Knowledge grows

Optimising NUE

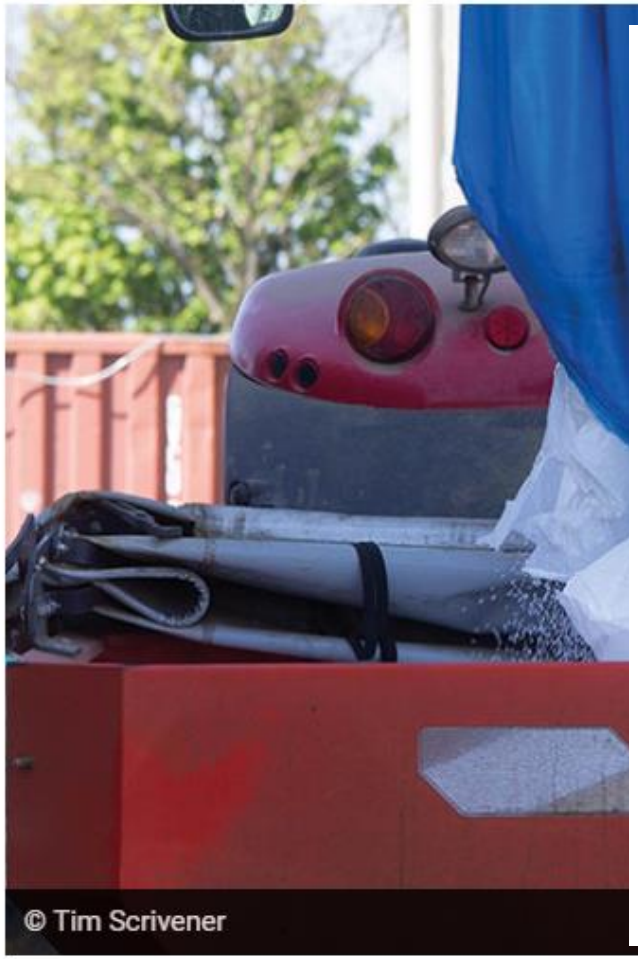
Assured Agronomy Grower Update Day

Phil Burrell – YaraVita Product Manager

28th February 2023

BASIS Ref No: PN/123091/2223/d = 2 x PN

Defra’s urea fertiliser rules in England to be delayed


© Tim Scrivener

Defra’s proposed urea fertiliser rules to be introduced to the Red Tractor farm assurance scheme from April 2023 have been delayed by a year.

The original plan was for Red Tractor-assured farms in England to use only untreated urea fertilisers between 15 January to 31 March, and urease inhibitor-treated products thereafter.

See also: Tesco to trial low-carbon fertilisers with five growers

But given the current climate of nitrogen supply issues and price volatility, a formal request from an industry consortium – including Niab, Association of Independent Crop Consultants and NFU – has been made to delay the introduction until 1 April 2024, ahead of the 2025 fertiliser season.

Defra has told *Farmers Weekly* the implementation is now postponed, but it will monitor progress on industry action and regulate if necessary.

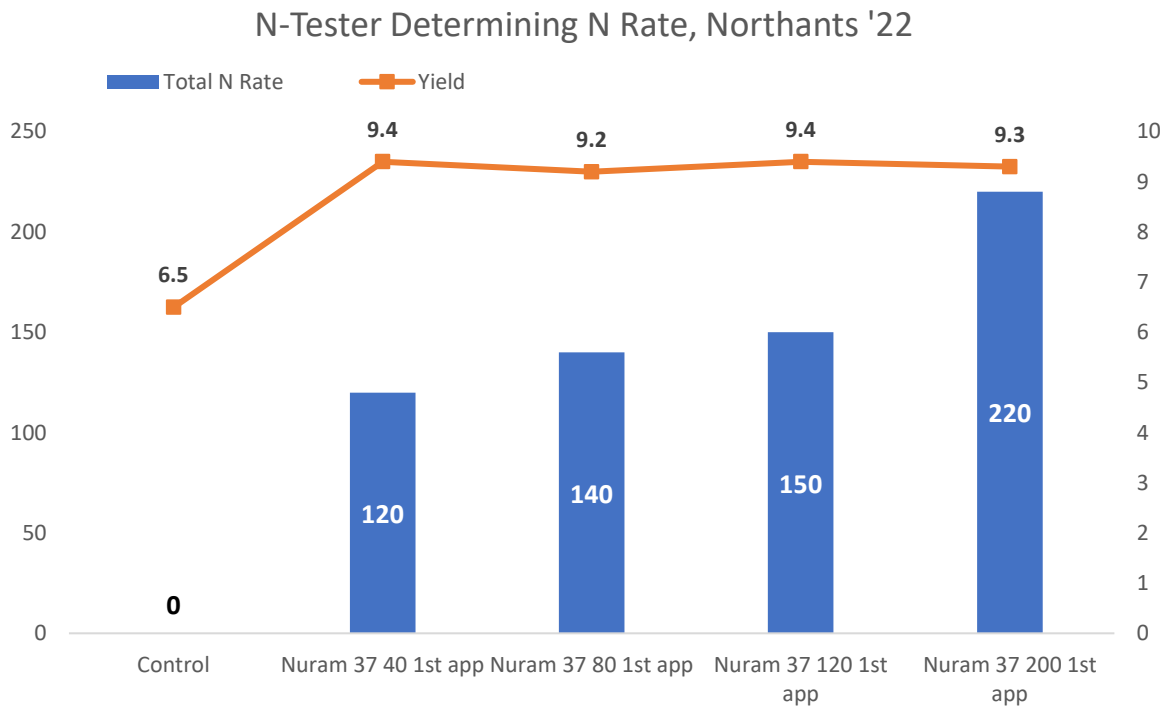
Industry “Option 4” approach

An agricultural industry partnership offered its commitment to deliver substantial ammonia emissions reductions from the use of both solid and liquid fertilisers containing urea from April 2023. The new Red Tractor farm assurance standard proposed is:

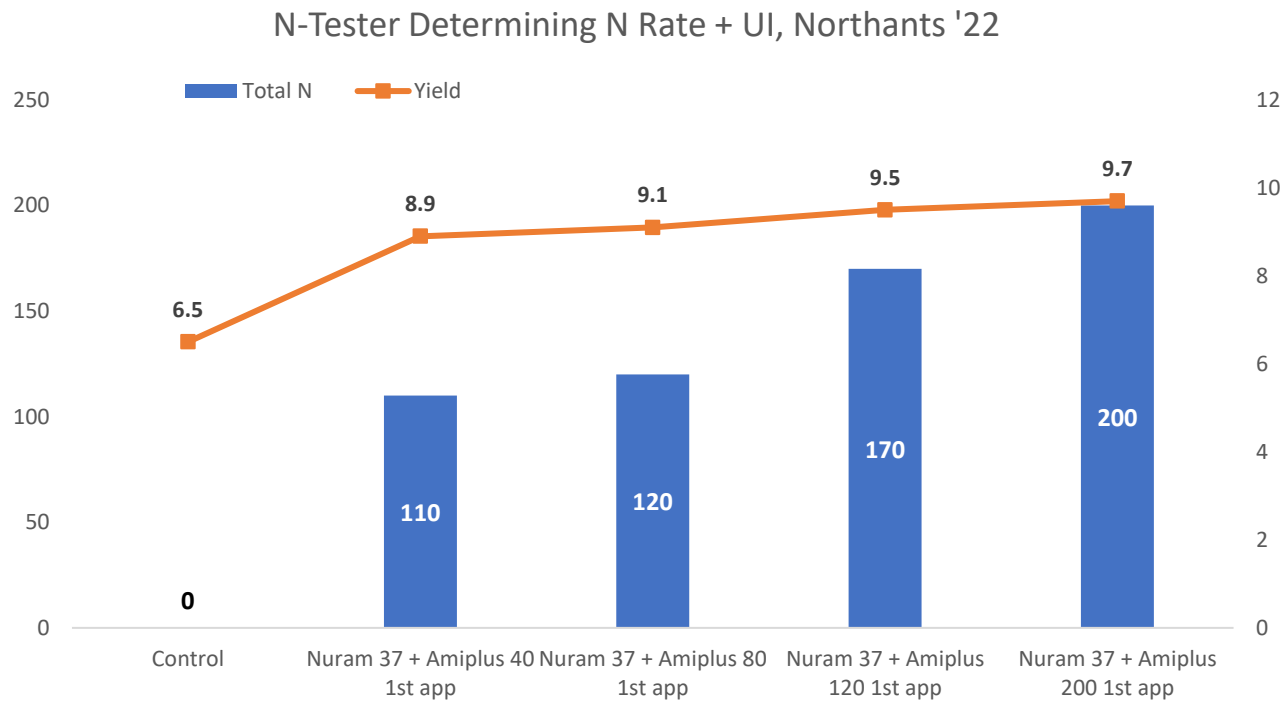
- Fertiliser containing Urea must only be applied where the following requirements are met:
  - protected/inhibited fertilisers containing solid urea can be applied within any product use-by/best before dates
  - protected/inhibited fertilisers containing liquid urea can be applied with the prescribed rate of protector/inhibitor for the application, and within any product use by/best before dates
  - in England, unprotected/uninhibited solid fertiliser containing urea can only be applied between 15th January and 31st March
  - in England, unprotected/uninhibited liquid fertiliser containing urea can be applied between 15th January and 31st March
  - in England, unprotected/uninhibited liquid fertiliser containing urea can be applied between 1st April and last application in autumn[9] only if agronomic justification is provided by
    - FACTS-qualified farm personnel[10] or
    - advice specific for the crop has been provided by a FACTS- Qualified Adviser and been followed (see EC 9.1)
  - in Northern Ireland, Scotland and Wales fertiliser containing urea (solid and liquid) can be applied as per relevant legislation

Uptake will be monitored through fertiliser sales and treatment data, Red Tractor monitoring data, and the British Survey of Fertiliser Practice. This will establish whether the ammonia abatement expected is achieved. In addition, Defra will gather relevant data to monitor and assess the level of ammonia abatement achieved by the scheme.

