Biostimulants in Agriculture: Their Current and Future Role in a Connected Agricultural Economy

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As the world's population grows, we will need increasing amounts of food. The world's population is expected to reach over 8 billion people by 2030 and over 9 billion people by 2050. A growing population means a growing appetite, and a growing appetite means that agriculture will become much more important to the future of our world.

Agriculture is a sector of the global economy that will continue to be critical to the livelihoods of individuals and to the stability of the overall global economy. Since the number of arable acres is expected to grow only modestly, agricultural producers will be required to become more efficient and more productive to create enough food for a growing, hungry world. At the same time, crop production will continue to be subject to unpredictable climates, from drought to flooding to intense heat, along with other stresses. Meeting future productivity goals will require significant advancements across a spectrum of technologies.

One emerging sector of the agricultural economy that is expanding rapidly is the category of products now called plant "biostimulants". Biostimulant products are used in a variety of applications in agriculture and horticulture. The category as a whole is gaining recognition for contributing to increased crop yields, improving horticultural practices and enhancing nutrient use efficiency by improving nutrient uptake and reducing losses to the environment.

What exactly is a plant biostimulant, then? Depending on whom you ask, the answers can be very different. Globally, there appears to be a general agreement that these are materials that are neither fertilizers (in the traditional sense) nor pesticides, but are beneficial in some way to the health and growth of a plant.

As this category grows, those in the industry are seeking consensus around the term. In Europe, for example, the European Biostimulant Industry Consortium (EBIC) has proposed a definition: *"Plant biostimulant mean a material which contains substance(s) and/or microorganisms whose function when applied to plants or the rhizosphere is to stimulate natural processes to benefit nutrient uptake, nutrient use efficiency, tolerance to abiotic stress, and/or crop quality, independently of its nutrient content."* The European Parliament in Strasbourg will begin rewriting their fertilizer law in 2013 to accommodate this definition or one similar to it, a process that will take over a year. Current thinking suggests a broadening of fertilizer definitions from the traditional N-P-K model to more integrated approaches to plant nutrition that include biostimulant technologies. It is expected that biostimulant products will begin being regulated under the new laws in Europe by 2015.

In the United States, fertilizer is not registered at the federal level. Instead, each state has its own fertilizer regulatory program. Thus, there are a number of different – and often conflicting – standards for managing fertilizers, plant or soil amendments and/or biostimulants. The fact that there is no single,

existing framework for how to register or label these products makes it difficult for many companies to register them in a number of U.S. states.

In response to these issues, the Biostimulant Coalition, a group of companies who are cooperating to address the regulatory and legislative issues around biostimulants, has proposed a definition of biostimulant that, while similar on several key points, differs slightly from the proposed European definition. The definition states that: *"A biostimulant is a material that, when applied to a plant, seed, soil or growing media - in conjunction with established fertilization plans, enhances the plant's nutrient use efficiency, or provides other direct or indirect benefits to plant development or stress response."*

The above definition is currently under consideration by the Association of American Plant Food Control Officials (AAPFCO). AAPFCO is an entity that promotes uniformity among U.S. states with regard to their fertilizer regulatory programs. If approved by AAPFCO, this definition could then be considered by the U.S. Department of Agriculture (USDA) for inclusion in a variety of department programs.

Due to the fact that U.S. fertilizer regulations have become increasingly more stringent, particularly with regard to nutrient loading in water bodies, demand for biostimulant products has grown. The Environmental Protection Agency (EPA) and an increasing number of states have put targets on reducing nutrient loadings into water. Additionally, USDA has created voluntary programs that offer financial incentives to producers who use technologies that lessen the environmental impact of farming, leading some producers to seek out plant biostimulant products. These trends are almost certain to continue and will likely result in an expanded biostimulant market.

Moreover, the organization of a recent international conference on the topic of biostimulants—New Ag International's November 2012 conference in Strasbourg, France, titled the "First World Congress on the Use of Biostimulants in Agriculture" —demonstrates the growing importance and recognition of the potential of these products. The conference was attended by 700 people from more than 30 countries, with attendees ranging from scientists who have studied plant biostimulant materials and products in the field, to CEOs of the companies at the forefront of this emerging industry. A similarly organized conference would likely attract great attention in the future if it were to be organized in the U.S.

Today, in Europe, biostimulant materials are used on approximately 4 million hectares (9.9 million acres), a number which is sure to increase. In the United States, we do not have accurate estimates of the number of acres on which biostimulant products are used, nor do we know what quantity of these products are currently being sold or used. Given that the industry is in its early stages, a study will need to be conducted in the near future to better answer these questions.

The biostimulant category is in its relative infancy, but the rapidly increasing level of investment in research is beginning to yield exciting insights into the potential of these products. As momentum grows, the level of applied knowledge around biostimulant technologies will increase as well. Despite all of the uncertainty related to the items discussed above, one thing is clear: plant biostimulants will play a significant, growing role in an expanding world.