

Enhancing Agricultural Production with NanoGrowth™: Boosting Yield, Quality, and Sustainability

As the global population rises to 9.6 billion by 2050, limited resources force the industry to produce highly efficient agriculture to reduce poverty and hunger [1]. Agriculture is under pressure to provide food security for this rising population. Thus, chemical fertilizers are essential for crop growth. Farmers believe utilizing more chemical fertilizers increases agricultural production. However, only half of the applied fertilizers will be used by the crop, while the rest may leak, become fixed in soil, or pollute water. Recent data reports show that the essential macronutrient components Nitrogen, Phosphorous, and Potassium added to soil are lost at 40-70%, 80-90%, and 50-90%, respectively, resulting in a significant loss of applied resources [2]. Farmers overuse fertilizers to boost yields, which decreases soil fertility and increases salt concentrations, causing future crop losses. Uncontrolled fertilizer use degrades product quality.

Producing “smart growth” nanotechnology, increases nutrient absorption, improves crop output, productivity, quality, and sustainability. NanoGrowth™ creates a high surface-to-volume ratio, controlled-release kinetics of nutrients to selected areas, and sorption capacity make nanotechnology crucial for effective fertilizer use and nutrient needs. NanoGrowth™ is an alternative to increasing costly fertilizer applications by more efficiently utilizing existing fertilizer applications. The belief that adding more fertilizer will increase crop yield does not play out in economics or in the field. More efficient delivery means healthier crops with lower inputs.

NanoGrowth™

NanoGrowth™ technology is a revolutionary solution for farmers worldwide. It increases crop yields by improving nutrient uptake, reduces inputs, and promotes sustainable soil health. This technology is universally applicable, regardless of crop species, climate, or soil chemistry, and offers significant benefits to farmers' bottom line. Farmers are already using the NanoGrowth™ line of products across the US and in countries worldwide to achieve these results.

Soil & Foliar Applications

NanoGrowth technology keeps nanoparticles and nutrients in solution and helps them reach root cells in soil. NanoGrowth™ nanoparticles and chemicals enter plants efficiently when they contact root cells and is the most efficient crop nutrition delivery technique. NanoGrowth™ wrapped nanoparticles and nutrients are efficiently absorbed foliarly. The NanoGrowth delivery system boosts liquid nutrition yields, saves money, and reduces waste, making farming more ecologically friendly.

The technology behind Nano Grow Max, called NanoGrowth™, is a catalyst system that assists growers in sustainably growing their crops and profits. The company's product improves crop nutrient absorption, boosts yield, decreases inputs, and supports longer-term soil integrity.

The benefit is that a higher plant absorption rate increases yield at a lower cost. Farmers have seen increased success when our products are applied, all while being safe for use around humans or animals.

Case Study 1 to 4 – Soybeans & Rice: Field Trial Report — Yield

In the latest agricultural field trial conducted by Alluvial Trade, crops were grown and tested in four regions of Nigeria under varying growing conditions and farmer skill sets. The trial was supervised and verified by the CEO of Alluvial Trade. This test was completed in December 2022.

The crops tested included soybeans and rice, with different amounts of NanoGrowth™ being applied to each plot. The results showed a significant increase in yield for the NanoGrowth™ treated crops compared to the control plots, with an average increase of 21.1% to 125%. The average yield increase for the soybean plots was 21.1% to 111.11% and 125% for rice.

The extrapolated yield per hectare for the NanoGrowth™ treated crops was 1.32 to 4.5 tons, compared to 1.09 to 2 tons for the control plots. Overall, these results demonstrate the effectiveness of NanoGrowth™ in increasing crop yields and hold significant potential for improving the agricultural industry in Nigeria and beyond.

Location	Soba-Kaduna	Toro-Bauchi	Joling-Taraba	Jaling-Taraba
Crop	Soybeans	Soybeans	Soybeans	Rice
Nano Treated (kg)	13.2	19.5	38	45
Control (kg)	10.9	14	18	20
Yield difference (kg)	2.3	5.5	20	25
% Yield difference	21.1	39.29	111.11	125
Plot Size (SqM)	100	100	100	100
NanoGrowth™ Yield Ton/Ha Extrapolation	1.32	1.95	3.8	4.5
Control Yield/Ha Extrapolation	1.09	1.4	1.8	2

Case Study 5 - Tomatoes: Field Trial Report — Yield

A field trial in Alitagtag, Philippines, confirms the benefits of NanoGrowth™ technology for tomato production. The Director of Agriculture Operations oversaw the trial on three hectares of Diamante Max tomatoes, applying the NanoGrowth™ solution four times, starting 15 days after transplanting and repeating every 15 days.

The average yield per hectare reported was 53 tons, an 18-ton increase from the previous 35-ton average or a 51% increase. The massive root systems of the plants, enhanced by NanoGrowth™, was more resistant to drought and extended the harvesting period to two months.

NanoGrowth™ was the only change to the regular growing procedures.

Advantages of NanoGrowth™ Technology:

1. Enhanced plant growth and productivity
 - Improved nutrient utilization
 - Boosted nutrient uptake by 30%
 - 21-125% increase in various crop yields
 - Prolonged fertilizer availability
 - Halved use of chemical fertilizers
 - Increases yield for all plant species

2. Sustainable agriculture
 - Biodegradable and non-synthetic
 - Non-carcinogenic and derived from natural sources
 - Environmentally friendly
 - Cleans up soil contaminated by previous chemicals
 - Balances the soil pH levels to an optimal range
 - No man-made chemicals or Plant growth regulators (PGRs)

Bibliography

1. Zulfiqar Faisal., et al. "Nonfertilizer use for sustainable agriculture: Advantages and limitations", *Plant Science* (2019): 110270.

2. Rakshit Rajiv., et al. "Customized fertilizers: Marker in fertilizer revolution", *International Journal of Agriculture Environment and Biotechnology* 51 (2012): 67-75.

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