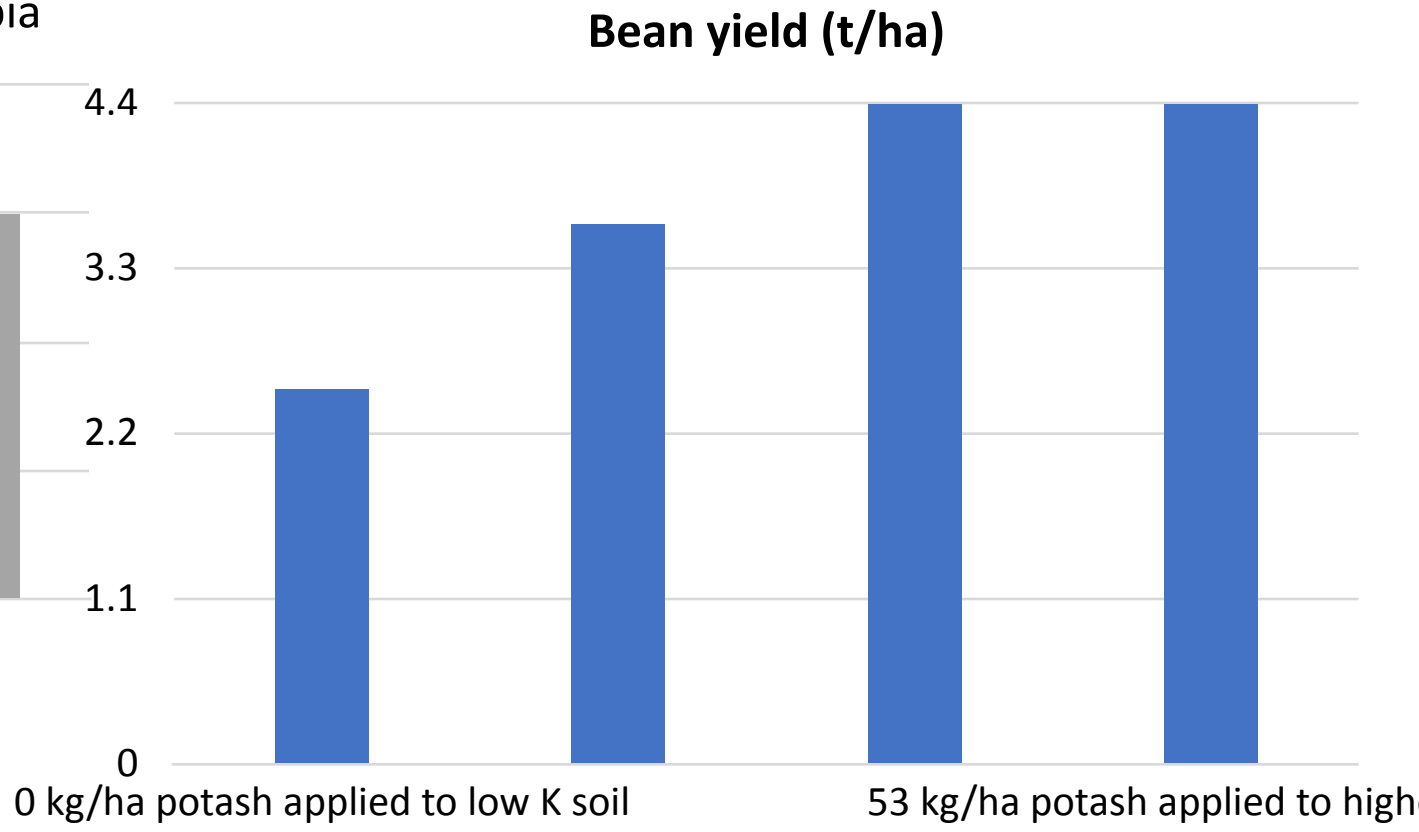
One of the most important of the major nutrients

Any significant deficiency is likely to cause yield depression if not corrected

High Mg may reduce K availability

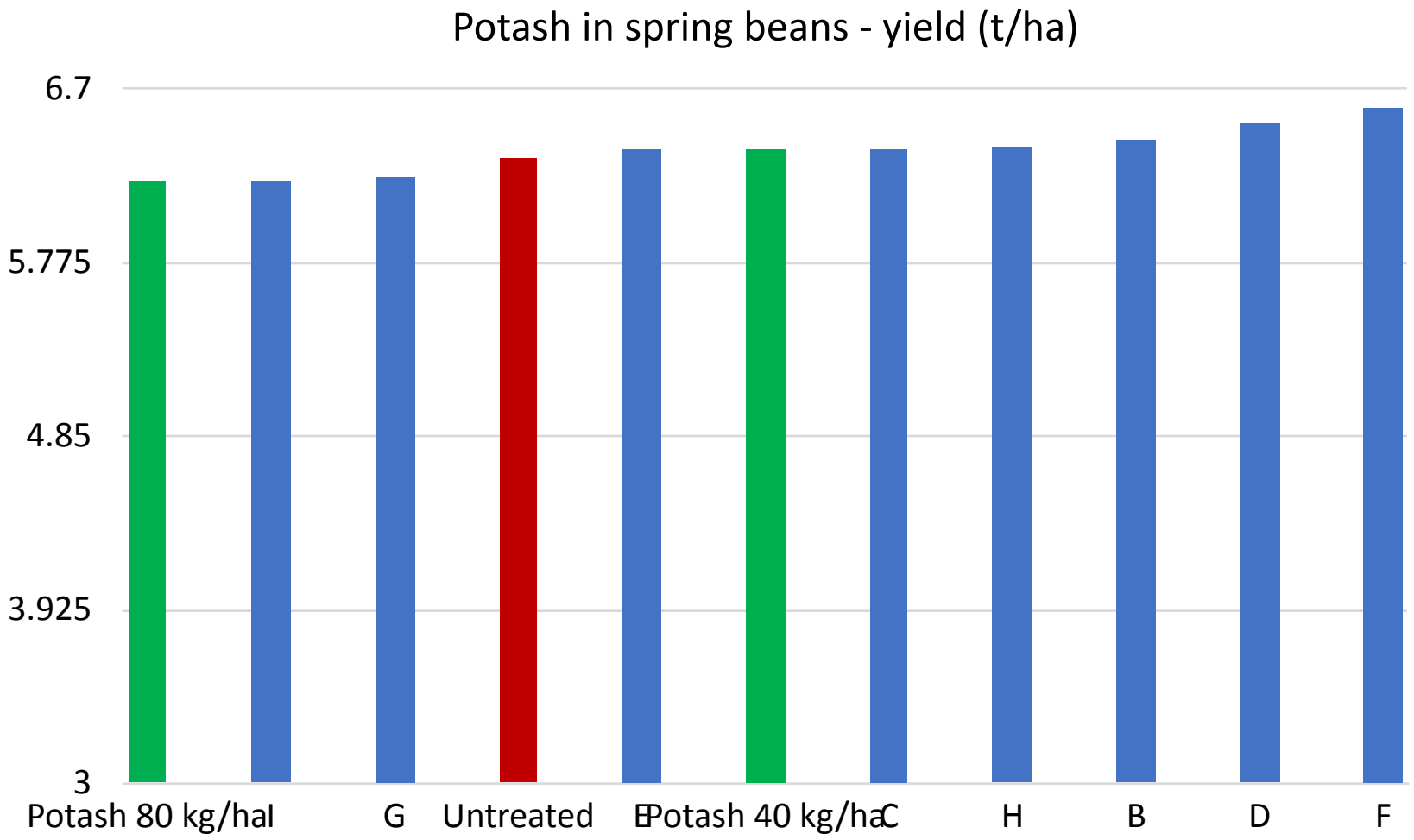
K deficiency may reduce N utilisation

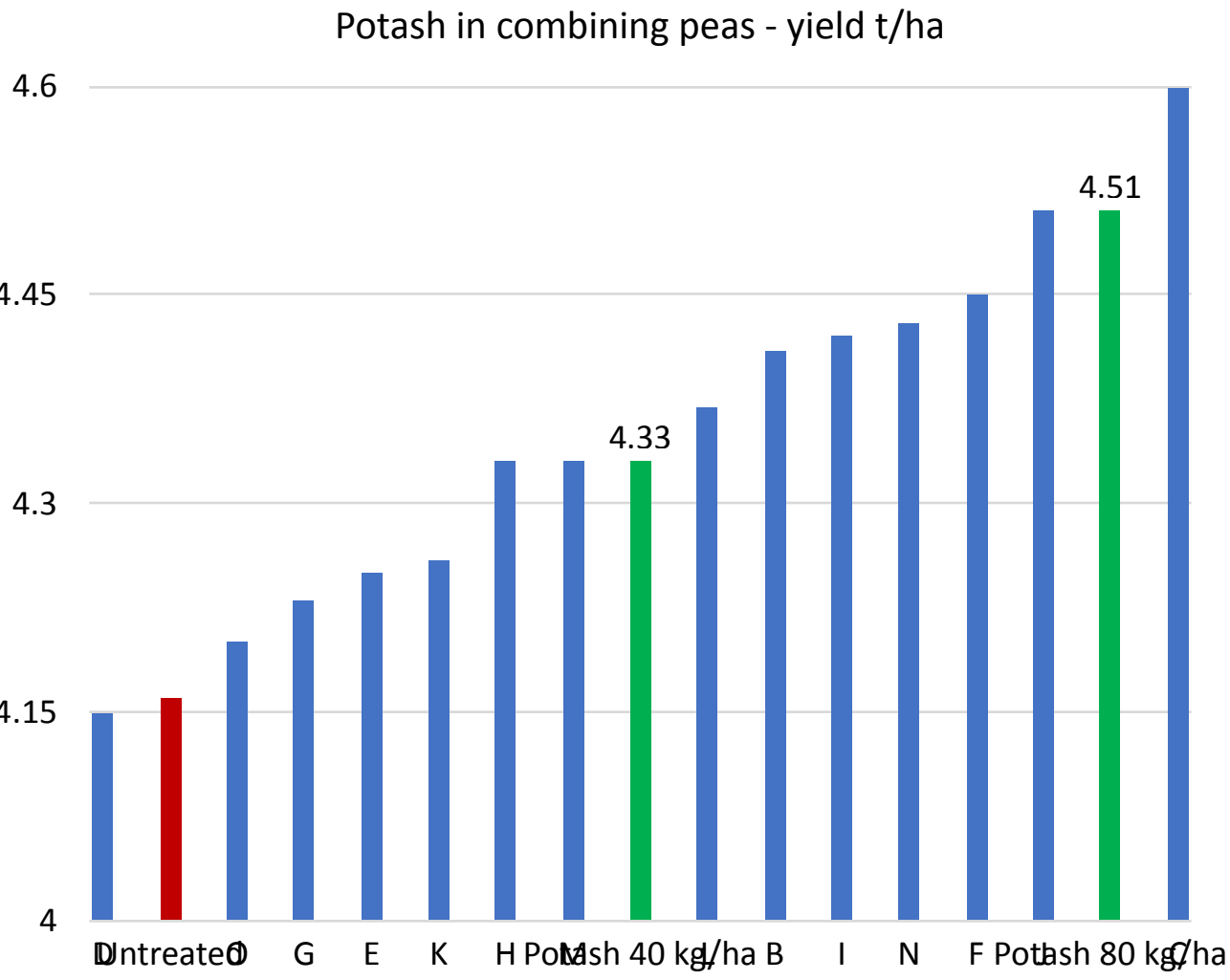


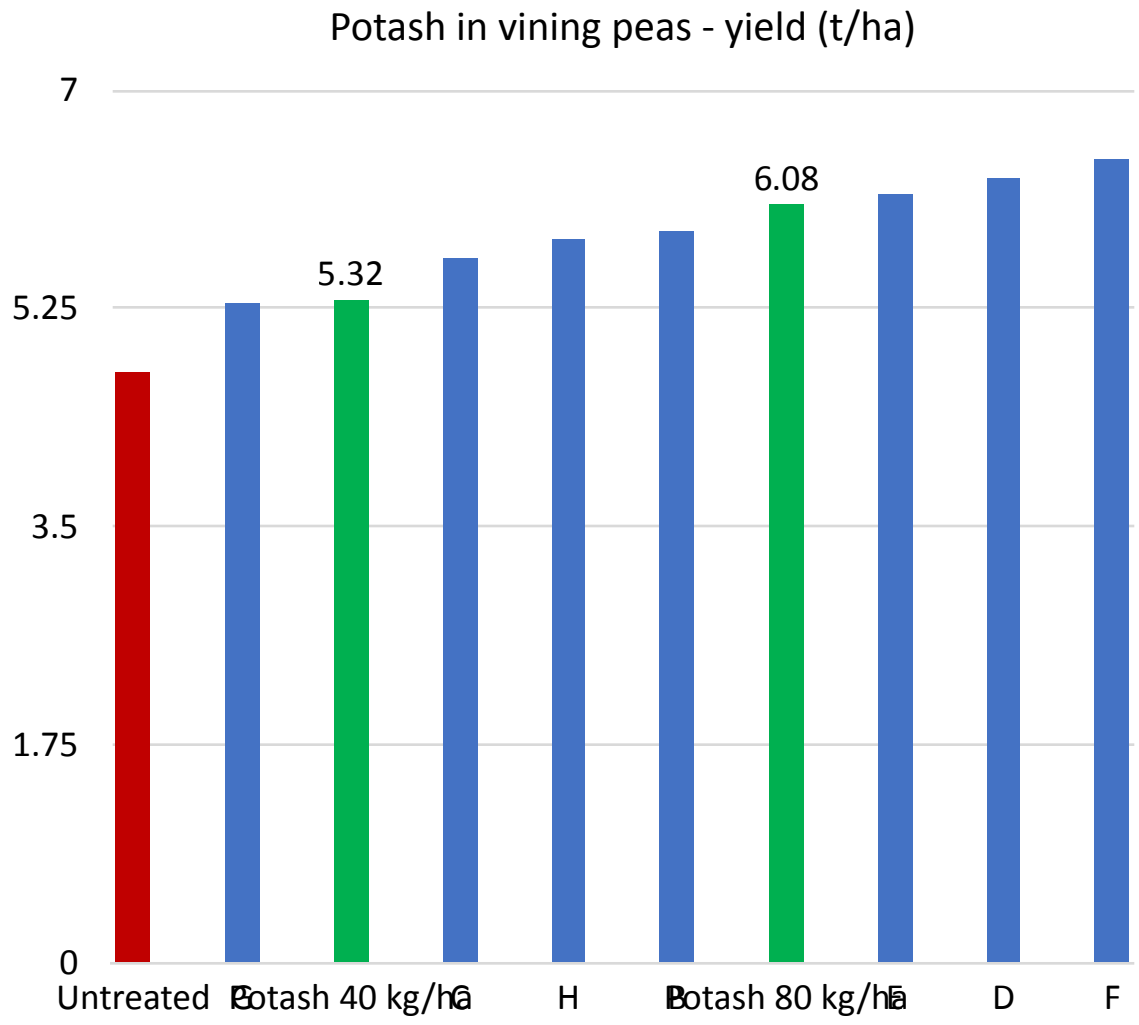


Potash for nodule formation (beans)
Source: The influence of potassium on the activity of Rhizobium activity. Proc. 11th Colloquium. IPI. PDA factsheet. Low = index 1, medium = index 2, high = index 3.

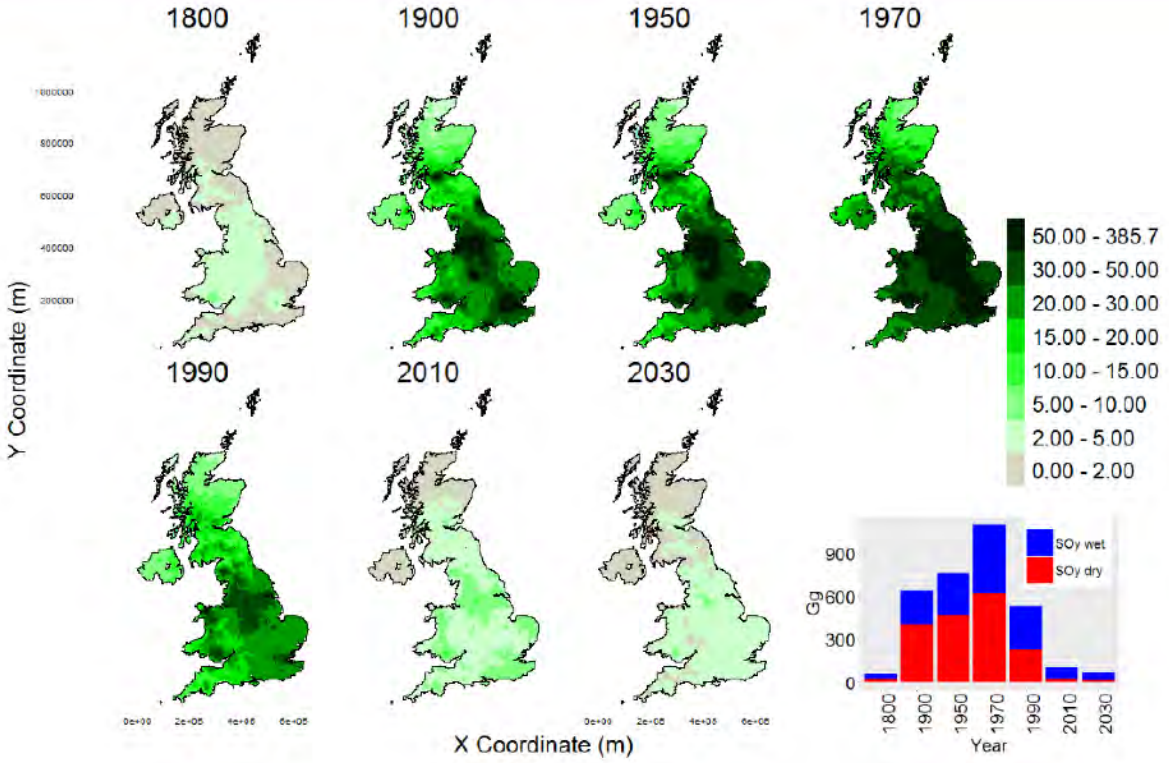
Low K soils were 110 mg/kg K (index 1).
Higher K soils were 170 mg/kg K (index 2-).


Potash in spring beans - yield (t/ha)
6.7
5.775
4.85
3.925
3
Potash 80 kg/ha
I
G
Untreated
E
Potash 40 kg/ha
C
H
B
D
F


Potash in combining peas - yield t/ha
4.6
4.45
4.3
4.15
4
4.33
4.51
Untreated
Potash 40 kg/ha
Potash 80 kg/ha

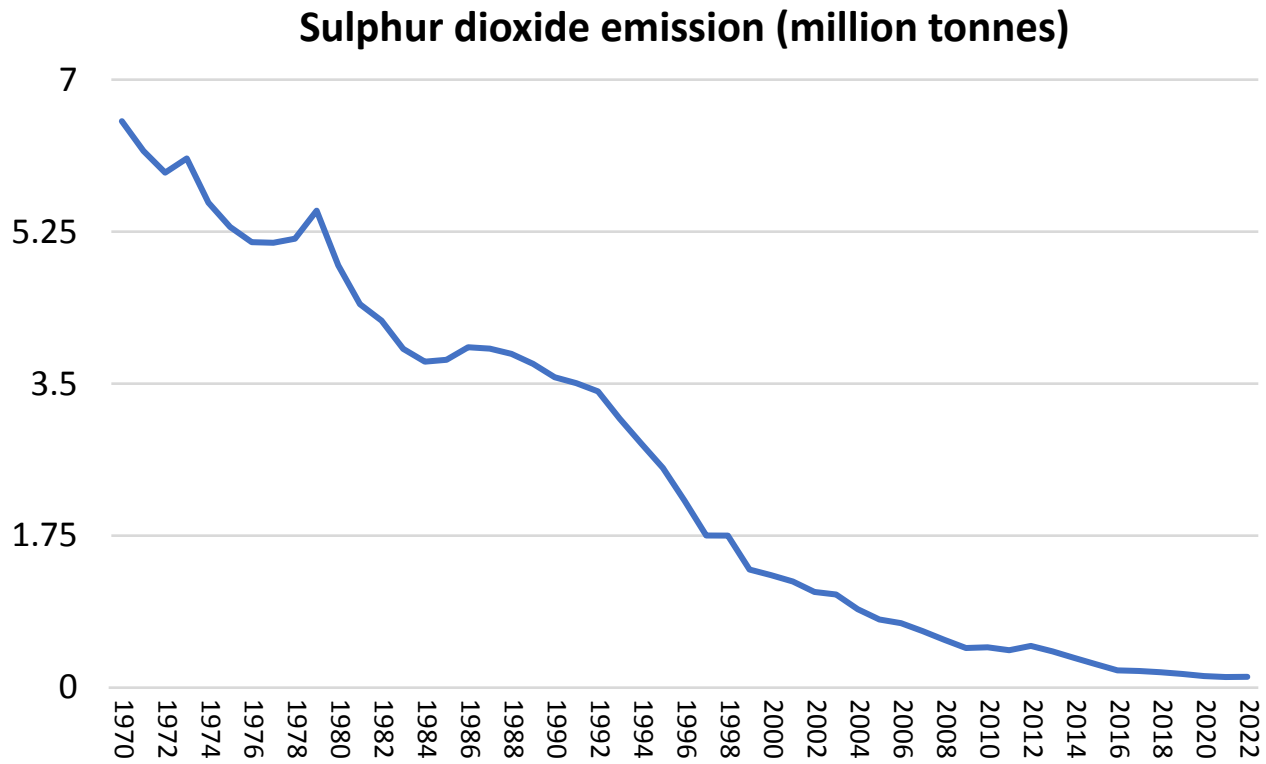

Potash in vining peas - yield (t/ha)
7
5.25
3.5
1.75
0
5.32
6.08
Untreated
Potash 40 kg/ha
Potash 80 kg/ha

Total S deposition (Kg S ha^{-1} yr^{-1})

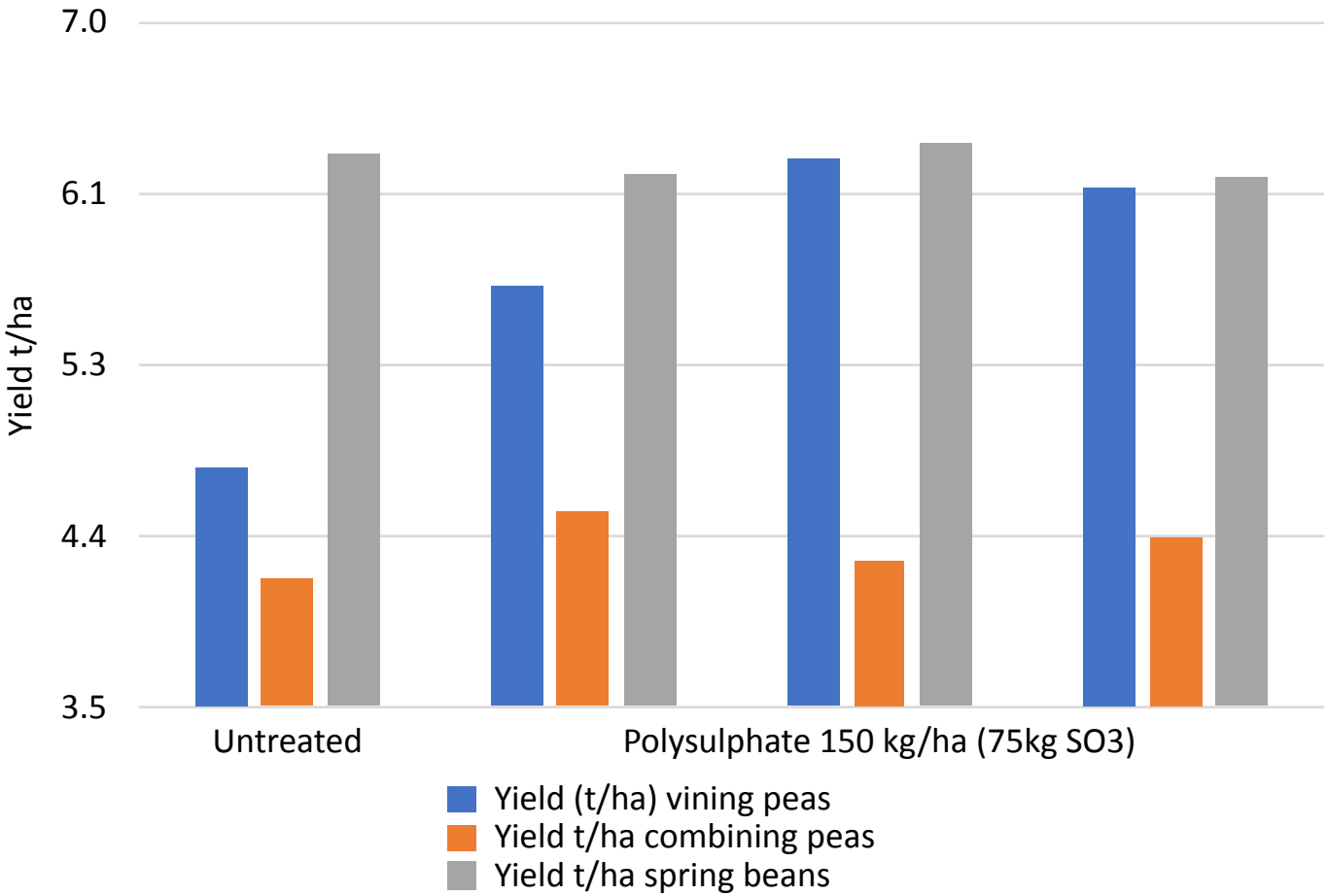


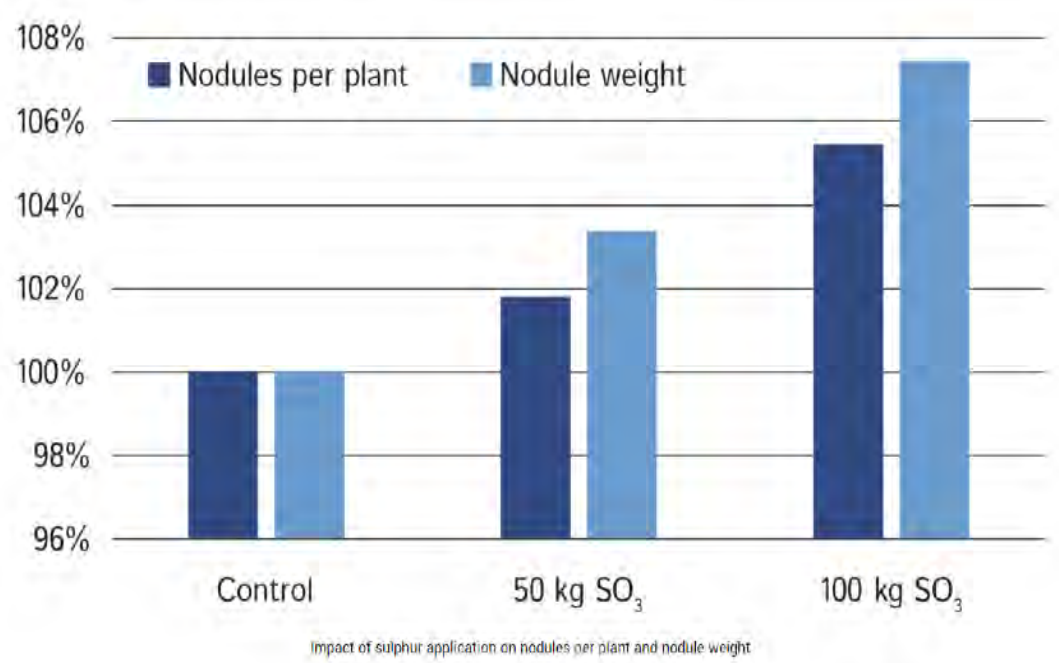
Historic Sulphur Deposition: Long-Term Trends
Tomlinson S.J., Carnell E.J., Dragosits U. & Dore A.J. *UK Centre for Ecology and Hydrology, Natural Environment Research Council.*

[Emissions of air pollutants in the UK – Sulphur dioxide (SO2) - GOV.UK]



Yield and nodulation response to sulphur





Impact of sulphur application on nodules per plant and nodule weight

Manganese deficiency

- *Manganese deficiency*

- Common on soils at pH 7.0 +
- Organic soils
- Soils with heavy lime applications
- Wet soil conditions

Treatment for Mn deficiency

- Treat if foliar symptoms seen or
- Treat at first pod
  - Either 32% Manganese sulphate (5 kg per ha) + wetter
  - or formulated manganese equivalent
- Repeat 10-14 days
- May require a 3rd treatment in wet season
- Consult labels if mixing with fungicides or insecticides

Rate of MnSO4 (32%)/ ha

	10%	15%	20%	30%	35%
1kg	3.2	2.1	1.6	1.1	0.9
2kg	6.4	4.3	3.2	2.1	1.8
3kg	9.6	6.4	4.8	3.2	2.7
4kg	12.8	8.5	6.4	4.3	3.7
5kg	16	10.7	8	5.3	4.6

What is a Biostimulant?

