LEGUME technology

NEWSLETTER

Q2

Dr. Bruce Knight

Founder and CEO, Legume Technology

Follow us on social media:

Introduction from the CEO

> After the storm...the calm.

Forgive me the poetic licence but overall, it's a good analogy. The first quarter of Legume Technology's calendar year is always busy. I wrote in the last issue about bringing all hands on deck to get our orders produced, packed, shipped and delivered; now, in the second quarter, there is a period of relative calm.

That's not to say we're sitting back. The 'calm' simply gives us the opportunity to take stock, refine product formulations and spend time – a lot of time – talking to customers, old and new, about what we can do better, how we can service them better, and how we can meet their needs better.

Each member of the team looks forward to Q2 with their own set of priorities. My own list of interesting opportunities reads like this: examining what microbial consortia we can add to organo-mineral fertilisers; overseeing the launch of granular Rhizobium fertilisers in Canada; assessing the fantastic results we're generating in new LT territories like Kazakhstan and the Balkans; and spotting the opportunities for product improvement that can further boost the outcome for our farmers, wherever they be in the world.

Remember, I'm a scientist at heart – so I'll admit that sometimes it is difficult to focus on everything. It's easy to become distracted by the sheer scope of opportunities and challenges the team identifies; even more difficult to decide which ones to pursue first.

But I think two key points emerge as we reach the halfway point of 2025. First, that the potential for ROOTFiX far exceeds our initial expectations. Excitingly so. Here we have a product that's already captured commercial imagination in several countries, but which seems to be a product that just keeps on giving. Not only does it give crops a terrific establishment boost, but now we're seeing how – thanks to induced systemic resistance – it also promises to reduce the impact of seedling diseases. That's a true 'wow' moment.

But that 'wow' is joined by another. For what always lifts my spirits, no matter how much work we have on, is the constant flow of emails from customers who relish sharing the results of our products on their crops. Each to their own, I know, but seeing the pictures of beautiful nodulation on legume crops, from lentils to groundnuts, from Kazakhstan to Senegal, never fails to thrill me.

It's the original inspiration for Legume Technology: after 25 years of all this, I'm still in awe at the sight of those tiny structures on plant roots, and their ability to transform the crop using nothing more than fresh air and sunlight.

And of course, I'm delighted that you, as a Legume Technology customer, have become part of that journey.

Thank you.

From the Lab

Dr. Mike Thomas

Research and Development Manager

Our research and development lead, Dr Mike Thomas, has the latest...

> Yes, my column is always titled 'From the Lab' but for this issue, it's not strictly true: I've been out in the field.

I've just returned from a trip to Belgium, accompanied by Legume Technology's head of business development Agnese Kromane. We went to view the field days being at Londerzeel, hosted by our development partner Certis Belchim.

For those of you not familiar with the company, it's a growing presence in the crop protection market. Formed in early 2023 by the merger of two companies that were both subsidiaries of the Japanese Mitsui Group, Certis Belchim is particularly focused on developing an integrated approach to crop protection that combines both biological and chemical products, in a bid to deliver more sustainable crop production methods.

It's an exciting product we're working on with them: Ultra Bioz is a premium two-pack root inoculant that combines both rhizobia and arbuscular mycorrhizal fungi in a single product. Aimed squarely at the soybean grower, it will be available in a one-hectare pack.

It's a product that I've championed at Legume Technology, from concept through product design, its packaging and – over the last few months while the production team has been focused on customer orders– even filling and packing it too!

SymbioLEG

Meanwhile, back in the lab itself, our SymbioLEG project is receiving a lot of my time too. A quick reminder: this project is funded by INRAE, the French National Research Institute for Agriculture, Food and Environment. Its objective is to develop a ready-to-use seed coating infused with species-appropriate Rhizobium.

The project hinges on the collection of hundreds of different Rhizobium strains from all around France; our role, as a partner in the project (thanks to our relationships with Terres Innovia and Semences de Provence) is to characterise all these strains and assess their ability to

colonise the plant root

and fix nitrogen.

However, while these two metrics are important, what will really help decide which ones we take forward is each strain's robustness in a commercial sense.

