



Biocatalyst
Technology



Extract
POWERED BY *Accomplish*®

TITAN®
XC

BIOCATALYST TECHNOLOGY:

Frequently Asked Questions

WHAT

What is biocatalyst technology?

Biocatalyst products in the Loveland Products portfolio contain naturally derived biochemistry designed to promote nutrient mineralization and increase nutrient availability and uptake from applied fertilizers and the soil. Products may also improve root growth and support general plant health, including crop tolerance to abiotic stresses such as drought, heat, cold and salinity. By using biocatalyst products, growers can improve the efficiency of their plant nutrition programs and maximize opportunities for higher yields and return on investment.

What is Accomplish MAX™?

Accomplish MAX is a biocatalyst designed to improve nutrient availability and uptake while also increasing crop tolerance to environmental stressors like cold temperatures, drought and salinity from applied fertilizers. It is specifically formulated for use with starter fertilizer applications.

What is Titan® XC?

Titan XC is a fertilizer biocatalyst specifically formulated for impregnation on dry fertilizer blends. It is designed to increase nutrient availability, improve plant uptake and enhance dry fertilizer efficiency.

What is Extract Powered by Accomplish® (Extract PBA)?

Extract PBA (6-0-0-13S) is a biocatalyst designed for liquid broadcast application to maximize nutrient mineralization and release from a grower's existing fertilizer investment. It combines the powerful biochemistry of Accomplish technology with the C:N ratio-balancing power of ammonium thiosulfate (ATS) to accelerate nutrient mineralization and release through expedited nutrient cycling.



What are the benefits of using biocatalyst products?

Benefits of biocatalyst products include, but are not limited to:

- Increased nutrient availability and uptake
- Improved plant performance
- Enhanced nutrient use efficiency
- Better root growth and development
- Outstanding potential return on investment (ROI)

Product benefits are seen over a broad range of plant types, soil types, and application methods. Growers who incorporate biocatalyst technology into their programs often see improved yield responses and increased fertilizer efficiency year after year.

Please see individual product booklets for information on specific benefits.

What is the “best” application for my fields?

There are multiple factors to consider. Tillage, fertility and cultural practices, crop rotation, growing conditions and yield goals should be taken into consideration to determine the best use of biocatalyst products to maximize yield and ROI.

Accomplish MAX, Extract PBA and Titan XC are all designed to easily fit within a grower's existing crop production system. Using one or more of the biocatalyst products within that system can have a positive effect on soil health and crop performance, providing an advantage in the current season and longer term, particularly with regular use.



WHAT

What are the recommended application rates?

Accomplish MAX – At Planting

- Apply 1 quart per acre at planting with in-furrow starters or 2x2 placement of liquid fertilizers

Extract PBA – Pre-Plant/Pre-Emerge/Sidedress/Residue

- For Pre-Plant or Pre-Emergent applications, apply 1-2 gallons per acre; can be mixed with herbicides and/or liquid fertilizers in a broadcast application
- Apply 1 gallon per acre with sidedress UAN
- Apply 1-2 gallons per acre for residue applications or on fields where poultry litter or manure has been applied
- Can be tank mixed with burndown crop protection products

Titan XC – Fall or Spring Dry Fertilizer

- Apply 16 ounces per ton on P & K fertilizers, MESZ, MES, pell lime, sulfate of potash, ammonium sulfate, & gypsum



How do the products work?

Accomplish MAX is a combination of core Accomplish biocatalyst technology and proprietary marine-based technology (MBT). The Accomplish technology improves the availability of nutrients from fertilizers and soil nutrient sources. It can also increase root size and branching, for better uptake of nutrients and water. The MBT component improves crop tolerance to abiotic stressors such as cold, drought and salt, which can represent significant yield-limiting factors.

Extract PBA combines Accomplish technology with ATS to speed nutrient cycling and residue breakdown—returning nutrients to the soil profile for uptake by the next crop.

Titan XC accelerates and increases the breakdown of treated dry fertilizers. This makes nutrients more available for plant uptake and utilization.

How do I apply the products?

Biocatalyst products are compatible with most fertilizers, herbicides, insecticides and fungicides. They can be easily incorporated into a grower's current plant nutrition program – without requiring product-specific equipment or a special trip across the field.

Accomplish MAX is applied with liquid starter fertilizers in furrow or 2x2.

Extract PBA can be mixed with herbicides and/or liquid fertilizers in a broadcast application as part of a Pre-Plant and/or Pre-Emergent application, applied with sidedress UAN, or applied directly on crop residues.

Titan XC can be applied to the entire blend of dry fertilizer (P & K) using a vertical, volumetric/horizontal, or rotary/drum blender on the farm or at your local Nutrien Ag Solutions location.

How long do the products last after application?

Biocatalyst products typically have season-long activity, but may have positive residual effects into the next growing season.

