Seaweed 'Nodosum Ascophyllum'.

A question of balance

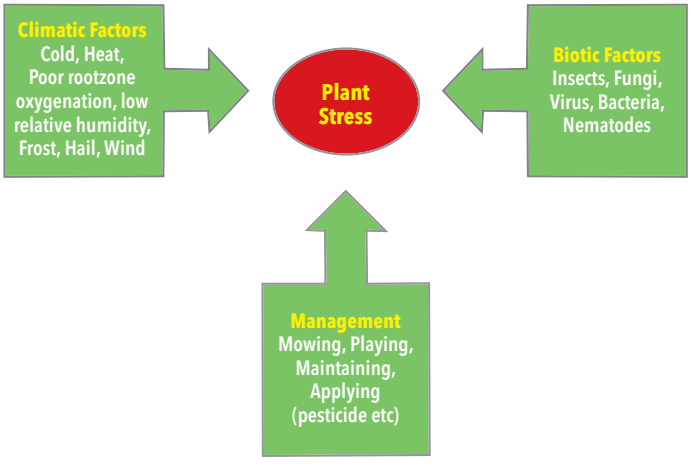
For greenkeepers, the early Spring of 2018 will go down as one of continual plant stress; the coldest, wettest and, in some parts of the country, to add insult to injury, the hottest weekend on record! But that of course is of little interest to players and Greens Committees who will still be placing unrealistic expectations requiring the course to be maintained to the highest quality.

Of course, now hopefully the worst is past, the catch-up can begin with intensive activity involving applications of fertilizers, herbicides, turf hardeners, re-seeding, increased mowing and aeration, not forgetting of course increased play…. all of which will inflict additional stress on the plant.

Assisting in this recovery phase, turf managers could look to the introduction of a biostimulant programme to target specific areas of plant growth, stress tolerance and the activation of the plant's natural defences.

Biostimulants are used together or formulated with nutrients to either obtain synergy between the component parts, or to just make applications more efficient and easy.

Factors that contribute to plant stress include:



- Biostimulants operate through different mechanisms than fertilizers, regardless of the presence of nutrients in the product formulations.
- Biostimulants differ from crop protection products because they act only on the plant's vigour and do not have any direct activity against pests or disease.

BioStimulants on turf

Biostimulants are effective, organic-based product that, in small quantities, can improve the health of turf grass, stimulate root & shoot growth, increase the plants ability to tolerate stress, and augment the capabilities of standard nutrients.

Biostimulants are not specifically

developed to influence the plant as a standalone application, however they do provide a synergistic benefit when tank mixed with other liquid products being applied in a nutritional programme.

Perhaps an easier way to look at this is, a biostimulant isn't a nutrient source and it's not a pesticide, but it is anything that can enhance plant health, from either an inert or biological source.

One of the oldest and most common biostimulant category applications to golf course surfaces is seaweed. Seaweed contains plant sugars, proteins and alginates, together with plant hormones such as auxins, cytokinins, gibberelins and betaines. Humic substances are another common component of biostimulant products.

Both seaweed and humic acid are very effective in stimulating plant growth, increase stress tolerance and enhance microbial activity in the soil; in itself a valuable mechanism in maintaining and promoting plant vigour.

When the plant is exposed to unfavourable environmental conditions and undergoing cultural stresses, levels of some hormones, such as cytokinins may drop. Applications of biostimulants containing cytokinins or other plant hormones will help the plant to better cope under such conditions.

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Close up of root mass – "Biostimulants boost microbial populations to increase rooting and overall plant health."

The role of amino acids

Amino Acids are another source of biostimulants that assist the plants ability to cope under particularly stressful situations. Under normal conditions a plant will produce sufficient amino acids for its every day needs and are the blocks that build up proteins and are essential in ensuring the structural integrity of the plant.

However when a plant is under stress, its ability to produce these essential amino acids and proteins is inhibited with the subsequent effect of poor growth and lack of plant-repair abilities.

