Why every Sports Turf Manager should consider using PGRs

Ben Polimer

Fields and Grounds Coordinator

Town of Weston, MA

Town of WESTON Massachusetts

Background:

- BS Agronomy and Environmental Science, Delaware Valley University
- Currently Fields and Grounds Coordinator for Town of Weston, MA
- Previous STM, Worcester Academy (6-PG school), Longwood Cricket Club (grass tennis)
- Current NESTMA President Elect
- 2016 STMA George Toma Award Recipient
- 2015 STMA President's Award for Leadership
- Used PGRs since 2006
- From high end grass tennis courts to little league fields

Outline:

- PGR history
- Types of PGRs
- Practical application

Do PGRs Fit Your Sports Field Program?

By Dr. Michael Goatley Jr.

The concept of applying chemicals for suppressing foliar growth and seedhead formation of turfgrasses goes back to the 1950s. But there has probably never been as much interest in plant growth regulators (PGRs) on turf as in the last couple of years.

This is especially true for sports fields because of potential reduction in maintenance costs from less mowing and the potential for improved playing-surface quality. However, there are things you need to consider about PGRs before selecting one.

First, be aware of how the chemical enters the plant. This will indicate to you whether or not irrigation or rainfall is necessary or even desirable following chemical application.

Second, be aware of the strengths or limitations of the growth regulating effects. Some PGRs provide only seedhead or foliar suppression while others are capable of both.

Strengths and Weaknesses

There are three classes of PGRs according to their mode of action.

Class A PGRs interfere with the production of gibberellins (plant hormones that influence cell elongation, photoperiod response and chilling tolerance) late in their production pathway. These PGRs are useful on intensively managed turf areas, usually result in less phytotoxicity, and provide shorter periods of growth suppression activity. An example of this compound is Primo.

Class B PGRs interfere with gibberellin biosynthesis, but at earlier stages in the production pathway. They generally provide longer periods of growth regulation, but there is usually more concern with phytotoxicity

Plant Growth Regulators

- What are they?
- How do they work?
- Will they work for me?
- Costs?
- Typical Application

PGR Types

- Type I PGR- foliar absorbed
- Type II PGR- Class A- foliar absorbed, Class B- root absorbed

Type I

- Foliar absorbed
- Inhibit cell division
- Inhibit leaf growth and seedhead development
- Mefluidide (Embark)
- Seedhead suppression in Poa

- Not used too often in SportsTurf

Type II

- Inhibition of gibberellic acid (GA)- cell elongation
- GA are plant hormones that promote shoot growth

- Class A- foliar absorbed, GA inhibitor late in process
  - Trinexapac-ethyl (Primo)-$135/gallon
  - Prohexadione calcium (Anuew)- No rebound effect!
- Class B- root absorbed, GA inhibitor early in process- Must be watered in
  - Paclobutrazol (Trimmit)- poa suppression
  - Flurprimidol (Cutless)-poa suppression, some seedhead

  - Trinexapac-ethyl and flurprimidol (Legacy or Edgeless)- foliar and root absorbed- stem suppression and seedhead elongation

- Natural hormone growth suppressant ethephon (Proxy)- seedhead suppression
- “Proxy/Primo” golf greens and poa annua tennis courts
- Paclobutrazol and TE good mix(suppression and poa control)

Reminder!!!!

- **Never apply to stressed turf!**
- **Drought, disease, insect**
- **Follow the label!**

GDD

- I don’t use GDD, limited by pesticide application laws (MA), don’t have a sprayer, contracted spraying. Applications on June – August.
- More information: turf.unl.edu
- Bill Kreuser- UNL Turf (@UNLTurf)
  - Dec. 2016 article on “Class A- B PRG can be modeled with GDD, application rate impacts amount of suppression, not duration of suppression, know the base temp, PGR over- regulation is real, rebound phase doesn’t always occur”

7-Day Forecast for Latitude... | Highlighted Research | Tur...

