X19

Corn & Soybean Biofungicide

PRODUCT INFORMATION

biotrinsic® by indigo

SATISFACTION GUARANTEE 100% with replant policy.

BIOFUNGICIDE

biotrinsic® X19

Indigo's Biological Seed Treatment

Plant for Performance and Grow with Confidence

biotrinsic® X19 FP, a breakthrough biological fungicide that sets an uncompromising new standard for managing key seedling diseases in corn and soybean and maximizing plant performance. Working in harmony with natural plant defenses, triple modes of action combine to form an expansive zone of disease protection.

FEATURES AND BENEFITS

biotrinsic® X19 for corn and soybeans offers:

- **Uncompromising seedling disease management:**
  Effective in managing key seedling diseases found in corn and soybeans. (*Fusarium* spp., *Pythium* spp., *Rhizoctonia* spp.)
- **Ease of application:**
  This Flowable Powder (FP) formulation can be easily applied to seed at the time of planting without restriction on the type of drill or planter.
- **Compatibility with other seed treatments:**
  Compatible with a wide range of pesticide treatment products to improve and strengthen the spectrum of disease intervention and give farmers the flexibility to design effective crop protection plans based on their specific field conditions.
- **Optimized resistance management:**
  Can be used alone or combined with existing non-biological fungicide seed treatments to forestall or overcome the development or progression of disease resistance.
- **Flexibility for use:**
  - Can be applied to corn or soybeans, lowering the risk of purchasing unneeded product.
  - Reviewed by the Organic Materials Review Institute (OMRI) and now available for use as a seed treatment on organic certified farming operations as well as on conventional or non-organic farms.

**Product performance information based on third-party field trials. Results will vary across growers and farm operations. A number of variables may affect agronomic outcomes. Indigo does not make any representations, warranties or guarantees as to any specific results or outcomes. Product may not be available in all areas. Limitations, terms, and conditions apply. [V1.A 11.16.22]*

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HOW IT WORKS

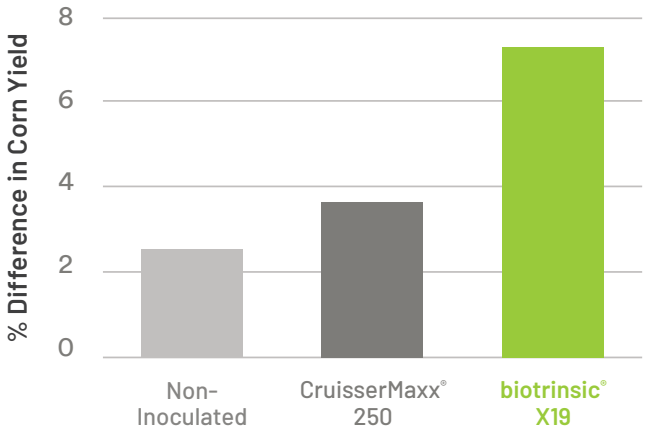
Although biotrinsic® X19 has only one active ingredient, it combines multiple **modes of action** to empower and enhance natural plant defenses against key seedling diseases:

- **Induced Systemic Resistance (ISR):**
  Through Induced Systemic Resistance (ISR), X19 empowers natural disease defense mechanisms by enhancing biochemical and biophysical actions within the plant to defend against attack from key seedling disease pathogens.

- **Root Colonization:**
  The product's microbes are living organisms that grow in harmony with plants, colonizing their roots and expanding the zone of disease intervention as the roots grow.

- **Bioblocker™ action:**
  When the microbes encounter mycelium or hyphae of targeted seedling disease pathogens, they rapidly surround the mycelium using Bioblocker™ action to form a microbial wall of separation between plant roots and the seedling disease, interfering with disease transference.

2019 FIELD TRIAL



+7.4%
Yield Uplift

+8.6
bu/a Yield Uplift

- 2019 field testing on corn using seed inoculated with a complex of *Fusarium* spp., *Pythium* spp., and *Rhizoctonia* spp. - Auburn University
- biotrinsic® X19 out-performed CruiserMaxx with a yield uplift of 7.4% for an increase of 8.6 bu/a

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MULTIPLE MODES OF ACTION

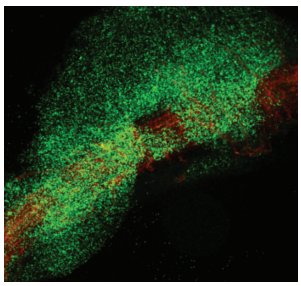
biotrinsic® X19 contains one active ingredient, the natural gram-negative bacterial endophyte *Kosakonia cowanii* SYM00028. However, when applied as a seed treatment this biofungicide merges multiple modes of action to defend plants against key seedling diseases (i.e., *Fusarium* spp, *Pythium* spp., and *Rhizoctonia* spp.). Specifically, biotrinsic® X19 combines root colonization, Bioblocker™ formation, and Induced Systemic Resistance (ISR), that coalesce into a harmonized natural disease intervention and management process.

