

Why Biostimulants Outperform Fertilizers in Building Lasting Soil Health

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STORY AT-A-GLANCE

- › Biostimulants are natural compounds that awaken soil biology, helping plants absorb nutrients more efficiently, resist stress, and grow stronger without the need for synthetic fertilizers
- › Unlike fertilizers that feed plants directly, biostimulants regenerate soil life – improving structure, water retention, and long-term fertility for healthier, more productive gardens
- › Key ingredients like humic acids, seaweed extracts, beneficial microbes, and chitosan work together to strengthen roots, boost plant immunity, and increase crop quality and yield
- › Using biostimulants with compost or natural amendments allows plants to draw more nutrition from the soil, reducing the need for added inputs and preventing runoff pollution
- › Home gardeners and consumers can support regenerative agriculture by choosing food grown with soil-enriching methods that prioritize biology over chemistry, helping heal the food system from the ground up

Chemical farming has pushed the limits of the land for too long. Fertilizers once promised endless abundance, but decades of dependence have drained the life from the soil, leaving it weaker and less able to sustain itself. The more we've tried to force production, the more fragile our food system has become. Today, rising fertilizer use and falling soil health tell a simple story: extraction without renewal always collapses in the end.

That's why a growing number of growers and home gardeners are shifting their focus from feeding plants to restoring the soil's natural vitality. Instead of relying on synthetic boosters, they're looking for ways to activate the biology already present underground. Biostimulants – natural compounds made from seaweed, compost, or beneficial microbes – are emerging as one of the most effective tools for this transition.

The beauty of biostimulants lies in their subtlety. They don't promise instant results; they bring balance back to a living system that's been overworked and oversimplified. They support the tiny organisms that make nutrients available, strengthen root systems, and help plants handle stress naturally. In a world of diminishing soil health and increasing environmental strain, understanding how these natural enhancers work is key to growing food that sustains both people and the planet.

Biostimulants Stimulate the Plant, They Don't Just Feed It

A Modern Farmer article explored how naturally derived biostimulants – like humic acids, seaweed extracts, beneficial microbes, and chitosan – help plants thrive by triggering their internal biological systems rather than simply feeding them nutrients.¹

Unlike fertilizers, which add minerals such as nitrogen or phosphorus directly to the soil, biostimulants work by enhancing the plant's natural processes, such as nutrient uptake and stress tolerance. This means that instead of forcing growth, they help plants use the nutrients already present in the soil more efficiently, leading to stronger, **healthier crops** that are more resilient to heat, drought, and disease.

- **Humic and fulvic acids act like the plant's digestive aid** – These compounds, formed from decomposed organic matter, improve how soil holds water and nutrients. Think of them as natural sponges that keep the soil hydrated and fertile.

By feeding soil microbes and boosting root growth, humic and fulvic acids allow crops to absorb minerals more easily and develop thicker, more extensive root systems. This not only improves plant growth but also supports better yields and

long-term soil fertility. Farmers using humic-rich composts or teas often notice richer, looser soil that stays productive season after season.

- **Seaweed extracts give plants resilience under stress** – Seaweed-based biostimulants have long been prized for helping plants survive tough growing conditions. These extracts are rich in amino acids and hormones that encourage strong cell formation and better water retention.

Farmers who use them typically see crops stay greener during dry spells and recover faster from **heat stress**. When sprayed onto leaves, seaweed extracts support amino acid synthesis – helping plants produce the proteins needed for cell repair and energy production.

- **Beneficial microbes strengthen the root zone** – Microbes such as Rhizobia and mycorrhizae form symbiotic relationships with plant roots, expanding their reach and nutrient access. These microscopic partners act like living bridges, transporting essential nutrients like nitrogen and phosphorus straight to the root system. Some, like Trichoderma fungi, even protect roots by outcompeting harmful pathogens.

This translates to more vigorous plants with fewer disease outbreaks and less need for chemical interventions.

- **Chitosan protects crops like a natural shield** – Derived from the **shells of crustaceans** or insects, chitosan acts as a plant fortifier. It strengthens cell walls, reduces water loss, and triggers the plant's built-in defense system against rot and fungal disease. Farmers are now experimenting with biostimulants made from cricket shells and crawfish claws, finding that even small doses boost plant immunity and extend the shelf life of fruits and vegetables.
- **The biggest advantage is long-term sustainability** – Fertilizers give an immediate nutrient hit, but over time they strip soil of vitality. Biostimulants do the opposite – they regenerate. These natural agents rebuild soil structure, reduce dependence on

chemical inputs, and help the land hold moisture and nutrients more effectively. That means healthier plants, less runoff pollution, and soil that keeps improving with each harvest.