turf.unl.edu/highlighted-research#regulator

UNL IANR Agronomy and Horticulture Turfgrass Science Research Highlighted Research

HOME GREENKEEPER TURF INFO RESEARCH TURF ADVICE UNDERGRADUATE PROGRAM

Scheduling Plant Growth Regulator Applications

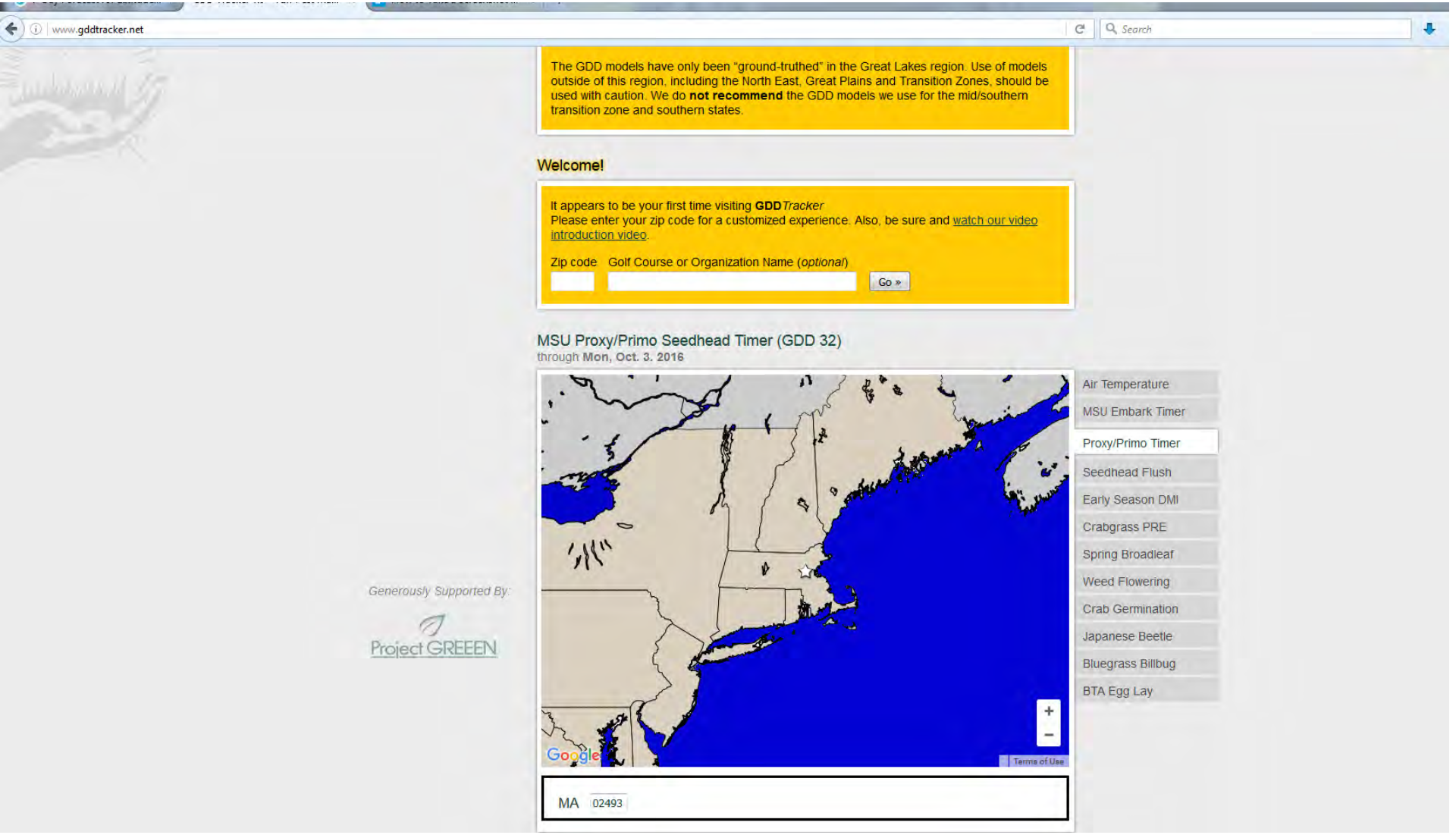
PGR GDD Tracker & Sprayer Calculator 3.0

