



The Effects of GrowGreen Fertilisers on Canola Yield Increase

Importance of Canola Production Worldwide

Canola is the one of the most significant oilseed crops on the planet. Its oil has low saturated fatty acid content and the residue produced by oil extraction is a protein-rich animal feed.¹ As canola production has rapidly increased around the world in the past four decades, it is vitally important to support high-yielding, high-quality crops in a manner that is biologically effective, environmentally responsible, and economically feasible.

Biofertiliser Function

GrowGreen biofertilisers achieve these results by providing canola crops with natural sources of essential macronutrients, micronutrients and biostimulants (such as phytohormones, amino acids, and plant beneficial microbes). As the name suggests, biofertilisers contain living microorganisms that colonize the soil or plant tissue and promote plant growth. The microorganisms enhance growth directly, by supplying nutrients to the crop plant, or indirectly, by negating the negative effects of a pathogenic organism², improving root development, plant hormone responses, or aiding beneficial symbiotic relationships.³

Foliar applications (shown to be up to 10 times more efficient than soil applications) of small concentrations of GrowGreen biofertilisers improve the natural vigour of canola plantations. Instead of coddling canola plants by eradicating every potential hardship (a costly and ultimately impossible task), providing natural sources of nutrients and biostimulants triggers root development, biomass accumulation, and bolsters the natural plant defence mechanisms that will allow the plants to withstand common stressors and continue to thrive despite unavoidable hardships. GrowGreen biofertilisers encourage the development of naturally vigorous and resilient canola plantations that produce high yields without becoming dependent on external inputs or contributing to nutrient runoff problems.







PGPR Improves Canola Resilience

Plant growth promoting rhizobacteria (PGPR) have been shown to support the nutrient status of crop growth through biological N₂ fixation, increasing the availability of nutrients in the rhizosphere, inducing increases in root surface area, enhancing beneficial symbiotic relationships, or some combination of all these responses.^{3, 4} These enhance the vigour of the plant and, in turn, its resistance to environmental stressors.

GrowGreen's Microbe Plus[™] range of biofertilisers are based on a precise combination of microorganisms that promote plant growth through two pathways: stimulating phytohormones, solubilisation and mobilization of phosphate, and production of antibiotics and induction of plant systemic resistance to pathogens. The fungi added to GrowGreen products protect plants against diseases and environmental stresses such as salinity and drought, while also improving plant growth and development.

Studies have demonstrated that PGPR inoculation, improves overall canola yield in nearly every respect plant height, root dry matter, number of lateral roots, number of pods per canola plant, and number of seeds per pod. A 6% increase was recorded in canola plant height when inoculated with PGPR, as well as a 13% increase in seeds per pod, and a 14% increase in 1000 seed weight. The combination of humic acid and PGPR inoculation led to increases in total seed yield, oil content, and uptake of NPK nutrients.⁴

Additional research has shown that the use of biostimulants, such as those present in the GrowGreen Microbe Plus range, or Microbe Plus[™] Kelp, is also an effective approach to pest control. Cabbage aphids (*Brevicoryne brassicae* L.) reared on plants treated with PGPR have been documented to have a lower longevity, fecundity, and reproductive periods, leading researchers to conclude: "canola plants treated with PGPR are more resistant to *B. brassicae* and "could be useful for integrated pest management of *B. brassicae* in canola fields."⁵

Biofertilisers Enhance N Use Efficiency in Canola

In each case, the plant growth promoting rhizobacteria present in GrowGreen biofertilisers can improve the overall health and development of the canola crop. Enhanced vigour allows canola to develop more quickly, resist pests, pathogens, and stressors, and ultimately produce a higher yield.

Nitrogen is the precursor to the proteins that canola plants absorb in the form of organic nitrogen, ammonium, or nitrates. As such, it plays an important role in the growth and development of canola, which is why it is a nitrogen-demanding crop. Seed yield, total dry matter and harvest index have all been shown to improve in canola crops with higher rates of nitrogen application.⁶ A linear correlation has also been made between an increasing seed and oil yield and an increased level of nutrient availability.⁶



GrowGreen biofertilisers provide key nutrients, and also improve canola plants' ability to use available nutrients efficiently. The protein sources in GrowGreen amino acid-based biofertilisers, like AminoElite, AminoKelp or the organic AminoOrganic Premium are naturally obtained from marine by-products, which are then digested by microbes. We do not use heat or chemicals in this process, because amino acids that are obtained from artificial synthesis or acid hydrolysis are present in a "D" shape, which is not directly absorbable by plants. In contrast, the "L" shape that results from microbial digestion makes the amino acids in GrowGreen fertilisers 100% plant absorbable. The resulting product also contains all of the proteinforming amino acids in their natural ratio. Through chelation, these amino acids help transport nutrients more efficiently within the plant and directly provide the building blocks for protein and enzyme production.