N-Tester Determined N Rate +/- Urease Inhibitor Site 1

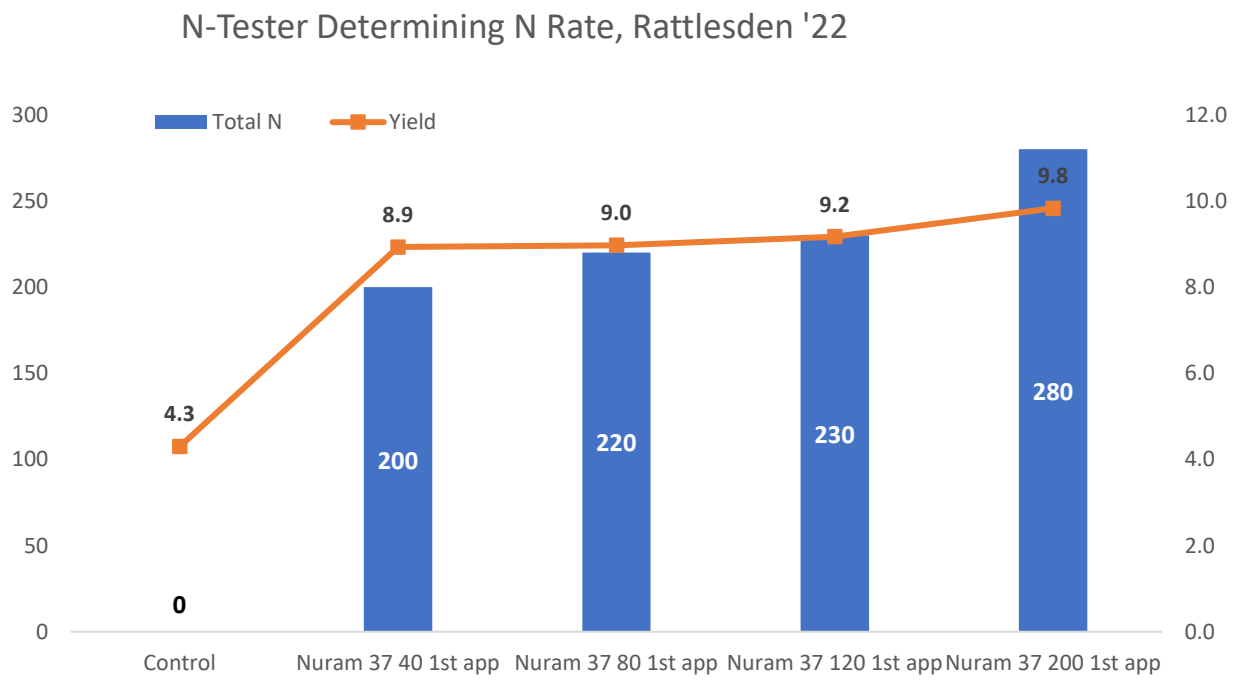


N Tester added (kgN/ha)			
80	60	30	20

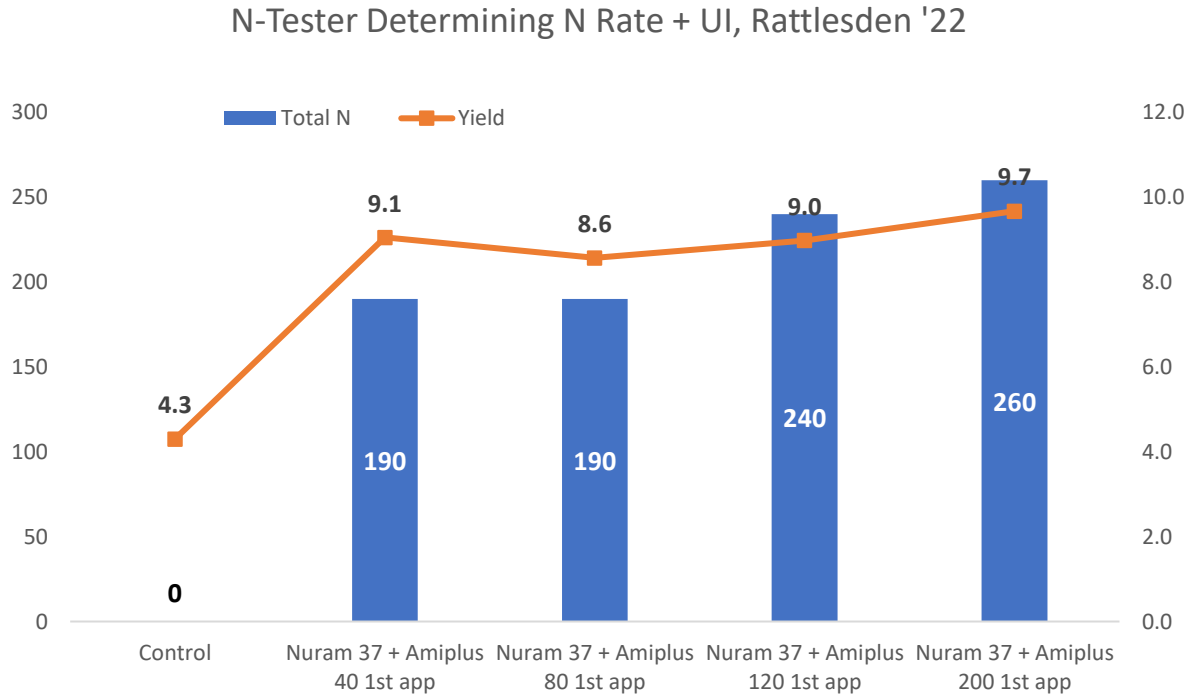


N Tester added (kgN/ha)			
70	40	50	0

N-Tester Determined N Rate +/- Urease Inhibitor Site 2

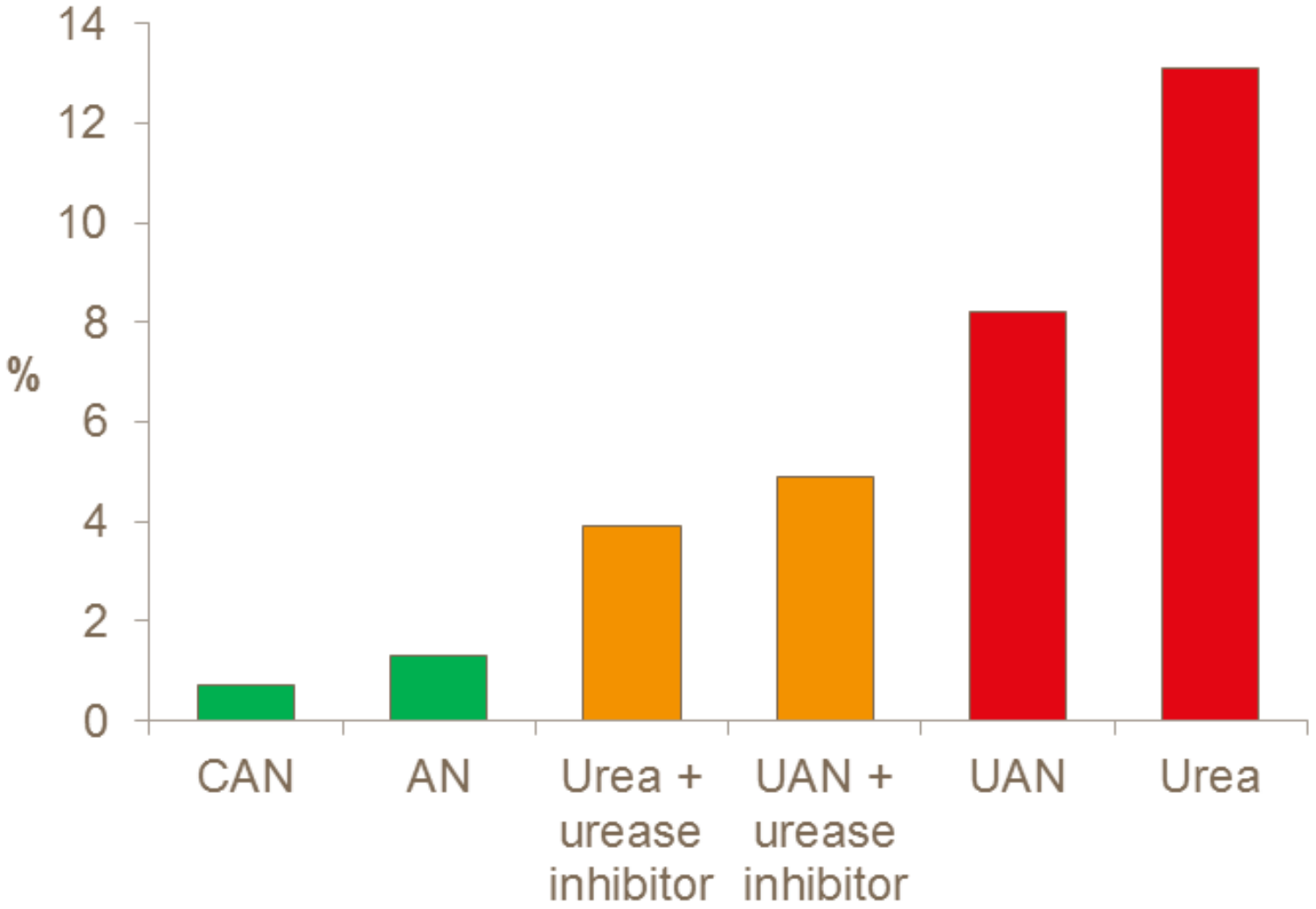


N Tester added (kgN/ha)			
160	140	110	80



N Tester added (kgN/ha)			
150	110	120	60

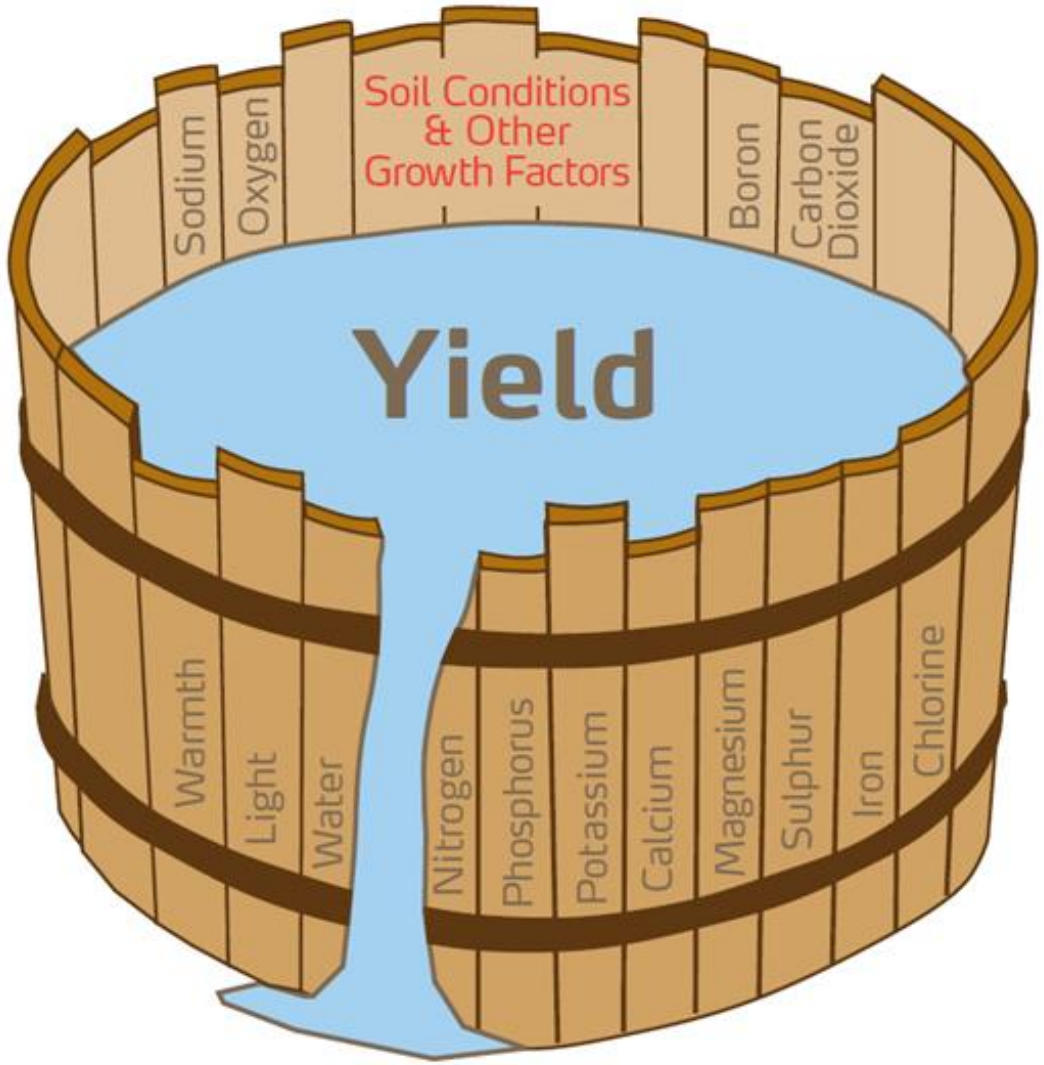
Emission Factors [%NH3-N of N applied]



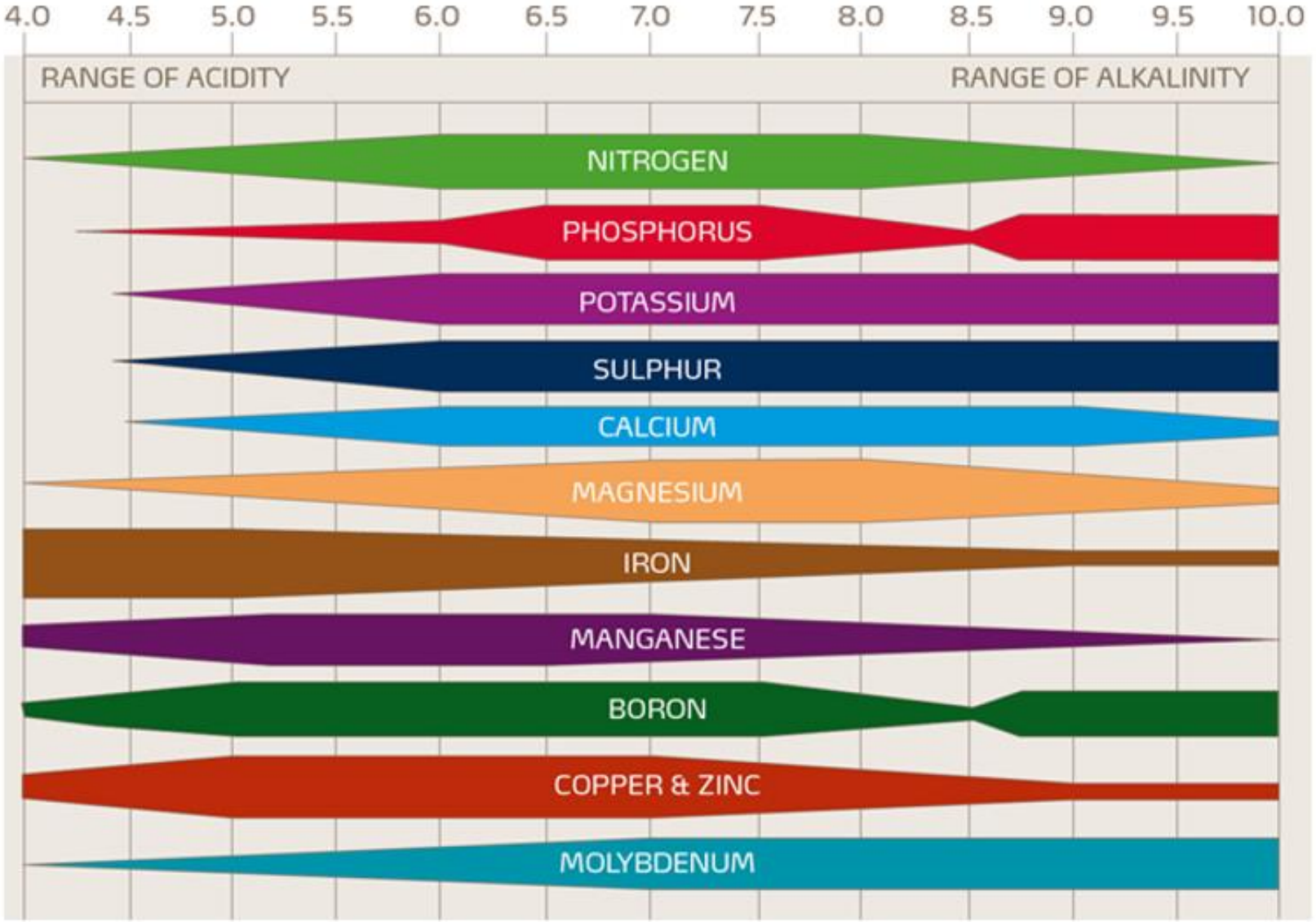

No Fert Left
inside overnight


CLEAN
ME
NO
TOMATOES
KEPT IN
VAN OVERNIGHT
SPRINTER
FD65 UBO

Get The Basics Right First !



Get The Basics Right First !



SCS Spreader & Sprayer Testing Ltd

Managing Deficiency

Visual symptoms seen

Report generated confirms problem

Analysis Results (LEAF)

Customer

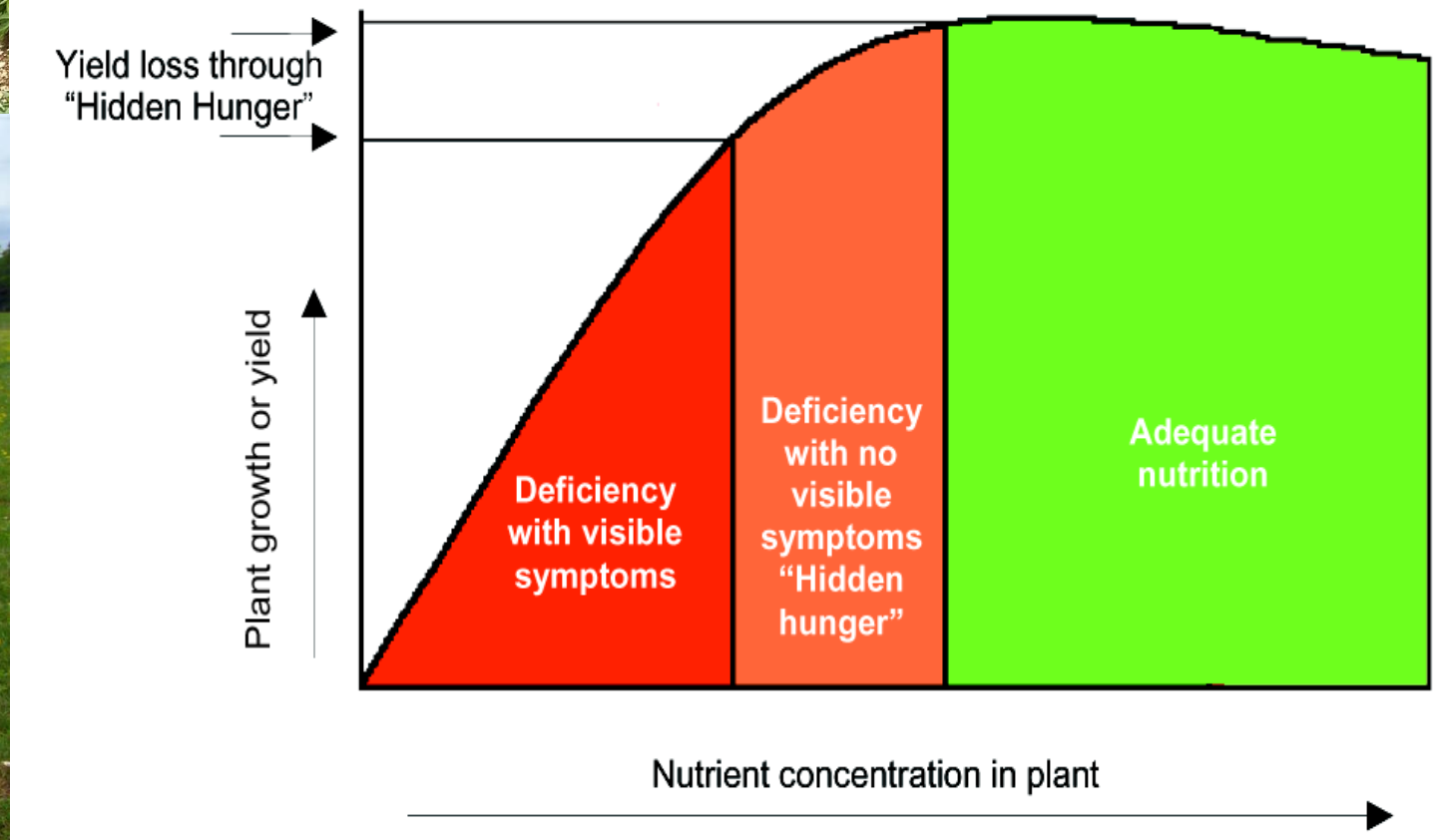
Distributor YARA UK LTD - PHIL BURRELL
22 HOUSEHAMS LANE
LEGBOURNE
LOUTH
LINCOLNSHIRE
LN11 8LG

Sample Ref LEG OF MUTTON
Sample No E263755/03
Crop WHEAT
Date Received 23/03/2021

Analysis	Result	Guideline	Interpretation	Comments
Phosphorus (%)	0.42	0.30	Normal	Adequate level.
Potassium (%)	2.92	3.50	Slightly Low	CONSIDER TREATMENT.
Calcium (%)	0.40	0.40	Normal	Adequate level.
Magnesium (%)	0.11	0.12	Slightly Low	Consider foliar applications of MAGNESIUM
Sulphur (%)	0.46	0.25	Normal	Adequate level.
Boron (ppm)	2.3	6.0	Very Low	Consider treatment with Boron.
Copper (ppm)	5.9	7.0	Slightly Low	Consider foliar applications of COPPER.
Iron (ppm)	180	50	Normal	Adequate level.
Manganese (ppm)	23.2	35.0	Low	PRIORITY FOR TREATMENT.
Molybdenum (ppm)	0.57	0.10	Normal	Adequate level.
Zinc (ppm)	16.0	25.0	Low	PRIORITY FOR TREATMENT.

