

Grain nutrient analysis and benchmarking webinar

Roger Sylvester-Bradley, Sajjad Awan and Teresa Meadows

Housekeeping



@rogersylbrad
@CerealsEA
@AHDB_Cereals

**Nutrient Management
Guide**

ahdb.org.uk/rb209

BASIS/NRoSO Points



1 Point

Name; BASIS Account No; Postcode



1 Point

Name; NRoSO Member No; Date of Birth;
Postcode

Format



19:10	Theory, principles and evidence behind grain nutrient analysis <i>Roger Sylvester-Bradley, ADAS</i>
19:25	Using grain nutrient analysis on-farm <i>Roger Sylvester-Bradley, AHDB and Sajjad Awan, AHDB</i>
19:35	Questions and discussion
19:50	Nutrient management planning and RB209 reminder for harvest 2021 <i>Sajjad Awan, AHDB</i>
19:55	Closing comments <i>Teresa Meadows, AHDB</i>
20:00	Close



Your host...
Teresa Meadows
*Knowledge Exchange
Manager (East Anglia)*

Session objective



How to carry out, analyse and use the results of grain analysis on-farm.

Q: What would you like to know by the end of this session?



Grain Nutrient Analysis

Roger Sylvester-Bradley

Boxworth, Cambridge

MONITORING CROP NUTRITION – OVERVIEW:



- SOIL analysis .. tells about availability



- LEAF analysis .. indicates immediate crop status



- GRAIN analysis .. NEW .. tells about ultimate nutrient capture



- Significant value in sharing results ... BENCHMARKING

Analysing grain for nutrients



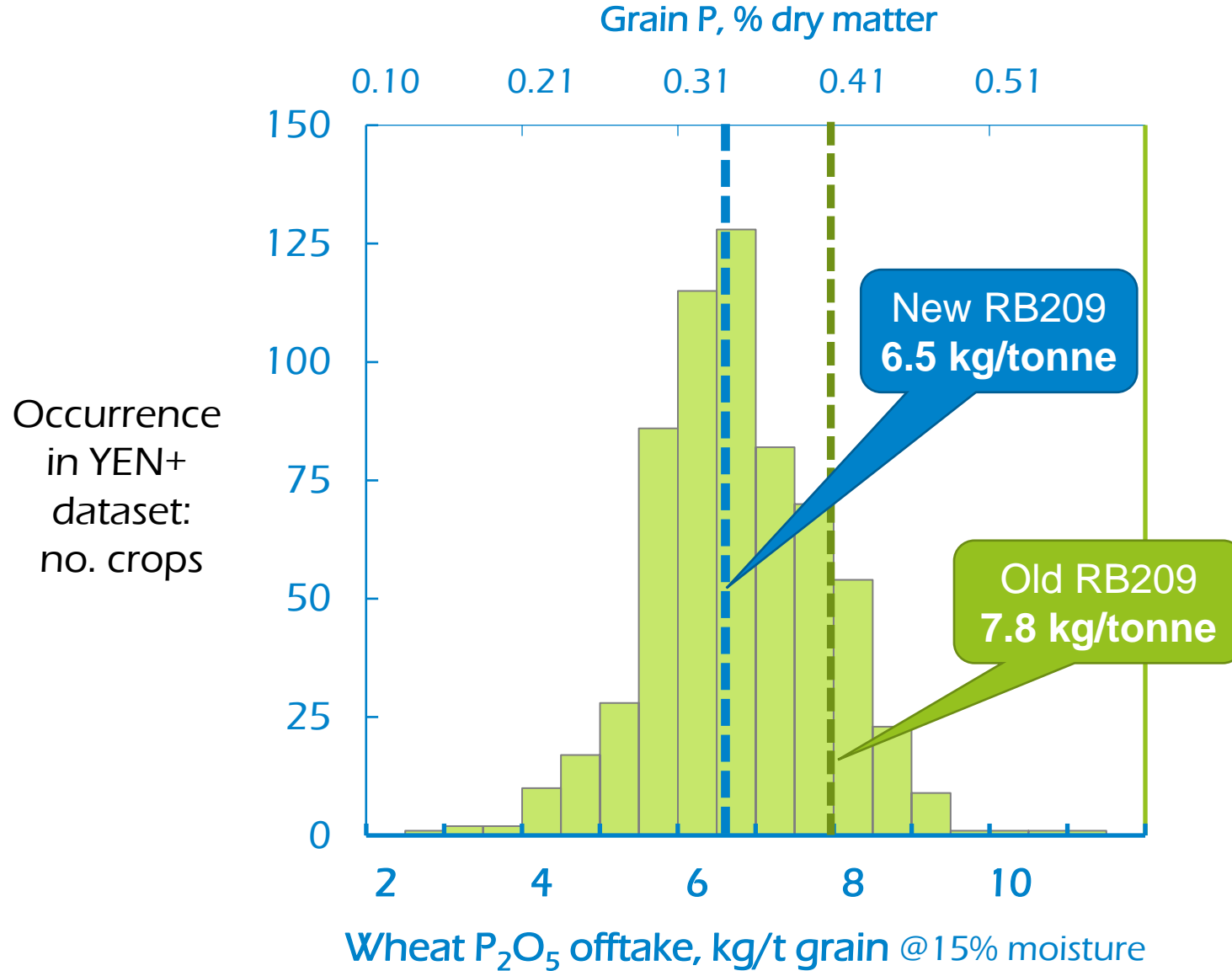
- Easy & accurate representative sampling of whole fields