PGR GDD Training Video (YouTube)

A Growing Degree Day Model to Schedule Trinexapac-ethyl Applications on *Agrostis stolonifera* Golf Putting Greens (PDF, 631KB)

Precise PGR applications on greens (PDF, 1MB)

Turf.unl.edu



www.gddtracker.net

Q&A with Pamela Sherratt

Questions? Send them to 202 Kottman Hall, 2001 Coffey Road, Columbus, OH 43210 or sherratt.1@osu.edu
Or, send your question to Grady Miller at North Carolina State University, Box 7620, Raleigh, NC 27695-7620, or email grady_miller@ncsu.edu

PGRs and GDDs

Q: After many years of consideration and discussions with colleagues from around the country, we are finally going to start into a Primo program. I've gotten fairly consistent thoughts on rates, but application frequency has become a more interesting topic. It's been recommended to base intervals on growing degree days rather than calendar days. That absolutely makes sense to me. My question is, how many actual growing degree days should be the basis? Is there a chart to base this off? And does it differ based on species of turf? In our few test applications this fall, we've seen significantly different response from the KBG (which is the vast majority of our field) compared with rye (in wear areas) and *Poa*.
Wes Ganobcik, Columbus Clippers

A: Wes, as you quite rightly point out, it's difficult to predict plant growth based on the *calendar* because temperatures can vary greatly from location to location, year to year. Growing Degree Days (GDD) are considered more precise because they are based on local, daily air temperatures.

To review, GDDs are used to estimate the growth and development of plants and insects during the growing season. The basic concept is that development will only occur if the temperature exceeds some minimum development threshold, or base temperature. The base temperatures are determined experimentally and are different for each organism. In essence then, GDD modeling will vary among location and also plant species. Plant growth responses are monitored and correlated with the accumulated GDD. For example, GDD modeling for applications of plant growth regulator are created by monitoring turf growth suppression and rebound following a plant growth regulator application.

GDD modeling has been used in the green industry since 1958 when it was first used to predict corn harvest times. Since then there has been much research done in relation to turfgrass maintenance & GDD, including the timing of growth regulators for *Poa* seedhead suppression, the timing of pre-emergent herbicides for crabgrass control, and timing of amine or ester formulations of herbicides. The most recent GDD model for turf management is in relation to growth regulator applications.

Applications of the growth regulator trinexapac-ethyl (TE) are becoming more commonplace in sports turf management and the advantages have been long reported. A reduction in clipping yield was the original goal but there are many other added benefits that can be used to improve sports fields, like an increase in tillering and lateral shear strength, and improved turf quality. Applications of TE have historically been made on bi-weekly or monthly intervals at the recommended label rate. The goal is to suppress grown evenly and to avoid the "rebound" effect that occurs if a timely re-application isn't made. The efficacy of TE is dependent on air temperature. This means that applications of TE made in the summer months may not give the suppression duration that's expected. Research by Dr. Branham found that turfgrass plants break down TE faster as air temperatures increase, leading to a reduction in suppression over the summer period. This variability in TE efficacy during hot weather means that calendar based TE re-application intervals are not efficient at maintaining consistent growth suppression.

