

WINTER PREPARATION GUIDE



**PRECISION**[™]
LABORATORIES

Results. Expect it.



WINTER IS COMING. IS YOUR TURF PREPARED?

You spend thousands of dollars and devote countless hours to create great playing surfaces for your customers. Don't let winter destroy your hard work. Prepare your turf and root zone for cold, snow and ice with products from Precision Laboratories.



What we didn't expect was the prolonged snow mold control. We didn't expect the higher soil temperatures and we didn't expect the vigorous growth so early in the season.

CARL SAMUELSON, Park Superintendent
Newtown, CT



We use Cascade and Duplex all year long. The biggest thing we noticed was in the spring when the greens cleared off, they were not hydrophobic. Every year before that, the greens have been completely hydrophobic in April and would not take the water.

GREG CORMIER, Golf Course Superintendent
Nashawtuc Country Club, Concord, MA



We spray Wintergreen before any cover goes on. I think it definitely gives you a little edge in terms of survival during the winter. I'm a strong believer that it saves turf.

ERIC RICHARDSON, Golf Course Superintendent
Essex County Club, Manchester-by-the-Sea, MA

WHAT IS WINTERKILL?

Winterkill is a general term used to define turf loss during the winter. Winter conditions are not easy to predict. They can vary from course-to-course and hole-to-hole and are usually caused by a combination of factors including:

- LOW TEMPERATURES
- CROWN HYDRATION
- DESICCATION
- ICE COVER
- SNOW MOLD

SOLUTIONS FOR WINTERKILL

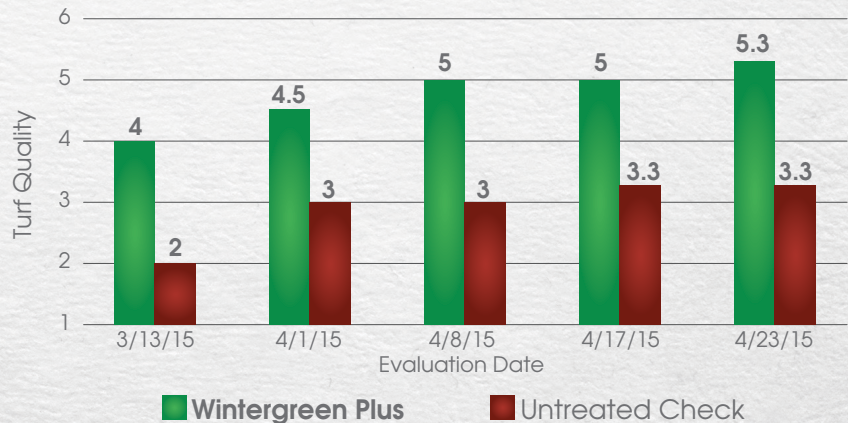
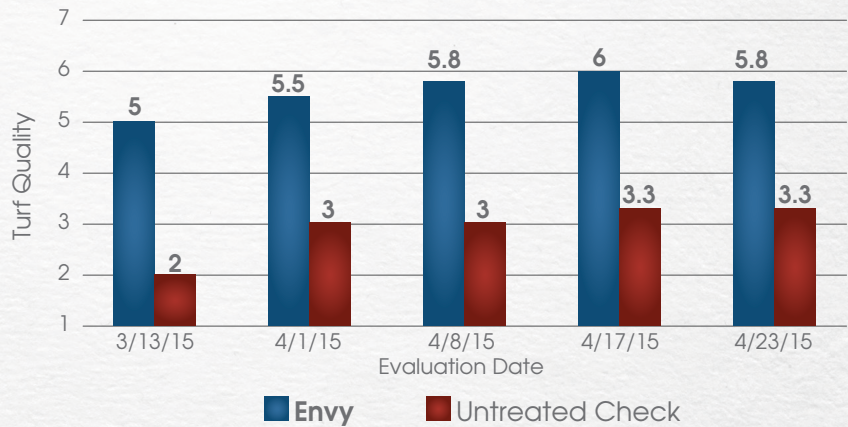
Adjuvants, soil surfactants, turf paints and pigments from Precision Laboratories offer field-tested solutions that help you protect your turf from winterkill.

