

“It’s all about taking a proactive, rather than a reactive approach.”

A programmed approach

Technical **Better** biostimulation

With a hard focus on being able to deliver ‘bang for your buck’ when using biostimulants, Frontier Agriculture’s new BioPlan concept is taking a rigorous approach to evaluating products to ensure there’s concrete data to substantiate claims. *CPM* finds out more.

By *Charlotte Cunningham*

When you think about biostimulants, what springs to mind? Seaweed? Amino acids? Fungi, perhaps?

Well, all of the above are correct, with the term ‘biostimulant’ actually engulfing a huge range of sources and individual products — all with slightly different uses and capabilities.

For some time now, biostimulants have blurred the lines between not quite being a fertiliser or a plant protection product.

And the outlook is even more complex for growers as science and discovery

identify new solutions — all of which require sifting through to seek out the products that deliver benefits in crop production.

But it’s this challenge that Frontier is looking to overcome within its BioPlan concept — an initiative designed to take a more programmed approach to sustainable crop production, in particular, looking at the targeted use of specific modes of action.

Two-pronged approach

According to Dr Paul Fogg, Frontier’s crop production technical lead, this is a two-pronged approach. “Firstly, the aim is to optimise establishment and build resilient foundations that have the potential to better access water and nutrients, as well as better withstand environmental conditions, pest and disease pressures. Secondly, we want to support that potential through optimised utilisation of resources and to help the plant mitigate stress.”

So where do biostimulants fit in?

Paul says that having a programmed approach — in combination with good crop nutrition and plant protection — means both agronomists and growers will have the opportunity to push good crops harder, rather than trying to lift

poor/average crops. “When I first joined Frontier, we were just beginning to dabble in biostimulants. In all honesty, were expecting a lot from them without really knowing how they worked.

“But what we’ve learnt is that biostimulants are not a substitute for rainfall or sunlight — nor are they a miracle cure — but they can significantly mitigate the effect of stress, in the right situation, allowing good crops to perform to their full potential.

“We’re getting more extreme weather ▶



Jim Stotzka stresses that it’s essential to realise that biostimulants don’t replace conventional crop protection but can complement them.



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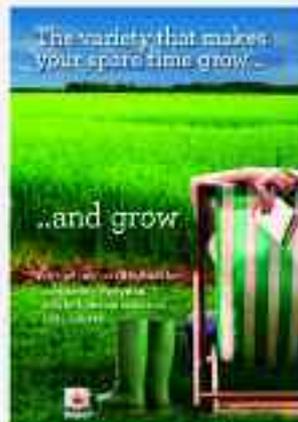


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If you don't know what is in a product, or how it is supposed to work, then why would you use it, says Paul Fogg.

► events now and we also often talk about 'yield plateaus', so why wouldn't you want to use this technology to break through that ceiling?"

The aim of a biostimulant is to build plant resilience to allow crops to withstand biotic and abiotic pressures as well as improving soil health and quality, says Jim Stotzka, Frontier's lead on sustainability.

But to get the best from biostimulants, to use them as part of a programmed approach, there has to be an understanding of exactly what individual products do and how they may be advantageous to growers. "It's all about taking a proactive, rather than a reactive approach," he adds.

The regulatory future

Though it's not yet clear where UK regulations will end up, there's a seismic shift occurring in terms of biostimulant regulations on the continent.

IntraCrop's Neal Sanders is involved with European Biostimulants Industry Council (EBIC) and gave an update on the current situation when it comes to regulating the biostimulant market.

So where are do we stand today? Neal says the new EU fertiliser regulation marks a step forward. "This is good news is because it provides a common definition of what a biostimulant is for the first time, when previously they've played the field between being a fertiliser or a plant protection product. This effectively gives a single market direction for manufacturers to head in."

According to a definition set out by EBIC, a biostimulant can now be defined as: 'a material

Products can be split into two main groups — microbial and non-microbial, says Jim. "Microbial sources include products like inoculants, beneficial fungi and bacteria, whereas non-microbial biostimulants come in the form of elicitors and stimulants, including amino acids and seaweed, as well as the metabolite groups. Products like phosphite and pidolic acid sit within this category."

Specific functions

These products can then be split again into sub-categories, to delve deeper into the specific function of the biostimulant, and it's this knowledge that is crucial for understanding exactly how a biostimulant could perform, he explains. "With non-microbial sources, we're really looking at just stimulants and elicitors. These stimulate a specific plant function such as root and shoot growth, meaning we're able predict what we want from a product containing them and manage expectations of results growers are likely to see.

"Stimulants and elicitors can also be used to stimulate the activity of beneficial microbes, so we can use things like prebiotics in soils — they are much easier to handle than live organisms in terms of shelf life and managing application."

Within live microbes, this can be split into two sub-categories, fungi and bacteria. "Fungi encompasses biologicals like mycorrhiza and other growth promoting fungi like penicillium, as well as saprotrophes which aids the breakdown of organic materials."

that contains substance(s) and/or microorganisms whose function, when applied to plants or rhizosphere, is to stimulate natural processes to benefit nutrient uptake, nutrient efficiency, tolerance to abiotic stress and/or crop quality, independent of its nutrient content.'

Plans for the EU regulations are still being finalised, with expectations of coming into force in June next year.

And though it's not yet certain how, or if, they will be mirrored under UK laws, Neal says an EC certification will help further build credibility. "For the first time ever, manufacturers will have to substantiate the claims they make. Products which are backed up by efficacy data and have a precise category of registration and purpose will certainly bring an element of quality assurance to the market."

