

Biostimulants – Summary of Literature

Better turf surfaces with less environmental impact. So many turf managers are looking to use natural products, but reputations rely on results. “Prove that it works and I’ll give it a go” is the common response to natural substances that are sold for turf nutrition and protection. The information below is designed to shed some light on the ingredients that actually work, how and why.

Plant growth regulators (PGR’s) are substances that influence metabolic processes in plants at very low concentrations. When produced naturally by plants they are called ‘phytohormones’. These substances can best be described as chemical messengers regulating the normal progression of developmental changes and responses to environmental signals. The terms phytohormones and PGR’s are used interchangeably, particularly when referring to auxins, gibberellins, cytokinins, ethylene and abscisic acid.

Despite the fact that plants naturally produce phytohormones, they can also respond to externally applied PGR’s in certain growth stages and under specific conditions. For instance, plants may not produce enough phytohormones for optimal growth under poor climatic or environmental conditions. In this situation, proper external application of appropriate PGR’s can stimulate plant growth and tolerance to water and other environmental stresses.

A group of naturally derived and phytohormone containing substances have already been widely used and tested for professional turf management. These materials are favoured because they offer significant benefit while posing no harmful threat to environmental quality - they include seaweed extracts, humic acids and vitamins.

“Foliar applied humic acid (2.9% active) at 23.7 and 47.1L/ha improved leaf water status, shoot and root development in tall fescue, Kentucky bluegrass and Creeping bentgrass grown under drought. Humic acid (2.9% active) at 15.5L/ha and seaweed extract at 326g/ha, significantly reduced dollar spot incidence and improved turf quality in creeping bentgrass.” (Zhang 1997).

Seaweed extracts have been shown to exhibit various beneficial effects on plant growth and development. They have been reported to enhance nutrient uptake, increase chlorophyll content, protein synthesis and cell division, promote root and shoot growth and improve seed germination. When applied to plants, seaweed extracts can increase resistance to diseases and environmental stresses such as drought and salinity. It has also been observed that cytokinin like substances can inhibit free radicals, hydrogen peroxide, and superoxide, which are major elements for chlorophyll degradation during stress. Under drought stress, externally applied seaweed extract can replace naturally occurring cytokinin whose production is reduced by stress itself.

Foliar application of humic acid (25% active) at 5L / ha and seaweed extract at 326g/ha consistently enhanced antioxidant levels, leaf water status and growth in three cool season turfgrass species grown under high and low moisture status environments.” (Zhang 1997).

Humic Acid is a major component of humus. Humus is a natural organic substance high in humic acid and contains most of known trace minerals necessary to the development of plant life. Long used as a soil conditioner, recent research has showed that humic acid can provide phytohormones to improve plant growth and enhance stress tolerance. This has lead them to be described as extracts from ancient plant deposits, consisting of an immense arsenal and array of naturally occurring phytochemicals, nutrients, enzymes, hormones, amino acids and antibiotics.

Cameron Stuart, greenkeeper at Royal Sydney Golf Club, is currently looking at humic acid and its potential to enhance CEC in new green constructions. Cameron’s literature review has confirmed the ability of humic acid to release bound nutrients from soils and return them to an available state for plant uptake. He also speaks of humic acids ability to lift CEC and subsequent nutrient holding and microorganism activity in sand profiles. Cameron’s thesis work, toward the attainment of his masters degree in Agriculture ‘Turf Management, is expected to be complete by September 2005.

The above article draws on literature review conducted by Xunzhong Zhang from Virginia State University USA, in the partial fulfillment of the requirements for PhD in crop and environmental sciences, 1997. This work was also considered in the formulation of Vitalise® by Matchplay. For further information, Rob Cooper can be contacted on 0407 100 202.