SOLUTION	LOW TEMPERATURE	CROWN HYDRATION	DESICCATION	SNOW MOLD	ICE COVER
WINTERGREEN™	YES	NO	YES	NO	NO
ENVY™ / AQUALOCK™ COMBO	YES	NO	YES	NO	NO
CASCADE PLUS™ / DUPLEX™ COMBO	NO	YES	NO	NO	NO
CPF 0-0-20	YES	YES	NO	NO	NO
SYNC® FUNGICIDE ACTIVATOR	NO	NO	NO	YES*	NO
VIVAX™	NO	YES	NO	NO	NO
VIVAX™ 0-0-20	YES	YES	NO	NO	NO

*Adjuvant for use with snow mold fungicide.

EFFECTS OF TURF PIGMENTS ON QUALITY AND WINTERKILL

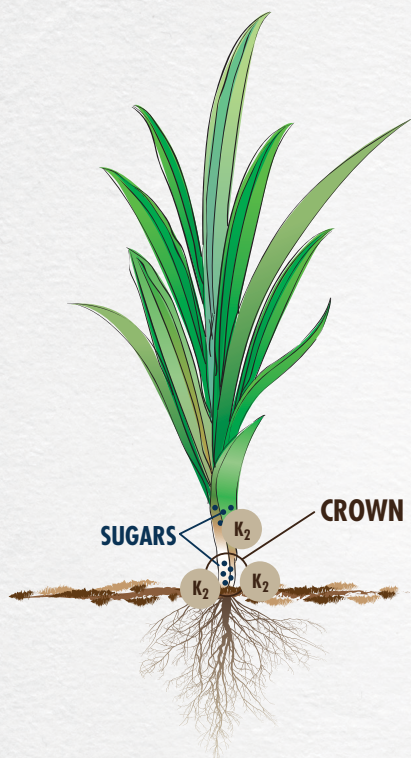
Minnesota had little snow cover in the winter of 2014/2015, resulting in a severe lack of turf color in the spring. Turf quality (TQ) ratings for Wintergreen Plus and Envy were significantly higher than the untreated check. These trials, conducted at TPC Twin Cities, indicate fall applications of Wintergreen Plus or Envy provide increased spring green up on bentgrass playing surfaces.



LOW TEMPERATURE KILL

During typical fall conditions, turf plants undergo a process called “hardening off.” This occurs when turf responds to gradually decreasing temperatures and shorter lengths of daylight. As the plant hardens off, plant tissue dehydrates and concentrations of potassium ions and sugars increase to help it resist low temperature kill. Warm weather late in the fall can delay hardening and cause plants to become susceptible to ice formation in the crown.

THE FOLLOWING TABLE INDICATES LOW TEMPERATURE HARDINESS BY SPECIES:



PLANT HARDENING:
As temperatures drop and daylight shortens, plant tissues dehydrate, which concentrates potassium and sugars to prepare the plant for low temperatures. Cascade Plus Fertilizer 0-0-20 provides needed potassium and manages water.

TURFGRASS SPECIES	LOW TEMPERATURE HARDINESS
ROUGH BLUEGRASS	EXCELLENT
CREeping BENTGRASS	EXCELLENT
KENTUCKY BLUEGRASS	GOOD
COLONIAL BENTGRASS	GOOD
TALL FESCUE	MEDIUM
RED FESCUE	MEDIUM
ANNUAL BLUEGRASS	MEDIUM
PERENNIAL RYEGRASS	POOR

LOW TEMPERATURE KILL SOLUTIONS FROM PRECISION:

Wintergreen Plus™: The dark green color of Wintergreen Plus absorbs sunlight during shorter lengths of daylight, which helps mitigate extreme temperature changes. Less temperature fluctuation allows plants to harden off gradually and become more resistant to cold temperatures. Apply at 16 - 32 oz. in 3 gallons of water per 1,000 ft². Make two perpendicular applications.