Farmer / Agronomist takes and send leaf samples to lab for analysis

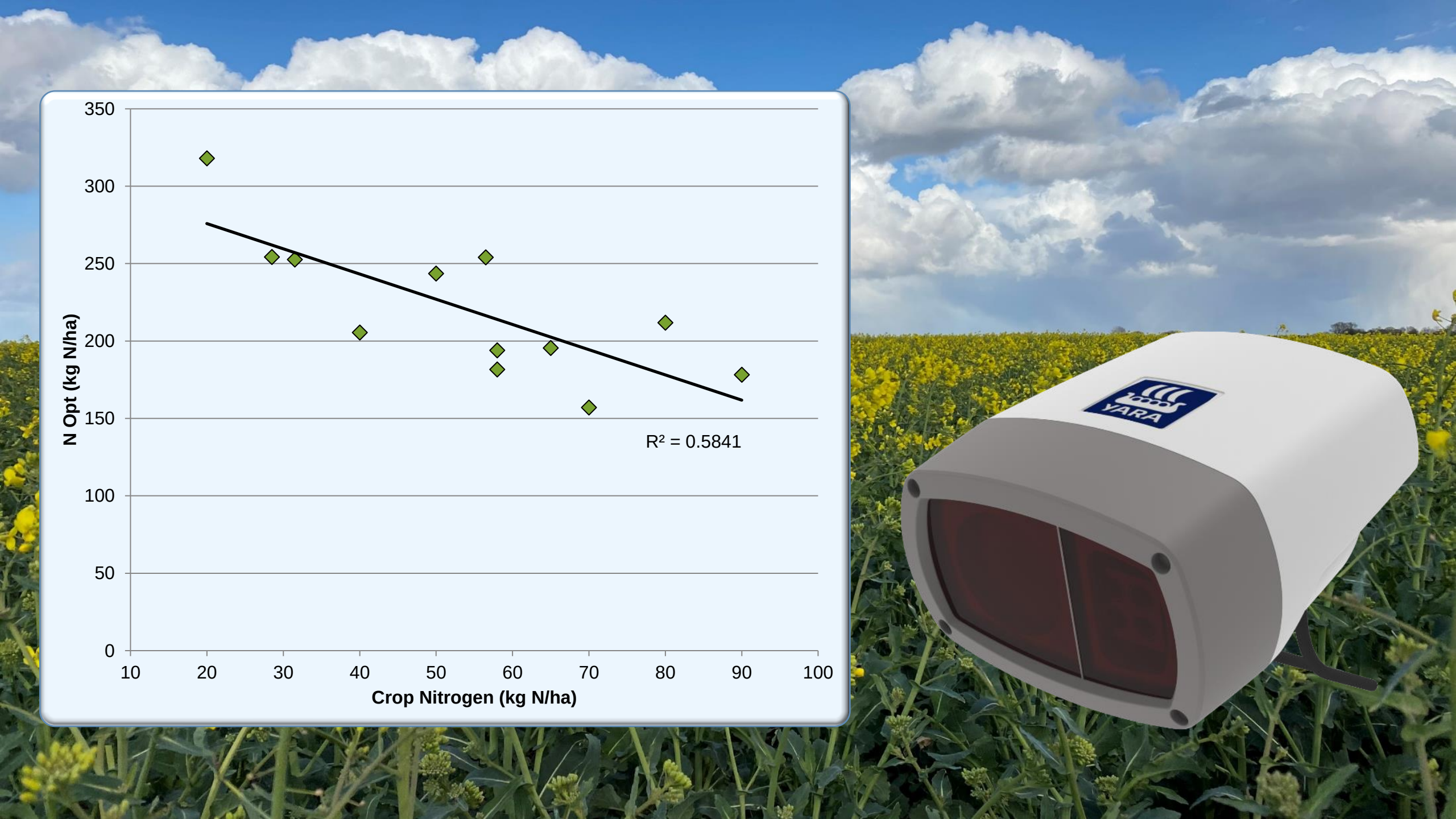
Apply nutrient that is deficient to correct the problem

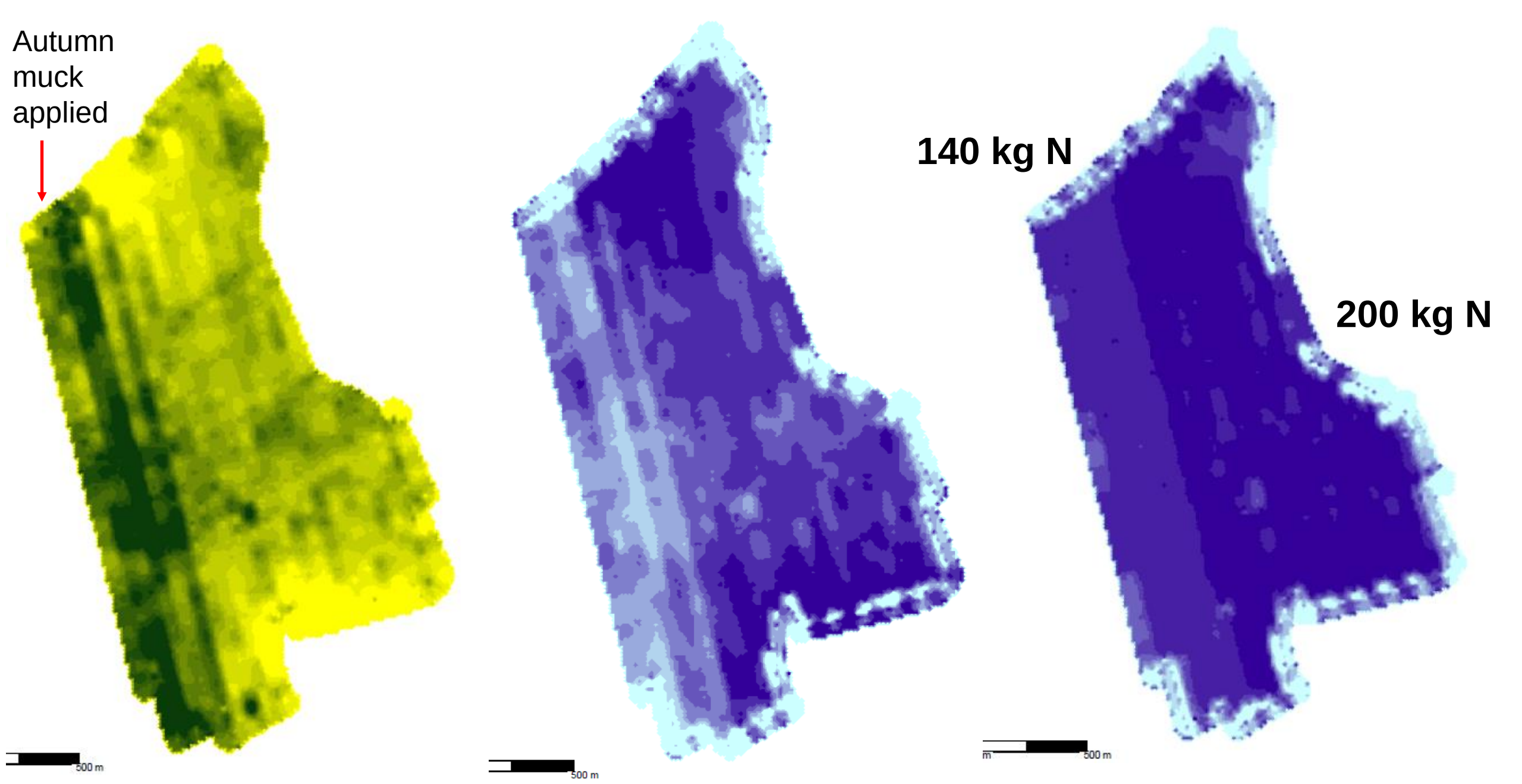

Yield loss through
"Hidden Hunger"
Plant growth or yield
Deficiency with visible symptoms
Deficiency with no visible symptoms "Hidden hunger"
Adequate nutrition
Nutrient concentration in plant

The Value Of Sulphur

OSR
+0.5 t/ha

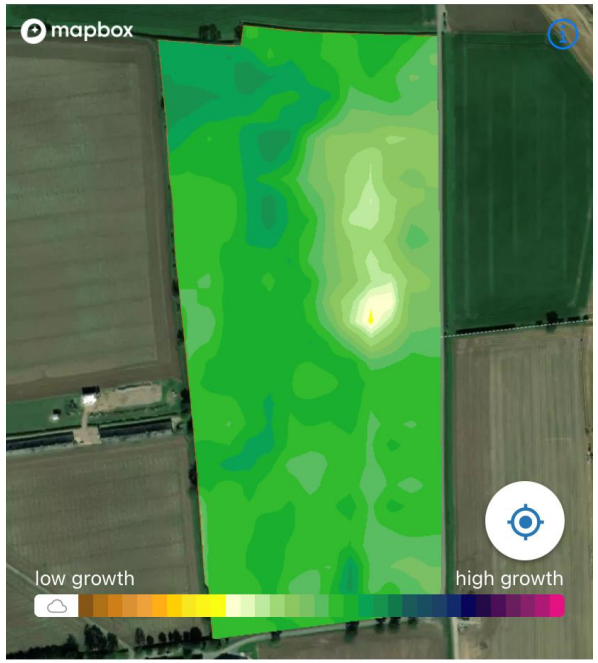
Wheat
+0.35 t/ha


350
300
250
200
150
100
50
0
N Opt (kg N/ha)
10
20
30
40
50
60
70
80
90
100
Crop Nitrogen (kg N/ha)
R² = 0.5841
YARA


Autumn
muck
applied
500 m
140 kg N
500 m
200 kg N
500 m

14:10

Back Pump
Winter oil seed rape - N/A - 14.3 ha



Optimized map

ec | 12 Dec | 15 Dec | 17 Dec | 20 Dec

Variable Spreading
Valid until 27/02/2023

Applications maps

Variable Rate Applications
Create variable rate application maps for any spreader using Atfarm's technology.

14:10

Back Pump
Winter oil seed rape - N/A - 14.3 ha

Applications maps

Variable Rate Applications
Create variable rate application maps for any spreader using Atfarm's technology.

Add application map

View application map

Tasks

View application map

Photo Analysis

Nitrogen Photo Analysis
Determine N-Uptake or get N-Recommendations by taking pictures of your crop.

Begin Photo Analysis

View photo analysis measurements

14:12

Back Photo analysis

Fill in the information required to get the Photo analysis Nitrogen result.

