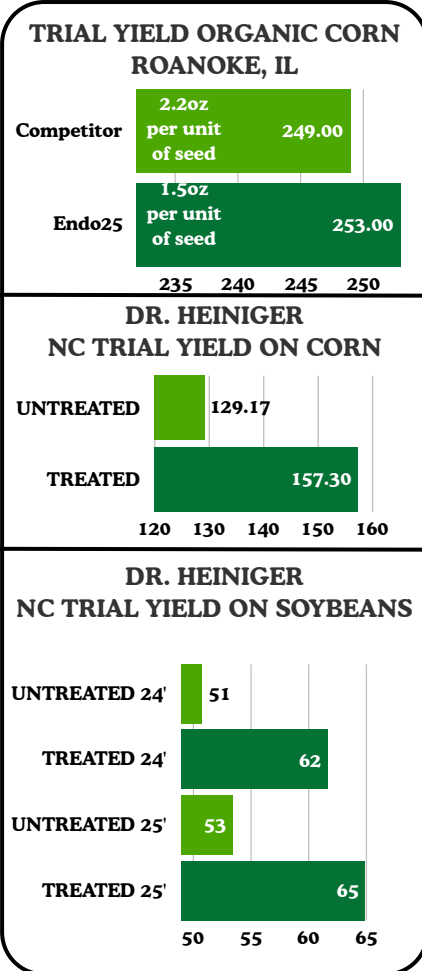


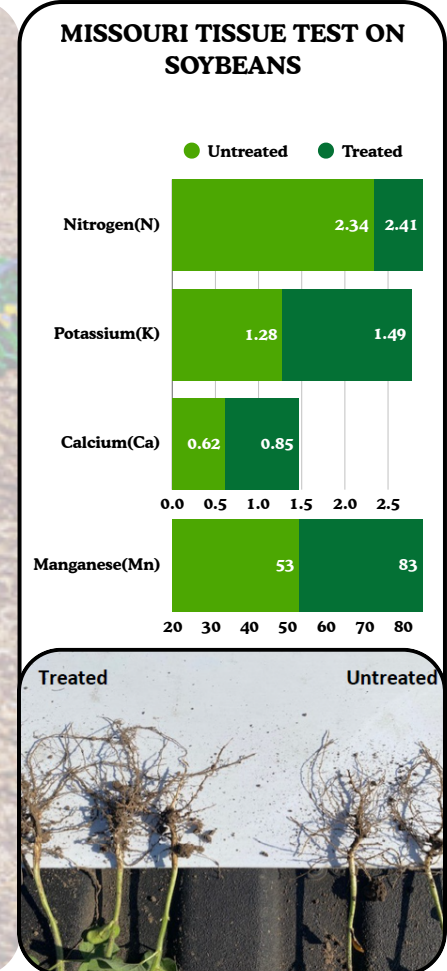


ENDO 25TM

SEED TREATMENT

Endo 25TM the simple, one-step way to give every seed a biological head start. Just mix this dry powder (4-10 oz per 100 lbs of seed) right in your planter box and watch your crop take off stronger from day one. Endo 25TM is packed with live, beneficial microbes, powerful bacteria (including several *Bacillus* species, *Pseudomonas*, and *Paenibacillus*), *Trichoderma* fungi, talc, graphite and four types of mycorrhizal fungi. These good guys wake up the second your seed germinates and colonize the young roots fast.

ENDO 25TM excels at delivering targeted, early microbial diversity for N dynamics and root vigor (with secondary tillth gains), while BioEnerGTM microbial blend provides broader, sustained soil-structure enhancement; making them a powerful synergistic approach for regenerative systems aiming for both productivity and soil health.



PERFORMANCE & BENEFITS

- Improved porosity and crumb structure (friable, easy-to-work soil).
- Better water infiltration and retention.
- Enhanced aeration (critical for root respiration and aerobic microbial activity).
- Long-term improvements in overall soil tilth, making fields easier to manage and more resilient to weather extremes.
- These effects are particularly valuable in no-till, reduced-till, or compacted soils, where physical structure limits root growth and nutrient/water movement.
- Reduced crusting and erosion risk.

1. **Improved early plant vigor:** Treated seeds show faster germination, bigger plants, greener foliage, and more robust early growth compared to untreated controls.
2. **Enhanced root development:** Treated seeds create a symbiotic relationship in plant roots, expanding the rhizosphere and improving soil structure.
3. **Yield boosts:** Farmer trials report consistent improvements, such as higher bushels per acre in corn and soybeans, reduced lodging, higher grain test weight, and lower moisture at harvest.
4. **Better nutrient uptake:** Increase access to minerals (especially phosphorus) and water, leading to greater drought resistance.
5. **Create a Future:** Supports biological farming principles.
6. **Support Tillage Practices:** Conservation tillage practices are gaining popularity due to their benefits in soil health and erosion control. Seed treatment can enhance the effectiveness of these practices by ensuring that seeds have the best possible start, even in less-disturbed soil conditions. This support is crucial for maintaining productivity while promoting soil conservation.

ENDO 25™ Contribution to Tilt

Endo 25™ improves soil structure via expanded root systems and rhizosphere activity. Healthier roots produce more exudates that feed microbes and help stabilize aggregates, but its primary focus is plant-side rather than bulk soil conditioning.

