

Advice Sheet 46: Grain Check Service

Introduction

Most nutrients acquired by crops are concentrated in the seed at harvest (not Calcium); routine assessment of grain at this time provides a robust 'end of term report' on the performance of the crop nutrition policy for any crop on any farm. The latest version of the industry's crop nutrition guide RB209 also recommends routine grain analysis. Grain nutrient analysis indicates the crop's success, through good rooting and growth, in recovering nutrients from the soil, as well as nutrient availability in the soil. We must emphasise that annual grain analysis should augment rather than replace routine soil nutrient analysis. A soil analysis predicts availability of a nutrient to a crop, so unless this information is available, it will not be possible to determine if the issue is one of soil supply (corrected by increasing manure and fertiliser applications) or alternatively if the deficiency can be attributed to a rooting problem for example, where the focus would be on improving the soil structure. Leaf analysis is also an important tool, but typically this will aid decisions on tactical nutrient applications during the growing season.

Sampling

Take a sample from each load

As each grain trailer is tipped at the farm's grain intake point, the operator should take a couple of sub-samples (*e.g.* a half cupful taken at points one third and two thirds through tipping) and place them in a bucket (one for each field, or field-zone). We should note that because grain loads straight from the combine harvester are relatively uniform, two samples from each load is sufficient.

Mix all samples from within each field

After the LAST trailer from a field is tipped, the operator should mix the bucket thoroughly and put a subsample (200g) into a bag, pre-labelled with all the essential details (client code, farm name & address, field identity etc.)

Save samples from all fields and send for analysis

Samples from each field should be stored until after harvest is complete and then samples from all fields can be sent to NRM along with the relevant paperwork indicating the analysis suite required:

A521 GRAIN CHECK SUITE - Includes Nitrogen, Phosphorus, Potassium, Sulphur, Calcium, Magnesium, Manganese, Copper, Zinc, Iron and Boron with N:S ratio.

A522 GRAIN CHECK SUITE PLUS – as above with the addition of Molybdenum (this is an optional extra as it is run separately as the low levels require a different instrument).

This service is suitable for cereals, oilseeds and pulses.

Analysis

Grain samples are prepared by drying at 105°C and finely grinding in a centrifugal mill.

A representative portion of the prepared sample is digested in an open vessel with concentrated nitric and hydrochloric acid (reverse aqua-regia) using a temperature-controlled digestion block. This is then analysed by ICP-OES for Phosphorus, Potassium, Sulphur, Calcium, Magnesium, Manganese, Copper, Zinc, Iron and Boron. Molybdenum is determined by ICP-MS as a lower detection limit is required.

Total Nitrogen is determined by a Dumas combustion analyser - high temperature combustion under an oxygen-rich atmosphere and detection of the resultant gases by TCD (thermal conductivity detector).

Results and interpretation

The results are reported on a dry matter basis (using the residual moisture % in the prepared sample).

The measured quantities for each nutrient are presented alongside the target value for comparison which will identify any shortfalls. Please see the enclosed example report on the final page.

Interpretation alongside soil samples and plant tissue analysis by a FACTS qualified advisor is vital.

For further information see

<https://www.yen.adas.co.uk/news/adas-launches-global-first-grain-analysis-initiative-improve-crop-nutrition>

Contact

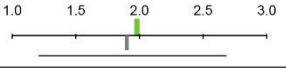
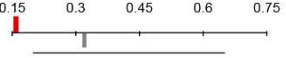
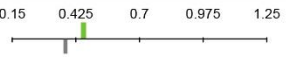
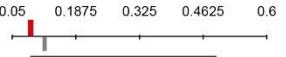
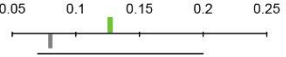
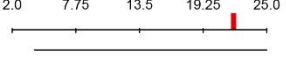
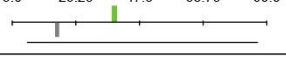
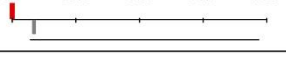
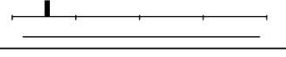
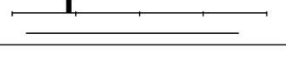
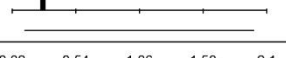
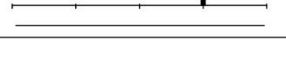
Advisors and Growers can request a grain sampling kit from NRM by emailing enquiries@nrm.uk.com



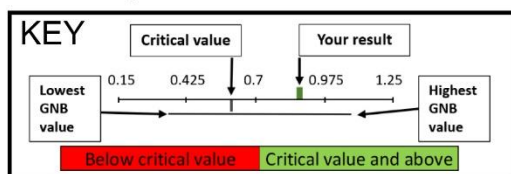
GRAIN CHECK REPORT



Report No: 19060	Cropping:	Farm Details:	Client:
Sample No. 255796	WINTER WHEAT	HOME FARM BRACKNELL BERKSHIRE RG42 6NS	U 49
Sample Ref. EXAMPLE			ANALYSED BY COURTESY OF NRM LABORATORIES COOPERS BRIDGE BRAZIER'S LANE BRACKNELL BERKSHIRE RG42 6NS
Received: 19/08/2020	Reported: 09/06/2021		

Element	Result (D.M. Basis)	Critical Value	Interpretation	Comments
Nitrogen	1.98 %	1.9 *		The critical value for N of 1.9% is variety dependent. Probably the best critical value to use for wheat varieties, is the lower of the two protein values given for each variety in the AHDB recommended list.
Phosphorus	0.159 %	0.32 *		Values of less than 0.32% in dry matter indicate a need for further checks on P nutrition
Potassium	0.458 %	0.38 **		RB209 assumes a standard value of 0.55% K in grain. Values less than 0.38 indicate a need for further checks on K nutrition, especially in soil analysis
Sulphur	0.09 %	0.12 *		Grain sulphur is important for storage protein formation. Sulphur is required in proportion to grain protein formation, hence N supplies. Low grain S is <0.12%
Magnesium	0.127 %	0.08 **		Values of less than 0.08% indicate low levels in grain. With further experience, grain Mg may provide a useful check on soil levels.
N:S Ratio	22.0:1	17:1 *		A good Sulphur supply would mean an N:S ratio lower than 17:1. Anything greater than 17:1 suggests that the crop may have suffered from Sulphur deficiency
Copper	6.47 mg/kg	2 **		Grain copper <2mg/kg indicates possible deficiency
Manganese	39.1 mg/kg	20 *		Values of less than 20mg/kg indicate a need for further checks. Grain levels may provide a useful check on leaf tissue analysis
Zinc	<2 mg/kg	15 **		Zinc values <15mg/kg are low, but whether these should be regarded as limiting is uncertain
Boron	0.96 mg/kg	***		There are currently no guidelines for Boron interpretation
Calcium	0.060 %	***		There are currently no guidelines for Calcium interpretation
Iron	42.5 mg/kg	***		There are currently no guidelines for Iron interpretation.
Molybdenum	1.58 mg/kg	***		There are currently no guidelines for Molybdenum interpretation

ADAS adopt three levels of confidence with the critical values - Reliable (*), Uncertain (**) & Unknown (***).



Ranges and comments sourced from 'Cost effective phosphorus management on UK arable farms (2019): Grain Nutrient Benchmarking (GNB): A. Rollett & R. Sylvester-Bradley. Project code PR-570

Critical values are based on winter wheat and are not yet available for oilseeds or pulses. Benchmarking against other concurrent crops will be the most reliable means of interpreting any analysis for these crop types.

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