Threes uses:

1. Measures P, K, etc. offtakes
2. Cross-checks soil analyses
3. Gauges possible nutrient deficiencies.

VARIATION is usually LARGE: e.g. grain P

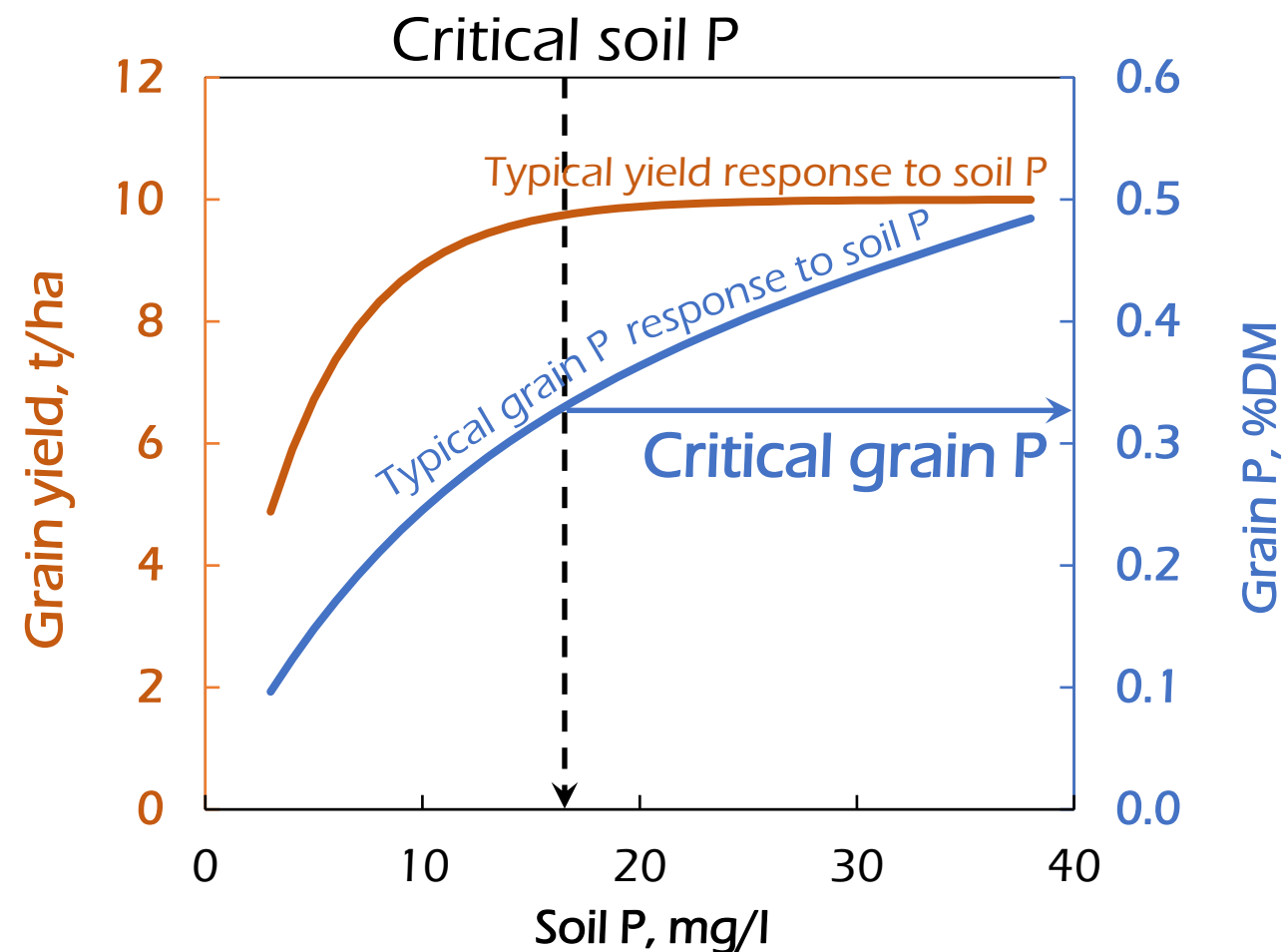
from the Cereal YEN⁺



⁺AHDB, Yara & ADAS data plus



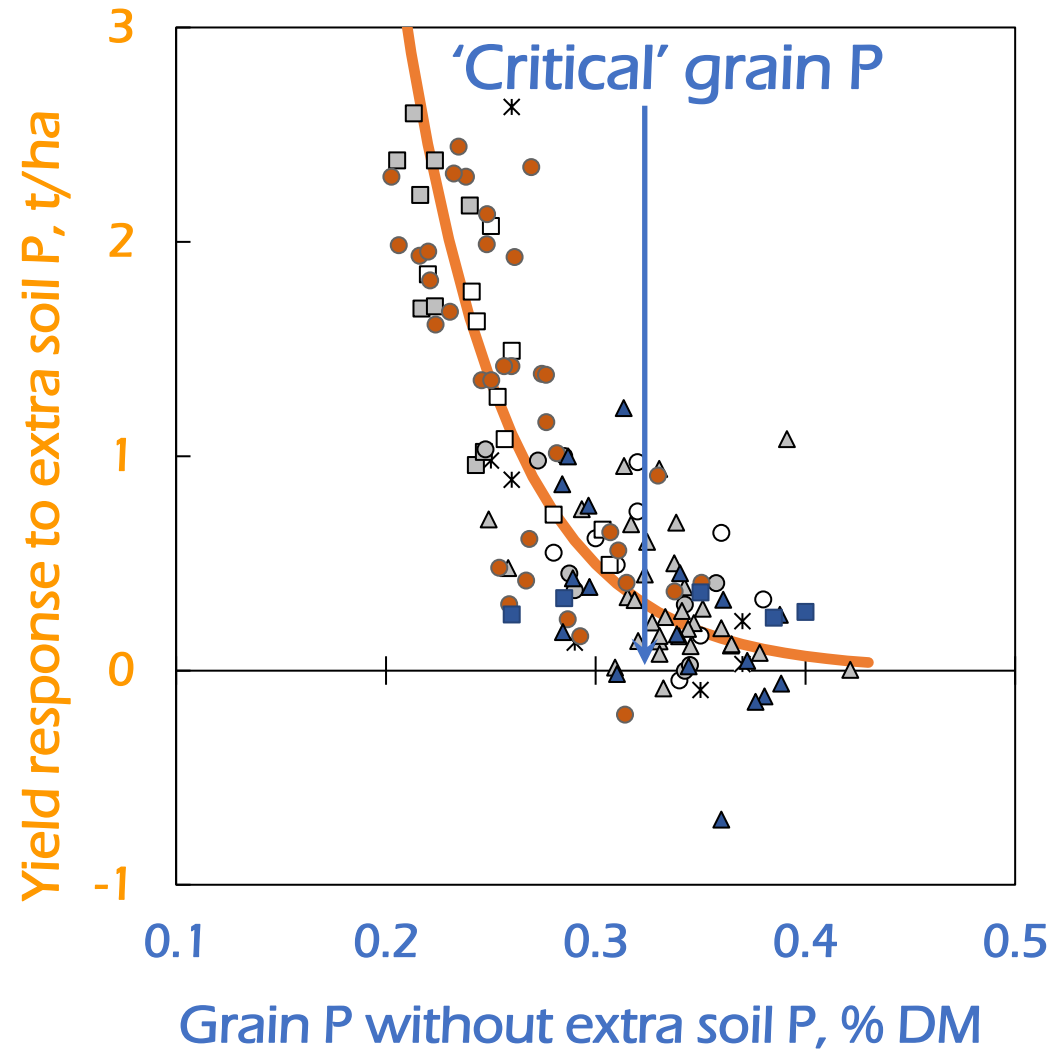
Grain concentrations are DIAGNOSTIC ... e.g. phosphorus