The most recent published research on using GDD to apply TE has been developed by Dr. Bill Kreuser and Dr. D.J. Soldat. As an STMA member, you can access their research report on Michigan's Turfgrass Library (https://tic.msu.edu). They found that re-applying TE every 200 GDD (base 0C) maintained season-long yield suppression (no rebound) and good turf quality regardless of season. Their model of TE at 200 GDD, based on a 0 Celsius base may confuse some people but it can be adapted to fit your own needs. The 0 Celsius base is used because it is most convenient not to have to subtract a base temperature. Once the application of TE has been made, the model is reset to 0. So as an example, the accumulation of GDD starts with the first application of TE in the spring and when 200 GDD is reached a subsequent application is made. At this point GDD is reset to 0 and accumulation starts again. The method used to calculate GDD in their report is the "Average Method": the actual daily GDD calculation is the average daily temperature minus the base (0C). Keep in mind that this model of 200 GDD is specific to creeping bentgrass putting greens (and likely *Poa annua*. Other species like Kentucky bluegrass and perennial ryegrass are still being determined experimentally. They are currently evaluating GDD models for low-mow Kentucky bluegrass cultivars and Dr. Kreuser had the following to say: "The ideal interval is roughly 250 GDD with a base of 0C. Generally, plant growth regulator application intervals for greens are shorter than they are for higher mowed turf."

Using the 200 GDD model, application frequency will differ greatly from a traditional 7-day, 14-day or 1 x month application schedule. For example, 200 GDD may occur in 14 days in the month of May and as frequently as every 9 days in July. During a heatwave with high temperatures of 100°F and lows around 75°F (average daily 89°F) 200 GDD occurs in 7 days or less. This reiterates

Continued on page 49

Potential Benefits of Using PGRs on Sports Fields

- Reduce clippings
- Enhance color, texture and density
- Extend life of painted lines
- Prevent tissue elongation
- Increase sod strength and divot resistance
- Better fall color and spring green up
- Wear tolerance and recuperative potential (rebound)
- Improved drought and heat stress tolerance
- Improved shade tolerance
- Increased root length and mass

Sportsfield Management- February 2013
Pam Sherratt & Dr. John Street

Applying Trinexapac-ethyl

- Foliar Absorbed
  - Must Dry on Leaf (Label Says 1 Hour)
- Expect 50% Growth Reduction (Effects 3-5 Days After Application)
- May Have Some Discoloration After First Application
  - Then Darker Green Color

APPLICATION RATE TABLE FOR USE OF QUALI-PRO T-NEX 1 AQ

Turf Type	Residential and Commercial Turf[b]	Golf Course Fairways (Cut at 0.5" or less)	Golf Course Greens and Tees	Edging/Banding[c]
	fl oz/A (fl oz/1000 sq ft)	fl oz/A (fl oz/1000 sq ft)	fl oz/A (fl oz/1000 sq ft)	fl oz/A (fl oz/1000 sq ft)
COOL-SEASON GRASSES[a]				
Bentgrass	33 (0.75)	11 (0.25)	6 (0.125)	44 (1.0)
Fescue, Red	33 (0.75)	--	--	44 (1.0)
Fescue, Tall (Ky-31)	44 (1.0)	--	--	44 (1.0)
Fescue, Tall (Turf Types)	33 (0.75)	--	--	44 (1.0)
Kentucky Bluegrass	26 (0.60)	11 (0.25)	--	33 (0.75)
Mixture (Bentgrass/ *Poa annua*)	--	11 (0.25)	7 (0.125)	--
Mixture (K. Bluegrass/ Fescue/ Ryegrass)	33 (0.75)	--	--	--
Mixture (K. Bluegrass/ Ryegrass/ *Poa annua*)	--	22[d] (0.50)	--	--
Ryegrass, Annual	44 (1.0)	--	--	44 (1.0)
Ryegrass, Perennial	44 (1.0)	22 (0.50)	--	44 (1.0)

