

“ Biostimulants shouldn't be considered as a blanket measure for all crops.”

Agronomic need determines success

Technical Research Briefing

One of the biggest concerns growers have about applying biostimulants is whether they will see a return on their investment. Years of research and development at Omex indicate a targeted approach will give the best results. *CPM finds out more.*

By Lucy de la Pasture

The biostimulant market is booming. With more than 300 products available in the UK there's a bewildering choice for growers in an expanding market where the potential of products can sometimes be overplayed. That's the view of David Booty, technical development manager at Omex, which has a long history in biostimulant products.

He highlights that the key to using biostimulants as they were intended is in the name itself. "Biostimulants work by upregulating a natural process in the plant, so if a plant is growing happily then it's unlikely to benefit from the application of a biostimulants because it's doing ok on its own."

For this reason he very much advocates using a biostimulant when it's agronomically justified rather than as a routine treatment, prescribed at frequent intervals.

"If a crop has adequate nutrition, is protected by fungicide and growth isn't limited by any environmental factors then it's probably already going to meet its potential. So in many winter crops, for example, it's highly unlikely that a biostimulant application will produce a yield benefit, or if it does then it will be a marginal one," he says.

Focus on spring

Autumn sown cereals and oilseed rape have phenomenal powers of recovery, he explains. "Winter wheat and OSR are very robust. It's the faster growing, shorter season crops where any less than perfect growing conditions can limit yield because they don't have the time to bounce back."

With that in mind, he believes the crops to focus on, and where biostimulants have the most value, are those sown in spring, such as spring barley, sugar beet, maize and potatoes — as well as very short season salad and vegetable crops.

To back up his assertions, David points to an Omex trial series carried out over three seasons (2010-2012), with 112 trials in total. The work was carried out to look at a bacterial biostimulant to

promote root development in potatoes, on the premise that a greater root biomass is able to access more water and nutrients from the soil.

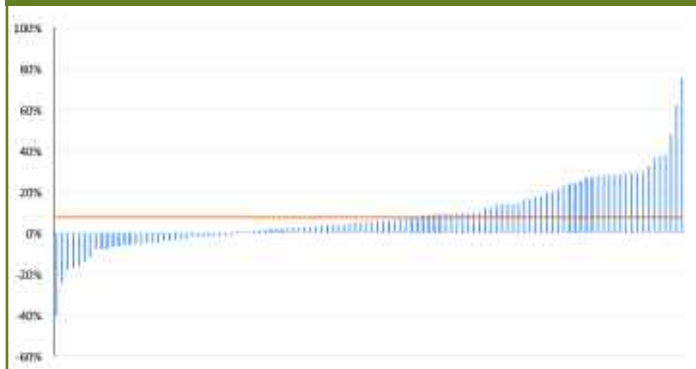
The results presented as a metadata analysis (or piano chart) shows the vast range of yield responses to the bacterial biostimulant and illustrates how some of the misleading information occurs when it comes to marketing claims, he says.

"Quite legitimately I could take these results and say they prove that the product gives an average yield response of 7.4%. But the data is also showing that in 30% of cases there was a negative or no yield



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Yield response to bacterial biostimulant



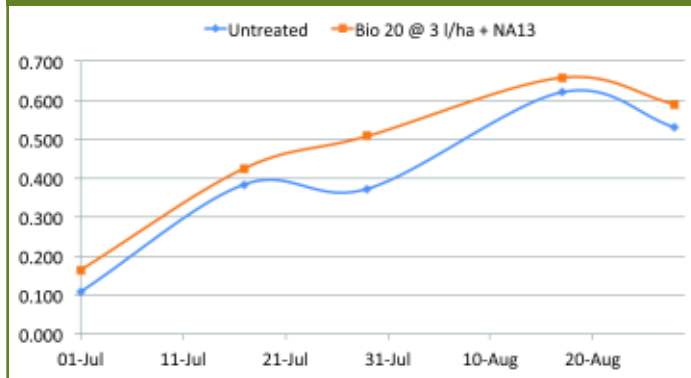
Metadata from 112 potato trials in the UK from 2010-2012.
Source: Omex, 2021

Uptake of foliar Mn



Biolab studies using different amino acid partners with Folex Mn in soya bean, under normal growing conditions.
Source: Omex, 2021

Stress relief in onions



Field trials show the effect Bio 20 has on canopy development (NDV) when onions come under drought stress.
Source: Omex, 2021

effect. Of the 70% which did show a positive yield response, the vast majority of these were only marginal. The largest responses, which represent a relatively small number of trials, is where the biostimulant application really came into its own.”

Identifying where these larger responses will occur is where Omex is concentrating its

efforts, explains Scott Baker, the company’s nutrition agronomist.