The application of amino-acids prior to, or following on from stress periods allows the plant to maintain its vigour without expending energy by having to produce fresh amino acids when it is least able. The functions of amino acids within the plant include:

- Enhanced recovery from cold, wear and water logging
- Increased photosynthesis & chlorophyll content
- Stimulating root growth
- Enhanced germination

Amino Acids also have important chelating properties, being formed by combining with important elements such as iron, manganese, calcium, magnesium and copper. As a result, nutrients applied at the same time as a biostimulant containing amino acids will be more readily absorbed by the roots and leaves.

Amino-Form LX contains L form amino acids.

This last benefit gets back to the close utilisation of biostimulants with nutrients. A study showed that a formulated amino acid product enhanced uptake of iron and subsequently chlorophyll within the plant. A liquid iron product with 8% Fe applied at 10lts per hectare was compared with an Amino Acid formulation with only 3% Fe applied at 5lts per hectare. Over a two month period and three applications the enhancement of photosynthetic pigments, chlorophyll was over 9% better and carotene levels were 25% better.

Humates

Products that contain humates are also an excellent addition to the greenkeepers stress relief programme. Products rich in humates have a powerful stimulating effect on beneficial fungi that can deactivate pathogens, which could compromise the plants immune system. Another major benefit is that humates assist the plant to use nutrients more efficiently, in particular Phosphorous and Nitrogen.

It can also increase water-holding capacity and root-zone moisture retention, which in turn can increase the retention and availability of soluble fertilizers in the soil. Humates, such as in the Rigby Taylor BIO packs also have a high CEC [cation exchange capacity] and will 'grab' and hold metal ions like iron, manganese, copper and then 'hold' these micronutrients in the rootzone, making them more available to the plant."

More recently, advances in biological inputs have been developed, including mycorrhiza and bacillus. The root zone is host to a myriad of microflora, which have a symbiotic relationship with all plants.

Microbial army

Different approaches have been made to get the best benefit of this microscopic 'army', principally encouraging the indigenous species with nutrient supplements, including sugars, and maintaining an environment encouraging good bacteria, through aeration.

Another approach is to apply microbial inoculations, either direct to the root zone or by direct contact with seed as it grows and establishes after seeding. Germin-8T , seed treatment with added mycorrhiza and trichoderma atroviride, is such a development which has shown significant benefits in improved germination and seedling establishment, particularly under cold, wet conditions and improved disease tolerance during the emergence stage.

Finally, biostimulants are not cure-all products, however by introducing them into the growing environment they can have a significant effect on the plant's ability to survive and thrive during conditions that are unfavorable to growth.

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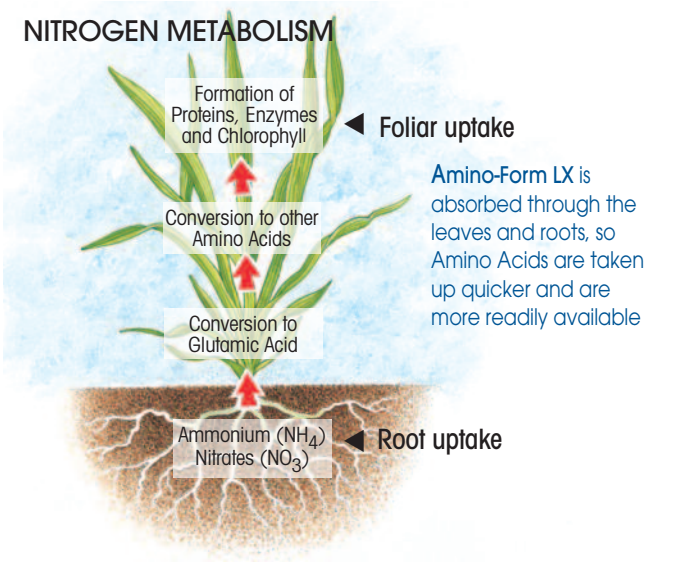

Graphic showing that biostimulants containing growth promoting hormones can be taken in by the plant by both the leaves and the roots with the potential of stimulating both root and shoot growth.