SOIL P INDEX:

0	1	2	3
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Evidence for INTERPRETING GRAIN ANALYSIS ... example of phosphorus



Old UK & Foreign data:

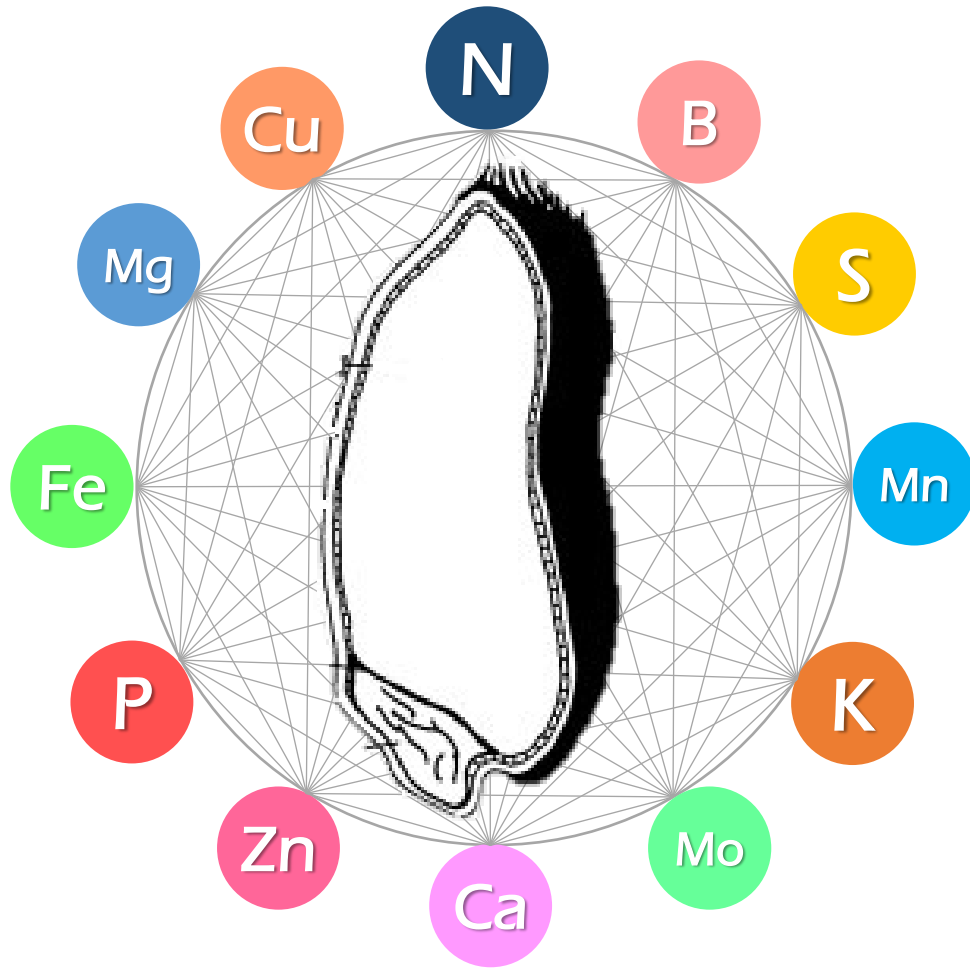
- * Stapleford '76-88
- ADAS '70s, 9 sites
- Tumby Bay wheat
- Tumby Bay barley
- Tylstrup, Denmark
- △ Finland, 17 sites

New AHDB data:

- Peldon 2015 & 2016
- ▲ Gt Charlton 2016
- Cholsey 2016

Grain analysis reports ALL 12 NUTRIENTS

... BUT we only know about four .. at present!



