

BIOSTIMULANTS – SCIENCE OR HOCUS-POCUS?



Biostimulants and their effects are currently a widespread and much-discussed topic. But what do these highly praised substances really do and where is still a need for research?

The market is booming worldwide, and annual growth rates of 10 to 12 % in sales of biostimulants have been observed for a long time (source: European Biostimulant Industry Council (EBIC)). This is often accompanied by astonishing advertising claims: yield increases of 50 % and more are promised - considerable reductions in fertiliser use are said to be possible - only with biostimulants can crops survive stress situations until harvest - and much more. There are currently around 200 producers of biostimulants in Europe. The choice of products is huge and it is difficult to maintain an overview, especially as practitioners often lack reliable tests of the products. The following article attempts to bring some order to the large field of biostimulants.

What are biostimulants?

It is easier to explain what biostimulants are not: they are neither fertilisers nor pesticides. Helpful for the understanding is the origin of the word stimulants, which comes from the Latin word *stimulare* = 'stimulate'.

Biostimulants encourage metabolic processes in plants, regardless of their nutrient content. This stimulation can increase the efficiency of nutrient utilisation, increase tolerance to abiotic stress, improve quality characteristics and/or optimise the availability of nutrients contained in the soil or rhizosphere. This is defined in the EU Fertiliser Product Regulation 2019/1009, which came into force in 2019 and stipulates for the first

time that biostimulants can CE labelled (EU test mark), whereby the agronomical efficacy must be guaranteed. So far, only very few biostimulants have this label and can continue to be sold without CE labelling. Algae products are in first place in the global market share of biostimulants. Humic acids, microorganisms and amino acids, alongside plant extracts and inorganic products such as rock flours, follow this group. Due to the mode of action of biostimulants, the effect of the products is highly variable and depends on many factors, such as the environmental conditions, the crop, the variety and the application. In addition to the application via the leaf and the soil, there is also the application as a seed treatment.



It is therefore not easy to identify the right products that have a measurable impact in practice.

In addition, there is no official testing system that can compare all the biostimulants on the market and help you to make your choice. What can the farmer rely on?

DynaSeed - tested quality from the plant breeder

Deutsche Saatveredelung AG (DSV) is a plant breeder and has been working for many years on the question of how to better utilise the potential of innovative variety breeding. In simple terms: how can the development of high-quality DSV seed be additionally supported?

To this end, the company has created a separate research area focussing on seed technology. DynaSeed has been developed in this area of DSV. Here, innovative seed treatment products are developed directly by the breeder to ensure greater dynamism in plant development processes. They contain a wide range of biostimulants, nutrients and coatings. Their visible effects have been proven by scientific research methods. As mentioned above, finding the right 'recipes' is a long process. Initially, individual biostimulants are tested in DSV's own test system. The best biostimulants are then combined into complex recipes. Only the most innovative formulations are used to coat DSV seeds, which later carry the DynaSeed trademark. True to the credo: high research effort, significant results and visible effects.

But what does "high research effort" mean in this context? A small part of the DynaSeed test system is described below:

Germination test: The treated seeds are laid out on filter paper and cultivated under controlled conditions. After 7 to 21 days, depending on the species, the germinated plants are counted by hand and the germination capacity is calculated. These results show that DynaSeed can increase the germination capacity by up to 12 %.

Vigour/sprouting force test: A filter paper is



The Vigour test can be used to check the vitality of the seed and the radicle growth

covered with treated seed and then placed vertically so that the roots can grow downwards. The determination of vigour, radicle length and germination period is carried out fully automatically using image analysis software. With DynaSeed, the radicle length can be increased by up to 20 %.

Field emergence test: In this test, the treated seed is sown in weed-free topsoil that has been thermally treated and cultivated under controlled conditions. This is also an automated process. It uses image analysis software and artificial intelligence. The percentage field emergence, the duration of field emergence and the average cotyledon size of the plants are determined.

Tests at low and high temperatures: Germination tests and field emergence tests can also be carried out in an unusual temper-



Field emergence test

» The biomass yields of the alfalfa in the individual cuts are between 30 % and 100 % higher than without DynaSeed LegumeMaxx treatment. «

Markus Schlotmann



In the case of legumes, a clear difference in yield can be observed between treated and untreated crops.

