



“ Since we started to highlight the issue we’ve seen a reduction in the number of cereal crops that are being reported deficient in magnesium.”

Tissue testing

A wealth of nutritional data has been collected during the past seven years, allowing the analysis of regional and national trends. CPM hears how one farmer has been contributing to the data set and the benefits tissue testing has had on his business.

**Janine Adamson
and Rob Jones**

Nutritional nuances

growing season and making subsequent corrections using regular foliar applications, something that’s supported by his agronomist Matthew Beech from Agrii.

Matthew says having used SAP testing through a previous farming role, he continued to have an interest in nutrition when he switched over to agronomy. And with Peter already undertaking tissue sampling before participating in YEN, it made sense to compare the two methods, so no stone was left unturned, he adds.

“The aim is to understand what’s going on in the crop to maximise output where we can,” explains Matthew. “We want to identify issues before we can physically see them in the field and address the ‘hidden hunger’ by delivering nutrition to the plant through its foliage for optimum uptake.”

a complete overview of a plant’s nutrient uptake while detecting deficiencies and/or excesses before visible symptoms appear.

But why did FMC commit to running such a programme? Chris says it began when the company started to see trends in nutrient analysis but didn’t have the information to back up such hunches. “We started to collect data with a view to building a picture of trends over a few years.

“At the beginning we only looked at

Finessing crop nutrient requirements through utilising regular tissue analysis has helped one East Yorkshire farmer to grow an award winning crop of winter wheat while contributing to a national data set.

Peter Southwell and his family run Sancton Hill Farm near Beverley, overseeing 250ha of arable cropping. A long-time participant in the Cereal Yield Enhancement Network (YEN), the farm won last year’s YEN award for the highest yield in the northern region with a 12.09t/ha crop of Champion winter wheat.

Peter credits much of his success to analysing crop nutrients throughout the

Tissue testing programme

Two years ago, Sancton Hill Farm teamed up with Chris Bond, product manager for crop nutrition at FMC, to take part in the company’s nationwide tissue testing programme. This was with the goal of improving the farm’s YEN results even further.

“With Chris, we had the chance to compare and contrast three different tests, including SAP and conventional tissue testing, as well as utilising his expertise in nutrition,” explains Peter.

But how do the tests differ? Conventional tissue testing reports the level of nutrients in a sample whereas SAP analysis has been coined as a blood test for a plant – offering



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cereals, but since then testing has expanded to include a number of other crops. However, cereals is the biggest data set with almost 5,700 samples from seven years of testing," he says.

For the farmer or agronomist, sample collection is straightforward, says Matthew. "For both SAP and conventional testing, you put the sample in the bag, then into a pre-paid envelope, which you send off the same day.

"We take samples before each plant protection product application as most of the available nutrition products have good compatibility, allowing them to be applied at the same time as the fungicide programme, for example. This reduces the requirement for additional application passes with the sprayer.

"In some cases, we found the SAP testing detected deficiencies sooner than tissue testing. An example being, magnesium deficiency showed up at T0 with a SAP test but not until T1 from tissue testing."

The significant amount of data collated by FMC means Chris and his colleagues have seen both long-term trends and seasonal differences. "One message we've reinforced during the years is the importance



According to FMC's Chris Bond, a trend which stands out from the firm's latest data is the increase in crops short of zinc, something which has occurred during the past couple of years.

of applying magnesium throughout the whole season, not just at the flag leaf stage," he comments.

"Since we started to highlight the issue, backed by the results from the programme, we've seen a reduction in the number of cereal crops that are being reported deficient in magnesium.

"It has many functions, particularly its role in chlorophyll production and light capture for photosynthesis, but also releasing ATP (known as a cell's energy currency) in the photosynthesis pathway," explains Chris. "So if you don't have sufficient magnesium, your



For both SAP and conventional plant tissue testing, sample collection should be straightforward.



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Tissue testing

▶ plant is never going to grow to its full potential through the season, especially building proteins and producing yield.”

Another trend which stands out from the latest data is the increase in crops short of zinc, something which seems to have occurred during the past couple of years, says Chris. As a result, this has become a greater focus for the company.

“Although growers know zinc is important, it can be somewhat overlooked. However, it’s involved in a lot of biological processes such as early root development, plant hormone production, cold stress responses, building chlorophyll and activating the enzymes necessary for protein synthesis, so any increase in deficiency is a cause for concern.”

This year has also seen more crops with below optimum levels of sulphur

and boron. “This is likely to have been caused by the extended wet weather we’ve experienced with the boron and sulphur potentially leaching from the soil. Because zinc becomes insoluble in cold, wet soils, it’s then unavailable to the crop,” explains Chris. “The cold weather also slows the biological processes in soils, which will further reduce zinc availability.”

Having such a comprehensive data set has allowed FMC to analyse regional trends around the country too. For some nutrients such as zinc, copper and sulphur, a north-south divide is becoming evident, with crops in the South and East often containing lower levels.

Elsewhere, the North-East (including Yorkshire) has shown lower than average levels of magnesium deficiency during the past seven years alongside boron

and manganese deficiency. However, there’s generally better levels of in-tissue nutrients than the national average.

