SFMA SPORTS FIELD MANAGEMENT ASSOCIATION

The ABCs of PGRs for Turfgrass

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The ABCs of PGRs in Turfgrass

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Technical Services Manager, T&O

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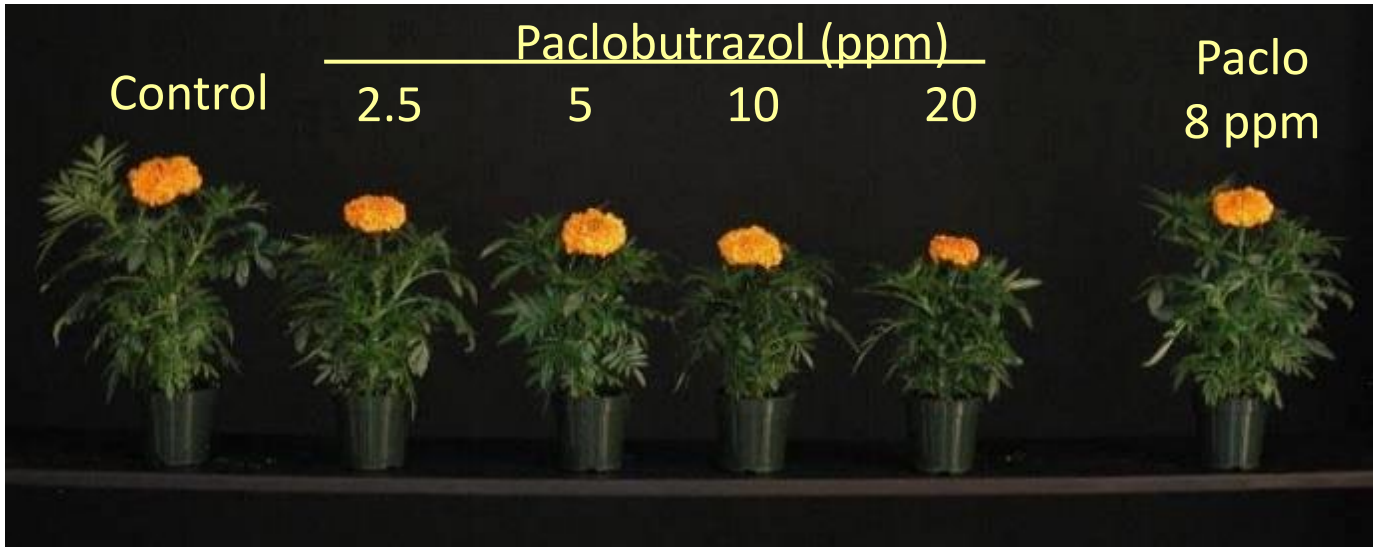
What are PGRs?
Definition: increase or decrease plant growth

- Cell division
- Cell elongation
- Senescence



Natural Plant Hormones

- **Abscisic acid** (ABA): close stomata; inhibition of germination, growth [gibberillic acid (GA)]; promotion of dormancy
- **Auxins**: growth promotion (cell elongation in shoots); apical dominance; root growth
- **Cytokinins**: promote cell division and lateral buds (tillers), delays senescence
- **Ethylene**: promotes fruit ripening, fruit and leaf abscission; stress response – up-regulate plant defense
- **Gibberellins (gibberellic acid)**: cell elongation

Old PGR Classifications

- Type I: inhibit cell division
  - mefluidide (Embark), maleic hydrazide (Rertard)
- Type II: inhibit cell elongation by inhibiting gibberellic acid (GA) production
  - paclobutrazol, flurprimidol, trinexapac-ethyl, prohexadione calcium

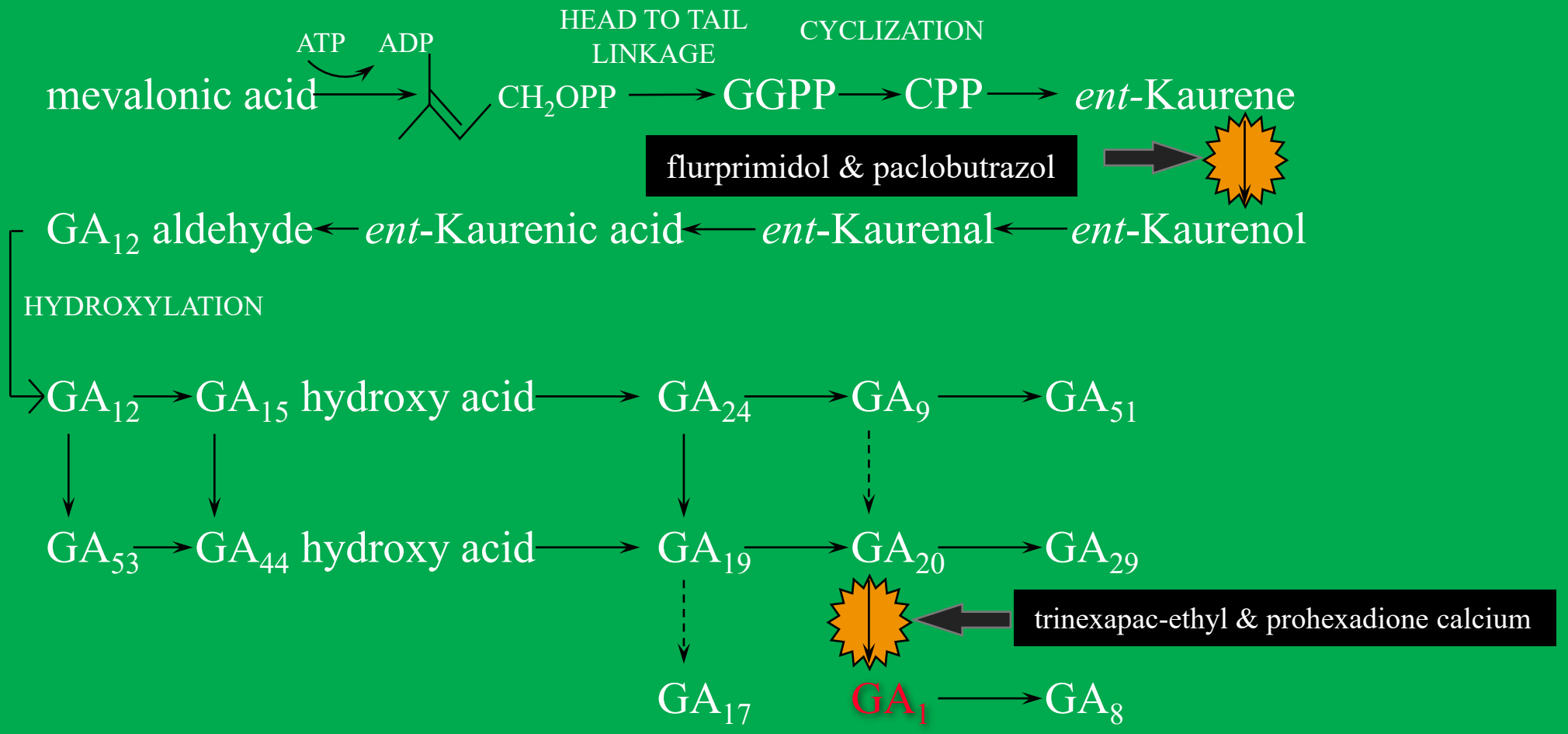
PGR Classifications

- **Class A: GA inhibitors, late in synthesis**
  - **trinexapac-ethyl, prohexadione calcium**
- **Class B: GA inhibitors, early in synthesis**
  - **paclobutrazol, flurprimidol**

Reduce or regulate **cell elongation**

- Class C: **cell division** (mitosis) inhibitors
  - mefluidide, maleic-hydrazide
- Class D: Herbicidal
- Class E: Hormones
  - ethephon (increases ethylene)
- Class F: Natural-source PGRs (seaweed extracts, humics)

Site of action (gibberellin biosynthesis)



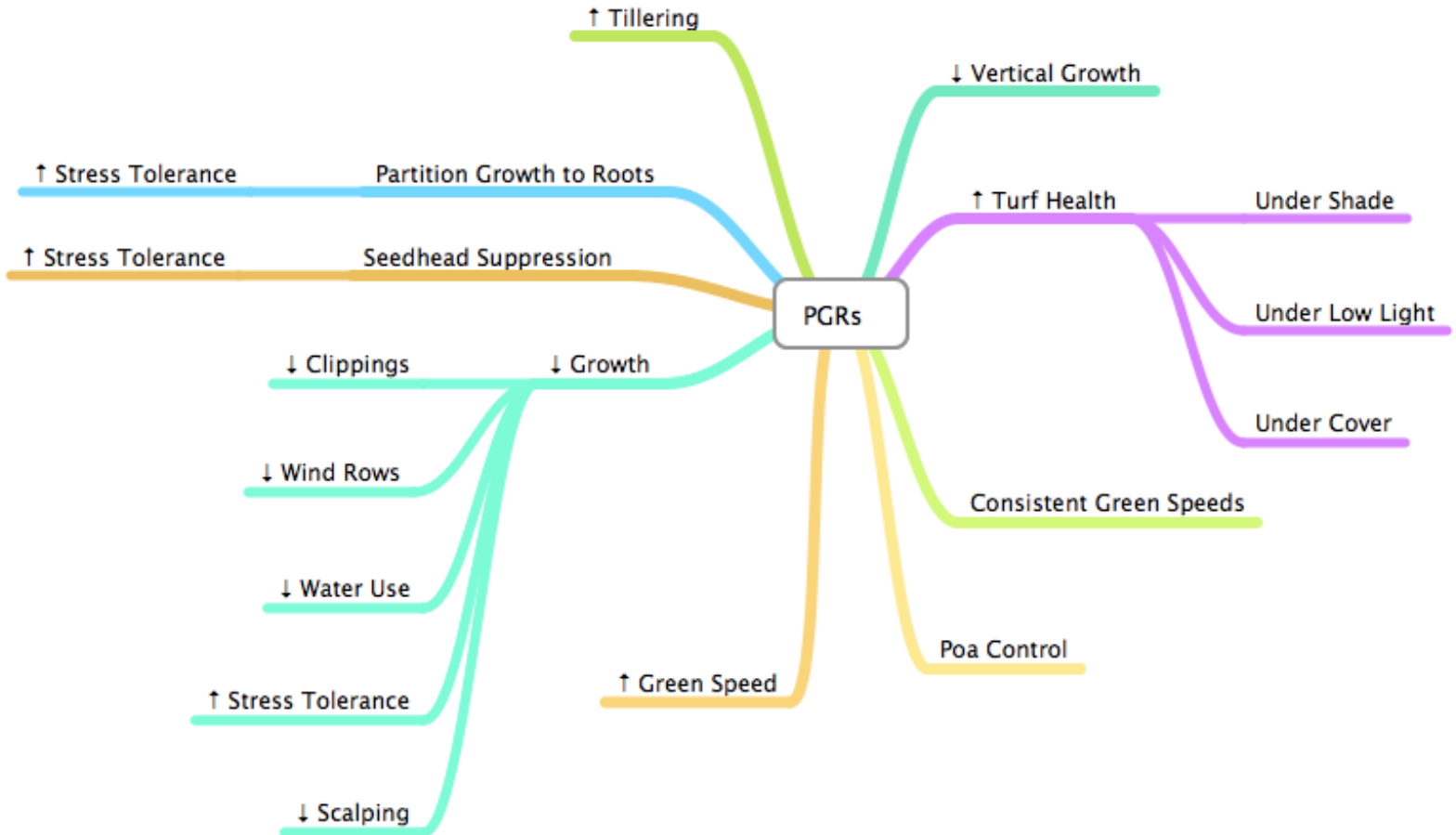
PGRs for Turf?

Class A – GA Inhibitors **Late** **Foliar** Absorption	Class B – GA Inhibitors **Early** **Root** Absorption
• Primo Maxx – trinexapac-ethyl	• Trimmit – paclobutrazol
• Anuew – prohexadione calcium	• Cutless – flurprimidol

Turf Health: Physiological Changes

Class A PGRs: trinexapac-ethyl (Primo Maxx) & prohexadione-Ca (Anuew)
Class B PGRs, perhaps, to a lesser extent: paclobutrazol (Trimmit) & flurprimidol (Cutless)

- decrease in vertical growth – partitioning of energy
- increased tillering / increased rooting
- increase mesophyll cell density
- increase chlorophyll concentrations
- dwarfed shoots, darker green


↑ Tillering
↓ Vertical Growth
↑ Stress Tolerance
Partition Growth to Roots
↑ Turf Health
Under Shade
↑ Stress Tolerance
Seedhead Suppression
Under Low Light
PGRs
Under Cover
↓ Clippings
↓ Growth
↓ Wind Rows
Consistent Green Speeds
↓ Water Use
Poa Control
↑ Stress Tolerance
↑ Green Speed
↓ Scalping

What can GA-inhibiting PGRs Do?