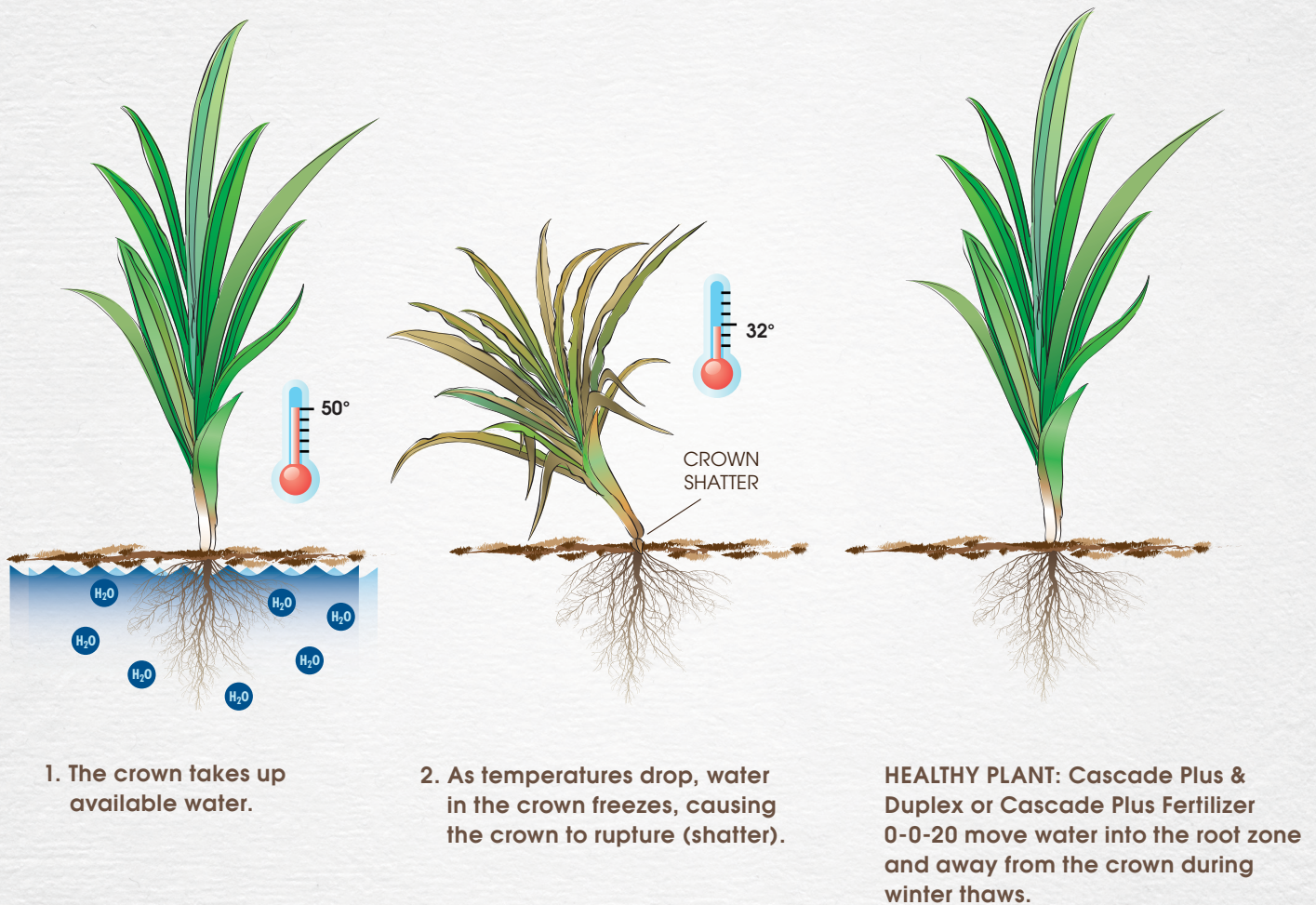
AquaLock™ & Envy™: The addition of Envy turf pigment to AquaLock provides a natural green color that absorbs sunlight to help mitigate extreme temperature changes. Less temperature fluctuation allows plants to harden off gradually and become better resistant to cold temperatures. Apply a mix of 6 oz. of AquaLock and 0.5 oz. of Envy per 1,000 sq. ft. Recommended for use in centrifugal pumps.

Vivax™ 0-0-20 or Cascade Plus™ Fertilizer 0-0-20: To provide potassium, which is essential for plant hardening, apply 5 lbs. per 1,000 sq. ft. of Vivax 0-0-20 or Cascade Plus Fertilizer 0-0-20 prior to soils freezing in late fall. These surfactants will move water from the soil surface deep into the root zone, which prevents conditions that lead to low temperature kill.