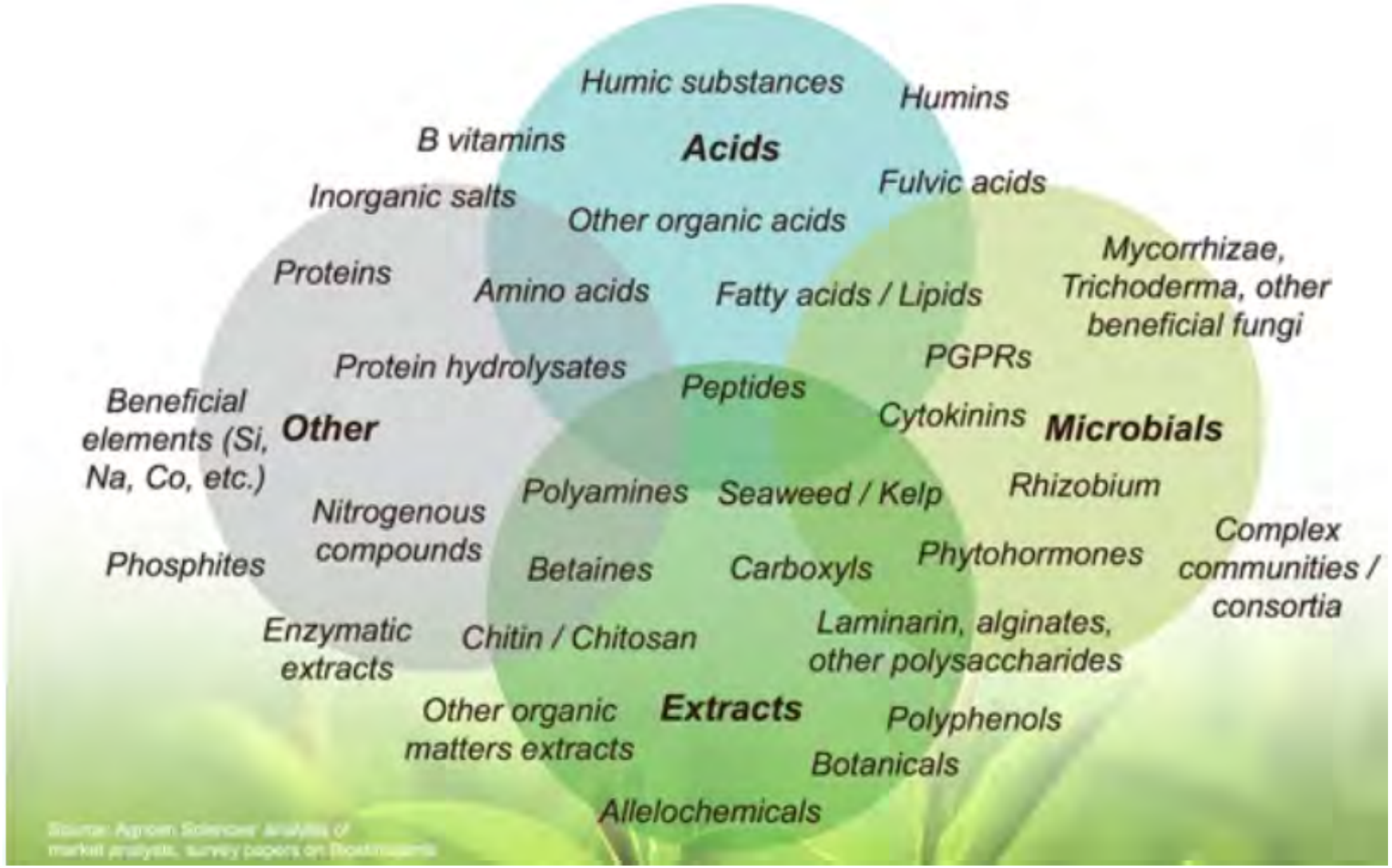
A plant biostimulant contains substances that stimulate natural plant processes.

Increasing tolerance to environmental stress

Improving soil conditions and availability of inputs

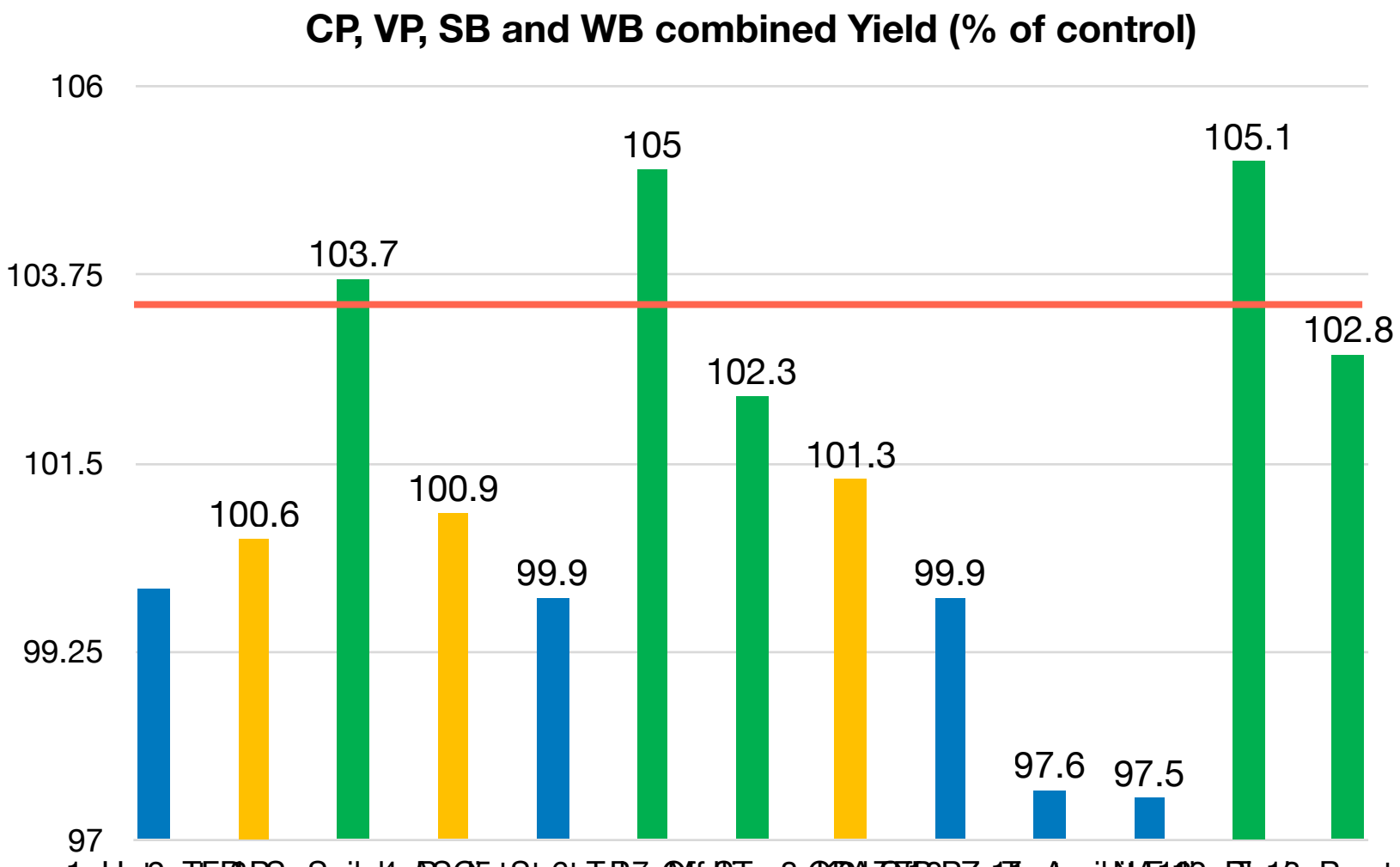
Improved quality and yield of final product?

Biostimulants



What have we learnt in previous projects?

Results from 3-year trial



* = phosphite
! = biological
= micronutrients

[Research Publications | PGRO]

Biostimulant conclusions (for now)

- Biostimulant – umbrella term – not specific enough.
- Biopesticide applications and Phosphite-containing biostimulants showed increases in yield and improved resilience to disease.
- Some Macro/Micronutrient-containing biostimulants showed yield response and improved resilience to disease.
- Results from many of the products have been inconsistent, although new products continue to be tested.
- Consider year effects and balance the cost-benefit over years, rather than in-year. Different conditions lead to varied effectiveness.

Nitrogen efficient plants for climate smart arable cropping systems

Pulse PEP | FarmPEP

Innovate UK

PGRO

ADAS

McArthur Agriculture

The James Hutton Institute

Farm Carbon Toolkit

BOFIN

Cranfield University

SRUC

Agrii

PBL Technology

KC Kelvin Cave Ltd

abagri

Game & Wildlife Conservation Trust

Wessex Water YTL Group

love every drop anglianwater

LEAF Linking Environment and Farming

first milk 'the farmers' business'

LC Beef Nutrition

NCS

NITROGEN CLIMATE SMART

Pursuit of profitable climate resilient solutions towards Net Zero

UK GHG emissions

424Mt pa

Dept for Business Energy & Industry Strategy

2021

UK GHG Farming emissions

46.3Mt pa

>10%

Maximum potential reduction in CO2e for UK Agriculture: Defra Agri Climate report 2021

2.8Mt pa

The aim:

Prove a reduction potential of

1.5Mt pa

>50%

Optimising rotational pulses and substituting for soya in feed

NCS

NITROGEN CLIMATE SMART

Pursuit of profitable climate resilient solutions towards Net Zero

UK GHG emissions

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UK GHG Farming emissions

46.3Mt pa

>10%

Maximum potential reduction in CO_2e for UK Agriculture: Defra Agri Climate report 2021

2.8Mt pa

FCT modelling shows that we can:

Provide an actual reduction of

3.4Mt pa

>100%

Optimising rotational pulses and substituting for soya in feed

NCS

NITROGEN CLIMATE SMART


YARA


NPZ


UNIVERSITY OF
LINCOLN


ANSWERS


PGRO


UKRI
Innovate
UK

Mixed Cropping Developments

Intercropping Insights & Bean Strategies

PGRO Syngenta Roadshow

2025

The Trinity of Intercropping

1. Targeting both species equally
2. High value crop + minimal support
3. Standard crop + minor crop for payment

1) Two equal targets

PGRO

- Beans + Spring Oats
- Peas + Spring Oats

- Beans + Spring Wheat
- Peas + Spring Wheat

- Peas + Beans

Separation vs Mixed End Use

Separation for Pulse and grain straightforward

Pea+Bean better for mixed end use

Organic Growers

Disease reduction

Weed suppression

N inputs without fertiliser

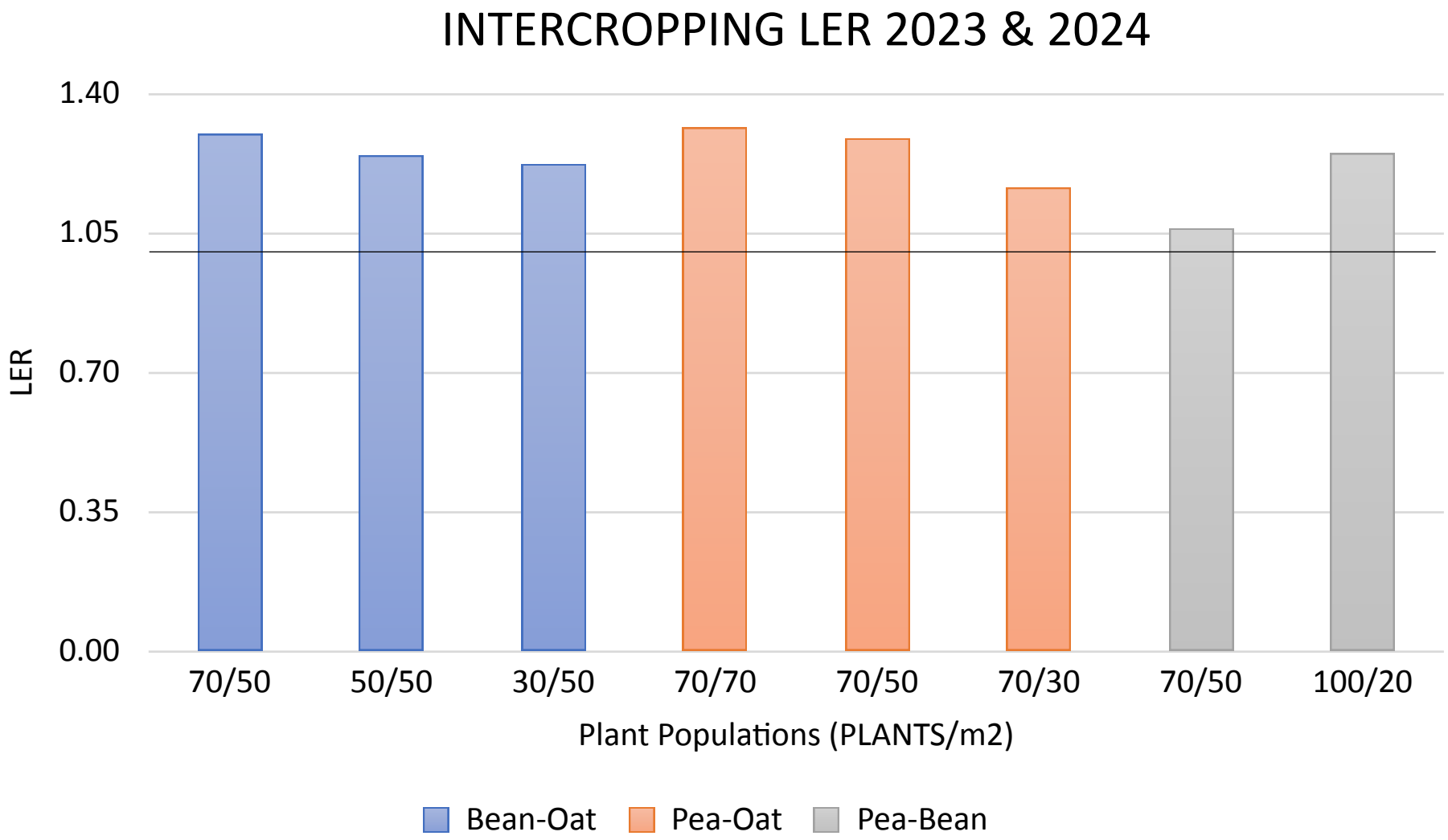
Benefits

Better standing Peas

Compensation for bad seasons

Extra payments

LER > 1.0

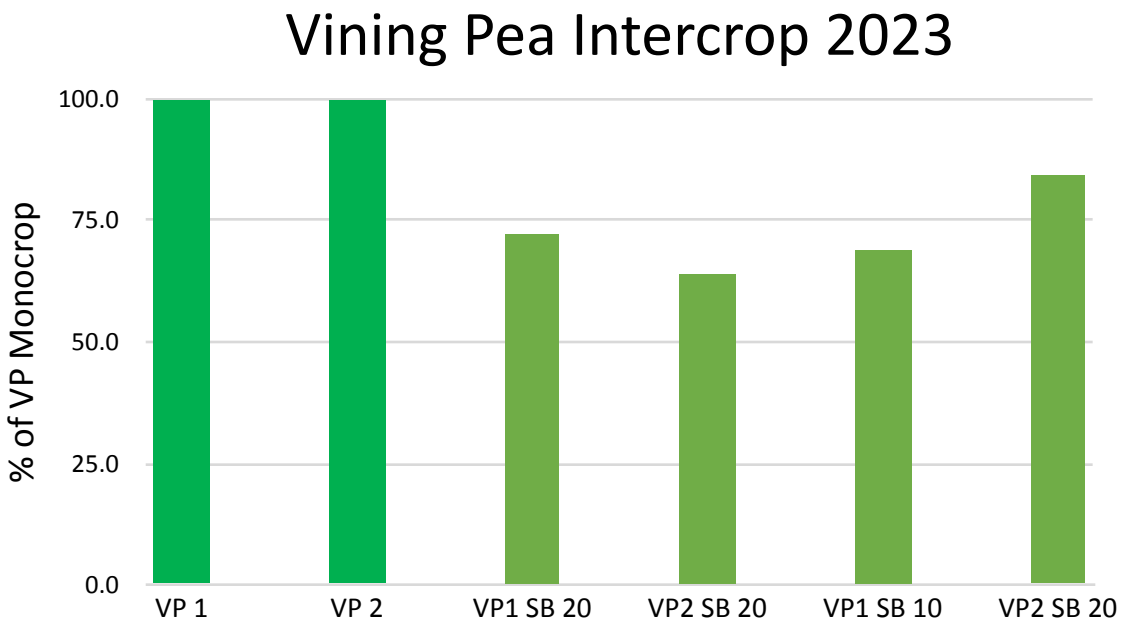

INTERCROPPING LER 2023 & 2024
1.40
1.05
0.70
0.35
0.00
LER
70/50
50/50
30/50
70/70
70/50
70/30
70/50
100/20
Plant Populations (PLANTS/m2)
Bean-Oat
Pea-Oat
Pea-Bean

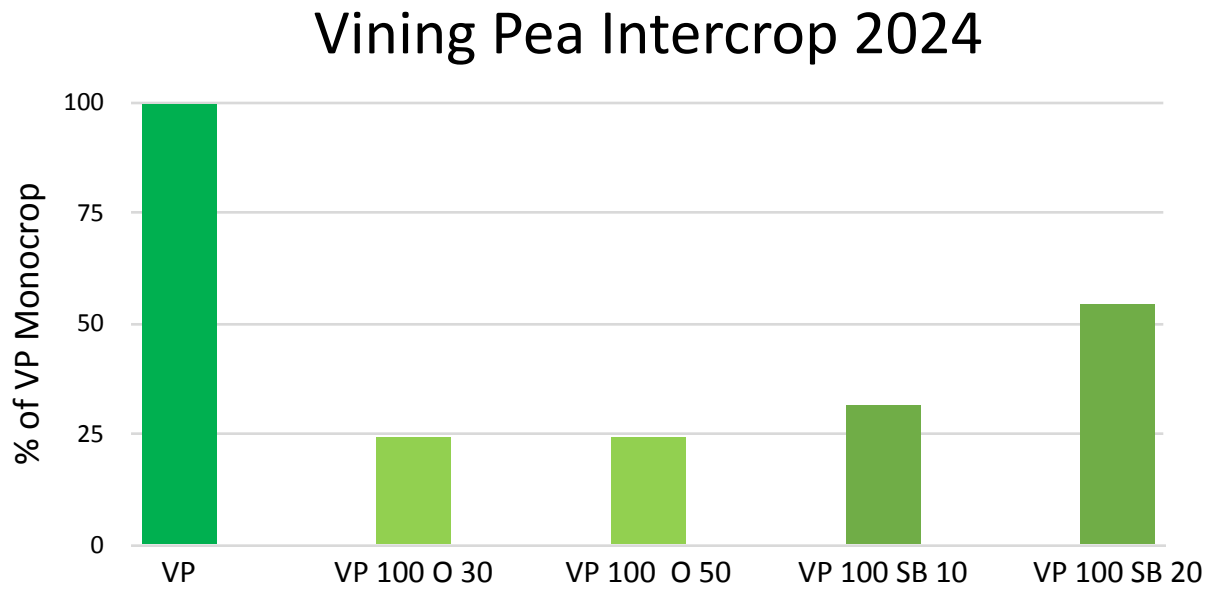
2) High value crop + minimal support

- High value crop is main target
- Goal is to increase yield/quality of main target
- Losses from competition needs to be small enough
- Vining Pea Seed Crops?

2) High value crop + minimal support

- PGRO has looked at Vining Pea Seed Crops
- Small amounts of Beans or Oats.
- Losses have been greater than benefits.





3) Standard Crop + Minor Crop for Payment

Minimal Beans

- Very small WB added to WW
- Targeting payment over quality or yield

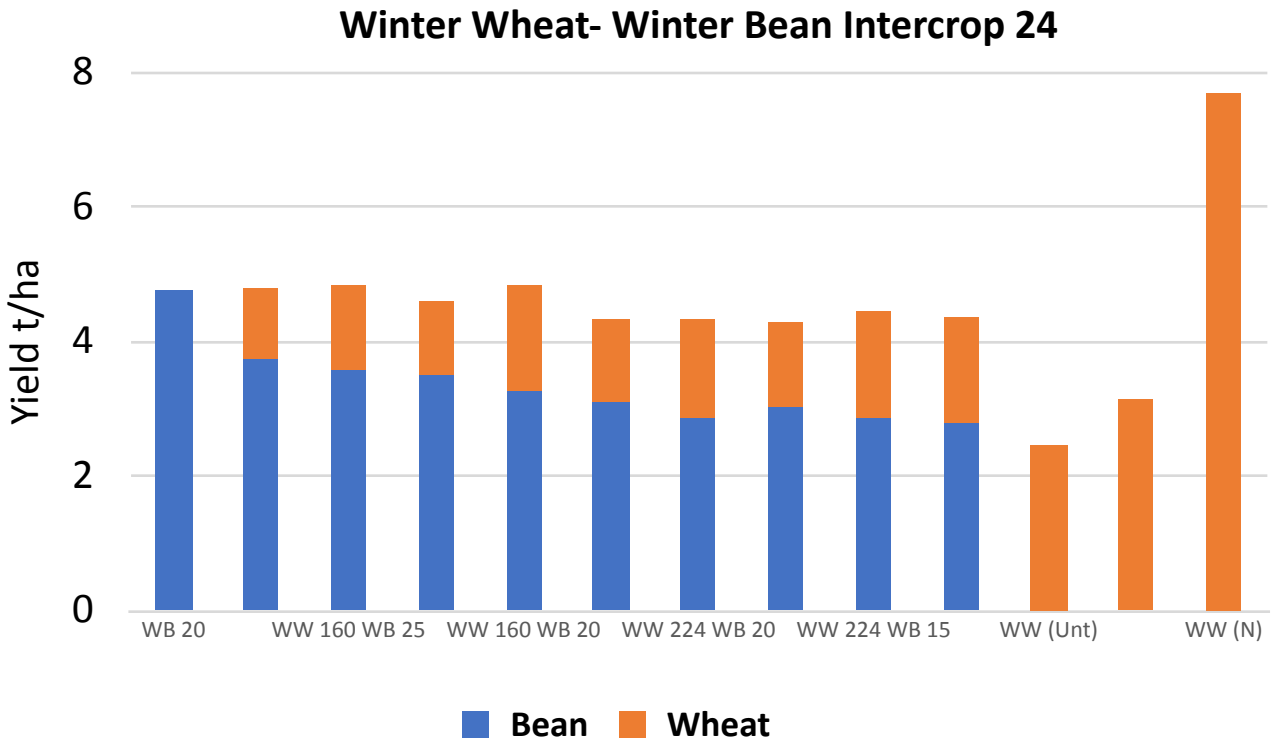
- Impact on rotations
- N applied ?
- Winter bean output

- Can we push to good rate for WB?

WW + WB Trials

Winter Beans

- WW /WB showed strong N deficiency in WW
- Intercrop performed as well as Beans, but fertilised wheat much better

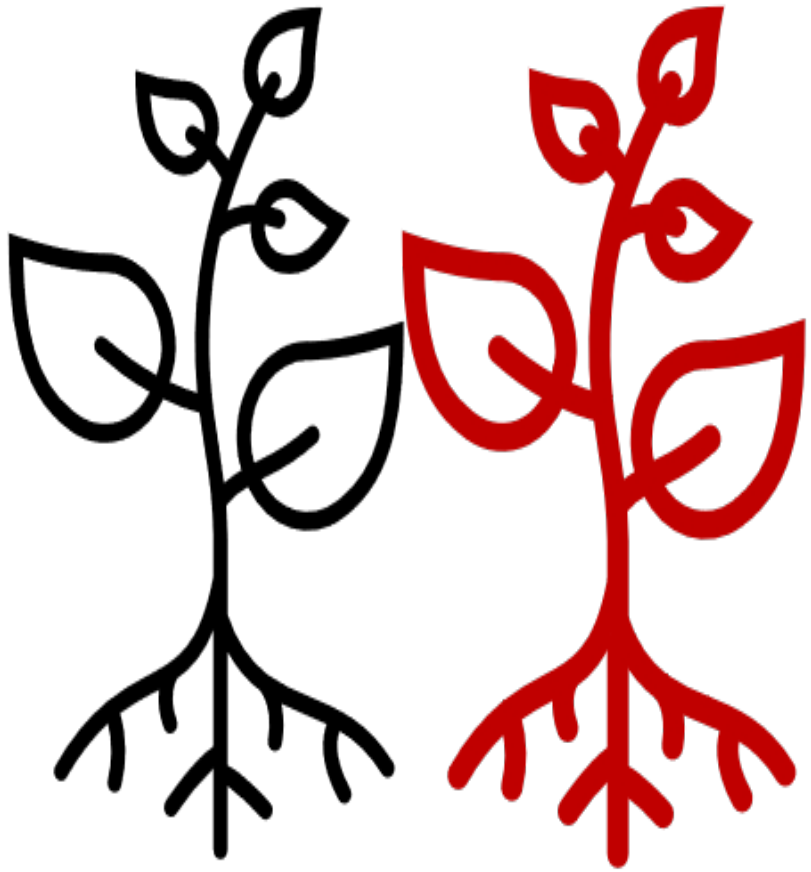


Blends (Concept)

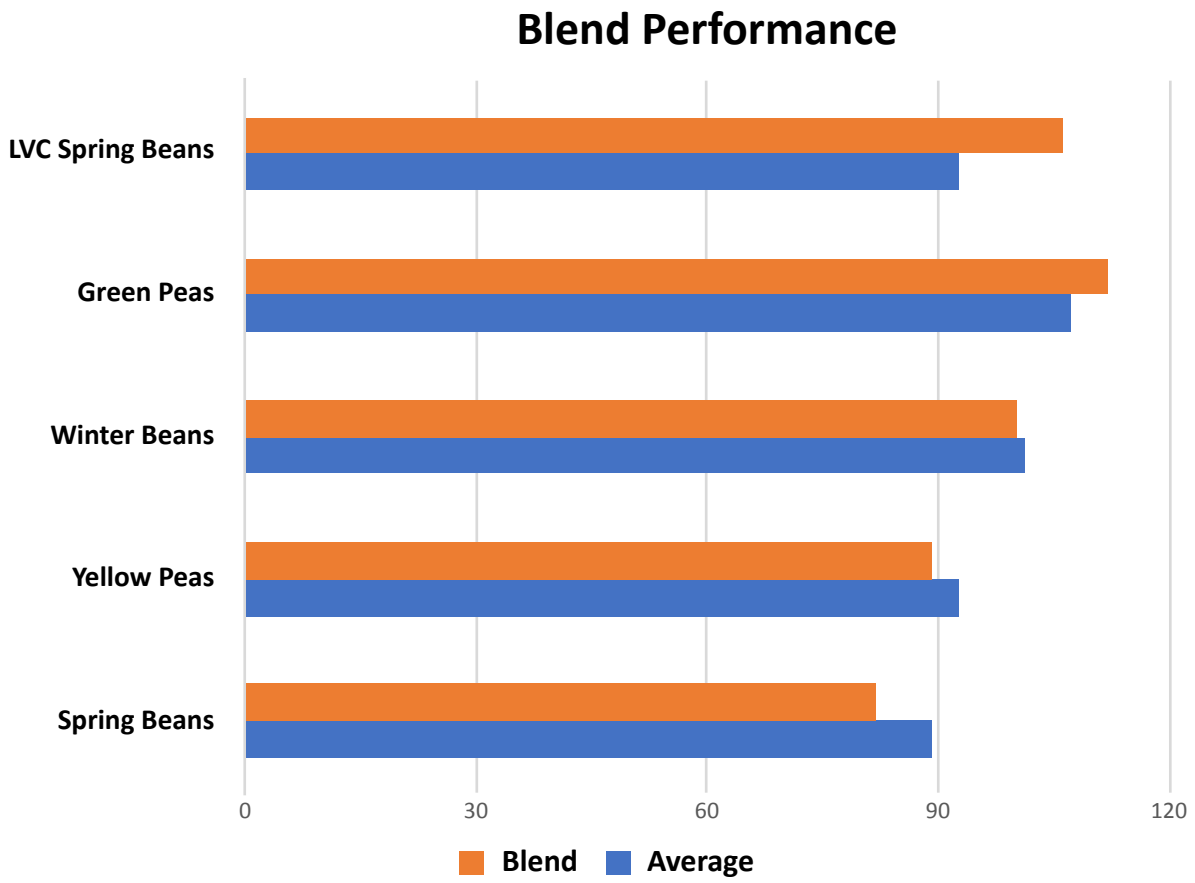
- Variety performance varies based on conditions.

