Are you a Wheat Grower?

Wheat is the most important cereal grain in world commerce

GrowGreen products enhance wheat yield and quality by pairing essential macronutrients with natural sources of micronutrients and biostimulants such as phytohormones, amino acids, and plant beneficial microbes. This mixture naturally enhances the vigour of any wheat crop. The wheat will not only be provided for nutritionally, it will be prepared to better provide for itself and have the elements it needs to withstand pathogens, pests, and environmental stressors. This means higher yields and healthier plants with less fertiliser inputs.

With that prominence comes concern about the negative impact of fertiliser runoff, the high cost of external inputs, and the vulnerability of wheat crops to pests and diseases. Vigorous stands of high-yielding wheat must be supported in a manner that is ecologically and economically sustainable.

Wheat Response to Plant Growth Promoting Rhizobacteria

Plant growth promoting rhizobacteria **(PGPR)** are regularly used within sustainable agriculture practice to inoculate seedlings in order to improve crop growth and yield. The interaction of the PGPR with the plant can suppress pathogens, support the cycling of nutrients, and generate plant hormones like auxin, which stimulates shoot elongation, root branching, and promotes fruit development.

Laboratory experiments on multiple wheat cultivars demonstrated that inoculating seeds with PGPR generated up to a 17.3% increase in root elongation, up to a 13.5% increase in root dry weight, and up to a 36.3% increase in shoot dry weight.[1] The study suggests PGPR is part of a beneficial domino effect. The inoculation stimulated auxin synthesis in the soil, which improved the wheat root system, ultimately leading to improved yield.

Additional research has demonstrated inoculated plants germinate better, develop and flower earlier, and have improved root development which positively correlates to higher yield.[1] One field trial reported a 27.5% – 31.9% increase in grain yield with a single inoculation, and a 54.7% increase in grain yield of wheat when a mixture of strains was used.[2]

Wheat has been shown to flourish when presented with microorganisms like GrowGreen's Microbe Plus Range.

Seaweed Extract Improves Spike Weight and Number

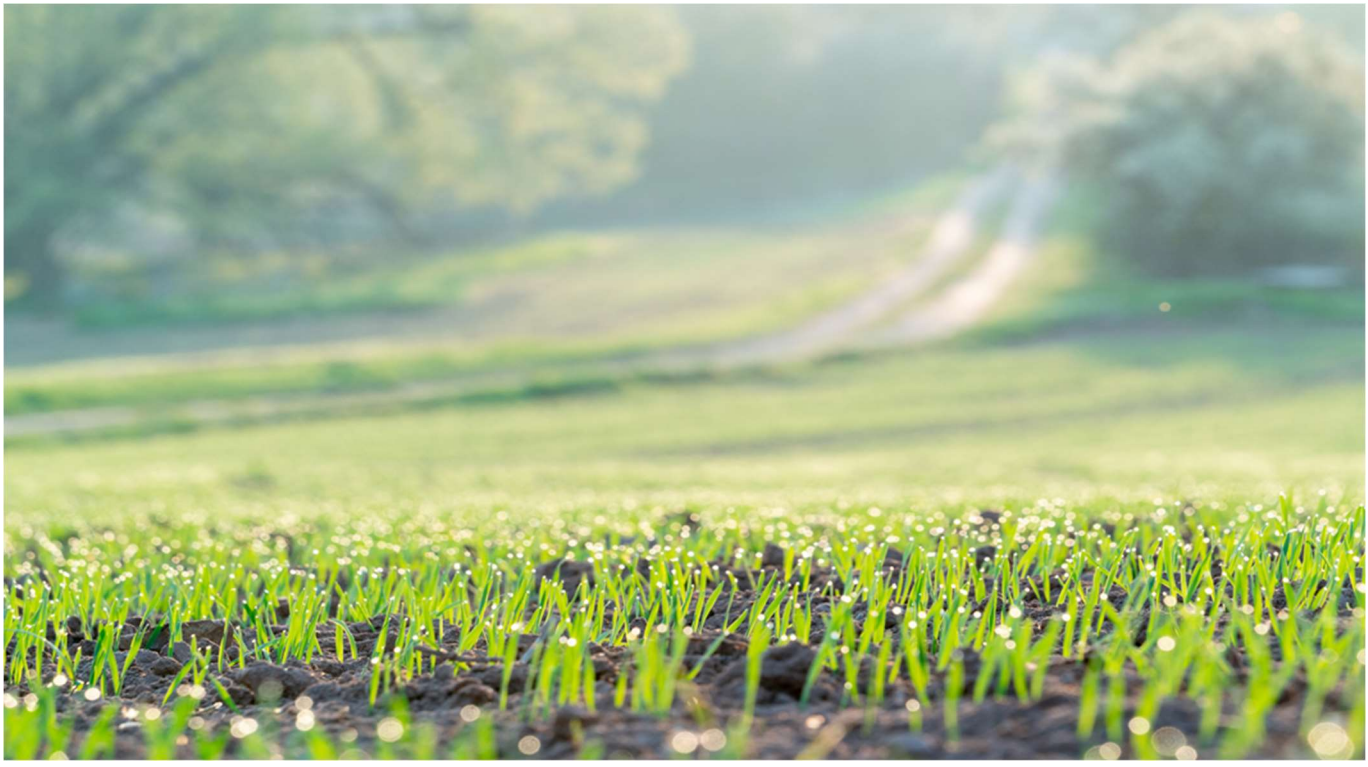
The application of seaweed extracts has also been shown to increase plant yield, vigour, and tolerance to adverse environmental conditions. In a study published in the *International Journal of Plant Production,* wheat that received a foliar application of kelp extract had significantly higher 100-grain weight, number, and length of spike—all of which contribute to a higher overall yield.[3] The application improved overall wheat biomass, and in particular, root biomass.