How quickly do the products start working?

Biocatalyst products typically start working within 30 days of application and are effective across a variety of soil and crop types.

How often should the products be applied?

Growers can incorporate the products into their programs each season based on discussions with their local crop consultant.

How It Works:

ACCOMPLISH MAX™

Untreated:

Plant growth and development genes not as "active" under cold or salt stress

Less ability for plant to tolerate abiotic stress and reach yield potential

More limited air and water movement

Nutrients "locked" in soil

Fewer, smaller roots

Soil microbes negatively impacted by stress

Treated:

Key stress tolerance genes "activated" under environmental stress

Better ability for plant to tolerate abiotic stress and reach yield potential

Improved soil tilth

More nutrients readily available

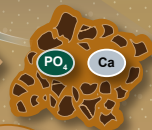
Increased root growth

Stimulation of soil microbe functioning

1. Accomplish MAX Applied In Furrow

2. Nutrient Mineralization

3. Nutrients "Unlocked"



Calcium displaces Na and H

Na flushed beyond the root zone

How It Works:

Extract

POWERED BY 

Untreated:

- ✓ Slow process of nutrient release and residue breakdown
- ✓ Valuable nutrients remain locked in residue and in soil
- ✓ Applied nutrients less available for plant due to N immobilization

Possibility for uneven or slow emergence and other consequences of nutrient tie up

Slow, temperature-dependent breakdown may immobilize nutrients

Nutrients locked up in soil or residue

Immobilization of applied N

With Extract PBA:

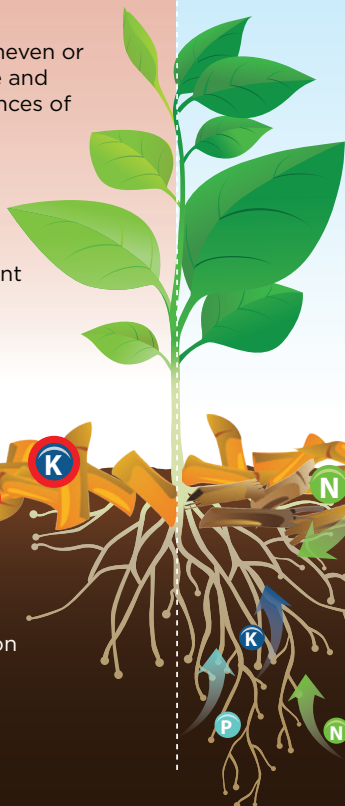
- ✓ Nutrients more quickly released and available for the next crop to use
- ✓ Rapid residue breakdown and nutrient release, even in cooler temperatures
- ✓ Easier plantability, more even emergence, and strong, healthy plants

Healthier plant and greater nutrient efficiency for the grower

Increased nutrient cycling

Improved nutrient mineralization

More nutrients available for plant uptake during growing season



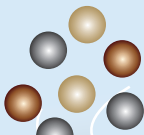
How It Works:

TITAN[®]

XC 

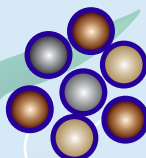
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Untreated
fertilizer
applied
to soil



1

Dry fertilizer treated with
Titan XC applied to soil



2

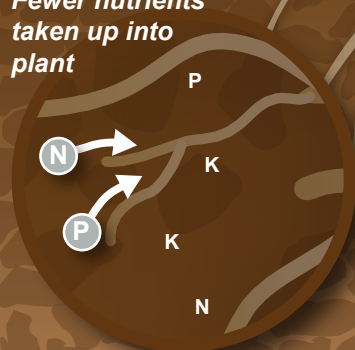
Titan XC
accelerates the
mineralization of
dry fertilizer

*Less breakdown
of dry fertilizer*

2

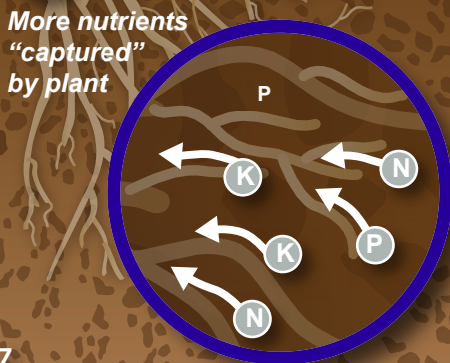
3

*Fewer nutrients
taken up into
plant*



4

*More nutrients
“captured”
by plant*



3

*More
nutrients
available sooner*

WHEN

When should I use **Accomplish MAX**, **Extract PBA** or **Titan XC**?

These biocatalyst products can be incorporated into growers' standard fertility programs year-round. **Accomplish MAX** is recommended for in-furrow use at planting. **Extract PBA** is recommended for use with pre-emergent herbicides, with UAN sidedress or in residue management programs. **Titan XC** is recommended for use with fall or spring dry fertilizer applications. Please speak to your local Loveland Products proprietary products manager (PPM) or Nutrien Ag Solutions retailer about which product is right for your current growing program.