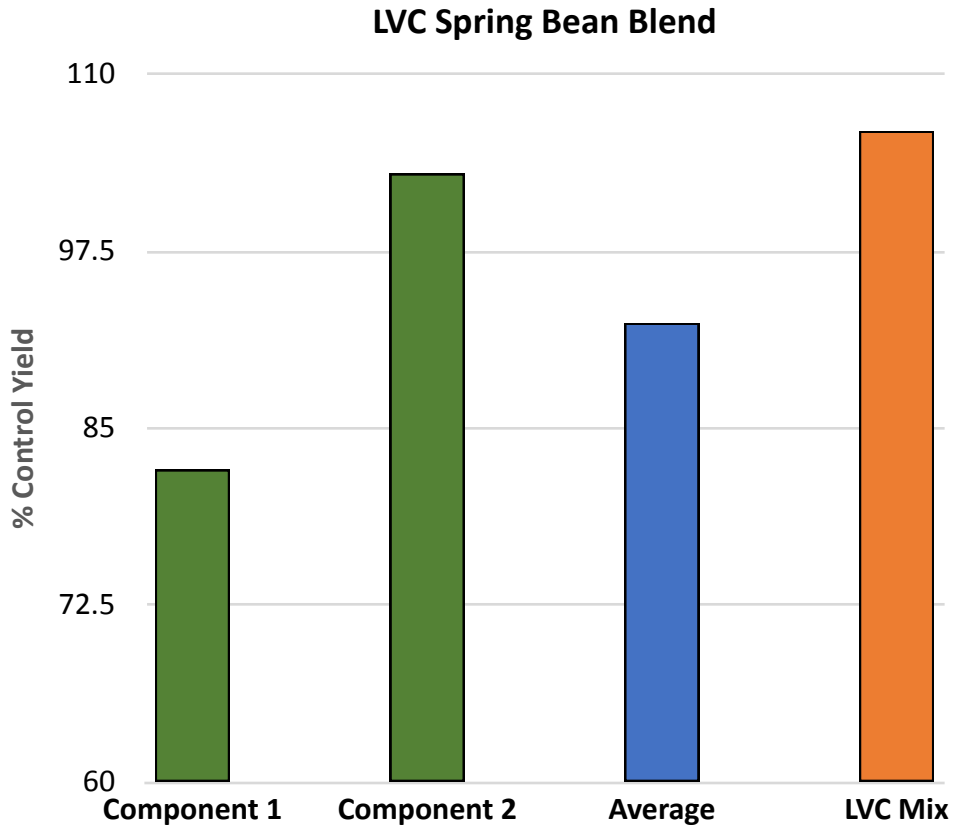
- Could combining two Elite varieties perform better than growing them separately ?

- Compensation / insurance
- More varied microclimate
- Difference in disease ratings

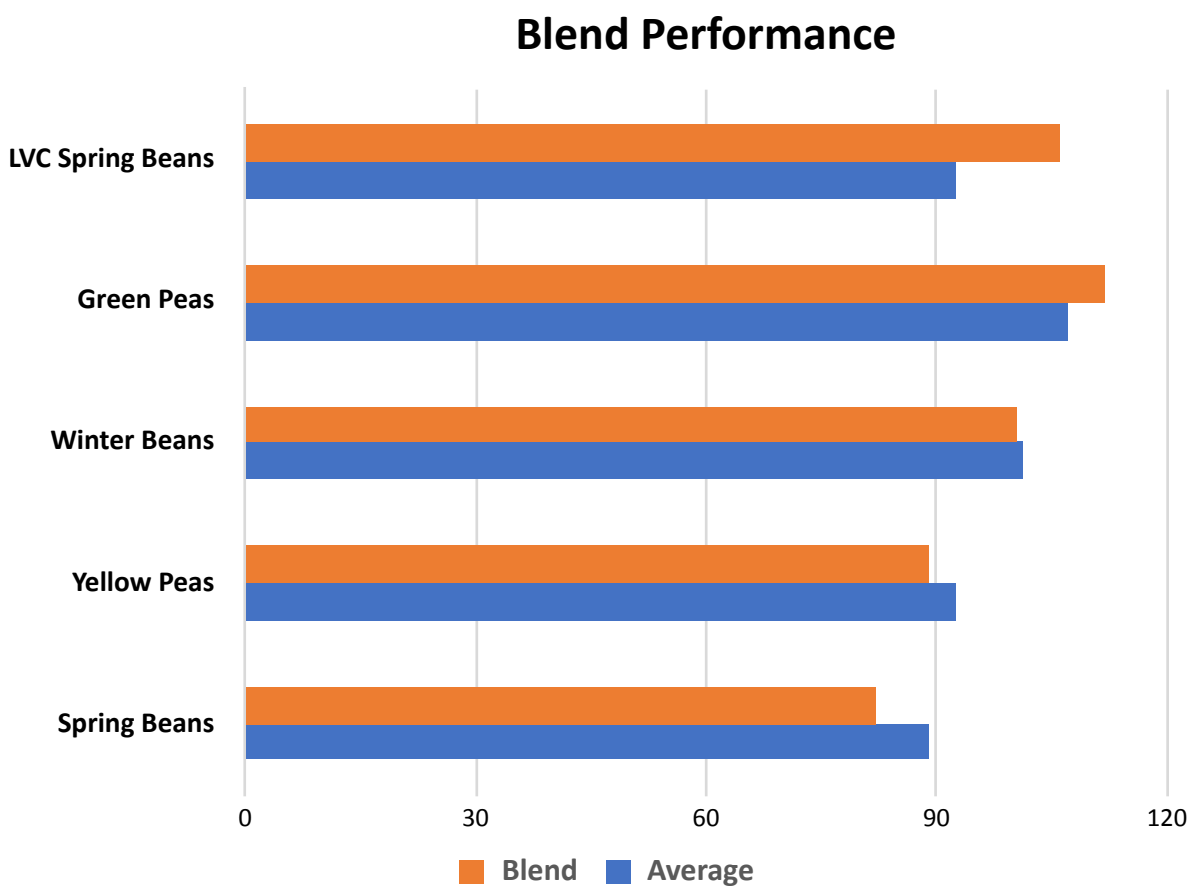


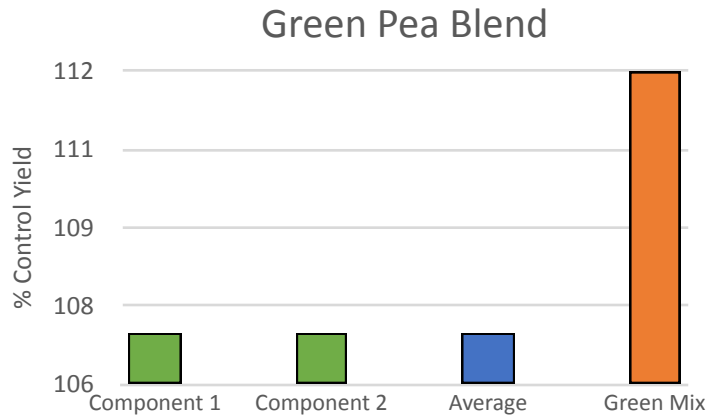
Pulse Blends 2024

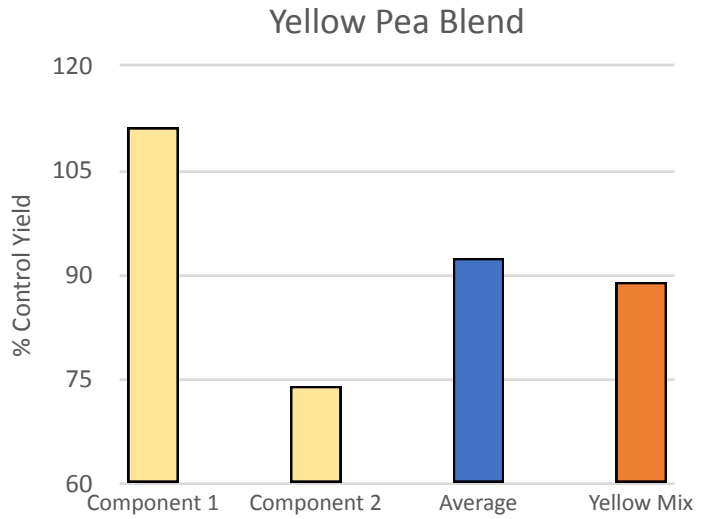




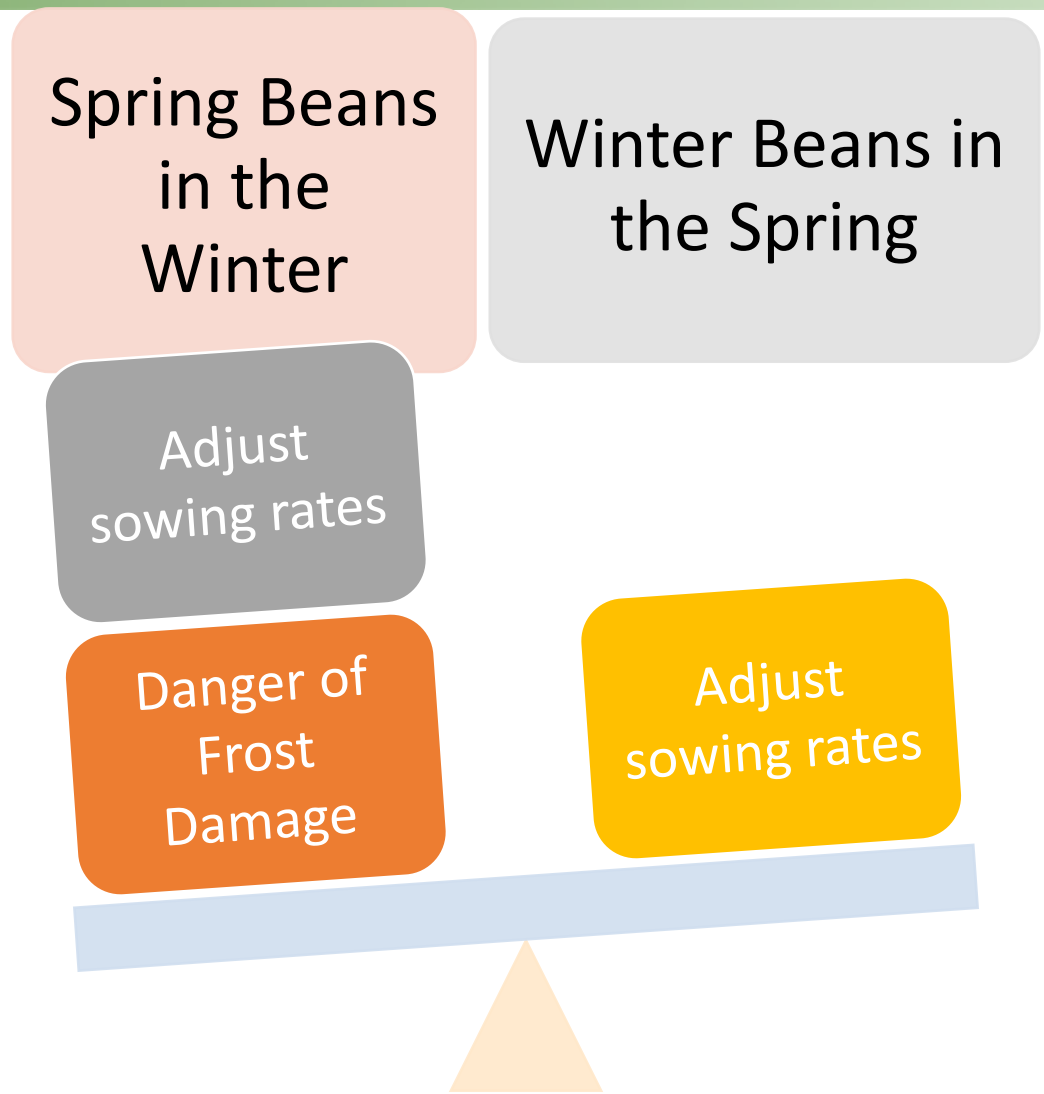
Pulse Blends 2024



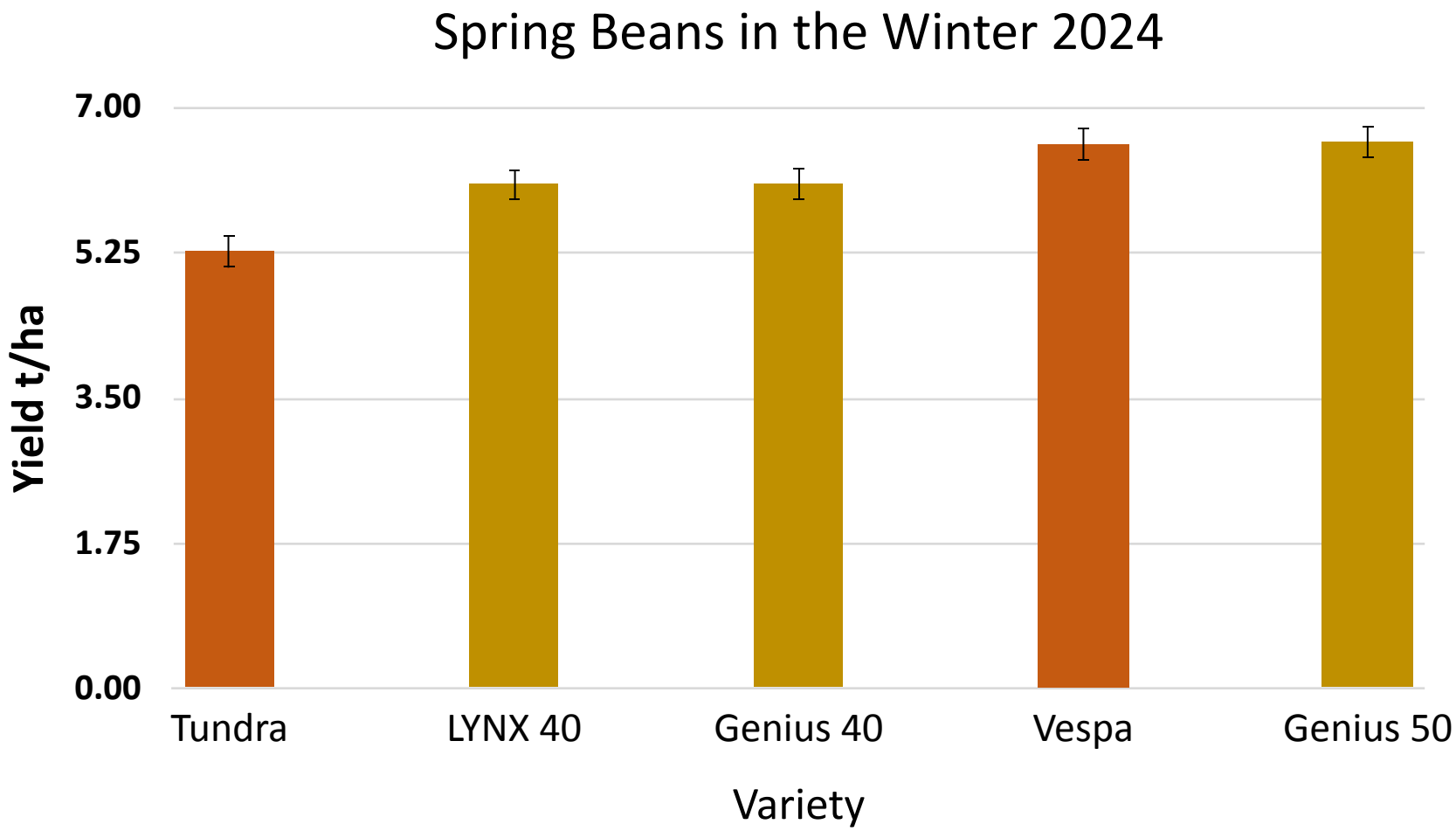




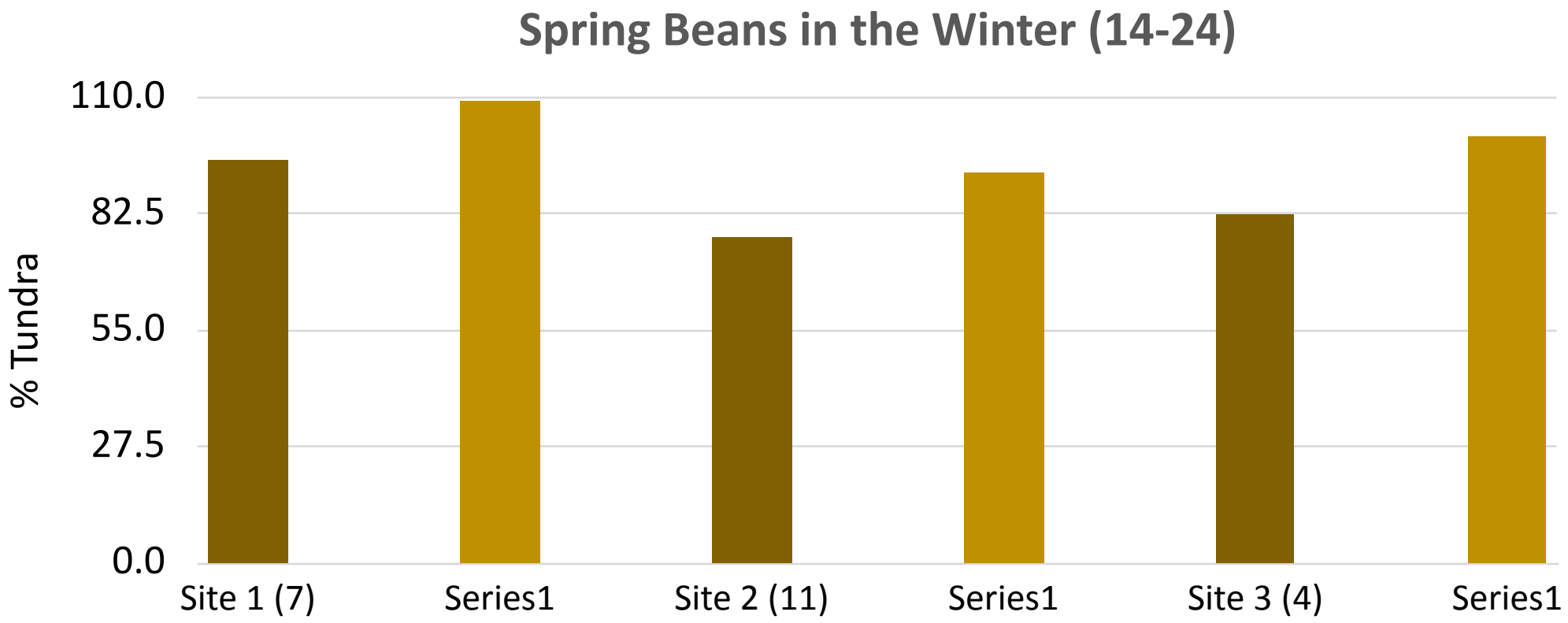
Off-season Beans



Spring Beans in the Winter



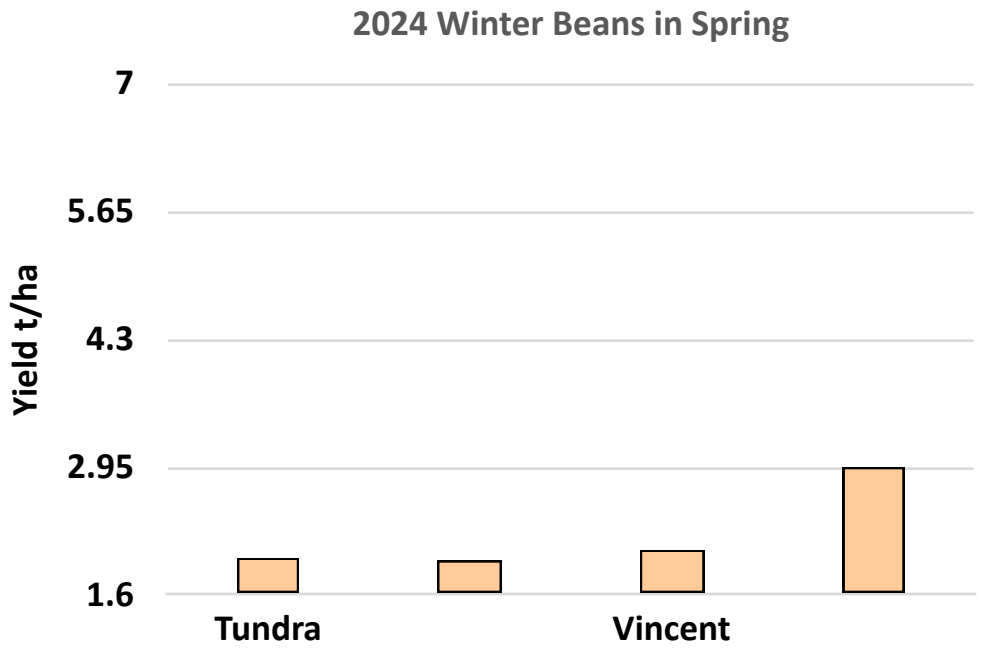
Spring Beans in the Winter

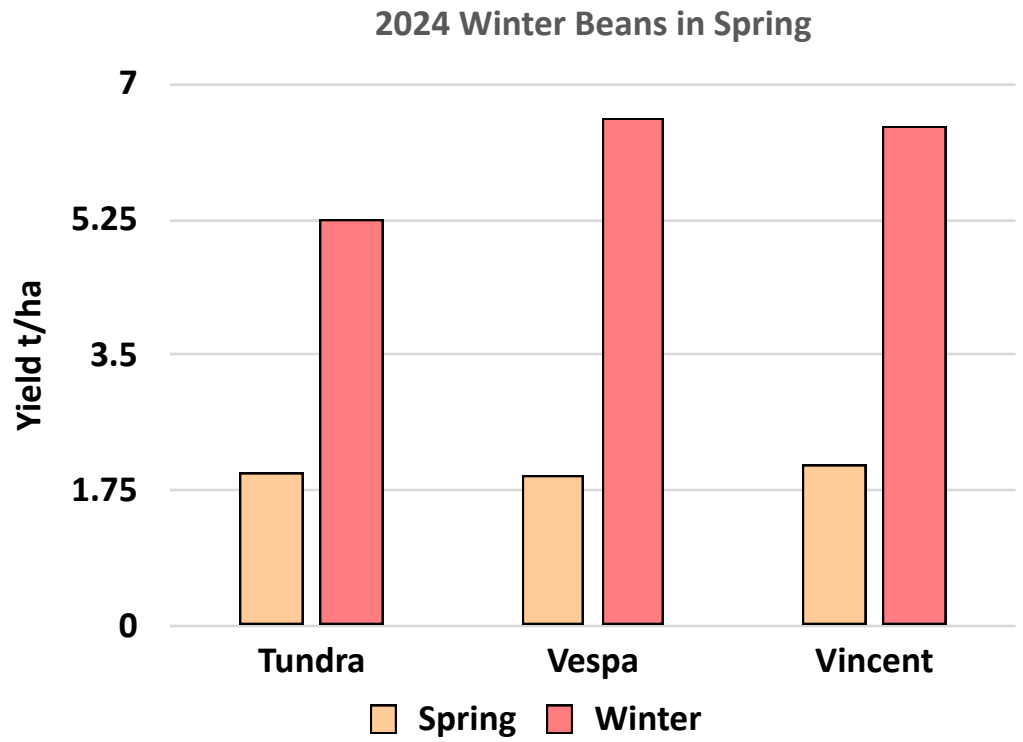


- **Sowing at 20 plants/m2 gives 85% WB**
- **Sowing at 40 plants/m2 gives 100% WB**

Winter Beans in Spring 2024

- Winter Beans in Spring can perform similarly to a spring crop at the right seed rate





Winter Beans in Spring

2024

Conditions at this location led to very good Winter Bean yields, and poor Spring Bean yields.

- ❑ Time of sowing was highly relevant to their performance
- ❑ Type of Bean was slightly relevant to their performance

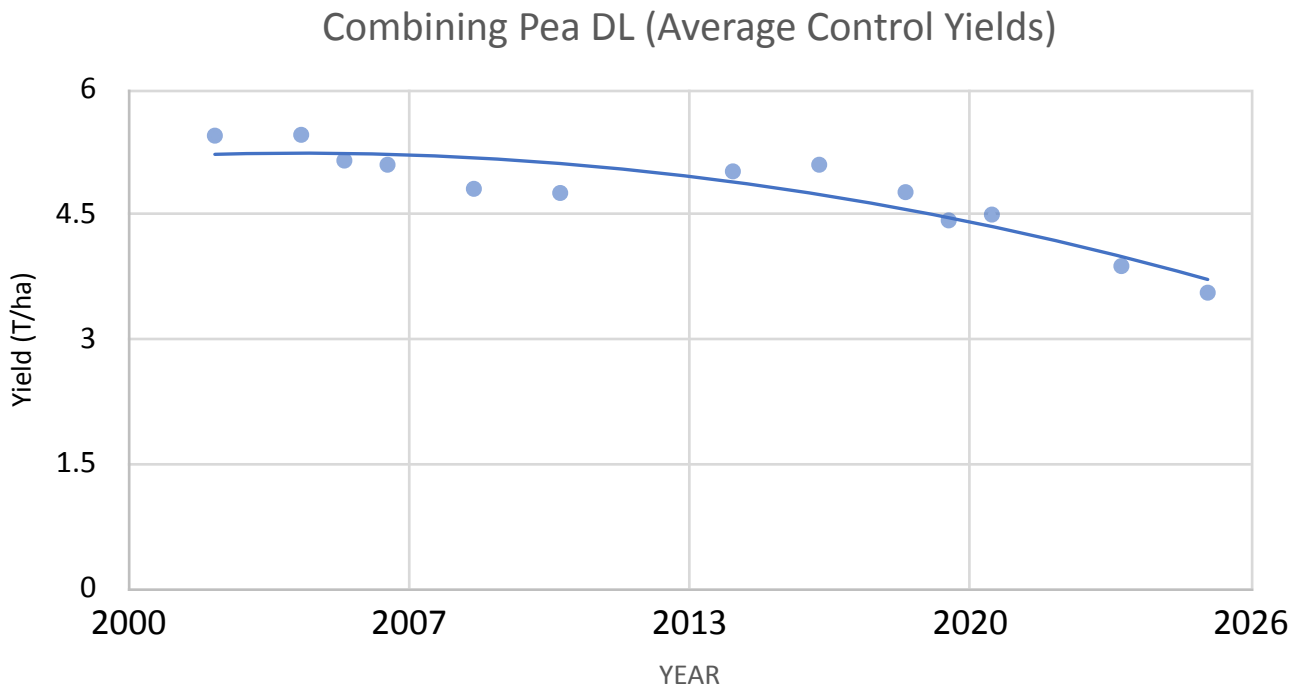
Winter Beans in Spring can perform similarly to a spring crop at the right seed rate,

….but conditions for spring beans need to be right

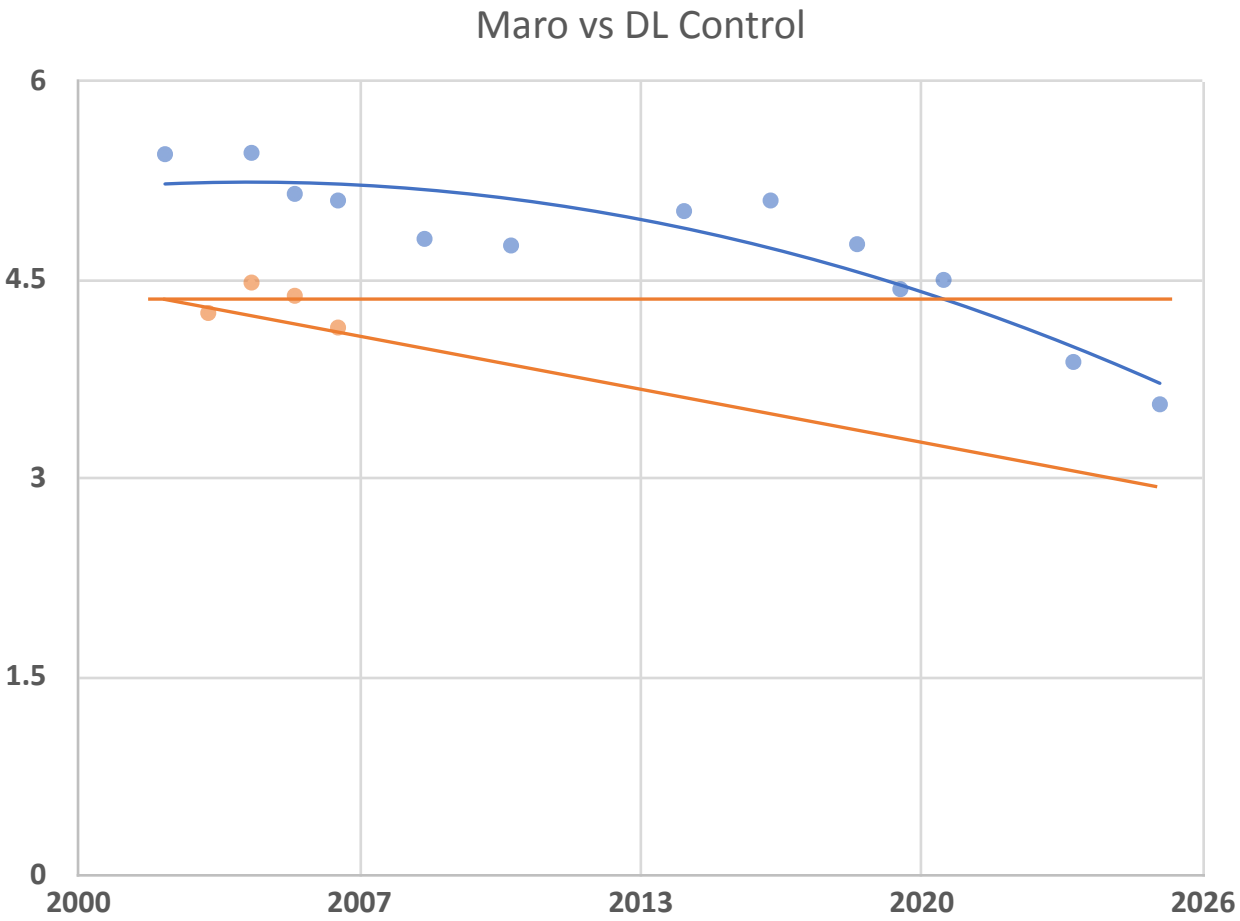
Historical Comparisons

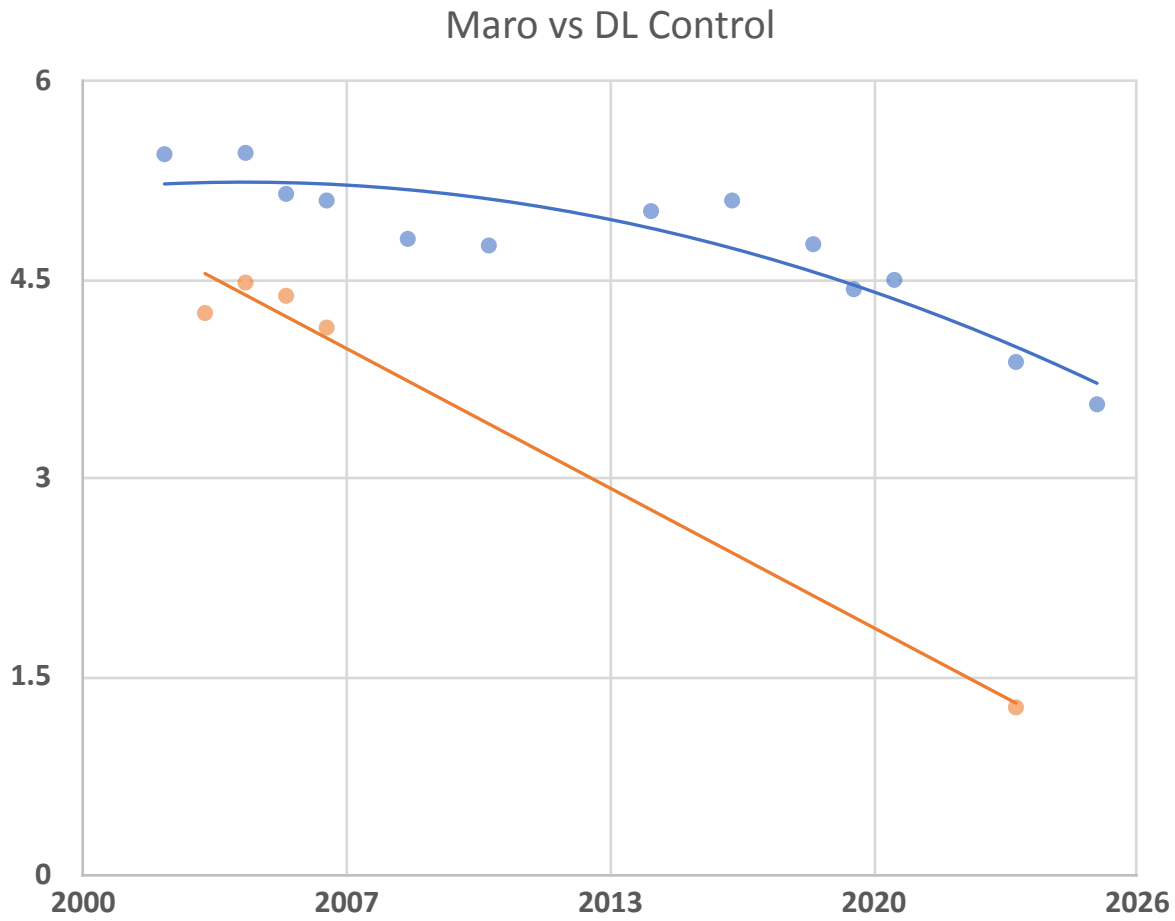
Average yields for DL trials haven't been increasing despite "NEW and IMPROVED" Lines .