	Critical value in grain DM	Depends on variety
Nitrogen, N	1.9 %	
Phosphorus, P	0.32 %	
Potassium, K		
Sulphur, S	0.12 %	
Magnesium, Mg		
Calcium, Ca		
Iron, Fe		
Manganese, Mn	20 ppm	
Zinc, Zn		
Copper, Cu		
Boron, B		
Molybdenum, Mo		

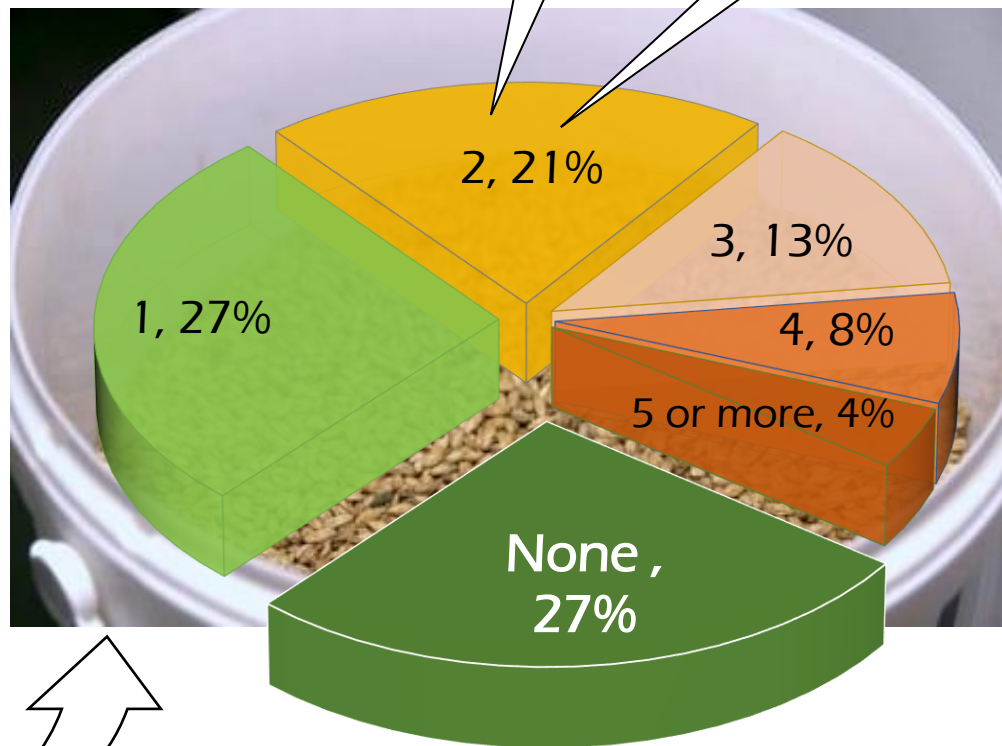
LESS
CERTAIN
values

Unknowns

On UK arable farms, **NUTRIENT DEFICIENCIES** appear to be **COMMON**

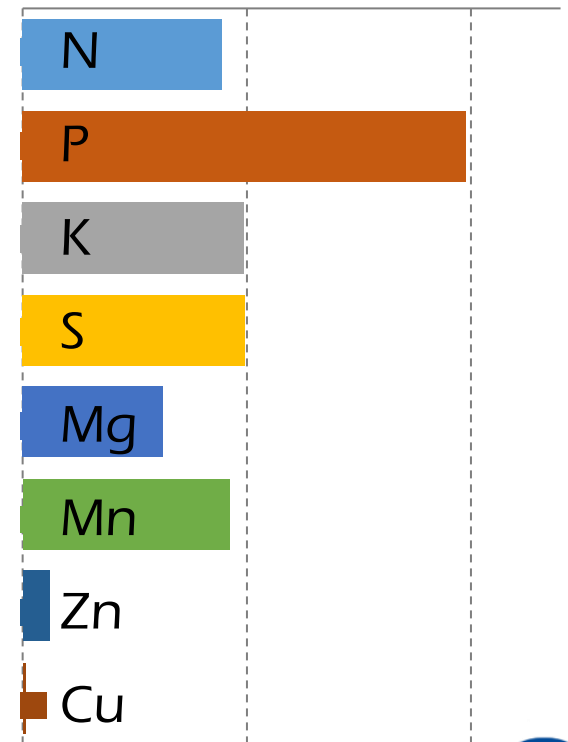


Deficiencies in grain samples from 633 YEN⁺ crops after harvests from 2016 to 2018:



Occurrence of deficiencies


0% 25% 50%



YEN⁺: Data from the YEN (by NRM), plus the Grain Nutrient Benchmarking pilot were supported by ADAS, AHDB & Yara (Lancrop)









PLANNING Grain Nutrient Analysis ... with Benchmarking




GRAIN NUTRIENT SAMPLING 2020

procedure at farm's grain intake point

- 1. LABEL BUCKETS**
Clearly label containers ready to collect grain from each field.
- 2. SAMPLE EACH LOAD**
Take two half cupfuls from each trailer as it is being tipped and place them in the labelled bucket for the correct field.