Vertical Growth Regulation & Energy Partition

- greenspeed consistency
- lower clipping weights
  - decreased mower maintenance
  - decreased dumping – when collecting clippings
  - decreased cleanup on fairways/lawns/sports fields
- fewer mowing events – skip days
- increased tillering/density
- increased root mass - variable
- increased non-structural carbohydrates
- reduced scalping
- decreased irrigation / increased water use efficiency
- improved turf color – more chlorophyll
- *Poa* control and/or suppression – growth regulation differential
- more even growth of mixed stands
- Seedhead suppression?
  - only ethephon?
- turf species transition – ryegrass to Bermudagrass and vice-versa
- decrease etiolation of turfgrass in high shade – increased health

Pau Sobina
22 Aug 98
LA PLATA, ARGENTINA

PGR Rate Ranges for Sports Field Height Turf Species

Trade Name	Anuew WDG	Anuew EZ	Primo Maxx	Trimmit 2SC	Cutless MEC	Proxy	Legacy	Musketeer
Active Ingredient(s)	prohexadione		trinexapac	paclobutrazol	flurprimidol	ethephon	flurprimidol trinexapac	flurprimidol paclobutrazol trinexapac
	oz/A	fl oz/A						
Kentucky bluegrass	8 – 16	18 – 35	26	16 – 32	25 – 49	218	15 – 30	18 – 36
tall fescue	8 – 16	18 – 35	33	16 – 32	25 – 49	218	15 – 30	-
ryegrass*	8 – 16	18 – 35	44	10 – 16	25 – 49	218	15 – 30	20 – 40
Bermudagrass*	12 – 24	26 – 53	9 – 33	32 – 48	12 – 37	218	10 – 20	20 – 30

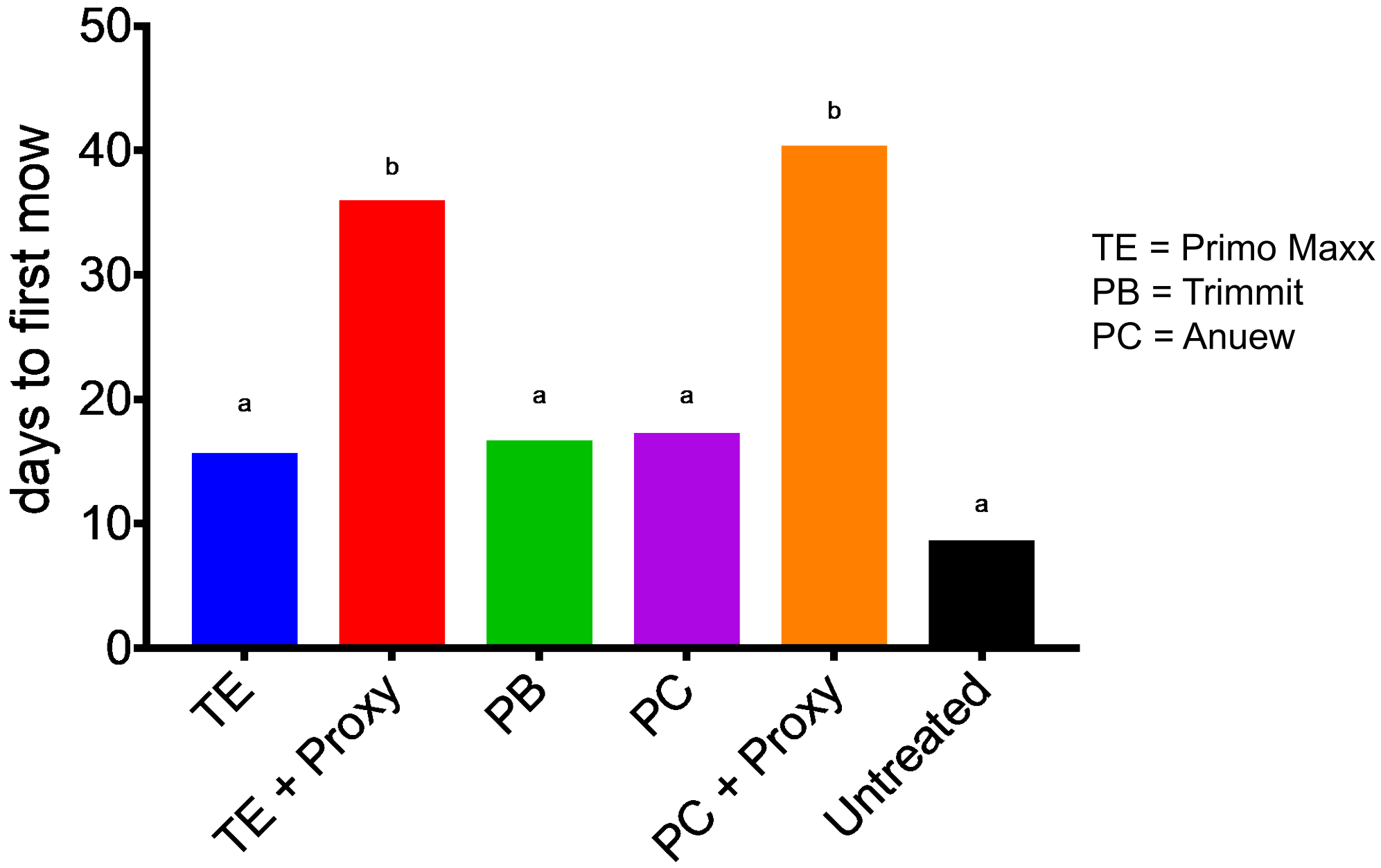
* labelled rates may vary depending on overseeding timing; be aware that paclobutrazol and flurprimidol are root absorbed so they may affect species that are dormant or going dormant.

1. Growth Regulation
   - reduce mowing and cleanup
     - baseball, softball and other relatively low traffic fields
     - fence rows, tough to mow areas, etc.


Untreated: 2 WAT


trinexapac-ethyl: 2 WAT

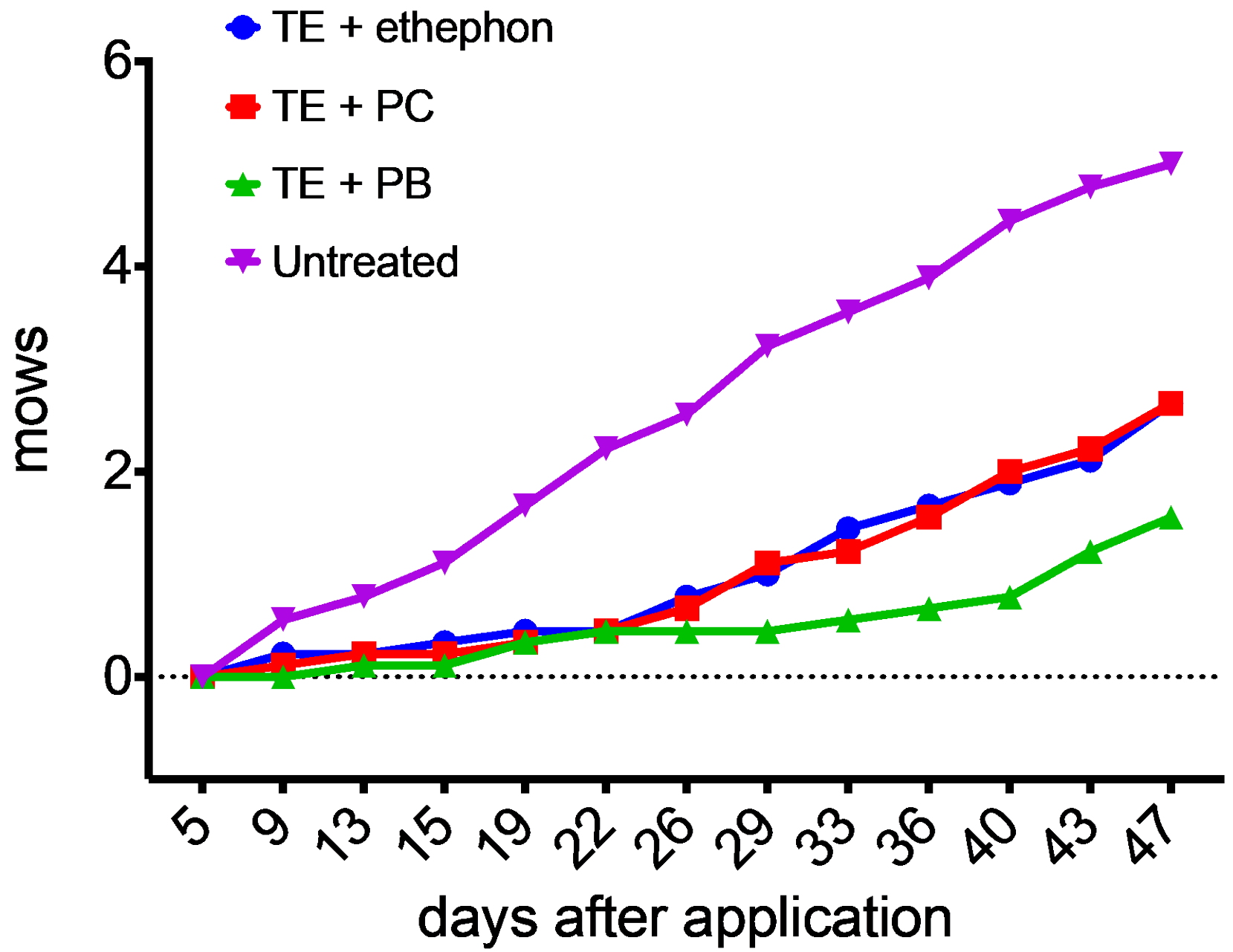

ethephon: 2 WAT

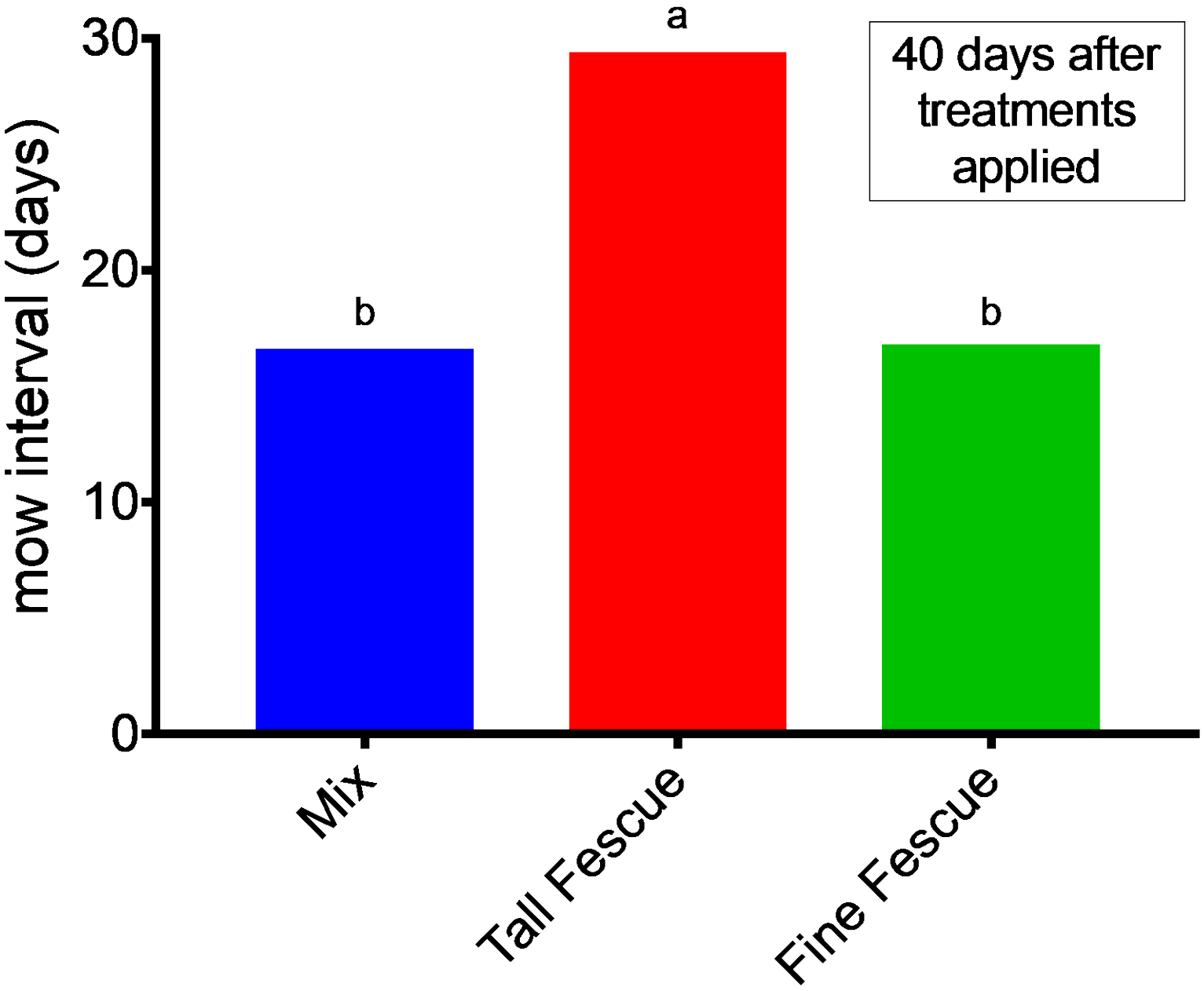

days to first mow
50
40
30
20
10
0
a
b
a
a
b
a
TE
TE + Proxy
PB
PC
PC + Proxy
Untreated
TE = Primo Maxx
PB = Trimmit
PC = Anuew