Might historical lines be good and worth considering again ?
OR
Have we been successfully fighting against yield loss, and old ones would be even worse?



Historical Comparisons





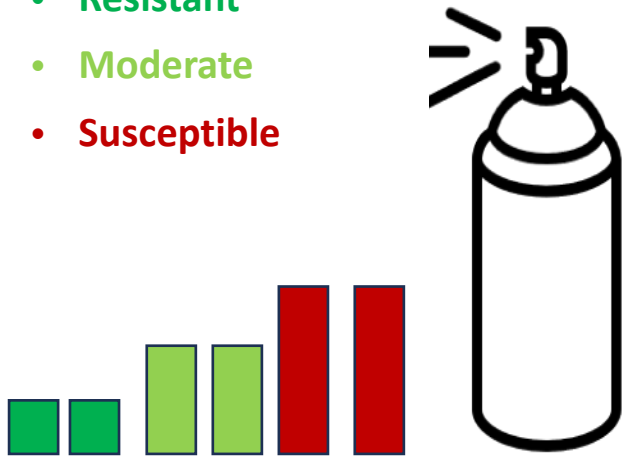
- **Weather conditions ? Loss of Actives ? Viruses ?**

Disease Progression

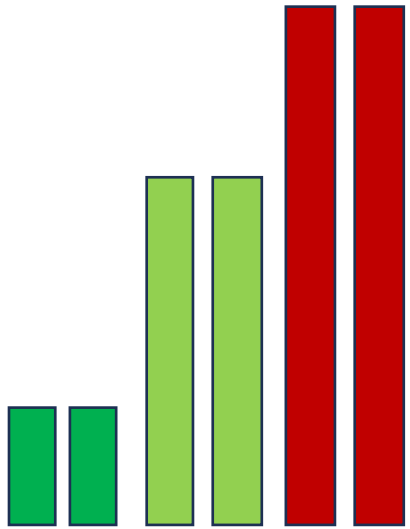
Disease progression work

- Better DL ratings
- Better info for organic growers
- Better info for poor disease control seasons

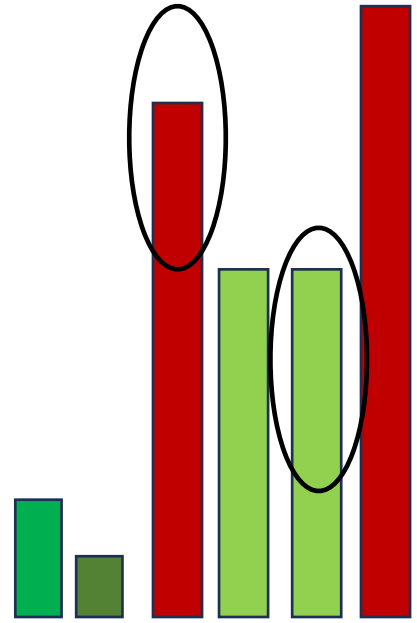
- **Resistant**
- **Moderate**
- **Susceptible**



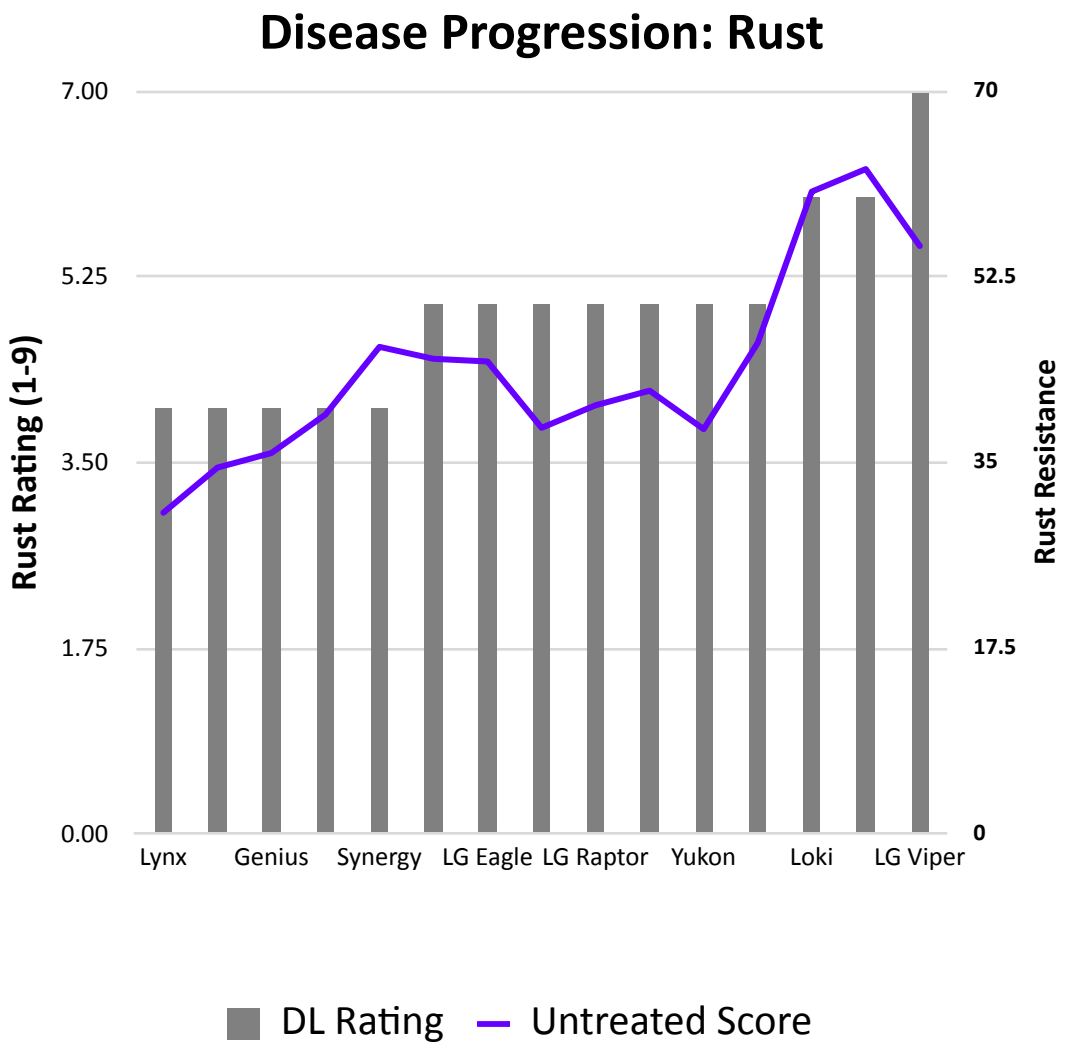
Varieties perform the same when untreated

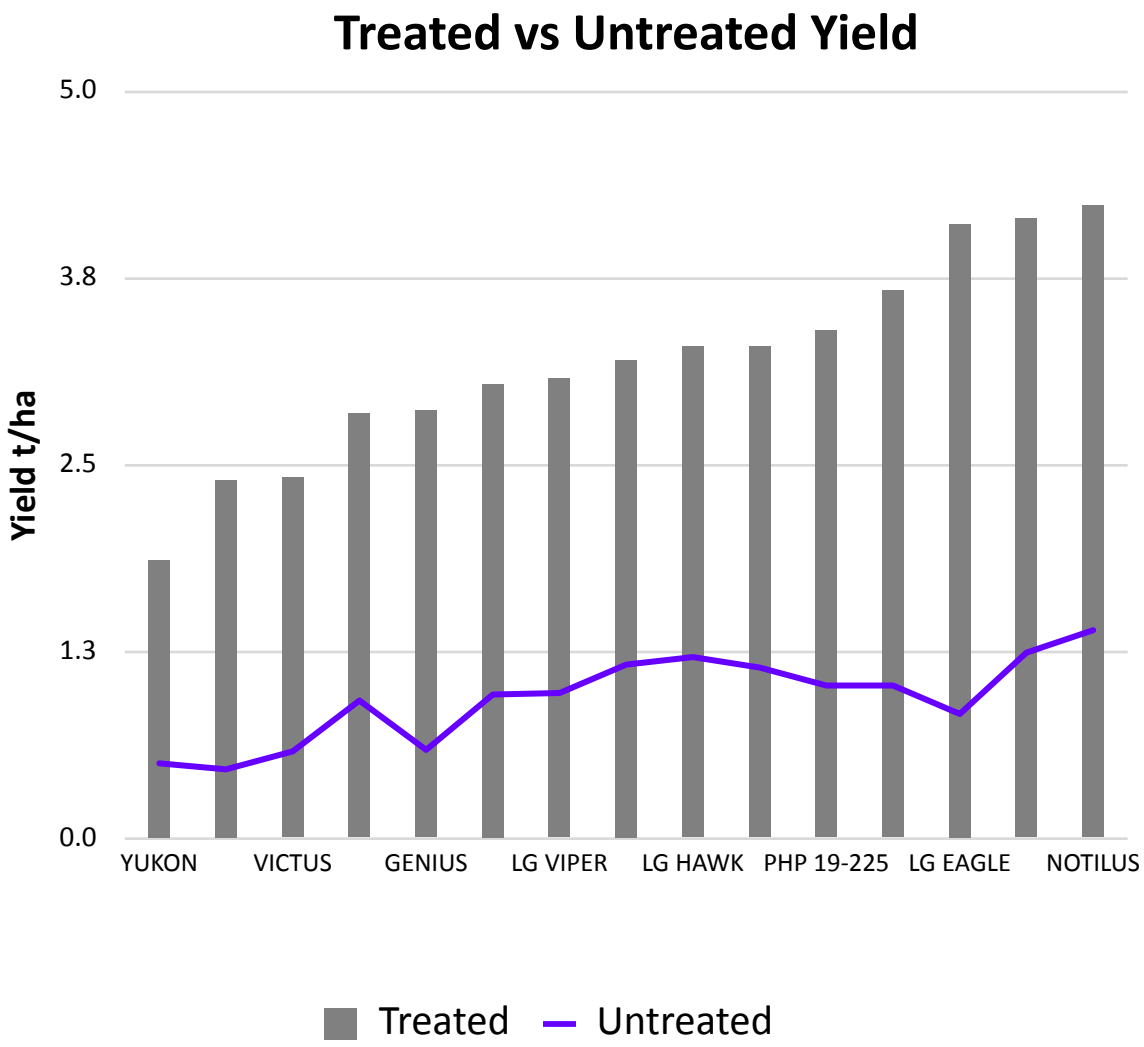


Changes in performance as disease progresses



Disease Progression



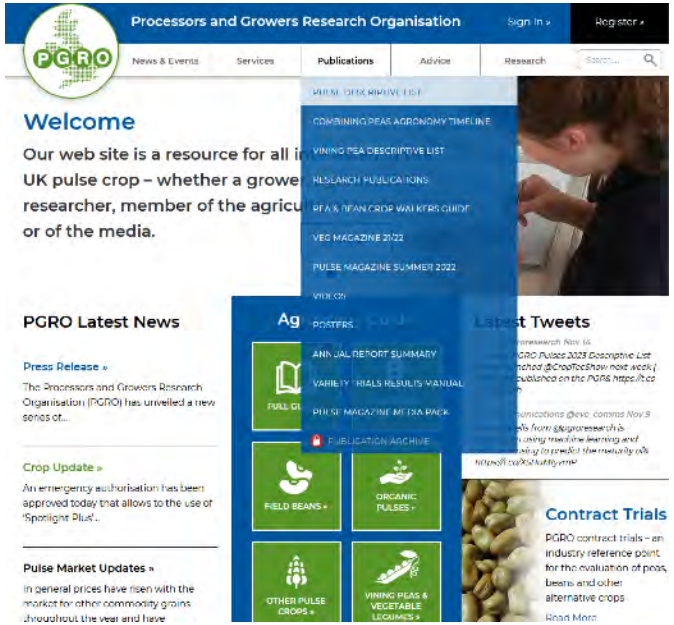


Pulse Descriptive Lists 2025 - Highlights

- New winter bean variety – *Miro (Good Early)*
- Four new spring bean varieties- *Notilus, LG Eagle, Ketu, Loki*
- Nine new varieties in peas
  - 1 Marrowfat *Midori*
  - 1 Green *Pangea*
  - 7 Yellow *KWS Bram, Marler, NOS Blondie, Captur, Bellair, LG Corvet, Bonham*
- Virus resistance information included for combining peas

2025 List Availability

- Available to download from PGRO Website www.pgro.org
- Printed in Winter Issue of Pulse magazine
- Podcast and Recording of Webinar



Questions


Filling the nitrogen gap, improving crop certainty

Agenda

- Atmospheric nitrogen fixing bacteria – What, When and Why?
- Other products
- Disease control

Atmospheric N fixing bacteria

Nuello® iN

Seed treatment

Vixeran®

Foliar

syngenta

Reasons to believe

Nuello®iN and VIXERAN® work with the plant as an additional nitrogen source.
Helping ensure N availability

Pulses are a protein crop and require nitrogen

Low soil nitrogen reserves high excess winter rainfall

Pea and bean weevil damaging rhizobium

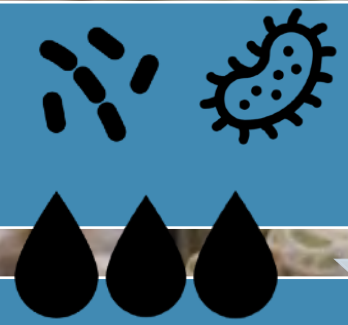
Nitrogen availability is reduced during dry conditions

Maintaining green leaf – ensure N availability during seed fill, retain leaf instead of robbing N from leaves.

What is Nuello® iN

Nuello® iN Seed Treatment

Two unique N-Fixing Endophyte Bacteria



Solo (Organic) or Co-applied standard seed treatment

Pseudomonas siliginis

Nuello® iN microbes

Curtobacterium salicaceae

A strong nitrogen fixing endophyte bacterial strain

A strong nitrogen fixing and soil insoluble phosphate mobilising endophyte bacterial strain

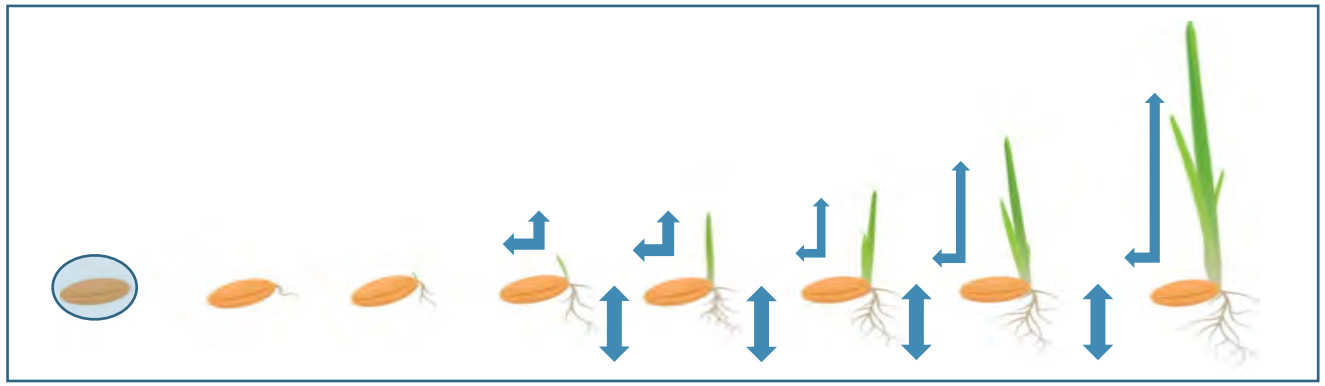
Nuello® iN

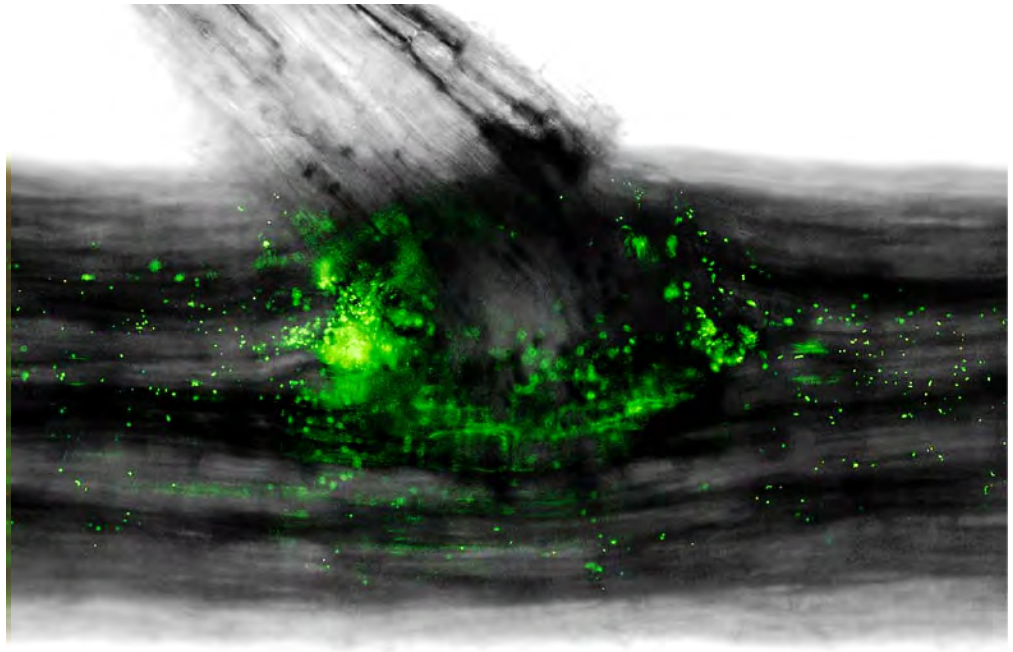
syngenta

Nuello® iN: ALWAYS ON Nitrogen Generation

Endophytes enter the plant through root cracks

→ colonize the roots and shoots for the duration of the season

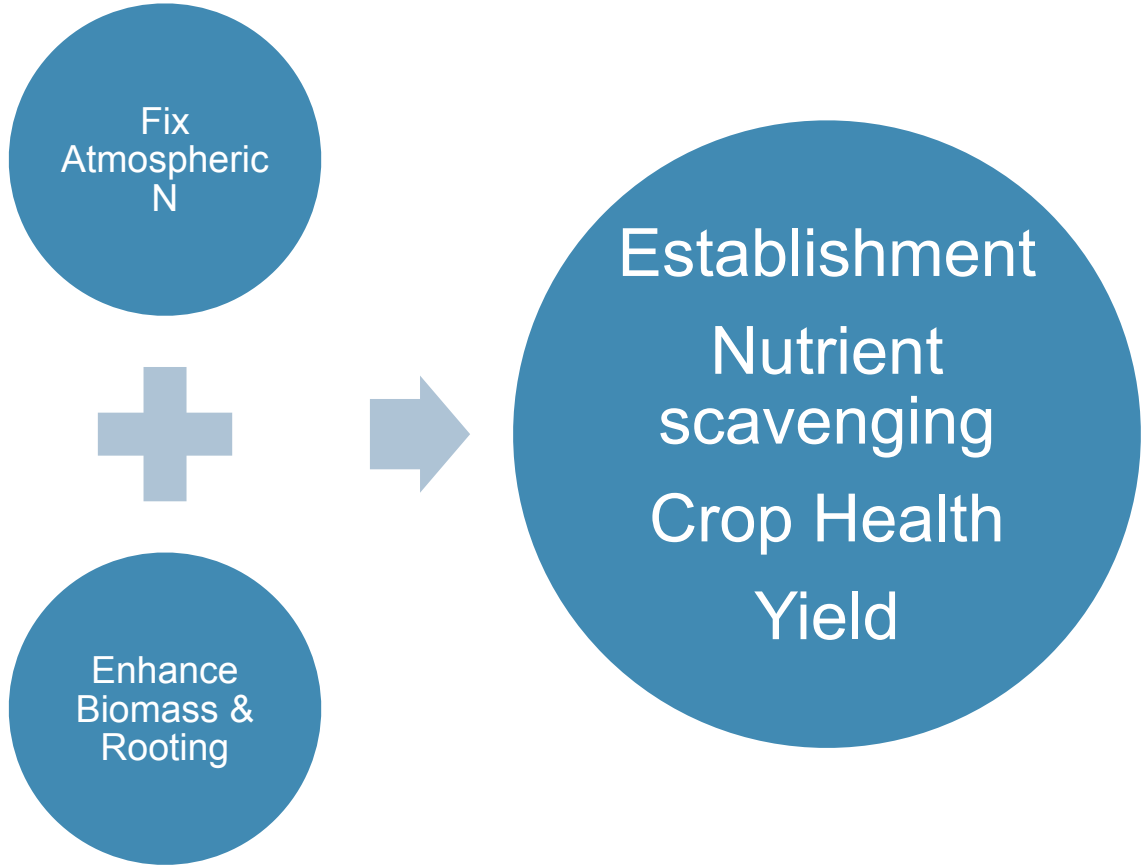




Inside the plant **the endophytes aerobically fix atmospheric nitrogen** producing ammonium NH_4 and organic N, providing the plant with additional nitrogen

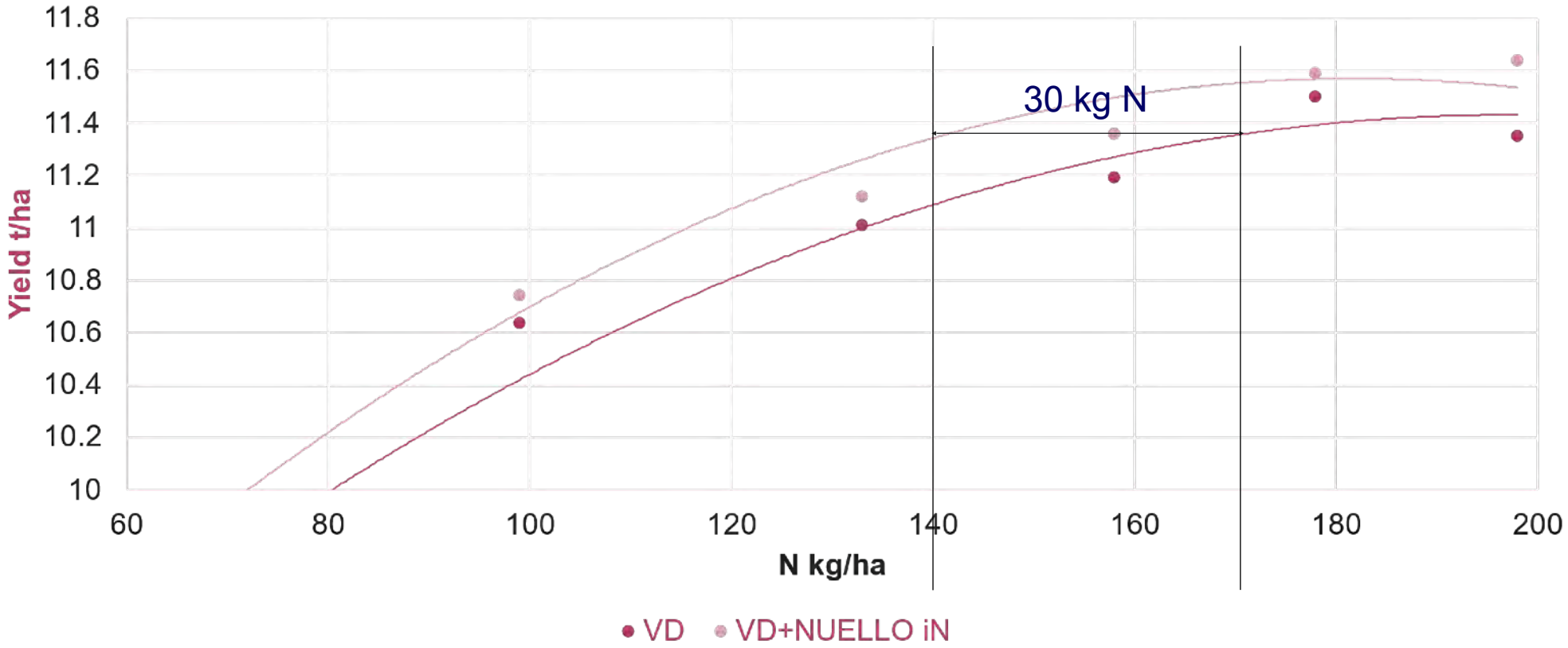
Nuello® iN

- **Launched 2023 – Winter Wheat, Winter Barley, Spring Barley**
- **Substitute/Insurance Policy Nitrogen Management Strategy**
- **30 kg N per Hectare**



Four site average winter wheat N curve trials 2022

Clear yield benefit for Nuello® iN equivalent to up to 30 kg N/ha on average



Average yield from Newark, Stretham, Balgonie and Bleasby
Newark, SY INSITOR, loamy sand, drilled early October 2021 following maize
Stretham SY INSITOR, organic land, drilled early October 2021 following lettuce
SAG Balgonie, SY INSITOR, sandy loam, drilled end September following winter oats
Bleasby, SY INSITOR, clay loam, drilled early October following winter OSR

Nuello® iN

syngenta

Nuello® iN enhances rooting

Untreated

VIBRANCE® Duo

BERET® Gold

BERET® Gold + Nuello® iN

Winter wheat, 40% *Fusarium* infection poly tunnel trial, planted 13th January 2022.
Rooting assessed 42 days after planting