CROWN HYDRATION

The crown is the site of root, leaf and stem production. Plants take up water during winter thaws and are prone to crown hydration when warm conditions are followed by a rapid freeze. During these cycles, ice crystals form in the crown of the plant and eventually burst - rupturing plant cells and causing the plant to die. Annual bluegrass is most susceptible to injury from crown hydration.

Creeping bentgrass is less susceptible to crown hydration because it remains dormant longer than annual bluegrass and does not readily take up water during winter thaws.



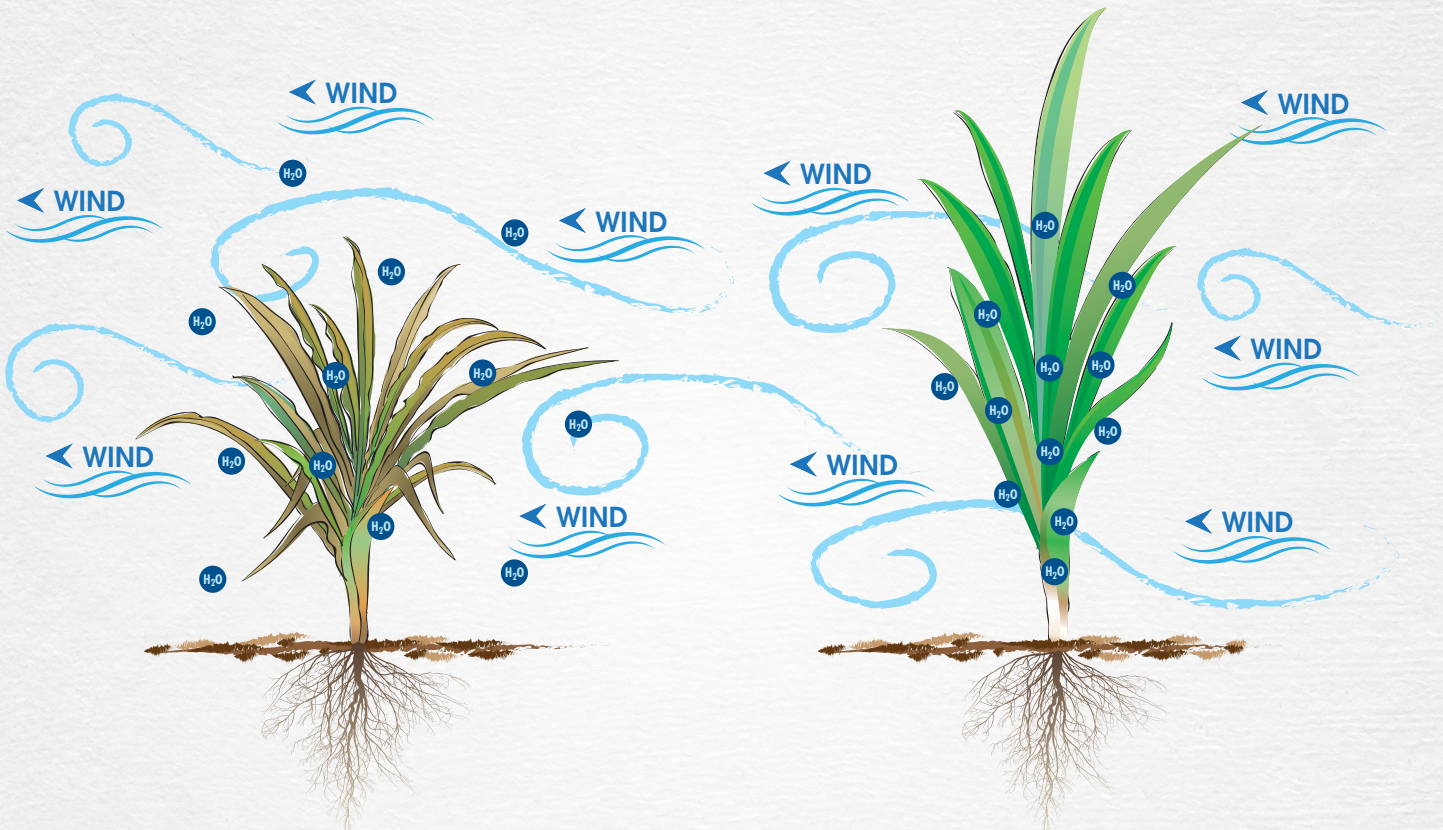
CROWN HYDRATION SOLUTIONS FROM PRECISION:

