LEGUME technology

NEWSLETTER

Q2

A Word from the CEO

Quarterly newsletters in agriculture tend to reflect the passage of the seasons, for crop lifecycles are well understood, predictable and repeatable. None of those adjectives is suitable for Covid-19, a disease that continues to affect our everyday lives and activities.

Agriculture is an industry well used to staying its course through adverse events beyond its control. It's weathered the storm before, and we will do so again. I wrote earlier in the year that it is very much 'business as usual' for us and, for the most part, that's still our stance. As you'll read in this issue, we're not letting the pandemic interfere:

> *Our new R&D manager has joined us, our European trials results are looking good and we're excited about a fresh new research path.*

'Business as usual' also describes how we'll be trading in 2021. This is the last newsletter before the UK's Brexit transition period ends. At the time of writing, the formal deal's still to be done – but whatever the outcome and wherever you are in the world, rest assured you'll still be able to use the Legume Technology products you know and trust...we've done all the hard work!

Dr Bruce Knight
Lead Microbiologist and CEO

Follow us on social media:

MEET DR DIANE

A warm welcome to Dr Diane Wilkinson, who joined Legume Technology in October as our new Research and Development manager.

In some ways, Diane has come full circle in joining LT; the role marks her return to the agricultural scene, the sector where she took her first job.

"That was my first experience in screening microbes for agricultural applications," explains Diane, who, in addition to a BSc in Microbiology also holds a PhD in Biochemical Engineering.

"Since then, I've enjoyed a broad and varied experience across many different aspects of biotechnology, from screening assays for viral diseases to developing applications for household and food use, leading R&D teams and heading up process development in pharmaceuticals."

With previous posts including stints at Novozymes, Albumedix and, most recently, Chain Biotechnology, Diane's process development experience will be invaluable at LT, as we continue to scale up production and bring new fermenting capacity online. Her role will also include new product development – such as the mixed culture research detailed in this newsletter – and ongoing formulation development to improve application and efficacy of LT's products.

"LT has a great ethos," Diane says. "It's modest, but progressive in thought and recognises the need to strike a balance between research and commerce. I particularly liked the close co-operation it enjoys with its supply chain and customers. That's crucial for effective knowledge transfer when dealing with the emerging technology that LT is propagating.

"I hope my own experience within the industry will add another perspective to LT's approach. I'm looking forward to joining the team, contributing to LT's work and rolling out further developments and IP in due course."

UK TO OBSERVE BIOSTIMULANT REGULATIONS POST-EU

The United Kingdom's imminent departure from the European Union at the end of 2020 will have no effect on forthcoming regulations designed to better define the definition and role of biostimulants.

Enacted as part of the EU's Fertilising Products Regulation and coming into effect from July 2022, the new rules will place a legal duty upon the manufacturers of biostimulants to prove that a product has the effects claimed on the label.

Legume Technology has warmly welcomed the introduction of this legislation as there has been no defining regulations and little policing in the past in the biostimulant market.

According to Bruce Knight, Legume Technology's founder: "Products have appeared on the market without proof of their ability to deliver, often with little regard for quality and consistency. Understandably, the presence of these products has tarnished some expectations for the biostimulant category – these sub-standard products have, not surprisingly, failed to live up to their claims."

The UK government says it has no current plans to repeal this legislation and, with the EU a major market for Legume Technologies, we'll be following the regulation to the letter.

"We don't need to make many changes to ensure compliance," says Bruce, "as we've always maintained a high threshold for quality with our rigorous approach to manufacturing and comprehensive glasshouse and in-field testing. "In the wider market, this regulation will help to restore the reputation of biostimulants and inoculants, encouraging farmers to better realise their potential.

While the EU is the first to enact specific biostimulant legislation, the US is following a similar process. It has yet to finalise a specific description, the first step in creating a suitable regulatory status.

FUTURE OF LEGUME TECHNOLOGY - MULTIFUNCTIONAL MIXED CULTURE INOCULANTS

The next big step in developing the biostimulant market – wider adoption, increased value and even better results – could lie in products that combine different types of bacteria, rather than offering only single strains.

Such mixed cultures would combine different species of bacteria within a single product, creating a 'multifunctional' inoculant.

"Each component would remain fully axenic," notes LT's Bruce Knight. But the combination would provide growers with a product that could deliver phosphate solubilisation and anti-fungal properties, for example, alongside the conventional inoculant ideology of nitrogen fixation. Such combinations could massively advance the adoption of inoculant technology in crops where they're currently under-utilised. This approach could make nitrogen fixation in cereals a reality.

Initial steps will focus on not only identifying potential strains, but also understanding what balances are required in mixed cultures: as it takes some sophisticated trials to discover

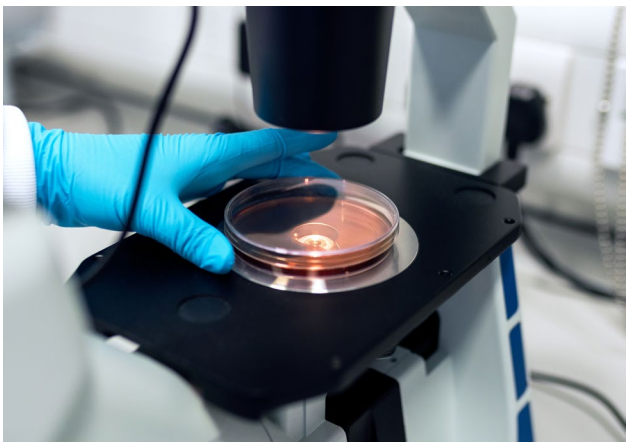
"LT's proven manufacturing technique is key to making this concept a reality and delivering a consistent product with assured efficacy."