Nuello® iN

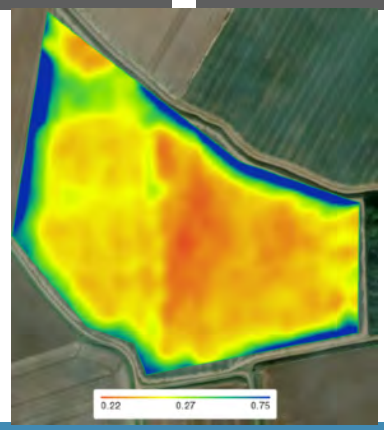
syngenta

NUELLO® iN excellent benefits in vining peas

Fludioxonil	+ NUELLO® iN
144 plants /m²	153 plants /m²

Fludioxonil

+ NUELLO® iN*



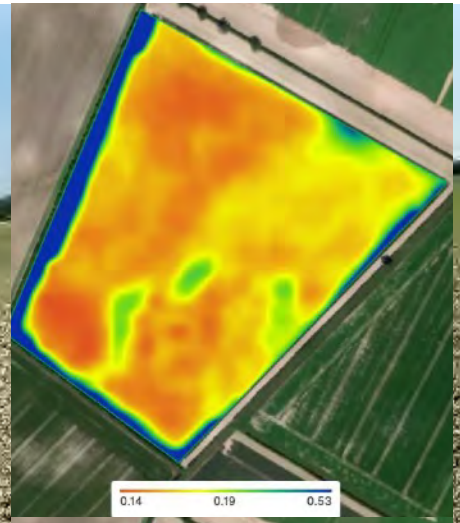
Perth, Scotland, Tomahawk vining peas, drilled 20th April 2024
Plant counts average of 3 sites. Plant counts and rooting assessed 22nd May 2024

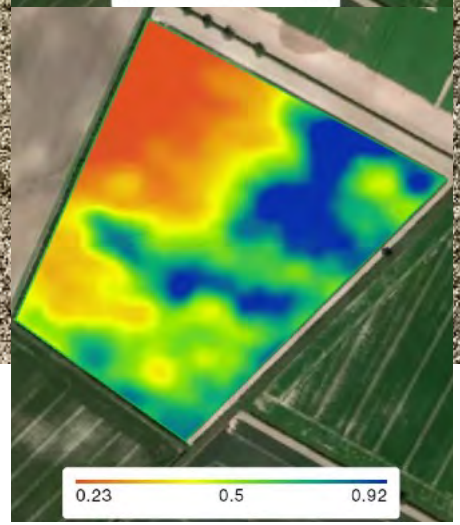
Kirton, Lincolnshire, Contigo vining peas
Rooting assessed 12th May 2024
NDVI 12th July 2024

Nuello® iN

syngenta

NUELLO® iN excellent benefits in vining peas





Fludioxonil

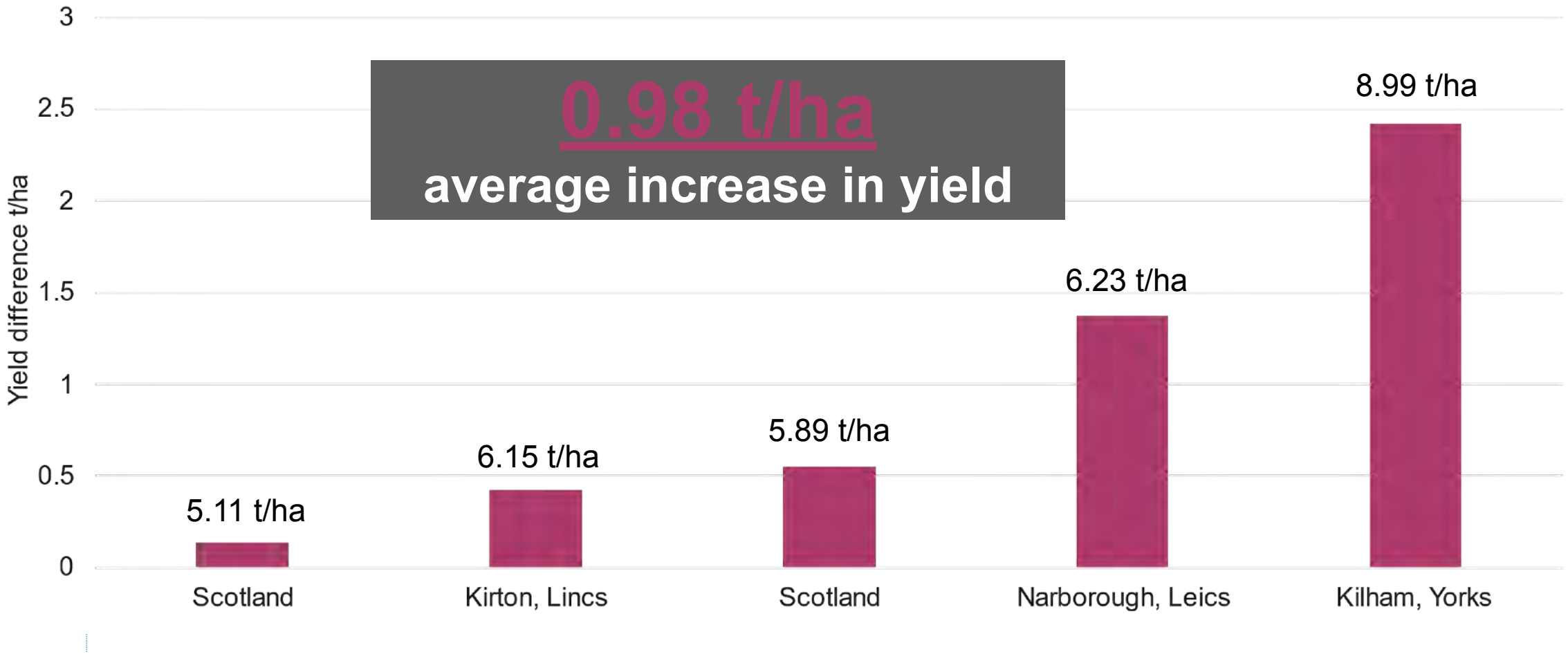
Fludioxonil + NUELLO® iN

Narborough, Norfolk, Contigo vining peas
Pictures 12th May 2024 and NDVI 5th May and 4th June 2024

Nuello® iN

syngenta

NUELLO® iN excellent yield benefit in vining peas



Perth, Scotland, Tomahawk vining peas, drilled 20th April 2024
Kirton, Lincolnshire, Contigo vining peas drilled April 2024
Narborough, Leicestershire, Contigo vining peas drilled April 2024
Kilham, Yorkshire, Trophee vining peas drilled 25th April 2024

Nuello® iN

syngenta

Untreated

Contigo A84 – 5.732 t/ha 127TR

Nuello® iN

Contigo A84 + Nuello® iN – 6.152 t/ha 124TR

Nuello® iN

syngenta

7th May 2024 – PGRO Combining pea replicated trial - Stubton

Untreated

Atuva™

syngenta

Quantis™

- **QUANTIS™** is a biostimulant containing metabolites from **yeast production** plus a combination of **organic carbons, potassium, calcium & amino acids**
- **QUANTIS™** stimulates the plant to combat abiotic stresses & helps maintain yield that might otherwise be lost

YIELDON

- YieldOn increases phloem loading and sugar transport
- Sugars are produced in photosynthetic leaves and then transported to non-photosynthetic tissues (sinks) like developing seeds

syngenta

VIXERAN®
on pulses

Vixeran®

syngenta®

Vixeran® recommendation on pulses

Timing

- From GS16 to first flower
- Ensure crop is actively growing for optimum inoculation
- Avoid periods of intense UV light – on bright sunny days apply early morning or late afternoon

Application

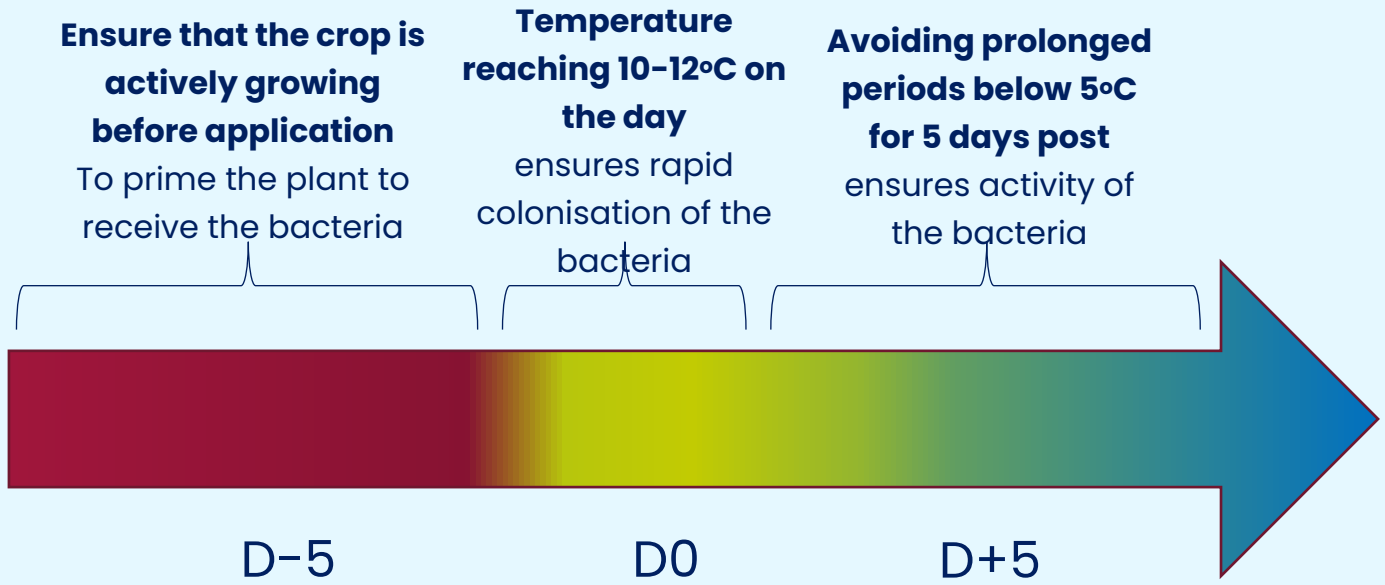
- 50 g/ha in 100-200 l/ha water
- Apply with foliar feeds to ensure nutrient availability – pulses have been shown to respond to sulphur, manganese, magnesium, boron and molybdenum
- Or apply with fungicide at earliest timing (first pod)

Ideal crop stages for application

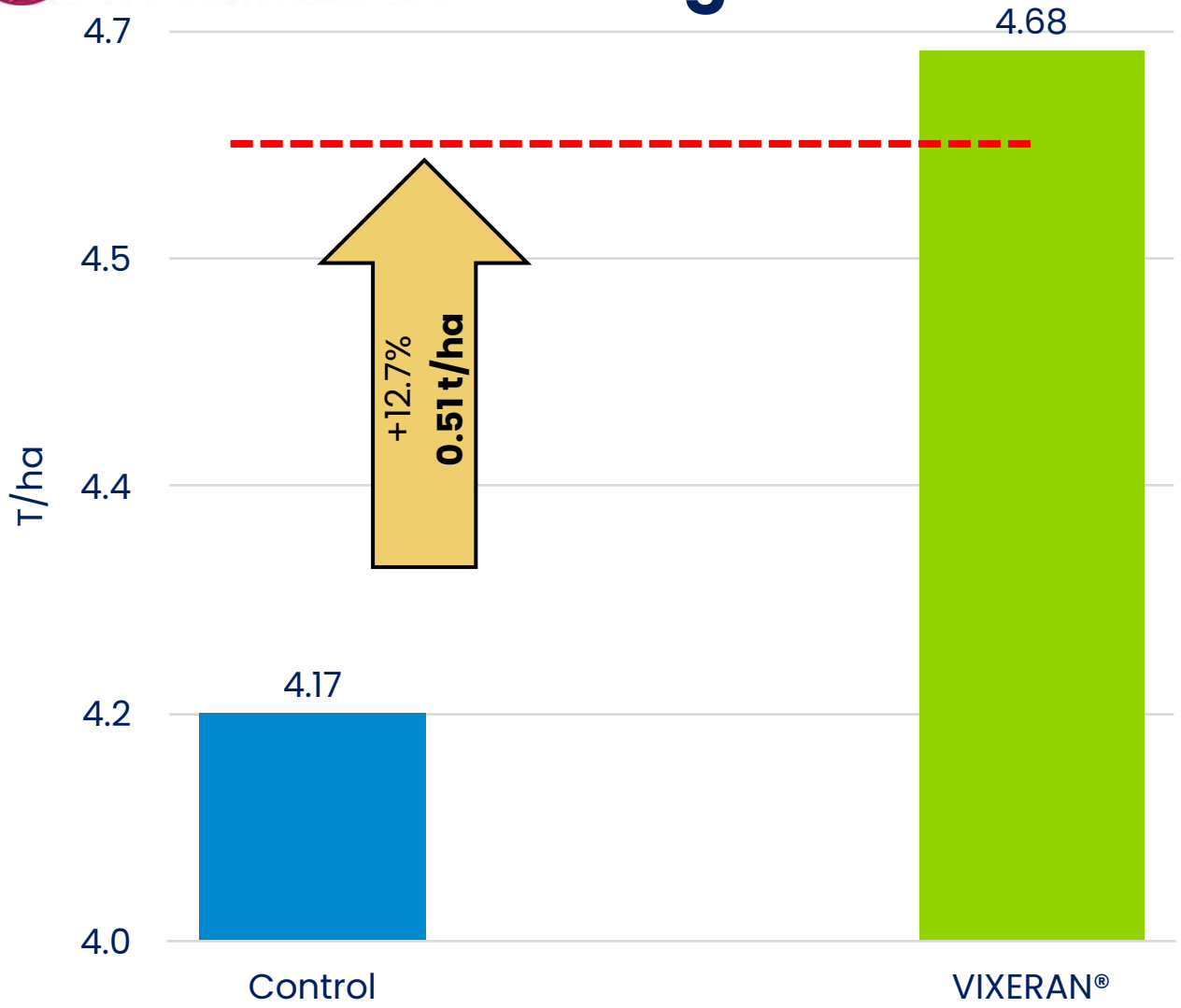
Best use application recommendations

Ideal application weather conditions

	Optimum conditions for application
Application rate 50 g/ha	• **Humidity > 8%** promotes colonisation • **When in periods of intense UV light:- apply in the morning or late afternoon** optimal periods of opening of the stomata • **Soil pH : 5.5 to 9.0** For product that lands on the ground • **Water volume: 100-200 l/ha**



Vixeran® **Average on beans in 2023:** Across 4 trials (Yield)



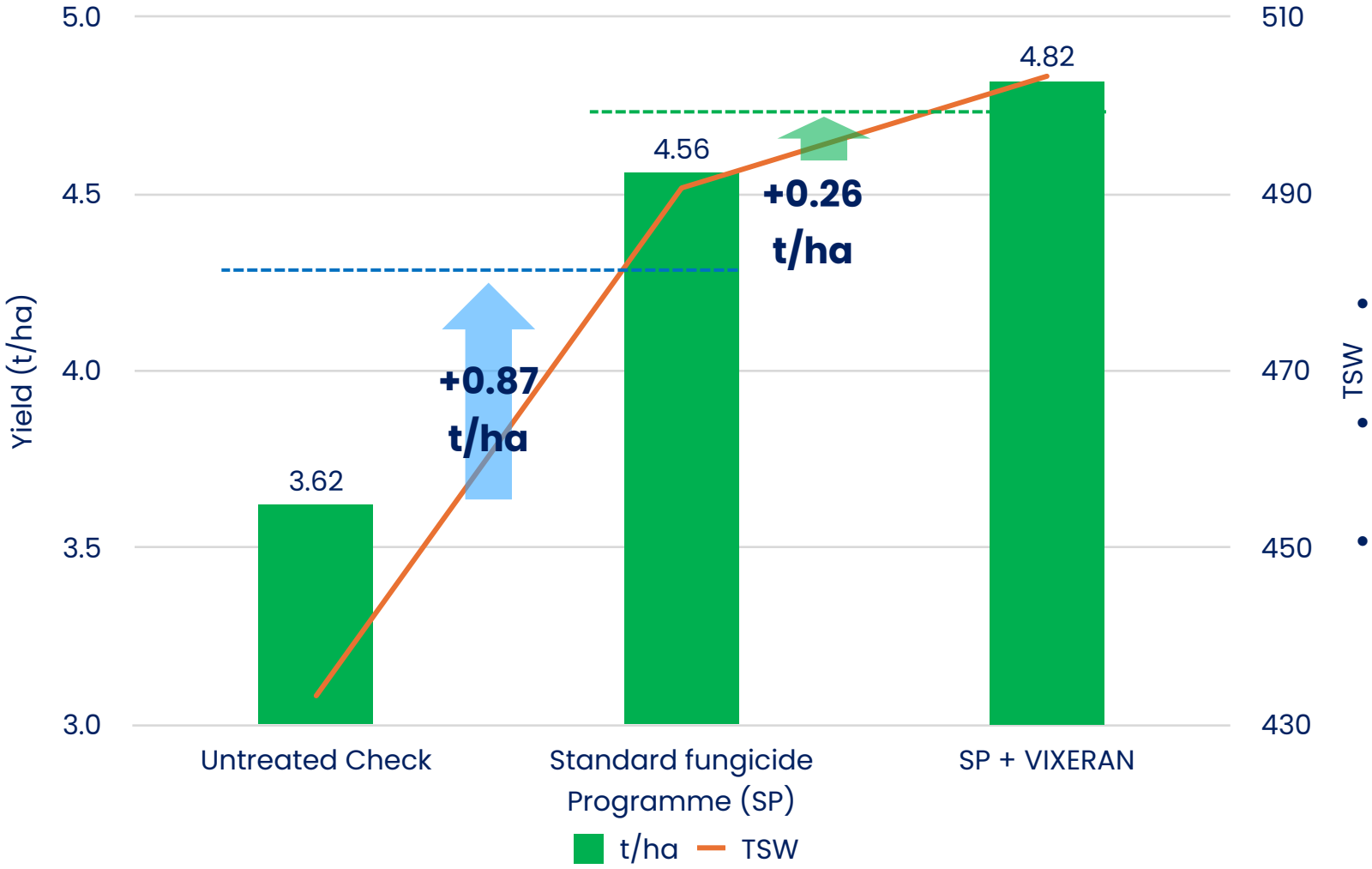
Location	Crop	Growth Stage of application	Variety	Yield difference + VIXERAN® (t/ha)
Elveden	Spring beans	51 (First flower)	Lynx	+0.82
Elveden	Winter Beans	51 (First flower)	Vespa	+0.31
Doncaster	Spring beans	51 (First flower)	Yukon	+0.28
Warwick	Winter beans	51 (First flower)	Wizard	+0.61
			Average	+0.51 t/ha

220 x 0.51 = £112.2

Vixeran®

syngenta

Same 2023 benefit in winter beans seen in 2024!



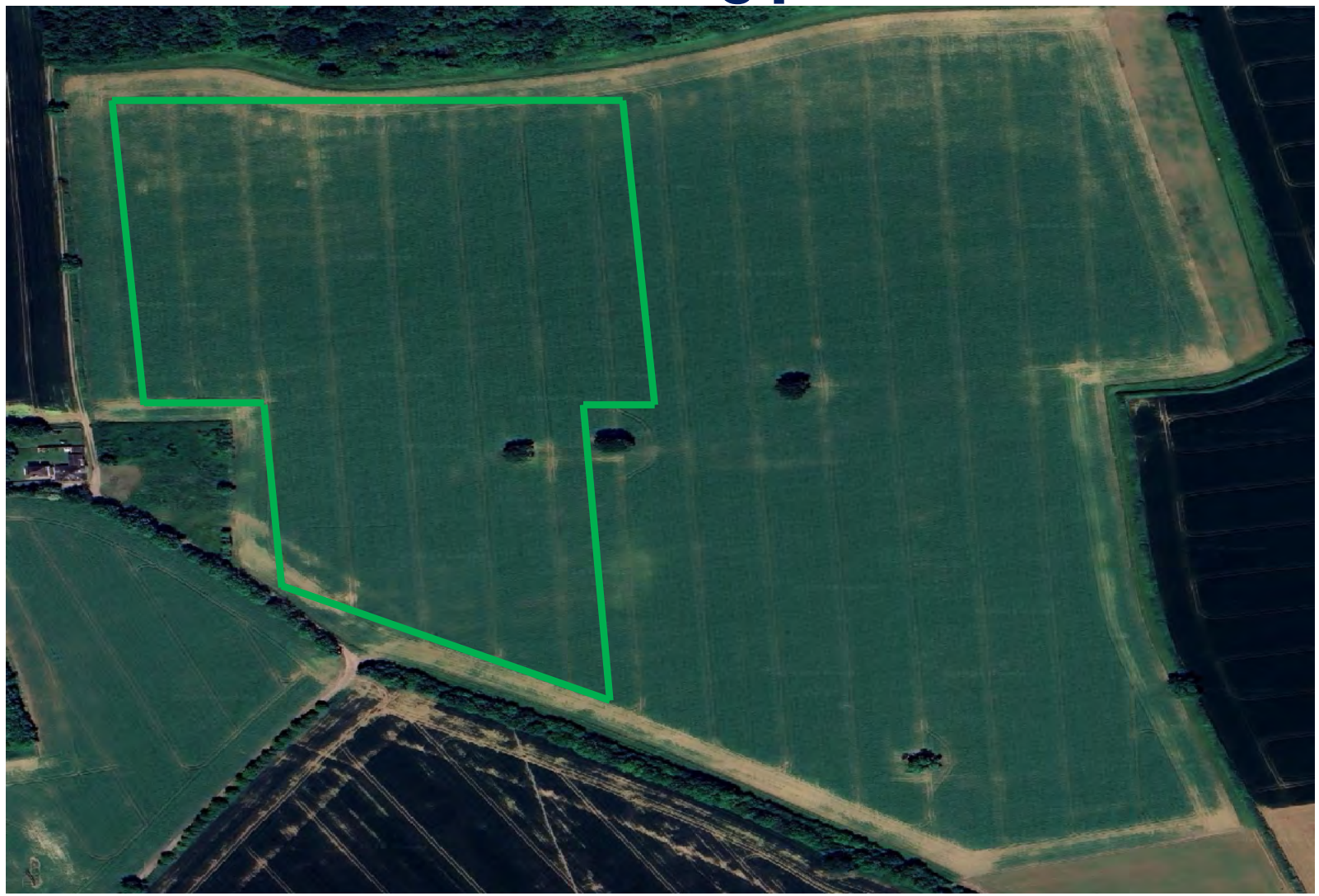
- Same trend seen from 2023 season
- VIXERAN improved yield by >0.5t/ha
- TSW was also improved

Trial No.: F24-001-001
Crop: S. Beans
Foliar app date: **25th April '24** (BBCH 51)

Protocol no.: F24-001-001
Variety: Lynx

Location: Stubton, Lincs
Drilling Date: 25th November '23

Benefit in combining peas

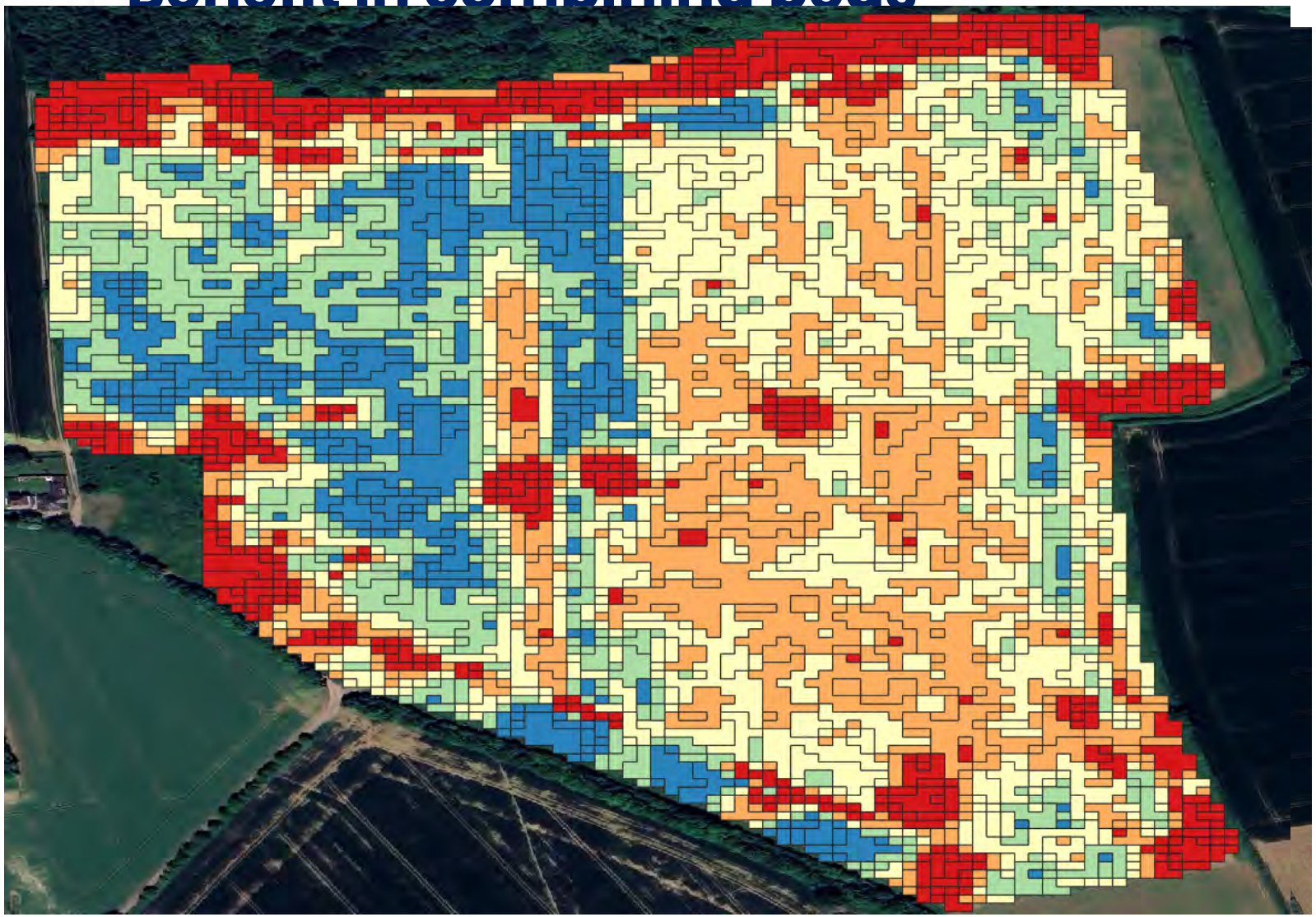


Trial No.: AC Grower Split Field
Crop: Combining peas
Foliar app date: **May '24**(BBCH 16)

Protocol no.: AGC101
Variety: TBD

Location: Brodsworth, South Yorkshire
Drilling Date: April '24

Benefit in combining peas

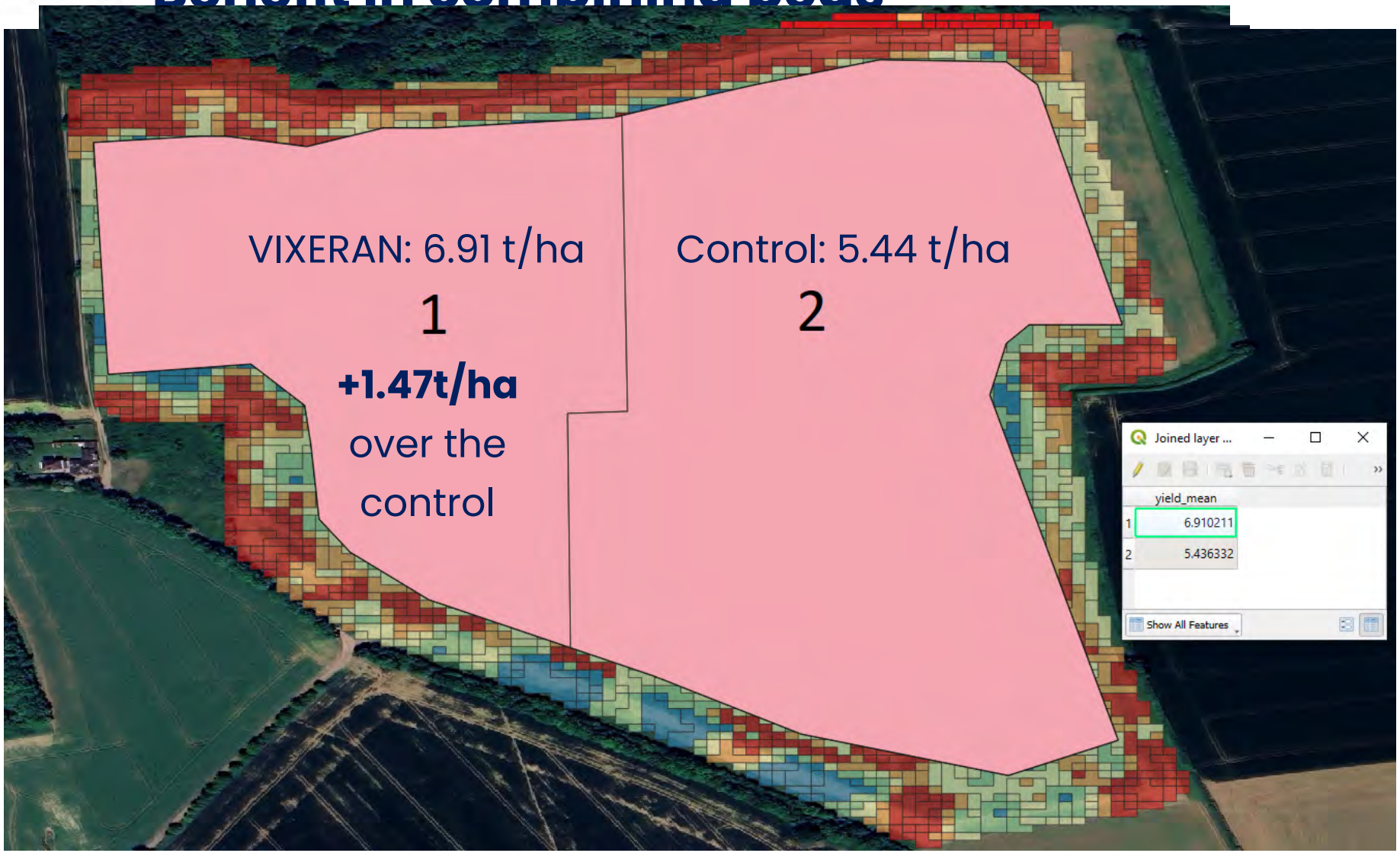


Trial No.: AC Grower Split Field
Crop: Combining peas
Foliar app date: **May '24**(BBCH 16)