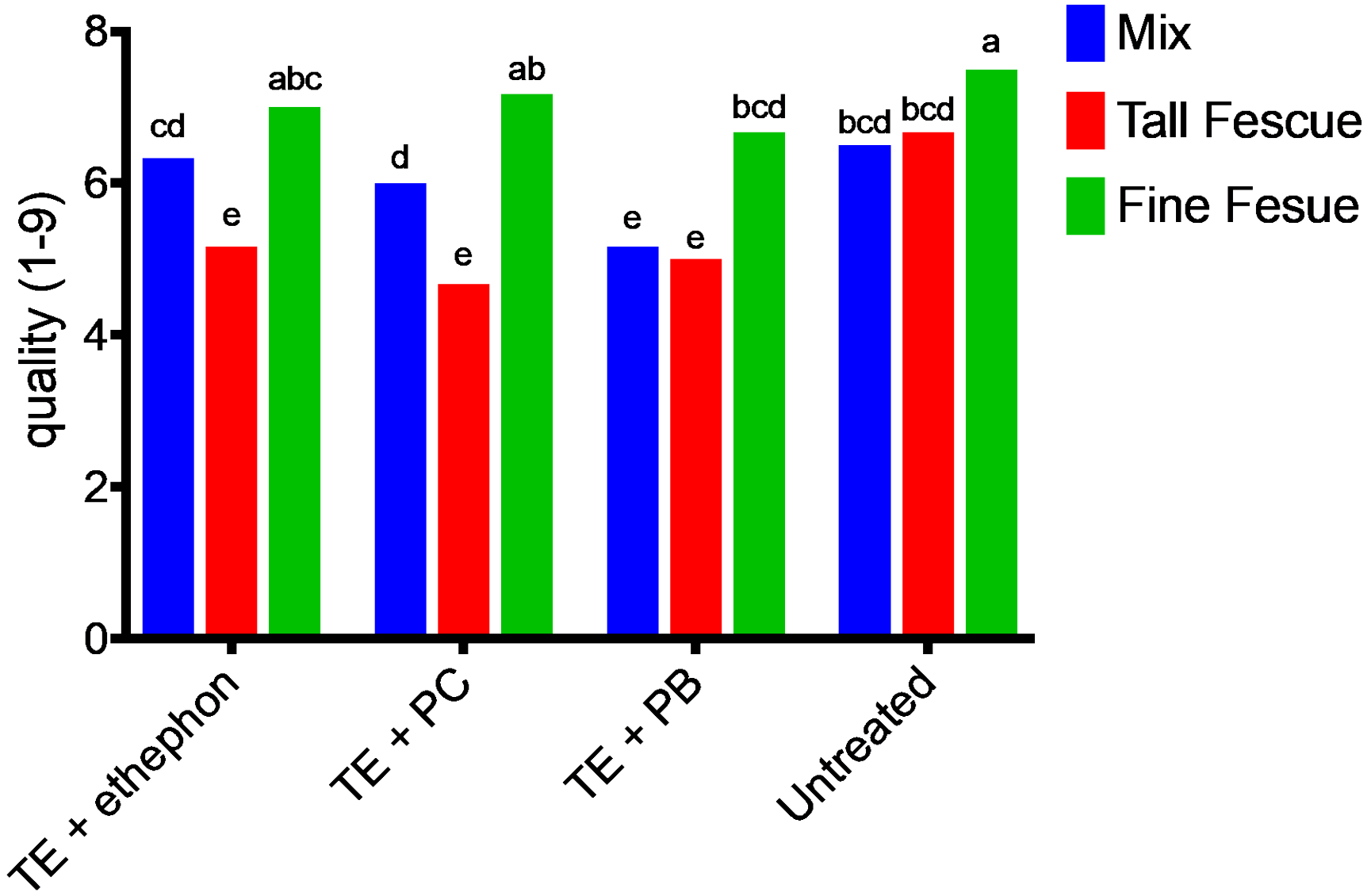
3 Turfs & 4 PGR Treatments

Turfgrass Species	PGR Treatments
1. Mix	1. trinexapac-ethyl (TE) + ethephon
2. Tall Fescue	2. TE + prohexadione calcium (PC)
3. Fine Fescues	3. TE + paclobutrazol (PB)
	4. Untreated

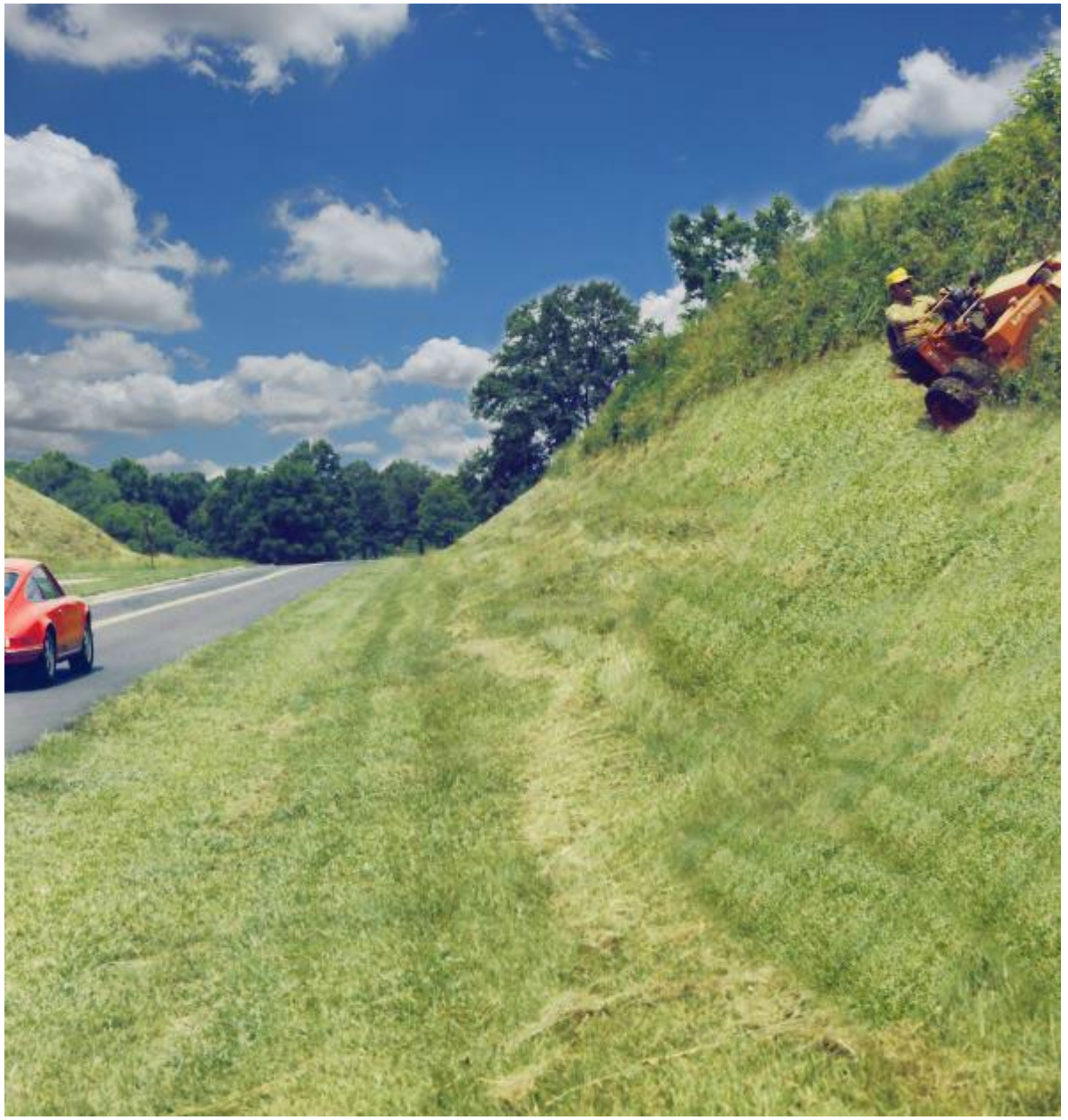
- Treatments applied once on August 30, 2017.
- Turf heights of each plot measured 2x/week.
- Plot mowed to 8.4 cm every time 12.6 cm was reached.
- Species x PGR Treatment factorial – split plot design.


TE + ethephon
TE + PC
TE + PB
Untreated
mows
6
4
2
0
5
9
13
15
19
22
26
29
33
36
40
43
47
days after application


mow interval (days)
30
20
10
0
a
b
b
40 days after treatments applied
Mix
Tall Fescue
Fine Fescue