As you'll know, inoculant handling through the supply chain is very important. It's vital that an inoculant product reaches the farmer in good condition. We know, because of the strains we've selected for existing products like LIQUIFiX, what our target populations will be and how they'll fare through the production, packaging and transport process.

But when we're dealing with completely new strains, we have to assess all of this from scratch. And very often, it can be the case that the best nitrogen fixer, or the best root coloniser, isn't necessarily the most robust...in which case we will prioritise a strain that's slightly less efficient with nitrogen but likely to be more viable in the long-term.

Other factors we're recording include:

- location of each strain,
- the soil type in which it was found,
- and its frequency.

Using these, we'll hope to be able to characterise strains that could be particularly effective on calcareous soils, for example.

There's still a lot of work to be done on this project, but it's been a great team effort so far – both from the lab and the production team – so we're well placed to see it through to completion.

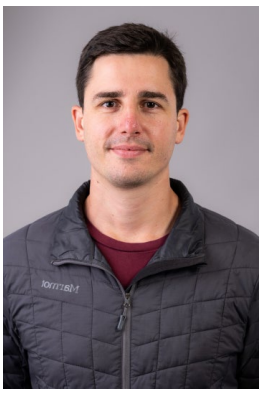
Still on strains

I shall never tire of talking about strains; as bio-based developers, strains are Legume Technology's best available resource – they give us so much flexibility in product development and optimisation.

What we're also seeing is how strain selection can help us in production efficiency, too. Certain strains can increase the production yield by three or four times – a terrific result. It means we can further optimise our own products, and it's a great example of how we never stop with product development. There's always room for improvement!

FROM THE FACTORY

Updates on lessons learnt, streamlining orders for EU customers, and ROOTFiX's 'secret sauce', from David Hosking, Legume Technology's production manager



David Hosking

Production Manager

> One of the (many) delights arising from the launch of our first Bacillus-based inoculant, ROOTFiX, is that it's usable on a lot more crops than our 'traditional' products, such as LIQUIFiX.

Coupled with the increase in customers beyond the northern hemisphere, this means we're seeing requests for ROOTFiX all through the year. So, a current focus is working our way through these orders, as well as seeking to put into practice the lessons learnt from our busy season.

That's something common to every small company as it starts to scale-up production and grow its markets. We will need to change the way we do things – better business processes, better logistics, better customer communications – to make the whole process slicker, better, more timely.

For example, we're hoping to significantly streamline the logistics involved with shipping product into the European Union. By establishing a 'staging point' – a warehouse in France – we anticipate taking standard stock into France, with one single customs agreement, before sorting and delivering onward orders to the rest of the European customs union without the need for individual customs paperwork for each and every customer order.

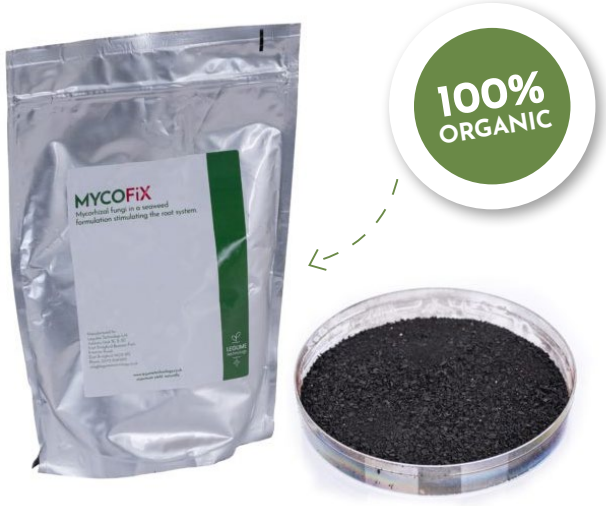
We'll trial this process over the next three to four months, to make sure the scheme works, so that we may have the full system in place by the beginning of 2026.

Increased, and more importantly regular, production of ROOTFiX has also provided us with the time and knowledge of how to optimise its production. You see, it's not just the bacteria in ROOTFiX that we value. It's also the metabolites that those bacteria produce that contribute so much to ROOTFiX's effects in the field. It also explains why the bacterial counts in ROOTFiX are lower than some of our traditional rhizobial products: the best outcome is a good mix of bacteria and metabolites.