Protocol no.: AGC101
Variety: TBD

Location: Brodsworth, South Yorkshire
Drilling Date: April '24

Benefit in combining peas



Trial No.: AC Grower Split Field
Crop: Combining peas
Foliar app date: **May '24**(BBCH 16)

Protocol no.: AGC101
Variety: TBD

Location: Brodsworth, South Yorkshire
Drilling Date: April '24

Elatus™ Era

Use in field beans and combining peas

syngenta®

Excellent against Chocolate spot

Untreated

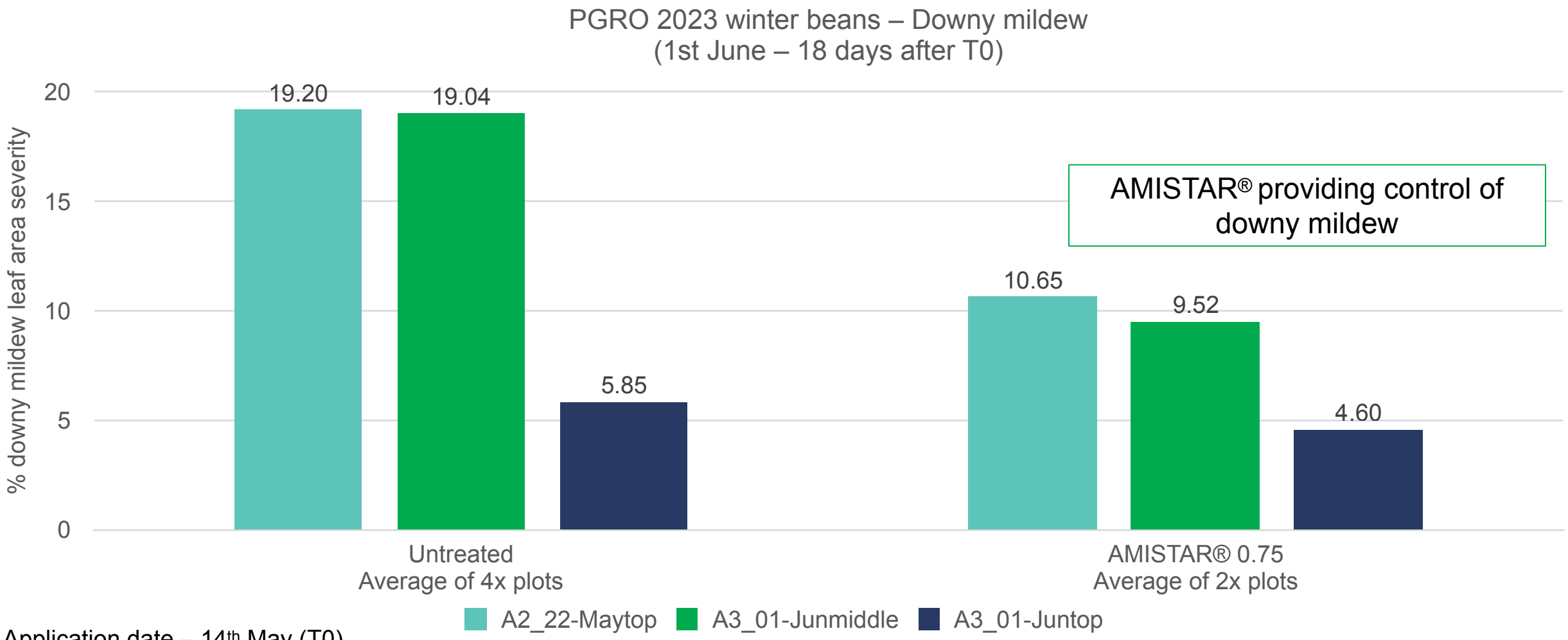
ELATUS® Era 0.66 at T1 fb AMISTAR® 0.75 at T2

Excellent against Bean rust

Untreated

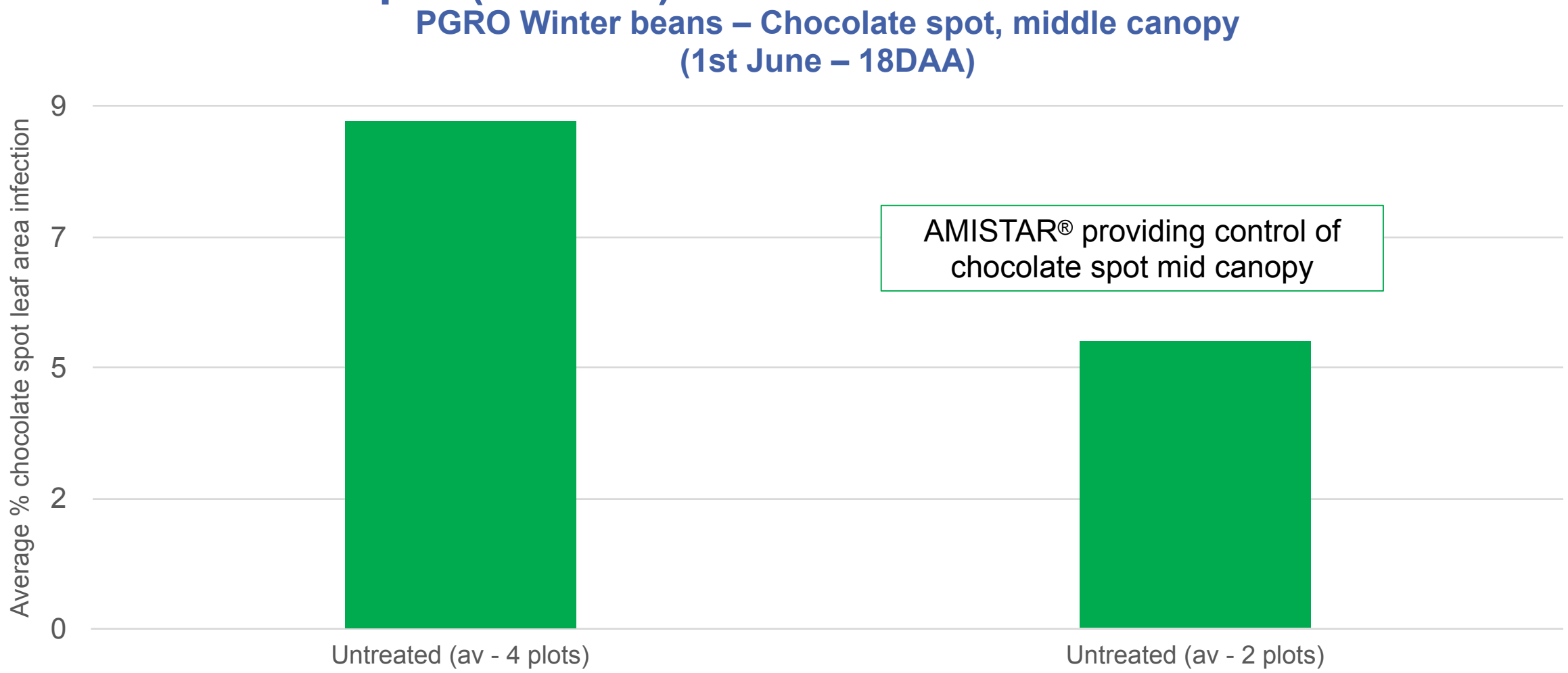
ELATUS® Era 0.66 at T1 fb AMISTAR® 0.75 at T2

AMISTAR® at the early T0 timing gave good control of downy mildew



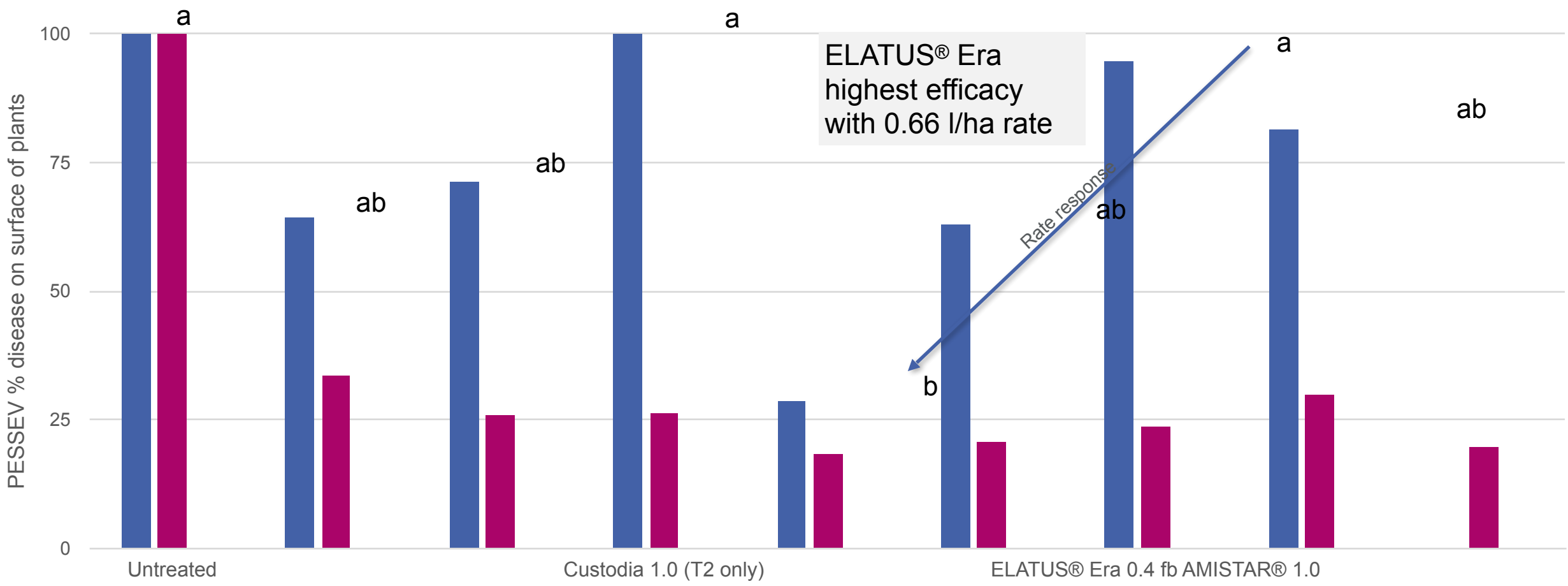
Application date – 14th May (T0)

2023 field results - AMISTAR® at the early T0 timing gave good control against Chocolate spot (18 DAA)



Application date – 14th May (T0)

ELATUS® Era fb AMISTAR® gave excellent control of chocolate spot when assessed in the middle canopy at the Rougham trial site



Source Syngenta: GBBUTF1752021

ELATUS Era and AMISTAR timing recommendations

T0

AMISTAR® 0.75 l/ha
GS51
Start of flowering

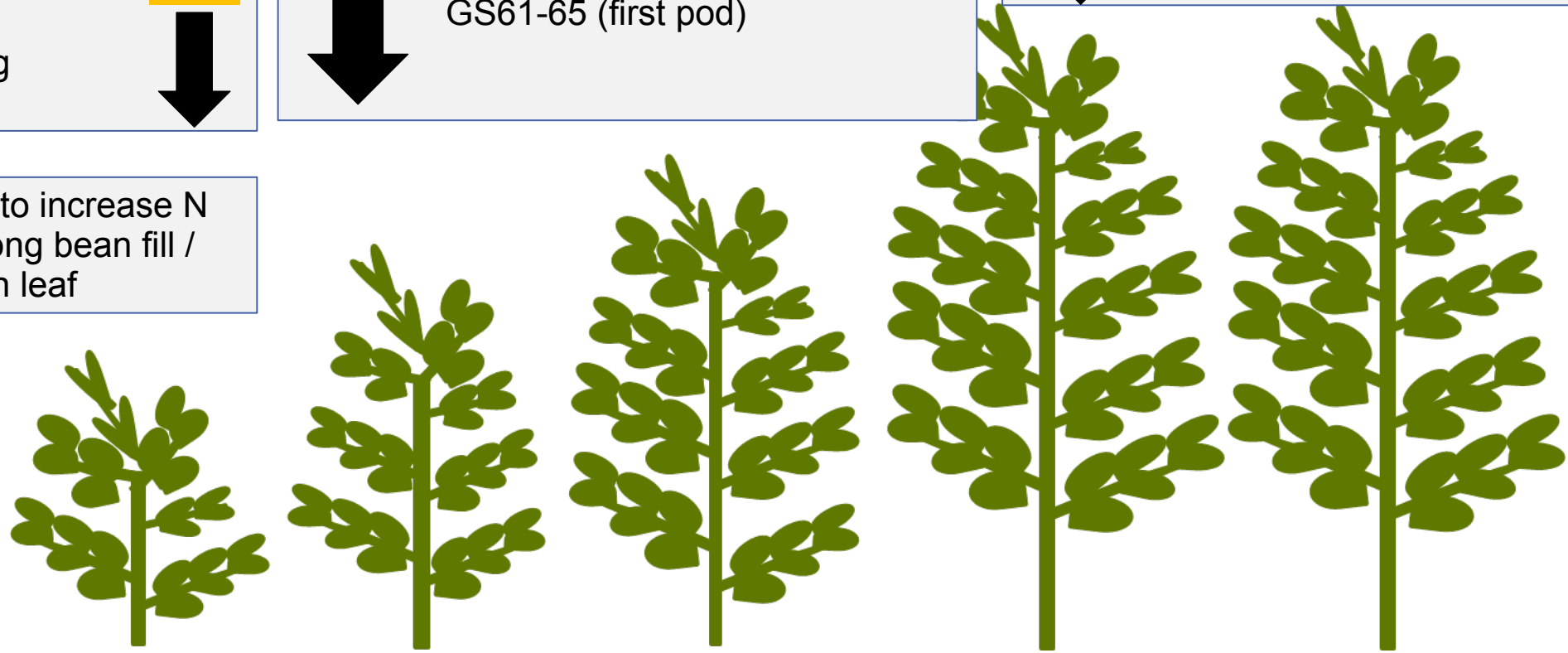
T1

ELATUS® Era 0.66 l/ha
GS61-65 (first pod)

T2

AMISTAR® 0.75 l/ha
GS69-70
End flowering
(21-28 days post T1)

Add VIXERAN® to increase N supply and prolong bean fill / help retain green leaf



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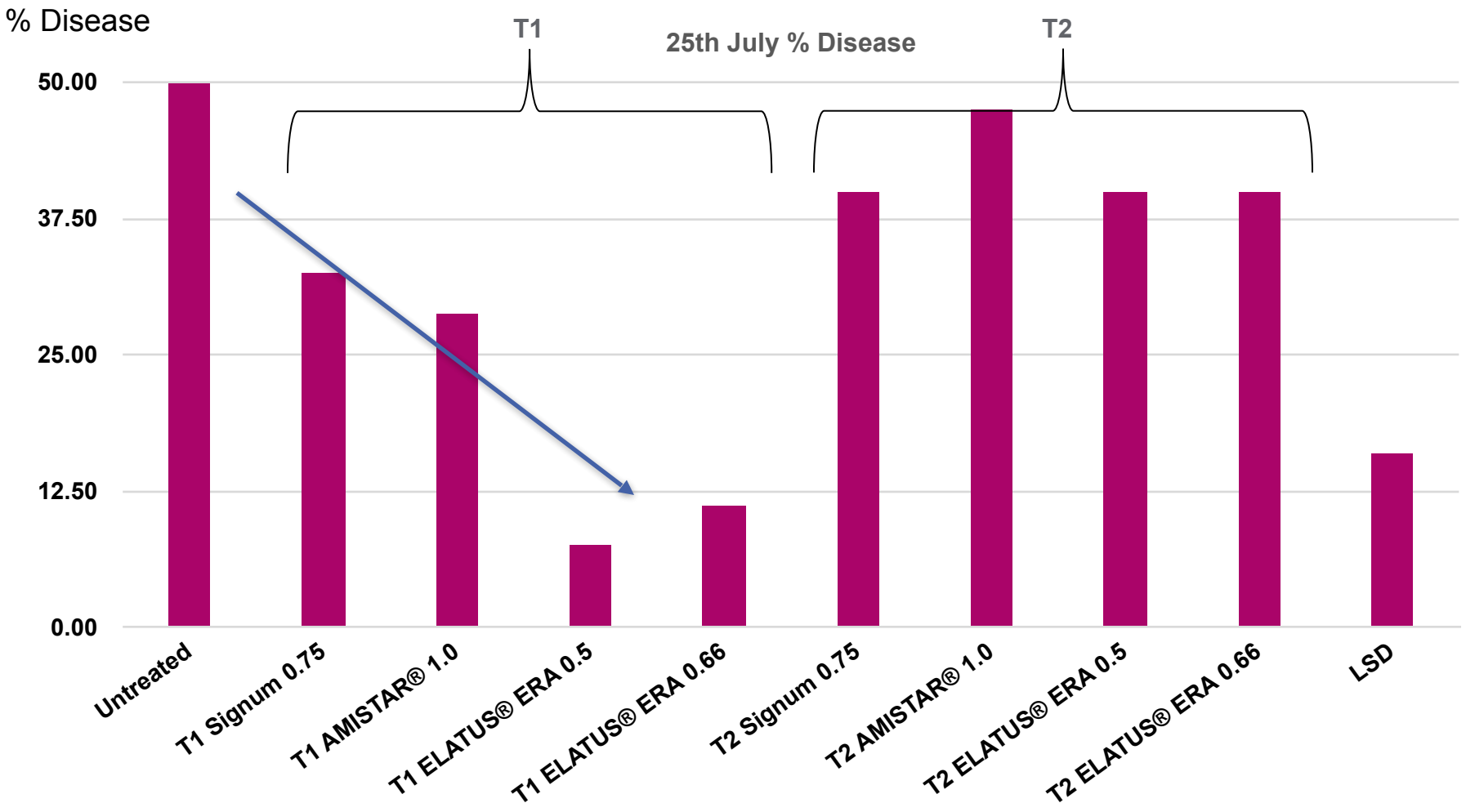
ELATUS® Era in combining peas – Powdery mildew trial Doncaster 2022



Application of ELATUS Era at T1 giving excellent disease control

T1 15/6/2022 Early Flower LSD 15.9 %

T2 4/7/2022 Full Flower

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Summary

- Bacterial atmospheric nitrogen fixing technology shows good potential to improve crop certainty
  - Nuello®iN is a seed treatment
  - VIXERAN® is a foliar applied solution
  - Trials are ongoing with other bio-products
- AMISTAR® for early downy mildew control
- ELATUS®Era
- Outstanding product for control of bean rust and chocolate spot
- Ideal to partner with AMISTAR® in a two-spray programme in field beans
- ELATUS®Era a good option for powdery mildew in combining peas

syngenta

Crop Protection Findings

Erin Matlock

Outline

- Disease control strategies
- Weed control strategies
- Virus prevalence
- Aphid control measures

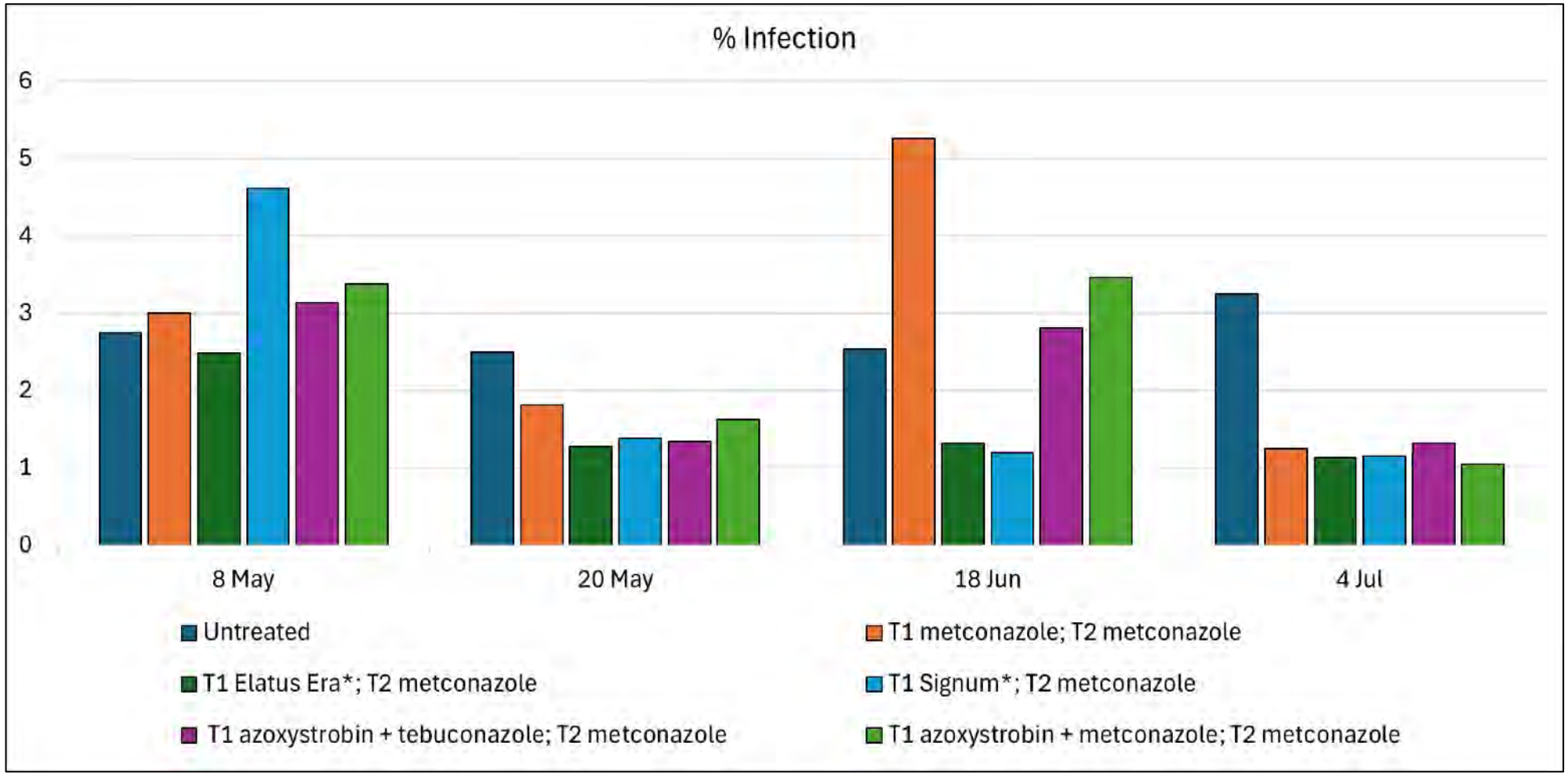
Chocolate Spot

- Encouraged by long periods of overcast and humid conditions
- Winter beans are more susceptible, especially under high plant populations
- Infection starts on the leaf but can spread to stems and pods
- Preventative sprays are essential when conditions are suitable for disease

Bean Rust

- Disease develops quickly favoured by hot days and cool humid nights
- Yield reductions can be huge if the disease develops during late flowering and into pod set
- Infections after pod development have little effect on yield
- Can impact both spring and winter beans

Chocolate Spot –2024 Winter Bean trial

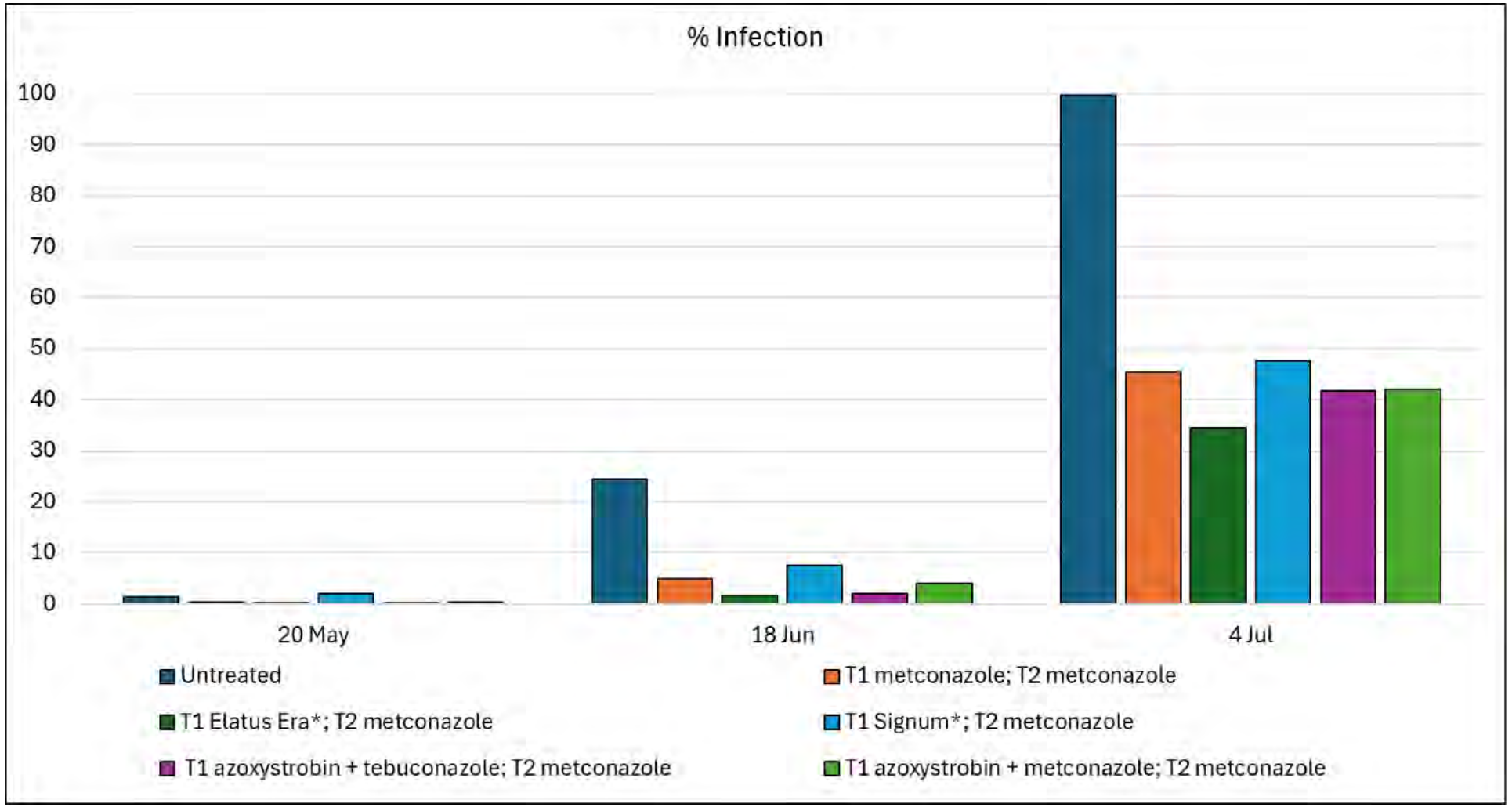


- T1 sprayed 8 May (BBCH 61)
- T2 Sprayed 6 June (BBCH 69)