INDUCED SYSTEMIC RESISTANCE (ISR)

Induced Systemic Resistance is a plant disease resistance mechanism that is activated by the microbes in biotrinsic® X19. This mode of action does not depend on directly killing the invading pathogen, but rather on empowering and energizing biochemical and biophysical changes, or barriers within the host plant. The change in physiological state, termed "priming" results in plants displaying a stronger and faster defense response against invasion by plant pathogens. ISR is plant specific, dependent on plant genotype, and requires the plant hormones jasmonic acid and ethylene. Recognized as an active plant disease defense response, plants in which ISR has been activated, are predisposed to protect against infection by controlling access, deposition, and progression of disease pathogens in and around plant tissues.

ROOT COLONIZATION

The active ingredient in biotrinsic® X19 consists of living bacterial microbes which are applied to corn and soybeans as a seed treatment. Once in the ground, the microbes interact with the seeds as they germinate and roots emerge. Rapidly growing in numbers, the microbes colonize the growing roots, forming a mutually beneficial disease defense relationship. In the picture to the right, the microbes (shown in green), can be seen colonizing the root (shown in red). An advantage of this microbial colonization process is that it is an evolving living environment capable of expanding its zone of disease fighting protection as the roots of the plant develop and grow.



BIOBLOCKER™ FORMATION AND ACTION:

Representing some of the most common fungal plant disease pathogens, *Pythium* spp., *Fusarium* spp., and *Rhizoctonia* spp. are known to cause seedling rots or damping off (post emergence seedling dieback). Often, living in association with decaying plant residues, these seedling disease pathogens live in the soil and infest roots as they grow and develop. However, as the microbes in biotrinsic® X19 contact or interact with the mycelium or hyphae of the disease pathogens they rapidly grow and expand in number creating a natural Bioblocker™ formation around the hyphae (see microbes surrounding Pythium fungal hyphae to right). This living microbial wall serves to protect plant roots and prevent infection by separating and blocking disease transference.

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PRODUCT DETAILS

CAN BE USED ON

- All farming operations, including organic farms
- Dryland or Irrigated fields
- Corn and soybean seeds within 15 days of planting
- All corn and soybean varieties and traits

HOW TO USE IT

- Apply to seed within 15 days of planting
- Flowable powder formulation for easy application to seed at the time of planting
- Can be applied over existing seed care treatments or to untreated seeds
- Minimum shelf life of 1 year
- Low use rate 1.00 fl oz./cwt

Pkg Treats	Pkgs/ Case	Case	Case Treats	Unit Measures
50 units	5	5x1x50	250 units	50 lbs

FP Application Rate: 1.00 fl oz./CWT

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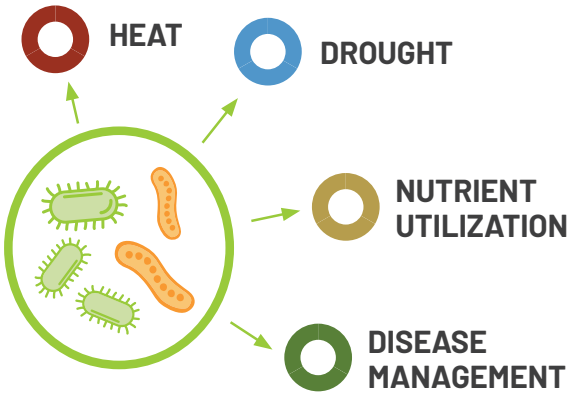
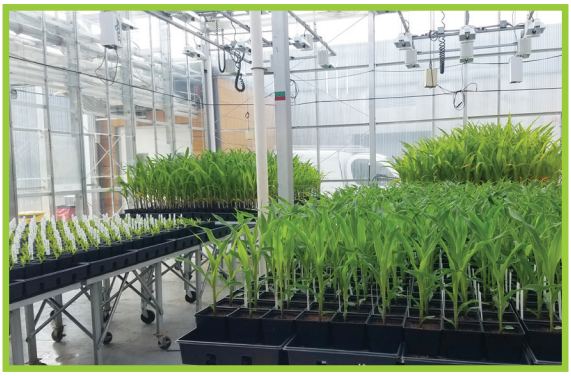
THE SCIENCE BEHIND THE DIFFERENCE

Microbiomes, or communities of microbes, help maintain internal processes for all living things – Indigo focuses on identifying microbes that have evolved in conjunction with plants over time to optimize their health and maximize their productivity.

At Indigo, we identify which of these microbes are most beneficial to a plant's health through the application of algorithms and machine learning. We further prove their performance at our research laboratories and greenhouses in Boston, Massachusetts, and Research Triangle Park, North Carolina along with extensive field trials throughout the United States. Our resulting seed treatment products complement a plant's natural process to improve health and development across each phase of life, while boosting crop yields.





WHAT MAKES BIOTRINSIC® DIFFERENT

More Beneficial for Your Crop

Microbes are selected to address the key stresses that limit crop yield potential. This allows you to select the right biotrinsic® products based on the stresses that have the greatest impact on your farm.

From Plants for Plants

biotrinsic® is a collection of over 30,000 naturally occurring microbrial strains that have been extracted from plants thriving in stressful conditions. We isolate microbes that are abundant in plants that are thriving under stress while other plants around them are not. This allows us to produce products to a specific crop and set of stresses.

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