

“ There’s a realisation that autumn-applied sulphur plays an important part in helping to capture residual and mineralised nitrogen in the soil. ”

Sulphur management

Following wash-out conditions during the past year, early-season sulphur applications could do much to boost crop establishment this autumn and create the foundation for optimising nitrogen utilisation next spring. CPM finds out why sulphur management deserves more attention.

By Rob Jones

Sulphur deficiency is becoming an increasingly widespread issue in modern crop production even in areas previously considered to have sufficient levels of the nutrient. That was the message shared by Professor Jorgen Eriksen of the Department of Agroecology at Aarhus University, Denmark, recently.

Across Europe and in other countries, a combination of reduced atmospheric levels of sulphur, increasingly wet conditions and poor availability of the nutrient in most organic sources of fertiliser,

The forgotten nutrient

is becoming a real concern, he told delegates at the International Fertiliser Society Conference in Cambridge.

“Sulphur is often called the forgotten nutrient, yet it’s one of the most important in terms of optimising plant health, making sure nitrogen is used by plants as effectively as possible, and ensuring the best yields and quality.

“With reduced emissions from industry and power generation, there’s now no more than a few kg/ha of sulphur available from the atmosphere and any sulphate present in the soil is vulnerable to leaching in much the same way nitrates are,” he says.

“Due to increasingly wetter conditions during the winter and spring – frequently seen as a result of climate change – there’s virtually no carry over of sulphate from one year to the next in many areas.”

All-time low

ICL Growing Solutions’ Scott Garnett says the past 12 months of weather in the UK have more than proven the point. “Many agronomists are saying soil sulphur levels are at an all-time low in many parts of the country and urgent action is required to address the problem. It’s been an issue for many years now, but the last season has put it into even sharper focus.

“Sulphur is used in the production of several amino acids required for protein and oil synthesis, as well as



Agronomists are reporting soil sulphur levels are at an all-time low in many parts of the country and urgent action is required, says ICL Growing Solutions’ Scott Garnett.



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being essential in chlorophyll formation, nitrogen stabilisation and nodule development in legumes. Furthermore, sulphur deficiency can reduce oil content in oilseeds and affect baking quality in wheat," he adds.

"Independent analyses by Lancrop Laboratories reveals a steadily increasing proportion of soils deficient in sulphur during recent years with up to 97% of UK soils now classed as 'low' or 'critically low' for sulphur deposits."

While the problem is particularly marked this year, addressing the issue requires long-term planning, careful evaluation of available sulphur sources and timing of applications, he says. "Crops have a season-long requirement for sulphur, so it makes sense to apply more than one treatment each year, but you have to be careful about the form of sulphur applied.

"Traditional thinking has positioned sulphur as a spring application but the latest agronomic approach moves away from this. There's a growing realisation that sulphur applied in the autumn plays an important part in helping the plant to capture any residual and mineralised nitrogen in the soil as winter crops are sown."

In ICL fertiliser trials, an

autumn application of phosphate, potassium and sulphur with calcium and magnesium has been shown to boost early root mass, leading to increased biomass in the spring to ensure the crop grows away strongly, he points out.

"An autumn application of around 100kg/ha of the naturally occurring mineral polysulphate (48% SO₃, 14% K₂O, 6% MgO and 17% CaO), for example, has resulted in a 41% increase in take up of phosphate and a 28% increase in nitrogen take up.

"This has been shown to increase root biomass by 30-40% and as just one extra centimetre of root on each plant touches an extra 130t of soil over a hectare, this is highly significant," he stresses.

"The larger root mass increases the plant's ability to access more soil-bound nutrients and water leading to a stronger, healthier plant going into the winter. And the more contact with soil moisture, the better protection crops will also have against drought stress, plus the larger root structure also helps reduce soil compaction and increases organic matter."

Organic sources

Jorgen suggests that while growers are being encouraged to make greater use of organic sources of fertiliser, in reality, they contain very little plant available sulphur so timely and appropriate supplementation is essential.

"Animal manure isn't a great source of sulphur as a huge part of it is in the organic form which isn't immediately available to the plant. The other problem is that we usually have to store manure for a long time due to legislation around nitrogen, with storage times of many months and often up to a year resulting," he says.

"During that time plant-available sulphate will turn into either the organic form or sulphide, which is extremely volatile and is basically the smell of manure, but neither of these are readily available to the plant.

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Origin Fertilisers' Peter Scott believes more people are turning to polysulphate which doesn't contain any nitrogen, because it gives greater agronomic flexibility.