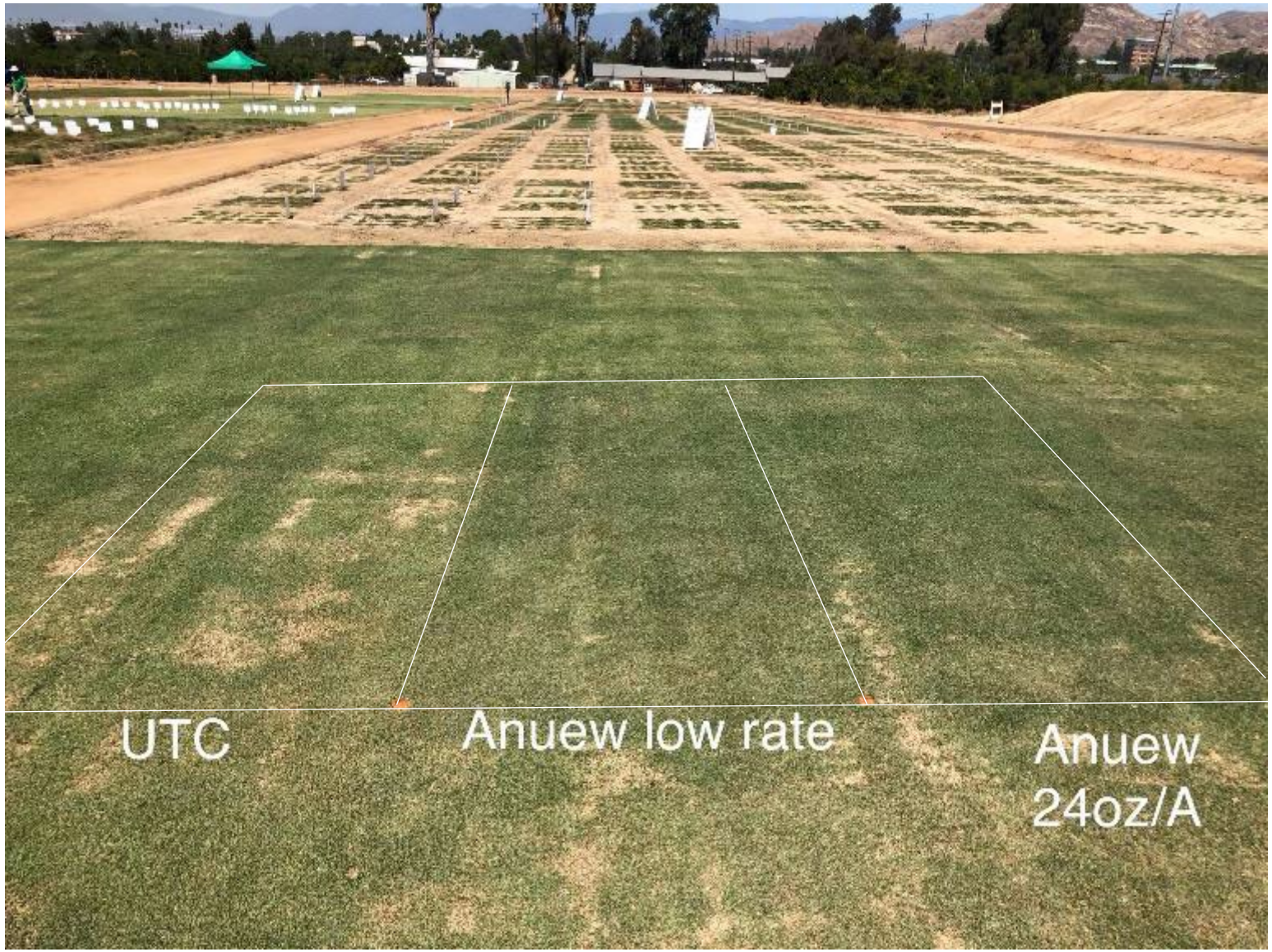

quality (1-9)
8
6
4
2
0
cd
e
abc
d
e
ab
e
e
bcd
bcd
bcd
a
TE + ethephon
TE + PC
TE + PB
Untreated
Mix
Tall Fescue
Fine Fesue

Key Takeaway: More even regulation of fairways that are commonly comprised of multiple species means less cleanup.



1. Growth Regulation
   - reduce mowing and cleanup
     - baseball, softball and other relatively low traffic fields
     - fence rows, tough to mow areas, etc.
2. Reduce Scalping

Reduced Scalping on BMG Fairway – UCR, 2021



Key Takeaway: Effective growth regulation from Anuew at 12 & 24 oz/A (Anuew EZ at 27 & 54 fl oz/A) which translated to reduced scalping.

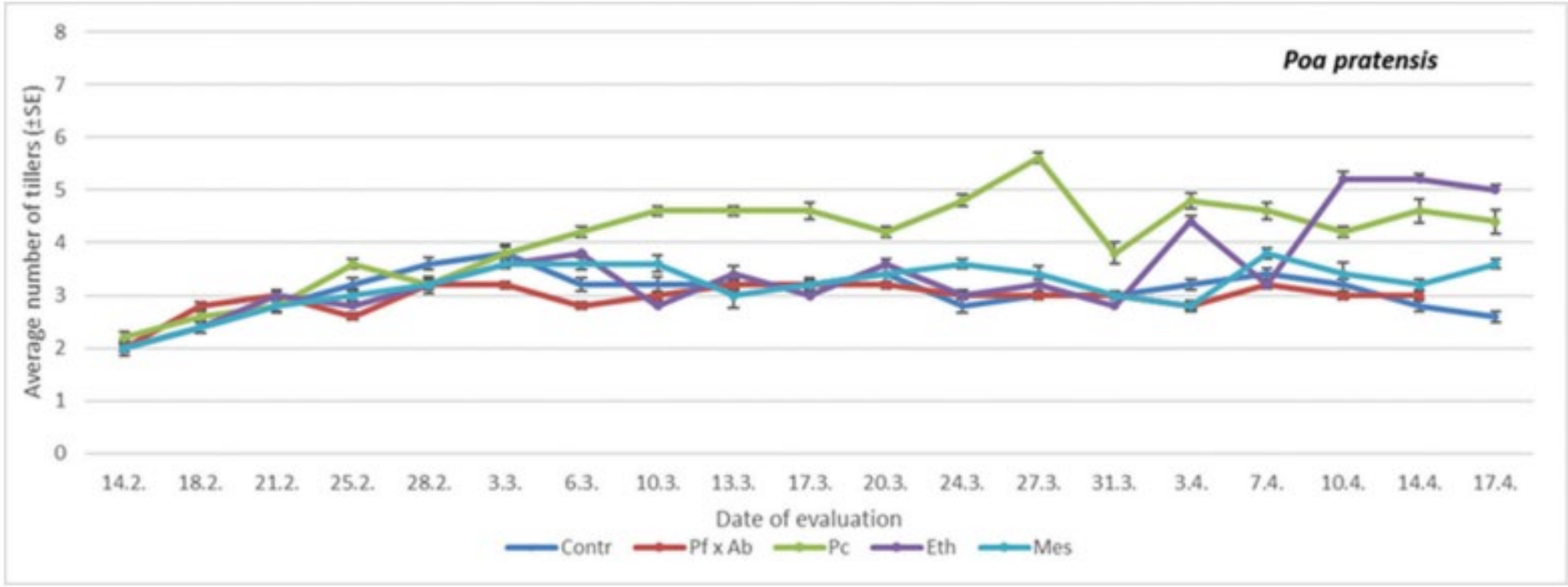
1. Growth Regulation
   - reduce mowing and cleanup
     - baseball, softball and other relatively low traffic fields
     - fence rows, tough to mow areas, etc.
2. Reduce Scalping
3. Increase Plant Health

Turf Health: Partition Growth

- Increased tiller density clear
  - PR, TE, 3WI, 67% increase
  - KBG, TE, 6WI, 22% increase
  - ZG, TE, 4WI, 12% increase
  - BMG, TE, sequential, 6% increase
- Increased rooting??
  - Less clear
  - TF, TE, decreased
  - PR, TE, no effect
  - KBG, TE, no effect
  - CBG, TE monthly, no effect

Handbook of Turfgrass Management and Physiology, Mohammad Pessarakli

Turf Health: Partition Growth

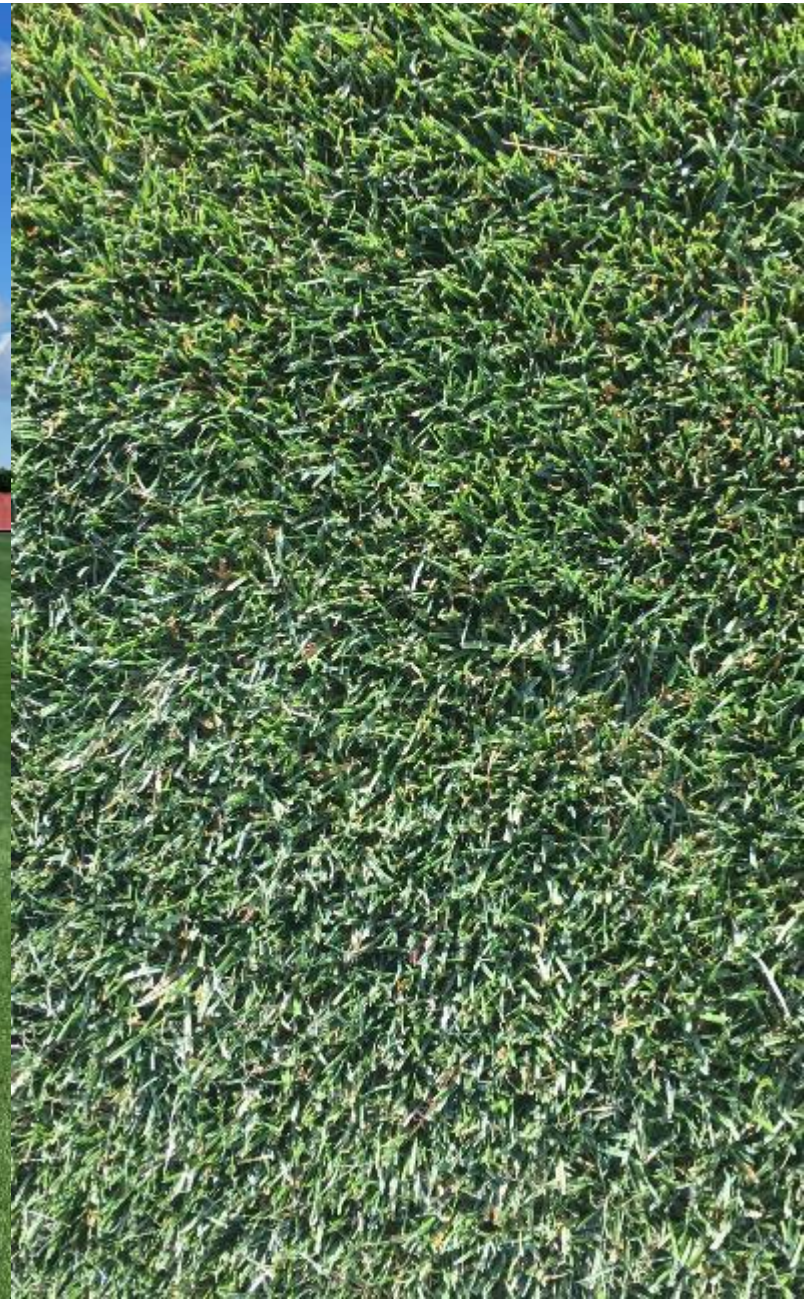


Trdan, S. et al., Folia Hort. 33(2) (2021): 275-292

Key Takeaway: Prohexadione-Ca (Anuew) consistently increased tillering in Kentucky bluegrass.


RICHS
Seaforth
RICHS

Anuew EZ on BGSU Soccer Field



Turf Health: Physiological Theory

- PGR applied
- Leaf elongation inhibited
- Crown sink for Photosynthate
- New tillers developed
- New roots initiated
- Growth of “old” roots inhibited?
- Measure roots/tiller?
- Is this an advantage?

Handbook of Turfgrass Management and Physiology, Mohammad Pessarakli

Turf Health: Partition Growth

- Hybrid Bermudagrass vs Cool-season
  - Less relative tillering response
  - Rooting increase more consistent
    - Cultivar specific
  - TE every 10 days increased root mass by 23% and 27% for Miniverde and Floradwarf, respectively
    - Unchanged root mass for 4 other cultivars
  - TE every 3 weeks increased root mass by 43% for Tifeagle

Handbook of Turfgrass Management and Physiology, Mohammad Pessarakli

Turf Health: Cytokinins

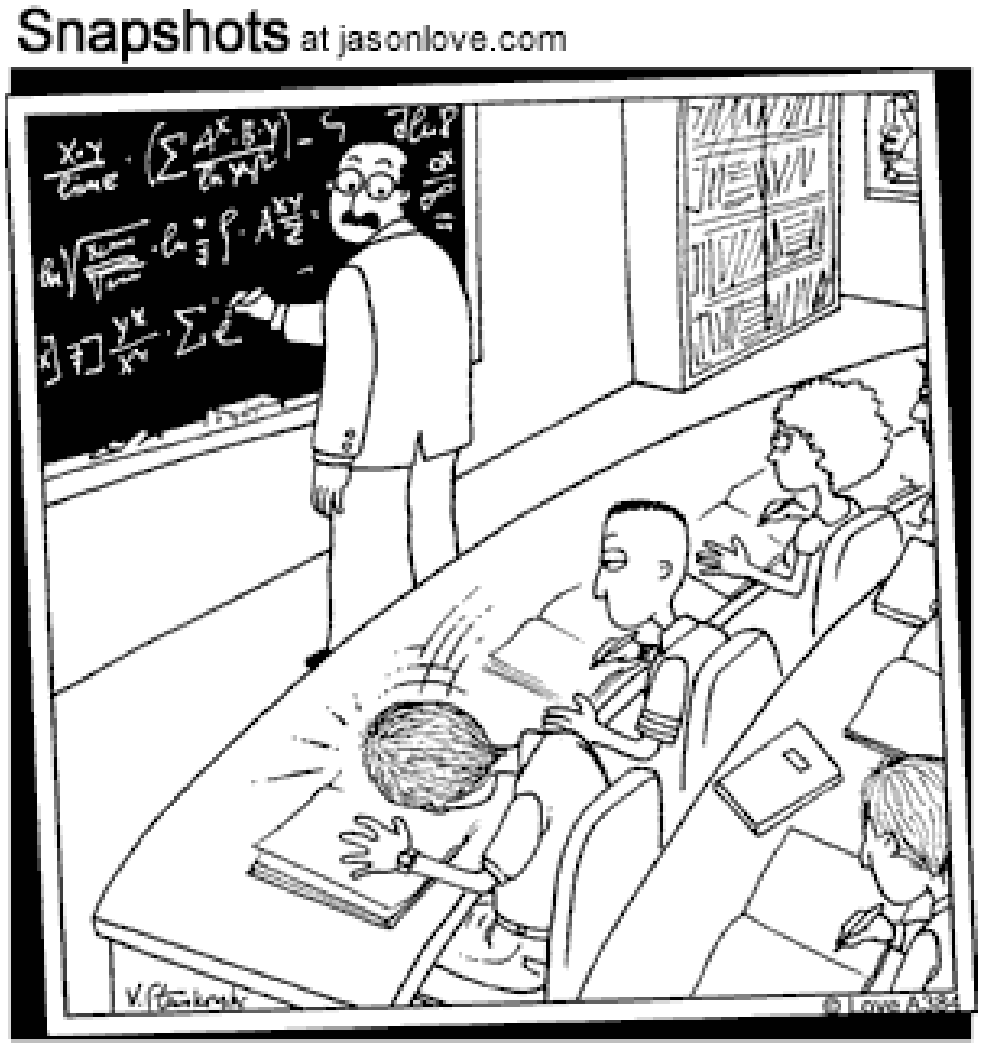
- Cytokinins
  - Delay senescence
    - Decrease enzymes invloved in membrane breakdown
    - Limit stomatal closure
    - Prevent chlorophyll loss
- Does an increase in cytokinins result in increased stress resistance??

