

Molybdenum application essential to realise nitrogen potential

Scaling back on micronutrients at a time when fertiliser prices are high may seem the easiest way to save some cash, however not applying these essential nutrients could mean valuable nitrogen isn't used to its greatest potential. Farmers Guardian reports.

Intro

The relationship between nitrogen and molybdenum shouldn't be underestimated as growers prepare to finalise and purchase fertiliser for next season's growing campaign.

Micronutrients such as molybdenum could have been forgotten this year as growers favour nitrogen and sulphur products over the smaller nutrients. However, there is growing evidence to suggest that molybdenum is key to nitrogen use efficiency (NUE), and by applying it as a fertiliser coating rather than a foliar application, can have a significant boost on yield.

Understanding how micronutrients interact with nitrogen will help inform choices for the year ahead and Peter Scott, technical director at Origin Fertilisers, believes that changing the way molybdenum is viewed can be hugely beneficial to nitrogen use.

"Molybdenum has traditionally been a nutrient addition applied as a foliar partly down to the small quantities that are required; however, this type of application only targets the plant, but it is the soil bacteria that requires the molybdenum as a catalyst to increase nitrogen efficiency.

"Through our recent trial work, we have evidence to suggest that targeting where and how molybdenum is applied can increase NUE and have a positive impact on yield and any return on investment."

Trial work

Trials have been carried out with a molybdenum fertiliser coating on spring barley, winter wheat and oilseed rape crops. All trial crops delivered yield increases when compared with a standard fertiliser programme on the same area, and a return on investment as high as 6:1 in the spring barley crop.

Perhaps most interestingly, the oilseed rape trial also compared an application of a foliar molybdenum spray at T1 growth stage in addition to the fertiliser programme, Mr Scott explains the results.

"When using the granular fertiliser coated with molybdenum, oilseed rape yield increased by 2.3% compared to the fertiliser only, and by a bigger 3% margin when compared to the area that received a foliar molybdenum spray. When molybdenum was applied to the nitrogen, uptake rose by 5.4% and increased NUE by 4.5%.

"By coating the nitrogen granules, the molybdenum is in the right place to act as the catalyst with the nitrogen as soon as it starts to dissolve. Molybdenum helps the nitrification process, converting nitrogen from ammonium to nitrate, so the plant can access it in an easier form."

Essential nutrient

Molybdenum is a naturally occurring metal and is a catalyst that sparks a reaction in soil bacteria enzymes that stimulate the nitrification process, and Mr Scott says having good molybdenum levels helps the conversion in the plant of raw nitrogen into protein.

“The addition of molybdenum as a fertiliser coating has been shown to fire up the nitrification process. The Origin coating is a dry powder that has an electrostatic charge and doesn’t require a liquid to attach it to the granule.”

Recognising a soil is deficient in certain nutrients allows a prescriptive fertiliser application tailored to correct these issues. Molybdenum is also used in the plant for converting raw nitrogen into useable plant proteins, a process called nitrogen assimilation, adds Mr Scott.

“In a similar way that we need time to convert the food into energy, the plant requires molybdenum as the catalyst to convert nitrogen into protein efficiently and allow room for additional nitrogen.

“The enzyme needed for this is nitrate reductase, for which an essential catalyst is molybdenum. A shortage of nitrate reductase in the plant will cause the plant to slow down its nitrogen uptake, and in-turn reduce protein production. Ensuring that soil molybdenum levels are correct is essential to maximise crop production.”

Molybdenum is mobile within the plant but acts differently to other micronutrients as it increases in higher pH soils, whereas most others become less available. Legumes rely heavily on molybdenum to draw atmospheric nitrogen into the roots and nodules for fixation.