▶ manure, there's some content of plant-available sulphur, but the longer it's stored the less of this there is and the more of the unavailable organic forms there are."

Digestate from biogas production performs a little better in terms of sulphur availability, he points out. "When organic manures are used in digesters, plant availability of nitrogen in the resulting digestate increases compared with the raw manure or slurry.

"But this isn't the case with sulphur. The result of the decomposition

process produces volatile forms that become emissions and when the methane goes to the grid, these have to be collected in filters."

Immobilisation

Furthermore, Jorgen says the solid material leaving the digester isn't only very low in sulphur, it also creates immobilisation of sulphur in the soil. "It doesn't contribute to plant availability, it actually fixes some of the sulphate that was otherwise available.

"All-in-all, I'd say organic sources offer the potential to supply 10% of the sulphur crops require, but no more. Growers relying on manures and slurries for their sulphur will soon run into deficiencies, so supplementation is essential."

According to Origin Fertilisers' technical director Peter Scott, growers should consider sulphur supplementation as part of a wider picture. "Despite its fundamental importance, we still don't give sufficient attention to sulphur nutrition in terms of how much, when and in what form.

"Ammonium sulphate (AS), for example, is the main sulphur source in the UK and is widely available as a 'straight' and also within nitrogen sulphur (NS) compounds and nitrogen, phosphate, potassium and sulphur (NPKS) blends," he says.

Peter adds that more people are turning to polysulphate which doesn't contain any nitrogen, meaning sulphur strategies can be planned separately from nitrogen

which gives greater agronomic flexibility.

"Polysulphate is a multi-nutrient fertiliser providing potash as well as calcium and magnesium in water-soluble forms which is important. A lot of Ca and Mg products on the market aren't water-soluble and have limited agronomic effectiveness; polysulphate also has no acidifying effect in the soil."

Scott agrees, adding that growers are increasingly thinking about the environmental implications of their fertiliser decisions. "The food industry as a whole is focused on sustainability and we're seeing growing interest not just from farmers, but also key multiple retailers, keen to understand how they can reduce the carbon footprint of the products they sell.

"Polysulphate is a low carbon British product with minimal processing and transport required, which has all contributed to a recent reduction in its carbon footprint of 90% and a CO₂e of just 0.0029kg per kg of product.

"Autumn applications can be carried out from early October to before Christmas either as a straight or in a blend as part of a grower's autumn fertiliser programme and it can be broadcast using conventional fertiliser spreaders or direct-drilled with the seed.

"These applications can then be topped up with another 100kg/ha in the spring or as appropriate following soil testing," he concludes. ■

Phosphate Power launch

British farmers can now benefit from a new decision-making tool which has been designed to help optimise phosphorus use efficiency in crops.

Phosphate Power, developed by Unium Bioscience, is a free online tool which aims to assess the phosphorus biological availability in soils with just a postcode entry.

A critical nutrient during germination and establishment, phosphorus availability can often be limited by various soil and environmental factors, says Unium Bioscience's John Haywood.

But by utilising Phosphate Power – which uses the phosphorus index – farmers can better understand whether soils are biologically optimised to offer what the crop requires. If not, the service provides advice and information to help overcome any transient deficiency.

"Phosphate Power is both simple and practical," states John. "It links environmental conditions such as soil moisture, temperature,

and soil texture to provide growers with precise, location-specific guidance."

The tool offers tailored recommendations depending on the phosphorus levels in the soil. If phosphorus availability is limited, it gives advice on appropriate action, such as the application of seed treatments, foliar phosphorus products, or biostimulants, which encourage root growth to enhance phosphorus absorption from the soil.

One of the key advantages of Phosphate Power is its ability to help farmers during the critical early stages of crop development, ensuring plants have the necessary nutrients for optimal growth, adds John. By leveraging environmental data, it aims to maximise efficiency, leading to healthier crops, improved yields, and reduced input costs.

"By integrating this tool into farming practices, growers can expect to optimise crop phosphorus uptake and enhance their overall production efficiency."



A key advantage of Phosphate Power is it helps farmers during the critical early stages of crop development, ensuring plants have the necessary nutrients for growth, says Unium Bioscience's John Haywood.

Phosphate Power will be available to growers nationwide by visiting www.uniumbioscience.com/phosphate-calculator/. Once a postcode has been inputted, users will receive a detailed analysis of the phosphorus content in their soils.