↑ tillering

↑ Root mass??

↑ TNC??

↑ cytokinins??



species

timing

rate

TE: Stress Resistance/Avoidance

- Handbook of Turfgrass Management and Physiology, Mohammad Pessarakli
  - Evapotranspiration:
    - TF, 11% reduction over 6 weeks
    - KBG, reduction in 5 of 34 weeks over 3 years
  - Drought: higher quality in PR in greenhouse during dry-down
  - Heat Tolerance: app before sod harvest resulted in cooler temps in stack, better tensile strength and quality
    - Temp to kill 50% of KBG pop. was 35.5C (TE-treated) vs 36.1C (untreated) in growth chamber

TE: Stress Resistance/Avoidance

- Handbook of Turfgrass Management and Physiology, Mohammad Pessarakli
  - Freezing Tolerance:
    - Increased winter survival of Poa supina (80% shaded)
    - Increased stolon freezing tolerance of Tifway BMG in October but not November
      - Overall, late season app does not have significant freeze tolerance effect on Tifway

Turf Health: prohexadione-Ca (Anuew)

The Enhancement of Drought Stress Tolerance of Kentucky Bluegrass by Prohexadione-Ca Treatment
Journal of Ornamental Plants (2015).

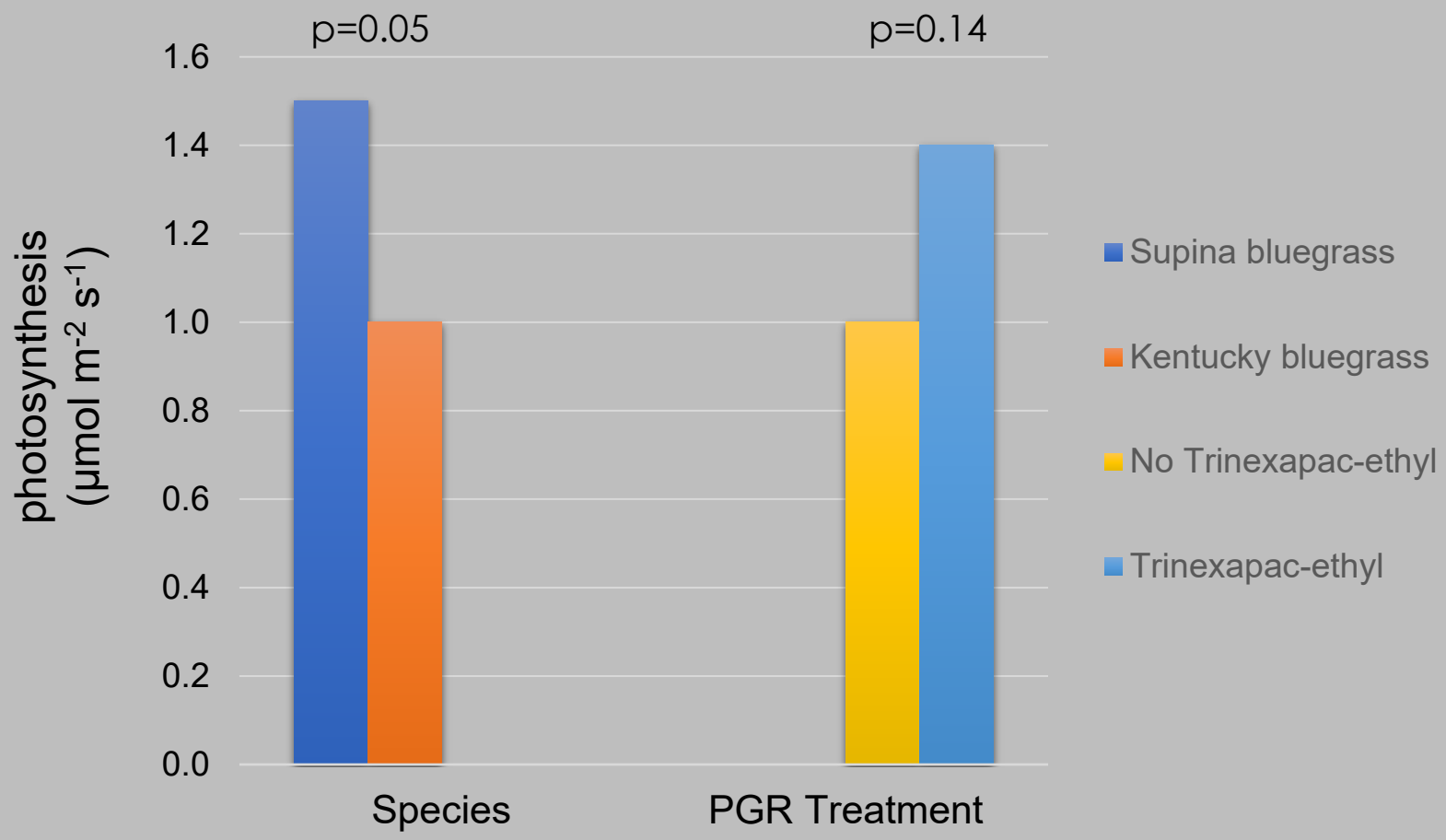
1. Increased relative water content.
2. Lower electrolyte leakage and malondialdehyde (membrane integrity indicators).
3. Increase in antioxidant enzymes (SOD, APX, and CAT) activities under well-watered and drought conditions.
4. 8 oz/A provided the best results (vs. 4 and 13 oz/A)

1. Growth Regulation
   - reduce mowing and cleanup
     - baseball, softball and other relatively low traffic fields
     - fence rows, tough to mow areas, etc.
2. Reduce Scalping
3. Increase Plant Health
   - Reduce Water Use
   - Help Under Shade (low light)
   - More Resilient Under Disease Pressure

Shade Effects on Turfgrass

- Lower Carbohydrate Reserves
  - etiolation - elongated shoots
    - reduced shoot density
  - partitioning - shorter root system
- Reduced Transpiration
- Lower Respiration
- More Succulent
  - with high humidity = disease pressure
- Reduced Cuticle Thickness
  - susceptible to traffic stress

Effects of Species and TE on Turf Photosynthesis in Reduced Light (3.5 mol PAR day^{-1}), 23 November 1996



† 0.19 kg ha^{-1} Applied 18 Sept. 1996

KBG in shade @ 4 lb/N/M/yr

WAT	Quality Rating 1-9	
	No PGR	PGR
1	5.3	7.7
2	4.8	7.8
3	4.5	7.5
4	5.0	8.2

Trinexapac-ethyl (Class A) Under Shade

PGRs for Turf Health Under Shade

1. Apply during times of less use to prepare turf and increase health leading up to more use/traffic – especially for football.
2. Certain soccer fields, baseball, and softball fields could be treated all year long.

Turf Health: Partition Growth

- Increased turf density – uniform turf stands
- Increased recovery from injury?
  - Divot closure, mechanical injury, traffic?

Interaction of Nitrogen and Wear

PGR Treatment	Rate	-Wear		+Wear	
		Low N	High N	Low N	High N
	(lb ai A^{-1})	(quality rating 1-9)		(quality rating 1-9)	
Control		5.3	6.6	4.3	5.0
Flurprimidol	0.5	6.0	7.4	1.9	4.0
Paclobutrazol	0.25	6.9	7.3	3.1	4.7
Trinexapac-ethyl	0.175	7.1	7.0	5.5	5.5
LSD (p=0.05)		1.0		1.4	

TE at 22 fl oz/A (Primo Maxx)
FL at 49 fl oz/A (Cutless MEC)
Paclo at 16 fl oz/A (Trimmit 2SC)

Divot Closure

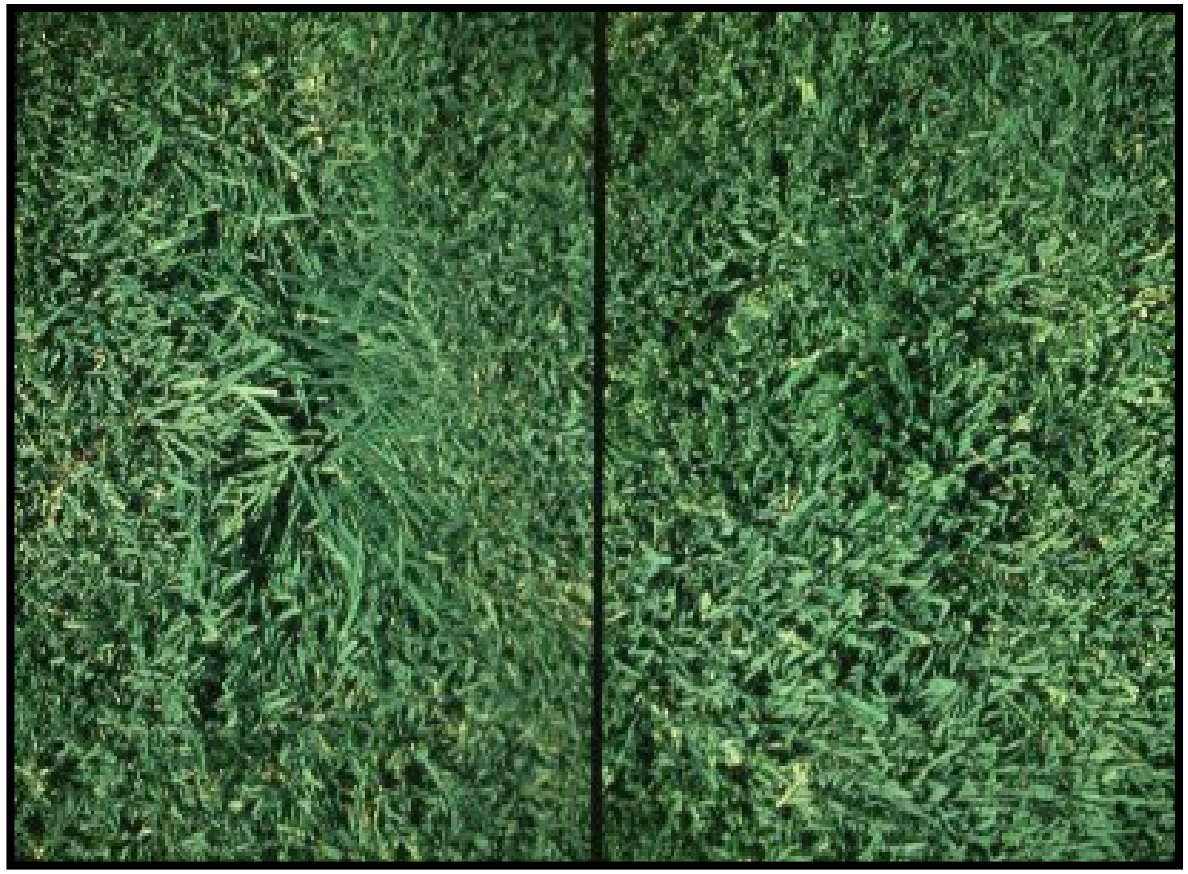
PGR Treatment	Rate	1994		1995	
		Low N	High N	Low N	High N
	(kg ha^{-1})	(quality rating 1-10)		(quality rating 1-10)	
Control		5.3	9.3	3.0	6.3
Flurprimidol	0.56	3.7	5.3	2.6	6.3
Paclobutrazol	0.28	2.3	5.7	3.7	5.9
Trinexapac-ethyl	0.20	6.0	8.7	7.8	10.0
LSD (p=0.05)		3.1		4.6	