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	fl oz/A (fl oz/1000 sq ft)	fl oz/A (fl oz/1000 sq ft)	fl oz/A (fl oz/1000 sq ft)	fl oz/A (fl oz/1000 sq ft)
WARM-SEASON GRASSES[a]				
Bahiagrass	44 (1.0)	--	--	44-88 (1-2)
Bermudagrass[e]	--	--	--	--
Bermudagrass, Common	33 (0.75)	11 (0.25)	--	44-88 (1-2)
Bermudagrass, Other Hybrids	11 (0.25)	9 (0.20)	--	22-33 (0.50-0.75)
Bermudagrass, Tifdwarf	9 (0.20)	9 (0.20)	3 (0.062)	22-33 (0.50-0.75)
Bermudagrass, Tifgreen (328)	11 (0.25)	9 (0.20)	6 (0.125)	33 (0.75)
Bermudagrass, Tifway (419)	16 (0.38)	11 (0.25)	--	33 (0.75)
Buffalograss	44 (1.0)	--	--	44 (1.0)
Carpetgrass	11-18 (0.25-0.40)	--	--	22 (0.50)
Centipedegrass	22 (0.50)	--	--	44 (1.0)
Kikuyugrass	13-22 (0.30-0.50)	13 (0.30)	--	44 (1.0)
Seashore Paspalum	16 (0.375)	6-11 (0.125-0.25)	4-9 (0.08-0.20)	22 (0.50)

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WARM-SEASON GRASSES[a] (CONT.)				
St. Augustinegrass	4.50-6.50 (0.10-0.15)	--	--	18-36 (0.40-0.80)
St. Augustinegrass, Texas Common	4.5 (0.10)	--	--	9 (0.20)
Zoysiagrass	11 (0.25)	6 (0.125)	--	33 (0.33)

Reduced Clippings

- 50-60 percent reduction, 4-7 week suppression (Sherratt, Street)
- June-August- 16 oz/ac-20 oz/ac

- $135/gallon(post patent)
- 128 oz/16 oz=8 ac/gallon
- **$135/8ac=$17/ac**

- I apply in June-August, 3x apps

Enhance color, texture & density

- Darken color
- Reduce vertical growth, then increases density
- Increased tiller density= more plants per square inch

- WA- 1.25” HOC, 3x/week
- AD noticed by 2 application

- Weston- 2.5” HOC, 1x/week


Sharon, MA LL


Oct. 8th 2015

Extend life of painted lines

- Label rate is 1 oz trinexapac- ethyl per 1 gallon of paint
- HALF THE RATE!
- Reapply every 3-4 weeks
- $135/gallon, 128oz/ 1 gallon = $1.05/oz
- 2.5 oz/5 gallon bucket =$2.63 per bucket
- Average football field painting- 5- 5 gallon buckets=25 gallons- $13.15
- Save on logo painting?

Caution on wheel to wheel painters


Picture **courtesy** of Darian Daily

Picture courtesy of
Matt Anderson

Pictures courtesy of Eric Campbell


October 3, 2016

Prevent tissue elongation

- “leggy” turf
- Under tarps, covers, turf protection
- Applications timed so vertical growth is slowed down during the time the turf is under cover can prevent leggy, lush, and disease- susceptible turf from forming underneath (Sherratt, Street)

Springsteen, 2003

Increase sod strength and divot resistance

- Increase in the amount of tillers produced after 4 weeks. Divot length reduced (Sherratt, Street)
- Increase energy to lateral growth
- PSU Research (TE) Improve Divot Resistance- May – July- “Pre Condition”
  - Sand Rootzone 10-20% reduction in divot size
  - Native soil 10% reduction in divot size


Oct. 2015, 1.25” HOC, KBG
Practice Soccer 5 days/wk
Game field MS, JV

Better Fall color, spring greenup

June 27, 2016

Wear tolerance and recuperative potential

- Not under suppression
- Increased tolerance observed coming out of suppression
- “Rebound effect”
- Last app 3 days before fall sports- 4 week residual
- Rebound after “2 a days”
- “I like to cut turf”

Oct. 22, 2016
After game
1.5” HOC


TS.COM
Mahogany Sun
a world at play
TICKET
GALAXY
USCLE MILK
LAZ
TE/ Flurprimidol