It is suggested that the reason wheat responds so well to seaweed extract is because of the presence of growth promoting hormones. Cytokinins and gibberellins have both been found in seaweed extract. Cytokinins are plant hormones that promote cell division in roots and shoots, and external applications of cytokinins have been shown to increase grain yield of winter wheat under heat stress.[4]

Gibberellin is another hormone that has signalling roles in plant fruiting and deterioration. The research suggests that the presence of these substances in the seaweed application enhanced the rooting ability of the wheat. This ultimately allowed the wheat to gather more nutrients on its own.

The foliar seaweed application also enhanced the nutritional quality of the wheat's carbohydrate, protein, and fat content. Macro and micronutrients were also higher than in the control group. Because of the presence of beneficial growth promoting substances, in addition to providing key nutrients and amino acids, the application of seaweed extracts helps wheat provide for itself more efficiently over the course of the entire growing season.

GrowGreen products, like Microbe Plus™ Kelp, blend digested seaweeds with beneficial microbes: fungi, and bacteria. Instead of focusing on a high nutrient content, this combination provides wheat with hormones and stimulants that regulate growth, development, and defence responses to pests and diseases.



Applying GrowGreen products directly to plant leaves allows wheat to readily absorb the nutrients. Foliar application can be 5-8 times more efficient than other fertiliser applications.

Amino Acids Yield More Grain Ears/m^2

A 2018 study found that wheat treated with amino acid-based biostimulants outperformed controls in terms of yield across every tested group.[5] While the number of grains per ear did not change, the number of grain ears per m^2 increased 4-17% compared to the control yield. Both plant vigour and leaf colour of the amino acid treated wheat were recorded at optimum levels.

Protein hydrolysates (the product of chemically breaking down proteins in water) have been effectively used in sports medicine because the human body absorbs amino acids more readily than intact proteins. This maximises the nutrient delivery to muscle tissue. The same principle holds true in wheat growth, which is why amino acids are a key component of GrowGreen biofertilisers.

Much of the nitrogen supplied to a wheat crop is ultimately used by the plant to develop amino acids—the natural building blocks of plant growth. Plants can use these building blocks to make proteins, vitamins, and enzymes, but the process consumes a great deal of energy. [5] The protein sources in GrowGreen biofertilisers are naturally obtained from marine by-products, which are then digested by microbes that break the proteins down into "L" shape amino acids. These are 100% plant absorbable, unlike the "D" shape that results from artificial synthesis or acid hydrolysis, which is not directly absorbable.

Amino acid treated wheat had a higher ash content, which is a measure of the grain's mineral content and, by extension, nutritional value. The researchers reasoned that since amino acids help transport elements throughout the plant structure, they were the cause of the nutritional biofortification. The study also found that wheat treated with amino acid based biostimulants had the highest protein content and a high Zeleny sedimentation index value, which is associated with good baking quality.[5]

In wheat crops, a higher dose of nitrogen fertilisation corresponds to a higher grain protein content and can increase the gluten in grains. GrowGreen's amino acid based biostimulants not only provide wheat with nitrogen, they help wheat crops use it more efficiently. Compared to the control groups, amino acid treated wheat recorded a wet gluten content that was ≈2% higher than the control group and ≈5% higher than another tested commercial biostimulant.[5]

Finally, amino acid based biostimulants increase wheat's ability to uptake environmental nutrients and use those nutrients efficiently. For both micro and macronutrients, the researchers wrote, "the use of preparations based on amino acids had a positive impact on the increase of these elements in wheat grain."[5] Part of this increase can be credited to the chelating, or bond-forming, properties of amino acids, which allow them to serve as carriers of the nutrients present in soil or fertiliser.

The biostimulants contained within GrowGreen's hormones and amino acid-based fertilisers (AminoElite, AminoKelp and Microbe Plus Kelp and their organic equivalents) have been shown to accelerate the life processes of plants, increase their resistance to environmental stressors, stimulate development of roots and leaves, and enhance seed germination.[5] This jump start can be the difference between crop failure and a successful harvest when wheat faces times of stress or critical development—flowering, drought, frost, etc.

While it is important to provide the right plant macronutrients, that is only the first step towards growth. GrowGreen fertilisers help wheat crops uptake more of those key nutrients, use them efficiently, and move minerals throughout the plant body.

The wheat treated with amino acids also produced higher quality grain in terms of mineral nutritional content.

GrowGreen Fertiliser Programs

The complexity of GrowGreen fertilisers matches the complexity of the wheat formation process. Our range of products supplies a balanced mixture of both micro and macronutrients needed for plant growth. As beneficial microbes metabolise these fertiliser nutrients, they are stabilised in the soil, protected from leaching, and available to the wheat crop as needed.

Supplying amino acids frees up energy to support wheat development. Biostimulants and plant hormones enhance rooting ability, grain formation, and resistance to stress throughout the life of the crop. GrowGreen also supplies key nutrients that are needed throughout grain formation.

Instead of creating a dependence on external inputs, GrowGreen products enhance your wheat's ability to provide for itself by encouraging vigorous root development and providing plant stimulants (amino acids and hormones) which will increase the formation of proteins and enzymes that are key to grain formation. A small concentration of GrowGreen products will provide natural sources of nutrients and plant hormones that will increase your crop yield and quality while protecting the sustainability of your land and bottom line.

References

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