And yes, just like you and me, our bacteria have specific dietary requirements if they're to produce adequate quantities of those very specific metabolites. Into each batch – we're currently using the small fermenter precisely so that we can increase the number of batches and make gradual changes as we go – goes a very exacting set of raw materials. We're working closely with the raw material suppliers to firm up quantities, frequencies and lead times for these materials.

It's the unique combination of these raw materials, and how they behave and interact with the bacteria during fermentation, that is ROOTFiX's 'secret sauce'.

Another product we're excited about from a production angle is MYCOFiX. While we've offered this for quite some time, it's always surprised me that this arbuscular mycorrhizal fungus (AMF) product is not more popular.



After all, we've got phenomenal amounts of data on it, it's fantastic in co-inoculation with a rhizobial product (as Mike has shown in his work with Certis Belchim) and it's applicable to a wonderfully broad range of crops.

But perhaps its story is now becoming more widely understood, because now we are experiencing an uptick in orders. A lot of those orders are coming out of Africa, where it appeals as a good technical sell without any of the supply chain requirements associated with the bacterial products. It's also a lot more forgiving for the end-user, who faces far fewer extenuating factors in applying it, yet can still deliver a convincing result and a valuable return on investment.

FROM THE FIELD

Agnese Kromane

Head of Business Development

It's been a busy couple of months for Legume Technology's head of business development, Agnese Kromane.

> **'Making it happen' has been my motto for the last few months, as we focus on pushing eastwards with Legume Technology's expanding customer base.**

How far east? Well, we'll see how far we go, but initially we're talking eastern Europe, Türkiye and onward into the growing opportunity – in more than one sense – that is the Central Asian region.

Türkiye, of course, served as both the venue for the ISF World Congress – where ROOTFiX was far and away our primary talking point on the LT stand – as well as the continued focus on finding new partners for a country whose agricultural potential remains huge

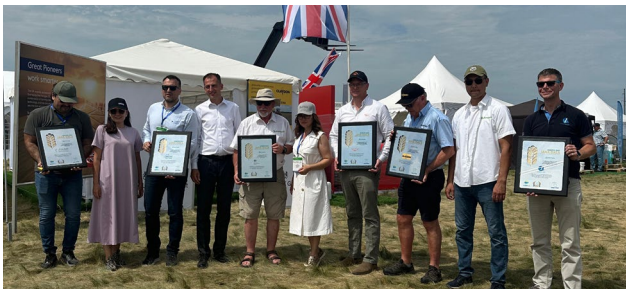
A head of business development's work is never truly done, so with the ISF Congress complete, I found myself in **Romania**. With the primary crops being legumes, cereals, maize, sunflower and oilseed rape, there's plenty of interest here in using biostimulants as seed treatments..

We'll take this to the next stage by setting up trials and seeing where the opportunities lie – as well as understanding how our products fit into Romanian crop production practice.