Fertilizers Feed Plants While Biostimulants Train Them to Thrive

Fertilizers and biostimulants work through completely different pathways. As reported by Biostimulants Agriculture, while fertilizers provide food, biostimulants teach the plant how to make the most of it.² In other words, fertilizers focus on supply, while biostimulants focus on efficiency.

- **Biostimulants help plants handle environmental stress** – Abiotic stress – caused by drought, heat, or poor soil – sharply reduces crop yields. Biostimulants counter this by stimulating the plant's metabolism, which includes all the chemical processes that keep cells alive and functioning.

When metabolism improves, so does energy production, allowing plants to withstand harsh conditions without wilting or losing productivity. This is especially important in climates with high temperatures and unpredictable rainfall. For farmers, the practical benefit is more consistent yields and less crop loss, even under difficult growing conditions.

- **Balance and timing in nutrient delivery are key** – Plants need a steady balance of macronutrients (like nitrogen, phosphorus, and potassium) and micronutrients (such as zinc, iron, and boron). Fertilizers supply these elements, but without proper absorption, much of it goes to waste.

Biostimulants improve ion transport – the process that moves nutrients through plant tissues – and redox reactions, which are chemical exchanges that fuel growth. When these internal systems are optimized, plants draw more nutrition from every ounce of fertilizer used. The result is greater efficiency, lower costs, and less environmental runoff into nearby waterways.

- **Biostimulants enhance key plant processes to maximize growth** – Biostimulants boost photosynthesis – the conversion of sunlight into energy – and respiration, the system that releases stored energy to power cell activity. By improving these systems, plants grow faster and more uniformly. The improved cellular energy also supports better fruiting, flowering, and root development. This translates into fuller leaves, stronger stems, and more nutrient-dense produce.
- **The biggest advantage lies in sustainability and soil regeneration** – Unlike synthetic fertilizers, which are known to cause long-term **soil degradation** when overused, biostimulants work in harmony with the environment. They don't pollute groundwater or disrupt microbial communities. Instead, they restore the soil's natural fertility over time by encouraging beneficial bacteria and fungi that recycle organic matter into nutrients.

Using biostimulants lays the foundation for healthier soil in the years ahead. For anyone committed to **regenerative farming**, this dual system of fertilizer support and biostimulant activation represents a long-term investment in both productivity and planetary health.

Biostimulants Boost Plant Energy, Yield, and Soil Health

A report from Verdesian emphasizes the expanding role of biostimulants in global agriculture as farmers face mounting pressure to double food production by 2050 while protecting soil and water resources.³ By improving nutrient use efficiency and reducing fertilizer waste, biostimulants make each harvest more sustainable, helping growers maintain productivity without exhausting the land.

- **Specific categories of biostimulants target different stages of plant growth** – Verdesian breaks these into five main groups – protein hydrolysates, humic and fulvic acids, seaweed extracts, chitosan, and inorganic compounds such as silica or selenium. Protein hydrolysates, which come from the breakdown of animal or crop proteins, act like growth accelerators by supplying amino acids that strengthen root systems and enhance stress tolerance.

In contrast, humic and fulvic acids improve nutrient absorption and soil texture, while seaweed extracts help plants hold water and recover from heat or drought. Each category is designed to trigger a specific natural process, giving farmers a toolkit to match their crop's needs and environmental challenges.

- **Biostimulants lead to measurable improvements in plant resilience and quality** – Biostimulants don't just help plants survive – they help them thrive.⁴ These substances promote faster germination, stronger root development, and higher-quality grains and fruits.

For example, corn treated with biostimulants produced fuller kernels, while fruit crops developed better color and longer shelf life. Some biostimulants even strengthen plant cell walls and increase antioxidant defenses, helping plants repair themselves faster after damage.

- **Soil ecosystems benefit as much as the crops themselves** – Biostimulants encourage a flourishing underground community of bacteria and fungi that recycle nutrients and support long-term fertility. Over time, this means healthier soil that requires fewer chemical additives.

For anyone growing food – whether on a small plot or large acreage – the takeaway is simple: biostimulants don't just feed your plants for one season; they rebuild the foundation for years of abundant, sustainable growth.

How to Use Biostimulants to Restore Your Garden's Energy and Grow Stronger Plants

If your garden soil feels tired, compacted, or unresponsive no matter how much compost you add, the issue isn't a lack of effort – it's a lack of biological life. Modern soils have lost much of their natural microbiome, the living network of fungi, bacteria, and organic matter that makes nutrients available to plants. The fix isn't more fertilizer. It's restoring that life.