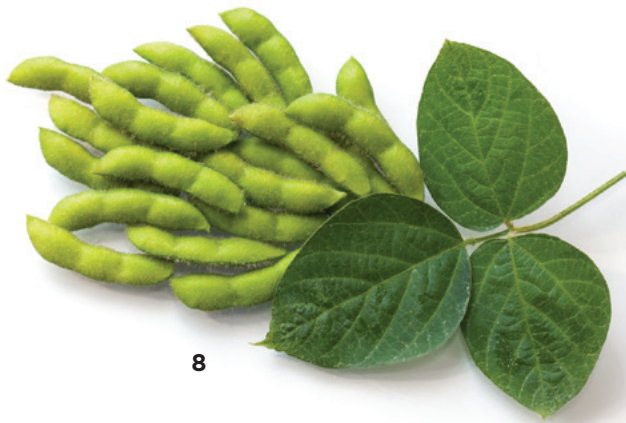
WHERE

Where can I purchase **Accomplish MAX**, **Extract PBA** or **Titan XC**?

Accomplish MAX, **Extract PBA** and **Titan XC** are distributed by Loveland Products through Nutrien Ag Solutions. Please talk to your Nutrien Ag Solutions branch if you are interested in purchasing these products.

Where can I learn more about these products?

Additional information on Loveland Products' complete line of high-performance crop input products, including **Accomplish MAX**, **Extract PBA** and **Titan XC**, can be found by visiting www.lovelandproducts.com or by speaking to your local Nutrien Ag Solutions crop consultant.





Accomplish MAX at a Glance

Application

- Apply with liquid starter applications

Key Components

- Concentrated microbial-derived biochemistry
- Highly soluble *Ascophyllum nodosum* (kelp) extract

Key Features & Benefits

- Mineralizes nutrient sources to increase nutrient availability
- Enhances root growth to improve nutrient and water uptake
- May improve plant tolerance to abiotic stresses such as salt, drought and cold
- Highly soluble formulation
- Compatible with most fertilizers, insecticides, fungicides and herbicides



Uses and Rates

Application	Recommended Rate	Notes
Starter	1 quart/acre	Use with in-furrow liquid starters, 2x2 placement of liquid fertilizers, concentrated band applications and liquid strip till.
Irrigation Injection	Set injection system to distribute 2-4 quarts of concentrate per acre	Mix with water (1:1) prior to combining with concentrated liquid fertilizers.

NOTE: Please see Accomplish MAX label for additional details

Extract PBA at a Glance

Application	<ul style="list-style-type: none">• Use with broadcast applications, including Pre-Plant/Pre-Emergent, UAN sidedress or residue applications
Key ingredients	<ul style="list-style-type: none">• Concentrated microbial-derived biochemistry• Ammonium thiosulfate (ATS)
Features	<ul style="list-style-type: none">• Maximizes nutrient release from crop residues and the soil• Extends existing nutrient availability later into the season• Supports easier plantability in the spring• Promotes more even crop emergence• Enhances nutrient use efficiency• Compatible with liquid broadcast fertilizers and herbicides

Uses and Rates

Application	Recommended Rate
Pre-Plant/ Pre-Emergent	<ul style="list-style-type: none">• Apply at 1-2 gallons/acre• Can be mixed with herbicides and/or liquid fertilizers in a broadcast application• Minimum spray solution volume: 10 gallons/acre
Sidedress	<ul style="list-style-type: none">• Apply at 1-2 gallons/acre• Use with UAN sidedress/ Y-drop applications
Residue	<ul style="list-style-type: none">• Apply at 1-2 gallons/acre• Minimum spray solution volume: 10 gallons/acre

NOTE: DO NOT use in furrow or 2x2 at planting.



Titan XC at a Glance

Application	<ul style="list-style-type: none">• Dry fertilizer impregnation
Functioning components	<ul style="list-style-type: none">• Concentrated microbial-derived biochemistry
Primary mode of action	<ul style="list-style-type: none">• Increases mineralization & availability of nutrients in dry fertilizer blends
Features	<ul style="list-style-type: none">• Effective in a wide variety of soil types• Compatible with P & K fertilizers, MESZ, MES, pell lime, sulfate of potash, ammonium sulfate, & gypsum• Shelf stable



Uses and Rates

Dry Fertilizer	Recommended Rate
Phosphate (MAP 11-52-O, DAP 18-46-O, MES, MESZ) blends, potassium blends, sulfate of potash (SOP), ammonium sulfate (AMS), pell lime, gypsum and blends with urea	16 ounces/ton

Contact Your Local Nutrien Ag Solutions® Retailer

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www.lovelandproducts.com



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