A 2012 study published in the *International Journal of Agriculture and Crop Sciences* clearly demonstrated the benefits of pairing nutrients with biofertilisers, like GrowGreen products, which enhance nitrogen use efficiency. When comparing control groups to differing levels of nitrogen applications and biofertiliser applications, researchers found "The highest seed yield belong[ed] to biofertilisers followed by

nitrogen fertilizer." Overall canola plant height was also "significantly different and superior" when inoculated and treated with biofertilizers.⁶

The researchers concluded that biofertilisers like GrowGreen improve photosynthesis by increasing the absorption of water and nutrients. The improved nutrient absorption enhances water distribution throughout the plant body and stimulates the production of phytohormones that influence growth. This ultimately improves canola growth and leads to a higher seed weight.

In the study, the biofertilisers also resulted in an increased seed number per siliquae, and higher nitrogen levels resulted in the maximum number of siliquas per stem.⁶ In addition to improved seed yield, when using biofertiliser inoculation methods, the consumption of nitrogen chemical fertilizer was significantly reduced, presumably because the canola crop was more equipped to naturally gather nutrients and use them more efficiently.⁶

Nitrogen is the key to high canola yields. However, if that nitrogen is present, but not actually available to the canola plant, money is lost and runoff problems are exacerbated with every fertilizer application.



GrowGreen biofertilisers take the guesswork out of integrated fertiliser management by combining ideal proportions of soil microorganisms, biostimulants, and macro and micronutrients. This maximizes nutrient availability and stabilizes those nutrients in the soil, enhancing plant growth and yield while minimizing cost and runoff.

Seaweed Extract Triggers Canola Root Development

Liquid seaweed extract is known to be a natural source of growth promoting hormones that act as regulators within plant bodies, which is why it is a key element of GrowGreen products like AminoKelp and Microbe Plus[™] Kelp. The application of seaweed extract has been linked to increased crop yields, delayed senescence, improved overall plant vigour, improved yield quality and quantity, and improved ability to withstand adverse environmental conditions.⁸ In particular, cytokinin, a phytohormone that promotes cell division in roots and shoots is readily absorbed through leaf surfaces, making a foliar application of GrowGreen products especially effective.

In a study published in the *South African Journal of Plant and Soil*, canola crops treated with seaweed extract consistently outperformed controls. The application was most effective when applied during the three-leaf stage of the canola

crop (a 2.7% increase in kg/ha yield).⁸ This is because when you apply growth regulators, like those present in GrowGreen's seaweed extracts, you are working with the plant to stimulate its natural growth mechanisms. This is most effective when applied during a suitable growth stage of the plant.



Microbe Plus[™] Kelp and AminoKelp, blend digested seaweeds with beneficial microbes; fungi, and bacteria. Instead of focusing on a high nutrient content, this combination provides canola plants with hormones (like auxin, which stimulates shoot elongation, root branching, and promotes fruit development) and stimulants that regulate growth, development, and defence responses to pests and diseases.



In the study, the improved yield of the canola crop was attributed to stimulation of the canola root system by the phytohormones and plant regulators present in the seaweed extract.⁸ A more developed root system supports greater nutrient uptake and biomass production, which naturally improve final yield and oil content. GrowGreen's AminoKelp addresses multiple canola needs at once by combining absorbable amino acids (enhanced nitrogen use efficiency) with key nutrients and the phytohormones and biostimulants that regulate root development, shoot growth, and fruiting.

GrowGreen Biofertilisers for Canola Plants

GrowGreen specializes in supplying plants with biostimulants, amino acids, hormones, beneficial microbes and specialized crop nutrition. GrowGreen is committed to help growers achieve the best possible results through a diverse range of products, including AminoElite, AminoKelp, and the Microbe Plus™ range. These biofertilisers work with the soil microbiology to enhance canola root systems, biomass growth, and nutrient uptake and use efficiency proving that high canola yields don't have to come with a high economic and environmental price tag.

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