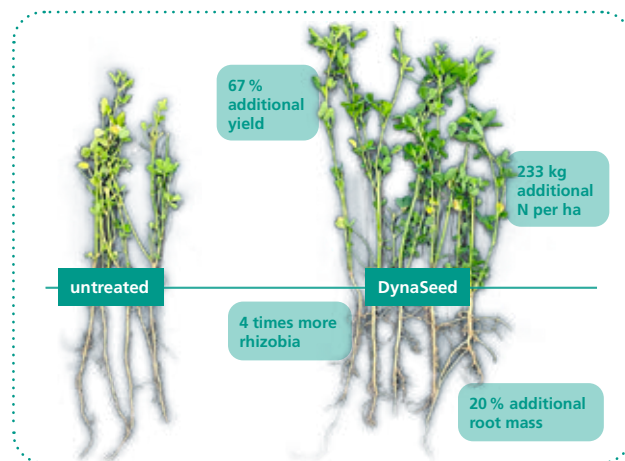
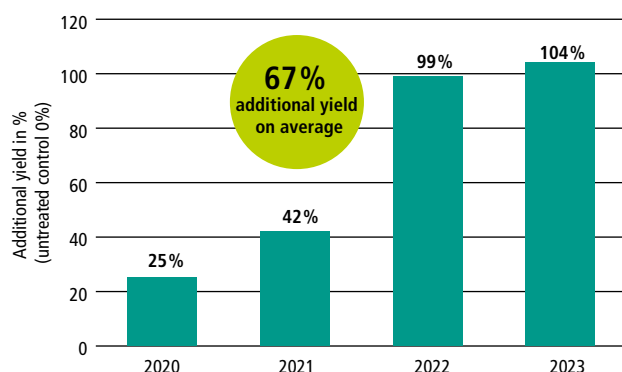
ature range of 5 to 35 °C. The germination capacity, germination speed and the fresh weight of the plants are recorded manually. In such stress situations for the plant, the effect of biostimulants can become particularly visible.

Field trial: For field trials, the treated seed is sown in small plots. The trials are repeated over several years at different locations. Extensive characteristics are recorded, such as the biomass development of the plants at different points in time, the number of plants, pest infestation and yield. It is often a challenge to make a significant impact on yield with a biostimulant seed treatment. This is because there are many factors that affect the yield and these cannot be controlled by seed treatment alone. Legumes are an exception here. A clear difference in yield can be observed with and without treatment.

DynaSeed LegumeMaxx - measurable yield difference

The name of the LegumeMaxx product contains the word 'Legume', derived from the legume plant family. These are known to be able to work together with root colonising

FIG. 1: ADDITIONAL YIELD (DM) FROM A DYNASEED LEGUMEMAXX TREATMENT ON ALFALFA 2020-2023



bacteria, the rhizobia, to fix nitrogen and convert it into a form that can be used by plants. The interaction between rhizobia and legumes is known as symbiosis and is highly complex. With DynaSeed LegumeMaxx, the seed treatment for legumes, every seed is coated with rhizobia. This ensures that they can colonise the roots of the legumes shortly after germination and start nodule formation. To further support this symbiosis, algae extracts, minerals and micronutrients such as molybdenum are added to the seed treatment. This treatment leads to a significant increase in nodule formation compared to untreated varieties. In addition, the combination of biostimulants results in faster juvenile development and improved root growth.

The effects can lead to considerable additional yields, as shown in Fig. 1. Due to its many advantages, DynaSeed LegumeMaxx has been a standard treatment for legumes in DSV COUNTRY forage mixtures for years.

Under favourable conditions, a nitrogen-fixing capacity of 250 kg per hectare can be expected over the entire vegetation period in an alfalfa treated with DynaSeed LegumeMaxx. This has a direct effect on the plants and therefore on the yield. Crops in which the nitrogen fixation of legumes does not work optimally appear light in colour and often inhomogeneous. Crops with functioning nitrogen fixation are lush green, healthy and dense. In addition to legumes, DSV also offers turf grasses with DynaSeed. You can find more information at www.dsv-seeds.com.

Conclusion

When used correctly, biostimulants can help to meet the challenges facing

agriculture today. With legumes in particular, inoculation vaccination with rhizobia can save large quantities of nitrogen fertiliser and increase yields. This depends on many factors, such as environmental conditions,

crop and variety. The best products and combinations can only be identified through intensive screening in the laboratory and extensive tests in the field. Find out what biostimulants can achieve in oilseed rape in the next issue.

Dr. Ulf Feuerstein

Asendorf

Phone +49 4253 9311 11



Kathrin Kahle

Asendorf

Phone +49 4253 9311 34



Markus Schlotmann

Lippstadt

Phone +49 2941 296 136



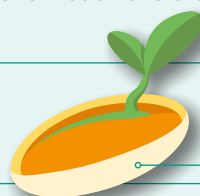
In all COUNTRY mixtures with legumes:

DynaSeed® LegumeMaxx – for maximum yield

DynaSeed® LegumeMaxx is the innovative seed treatment for alfalfa and clover species. The customised DynaSeed® coating compound ensures improved root growth and faster juvenile development. The addition of species-specific rhizobia and molybdenum supports nodule formation and thus nitrogen fixation and yield.



- High N-fixation
- Additional yield
- Relief of the fertiliser balance



DynaSeed® coating