Measurement date

Before winter | After winter

Crop height

30 cm

Supply of nitrogen from the soil

Low | Medium | High

Yield expectation

50 dt/ha

N-uptake before winter

Not available

Fraction of brown leaves

30%

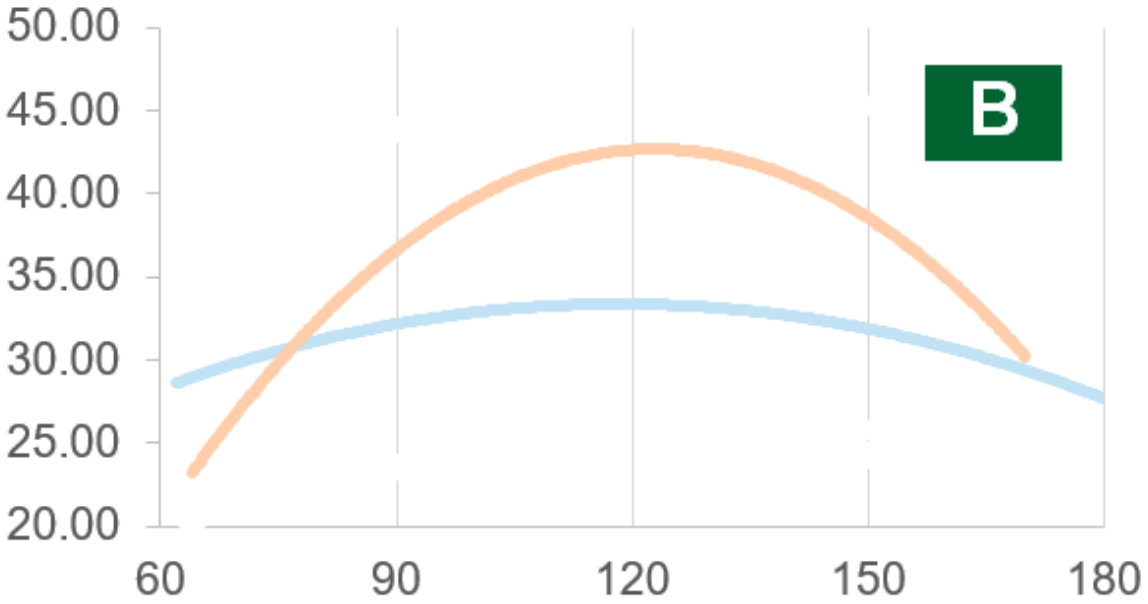
Initiate analysis

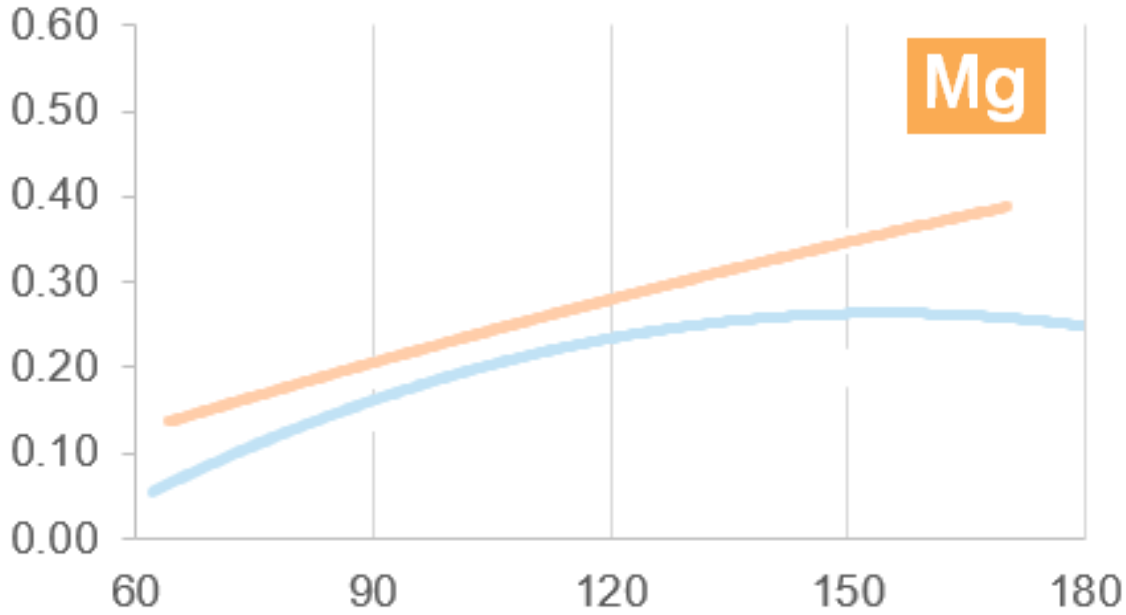
B

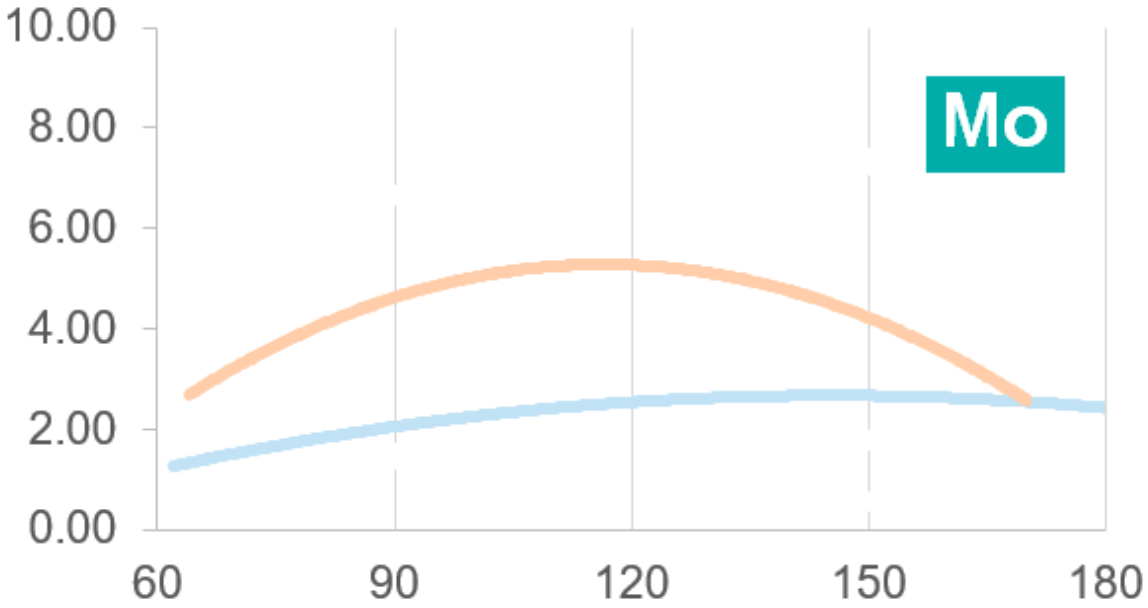
Mn

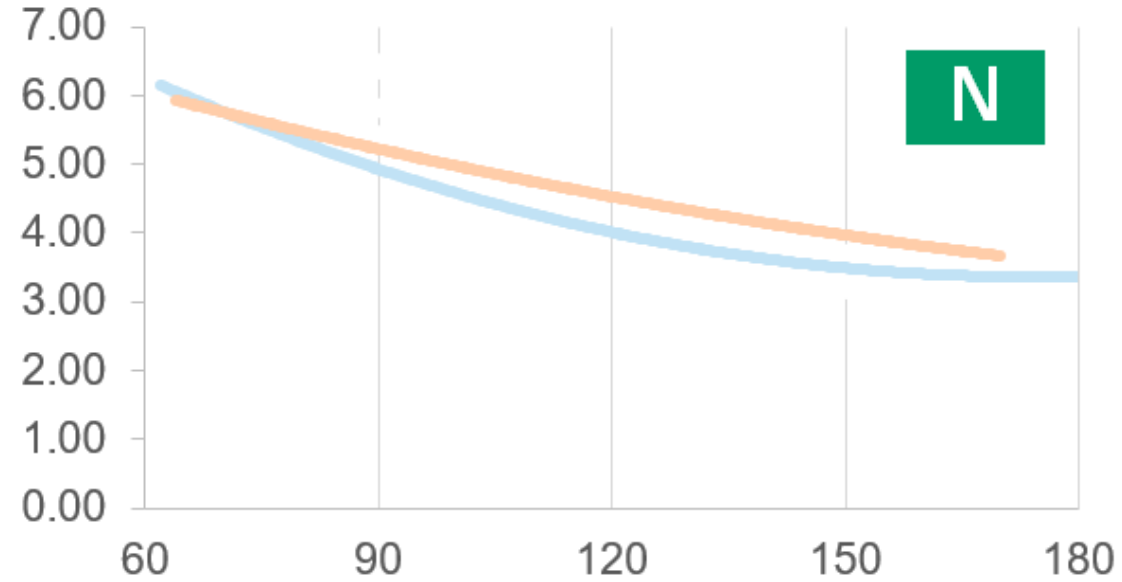
Mg

Mo





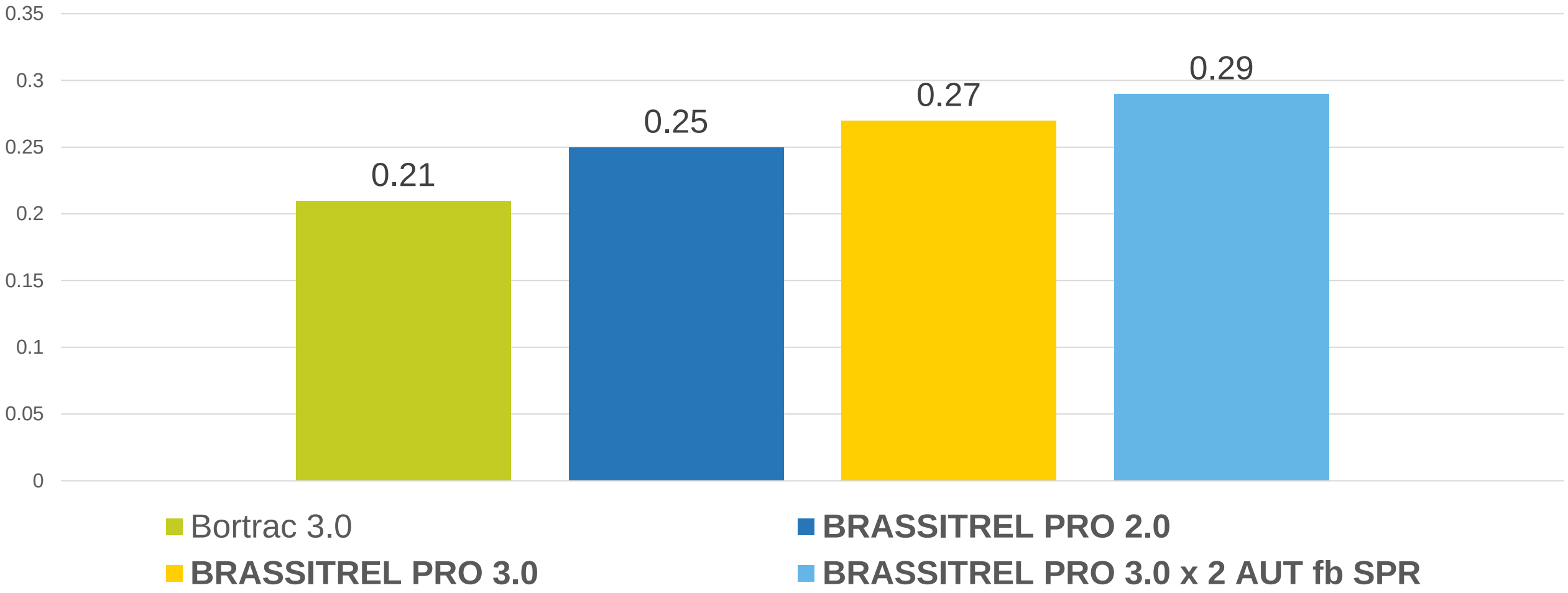




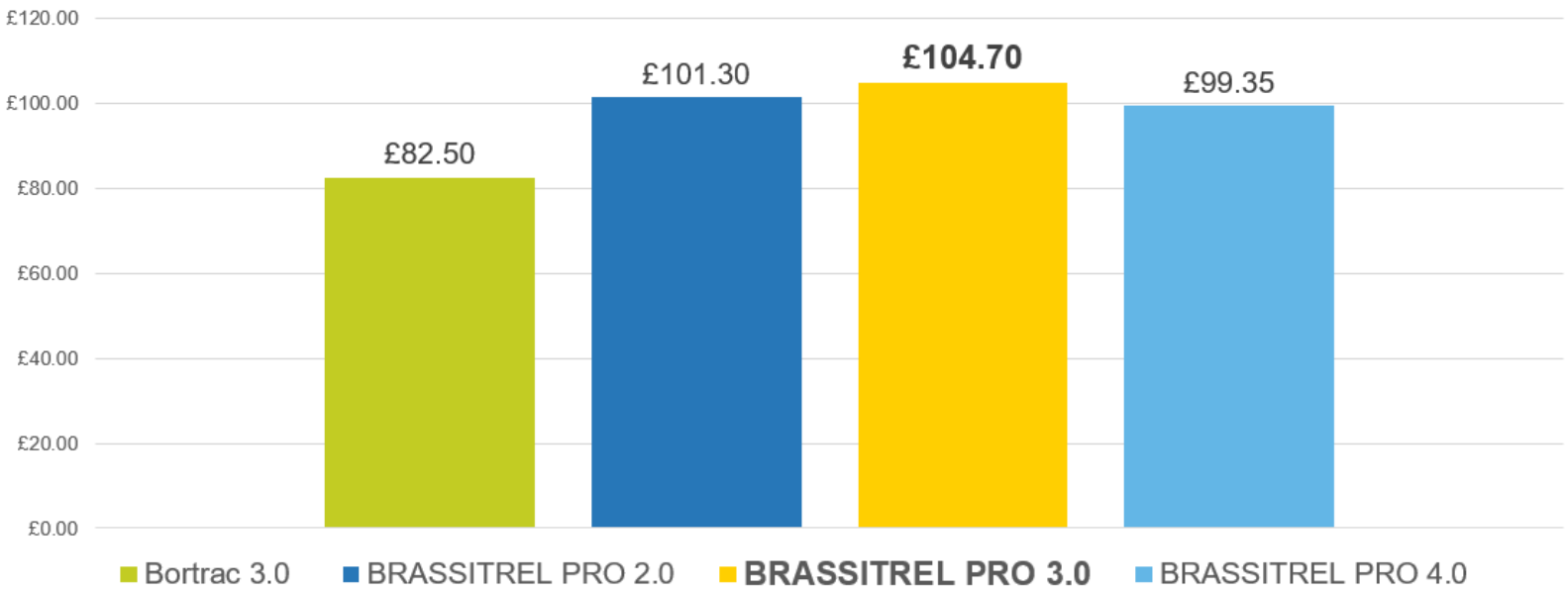
Top 5 vs Bottom 5 YEN oilseed crops leaf tissue ppm vs day of year – 2019 to 2022

Yara UK Brassitrel Pro Trials 2016 to 2021

yield increase over untreated (t/ha)




YARA
YaraVita™
BRASSITREL PRO™


MOIC (£/ha)
£120.00
£100.00
£80.00
£60.00
£40.00
£20.00
£0.00
£82.50
£101.30
£104.70
£99.35
Bortrac 3.0
BRASSITREL PRO 2.0
BRASSITREL PRO 3.0
BRASSITREL PRO 4.0

CHAFER NUFOL 20

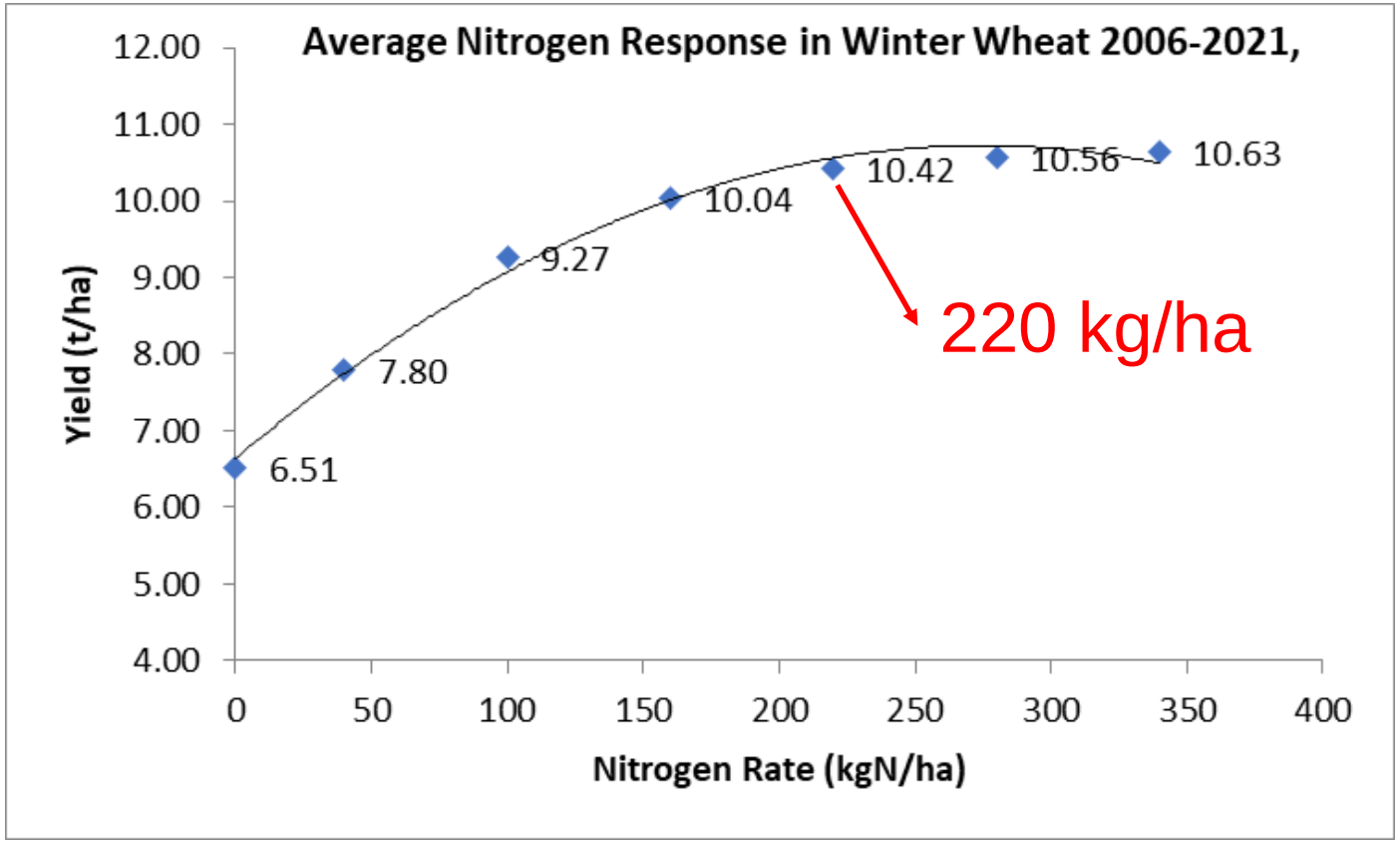
Yield driven by:

- ✓ number of ears / sq m
- ✓ numbers of grains / ear
- ✓ size of grain

AHDB Benchmarks for 11 ton/ha:

- ✓ 460 ears / sq m
- ✓ 48 grains / ear
- ✓ 50 mg / grain

What N Rate For Winter Wheat?