Using a combination of root growth analysis, gene expression studies, pot experiments in controlled conditions — including induced stress — as well as formal replicated plot trials in field crops and grower’s own trials, Omex is working to give growers the best advice on ▶

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When conditions aren't favourable, the plant shuts down and this is where a biostimulant can upregulate the plant's metabolism, explains Scott Baker.

► how and where to use its products.

"Large responses to biostimulants tend to occur where there are limiting factors, often associated with unknown variables — often where land is rented; sandy soils with low organic matter; unirrigated land; or where crops are late-planted. In highly productive, high organic matter soils with irrigation and plenty of available nutrients, there's unlikely to be a response from biostimulant applications," he says.

For this reason, both Scott and David advocate using the right product, in the right place, at the right time. Determining what to use, where and when should be based on establishing agronomic need, just as with any other a gricultural input, adds Scott.

"Far too many products are being applied without any agronomic benefit and biostimulants shouldn't be considered as a blanket measure for all crops. By understanding what it is you're trying to achieve, it's possible to match the right product to the crop's needs."

David explains that much of the role of a biostimulant is to help crops withstand stress and this is something Omex has looked at in lab trials on soya beans where stress

has been induced.

"We looked at a standard manganese versus no foliar applied manganese in a low nutrient situation and found, unsurprisingly, that by applying foliar manganese it improved the manganese levels in the plant.

"We also looked at manganese applied with different brands of amino acid biostimulant and found that manganese uptake was improved by applying the two together. It also showed that the extent of manganese uptake varied depending on the amino acid product it was paired with," he explains.

Drought stress

Further trials in the biolab have been carried out on field beans, comparing a biostimulant/nutrient product (Bio 20), used under normal growing conditions, with induced drought stress. "The deliberately induced chronic drought stress in this trial was exacerbated by very high temperatures towards the end of the experiment.

"50% of the drought control plants had completely died by 9 June and all of the plants treated with a biostimulant survived the drought stress. Consequently, the biostimulant treatments show considerable advantages in plant height, mass, number of leaves and leaf chlorophyll over the drought-stressed control by the end of the experiment," explains David.

He adds that climate variation is a factor that farms are having to contend with more and more. The UK climate is witnessing more weather systems which seem to get 'stuck', as seen over the past few springs where April has been predominantly dry, he comments.

"Any prolonged stress in the life of a spring-sown, short-season crop will have an effect on yield potential, so applying a biostimulant in advance of an anticipated

Research briefing

To help growers get the best out of technology used in the field, manufacturers continue to invest in R&D at every level, from the lab to extensive field trials. CPM Research Briefings provide not only the findings of recent research, but also an insight into the technology, to ensure a full understanding of how to optimise its use.

CPM would like to thank Omex for sponsoring this Research Briefing and for providing privileged access to staff and material used to help bring it together.

Omex operate in over

85 countries around the world, researching and developing a range of liquid fertilisers, including suspension, solution and foliar fertilisers. Omex work with farmers to help sustainably feed a growing population, promoting plant health and crop nutrition to achieve optimum yields. The company is celebrating its 45th year as a family run business.



stress, or before it advances to a point where it starts to take its toll on the crop, is a situation where a positive effect would be expected."

David points out that in the trial there were no significant differences at the end of the experiment between the treated and untreated plants (not under drought stress), so a benefit is unlikely to be seen under normal growing conditions.

Further work looked at Bio 20 in strip trials in onions at a farm in Norfolk. "The field was irrigated but was a distance from the main holding, so part of the field received Bio 20 ahead of a droughty period and the canopy growth was monitored.

"In the untreated, canopy development went backwards over a period of two weeks when there was drought stress. The treated canopy showed a tiny dip in growth but quickly recovered as the biostimulant helped the crop through the stress period."

Ultimately there was a difference in the yield and size fraction of the onions harvested. "The area under the curve (see graph on page 59) represents the amount of light intercepted which corresponds to yield. The effect is the same in potatoes," he adds.

Another key role of many

biostimulant products is to promote root growth, adds Scott. "It's logical to look at applying a biostimulant to help during establishment if conditions aren't conducive to root growth. When conditions aren't favourable, the plant shuts down and this is where a biostimulant can upregulate the plant's rooting metabolism to encourage growth, in spite of the stress."

However, that doesn't mean multiple products or repeated applications of a product are necessary. "You can only turn the genes on once, so more isn't better," adds David.

Summing up, Scott emphasises that the principles of applying a biostimulant aren't different to crop nutrition — there isn't a routine requirement so it's necessary to establish what the likely 'need' is before deciding whether a biostimulant is likely to be warranted or not.

"Crops can get hungry even when they have enough nutrition, so we use tissue or SAP analysis to get a picture of what's going on in the crop."

With biostimulants it can be more tricky — predicting the weather and upcoming abiotic stress periods isn't a precise science but as long as a biostimulant is applied before a crop goes backwards then it will help it through adverse conditions." ■