“Although zinc levels are better than the national average in the North-East, it’s still a relatively high level of deficiency,” comments Chris. “At the same time, you’d expect manganese issues on the sandy and high-pH chalky soils which are common in the region.”

Manganese deficiencies

Reflecting on these results in respect to his farm, Peter says testing during recent years has detected the classic manganese deficiency you’d expect on the Wolds, as well as some issues with zinc and copper, particularly in dry springs.

“This year, with it being wetter, while we did detect some issues with zinc, we didn’t see the low levels of copper we might otherwise have expected, which then makes it harder to know if we should be applying foliar copper as a precaution,” he continues.

“During the years we’ve started to build up a pattern, but there are differences each season. For example, this year we had low levels of calcium which we haven’t seen previously.”

Matthew adds: “We’ve seen a few different issues this year that we didn’t expect, and those differences each season underline how important constant monitoring is to know what’s actually going on in the crop.”

Where growers experience micronutrient deficiencies, the use of foliar products is one of the easiest ways to correct problems during the growing season, suggests Chris.

“You’re applying a relatively small amount of that nutrient to take the crop from deficiency to sufficiency, and are bypassing problems in the soil such as temperature which may be causing that deficiency in the first place,” he stresses.

This has been the approach adopted by Peter, who says he uses FMC Zinic as a source of foliar zinc. “Last year we also used the FMC Magnor magnesium product. By the time we’d got to the end, testing at T3 showed that we’d pretty much cleared all of the nutritional deficiencies in the crop. Nortrace Uptake Plus (phosphate) and Feeder K (potassium) from Agrii were also applied when necessary,” he comments.

Matthew says the farm has an issue with phosphate due to the calcareous nature of the soils, which lock-up quickly if TSP (triple super phosphate) is applied. “We can’t meet all of the crop’s demand through foliar applications, so are using digestate



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Uplift in speedy SAP

SAP analysis is becoming increasingly popular among UK farmers looking to use data to make more informed decisions and better improve crop quality, yield and profitability, says Omex's Scott Baker.

"It's now playing a role in strategic management – SAP testing is used to identify the reasons why a crop might not be performing to its potential, but is also being used successfully ahead of key fungicide timings so required nutrition can be added into tank mixes for optimum efficiency and output," he explains.

With UK-based lab facilities and 30 years of experience, the company says it recognises the requirement for the rapid turnaround of results which can then support timely decision making.

Omex's head of research and development, David Booty, explains: "It's crucial farmers are supplied with accurate data which is what we're able to provide. But not only is data accuracy important, the speed in which we supply that data to is also critical.

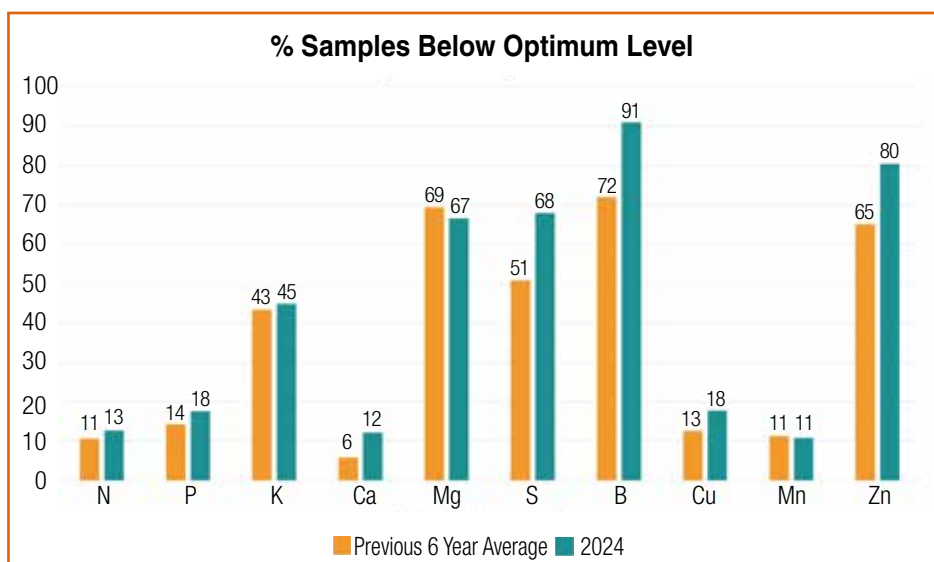
"SAP Analysis is carried out at our dedicated laboratories and the results are sent back to the customer within 72 hours, allowing real time refinements to nutrient programmes," he explains.

Each report indicates the levels of NO₃, NH₄, P, K, Mg, S, Ca, Na, Cl, Mn, B, Cu, Fe, Zn, Mo, Al in an easy to interpret bar chart, as well as pH, with interpretation conducted by a team of qualified agronomists.

"SAP is becoming an increasingly powerful tool on farm, thanks to the rapid turnaround we're able to offer," concludes David.



SAP is becoming an increasingly powerful tool on farm, thanks to the rapid turnaround Omex is able to offer, says the firm's David Booty.



National crop tissue testing results. Source: FMC 2024.