*Multiple products of same formulation exist

Adjuvants were added when required according to label

Bean Rust–2024 Winter Bean trial

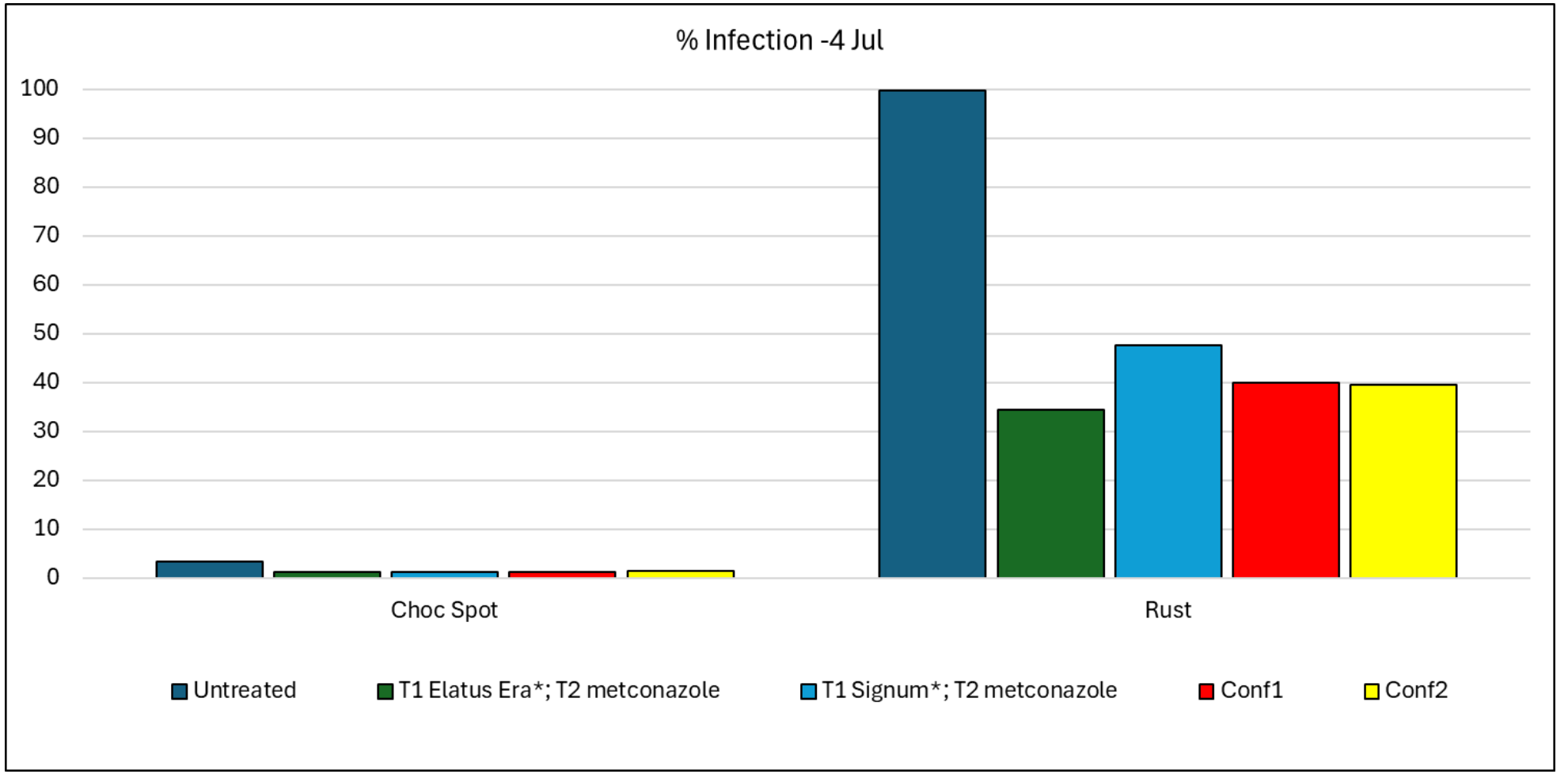


- T1 sprayed 8 May (BBCH 61)
- T2 Sprayed 6 June (BBCH 69)

*Multiple products of same formulation exist

Adjuvants were added when required according to label

Confidential trial products - Winter Bean

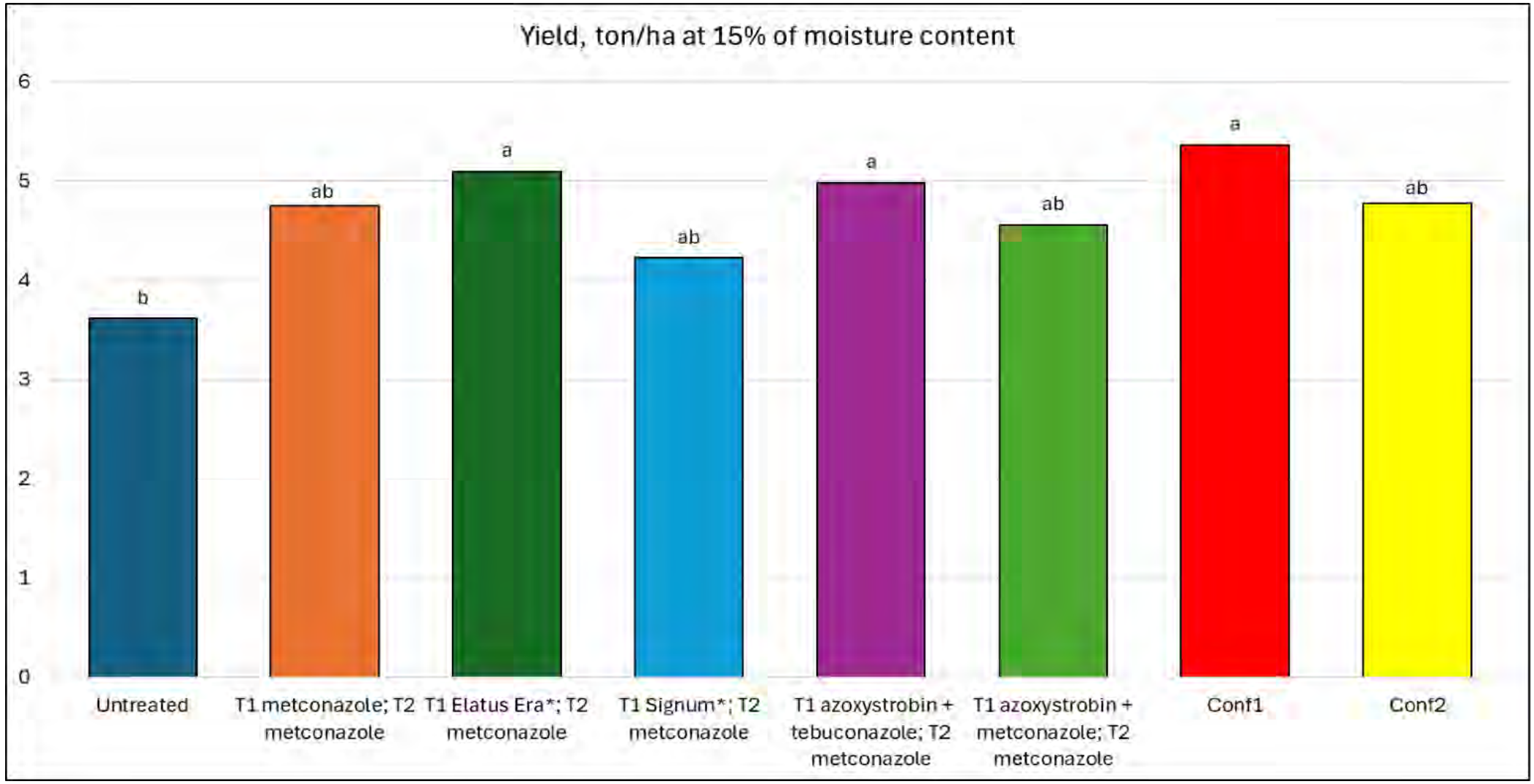


- T1 sprayed 8 May (BBCH 61)
- T2 Sprayed 6 June (BBCH 69)

*Multiple products of same formulation exist

Adjuvants were added when required according to label

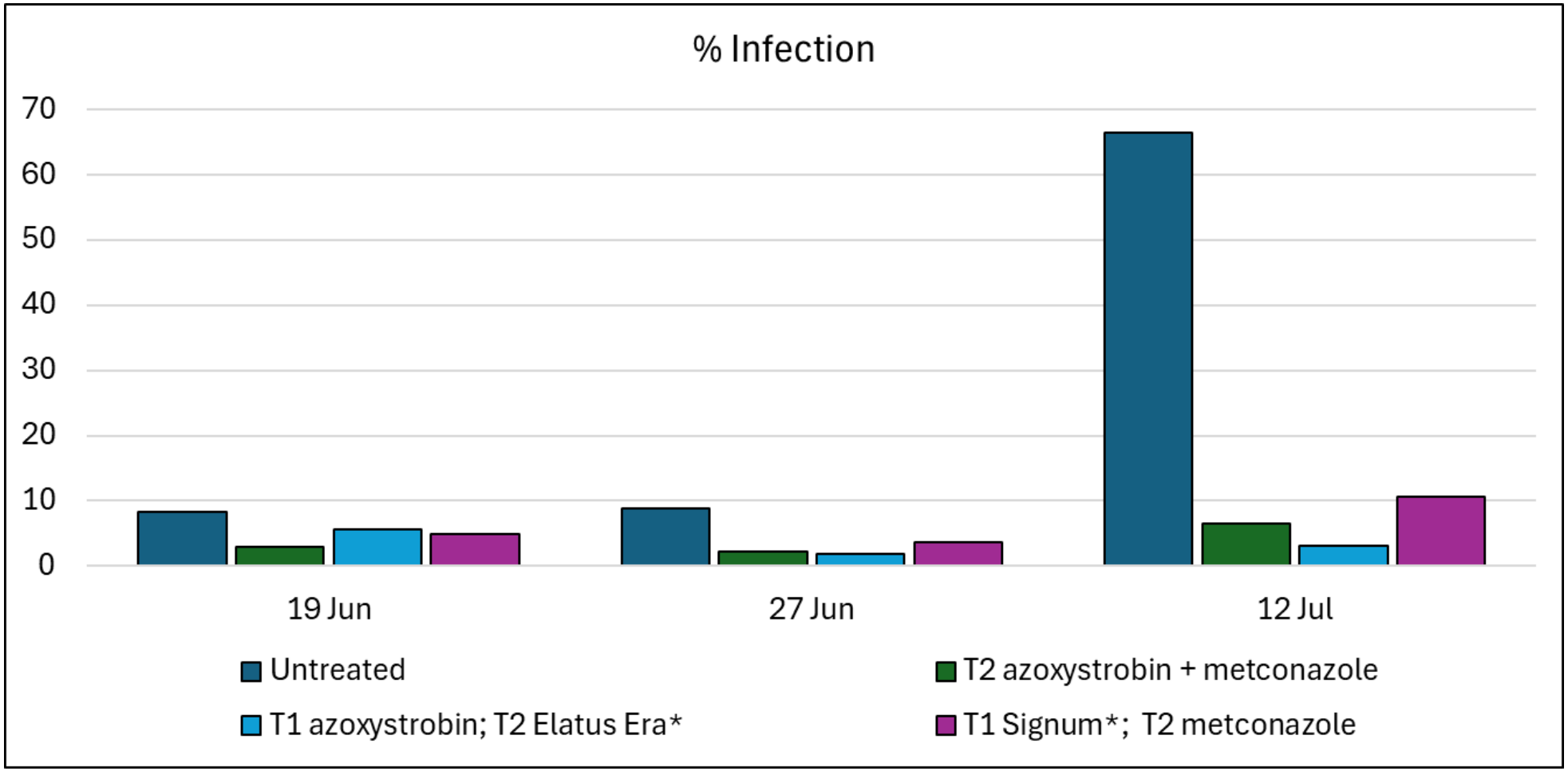
2024 Winter Bean trial -Yield



*Multiple products of same formulation exist

Adjuvants were added when required according to label

Bean Rust–2024 Spring Bean trial



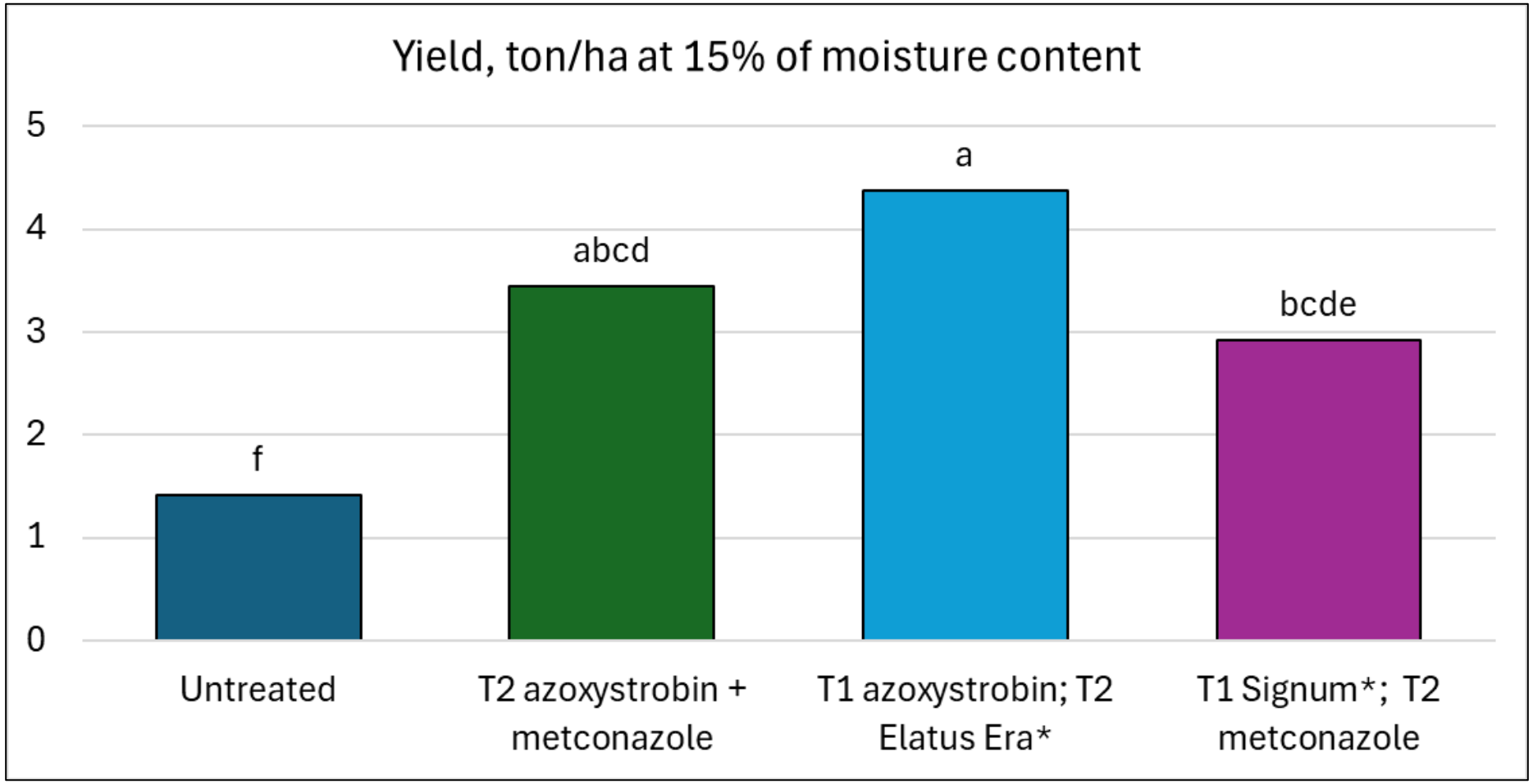
T1 sprayed 12 Jun (BBCH 60)

T2 Sprayed 1 Jul (BBCH 69)

*Multiple products of same formulation exist

Adjuvants were added when required according to label

2024 Spring Bean trial -Yield

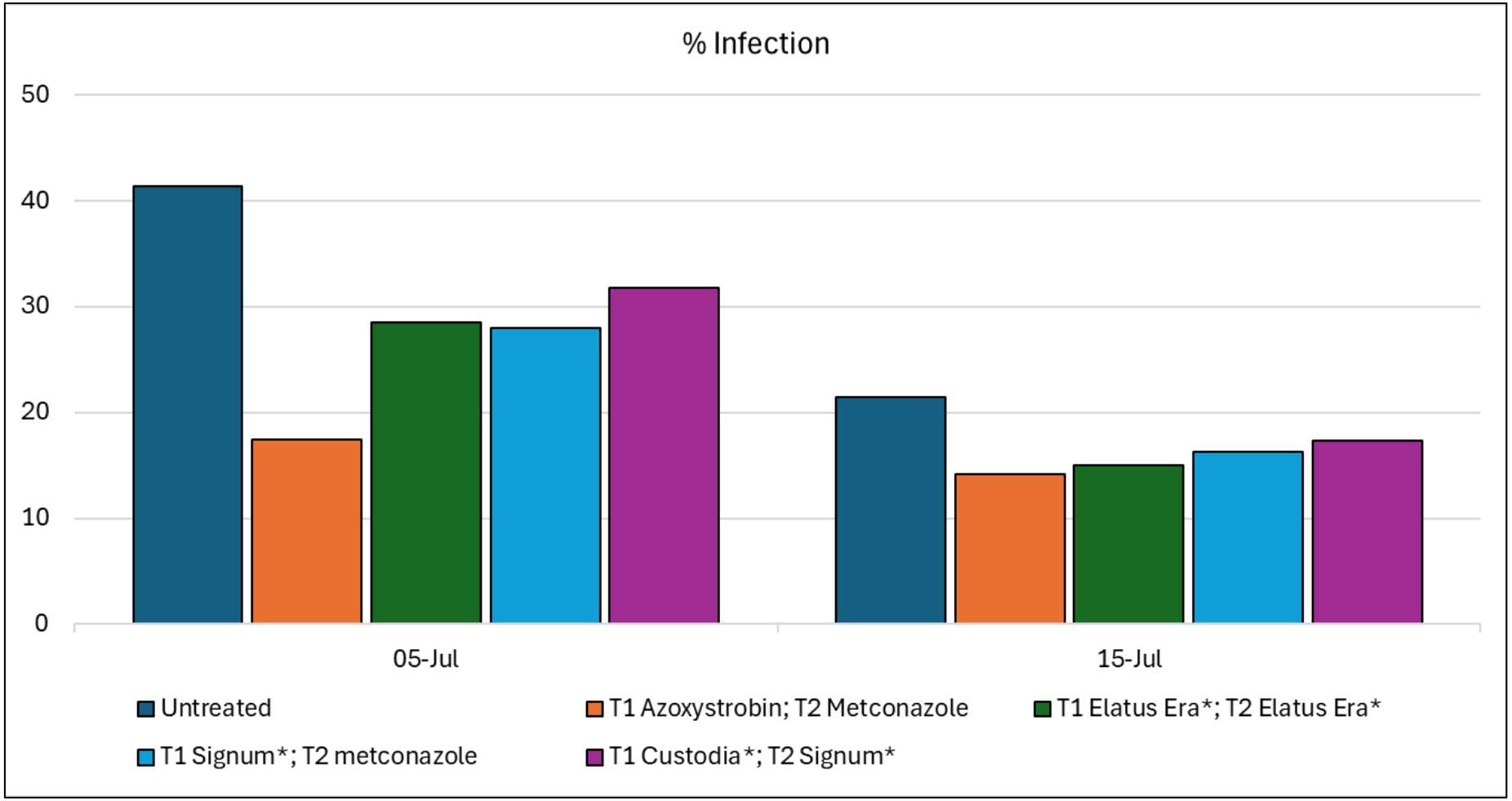


*Multiple products of same formulation exist

Adjuvants were added when required according to label

Downy Mildew–2022 Bean trial

- With the loss of SL 567A (metalaxyl-m), there are still viable options



- T1 sprayed 16 Jun (BBCH 70)
- T2 sprayed 3 weeks after T1; 7 Jul (BBCH 75)

*Multiple products of same formulation exist

Adjuvants were added when required according to label

General bean disease control

- Resistance ratings are on the DL
- Monitor for downy mildew early on
  - There are options beyond SL 567A
- Stay on top of Chocolate Spot
- 2nd fungicide application for Chocolate Spot (if needed) should also be targeted for rust

WINTER BEANS - PGRO Descriptive List 2025

The control for yield is the mean of 4 & 5 year varieties (4.09t/ha). Yield differences of less than 9.2% are not statistically different.

		Agronomic characters				Resistance to			Seed characters			
UK Agent see appendix	Yield as % of control	Flower colour	Earliness of maturity (1-9)	Straw length (cm)	Standing ability at harvest (1-9)	Downy mildew (1-9)	Rust* (1-9)	Chocolate spot (1-9)	Thousand seed weight (g) (@15%mc)	Protein content (% dry)	No. Years in matrix	Year first listed

SPRING BEANS - PGRO Descriptive List 2025

The control for yield is the mean of 4 and 5 year varieties (4.25 t/ha). Yield differences of less than 8.4% are not significantly different.

		Agronomic characters				Resistance to		Seed characters			
UK Agent see appendix	Yield as % of control	Flower colour	Earliness of maturity (1-9)	Straw length (cm)	Standing ability at harvest (1-9)	Downy mildew (1-9)	Rust* (1-9)	Thousand seed weight (g) (@15%mc)	Protein content (% dry)	No. Years in matrix	Year first listed

Fungicide options for beans

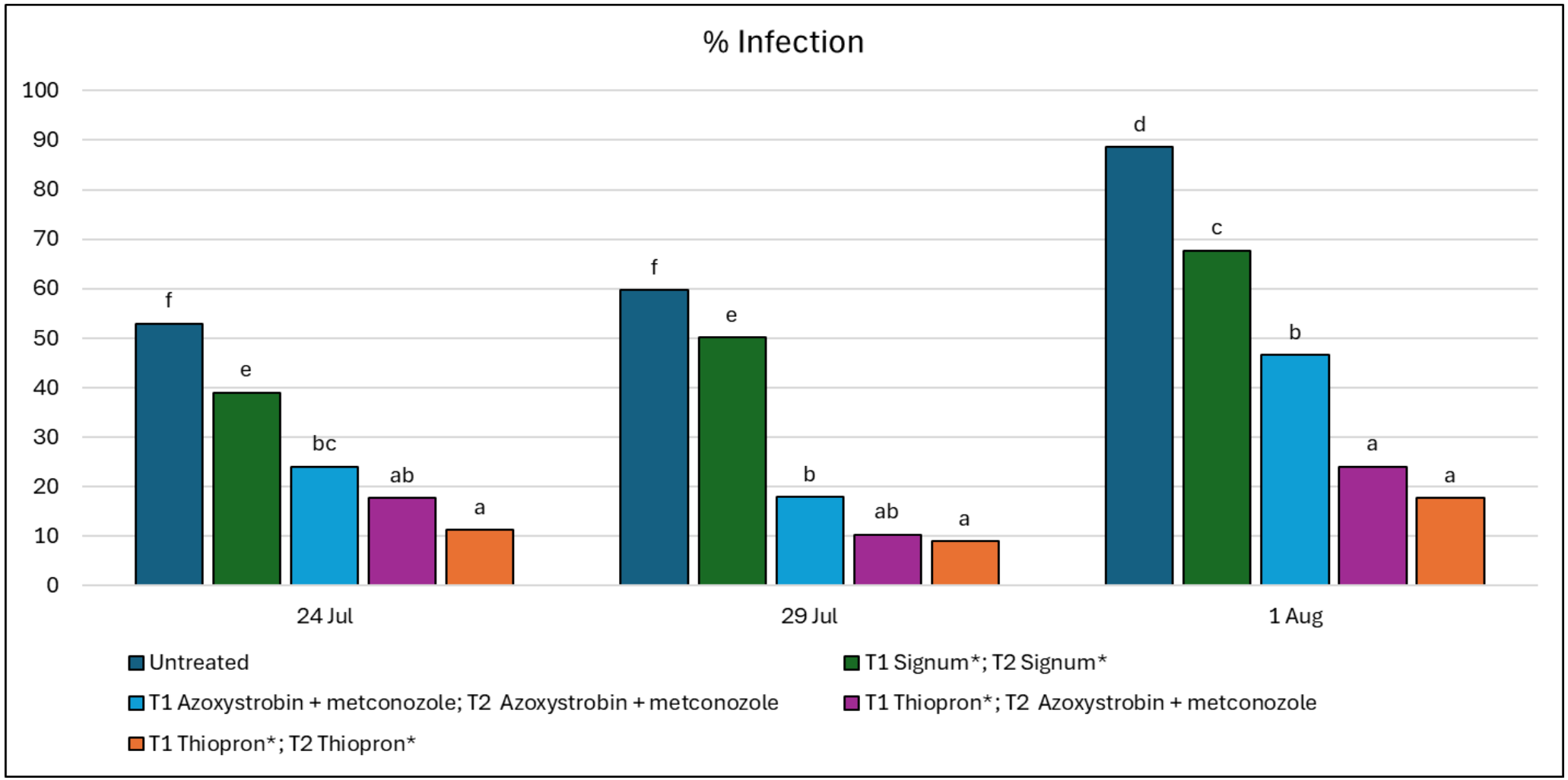
Fungicides						
Active ingredient	**Approved product**	**Harvest interval (days)**	**Restrictions of use**	***Ascochyta***	**Bean rust**	**Chocolate spot**
azoxystrobin	Various	35	Apply from BBCH 60-69	●	●	●
azoxystrobin + tebuconazole	Custodia, Seraphin	Latest application BBCH 75	Apply during April to July, from BBCH 50, early flowering. Latest time of application up to 50% of fruits having reached final size or fruit has reached 50% of final size (BBCH 75)	•	•	•
boscalid + pyraclostrobin	Darwin, Pyrabos, Signum	21			●	●
benzovindiflupyr + prothioconazole	Elatus Era, Levee, Lizard, Tacanza Era, Velogy Era	Latest application BBCH 72	Apply from GS 51 up to and including 20% of pods have reached typical length (BBCH 72)		●	●
cyprodinil + fludioxonil	Botrefin, Clayton Gear, Modif, Shift.	28				●
metconazole	Various	14			●	●
tebuconazole	Various	35	For some products do not apply before BBCH 40 (first flower buds)		●	●

1. Check product label for manufacturers recommendations.
2. Many of these products are not eligible for buffer zone reduction under the Local Environmental Risk Assessment for Pesticides (LERAP) scheme.

Powdery Mildew – Combining Peas

- Occasionally may impact late maturing crops
- Plants become covered with a grey white film
- Can delay maturity
- Varietal resistance is available

Powdery Mildew –2024 Combining peas



- T1 sprayed 17 Jul (BBCH 77)
- T2 sprayed 29 Jul (BBCH 85)

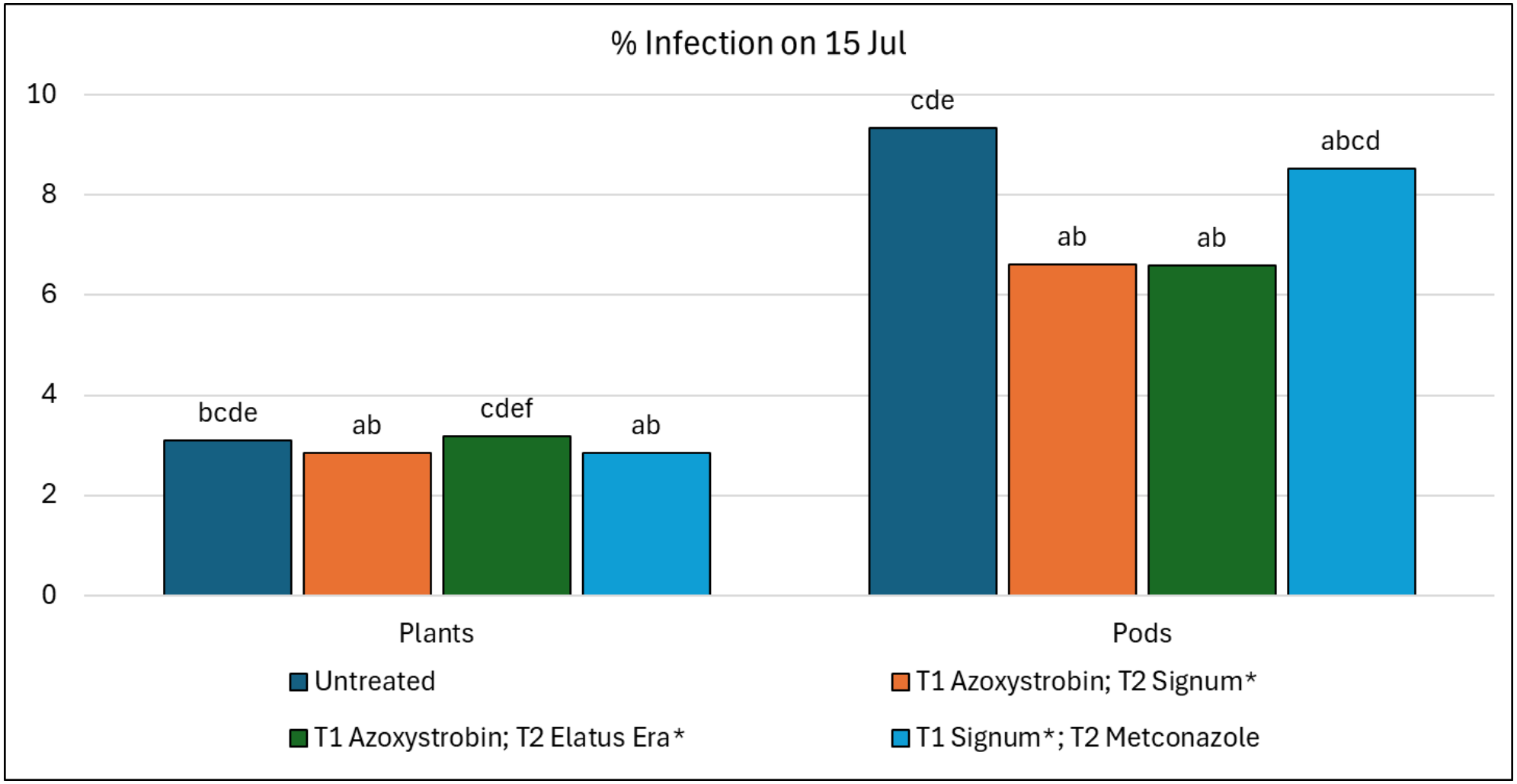
*Multiple products of same formulation exist

Adjuvants were added when required according to label

Downy Mildew – Combining peas

- Primary infection is caused by soil resting spores in young pea plants
- Secondary infection is caused by air borne spores produced from initial infection; especially under cool humid conditions
- Grey mycelial growth on leaf underside
- Pods develop yellow blotchy patches; seeds fail to properly develop
- Main defence mechanism is varietal resistance

Downy Mildew –2024 Combining peas



- T1 sprayed 17 Jun (BBCH 61)
- T2 sprayed 1 Jul (BBCH 67)

*Multiple products of same formulation exist

Adjuvants were added when required according to label

General combining pea disease control

- Use varietal resistance for downy mildew
- Seed should be tested for leaf and pod spot (*Didymella pinodes*, *Didymella pinodella* and *Ascochyta pisi*)
- Botrytis is favoured under wet conditions, especially at flowering
  - One or two applications of fungicides at pod set and at the flat pod stage may be required
- Powdery mildew may occur in late maturing crops
  - Control options as well as varietal resistance

COMBINING PEAS - PGRO Descriptive List 2025

The control for yield is the mean of 4 and 5 year varieties (3.56 t/ha). Yield differences of less than 12.8% are not statistically different.