Nitrogen Rates (kg N/ha)	Increased Yield t/ha	kg Grain / kg N
0-100	2.76	28
100-160	0.77	13
160-220	0.38	6

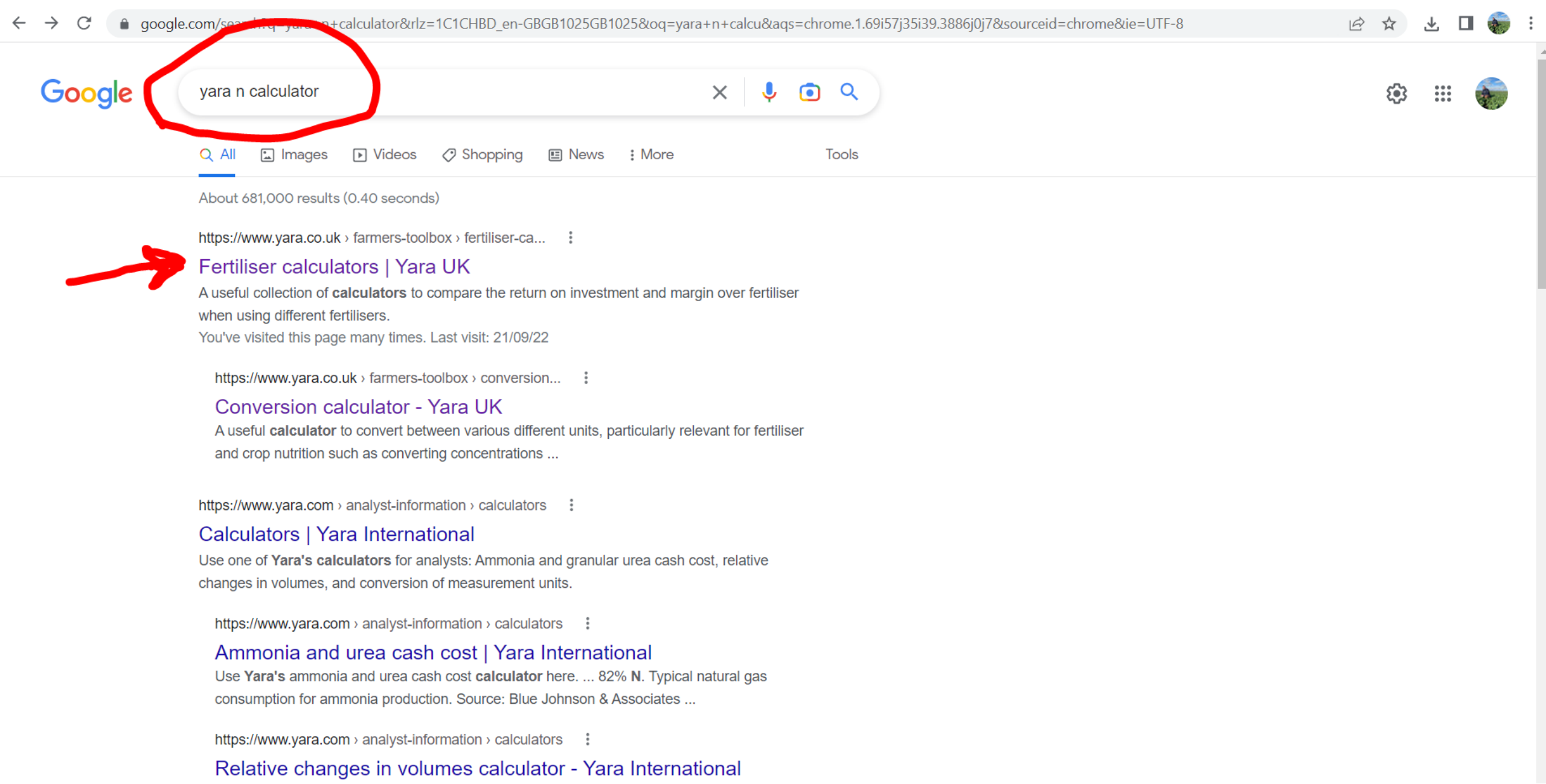
first 160 kg N gives 3.53 t/ha

x £230 / t = £812/ ha

from a £250 / ha investment

= £3.25 / £1

atfarm


google.com/search?q=yara+n+calculator&rlz=1C1CHBD_en-GBGB1025GB1025&oq=yara+n+calcu&aqs=chrome.1.69i57j35i39.3886j0j7&sourceid=chrome&ie=UTF-8
Google
yara n calculator
All
Images
Videos
Shopping
News
More
Tools
About 681,000 results (0.40 seconds)
https://www.yara.co.uk › farmers-toolbox › fertiliser-ca...
Fertiliser calculators | Yara UK
A useful collection of calculators to compare the return on investment and margin over fertiliser when using different fertilisers.
You've visited this page many times. Last visit: 21/09/22
https://www.yara.co.uk › farmers-toolbox › conversion...
Conversion calculator - Yara UK
A useful calculator to convert between various different units, particularly relevant for fertiliser and crop nutrition such as converting concentrations ...
https://www.yara.com › analyst-information › calculators
Calculators | Yara International
Use one of Yara's calculators for analysts: Ammonia and granular urea cash cost, relative changes in volumes, and conversion of measurement units.
https://www.yara.com › analyst-information › calculators
Ammonia and urea cash cost | Yara International
Use Yara's ammonia and urea cash cost calculator here. ... 82% N. Typical natural gas consumption for ammonia production. Source: Blue Johnson & Associates ...
https://www.yara.com › analyst-information › calculators
Relative changes in volumes calculator - Yara International

Fertiliser calculators

A useful collection of calculators to compare the return on investment and margin over fertiliser when using different fertilisers.

Wheat N Response | S Barley N Response | Value of Grass | Nitrate vs Urea | NS vs Straight N

Compound vs Blend | Tropicote Benefit

Wheat nitrogen response calculator

To begin please enter the required values

Fertiliser details

Price per tonne (£)
505

Nitrogen content (% N)
33.5

Crop Details

Crop price (£/t)
236

Applied N Rate (kg N / ha)
220

Your results

Cost of nitrogen per kg **1.51** £ /kg N

Optimum N Rate

Optimum N Rate 216 kg N/ha

Predicted yield 10.48 t/ha

Extra yield 3.86 t/ha

Extra crop value 912 £/ha

Cost of fertiliser applied 325 £ /ha

Return on investment 2.8 £/£ spent

Margin over fertiliser 587 £/ha

Comparison N Rate

Applied N Rate 220 kg N/ha

Predicted yield 10.51 t/ha

Extra yield 3.89 t/ha

Extra crop value 918 £/ha

Cost of fertiliser applied 332 £ /ha

Return on investment 2.8 £/£ spent

Margin over fertiliser 587 £/ha

Your results

Cost of nitrogen per kg **2.00** £ /kg N

Optimum N Rate

Optimum N Rate 196 kg N/ha

Predicted yield 10.34 t/ha

Extra yield 3.72 t/ha

Extra crop value 878 £/ha

Cost of fertiliser applied 392 £ /ha

Return on investment 2.2 £/£ spent

Margin over fertiliser **485** **£/ha**

Comparison N Rate

Applied N Rate 220 kg N/ha

Predicted yield 10.51 t/ha

Extra yield 3.89 t/ha

Extra crop value 918 £/ha

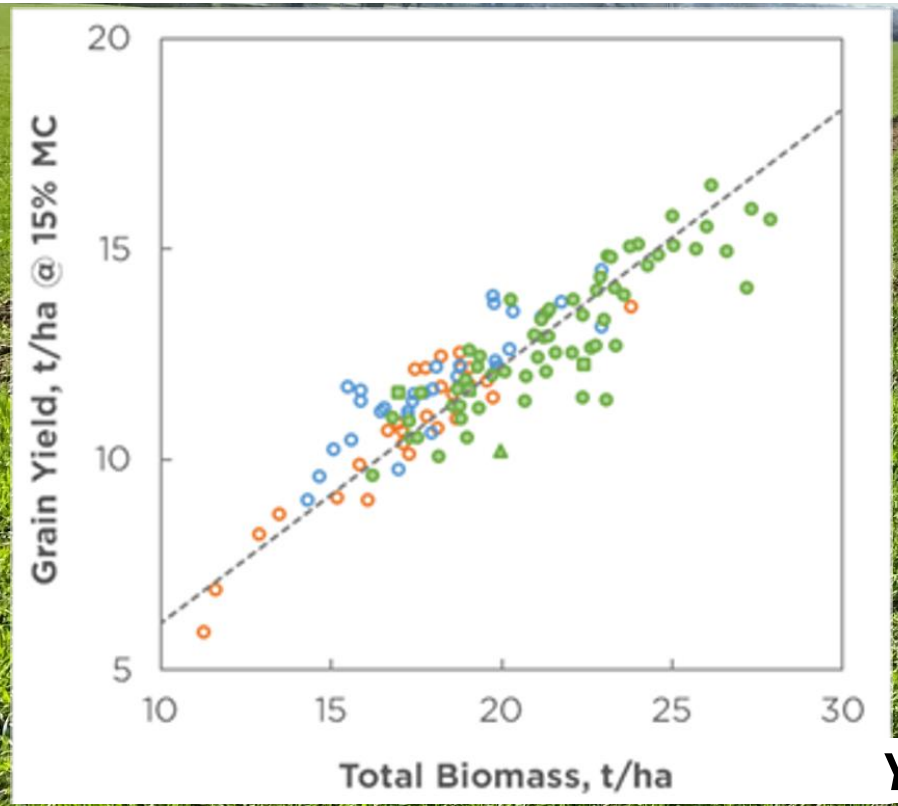
Cost of fertiliser applied 440 £ /ha

Return on investment 2.1 £/£ spent

Margin over fertiliser **478** **£/ha**

Key facts

- A mature root system has 20 or more main roots per plant, with many branches
- Root growth is slow in the foundation phase, more rapid in the construction phase, then slow during the production phase when dry matter is redistributed and roots senesce
- Good rooting, especially deep rooting, will enhance crop growth when water or nitrogen is limiting



N

S

THE FOUNDATION STAGE (pre BBCH30)

Focus on establishment, rooting and tillering for optimising NUE and maximising yield