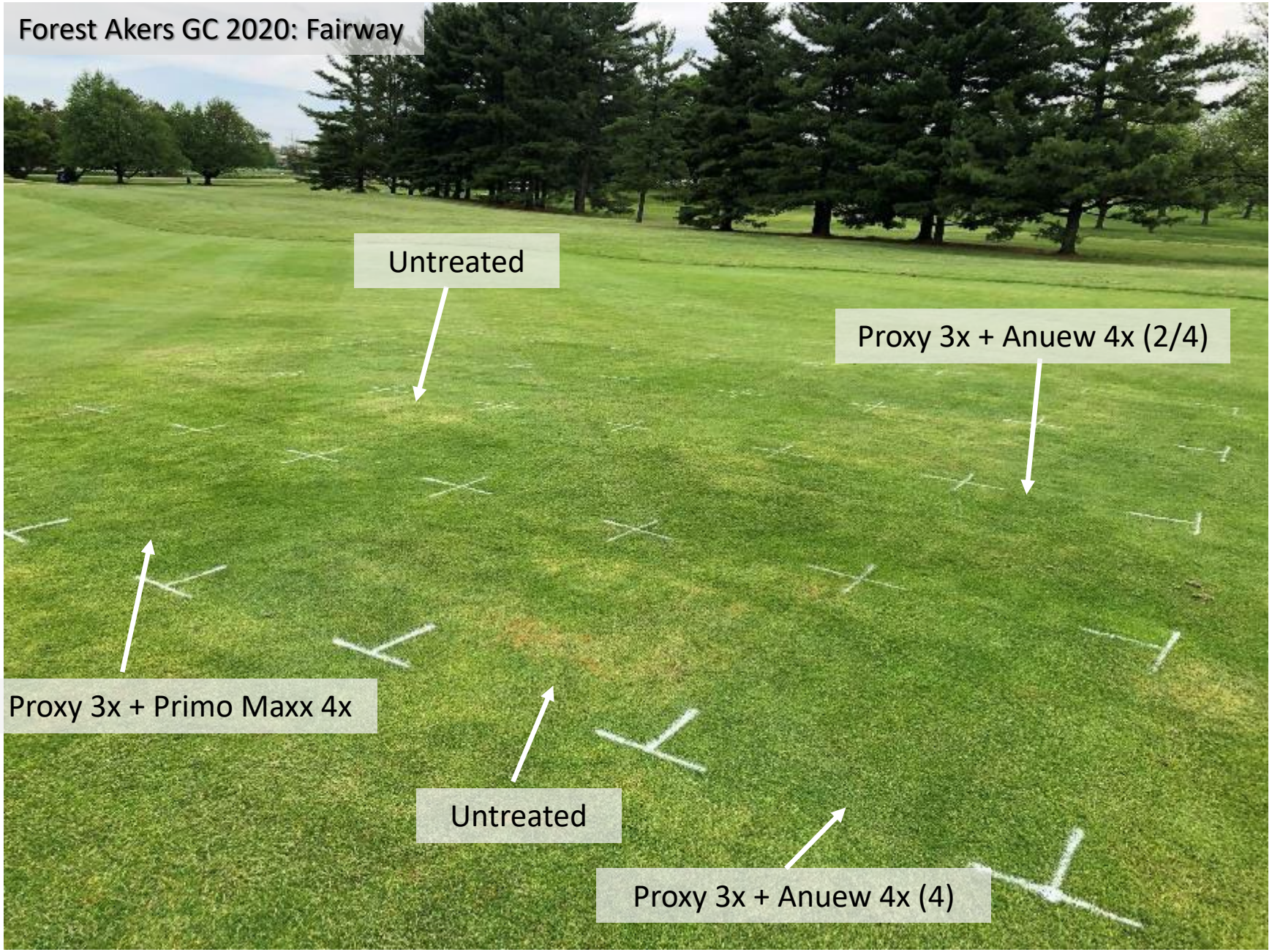
TE at 22 fl oz/A (Primo Maxx)
FL at 49 fl oz/A (Cutless MEC)
Paclo at 16 fl oz/A (Trimmit 2SC)

Divot Recovery – Creeping Bentgrass

Scott's TGR (paclo)

Primo





Seedhead Suppression Trial in Michigan

1. 100% annual bluegrass fairway
2. PGRs applied for seedhead suppression
3. Photo captured May 27, 2020 – every plot treated with any PGR had no pink snow mold while every untreated plot did.

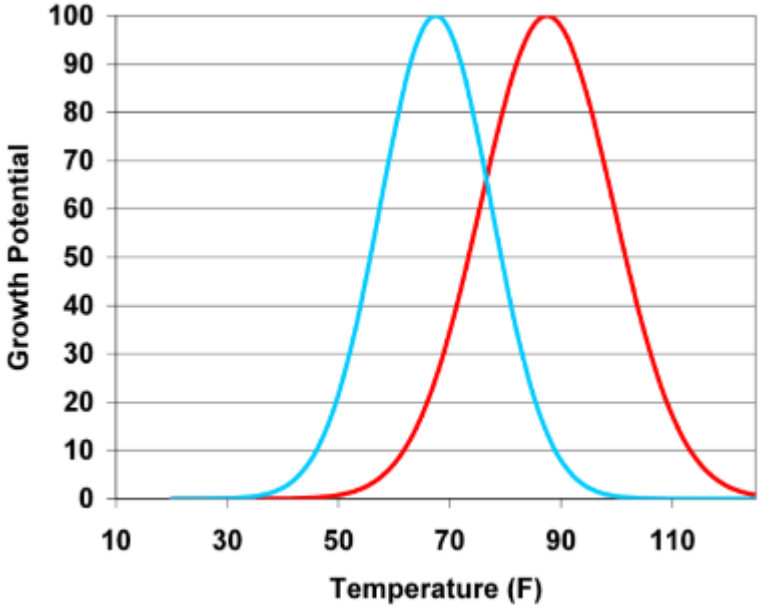
Kentucky bluegrass
paclobutrazol
trinexapac ethyl
prohexadione calcium
flurprimidol

Bermudagrass
flurprimidol
paclobutrazol
trinexapac ethyl
prohexadione calcium

annual bluegrass rough bluegrass
paclobutrazol
prohexadione calcium
flurprimidol
trinexapac ethyl

PGR Differences:

1. intensity of regulation
2. longevity of regulation
3. root or foliar absorption



‘North Bridge’ Bermudagrass Fairway; Frisco, TX
Bill Kreuser, GreenKeeper App

App 1 – May 26, 2022
Photo 12 DA-App 1

Anuew WDG used in this trial – rates as oz/A. All other rates as fl oz/A.

Key Takeaway: PGRs have the potential to injure Bermudagrass especially around greenup – Anuew EZ provides better safety than trinexapac-ethyl and can be effectively used in tankmixes. A tankmix of Anuew EZ at 13 – 27 fl oz/A + Cutless MEC at 12 fl oz/A can provide the longevity of Cutless (about 3 wks), while the Anuew EZ can safely add regulation intensity at differing rates.

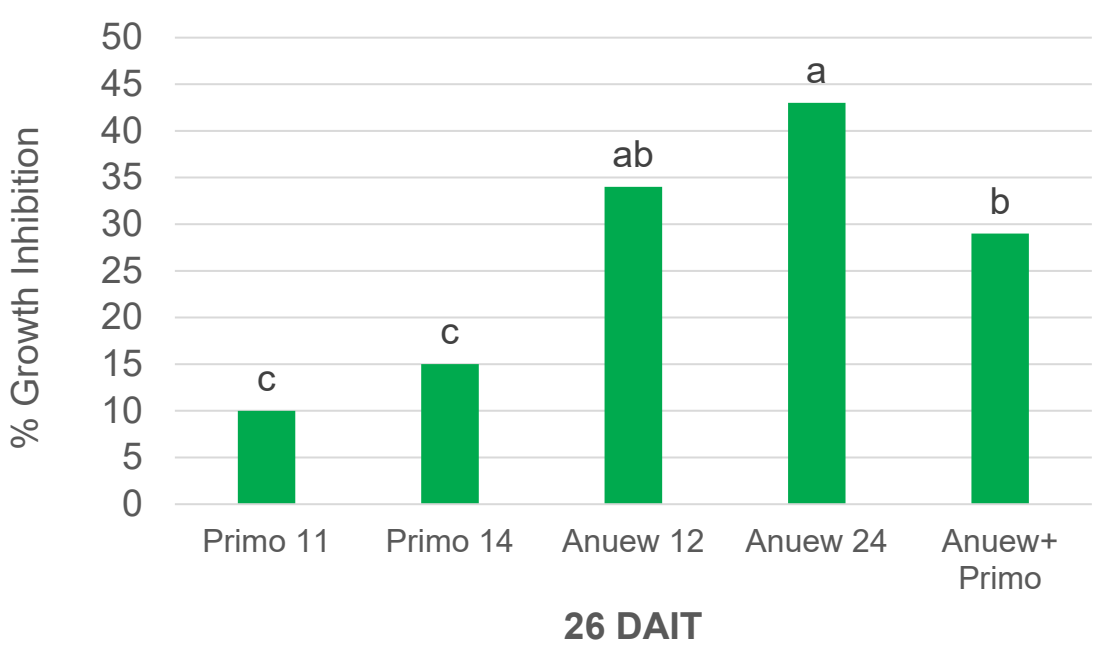
‘Iron Cutter’ Hybrid Bermudagrass Response to PGRs

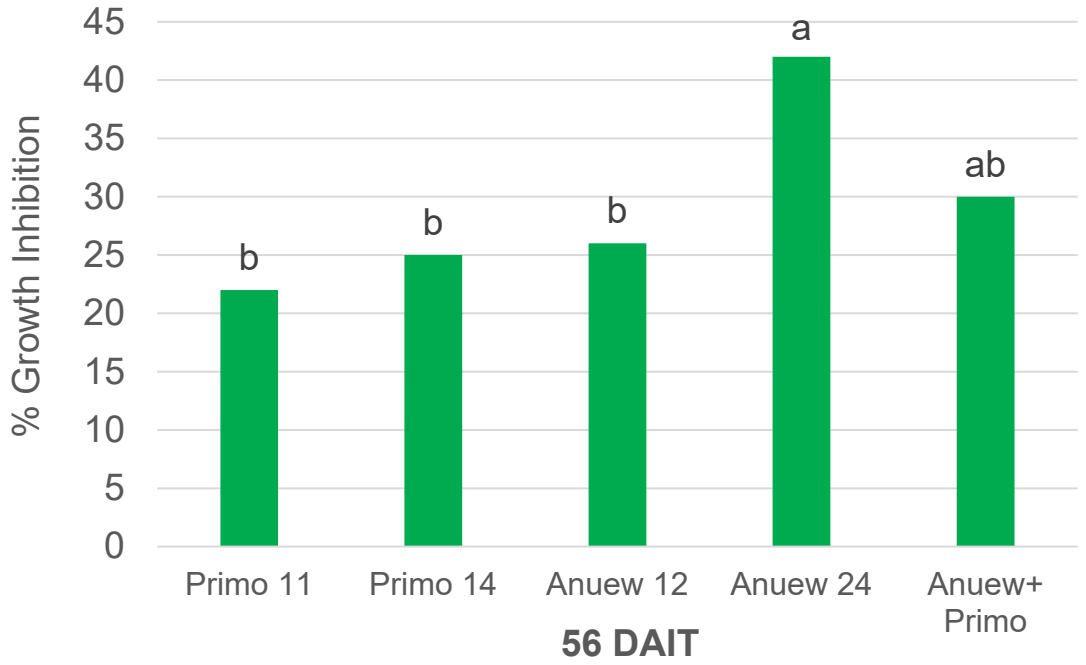
Gerald Henry, et al., Athens, GA, 2021

1. Mowed at 1 inch – more of a sports turf height.
2. PGRs applied every 2 weeks beginning July 15, 2021 for 6 total applications.
3. Treatments
    - Primo 11 fl oz/A (Primo Low)
    - Primo 14 fl oz/A (Primo High)
    - Anuew 12 oz/A (Anuew Low)
    - Anuew 24 oz/A (Anuew High)
    - Anuew 12 oz/A + Primo 11 fl oz/A (Anuew + Primo)
4. Clippings collected, color and quality evaluated every 2 weeks.