		Agronomic characters			Resistance to			Seed characters			
UK Agent see appendix	Yield as % of control	Earliness of maturity (1-9)	Straw length (cm)	Standing ability at harvest (1-9)	Pea wilt (Race1)	Downy mildew (1-9)	Powdery mildew *	Thousand seed weight (g) (@15%mc)	Protein content (% dry)	No. Years in matrix	Year first listed

Fungicide options for combining peas

Fungicides									
Active ingredient(s)	**Approved product(s)**	**Harvest interval (days)**	**Restrictions of use**	***Botrytis***	**Damping-off**	**Downy mildew**	**Leaf and pod spot**	**Powdery mildew**	***Sclerotinia***
azoxystrobin	Various	35-36		●			●		●
benzovindiflupyr + prothioconazole	Elatus Era, Levee, Lizard, Pro-Benzo, Tacanza Era, Velogy Era	NS	Apply from BBCH 51 up to and including 20% of pods have reached typical length (BBCH 72).	●			●	●	
boscalid + pyraclostrobin	Darwin, Pyrabos, Signum	21		●			●		
cyprodinil + fludioxonil	Various	28		●			●		●
fludioxonil	Prepper	ST					●		
metconazole	Various	14		●			●	●	
sulphur	Microthiol Special (EAMU 2674/23) Thiopron (EAMU 1305/21) Vertipin (EAMU 2443/23)	NS 1 for Vertipin	Apply between May and September when pods have reached typical size, peas fully formed (BBCH 79)					●	

● = Target NS= Not Stated ST = seed treatment

1. Check product label for manufacturers recommendations.
2. Many of these products are not eligible for buffer zone reduction under the Local Environmental Risk Assessment for Pesticides (LERAP) scheme.

Weed Management

- Peas and beans are poor competitors in early growth stages
- Do as much weed control as possible in previous crops
- Start with a stale seed bed
- Most herbicides available are pre-emergent

Pre-em herbicide options

Active	Example of Product	Winter Beans	Spring Beans	Combining Peas	Vining Peas
Aclonifen	Emerger	✓	✓	✓	
Clomazone	Centium 360 CS	✓	✓	✓	✓
Imaxamox + Pendimethalin	Nirvana	✓	✓	✓	✓
Pendimethalin + Clomozone	Stallion Sync TEC	✓	✓	✓	✓
Propyzamide	Kerb Flo	✓			
Pendimethalin	Stomp Aqua			✓	✓
Prosulfocarb	Defy				✓

Always read the label before use

Post-em herbicide options

Active	Example of Product	Winter Beans	Spring Beans	Combining Peas	Vining Peas
Bentazone	Basagran SG	✓	✓	✓	✓
Cycloxydim	Laser	✓	✓	✓	✓
Fluazifop-p-butyl	Fusilade Max	✓	✓	✓	✓
Propaquizafop	Falcon	✓	✓	✓	
Quizalofop-p-ethyl	Pilot Ultra	✓	✓	✓	✓
Quizalofop-p-tefuryl	Panarex	✓	✓	✓	
MCPB	Tropotox			✓	✓
Clethodim	Centurion Max				✓

Always read the label before use

Weed control

Active	Example of Product	Black-grass	Fathen	Black Bindweed	Black nightshade	Cleaver
Aclonifen	Emerger	MS	S	MR		MR
Clomazone	Centium 360 CS	R	MS	MS	MS	S
Imaxamox + Pendimethalin	Nirvana	MR	S	S	MS	MS
Pendimethalin + Clomozone	Stallion Sync TEC		S	R	S	MS
Propyzamide	Kerb Flo	S	S	S	S	MR
Pendimethalin	Stomp Aqua	MS	S	MS	MS	
Bentazone	Basagran SG	R	MR	MS	S	MS
Cycloxydim	Laser	MR				
Fluazifop-p-butyl	Fusilade Max	S				
Propaquizafop	Falcon	S				
Quizalofop-p-ethyl	Pilot Ultra	S				
MCPB	Tropotox	R	S	S	R	R

Always read the label before use

Pea & Bean Viruses

Virus	Vector/ mode of transmission	Reported host plants (for virus)
Bean leaf roll virus (BLRV)	pea aphid and peach-potato aphid	faba beans, peas, lucerne, red clover, sainfoin, and white clover
Bean yellow mosaic virus (BYMV)	pea aphid, peach potato aphid and black bean aphid (sometimes seed-borne)	chickpeas, faba beans, peas, lentils, lupins, lathyrus, lucerne, vetch, medic and clover
Broad bean true mosaic virus (BBTMV)	pea and bean weevil, clover seed weevil, seed-borne	faba beans
Pea enation mosaic virus (PEMV)	pea aphid, potato aphid, peach potato aphid	peas, lucerne, faba beans and vetches
Pea early browning virus (PEBV)	stubby root nematodes, seed-borne	peas, lupins, black medic, lucerne, Phaseolus beans and faba beans
Pea seed-borne mosaic virus (PSbMV)	seed-borne, pea aphid, peach potato aphid, black bean aphid	peas, chickpeas, lentils, shepherds purse and faba beans
Turnip yellows virus (TuYV)	pea aphid, peach potato aphid	brassicas, radish, peas, clover, chickpea, lupin, vetch, faba bean, multiple weed species

Bean Leaf Roll Virus (BLRV)

- Aphid transmitted virus
- Infection is more obvious when aphid infestation is before flowering
- Early infection causes stunting
- Later infections cause leaf thickening and leaves are rolled upwards
  - Also, significant reduction in pod set
- Can lead to potential yield losses of 50-90%

Bean Yellow Mosaic Virus (BYMV)

- Can develop in beans any time prior to flowering; peas are also a host
- Leaves are crinkled and vein clearing can develop
- Does not cause translucent spotting like PEMV
- Pea aphid is principal vector, but can also be transmitted via black bean aphid

Pea Enation Mosaic Virus (PEMV)

- One of the most prevalent viruses in UK peas; field beans are also a host
- Leaves develop a mosaic, mottled symptom at the top of the plant and vein clearing can occur. Veins may be ridged
- Newer leaves may be smaller and distorted and older leaves may develop scaly structures (enations)
- Pods and peas are malformed

Pea Seed-borne Mosaic Virus (PSbMV)

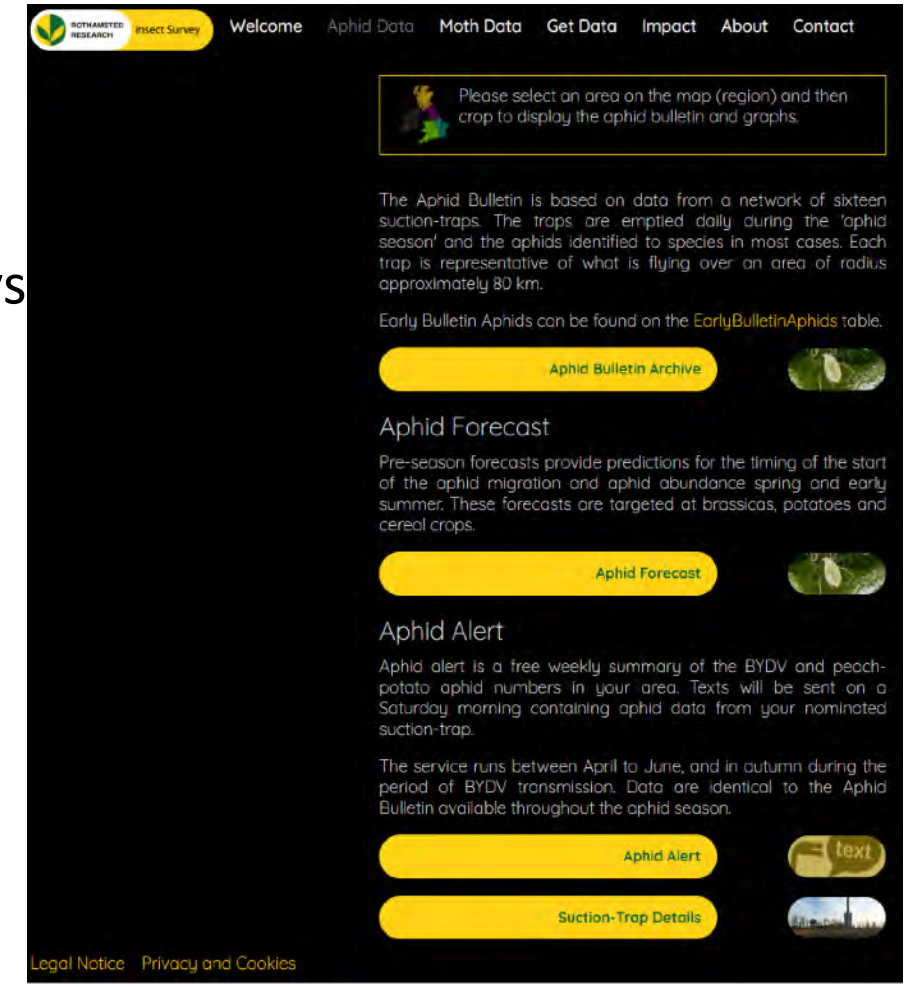
- Established using infected seed and transmitted via winged aphids in early spring
- Leaves are rolled & pale; pods are small with few seeds
- Seeds may be undersized and display blistering or blemishing (this may resemble tennis ball markings)
- Peas and field beans are host plants
- Seed testing is the principal means to prevent infection

Turnip Yellows Virus (TuYV)

- Persistent virus that is transmitted by aphids
- Was most prevalent virus found in pea crop survey conducted between 2019 & 2022 (AHDB (FV 459) funded project)
- Despite lack of symptoms found in UK peas, yield loss of 40% has been reported
- Not known to be found in UK field beans, but extensive survey has not been completed

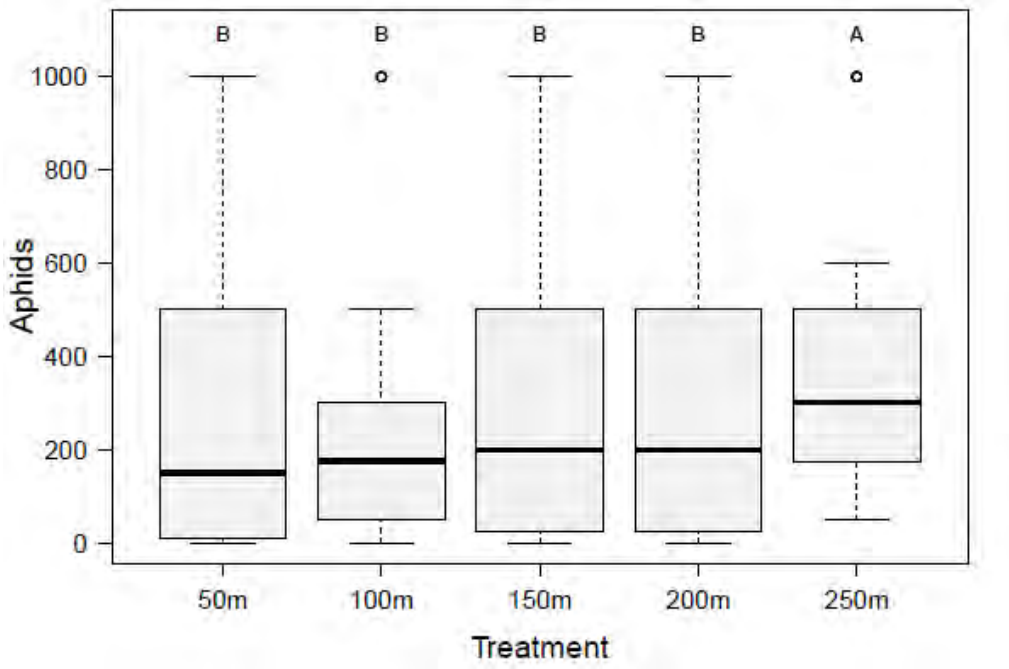
Aphid Monitoring

- Rothamsted Insect Survey provides seasonal updates
  - Generally, when aphid flights are first recorded in suction cups, they will be present in the crops a few days later
  - https://insectsurvey.com/aphid-bulletin
- In-field inspections can identify presences of aphids in low numbers
  - Be sure to also look at leaf undersides
  - Early infection causes more crop damage



Aphids –Cultural Control Methods

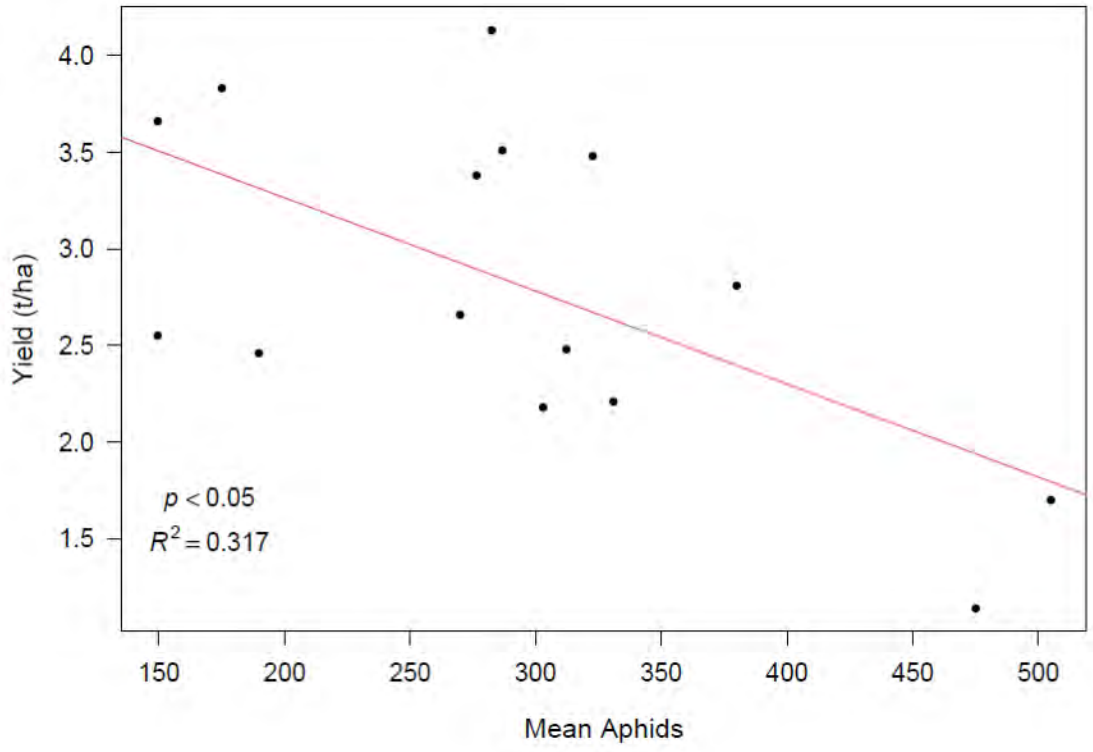
- Wildflower Margins
  - Promotes habitats for natural enemies
  - Enhancement of early season activity of parasitoids and carabid beetles



Aphid numbers increased slightly with distance away from the mixed trap crop area in 2023

Aphids –Cultural Control Methods

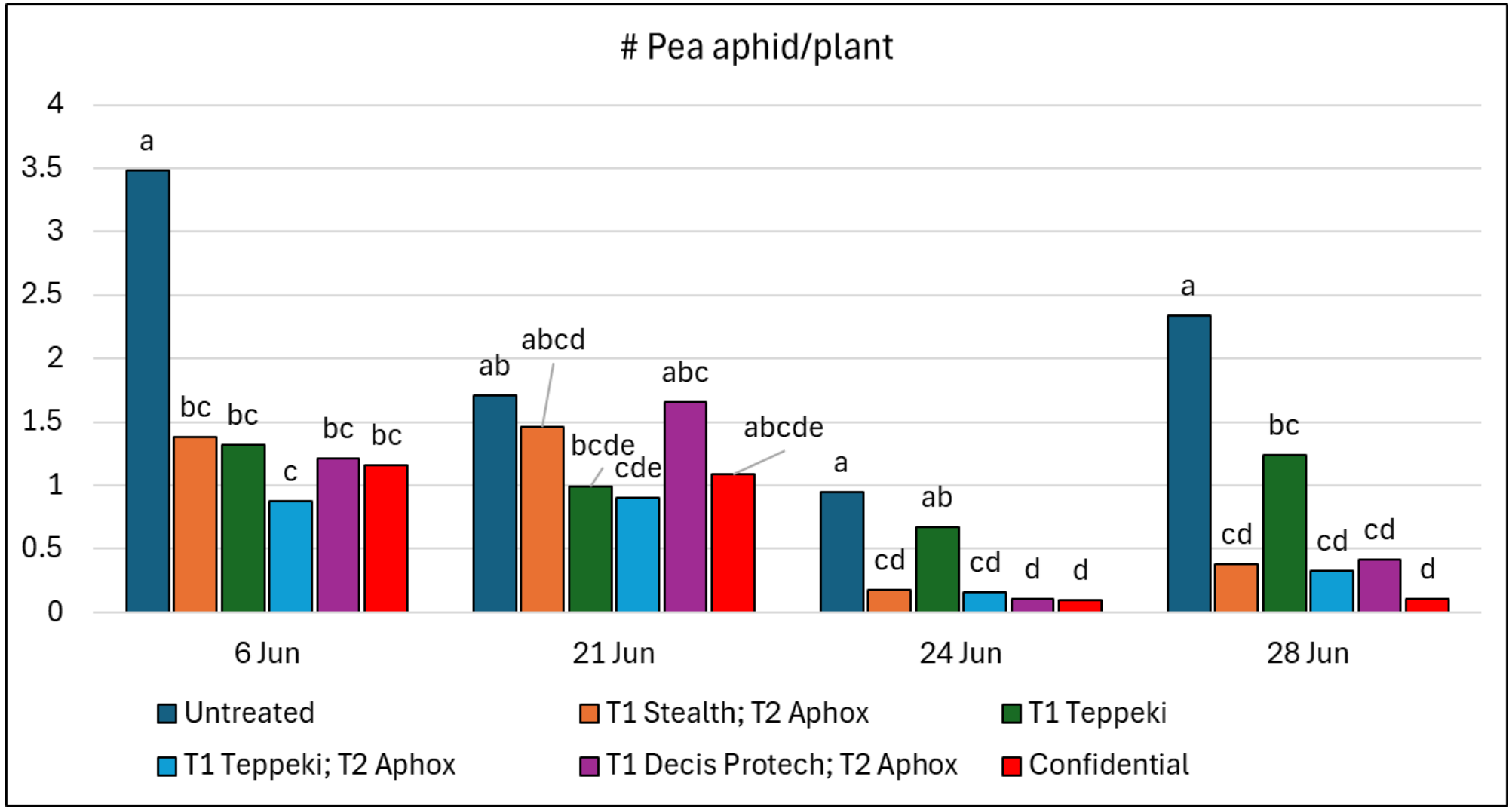
- Wildflower Margins
  - In previous work, pea yields increased, and aphid pressure was reduced, close to perennial flowering margins.
  - Perennial field margins with combined agronomical and ecological benefits for vegetable rotation schemes | AHDB



Thresholds for Aphid Chemical Control

- Economic thresholds vary depending on crop value and chemical costs
- Black bean aphids
  - Where general infestation of 10% of the plants are colonised, spraying should be carried out
  - Applications made at early flowering reduce aphid-transmitted virus infection
- Pea aphid
  - For virus management, control measures are warranted at first site of aphids, especially under humid conditions
  - If wanting to prevent feeding, threshold is 20% for combining peas and 15% for vining peas

2024 Combining pea trial



- T1 sprayed 3 Jun (BBCH 16-18)
- T2 sprayed 21 Jun (BBCH 61)

Combining pea insecticide options

Insecticides										
Active ingredient(s)	Approved product(s)	Harvest interval (days)	Restrictions of use	Caterpillars	Pea aphid	Pea midge	Pea moth	Pea and bean weevil	Slugs and snails	Thrips
acetamiprid	Insyst	28	50% of pods at final size (GS 75 BBCH) and before harvest interval. The earliest time of application is restricted to enclosed bud stage.		●					
alpha-cypermethrin	Fasthrin 10EC, Hi-Aubin	7	Risk to bees. Must not be used during flowering.	●	●		●	●		●
cypermethrin	Afrisect 500EC, Cyper 500, Cythrin 500 EC, Cythrin Max EC, Permasect 500 EC, Supasect 500 EC	14	Risk to bees. Must not be used during flowering.	●	●		●	●		●
deltamethrin	CMI Delta 2.5 EC, Decis Forte, Decis Protech, Deltason-D, Tecsis	7	Final use date 30th April 2024 for CMI Delta 2.5 (16695) and EC Deltason-D (17735)	●	●	●	●	●		●
esfenvalerate	Barclay Alphasect, Clayton Cajole, Clayton Slalom, Clayton Vindicate, Gocha, Kingpin, Sumi-Alpha, Sven	35						●		●
ferric phosphate	Various	1							●	
lambda-cyhalothrin	Various	25		●	●	●	●	●		●
pirimicarb	Aphox, Clayton Pirimicarb, Jaspin, Pomona	14	Do not apply before BBCH51 – 1st flower buds visible. A single application only. Must be applied between 1st May and 31st August.		●					
Maltodextrin	Majestik, Eradicoat, Terminus	1	Risk to bees.		●					

● = Target

Field bean insecticide options

Insecticides							
Active ingredient	**Approved product**	**Harvest interval (days)**	**Restrictions of use**	**Aphid**	**Bruchid Beetle**	**Pea and Bean Weevil**	**Slugs and Snails**
alpha-cypermethrin	Fasthrin 10 EC, Hi-Aubin	7	Risk to bees. Not to be used during flowering.			●	
cypermethrin	Afrisect 500 EC, Cyper 500, Cythrin 500 EC, Cythrin Max EC, Permasect 500 EC, Supasect 500 EC	14	Risk to bees. Not to be used during flowering			●	
deltamethrin	CMI Delta 2.5 EC, Decis Forte, Decis Protech, Deltason-D, Tecsis	7		●	●	●	
esfenvalerate	Barclay Alphasect, Clayton Cajole, Clayton Slalom, Clayton Vindicate, Gocha, Kingpin, Sumi-Alpha, Sven	35				●	
ferric phosphate	Various	1					●
lambda-cyhalothrin	Various	25			●	●	
pirimicarb	Aphox, Clayton Pirimicarb, Jaspin, Pomona	14	Do not apply before BBCH51 – 1st flower buds visible. A single application only. Apply between 1 May and 31 August.	●			

● = Target

Cruiser SB treated sugar beet

- 32-month restriction for subsequent crops planted on same area of land as Cruiser SB treated seed was sown
- Was a restriction placed on the emergency authorisation

- **Any crop excluded from the below table should be considered 'restricted' i.e. a minimum of 32 months from drilling of Sugar Beet.**
- **The 32-month restriction applies to those agri-environment options that allow flowers to grow or appear on the same ground on which Cruiser SB treated seed was sown in 2023.**
- **Cover crops (including mixes) must also follow the 32-month restrictions.**

	Non-restricted	*Restricted*
Rules	*No restrictions following Sugar Beet*	*A minimum of 32 months from drilling of Sugar Beet*
Crops	1. *Wheat (including Durum Wheat)* 2. *Barley* 3. *Millet* 4. *Sorghum* 5. *Oat* 6. *Maize / Corn* 7. *Rye* 8. *Triticale* 9. *Canary seed* 10. *Spelt* 11. *Potato* 12. *Cabbage* 13. *Kale* 14. *Swede* 15. *Lettuce / Babyleaf / Spinach* 16. *Onions* 17. *Leeks* 18. *Carrots* 19. *Parsnips* 20. *Cauliflower* 21. *Broccoli* 22. *Turnip*	23. *Oilseed Rape* 24. *Linseed* 25. *Mustard* 26. *Soya Bean* 27. *Pea* 28. *Bean* 29. *Buckwheat* 30. *Clover* 31. *Phacelia* 32. *Chicory* 33. *Radish* 34. *Vetch* 35. *False Flax* 36. *Lucerne* 37. *Sunflower* 38. *Borage* 39. *Sainfoin* 40. *Nyger* 41. *Lupins*

PGRO Crop Monitor

Processors and Growers Research Organisation

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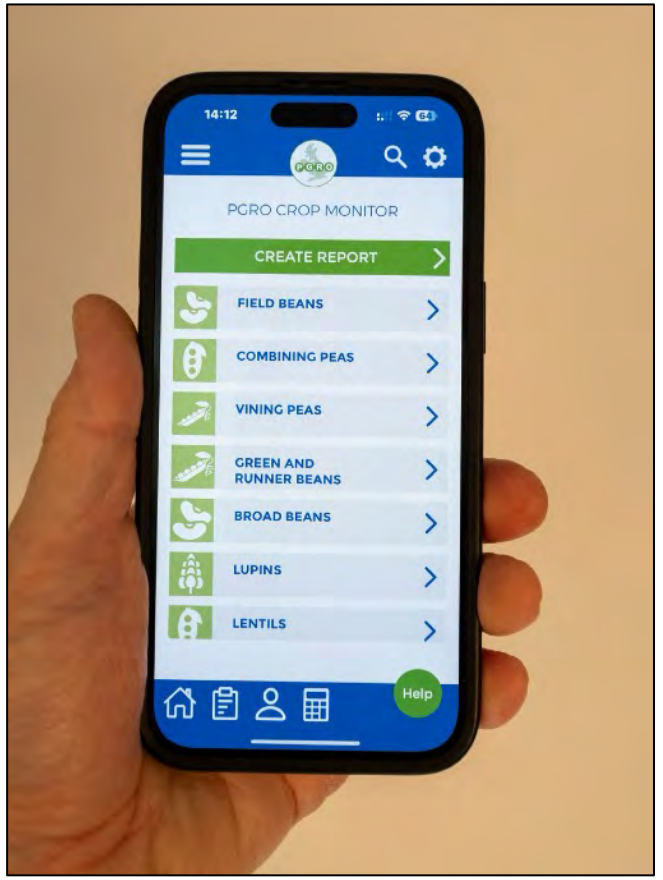

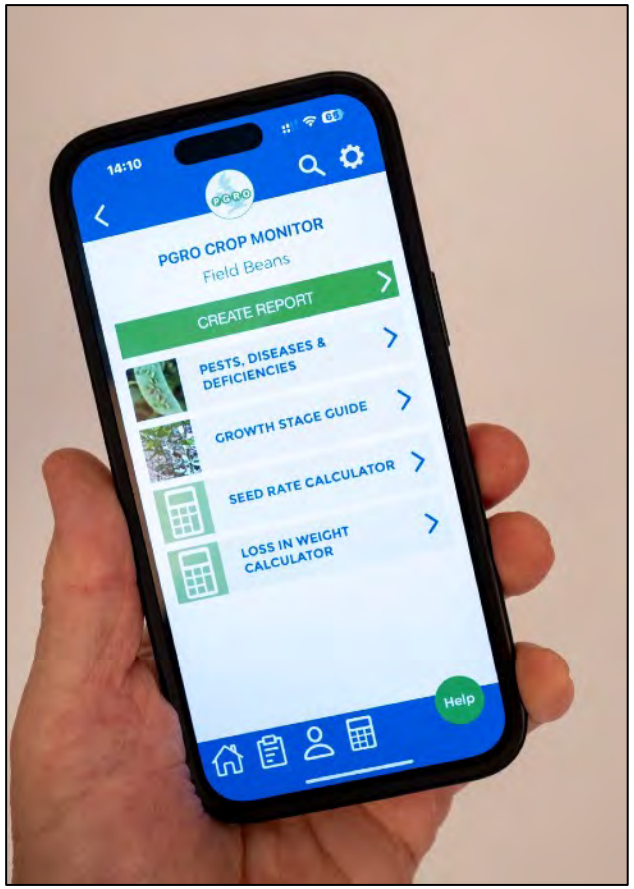

Pea and Bean YEN

Don’t forget to sign up to the Pea and Bean Yield Enhancement Networks (YEN) and help find the best way to improve your crop performance.

Sign up at http://yen.adas.co.uk

THANK YOU!

Pulse Potential Event 2025