- 3. SUB-SAMPLE INTO BAG:**
When the whole field is harvested, mix the grain in each bucket and bag-up a sub-sample (~200g; 8oz), WITH ITS CORRECT LABEL

- 4. STORE & DESPATCH**
When all fields have been harvested, complete despatch form, and send all together to your chosen lab. AND ... RECORD YIELDS on-line




For further details go to: www.yen.adas.co.uk/projects/yen-nutrition

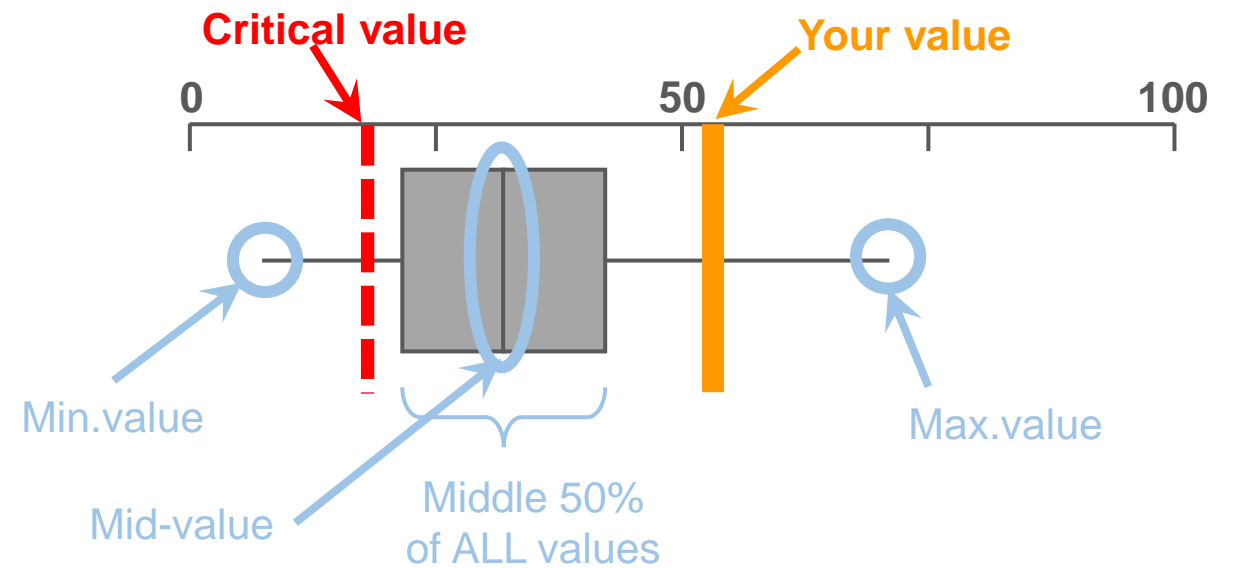
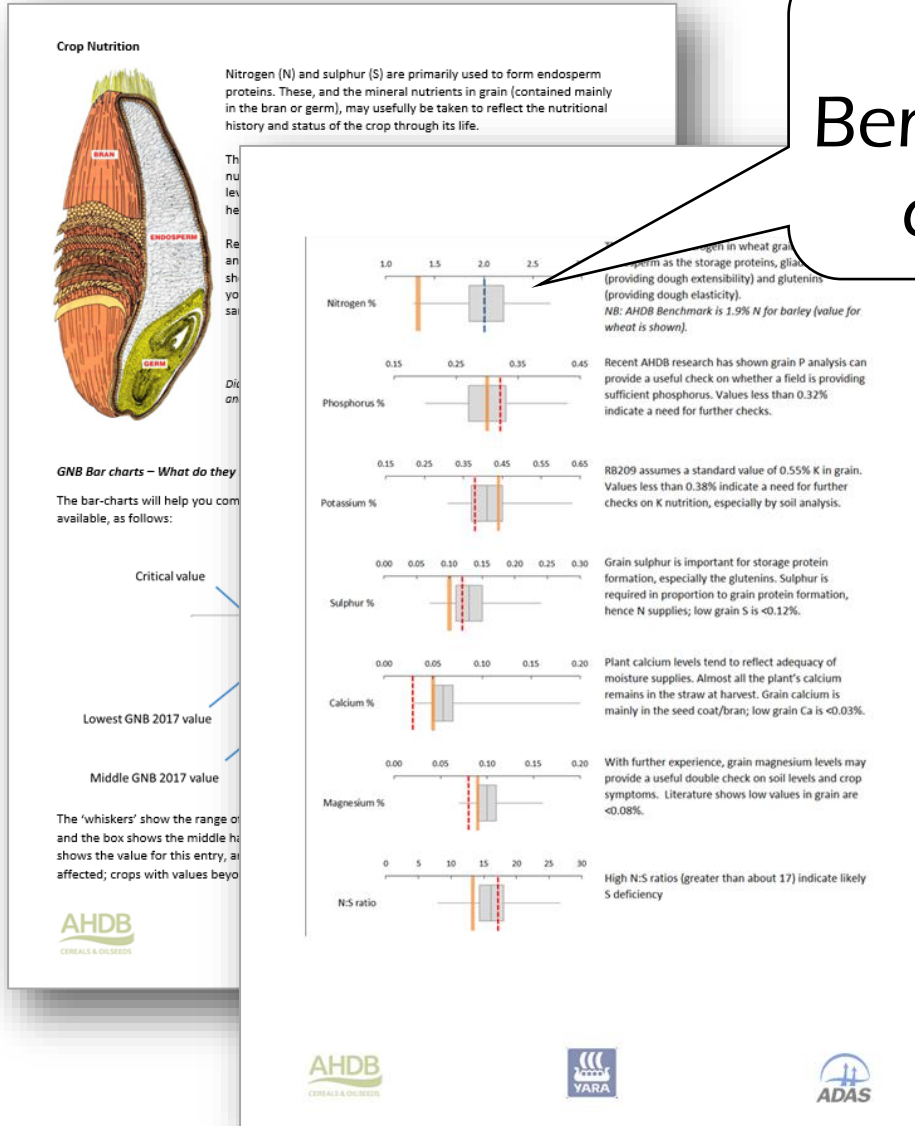