Vivax™ or Cascade Plus™ & Duplex™ 4+1: Apply 5 oz. of Vivax or a tank mix of 4 oz. of Cascade Plus and 1 oz. of Duplex per 1,000 sq. ft. prior to soils freezing in late fall. This fall application will remove water from the soil surface and into the deep root zone, which helps prevent conditions that lead to crown hydration.

Vivax™ 0-0-20 or Cascade Plus™ Fertilizer 0-0-20: Removes water from the soil surface into the deep root zone to prevent conditions that lead to crown hydration. Apply 5 lbs. per 1,000 sq. ft. of Vivax 0-0-20 or Cascade Plus Fertilizer 0-0-20 prior to soils freezing in late fall.

DESICCATION

Desiccation occurs when turf is unprotected and subject to drying, cold winds for extended periods of time. Exposed turf can lose moisture in crown tissues, which results in plant death. This condition is common in short-cut annual bluegrass (*Poa annua*), but can occur in other species and on sports turf as well.



AFFECTED PLANT: Cold, drying winds make the crown lose moisture, causing plant injury or death.

HEALTHY PLANT: Wintergreen Plus or Envy & Aqualock coat plant tissue with a protective film of colorant and anti-desiccant.

DESICCATION SOLUTIONS FROM PRECISION:

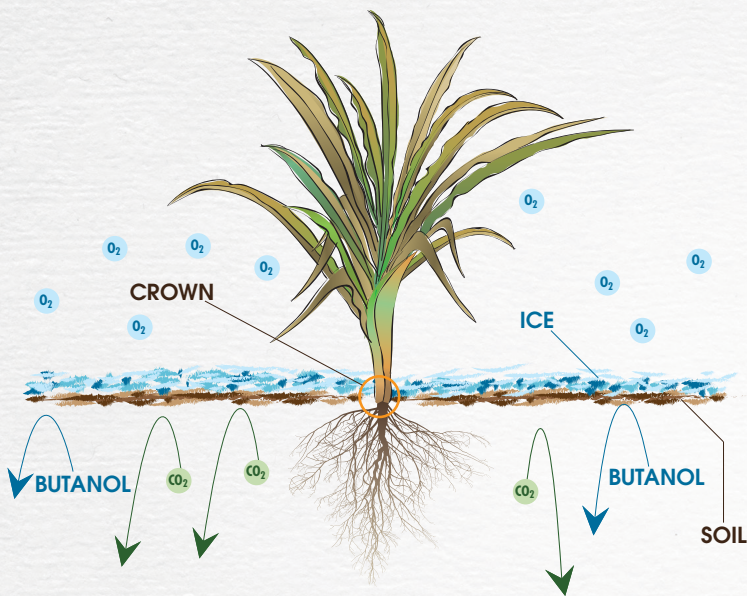
Wintergreen Plus™: Wintergreen Plus' unique formulation coats the exterior of the entire plant and provides a long-term insulating layer that helps turf retain moisture. This offsets the harmful effects of plant desiccation during periods of extended winter exposure. Apply at 16 - 32 oz. in 3 gallons of water per 1,000 ft². Make two perpendicular applications.

AquaLock™ & Envy™: AquaLock's waxy layer adds extra protection against the harmful elements that are commonly associated with long term exposure during winter months. Apply a mix of 6 oz. of AquaLock and 0.5 oz. of Envy per 1,000 sq. ft.