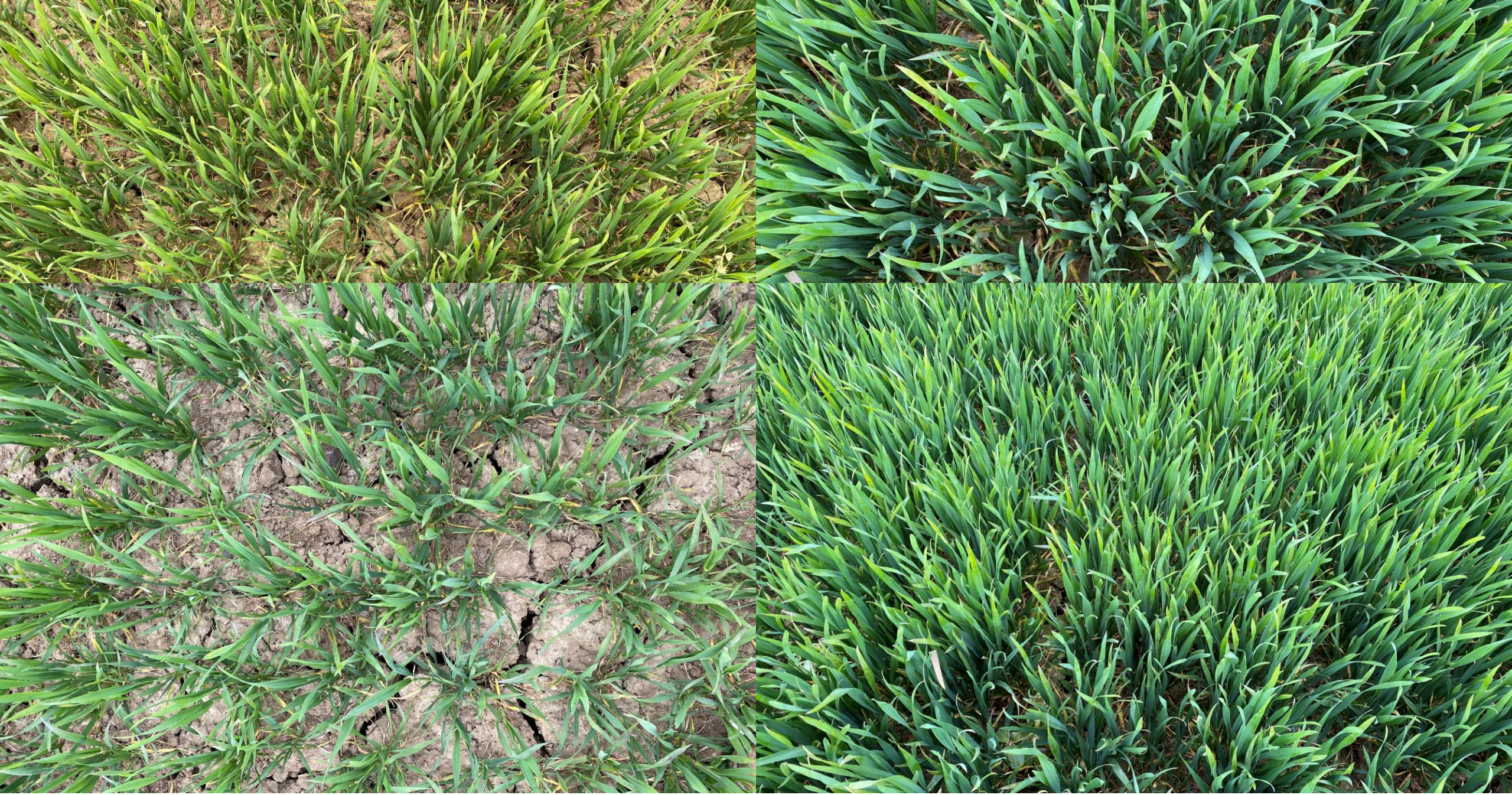
Bigger root system = higher yields

Mg

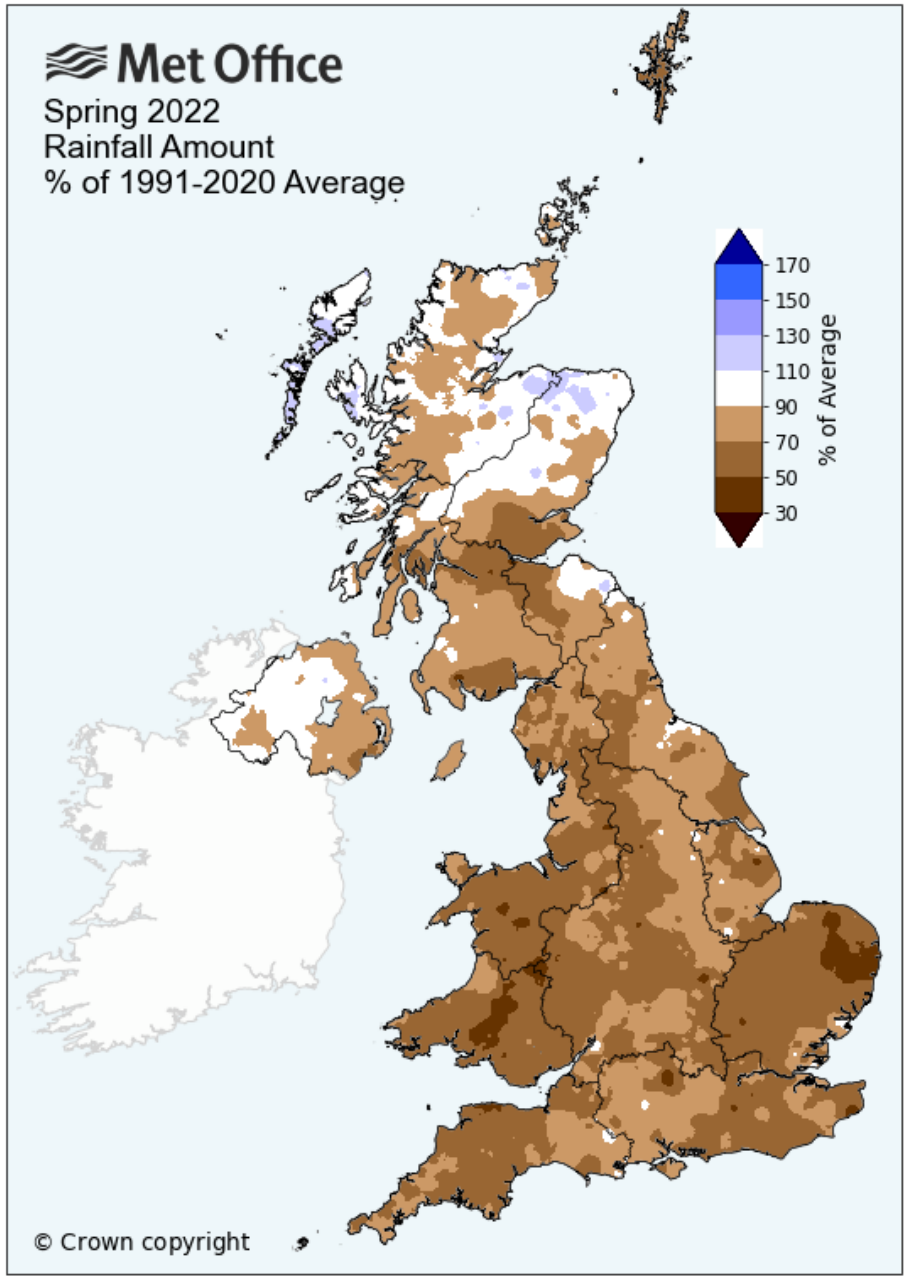
P

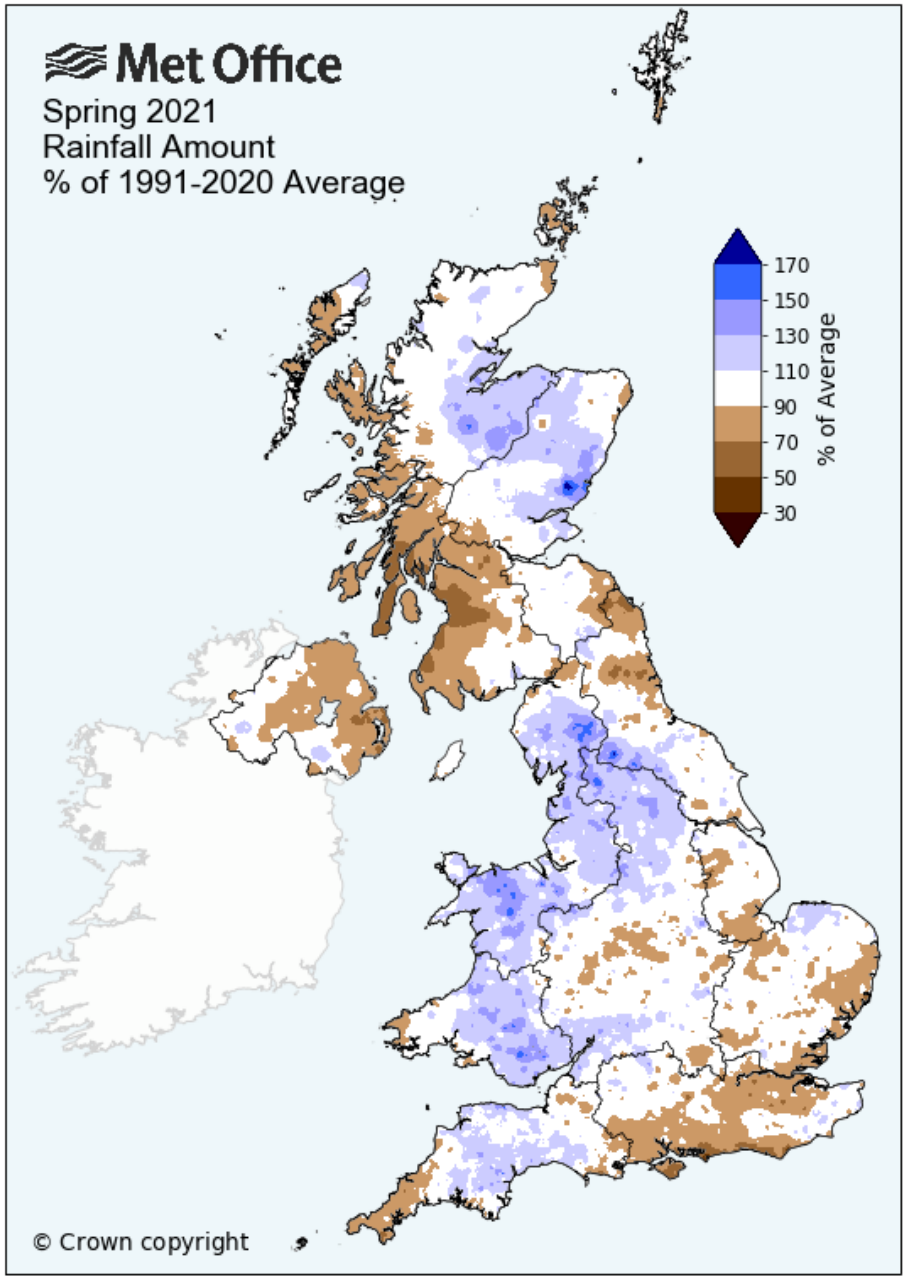
Mn

YEN data suggests higher biomass = higher yield

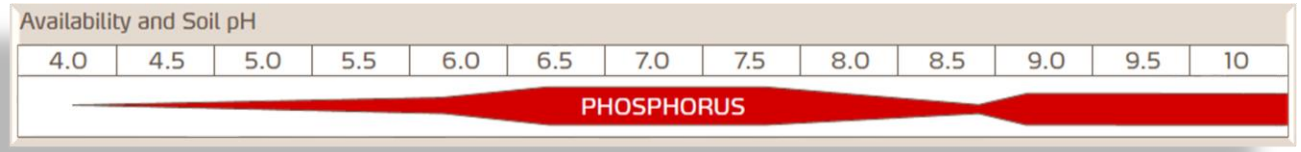


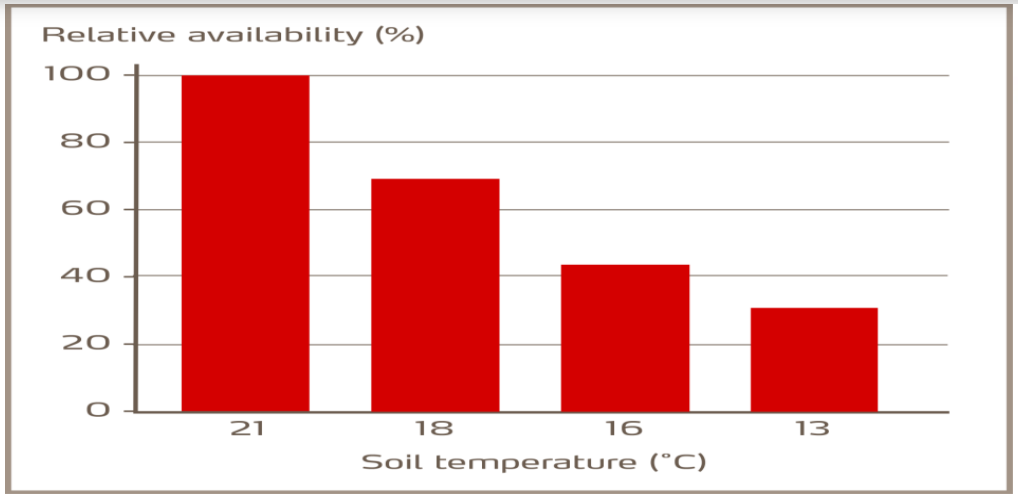
Foliar cannot make up for incorrect nitrogen/sulphur applications


Met Office
Spring 2022
Rainfall Amount
% of 1991-2020 Average
170
150
130
110
90
70
50
30
% of Average
© Crown copyright

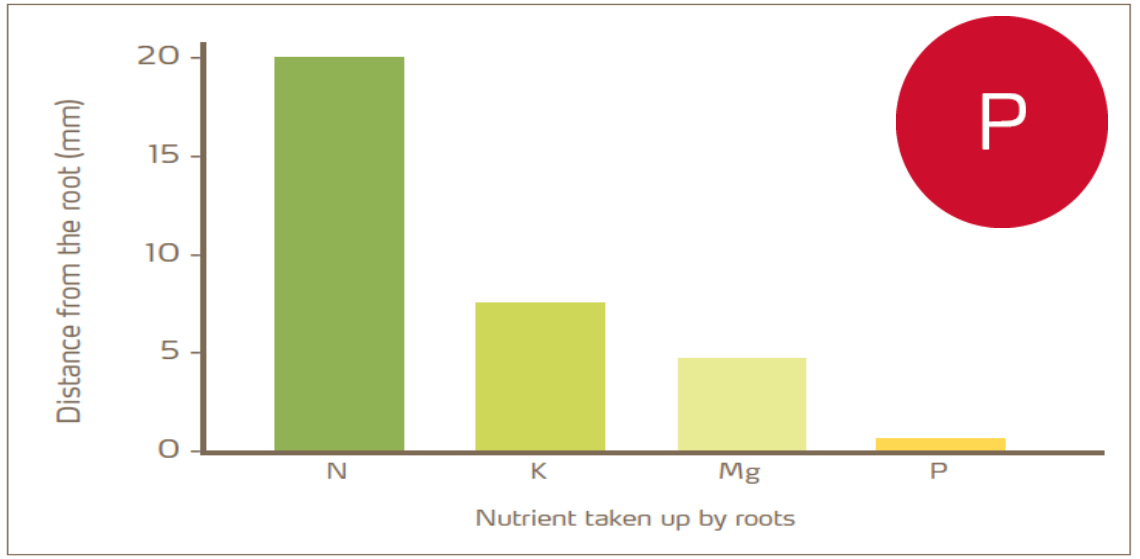

Met Office
Spring 2021
Rainfall Amount
% of 1991-2020 Average
170
150
130
110
90
70
50
30
% of Average
© Crown copyright

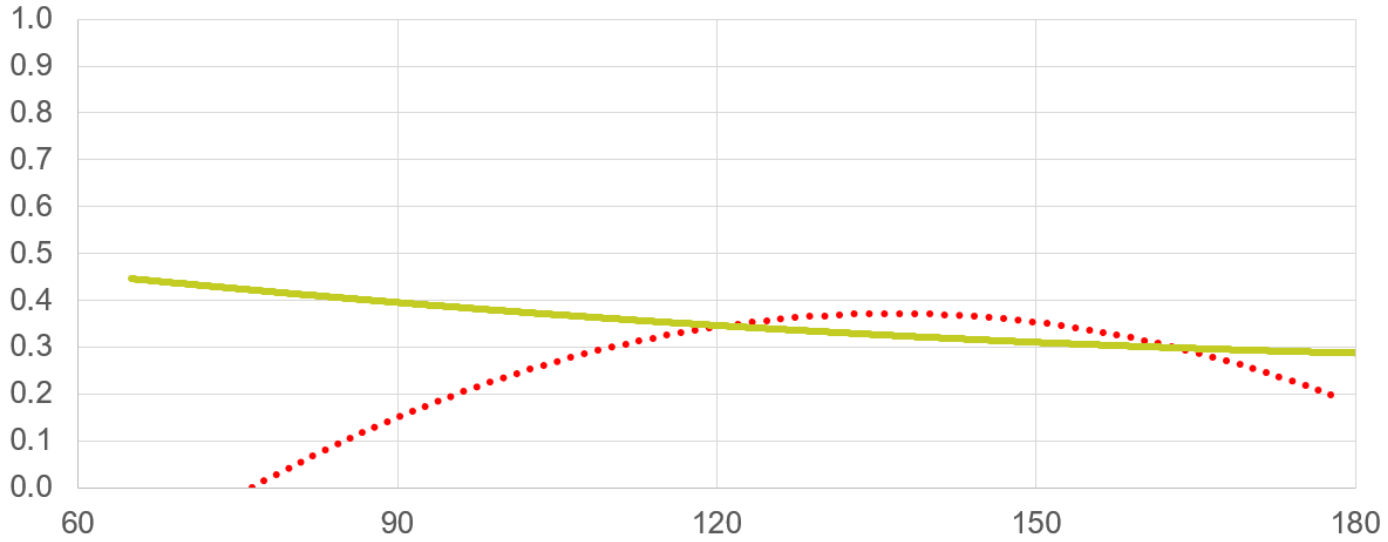
It doesn’t have to be out of a bag or bottle!
Spring rolling can encourage tillering

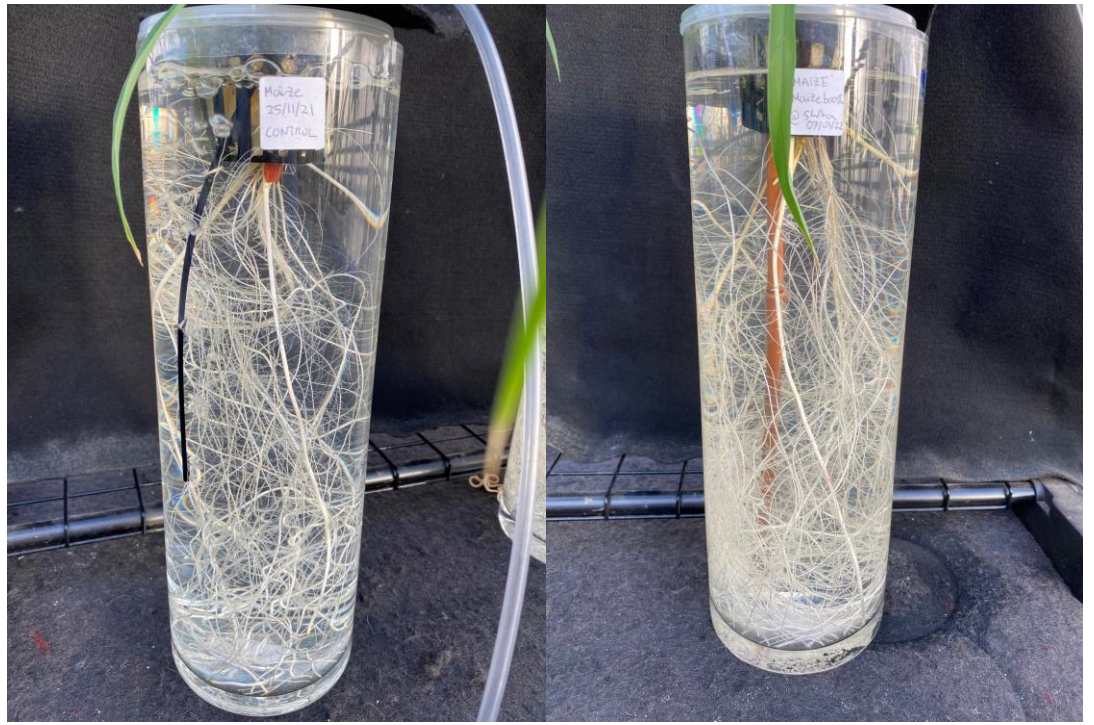

Availability and Soil pH
4.0
4.5
5.0
5.5
6.0
6.5
7.0
7.5
8.0
8.5
9.0
9.5
10
PHOSPHORUS