Extra information needed for Benchmarking

- Location
- Crop type & variety
- Grain yield & moisture
- Soil texture
- Soil pH, P, K & Mg
- Recent fertiliser use
- Recent organic manure use.

Reporting Grain Analysis ...

with
Benchmarking
diagrams



MONITORING CROP NUTRITION – OVERVIEW:



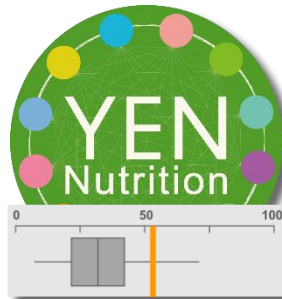
- **SOIL analysis tells about availability**
 - But is not fully reliable
 - Needs cross-checking



- **LEAF analysis indicates immediate crop status**
 - Can support corrective sprays etc.
 - Problematic to interpret ... weather effects ... 'norms' change as crops age
 - Uncertain thresholds / critical values



- **GRAIN analysis tells about ultimate nutrient capture**
 - Most accurate, precise & easy
 - Embraces soil supply, rooting, foliar sprays and any soil moisture issues
 - NEW .. so Significant value in sharing results ... either informally, .. or with organised BENCHMARKING



Using grain nutrient analysis on-farm

Roger Sylvester-Bradley and Sajjad Awan

Any questions?

Please use the chat function



Nutrient Management for 2020/21

Dr. Sajjad Awan

Resource Management Scientist, AHDB



Maximise the benefits of nutrient management plan by cutting losses



For accurate and precise nutrient management, attention to detail is essential

The '4R' rule for nutrient management:

- Right Source: AN, Urea, DAP, TSP
- Right Rate: Match the crop requirement;
 - Accuracy of yield prediction is crucial
- Right Time: Autumn vs Spring applications
- Right Place: broadcast vs incorporated/injected



Future development of RB209



Currently 3 main projects are in progress;

1. Updating N & S fertiliser recommendations for spring malting barley: April 2021
2. NOatS: Nitrogen and Sulphur management of spring oats: May 2022
3. Nitrogen and sulphur fertiliser management to achieve grain protein quality targets of high yielding modern winter milling wheat: March 2022





Sajjad.Awan@ahdb.org.uk

024 7647 8787
07815 505800



A series of thin, white, wavy lines that flow from the left side of the slide towards the right, positioned above the main text area. The background of the slide is a gradient of blue and green, with the blue being more prominent on the left and the green on the right.