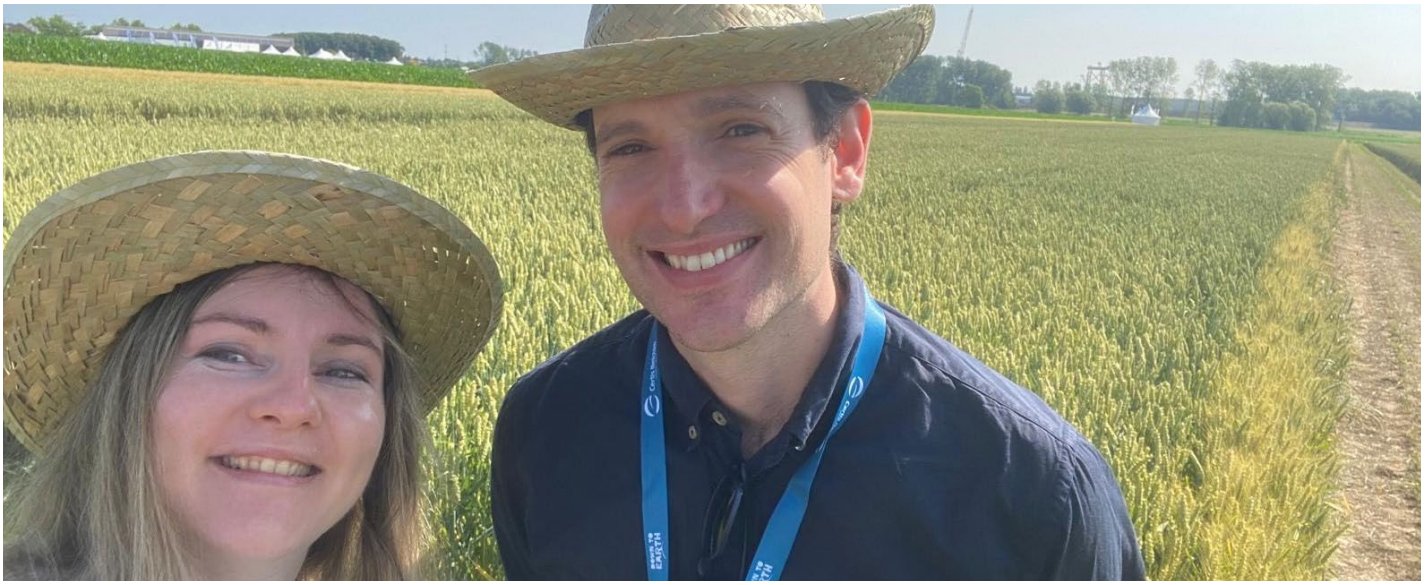
Serbia is another interesting prospect. June took me to Novi Sad, where an exciting new partner is located. They're focused on soya and maize and, with approval already bestowed on both LIQUIFiX and ROOTFiX, we have few barriers to worry about in moving forward with them.

What's more, they're really enthusiastic about our products; they can't wait to get out there and start pushing the LT value proposition. It was great to spend time with them, meeting some of their customers and seeing how they work together.

Further east still is **Kazakhstan**, where we started working with our partner Hanseplant just this year. Jana Dala (Green Day) is one of the largest agricultural exhibitions in the country, specialising in crop production technology, machinery and more. Over 200 companies take part, with around 5,000 visitors. Thanks to the UK Government's Department of Business and Trade, Legume Technology, represented by our partner Hanseplant, was one of an invited list of British firms to participate in the show.



And for my last trip of the month, I was much closer to home. I joined Mike Thomas, for the trip to Certis Belchim's field days on **19th June** in **Londerzeeel, Belgium**.



NEWS IN BRIEF

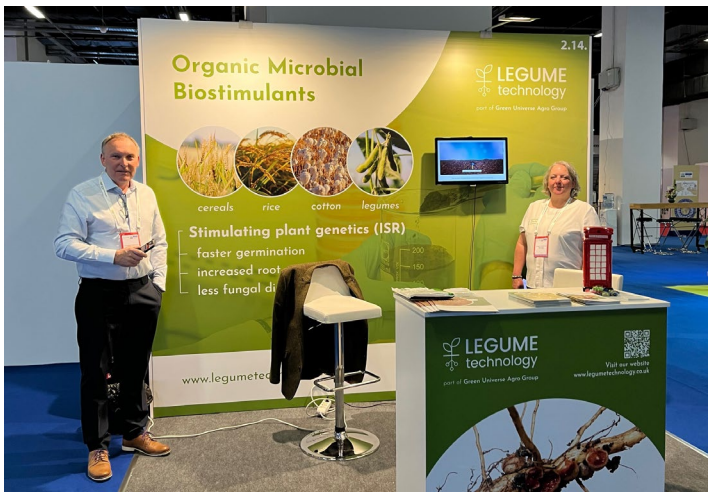
ISF Congress

Did we see you at the ISF World Seed Congress in Istanbul in May?

Whether it was your first time meeting us, or we welcomed you as a long-standing customer, it was good to see you and 'talk shop'. Our 'next gen' microbial biostimulants and seed treatments were our focus in Istanbul.