In the longer-term, this research could present the possibility of mixed culture products formulated to deliver any combination of microbes to recreate all the beneficial aspects of a healthy, balanced soil.

Watch this space for further updates!

what's working and what's not, as well as identifying any unwanted interactions between microbial populations that could affect efficacy. Such interactions could be prevented by adopting appropriate formulation techniques, such as microencapsulation to separate one species from another.

"Mixed cultures do already exist", acknowledges Bruce, "including some that offer up to seven different species. But they're unreliable, inconsistent and appear to be unstable in storage, probably because of interactions between strains and species. "If these are Mixed Cultures 1.0, we're very much on the path towards Mixed Cultures 2.0," suggests Bruce.



FIELD TRIAL REVIEW, PART 1

Despite Coid-19 curtailing our usual travel – we would normally spend the summer visiting trials and viewing plots – we've managed to undertake a full complement of trials throughout Europe, exploring inoculant effect and potential across the continent's crops.

Trials results are always fascinating. Naturally, we're delighted when they display unmistakably clear and unambiguous results, demonstrating exactly what inoculants can deliver. While it's hugely satisfying to see years of research and development vindicated in the field, the primary objective is to secure reliable, replicated performance data showing exactly what the product does.

Not only does it demonstrate the product's commercial and agronomic potential – shared with our distributors, partners and end-users – but it's also essential for regulatory purposes. That's going to become even more important as new legislation, specific to biostimulants, comes into effect (as per the story elsewhere in this newsletter).

But there's a secondary purpose – often it's just as valuable when trials don't deliver the results we expect.

On those occasions, rather than writing off the trial, we'll spend time 'unpicking' the results. We try to identify what, if any, factors might be responsible: variety choice,

soil characteristics, weather patterns over the trial's duration, extraordinary pest or disease pressure and so on. Once identified, we can propose solutions, be that a formulation tweak, a change to the label instructions or an increase in application rate for use in certain soils. Crucially, we will always document these factors carefully: understanding them properly will ensure we're able to provide full technical and product support for growers and their advisers.

2020 TRIALS

It's still early days for collating the results and analysing the data. But we have seen some very pleasing results across maize, sunflowers and soybeans. We've also seen some early promise from new trials in the UK; focusing on peas and strawberries, both are due to continue in 2021.

From **Czech Republic**, we've been impressed with a set of small-plot trials on winter wheat to assess the effect of ROOTFiX (*Bacillus* spp), singly and in combination with MYCOFiX (mycorrhiza). Seed-applied September treatments resulted in increased root length during early establishment (see picture).

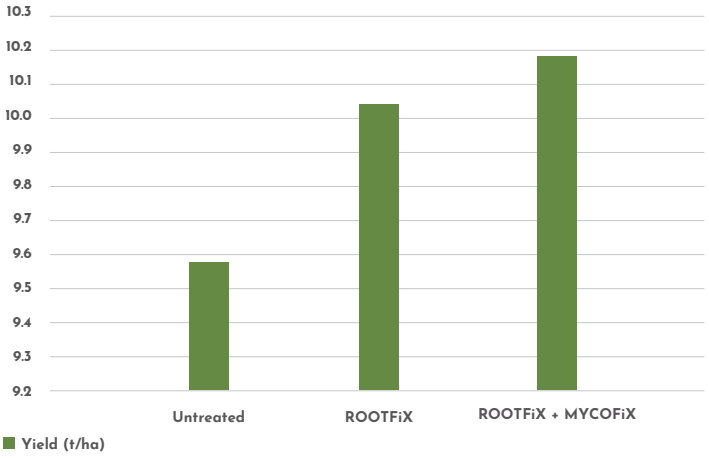
Control | ROOTFiX | ROOTFiX

This appeared to translate into much-improved crop vigour (index-measured) through spring and early summer. Taken through to yield, Rootfix alone showed a 4.8 per cent increase while the addition of Mycofix increased yield to 6.4 per cent above that from the untreated control.

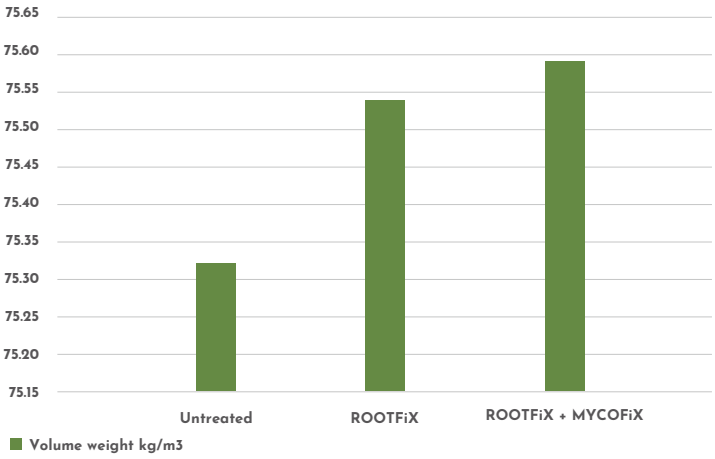
Meanwhile in **Ukraine**, we've used ROOTFiX and MYCOFiX to run further trials on sunflower and maize. Here, we've been looking specifically at root development and performance. Although still requiring further analysis, we've seen some terrific headline results from MYCOFiX where it's been able to increase sunflower root volume more than four-fold.

Keep an eye out in future newsletters – and on our new website – for more analysis and insight into these

Winter wheat **Czech Republic, 2020**
ROOTFiX, MYCOFiX



Winter wheat **Czech Republic, 2020**
ROOTFiX, MYCOFiX



Don't forget to follow us across our social channels for regular industry updates and to find out more about what we're up to.

Have you visited our brand new website?
www.legumetechnology.co.uk