Further information

RB209 Updates



Section 1

Crop analysis

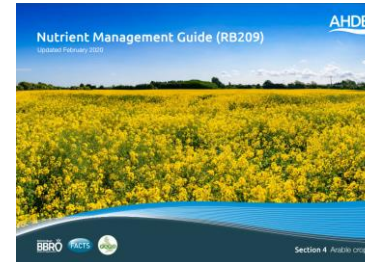
Crop analysis can target leaves, to indicate whether the P or K concentrations in crops are at, or below, optimum levels at a particular point in time. Analyses of grains, tubers and other harvested materials can also be used to check the final crop nutrient status and nutrient offtakes.

Crop analysis should not substitute for a good soil-testing programme and it will be more effective when used in conjunction with soil testing.

To provide meaningful information, testing should be carried out at a defined growth stage and on a specific part of the plant, for which standard thresholds are known. For example, for winter wheat, testing is best carried out on the newest fully expanded leaf blade during stem extension (between GS31 and GS39). At such times, diagnostic sampling in good and bad parts of a crop can be a useful method to determine whether there is a nutrient deficiency.

Laboratories typically analyse plant tissue for nutrients by measuring their concentrations in the dry matter. Critical or threshold concentrations are known for some nutrients in some crop species (see Sections 3–7). Threshold levels tend to decrease as the crop grows. A threshold level of 0.32% P in wheat grain has been shown in recent research. P and K concentrations can also be measured in the leaf tissue water (cell sap) on farm using appropriate equipment, but these are prone to short-term fluctuations and may be less useful.

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Section 4

Grain analysis to improve phosphate management

Grain P and K analyses can provide better estimates of crop phosphate and potash offtakes than the typical values in Table 4.11. This information also complements soil analyses for P and K. AHDB-funded research on P nutrition has shown that the critical level of grain P in winter wheat is 0.32% (or 3,200 mg/kg). Grain P contents repeatedly below this level in crop P uptake was deficient enough to reduce grain yield.

Crop P deficiencies may arise through low soil P supplies, poor rootir poor growing conditions (e.g. dry topsoil). If soil conditions are satisf but a field repeatedly shows grain P deficiency, available soil P shoi increased for future crops. For example, by applying organic mater inorganic phosphate more frequently or at increased rates. Subser analyses should confirm if this strategy was successful.

Collection of grain samples

- Grain samples must be representative of fields or areas from soil analyses are taken
- Samples should not be taken from stores where grain from different fields has been combined
- Representative samples should be taken from each field, by sampling grain from each trailer load
- Sampled grain should be mixed and approximately 200 g should be put in a clearly labelled plastic bag, with sufficient information to identify the farm and field, and sent to the laboratory

Interpretation of grain analysis results

To calculate grain phosphate and potash offtakes, grain P and K concentrations should be converted to kg P₂O₅ and K₂O per tonne of grain at 15% moisture using the conversion factors on page 46.

Example 4.7
Using nutrient contents from laboratory analysis and conversion factors (on page 46), estimate nutrient removal.

Laboratory analysis shows that the grain P content was 0.45% and grain K was 0.40% from a winter wheat crop yielding 10 t/ha, with straw incorporated.

Nutrient removal = yield x grain P/K content x conversion factor	
Phosphate	= 10 x 0.45 x 19.5 = 88 kg P ₂ O ₅ /ha
Potash	= 10 x 0.40 x 10.2 = 41 kg K ₂ O /ha

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Resources

- Nutrient Management Guide – 7 sections
- Nutrient Management App
- Fertiliser Prices
- AHDB GREATSOILS website



Wider resources

- Cereals and Oilseeds Webinar Archive
- **Website:** ahdb.org.uk/cereals-oilseeds
- **New events:** ahdb.org.uk/events

AHDB Agronomy Week 2020

Monday 30 November – Friday 4 December



- Daily webinars focusing on varieties, soils, pests, water and diseases
- Exclusive sessions for new intake agronomists and advisors
- Opportunity to network with delegates, speakers, AHDB research managers and exhibitors with our easy-to-use virtual event platform
- Free to attend
- BASIS points will be applied for



More information available soon
ahdb.org.uk/events
or email emily.pope@ahdb.org.uk

Thank you for listening



REC ●



@rogersylbrad
@CerealsEA
@AHDB_Cereals

Teresa Meadows
teresa.meadows@ahdb.org.uk
07387 015465

Next webinar: Managing BYDV – 2 September, 7pm

ahdb.org.uk/rb209