‘Iron Cutter’ Hybrid Bermudagrass Response to PGRs

Gerald Henry, et al., Athens, GA, 2021





Key Takeaway: Anuew provides strong growth suppression which is variable according to rate.

‘Iron Cutter’ Hybrid Bermudagrass Response to PGRs

Gerald Henry, et al., Athens, GA, 2021

Treatment	Rate/A	Turf Color	Turf Quality	NDVI
Untreated		6 c	6.5 c	0.64 c
Primo	11 fl oz	6.6 b	6.6 bc	0.71 b
Primo	14 fl oz	6.5 b	6.9 ab	0.71 b
Anuew	12 oz	6.6 b	6.9 ab	0.73 ab
Anuew	24 oz	7 a	7 a	0.76 a
Anuew + Primo	12 + 11	6.8 ab	7 a	0.74 ab
LSD (p=0.05)		0.3	0.3	0.04

Key Takeaway: Anuew provides high quality turf while suppressing growth effectively. More growth regulation generally means higher quality as long as recovery growth is available.

Wisconsin: Precision Growth Regulation for Athletic Fields

Treatment	Rate	Interval	Apps
Untreated			
Anuew	6 fl oz/A	375 GDD	6
Anuew	12 oz/A	375 GDD	6
Trimmit 2SC	11 fl oz/A	550 GDD	4
Trimmit 2SC	22 fl oz/A	550 GDD	4
Primo Maxx	26 fl oz/A	450 GDD	5

Apps began May 11, 2021.
Apps shown through August 16, 2021.

Kentucky bluegrass mowed at 2.25”.

Traffic applied with Brinkman simulator 6 times per week – which simulates 3 NFL football games per week.

Turfgrass Quality

Treatment	19 May	1 June	14 June	28 June	12 July	27 July	11 August	Average
	---------- 1-9, 1 is death 9 is best ----------							
Control	6.7 a	6.7 a	6.7 a	6.7 a	5.7 a	5.7 a	6.7 a	6.4
Anuew Low	6.0 a	6.3 a	5.7 bc	6.0 ab	5.3 a	6.0 a	6.0 ab	5.9
Anuew High	6.0 a	6.3 a	6.0 abc	5.7 ab	5.3 a	6.0 a	5.7 ab	5.9
Trimmit 2SC Low	6.7 a	7.0 a	6.0 abc	6.0 ab	4.3 b	5.0 ab	6.0 ab	5.9
Trimmit 2SC High	7.3 a	6.7 a	5.3 c	4.7 b	3.7 b	4.0 b	4.7 b	5.2
Primo	6.7 a	6.7 a	6.3 ab	5.7 ab	4.0 b	5.7 a	5.7 ab	5.8

Wisconsin: July 20, 2021

Wisconsin: July 20, 2021

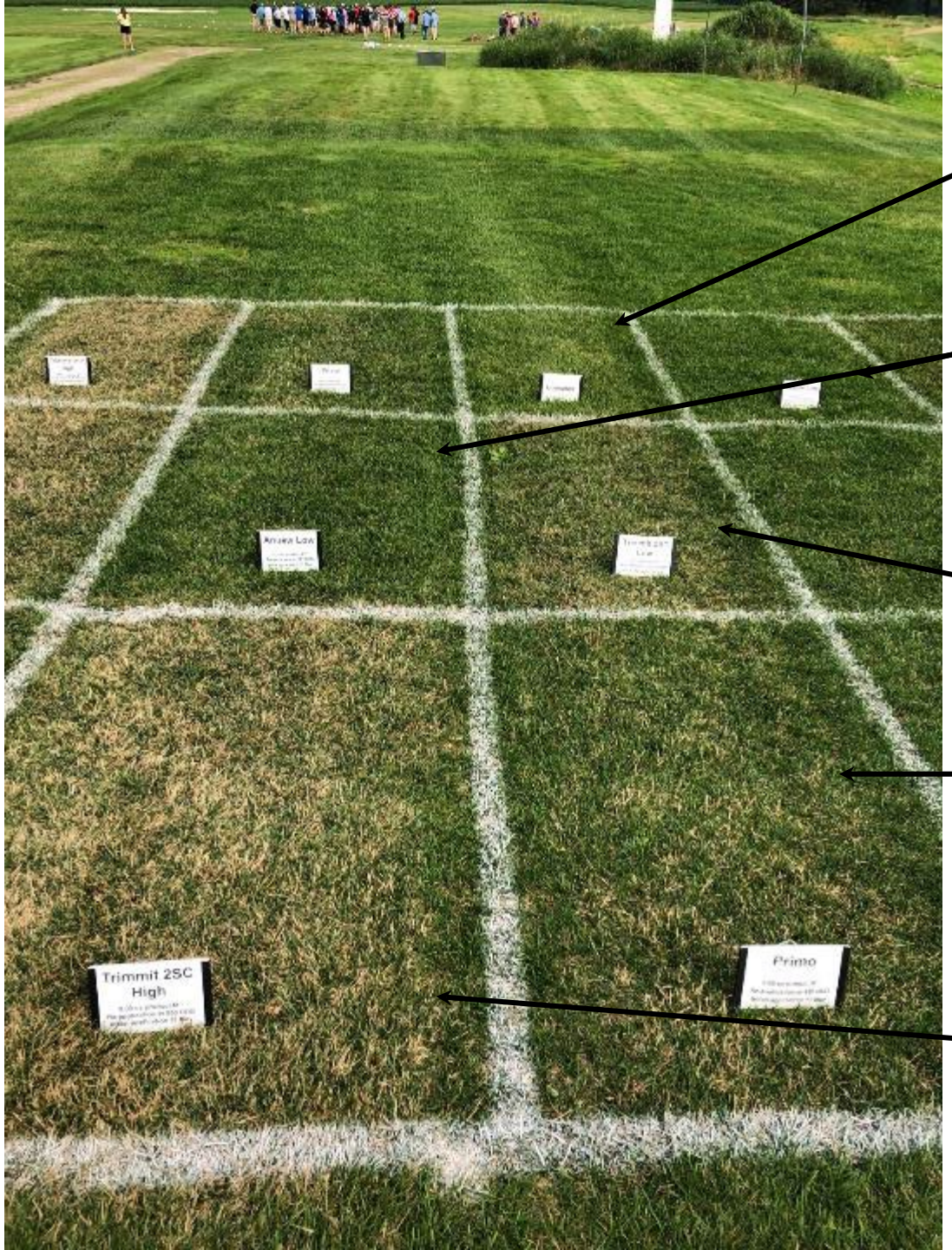
Untreated

Trimmit Low

Anuew High

Primo

Wisconsin: July 20, 2021



Untreated

Anuew Low

Trimmit Low

Primo

Trimmit High

Wisconsin: July 20, 2021

Trimmit used for Poa control in KBG athletic fields.

Anuew may be a better option in conjunction with Tenacity and Prograss.

Clippings

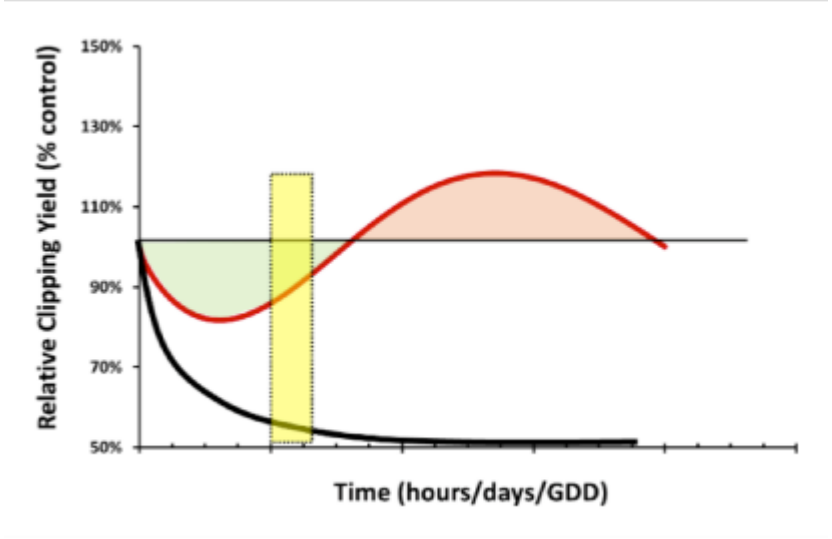
Treatment	19 May	1 June	14 June	28 June	12 July	27 July	Average
	---------- grams / plot ----------						
Control	31.7	30.0	7.9	1.8 a	2.3 a	17.4 a	15.2 a
Anuew Low	10.8	24.1	5.5	0.6 b	1.7 ab	13.8 ab	9.4 ab
Anuew High	4.6	16.3	4.5	0.8 b	0.9 b	8.6 bc	5.8 b
Trimmit 2SC Low	20.6	17.2	3.1	0.9 b	1.5 ab	4.4 c	7.9 ab
Trimmit 2SC High	37.4	23.3	3.1	1.1 ab	1.6 ab	3.8 c	11.7 ab
Primo	13.4	21.7	4.3	0.9 b	1.4 ab	9.9 bc	8.6 ab

Calculating Growing Degree Days (GDD)

- Find average temperature for the day(s)
- Subtract the base temperature: 0C for CS; 10C for WS.
- Example: **27.8 C** (avg. temp) – 0 C (no base temp.) = **27.8 GDDs** collected for Cool Season turfgrass species.
- Reapply when you reach your target
  - because temperature is the driver of PGR breakdown
- RESET back to ZERO after each application and begin accumulation again!
- Why a base? Is there anything physiologically happening of consequence in the plant when temperature is below freezing?

Re-Application Interval Studies

- Metabolism of PGRs
  - Beasley and Branham, 2005
    - TE breakdown rate doubles when air temps (C) double
    - 6.4 d at 64F (18C); 3.1 d at 86F (30C)
- Rebound Effect



Bill Kreuser (Nebraska)