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Tissue testing

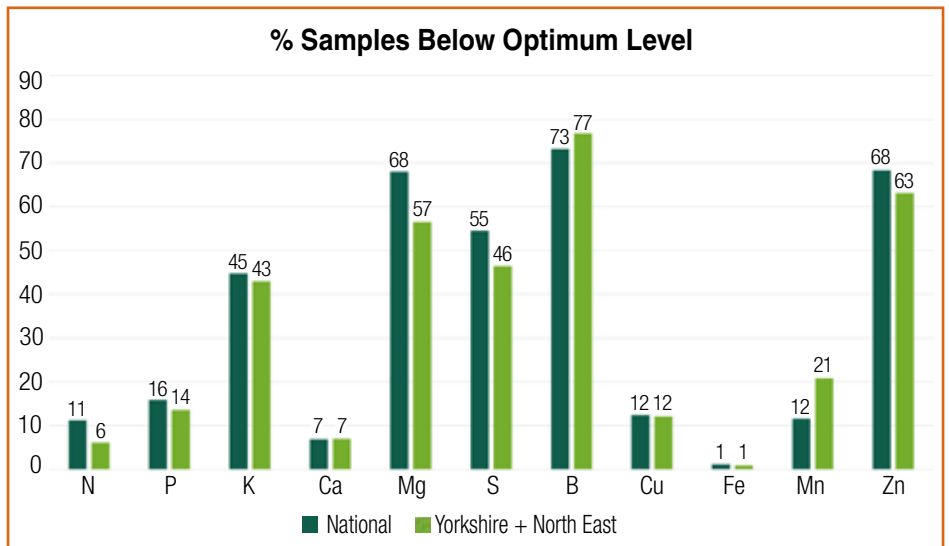
► in the rotation to try to build the indices in the soil through organic sources.”

He adds there was a particular focus on magnesium and zinc last year, the success of which was demonstrated by the resulting crop yield and grain analysis results, which showed protein, magnesium and zinc levels all at the higher end.

“It was encouraging to see in the grain analysis from the YEN report, showing we’d met the demand of the crop through foliar applications driven by the analysis results, ensuring nutrient deficiency wasn’t the limiting factor on yield,” comments Matthew.

Furthermore, Peter says grain phosphate results were above average, which given the relatively high yield for the year, showed the crop had utilised what was applied. “I don’t want to use a lot of bagged nutrients – phosphates in particular because they just get locked-up – although we’ll apply DAP down the spout when drilling oilseed rape or spring barley to feed the crop from underneath, while continuing to use digestate and compost.

“We also practice minimal ‘scratch’ tillage, so tend to keep nutrients in



Tissue testing results national versus Yorkshire & North East. Source: FMC 2024.

the top layer of soil and recycle them as fast as we can,” he explains.

While the historic focus has been on crop testing, Matthew adds that the farm is also looking to improve nutrient use efficiency (NUE). “This year we applied fulvic acid with the foliar nutrient applications to

try and improve uptake by the crop.

“We’re also undertaking trials looking at the level of bagged nitrogen versus foliar nitrogen – again with the addition of fulvic acid – and will analyse the grain at harvest to assess NUE and compare that with the field yield maps,” he concludes. ■

FieldSense launch

‘Precision in partnership’ is the promise from agronomy firm ProCam, having launched its new precision farming tool – FieldSense.

The platform is the latest in a family of services following the reveal of SoilSense last year, says managing director, Alex Collingwood. “FieldSense isn’t a data collection exercise, its aim is to add value to farming businesses through meaningful, achievable information which enhances agronomic advice.”



With no official packages or tiers, ProCam’s Nigel Scott says FieldSense is completely flexible without growers having to lock in or commit.

And rather than being rolled out from the ‘top down’, it’s been developed in close conjunction with agronomists and farmers. “That’s perhaps why we’re a little late to the party – we’ve taken time to work with growers to test and develop the system,” says agronomist for the North East, Nigel Scott.

“The concept of FieldSense is to provide a farmer-focused digital platform where growers work together with their agronomists for in-depth insight. All data is important, but agronomic knowledge is key,” he adds.

In terms of functionality, FieldSense offers a range of pick and mix services, which Nigel says are fully customisable. These include variable rate nitrogen applications using NDVI, soil sampling to 1ha grid, variable rate lime, P & K from soil test results, variable rate seed using satellite performance maps, and yield mapping data input.

Information is held in an app and hosted on the cloud and once in use, FieldSense can generate concise reports to assist with record keeping. It can also be integrated with Gatekeeper or other popular digital platforms.

“Importantly, there are no official packages or tiers, it’s completely flexible without having to lock in or commit,” adds Nigel. “It’s not just for large-scale operations, it’s ideally placed to work with



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smaller or mixed farming systems too.”

Furthermore, growers can trial a small area of their cropping rather than the whole farm, accommodating those who are just beginning their precision farming journey. The pricing structure reflects this, with growers only paying for the modules being used, says Nigel.

“As agronomists, we’re often at the kitchen table working with multiple generations of farming families. Being able to continue to use that knowledge, supported by FieldSense, is what can deliver strong results,” he concludes.