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Double reason to make most of N

Microbial biostimulants

With so much focus on biostimulants to help crops use nutrients more efficiently, *CPM* finds out how two growers are using different microbial bionutritional products on their farms.

By Rob Jones and Lucy de la Pasture

Using nitrogen more efficiently is a key goal for many growers and a Kent-based farmer believes biology holds the answer. With nitrogen prices heading higher every day, coupled with rising wheat values, Simon Chiles's agenda is to maximise yield without applying extra and expensive nitrogen.

"Some farmers might have bought N at the right money, but I can't see that many will apply more than 75-80% of their normal rate, which will enable them to achieve the best yield with the N they've bought," he says.

Simon started out as an agricultural contractor but has gradually migrated to farming. His business, based near Edenbridge in Kent, is now about half arable farming, with the remainder producing hay and straw for the equestrian market.

The farm of 120ha has an arable rotation, with crops varying year-to-year but including winter wheat, oats, triticale, linseed, soya, lupins and millet — mostly on seed contracts — plus 160-200ha hay for local equestrian market.

"I don't often grow barley because I don't think our heavy weald clay suits it," he says. "I like to have a market lined up for a crop before I plant it and have grown a wide variety of crops — anything where I can see a niche market."

Tramline trial

Despite the heavy ground, Simon has made a success of direct drilling, which he has practised for more than 20 years. "When direct drilling first came in during the 1960s and 1970s, this land was classified as not being suitable for it, but for 22 years we've proved otherwise."

Typical winter wheat yields on the farm are 7.5-8.5t/ha. "It is not the highest yielding land but we use the straw it produces for the equestrian market in order to maximise our margins," he says.

Interested in improving his yields, Simon hosted tramline trials for biofertiliser company, PlantWorks, which developed a bacterial product to improve nitrogen-use efficiency and yield. The bacteria colonise the plant root zone, promoting growth by increasing the supply or availability of essential nutrients to the host plant, he explains.

In the 2017/2018 season, applying the product five days before UAN boosted winter wheat yields by 5% compared with controls. For the 2018/2019 season the yield increase was more modest at 2% — believed to be due to the product being applied in late February when the soil temperature had not reached 10°C.

Simon Chiles grows a wide variety of crops, including triticale, mainly for seed.

"In the trials, PlantWorks refined the product using fewer but more targeted bacterial species; with fertiliser prices going up and the prospect of wheat prices continuing to rise, I decided to use it on spring wheat this spring," says Simon. "We want to increase yield to make the most of higher prices but not by applying masses of fertiliser; we need to be smarter than that."

He plans to plant 26ha of Mulika milling wheat by mid-April and will apply PlantWorks' SR3 Wheat plant growth promoting rhizobacteria (PGPR) at growth stage 13-19.

PlantWorks managing director Robert Patten says it's important to apply the product at least a week before or after nitrogen and when soil temperature is at least 10°C.

"Typically, bacteria are found to multiply more slowly in the presence of high levels of nitrogen fertiliser," says Robert. "Leaving a week window between the application of fertiliser and bacteria ensures the latter function optimally. Soil temperature is important as the bacteria replicate more rapidly when the ground is warm, and they have a ready source of food — root exudates — as the plant's growth accelerates."

Apart from the single application of SR3 Wheat, Simon will apply nitrogen as UAN in accordance with his usual spring milling wheat regime. "I'll put on 180kgN/ha with half going in the seed bed, or shortly after planting, and the other half going on later in the season in probably two applications, depending on the weather. I don't want a sudden rush of N as this alters the sap pH and makes plants more susceptible to disease."

Simon will also test N levels later in the season and apply foliar N if needed to achieve protein specification for milling. ■

Microbial biofertiliser shows promise in salad potato trials

Small is beautiful when it comes to salad potatoes, but it's the large numbers of tubers that drives profitability.

A high tuber number — the aim is over 1M tubers / ha — creates competition per unit area and divides the crop's energies and resources into maintaining a greater number of smaller tubers, perfect for salad potatoes where the ideal size is 25-45mm.

But around tuber initiation, having enough available phosphorus is crucial to avoiding tuber abortion, says independent potato agronomist Edward Maule.

"We have this issue in salad potatoes and also in seed crops, where we lose tubers around that stage and again two to three weeks later."

Phosphorus is relatively immobile in soils, and for crop uptake it also needs to be available via the soil solution. "When you apply P it's hard to quantify how much will be taken up and utilised by that crop in that year."

That's why Edward became interested in the potential of microbes to unlock phosphorus and make it more available at a key time in the growth of potato crops. He's been trialling microbial manufacturer Biolevel's PhosN product, which contains a mix of nitrogen-fixing and phosphorus and potassium solubilising microbes, on two potato farms in East Anglia.

Unlike some biological products, PhosN is easy to store in its powder formulation and use with flexibility around application method with a low use rate of 250g/ha, he claims.

"In two of the trials it was applied in-furrow with Amistar (azoxystrobin), which is easy for application at planting and fits into current systems. In the third trial, it was applied with the first herbicide spray. It can also be applied as a powder direct as a seed coating like Monceren used to be," adds Edward.

The trials were set up in 2ha blocks in field-scale trials within three mainstream salad varieties across the two farms — Jazzy, Venezia and Paris. Test digs were carried out in four places in both the treated and untreated control blocks at harvest to compare the treatments.

In each case the biological product increased both tuber numbers and marketable yield, says Edward. The highest increase was in Jazzy, where tuber numbers were increased by 260,000/ha with a corresponding marketable yield increase of 9.75t/ha, while the smallest increase was in Paris at 3.2t/ha, where the product was applied with the pre-emergence herbicide spray.

At current salad potato prices — around £390/t delivered — that would be worth an extra £1248 to £3802.50/ha, he says.

"The increases in tuber numbers are why we've been able to achieve the higher yields — we've got more potatoes in the 25-45mm bracket. If you don't get the higher numbers, you'll get a higher percentage in the over 45mm bracket.

"It answered the question about supporting salad, or seed, crops through that tuber initiation period, so we're planning to roll this out further."

Edward is also planning a new set of trials in both salad and ware crops where the aim is to increase or maintain marketable yield while reducing synthetic nitrogen requirements. It's an approach that's been successful in maize trials and a topic of increasing importance given the current capital cost requirements for purchasing fertiliser, potential supply concerns and the need to increase nutrient-use efficiency. Applications in ware crops are likely to be later, probably with the second or third blight fungicide spray.

Edward Maule became interested in the potential of microbes to unlock phosphorus and make it more available during tuber initiation.

"With the current prices and the environmental pressures on the use of fertilisers, reducing synthetic fertiliser use by 20% and using PhosN to make the nitrogen applied more efficient is the next step for potatoes, and also potentially onions," he explains.

"I think microbial biostimulants can help farmers with sustainable production and help reduce the problems associated with the use of fertilisers, such as leaching, runoff and nitrification."

Tuber numbers and yield +/- microbial bionutrition product

	Untreated tuber numbers/sqm	PhosN tuber numbers/sqm	Difference in tuber numbers/sqm	Untreated calculated Yield/sqm	PhosN tuber calculated yield (t/ha)	Difference in yield (t/ha)
Jazzy	90.75	116.75	26	29.75	39.5	9.75
Paris	107.5	117	9.5	32.6	35.8	3.2
Venezia	87.5	106.8	19	29.1	33.4	4.3

Source: Biolevel, 2021