Rebound Effect

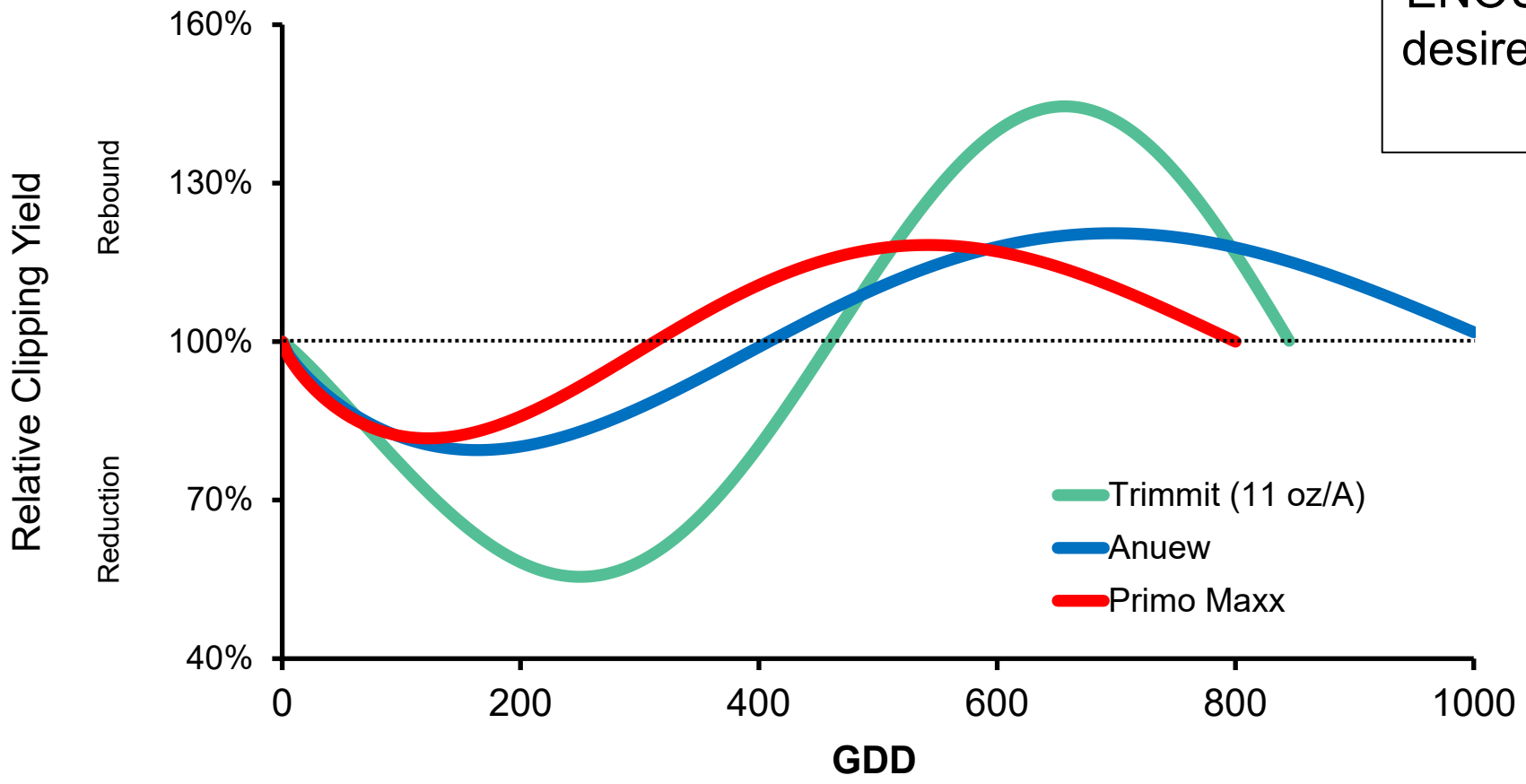
- Precursors Flow Freely

- Precursors Accumulate During Inhibition

Determination of Degree Day Reapplication Intervals

Kreuser B., University of Nebraska 2014

ENOUGH growth is always desired, so watch **intervals and rates**.



The GDD models of clipping yield following application of three different GA-inhibiting PGRs to creeping bentgrass putting green turf.

Penn State: Divots After/During PGR Apps - 2009

Treatment	Rate	Interval	Apps
Untreated			
Primo Maxx	22 fl oz/A	Monthly	May, June, July
Primo Maxx	22 fl oz/A	Monthly	May, June, July, Aug, Sept, Oct
Core Cultivation + deep verticut		once	May

9 different cultivars of Kentucky bluegrass x 2 root zones (sand-based & silt loam) x different wear levels (none, medium, high)

Measurements: divot resistance (once in Nov.), tiller density, root/rhizome weight

PGRs on Athletic Fields

1. Decreased inputs – mowing, irrigation.
2. Reduced shoot growth:
    - Increased tiller density – increased by 15%.
    - Increased rooting
        - Reduction in divot size when “pre-conditioned” with PGRs (Penn State).
        - When applied from May – October – no difference from UTC (Penn State). May – July treatments increased root mass by 10%.

Penn State: Divots After/During PGR Apps - 2009

Results:

1. Pre-condition TRT increased divot resistance 20% on sand and 15% on silt-loam
2. May-Oct no different from control
3. Pre-condition TRT increased root/rhizome mass 10%
4. Pre-condition TRT increased tiller density up to 15%
5. May-Oct was the only other treatment to affect one of these factors – increased tiller density
6. Visual wear tolerance mostly unaffected
7. Certain cultivars had better divot resistance than others:
    - Limousine, Rugby II, P-105, Julia > Midnight, Baron (33% less divot resistance)
8. Some of the lower divot resistant-ranked cultivars benefitted the most from TE pre-condition apps
    - Pre-conditioned Midnight > untreated P-105
    - Tifway & Celebration > Riviera > Patriot (Bermudagrass evaluated later and TE pre-conditioning provided similar results)

PGRs on Trafficked Athletic Fields

1. Growth regulation = fewer inputs (mowing, irrigation, etc.)
2. Growth regulation = healthier turf.
3. Healthier turf = less disease pressure, less water loss, survival through stress.
4. Annual bluegrass, rough bluegrass suppression.
5. Planned rebound = Pre-conditioning
6. Challenges
    - Too much regulation during traffic periods = not enough growth to maintain cover, health, quality.
    - Rates, intervals, products???


TORO
MEIJER
State

PGRs on Sports Fields - BMPs

1. High traffic (football): “pre-condition” with PGRs at higher rates.
2. Lower relative traffic: apply PGRs at lower rates through play.
3. Baseball: high rate; all year
4. Do not apply PGRs immediately before or after aerification or verticutting.
5. Do not apply PGRs to stressed turf.
6. Use the rebound to your advantage (Oregon State).
7. Non-sports events: apply 2 months before the event and 21 days before field will be uncovered (rebound).
8. Poa Control
    1. Anuew = suppression without the phyto.
    2. Possible tankmixing with Trimmit at times.
    3. Spring apps most important. Use as part of a program (Tenacity, Prograss).
9. Increase paint life: prohexadione-Ca (Anuew WDG at 0.75 oz per gallon) OR trinexapac-ethyl (Primo Maxx)

1. Growth Regulation
   - reduce mowing and cleanup
     - baseball, softball and other relatively low traffic fields
     - fence rows, tough to mow areas, etc.
2. Reduce Scalping
3. Increase Plant Health
   - Reduce Water Use
   - Help Under Shade (low light)
   - More Resilient Under Disease Pressure
4. Poa Suppression
5. Seedhead Suppression
6. Species Transition

Response of *Poa* and Bent to Seasonal Applications of TE & Paclo

PGR & Rate	Seasonal Growth (% of Control)	
	Poa annua	creeping bent
Paclo 8 oz/A	87.1	89.1
Paclo 16 oz/A	**50.9**	**78.3**
Paclo 24 oz/A	29.6	63.9
TE 0.05 oz/M	98.7	95.1
TE 0.15 oz/M	76.0	74.9
TE 0.25 oz/M	**73.4**	**65.7**

Kentucky bluegrass
paclobutrazol
trinexapac ethyl
prohexadione calcium
flurprimidol

Bermudagrass
flurprimidol
paclobutrazol
trinexapac ethyl
prohexadione calcium

annual bluegrass rough bluegrass
paclobutrazol
prohexadione calcium flurprimidol
trinexapac ethyl

PGR Differences:

1. intensity of regulation
2. longevity of regulation
3. root or foliar absorption

Poa Control with PGRs

Anuew™

Poa trivialis suppression

Charlotte, NC

AFTER 2 apps at 16 oz/A

BEFORE


Richmond VA
Anuew 12 oz/A


Richmond VA
Anuew 12 oz/A

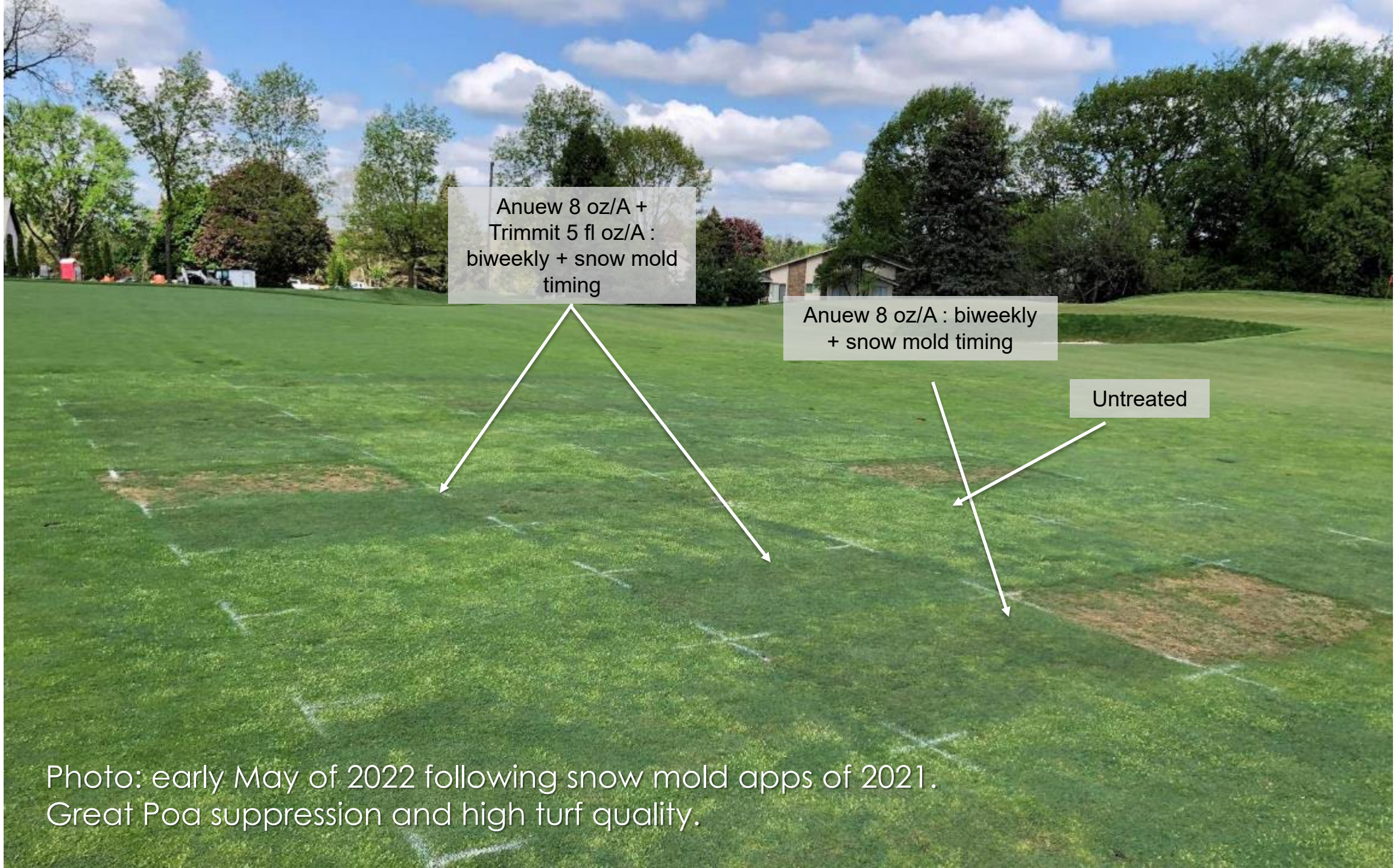


Photo: early May of 2022 following snow mold apps of 2021.
Great Poa suppression and high turf quality.


Embark
Miller Fe
1/4#
262 DD
Seed Heads

KBG Fairway Seeded 2021
At least some Poa infiltration.
Treated with Anuew at 8 oz/A on May 8; photo on May 27.

Prohexadione calcium (Anuew WDG & Anuew EZ) for Slow Ryegrass Transition to Bermudagrass

1. Anuew EZ is foliarly absorbed and will not be absorbed by Bermudagrass roots.

2. Anuew EZ is a strong growth regulator of perennial ryegrass.

3. Anuew EZ is a softer regulator of Bermudagrass vs. trinexapac-ethyl, paclobutrazol, and flurprimidol.

4. Anuew EZ will also suppress annual bluegrass that has infiltrated during winter months.

Example Spring Transition Program

1. Apply Anuew EZ at 13 – 22 fl oz/A during the winter (Jan. and Feb.) to slow the growth of perennial ryegass and suppress annual bluegrass.
   - Interval – use GDDs or make applications every 3 weeks in cooler temps.
2. Increase Anuew EZ rates (18-27 fl oz/A) in late Feb., depending on where they started.
   - Keep rates lower if high *Poa* population and flashing is a concern.
3. Possibility of increasing Anuew EZ rate up to 35 fl oz/A in March/April to further favor Bermudagrass.
   - Make the most of active ryegrass foliage for foliar-absorbed Anuew EZ.
4. Apply herbicide of choice (e.g. Sapphire, Certainty, Manor) in June to finish the job on ryegrass and release Bermudagrass.
5. Once Bermudagrass has fully greened up and the transition is complete, apply Anuew EZ at 13 – 27 fl oz/A + Cutless MEC at 12 fl oz/A.
   - Cutless MEC keeps your application interval around 3 weeks and Anuew EZ provided added growth regulation while maintaining safety and high quality turf.


Introducing…
AnuewEZ
PLANT GROWTH REGULATOR

Questions??

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