Active Microbial Mineralization

As we seed/inoculate live microbials into the root zone, an active rhizosphere develops. This provides many advantages as described in this sheet. As roots form and root exudation starts a chain of events unfold. More microorganisms actually stimulate more root exudation which stimulates more organisms which enhances nutrient availability. As bacteria and fungi populations greatly increase so do their predators often referred to as grazers. These grazers largely protozoa consume large quantities of bacteria. Bacteria contain too much protein (nitrogen) for them, so they expel ammonia that quickly becomes ammonium in the soil. Ammonium is a quite stable nitrogen source that is readily used by plants. And all of this happens right in the rhizosphere where the plant roots are active.

Rhizophagy

Rhizophagy is plant roots eating bacteria in the rhizosphere. Bacteria are taken into the root and are stripped of their cell wall causing their contents to leak feeding the plants. The plant harvests some of their N, P, K, for the plant's use. The stripped bacteria are expelled back to the soil where they can heal, and the cycle can repeat itself.

Why It Matters

Understanding the rhizophagy cycle is currently revolutionizing sustainable agriculture and botany. It suggests that robust soil biology is just as critical to plant nutrition as traditional fertilizers. By promoting diverse, healthy microbial communities in the soil. Using practices like compost extracts, bio-stimulants, and regenerative farming; farmers can optimize this natural nutrient-delivery system and drastically reduce chemical inputs. (Rutger's University, Professor James White)



Why It Supports Fixation of Atmospheric Nitrogen (N₂)

78% of Earth's atmosphere is nitrogen gas (N₂). N₂ is very stable and cannot be directly used by most plants, certain nitrogen-fixing microorganisms can convert atmospheric nitrogen into ammonia (NH₃) using the enzyme nitrogenase. This process, called biological nitrogen fixation, produces forms of nitrogen that can subsequently be transformed into plant-available compounds such as ammonium (NH₄⁺) and nitrate (NO₃⁻).

Plants then absorb these inorganic nitrogen forms from the soil. **Endo 25™** introduces this process:

- **Direct/associative N-fixers:** Paenibacillus polymyxa (gram positive nitrogen fixing bacteria) are well-documented diazotrophs capable of biological nitrogen fixation in the rhizosphere. They convert atmospheric N₂ into plant-available forms right near the roots. This supplements soil/fertilizer N without relying solely on synthetic inputs.
- **Enhanced symbiotic fixation:** Arbuscular mycorrhizal fungi strongly promote nodulation and nodule function by supplying phosphorus (critical for energy-intensive N-fixation) and improving overall plant health.
- **Rhizosphere priming:** The whole microbial community improves soil biology, root exudation, and nutrient cycling. This creates a favorable environment for additional native N-fixing microbes, leading to ongoing atmospheric N contribution throughout the season.

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AMINE NITROGEN

Why It Matters & Why Endo 25™ Delivers

Amine nitrogen is the most efficient form plants can use. Unlike nitrate or ammonium, amine N is taken up directly by the plant with almost zero energy cost. Due to no heavy carbon conversions needed inside the leaf or root. This saves the plant ATP (adenosine triphosphate is the primary energy carrier in plants, essential for various metabolic processes including photosynthesis and cellular respiration) and carbon, letting it grow faster, stay healthier, and handle abiotic stresses (drought, heat, salinity) better.

Where it comes from?

Live beneficial microbes (applied via **Endo 25™** + **BioEnerG™**) feed on root exudates, explode in numbers, store nutrients in their cells, then die and release amine-rich organic nitrogen right in the rhizosphere. The plant can grab it before it turns into less efficient nitrate that can leach or volatilize.

- **Timing is everything:** Microbes colonize the seedling from the moment the seed germinates.
- **Location is perfect:** Amine N is delivered exactly where the young roots need it most; right at the root hair zone.
- **Efficiency skyrockets:** Early microbial nitrogen turnover reduces the need for synthetic N right from V1-V2, builds soil aggregates faster, and creates a resilient plant from day one.

Bottom line is seed-applied live biology turns your planter into a precision delivery system cutting input costs, boosting stress tolerance, and improving soil health with every acre.

Why It Improves Benefits from Applied Nitrogen

Applied Nitrogen often has low efficiency in the field due to losses via leaching, volatilization, or poor root access. Endo 25™ microbes enhance uptake and utilization in these ways:

- **Expanded root system and absorptive surface:** The (Bacillus and Pseudomonas) produce phytohormones and enzymes that drive vigorous root branching and hair development. Trichoderma further promotes root colonization. This lets the plant explore more soil volume early, capturing more applied N before it moves away.
- **Mycorrhizal network boost (AMF):** These fungi form symbiotic hyphae that extend far beyond the root zone (acting like "super-roots"). AMF are proven to increase uptake of nitrogen (along with phosphorus and water), improving overall nutrient-use efficiency and drought resistance. This means more of your applied N fertilizer ends up in the plant rather than lost to the environment.
- **Better early vigor and stand:** Healthier seedlings from Day 1 have stronger demand and capacity for N, leading to higher N-use efficiency.