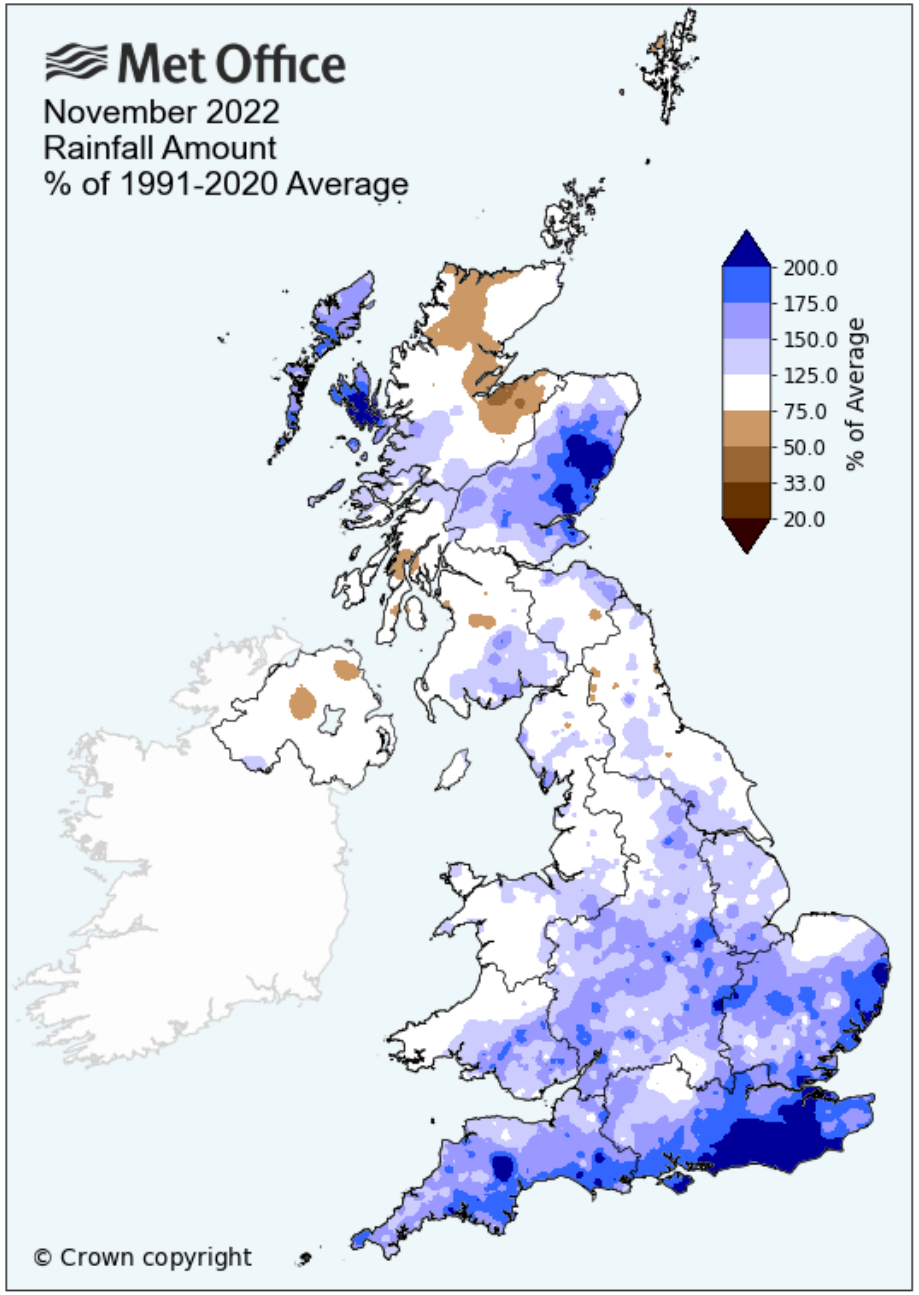

Relative availability (%)
100
80
60
40
20
0
21
18
16
13
Soil temperature (°C)