Sept. 2015

Oct. 15, 2015, 3 home games, weekly youth leagues

Application Schedule: Town of Weston- (A) Fields

- End of School- June 25th
- 4 week interval- July 25th, August 25th (before fall sports)
- Multi product application- post- emergent herbicide(broadleaf & grassy weeds), growth regulator, wetting agent, insecticide, Fe
- Timing due to notification laws in State of Massachusetts
- Irrigated fields only!
- Minimal summer activity June 15-August 15

Application price

- 22 acres=$60/acre, high bid of $135/acre- application only
- $16.80 per acre product @ 16 oz/ac rate
- Applicator is Golf Course Superintendent
- Side business of applications, granular/liquid

- Example-2 acre football field at high bid =$302 per application, 3 apps=$906
- Is this doable??

July 22, 2014

June 26, 2016
Insecticide, broadleaf weed herbicide, trinexapac- ethyl

June 26, 2016
Insecticide, broadleaf weed herbicide, trinexapac- ethyl


6 days after app August 1, 2016
Herbicide (Grassy & Broadleaf),
Trinexapac-ethyl (16oz/ac)

Alphabet Field, Weston, MA September 9, 2016

Improved drought and heat tolerance

- Does not improve shade tolerance, but slows down turf decline in both tree and stadium shade (Sherratt, Street)

Increased root length and mass

- Mixed findings on cool- season turf. Bermudagrass treated with PGRs have shown increased root length and mass. (Sherratt, Street)

Trinexapac-ethyl and flurprimidol (Edgeless)

- *Eliminate string trimming for up to 8 weeks*
- *Easy to follow calibration and application instructions*
- *Aesthetic improvement over total vegetation herbicide treatments, or unsightly scalping caused by string trimmers*
- *No damage to the base of trees, wooden fences and posts as with string trimming*
- *Increased profit from your company's reallocation of labor to other projects*

(Product Cut Sheet)

Governor™ G

FEATURES & USE TIPS:

- Reduce mowing by up to half
- Reduce clipping volume by up to half

PRODUCT CODE:

ASPGR34

Date: 030514
Supersedes: 000000
Label: B14

PRODUCT CHARACTERISTICS:

Product Type:
Growth Regulator

Particle Size:
SGN: 75

Net Weight:
34 lbs.

Coverage:
8,500 sq. ft.
@ Medium Rate

PRODUCT SPECIFICATIONS:

Active Ingredient: Trinexapac-ethyl (0.15%)

Anuew™

For Managing Growth, Improving Quality and Appearance of Turfgrass.

Introducing Anuew™, a proprietary tool for cool- and warm-season turf management. Anuew contains prohexadione calcium, a new turf PGR with a novel mode of action that can be applied to all managed turf areas including golf greens, tees, fairways and rough, residential and commercial lawns, sod farms, sport fields and similar areas.

TRUSTED PERFORMANCE

- New management tool for cool- and warm-season turf
- Reduces turf growth and mowing frequency
- Reduces amount of clippings
- Improves turf quality, density and appearance
- Longer plant activity supports consistent growth management
- Does not require iron or masking agents
- Low use rates in convenient packaging
- A Nufarm exclusive for the US turf market
- Labeled for use on all managed turf areas including greens, tees, fairways, rough, residential and sod farms
- Rainfast within 1-4 hours
- First EPA approved label containing application instructions based on Growing Degree Day (GDD) modeling

EPA REG. NO.	1001-91
ACTIVE INGR.	prohexadione calcium *(27.5%)*
FORMULATION	extruded granule
CHEM. FAMILY	acylcyclohexadiones
SIGNAL WORD	caution
RESTRICTED	no
PACKAGE SIZE	4 x 4 x 1.5 lb resealable pouch

RESIDENTIAL

COMMERCIAL

TURF

GOLF TURF

Questions?

Ben Polimer, Fields and Grounds Coordinator, Town of Weston, MA

polimerb@Weston.org

@Bpolimer