

Health is wealth with biosolutions



“Observing consistent results in the field from best practice application is a must.”

NEIL HARPER

What does experience from the field suggest in terms of peptides, elicitors and other biosolutions, and their ability to improve plant health in the face of challenging growing conditions? *CPM* takes a look from an agronomist’s perspective.

By Janine Adamson

The concept of a biosolution – the combination of biology and technology – is no longer a new notion, particularly in the world of sustainable crop production. Encapsulating a wide range of innovations from biostimulants and biofertilisers to biocontrol and pheromones, slowly but surely, more is being understood about how these products function.

As growers are now relatively accepting of what seaweed-based biostimulants can offer, focus is shifting to other modes of action and the role they can play in further boosting plant health, believes

Agrii agronomist, Neil Harper.

But while scientific knowledge transfer catches up, this is where in-field experience comes to the fore, he says. “I think it’s safe to say growers are successfully getting their heads around seaweed biostimulants and standard amino acids, how they work and what they offer. However, they are merely the tip of the iceberg in terms of the vast range of innovations available.

“We’re seeing growing intrigue in peptides and elicitors, with endophytes being another step beyond that. As such, it’s now about timing – being strategic to truly get the most from what have the potential to be very

exciting products,” he says.

Rather than let farmers take on the burden of trial and error, this is where Agrii field-scale trials come in, to help inform targeted biosolutions use, highlights Neil. Consequently, a bank of applied research insight is being built



Benefits of peptides

According to Agrii’s Neil Harper, while softening any pesticidal effects, peptides add to resilience and health meaning a plant is less susceptible to disease.

Boosting up the programme

How biosolutions can add value to conventional agronomy approaches

Slotting biosolutions into conventional agronomy programmes can offer noticeable improvements in plant health and resilience, as shown in trials, says Agrii technical manager, Jodie Littleford.

“There’s clear evidence emerging from Agrii’s trial work which suggests using biosolutions early in a fungicide programme is where they’re likely to deliver the best results,” she continues.

“When we do this, plus integrating with traditional chemistry and applying before disease levels escalate, we’ve seen better crop health and resilience, which has been reflected in overall lower levels of disease even compared with a standard fungicide programme.

“But where this pattern starts to break down is when disease levels have already started to build in the early stages of the spring so the effects of the biosolutions on crop resilience are potentially limited.”

Key to understanding how best to use biosolutions in programmes lies in knowing how they work and their mode of action within the plant, she points out.

“Elicitors, for example, trigger the plant’s hypersensitive response. This was discovered in 1992 and is effectively the response to a pathogen damaging the plant’s cell wall, and has been associated with disease tolerance.

“Once a hypersensitive response is triggered, it stimulates metabolic pathways in the plant that help with crop resilience and intrinsic defence against these pathogens.”

According to Jodie, peptides have been shown to mimic this cell wall damage and therefore trigger the response. “But the key to the success of peptides is application early in the programme ahead of disease onset. In this way, the plant’s immune response has been activated prior to a pathogen attack.

“It’s the same with fungicides really, where a protective approach is the most effective. If you’re in a situation

where you’re having to firefight then you’re really too late with the application whether that’s a conventional fungicide or a biostimulant.”

As well as the resilience-boosting results achieved with peptides, other biostimulants including amino acids, PGA (pyroglutamic acid) and phosphite, have also performed well in Agrii R&D, she highlights.

“Amino acids are building blocks utilised in a range of biochemical functions including protein synthesis, stress reduction and modulating stomatal opening. Biostimulation of these processes can enhance growth and improve nutrient cycling, helping crops to combat disease and increase productivity.

“PGA and phosphite have also been shown to enhance nutrient use efficiency as well as improving rooting and upregulating photosynthesis, which in turn provides the plant with more energy and resources to thrive,” explains Jodie.

Work carried out in the heightened and sustained disease pressure of the 2024 season further underlines the effects of biosolutions when used in a targeted approach alongside fungicides, she adds.

“Trials visited in July 2024 in South Wales – where septoria pressure is

usually high in a normal year but extreme levels were seen last season – showed plants treated with a standard fungicide programme had virtually no green leaf area remaining.

“But plots in the same trial with a fully biological approach at

T0 and T1 integrating elicitors, amino acids, phosphites and bio-fungicides, had significantly more green leaf area on the flag leaf.

“So even in a year like the last, bio-based solutions stack up against traditional chemistry when used in a programmed approach. Doing this, plus utilising stronger chemistry when it’s required particularly on less



Trial results

There’s clear evidence that using biosolutions early in a fungicide programme is where they’re likely to deliver the best results, highlights Agrii’s Jodie Littleford.

resistant varieties, can certainly deliver better results in terms of gross margin over input costs,” she suggests.

Jodie adds there’s a wide range of options for integrating biosolutions into existing fungicide programmes, however selecting the most appropriate can depend on the location and disease pressure seen.

