

Biostimulants: What's behind the name?

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Elicitors, phytostimulants, biostimulants, phytoprotectants, biofertilizers, bioactivators, soil enhancers and so on. What is this? What are they? Are they all the same? What do they do? What don't they do?

If you are lost in the jungle of all these products, don't be discouraged you are not the only one! Still, understanding the differences between these product categories, and more importantly the concepts and mechanisms that make them work in the field, sometimes with impressive results, is really worth the effort. Some of these products will definitely make their way through in the High Tech Agriculture of the future.

Seaweed extracts based products, humic acids products and amino acids based products, the three main categories of substances covered by the "biostimulants" term, are increasingly popular among growers although the mechanisms that drive the way they work on the crop or soil are not fully documented and known. Recent studies have shown that biostimulants protect against a number of biotic and abiotic (environmental) stresses and offer great potential for field application.

What are Biostimulants?

During the past 10 years researchers have evaluated many kinds of biostimulants for the agricultural industry. Of the various examined the most promising are seaweed extracts, humic acids, amino acids, salicylic acid and silicates. All of these products exert beneficial influences either through hormonal effects or by raising antioxidant levels.

Humic acids, amino-acids and seaweed extracts are three commonly used biostimulants.

- Humic acid has received increasing attention in recent years. Humic substances are naturally occurring organic materials derived from biological sources (i.e. decomposed organic matter). Scientists were exploring the benefits of naturally occurring soil humic acid on plants as far back as the 1940s and '50s. In the '70s researchers found that humic substances exhibited auxin-like activity and chelation properties (chelation of micro-nutrients, such as iron, aids plant uptake and utilization). In more recent research conducted at Virginia Tech in the USA, researchers found that in addition to root initiation, nutrient uptake, chlorophyll content and photosynthesis – humic acid inhibits indolacetic acid oxidase. The net result is higher growth hormone levels, which promote more growth.
- Seaweed contains various hormones, vitamins, amino acids, mineral nutrients and other components. It may affect plants in several ways. However, its stimulating influence—particularly for crops growing under environmental stresses has been attributed to its hormonal activity, especially that of cytokinins and auxins.

Biostimulants perform multiple functions: Biostimulants help plants help themselves!

Because biostimulants contain a diversity of chemicals, it's not surprising that the benefits associated with their use vary as well. The following outcomes can apply to a whole group of biostimulants:

1. Enhanced root and shoot development
2. Drought tolerance
3. Salt tolerance
4. Disease resistance
5. UV light tolerance
6. Heat tolerance

All these translating in better yield, higher flowering and fruit set, etc.

One of the roles of plant hormones is that of chemical messengers that tell plants when stressful environmental conditions exist. In response, plants may initiate or increase physiological processes that increase their tolerance to stress. For example, small, rapid changes in abscisic acid levels (which occur when plants are under moisture stress) cause stomata to close. Also, water stress reduces cytokinin activity. This change signals the plant to initiate a defence system to drought. Thus, another function biostimulants may perform is that they act as “switches” that turn on plants’ preparations for adverse conditions by altering hormonal balances.

Because humic acid and seaweed extract exhibit cytokinin-like auxin-like activity, these and other bio-stimulants that contain hormonal materials may signal plants to switch on their defence system to harsh environments.

Legislation

At every corner of the world, urea is urea, mancozebe is mancozebe, copper sulphate is copper sulphate, atrozine is atrozine, glyphosate is glyphosate etc.

In other words, there is a common language and a common word to describe a given product or molecule! What about biostimulants? The answer is NO! A rapid look at the legislation in various countries shows that the approach is different.

In Europe and in the USA they are working on shaping new legislation to overcome this, initiated at the First World Congress on the use of Biostimulants in Agriculture in November 2012.