Biostimulants help bring your soil back into balance so your plants grow stronger, produce more, and resist stress. Here's how to bring that natural vitality back to your [garden](#):

- 1. Feed your soil's living network first** — Your garden's foundation is its microbiome, the invisible world of microbes that support everything growing above it. Start by adding humic or fulvic acids through compost tea or liquid soil enhancers. These compounds act like soil prebiotics, helping beneficial microbes thrive and improving how roots absorb water and nutrients. Healthier soil means more vibrant plants and fewer pest or disease problems down the road.
- 2. Pair biostimulants with nutrient-rich compost or natural amendments** — Instead of reaching for fertilizer, feed your soil with life. Combine biostimulants like seaweed extract, humic acids, or microbial inoculants with homemade compost, worm castings, or well-aged manure.

This approach gives your plants slow, steady nourishment while helping beneficial microbes flourish. Over time, your soil becomes more fertile and resilient, allowing your plants to grow deeper roots, withstand heat and drought, and produce nutrient-dense vegetables — all without the need for chemical inputs.

- 3. Use seaweed extract for flavor, resilience, and drought resistance** — Seaweed provides plants amino acids and natural growth hormones that make them sturdier and more nutrient-dense. Spray a diluted seaweed solution on your vegetables every two weeks, especially before or after extreme weather. It helps them recover faster, keeps greens crisp, and enhances the taste of fruits and root vegetables.
- 4. Inoculate your soil with beneficial fungi and bacteria** — Mycorrhizal fungi and Rhizobia bacteria form living partnerships with plant roots, expanding their ability to pull in minerals and water. Use powdered or liquid inoculants when planting seeds or transplanting seedlings. These microbes build stronger, more resilient plants and help your soil retain vitality season after season.

5. Protect your plants naturally from disease – Chitosan, a compound derived from shellfish or mushrooms, strengthens cell walls and boosts natural immunity. Apply a diluted chitosan spray to your garden once a month to protect against rot and fungal issues – no toxic fungicides required. Your plants will develop a natural defense system that makes them less prone to disease and decay.

If you care about nutrient-dense, chemical-free food, don't stop at your own backyard. Support local farmers who use these same regenerative growing methods. Buy from those who enrich their soil with compost, humic substances, and microbial inoculants instead of relying on synthetic fertilizers.

Every purchase from regenerative farms helps rebuild the land, protect water systems, and keep your food rich in nutrients and life. When your garden and your farmers share the same philosophy – feed the soil first – you help heal the food system from the ground up.

FAQs About Biostimulants vs. Fertilizers

Q: What's the main difference between biostimulants and fertilizers?

A: Fertilizers provide nutrients directly to plants – like nitrogen, phosphorus, and potassium – while biostimulants enhance how plants use those nutrients. Biostimulants don't feed plants in the traditional sense; they stimulate the soil's biology and activate natural processes that strengthen roots, improve nutrient absorption, and boost resistance to stress.

Q: Are biostimulants better for the environment than fertilizers?

A: Yes. Unlike synthetic fertilizers, which pollute waterways and degrade soil over time, biostimulants work in harmony with nature. They support beneficial microbes, rebuild soil structure, and reduce runoff. Over time, they make the soil more fertile

and self-sustaining — helping you grow healthier plants while protecting the planet.

Q: Can I use biostimulants in my home garden?

A: Absolutely. Biostimulants are ideal for small gardens and raised beds. You can apply them as soil drenches, leaf-feeding sprays, or compost enhancers. Use products containing seaweed extract, humic acids, or beneficial microbes to revive your soil and support strong, nutrient-dense vegetables without relying on fertilizer.

Q: Do biostimulants replace fertilizer completely?

A: Not necessarily — but they reduce the need for it. For home gardeners, combining biostimulants with compost, worm castings, or natural amendments is usually enough to provide balanced nutrition. The goal isn't to feed the plant more — it's to make the soil more alive so it feeds itself naturally.

Q: How do I choose the right biostimulant for my garden?

A: Match the product to your garden's needs. Use seaweed extract to help plants withstand drought and heat, humic and fulvic acids to improve soil texture and water retention, and microbial inoculants to strengthen root systems. For disease protection, try chitosan-based formulas made from mushrooms or shellfish — they fortify plants naturally without chemicals.

Sources and References

- ¹ [Modern Farmer September 15, 2025](#)
- ² [Biostimulants Agriculture, What Is the Difference Between a Biostimulant and a Fertilizer?](#)
- ³ [Verdesian July 15, 2025](#)
- ⁴ [Live Farmer, Key Differences and Similarities Between Biostimulants and Fertilizers](#)