YARA
YaraVita
CROP BOOST


P
Distance from the root (mm)
20
15
10
5
0
N
K
Mg
P
Nutrient taken up by roots

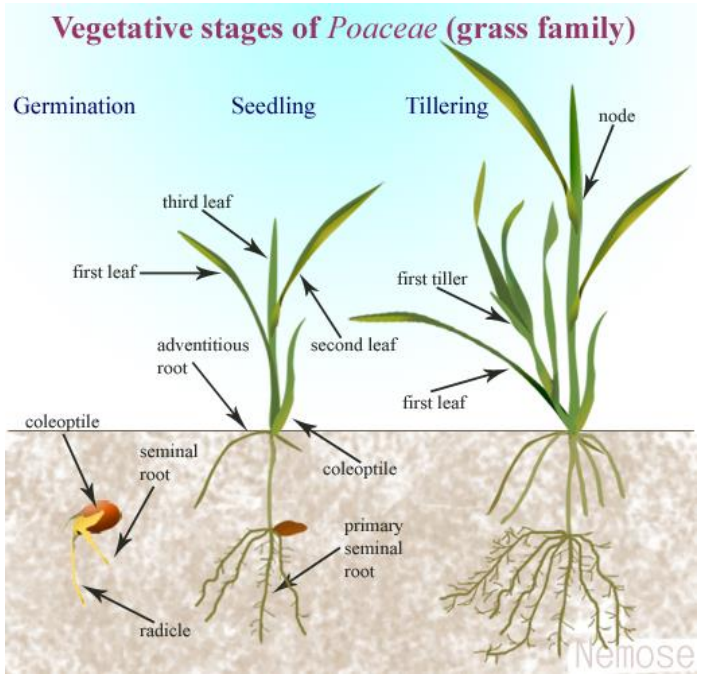

1.0
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0.0
60
90
120
150
180

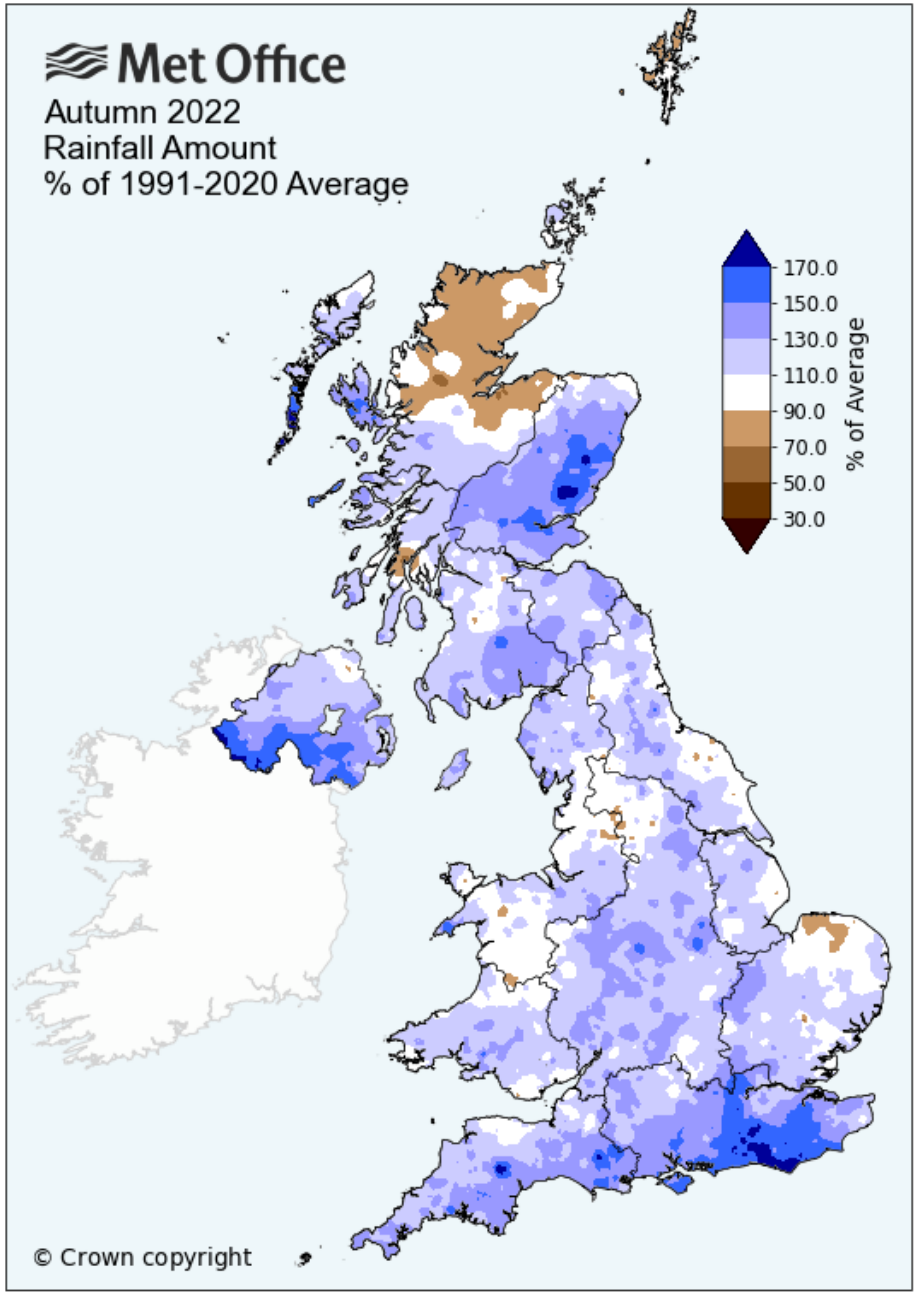




Rooting can be severely compromised following periods of heavy rainfall

Autumn 2022 (especially November) was particularly wet





BBCH 31-32 (T1) = yield building stage

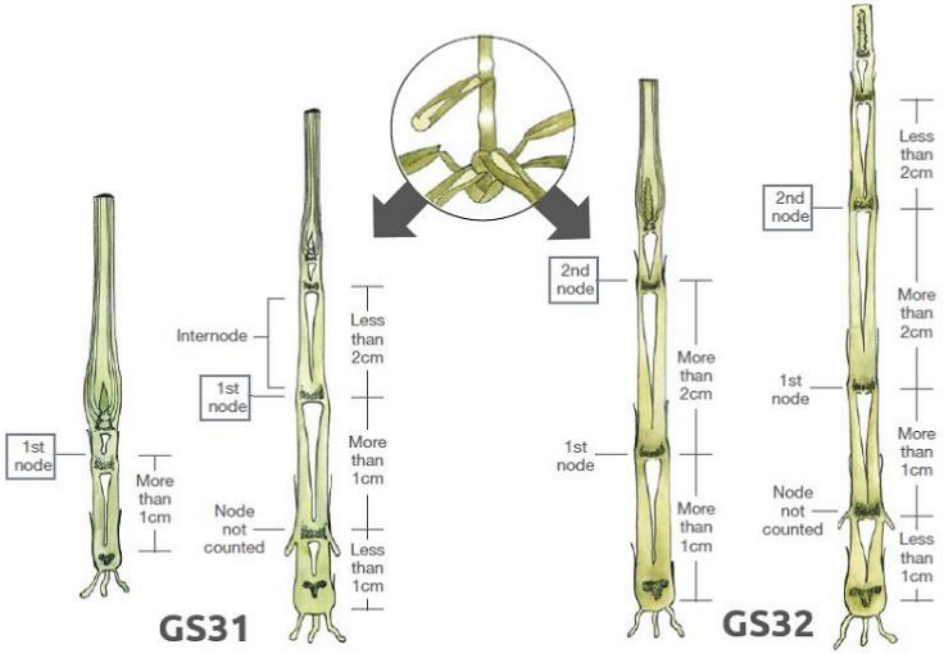
Ensure optimum grain set

Ensure good plant health to build ”natural” defences

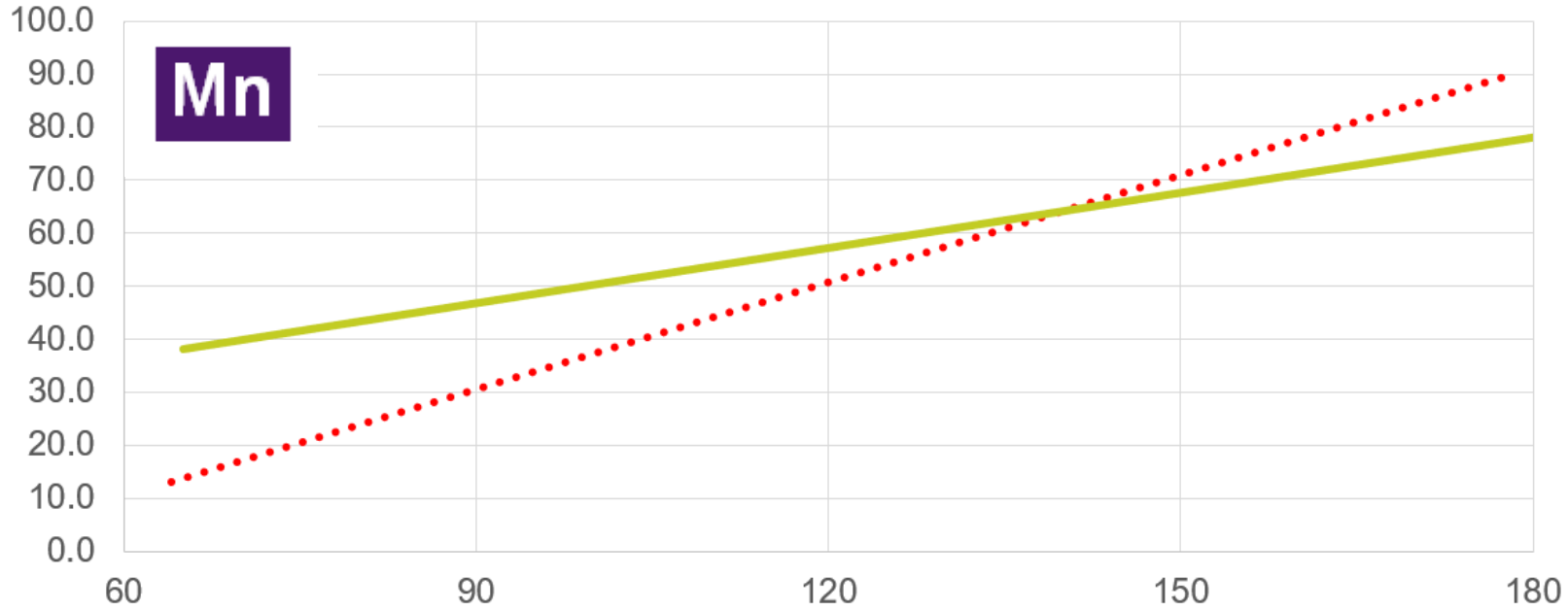
B

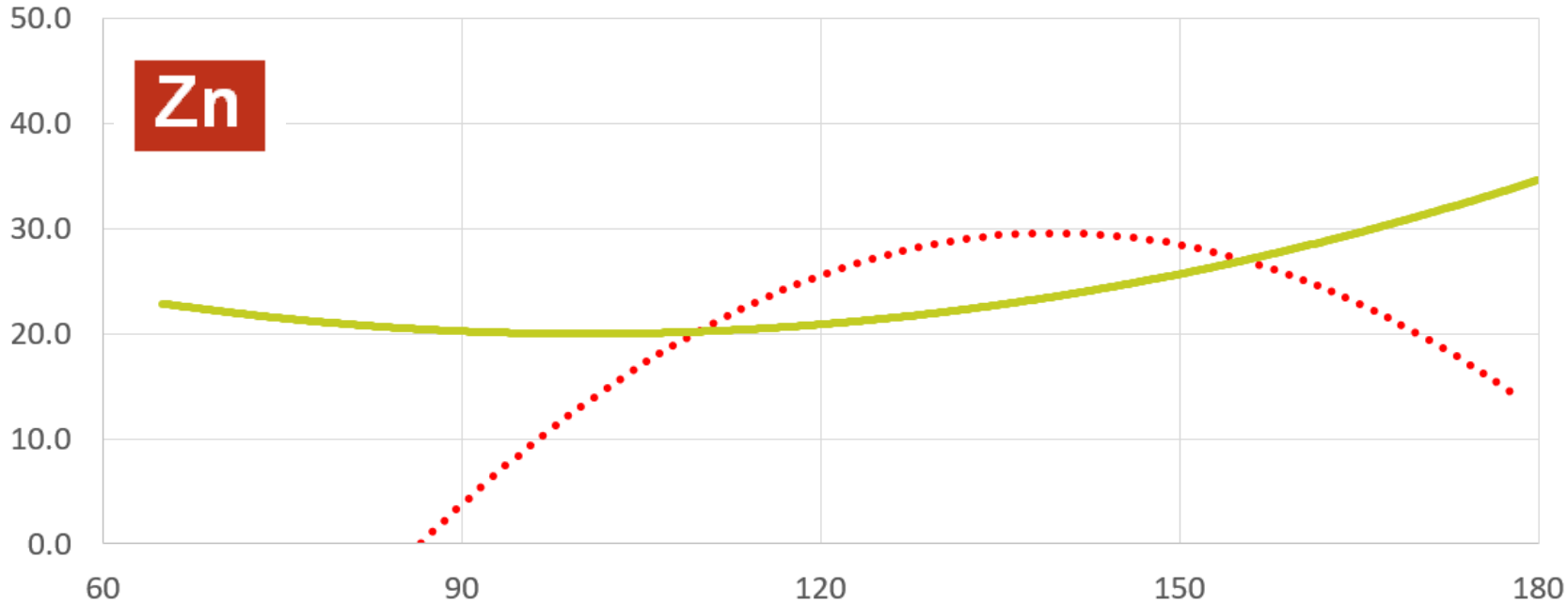
Cu

Zn



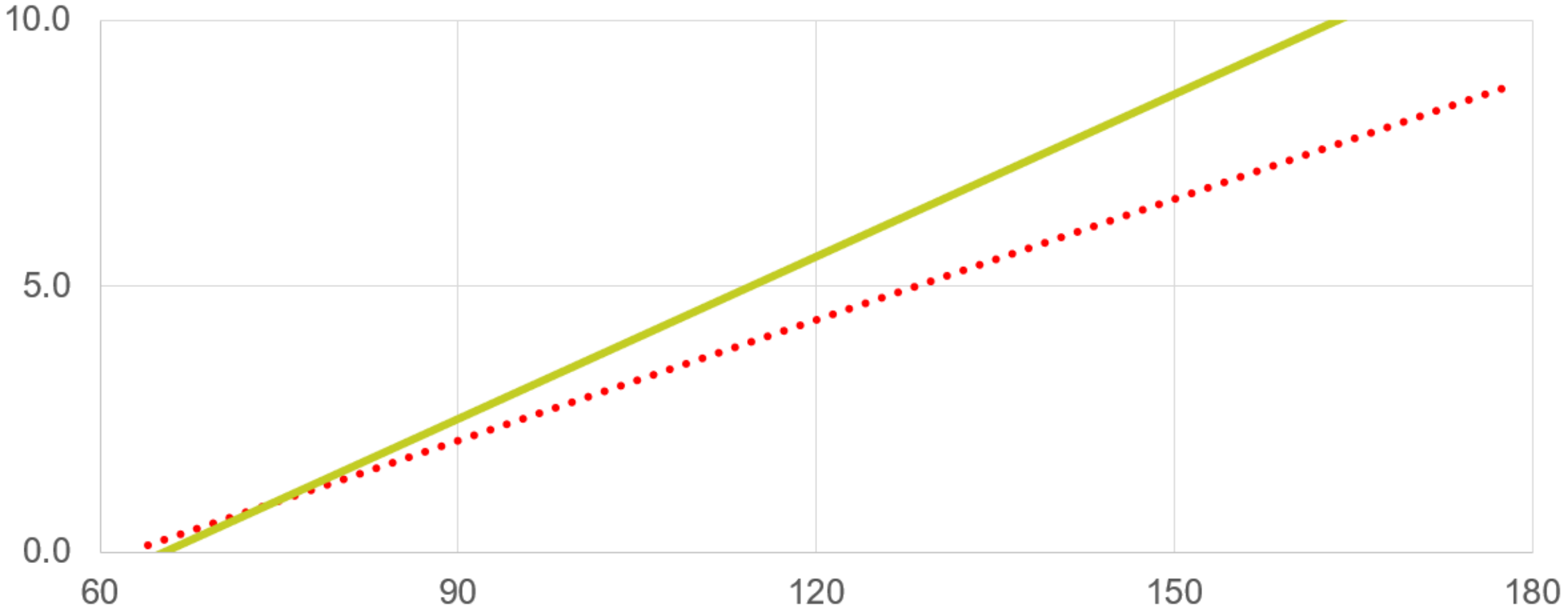
An internode is the part of a plant stem between two successive nodes. The first node detectable must be above an internode of at least 1cm*. The second and subsequent nodes detectable must be above an internode of at least 2cm. *Sometimes a node may be underground and bear roots. As long as the internode below it exceeds 1cm, count it.





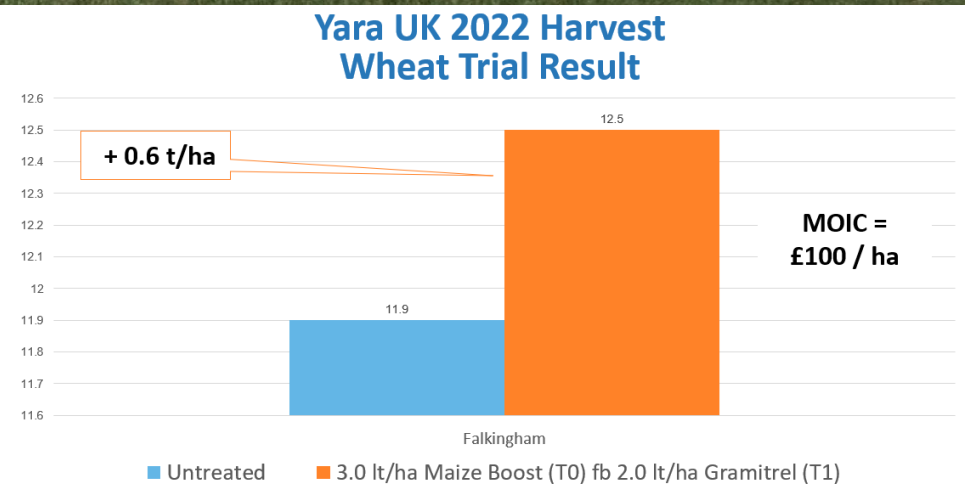
Top 10 vs Bottom 10 YEN winter wheat crops leaf tissue ppm vs day of year – 2019 to 2022

B



Top 10 vs Bottom 10 YEN winter wheat crops leaf tissue ppm vs day of year – 2019 to 2022

- Easy to use “one can” product
- Supplying all key nutrients for cereals
- Widely tank-mixable
- Extremely safe to the crop
- Rapid uptake and lasting feeding effect




BBCH 39-65 (T2 / T3)
= yield building (feeding and defending) and
improving grain quality
“still 10 weeks to harvest”
Mg
K
P

Foliar N Products?

Safe to the crop, tank mixable and high NUE

Can replace last 30 kg soil applied N?

5/1 rate for rate (30 kg soil = 6 kg leaf)

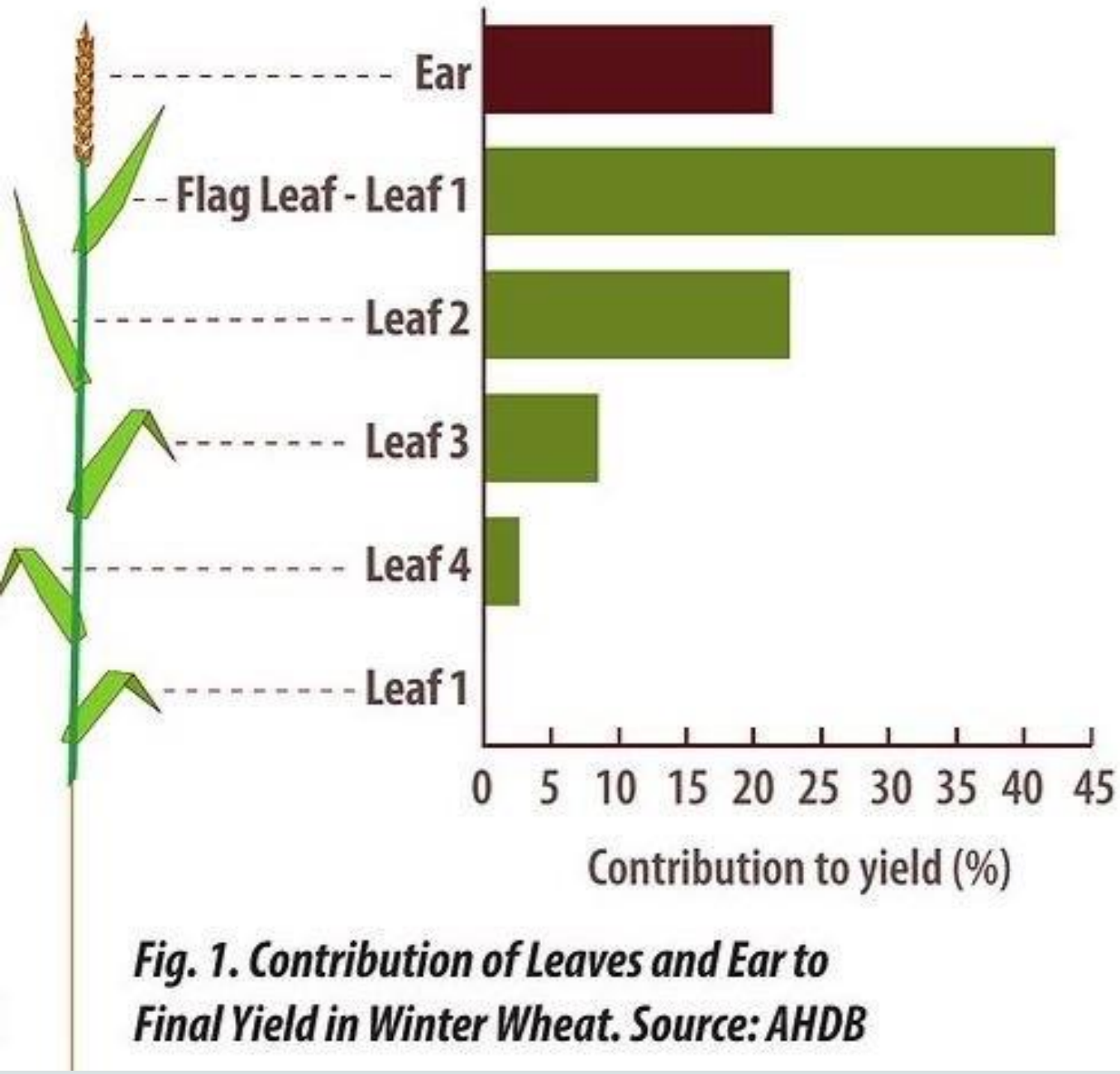
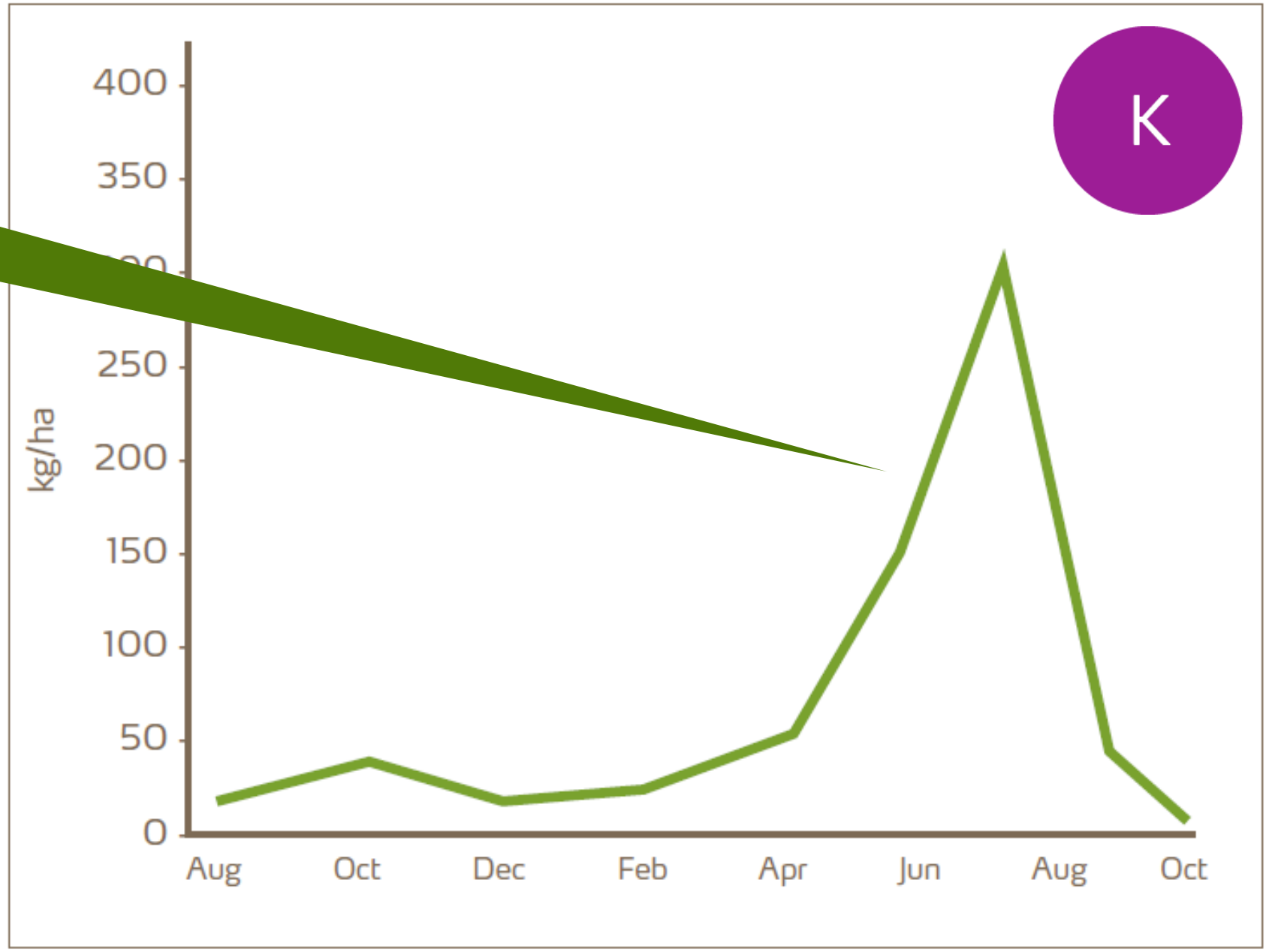


Fig. 1. Contribution of Leaves and Ear to Final Yield in Winter Wheat. Source: AHDB

Mg

up to 10 kg/ha K_2O uptake per day



Take Home Messages

- There is no silver bullet just get the basic right!
- Sulphur is vital for improving NUE

SCS Spreader & Sprayer Testing Ltd

- Determine N rate by calculating your average N price
- Use tools / calculators available to maximise NUE

- https://www.yara.co.uk/crop-nutrition/farmers-toolbox/fertiliser-calculators/

- Don’t ignore “micro nutrients” they are important
- Foliar nutrition can optimise crop yields

YaraVita™