One of the most exciting of the newer biostimulant options, believes Jodie, is Innocul8 – containing manganese, zinc and a peptide – which has been shown to trigger a plant’s complete hyper-sensitive response.

“At the early assessment timings, where we’ve used Innocul8 at T0 or before, we see enhanced greening and healthier crops carrying lower levels of disease which are better able to withstand environmental stress.

“We’ve also seen a consistent yield increase of around a third of a tonne per hectare (0.34t/ha) where we’ve applied Innocul8 at those early timings, highlighting that these biostimulants not only contribute to crop resilience, but also produce a good return on investment for growers.

“In conclusion, all of the emerging science and trial results are suggesting biostimulants – elicitors in particular – can be vital tools in boosting a crop’s ability to withstand the various challenges of climate change and more stressful growing conditions,” she says.



Agronomic advice

Grower Kevin Bell (left) has been advised by Neil Harper on how best to use biosolutions to complement the farm's efficiency-first approach.

► among the agronomic community.

"If we start with peptides, I perceive these as not dissimilar to giving a plant a flu jab which means moving away from conventional fungicide timings. We want a healthy, strong plant which is better prepared for the months ahead as a pre-cursor to a TO, just as a human would in readiness for winter cold season," he explains.

Peptides are short-chain amino acids which can help plants to overcome both abiotic and biotic stresses. Used as signalling molecules, they're involved in many biological processes and therefore, different peptides perform different roles in helping to boost plant health and resilience.

GREENER FOR LONGER

In contrast, an amino acid is a single building block molecule that when combined, forms a peptide.

"A beauty of peptides is they can be mixed with a herbicide which is helpful for those requiring an earlier pass ahead of TO. Yes this can be perceived as an additional round with the sprayer, but keeping a crop greener for longer may help with making efficiencies later on in the management programme," says Neil.

"We have to acknowledge that any fungicide or herbicide application has potential to check a crop to some degree. This is why optimising green leaf area and overall health status is so beneficial.

"Furthermore, while we're softening any pesticidal crop effects, we're also adding resilience and health, meaning

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With peptides increasing in popularity, Neil adds that Agrii has seen consistent results from their use which is critical when it comes to securing grower confidence in the products. "Because these products aren't regulated in the same way as conventional plant protection products, we all have a heightened awareness and natural scepticism of any manufacturer claims.

"Observing consistent results in the field from best practice application is a must – mis-using the technology with a resulting bad experience in many ways, belittles the science. That's why we're investing effort into really understanding how to best use biosolutions including their timing."

For those willing to try a pre-TO application of peptides, Neil says the risk is paying off. "With a protectant approach, growers are then seeing results which carry on through the season."

One such willing risk-taker is Kevin

Bell who farms around 100ha at Charing in Kent. He says his aim is to maximise the return of each hectare of land, which also led him to being part of Agrii's iFarm network.

With the guidance of Neil, Kevin has been trialling Agrii's approach to biosolutions. "I've seen some positive results and therefore plan to continue using the biosolutions to complement our drive towards efficiency gains.

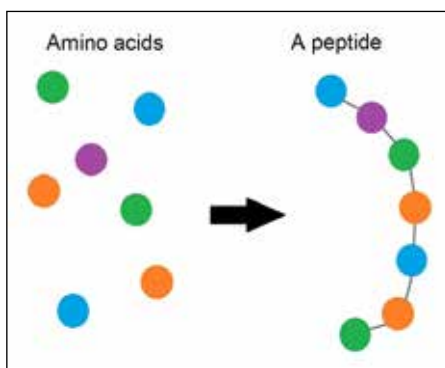
"I understand these types of products could be key in the future; seeing them being used in a trial scenario gives me confidence in exactly how and when to use them," explains Kevin.

Ensuring efficient production is front of mind for all growers, adds Neil, "We can't land in a place where money is being spent and growers aren't seeing positive results. Equally, input prices are increasing so we're seeing more interest in the role of plant health.

"If we can understand these natural processes and apply them as part of an IPM-approach to crop management, we can reduce our reliance on both new and old chemistry. Given rising sustainability demands, surely that's a good thing?" he suggests.

Although readily on-board with peptides, Neil does believe more research should be undertaken into how endophytes work. "Again, it's understanding the timing and application conditions required to yield the best results.

"Being a living organism, it adds an additional layer of complexity to the product which we've perhaps not had before. Yes they're an exciting technology, but in ways we can't afford to get it wrong," he concludes. ●



Molecular structure

Peptides are short-chain amino acids which can help plants to overcome both abiotic and biotic stresses.

Climate resilient cropping

With weather extremes becoming more frequent, and challenging conditions now perceived as the norm, what can growers do to improve the resilience of their cropping approaches?

This series of articles, kindly sponsored by Agrii, aims to explore some of the different approaches to de-risking crop production – from making better use of nutrients and boosting NUE, to getting the most from plant genetics.

CPM would like to thank Agrii for providing expert insight into these topics, and for the privileged access to the individuals involved.

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