

SILICA SUPPORTS SUSTAINABLE FARMING

AEROSIL® 

SIPERNAT® 

ZEOFREE® 



Using AEROSIL®, SIPERNAT®, and ZEOFREE® in fertilizer production helps reduce greenhouse gas (GHG) emissions and offers an alternative to microplastics.

The earth needs eco-friendly agriculture

The world's population is growing, and with it the demand for food. Hence, global yield needs to be increased by about 20% by 2030. At the same time, agriculture is facing changing climatic conditions, while farming needs to be practiced sustainably to protect the environment and preserve biodiversity. In Europe, the EU Green Deal's "Farm to Fork" strategy requires that 50% fewer pesticides and 20% fewer mineral fertilizers be used over the same period.

Today, the agricultural sector mainly uses synthetic fertilizers – more than 113 million metric tons of nitrogen fertilizers are deployed worldwide every year, accounting for more than 50% of all fertilizers used globally. The production of nitrogen fertilizer generates 1.2 tons of CO₂ for every ton of nitrogen fertilizer.

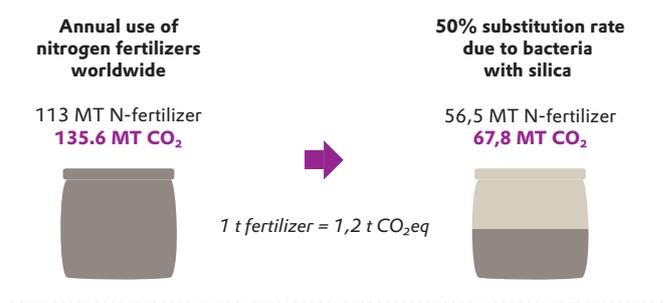
However, about 20-25% of the global nitrogen fertilizers production output (Source: Evonik Calculation based on J.N. Galloway et al., 2006) is not made bioavailable for crops, as it gets lost in farmland usage due to land erosion and emissions. On the other side, this is another root-cause to nitrification of soil water beyond the nitrogen emissions of livestock industry.

Replacing current practices by superior efficient and eco-sustainable solutions by natural nitrogen-fixing bacteria, immobilized on special carriers, is a strong lever

- to enhance the optimum utilization of all essential nutrients in crop applications
- to introduce alternative, efficient, natural nitrogen sources in modern crop farming
- to reduce the overall carbon-footprint of agro-production
- to protect precious soil water reservoirs against nitrification

Silica helps reduce the amount of fertilizer

A way to solve this dilemma is to use silica as a carrier for special, nitrogen-fixing bacteria and apply it to the leaves and seeds of plants, where the bacteria supply the plant with CO₂ from the air. Initial greenhouse trials have shown that only 50% of the usual volume of fertilizer is needed to achieve an almost identical nutritional effect. This means that bacteria with silica can substitute up to 50% of the synthetic fertilizer in greenhouse experiments. Silica itself stabilizes the bacteria and therefore improves its shelf life, leading to more efficient formulations.



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Silica as an alternative to polymers

Silica also helps prevent microplastic pollution, which is another threat to the environment: Silica particles are an alternative to polymers and can be used as extrusion aids, binders, and carriers in formulations for water dispersible granules (WG).

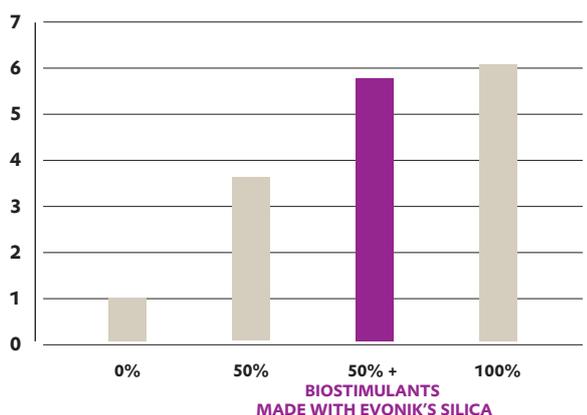
Silica in plant care formulations

- Increases efficacy of biofertilizers compared to chemical fertilizers, leading to a reduction of nitrate/phosphate pollution
- Improves the stability to reduce dosage of chemical pesticides that might harm ecological systems
- Improves viability of biological crop protection systems.

RESULTS OF GREENHOUSE TRIAL

Sprout

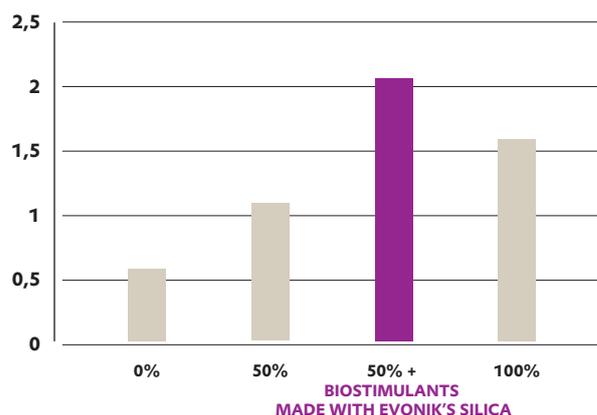
Dry weight [g]



Using 50% fertilizer and biostimulants made with Evonik's silica produces a plant biomass (without roots) almost as large as (93%) the result when using 100% fertilizer.

Roots

Dry weight [g]



Using 50% fertilizer and biostimulants made with Evonik's silica results in a significantly stronger root growth (131%) than when using 100% fertilizer.

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The Silica specialists at Evonik – Inside, to get it right.