

Biostimulant/Growth Enhancer Technology In Plant Care Programs

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Introduction

Biostimulants have assumed considerable importance in turf care and crop production practices in the United States. Field success and the increasing validation information confirm beyond reasonable question the viability of these products in this country, just as they have been viewed as critical in maximizing crop yields in other countries for many years. Along with genetically engineered improvements to plant species, biostimulants/enhancers now represent the only credible new technology for improving health, increasing yields and decreasing stress induced problems. As Dr. Ward of Auburn has stated, "There is a need for these products."

Certainly, as with all new technology, there has been a learning period—with some remarkable successes and some seeming "failures" over the past twenty years—in the application of biostimulants to improve plant performance. Fortunately, the past (and present) "failures" are identifiable as resulting from one or a combination of the following:

1. Ignorance or disregard of the needed balance and the inter-relatedness among the various hormone groups.
2. Inappropriate attention to other critical constituent (e.g., nutrient) requirements of plants.
3. Poor formulation chemistry, particularly in regard to stabilization of compounds.

A number of companies have made progress in dealing with some of these basic problems, at least in regard to the second and third items, and in fact have product currently on the market which may be fairly said to give good results in many circumstances on some species. Nevertheless, as far as hormonal chemistry itself is concerned, most manufacturers have yet to achieve a balancing of inputs of *all* growth hormone groups, especially as it relates to different species and consistency of desired result. Perhaps Dr. Karnok of the University of Georgia identified this problem best when he doubted that any single hormonal material could have the same effect on "...all species growing under all conditions."

A Primer on Biostimulation & Growth Enhancement

There is now a substantial body of evidence that the addition of biostimulants to nutrient programs can significantly improve:

- Survivability & Vigor
- Root Depth & Mass
- Stress Resistance
- Nutrient Uptake
- Moisture Utilization
- Apical Quality
- Disease Resistance
- Insect Resistance

What is a Biostimulant?

It is a compound containing one or more plant hormones from the Auxin, Cytokinin and Gibberellic Acid groups which control the health, efficiency, and growth of plants.

What does a Biostimulant do?

Under ideal conditions, a plant has adequate hormones to function efficiently. In the real world of plant management, conditions are never ideal, thus plants are always asked to perform at less than peak conditions. Biostimulant applications can replenish hormonal deficiencies and improve plant performance.

What results will Biostimulants give?

Generally a healthier, more efficient plant. The greater the stress, the greater the benefits—whether we are speaking of increased yields, more prolific roots or resistance to external agents.

What is a "Growth Enhancer"?

A compound containing both growth hormones and appropriate beneficial nutrients.

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Biostimulant—

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Are there differences in Biostimulant/Enhancer compounds?

Yes. Most compounds contain one or two hormone groups. While these sometimes *do* yield good results, often they lack consistency because they do not address all areas of hormonal deficiencies in the plant. They assume that one compound is appropriate for all types and all functionings of plants, and they often lack beneficial carrier constituents.

Plant Hormones

There are five types, or groups, of plant hormones. Two of these (Ethylene and Abscisic Acid) regulate or initiate decline activities including dormancy and death. The other three groups, primarily associated with growth enhancing activities, are:

Gibberellins (GA)

Produced and dominant in the new growth areas (particularly in seeds and apical portions), Gibberellins are key to cell division and elongation and are the "signal callers" or messengers of the plant. As apical growth occurs, GA travels downward (provided sufficient Auxins are present) and instructs the plant to:

- a) Produce more Cytokins for root proliferation.

- b) Translocate more Cytokins to the other areas of the plant to enhance the topical elements.

Auxins

Produced in the middle regions of the plant, Auxins contribute to root growth and formation and largely govern GA and Cytokinin movement to and from the extremities. They also play a major role in internode formation, which in turn significantly influences leaf quality.

Cytokinins

Manufactured in the roots, Cytokins profoundly affect root development and, with assists from GA, Auxins and sufficient nutrition, light, air and moisture, are integral to cell division and leaf and stem formation.

From a practical standpoint, the upshot of these facts is that a thorough understanding of hormones and their interrelationships to each other and the other sustaining elements of plant health is essential to producing dependable responses. The absolute corollary is that different responses require different prescriptions. Thus, for example, hormonal compounds with advantageous attributes for seed germination and early establishment may be ineffective or even damaging if applied to the same plant during a more mature state of the life cycle.



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