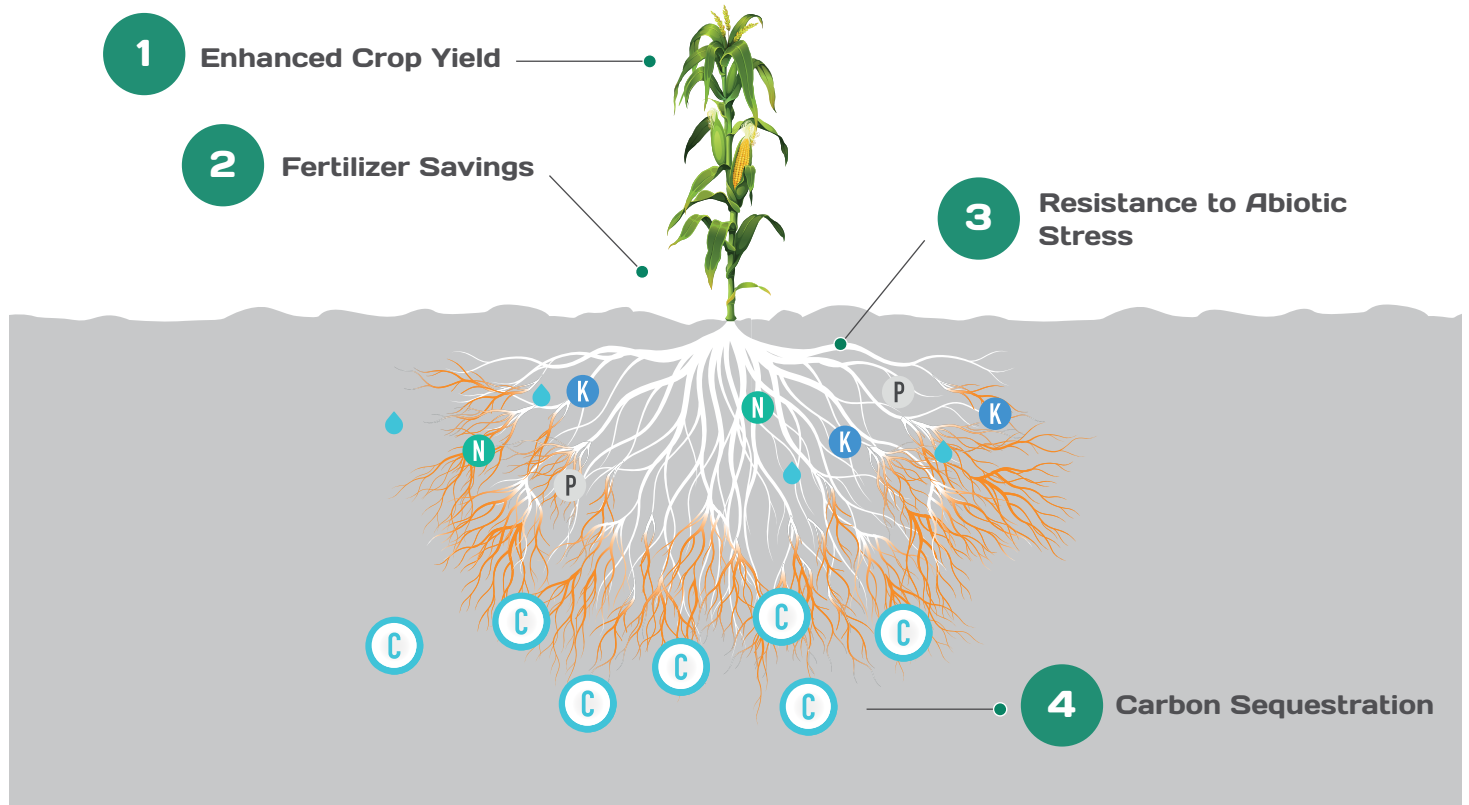


Rootella: Biology and Agronomy

Climate stress and intensive agricultural practices have degraded microbial communities, weakening soil health and creating challenges for farmers. By reintroducing mycorrhizae into soil, we can restore microbial populations and fortify plants with a nature-based "insurance policy" that improve crop health and mitigate stressors.

Rootella® is a proprietary line of mycorrhizal inoculants, designed with farmers in mind to enhance soil fertility, plant health and crop productivity. Rootella's beneficial fungi form a symbiotic relationship with plant roots, offering a wide array of benefits.



1. Enhanced Crop Yield:

Rootella's mycorrhizal fungi form a "Mycorrhizal BioPlatform," boosting plant growth and productivity.

- **Nutrient Uptake:** By effectively extending the plant root system by 10-100x, Rootella enables better access to vital macro and micronutrients.
- **Microbial Synergy:** Mycorrhizal networks foster cooperation with additional beneficial microbes, such as nitrogen-fixing bacteria, that utilize mycorrhizal pathways to nourish plants.

2. Fertilizer Savings:

Rootella's mycorrhizae effectively extend the plant root system and modify soil chemistry, unlocking bound nutrients and delivering them to plants.

- **Expanded root zone and absorption area:** Rootella effectively extends root systems by 10-100x, expanding their reach to access and uptake otherwise inaccessible nutrients.
- **Enhanced Phosphorus Availability:** In suboptimal soils, phosphorus binds to aluminum (acidic soils) or calcium (alkaline soils), becoming "legacy phosphorus." Up to 80% of the phosphorus applied as part of chemical fertilizers binds to soil molecules. Rootella's mycorrhizae modify soil pH in the area immediately surrounding the roots, releasing bound P and enabling plants to absorb it.



3. Resistance to Abiotic Stress

Rootella enhances plant resilience when facing environmental stressors like drought and floods.

- **Drought tolerance:** Mycorrhizal hyphae establish a vast network within the soil, effectively extending the root system beyond the drought zone. This increases plants' ability to access water and better withstand drought conditions.
- **Flood resilience:** Roots require oxygen to survive and when soil becomes flooded, roots can suffocate and rot. Mycorrhizal hyphae access oxygen from outside the flood zone and penetrate soil pores that are inaccessible to roots, supporting plants during flooding events.



4. Carbon Sequestration

Mycorrhizal fungi play a critical role in carbon sequestration. Up to 60% of plant-derived Soil Organic Carbon (SOC) can be attributed to mycorrhizae.

How Mycorrhizae Sequester Carbon:

- **Carbon Allocation:** Plants allocate a significant portion of their photosynthate (up to 20%) to mycorrhizae in soil, boosting carbon input. The carbon captured by mycorrhizae exceeds the carbon released through soil respiration, resulting in a net positive carbon flux.
- **Soil Aggregation:** Mycorrhizae aggregate soil particles, promoting the formation of Mineral-Associated Organic Matter (MAOM), a stable carbon sink that makes up approximately two-thirds of the world's SOC. Mycorrhizae catalyze (by 5-10x) the formation of carbon-rich stable MAOM, which has a mean age of 4,830 years, resulting in 66-87% of SOC and making it a cornerstone of mycorrhizal carbon permanence.



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