This transparency has the potential to have positive effects not only for growers, but right

Targeted offerings

Though there is a huge range of options available, Jim says Frontier has got a pretty lean programme of products under the BioPlan initiative at the moment. "We've stripped it back to products which we're confident in and know how they work — we've got a very structured research and development programme behind them.

"At the moment, we're offering phosphite, pidolic acid and one other biostimulant from sister brand, Intracrop, which is focusing on root development and nutrient assimilation and uptake."

Watch this space for more information about the products available under BioPlan in the next instalment of Better Biostimulation...

Within the bacteria group, there is plant growth promoting bacteria which tend to be endophytic — meaning they live within plant tissues — as well as specialist symbionts like rhizobia and again, saprotrophes, notes Jim. "The problem we see a little bit with microbial biostimulants is that the manufacturing, quality control and application can be difficult, meaning there's much more of research process needed before we can support a product like this."

And looking into that process further, a core strand of the BioPlan ethos is thorough evaluation of each of these individual products to really drill down into



Neal Sanders says the new EU fertiliser regulations mark a huge step forward for the biostimulant market.

the way across the food supply chain, adds Paul. "For example, food manufacturers and consumer brands are increasingly interested in the provenance of the ingredients they use. With this approach it's possible to be more confident in providing that information."

their capabilities and substantiate any claims — which is a rather lengthy process.

“We are continuously trying to question and justify a reason for applying biostimulants to crops. As far as we’re concerned, if you don’t know what is in a product, or how it is supposed to work, then why would you use it?” says Paul.

The analysis process involves isolating and evaluating the active ingredient, a proof of concept to make sure the mode of action is understood, in-vitro development, and finally taking the product into the field to see how it fares, explains Jim. “We have a very data-driven approach at Frontier, so within this programme it’s very much about trying to find the best solutions for our growers — I don’t think we’d ever feel comfortable putting anything onto the market that we weren’t confident would live up to expectations.”

When it comes to in-field testing, this is done via a combination of small plot, split field, and tramline trials, but the responses they are looking for are marginal, adds Paul. “There’s some really broad, sweeping claims out there. However, we see it as a much more marginal response — in the realms of 100s of kg/ha, rather than t/ha.”

Jim stresses that it’s important to be clear — biostimulants are absolutely not the same as crop protection products. “You’re not going to have the same win-rate as you would with a fungicide, for example, but for us it’s about looking for products that can build plant resilience and having the data to back up and support the claims.”

Dr Stephen Rossall, of Nottingham University, has been working alongside the team on the in-vitro testing front, to test the

products in both optimal and suboptimal conditions.

“Part of our development strategy has been based on not only when is a good time to potentially use a biostimulant, but also when is not a good time — presenting a much more transparent and realistic expectation for growers,” notes Paul.

In-vitro testing

So how does in-vitro testing work?

Traditionally, it involved removing roots from soil, but in a bid to find an easier substrate to work with than soil, Stephen has been using an expanded clay pellet material called hydroleca (often used in hydroponics) in his studies. “Recovering roots from soil is an overrated past time,” he laughs.

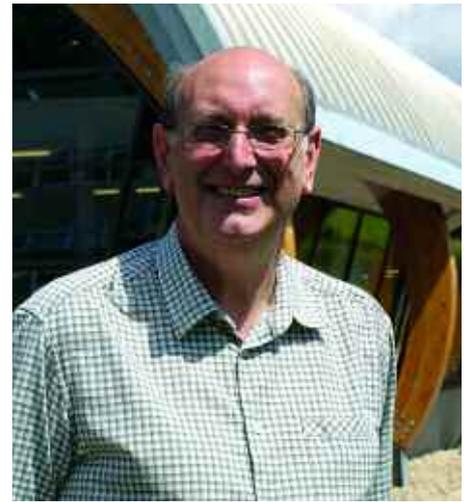
The process itself involves growing plug plants until GS12, in a peat-based module compost, before transplanting into pots of the hydroleca.

“Roots permeate between the pellets and makes the root recovery easier and the investigations much more straight forward,” he explains. “I then irrigate them every third day, with just a commercial NPK liquid feed, and water in between. Plants are grown on to GS14 before applying a spray at GS14.”

Typically, they’re then harvested 28 days later. “After this, I recover the roots and photograph/analyse them — comparing treated and untreated.”

A dry weight measurement of the root mass is also carried out.

Stephen says he’s evaluated a wide range of biostimulants in this way and the results show that some products work better than others — reinforcing the validity of this kind of testing. “Convincing, quality data is key to assuring growers that



Stephen Rossall has been working alongside the team on the in-vitro testing front, to test the products in both optimal and suboptimal conditions.

these products aren’t just ‘muck and magic’ and some of them really do work.”

While Paul is confident that the approach is going to help growers get the best out of biostimulants, he says there’s a caveat that these products won’t and don’t replace good farming. “There’s a lot of talk at the moment about soil health and we know this is going to be the direction of travel for future support payments and policy, but it’s important to remember that if you’ve got poor conditioned, heavily compacted soils then biostimulants won’t magically repair that — that has to be corrected first.

“If you get the basics right, biostimulant technology can be the cherry on top of the crop production cake.” ■

Better biostimulation

As biostimulants are set to play an increasing role in crop production, it’s important to separate the good from the not so effective.

This is what Frontier Agriculture aims to do through its BioPlan initiative. The Better biostimulation series will explore in more detail both the fundamentals of biostimulants and how to get the best from the Frontier range in the field.

CPM would like to thank Frontier for sponsoring the series and allowing privileged access to its staff and materials to put it together.

BioPlan®



The in-vitro testing involves analysis of the roots of treated and untreated plants.