What with all our meetings and keeping a presence on the stand, we weren't able to attend as many of the seminars and panel sessions as we wanted, but the feedback we heard from delegates was very positive and complimentary.

All round, a very good event. Congratulations to ISF for pulling off another excellent Congress – we're already looking forward to the 2026 event in Lisbon, Portugal.



Pictured at the Legume Technology stand in Istanbul: Bruce Knight and Heather Beastall

Euroseeds Congress, October 19-22

Two seed Congresses in a year?

Yes, the team's returning to the Euroseeds Congress again in 2025.

To be held in Edinburgh, Scotland's historic capital city, the event comes to the United Kingdom – Legume Technology's home country – for the first time.

Billed as the 'must-attend' event for the European and global seed sectors.

> **More than 1,500 delegates will enjoy three days of meeting, exhibition and networking opportunities.**

The event comes at an interesting time: the UK is now alone in Europe in progressing plant breeding innovation through Novel Genomic Techniques and, although the EU might yet catch up, what will this mean for European seed trade?

Also on the table will be EU-UK developments in phytosanitary cooperation as well as more general regulatory alignment – something you can imagine we'll be keeping tabs on, especially if you've already read David Hosking's notes about our own attempts to streamline shipping and customs matters.

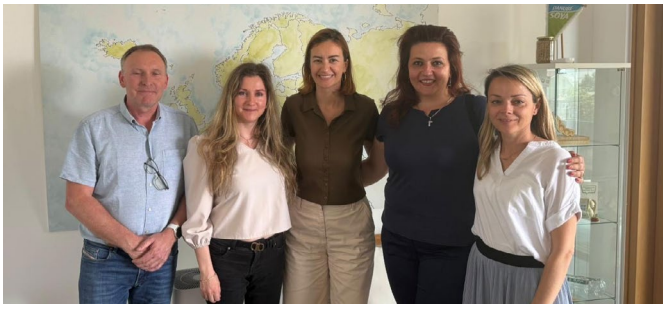
See you there? **Trade table #24**

Never mind the Balkans?

Well, for Legume Technology that's not the case anymore.

Bruce Knight and Agnese Kromane, in pursuing their relentless objective to bring Legume Technology's products to as many farms as possible, travelled to Serbia in June to meet the team at Donau Soja.

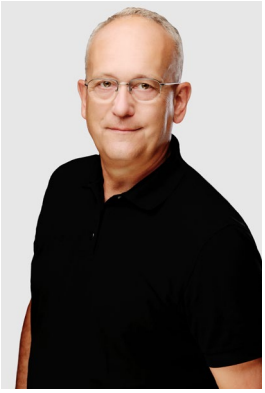
This marks our first foray into the Balkan countries and it's exciting to be partnering with an organisation like Donau. The organisation certifies over a million tonnes of soybeans every year. Like us, they're very supportive of sustainable, resilient practices for agriculture – indeed, just as we visited, Donau was hosting farmers from Serbia and Bosnia on a field visit in Croatia, getting up close with regenerative practices and strategies to reduce chemical inputs.



Soybeans and maize will be our focus crops with Donau. We're looking forward to seeing our products in use and how farmers in south-eastern Europe will make the most of them to enhance crop productivity, soil health and environmental resilience.

How innovation takes root - insight from our partners in CEE

Research and development work on Legume Technology's products is not limited to our lab in Nottingham, England. Ludek Nowak, of our Czechia CE distributor Agrinova Consulting, s.r.o., has been trialling a novel use of ROOTFiX.



Ludek Novak

CEO of Agrinova Consulting, Legume Technology partner in CEE region

> **It was in a taxi, in Kyiv, that I first got to know Legume Technology. I asked Bruce Knight for something that would shake up the Czech market – something innovative, a game-changer if you like – and the first product he offered me was LIQUIFiX.**

In those days, there was no use of liquid in inoculants, so LIQUIFiX really was a product with stand-out qualities. And unlike a lot of other products, its properties were not in doubt: farmers saw clear differences in the results. Those early batches of treated seed built real customer trust and stimulated an appetite for innovation.