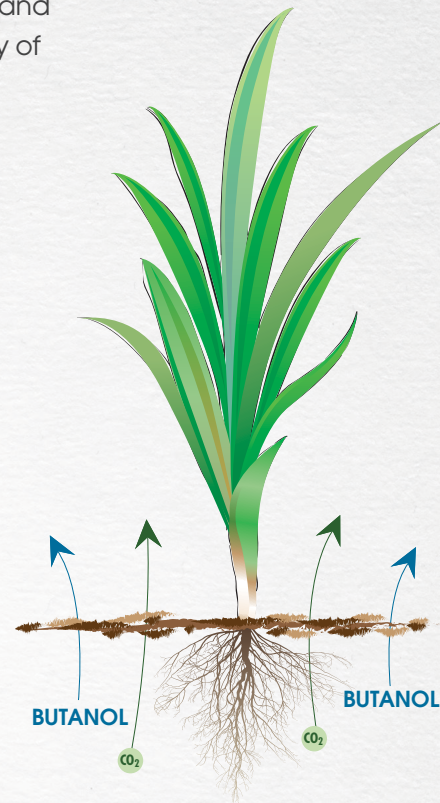


ICE COVER

When thick layers of ice cover the grass, it causes a reduction in gaseous exchange between the turf and the atmosphere. These conditions deplete oxygen and cause toxic gases like carbon dioxide, butanol and ethyl butyrate to increase, which eventually kills the plant. The severity of this issue is influenced by factors such as the period of time that ice covers the turf and the permeability of the ice cover.



AFFECTED PLANT: When ice covers playing surfaces, it causes a reduction in gaseous exchange. Carbon dioxide, butanol and other gases increase and become toxic to the plant.



HEALTHY PLANT: Removing standing water prior to freezing or physically breaking the ice cover allows gaseous exchange.



SNOW MOLD

Typhula blight (gray snow mold) and Microdochium patch (pink snow mold) are two diseases that cause injury to turf. Gray snow mold occurs during extended periods of snow cover; whereas pink snow mold may occur with or without snow cover. If left untreated with fungicides, snow mold damage occurs and adversely affects the playing conditions of greens, tees and fairways next spring.

SNOW MOLD SOLUTIONS FROM PRECISION:

SYNC® Fungicide Activator: Add 1 pint of SYNC to 100 gallons of fungicide spray solution to improve the performance and longevity of contact and systemic fungicides, even when applied at reduced spray volumes.

WINTERKILL SOLUTIONS FROM PRECISION

Adjuvants, soil surfactants, turf paints and pigments from Precision Laboratories offer field-tested solutions that help you protect your turf from winterkill.



WINTERGREEN PLUS™ A non-phytotoxic colorant and anti-desiccant formulated to impart a natural green color to dormant or actively growing turf. Wintergreen Plus is recommended for spraying systems using diaphragm pumps.

WINTERKILL ISSUES: Desiccation; Low Temperatures



AQUALOCK™ & ENVY™ AquaLock is a unique wax dispersion that forms a thin, flexible water-repellent layer on plant surfaces. Envy is a combination of pigments and spray adjuvants that provides a natural green color and partners well with AquaLock for winter injury prevention.

WINTERKILL ISSUES: Desiccation; Low Temperatures



CASCADE PLUS™ & DUPLEX™ 4+1 Provides nonionic surfactants that hydrate the soil and infiltration surfactants that produce deeper, more uniform water infiltration and firmer playing surfaces.

WINTERKILL ISSUES: Crown Hydration



CASCADE PLUS™ FERTILIZER 0-0-20 Combines the ability of Cascade Plus to move water off the soil surface and into the plant root zone. It contains potassium sulfate and calcium sulfate in a convenient formulation that does not require application with spray equipment.

WINTERKILL ISSUES: Crown Hydration; Low Temperatures



VIVAX™ & VIVAX™ 0-0-20 Vivax is a combination of new surfactant technologies designed to manage water across a wide range of soil and turf types, making it ideal for use on golf courses and sports turf. Vivax 0-0-20 is the same technology as Vivax with added fertilizer.

WINTERKILL ISSUES: Crown Hydration; Low Temperatures



SYNC® Enhances performance of contact and systemic fungicides, and lengthens disease control at reduced water volume on a wide variety of turf diseases. Data shows the addition of SYNC improves the performance of snow mold fungicides.

WINTERKILL ISSUES: Snow Mold

Don't let your hard work and resources go to waste. Call your Precision Laboratories distributor now and learn how innovative, sensible and effective products from Precision can prepare your turf for the long winter ahead.

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Specialized chemistries that enhance plants, seeds, soil and water.
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