Now, after six years as Legume Technology's distributor in the Central European region, there's a great two-way relationship. Bruce and I share a similar outlook, where innovation is the driver, underpinned by a commitment to good science. It's a great fit for Agrinova and we often share ideas and pursue new avenues.

It was this approach that opened up a new opportunity for ROOTFiX, the Bacillus-based inoculant. We've been working with ROOTFiX since 2021, pre-launch, conducting early trials that have fed into the strong body of evidence that makes ROOTFiX such a compelling product.

However, ROOTFiX has always made cereals its primary focus, LT pushing it as their first cereal inoculant.

The case is compelling: its ability to improve phosphorus acquisition is clear and much has also been made of how it can reduce stress during early establishment, leading to better uniformity. We saw a 20% increase in establishment uniformity over the first 28 days post-drilling.

While legumes have also been in ROOTFiX's sights, I was keen to see if we could find ways of achieving similar results by putting ROOTFiX to work in other crops. After all, crops like:

corn

soybeans

sugar beet

oilseed rape

All grown widely in this region – were suffering from climate change effects, such as irregular rainfall, wider temperature fluctuations, drought and flooding. What if we could bring some of ROOTFiX's stress-relief abilities to these crops?

Yet there was an obstacle. Much of this type of seed is pre-treated and sent straight to farmers for drilling. On-farm inoculation would be difficult.

But around the same time, we had started a trial to test the efficacy of phosphorus microgranules as an alternative to standard practice diammonium phosphate (DAP) applications. We found they were five times more efficient than DAP, an interesting discovery in itself. And then there was another thought...

> **What if we could inoculate the microgranules with ROOTFiX? Not only would these bring the benefits of ROOTFiX to otherwise inaccessible seed, but we surmised that the Bacillus itself would improve the solubilisation of the phosphorus within the microgranules, preventing it from being locked up into non-plant accessible forms.**

We tested the hypothesis last year, in both oilseed rape and corn. The treated microgranules are applied in-furrow, through the planter, together with the seed. From there, not only does the Bacillus solubilise the phosphorus, but also colonises the seedling's roots just as it would have had the seed received a ROOTFiX inoculation.

We saw improved vitality and vigour in the areas treated with ROOTFiX; further trials are now underway, for which we'll use satellite imaging to better quantify the effects on establishment and vigour. We also want to examine in more detail – perhaps with input from Legume Technology itself – how the Bacillus transfers from the microgranules to the roots, and what can be done to optimise the process.

Innovation? Certainly, if innovation is defined as doing something differently. It sums up all we want to do at Agrinova – from seed to harvest, to find solutions to each stage where the past approach to nutrition is failing. It's great to be working with a partner, like Legume Technology, who shares that same viewpoint and ambition.

Project Africa: update

It's been nearly a year since the Bill and Melinda Gates Foundation and the UK Foreign, Commonwealth and Development Office (FCDO) awarded Legume Technology a £2.15m grant to bring African smallholder farmers biological alternatives to synthetic nitrogen. Dr Mike Thomas sums up the latest progress.

It's all about the glasshouse and pot trials right now.

Having selected the first group of potential candidates from our strain library, we've put them into trials to see how they perform.

The aim of the pot trial is to generate a snapshot of everything that's happening, so we can see what responses the different inputs are eliciting.

For example, we'll be looking at tiller numbers, whether the plant reaches a particular growth stage any faster, how well and how quickly it establishes, and so on. These metrics will, at a later date, also feed into our general knowledge of how to measure and quantify what rates as a 'good' response.

Other metrics we will record include (as far as is possible, at this small-scale level) the yield response, as well as measuring nitrogen content in the plant tissue.

Later in the summer we'll return to the strain library for further selection. We hope to identify another 50 or 60 candidates for this next stage; all of these will then go through an ammonia excretion screen (we talked about this in a previous newsletter) so that we can pick out the most promising candidates for further trials and testing.

Excitingly, we're also making the necessary preparations.

Including finding pilot plots – to get autumn trialwork underway in Africa, using the first group of microbial candidates. To have reached this stage as we approach the first anniversary of the project is extremely satisfying.

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.