OGCSA Pest Management Webinar Series

Thank you for joining us.

We will begin at the top of the hour.

Presented By

Simplot PARTNERS

DISCUSSING HERBICIDES (OLD AND NEW) WITH THE PUBLIC

J.T. BROSNAN, PH.D.
UNIVERSITY OF TENNESSEE
@UTTURFWEEDS

ASSUMPTIONS

- I believe in peer-reviewed scientific research
- Gold standard
- When coupled with optimal agronomic practices, pesticides are a critical tool for maintaining safe athletic fields.
- Not an expert in communications

Waiehu Golf Course @WaiehuGC · Sep 15

Calling on all turfheads, supers & Ph'd's in the turfgrass/golf industry for support or documentation. Our county council is proposing a pesticide free and synthetic fertilizer ban for our municipal golf course. Any thoughts/ research would be helpful in fighting this ban.

4 3 2

Jay D Neunsinger @jay9singer · Sep 15

Will your states BMP's help? @gcsaa

1 1

Waiehu Golf Course
@WaiehuGC

Replying to @jay9singer @J_J_Dempsey and @GCSAA

We provided links to our Hawaii BMP's last year and also hard copy more recently. Certain folks are choosing only to believe the science they want and not see the whole picture.

6:11 PM · Sep 15, 2020 from Waihee-Waiehu, HI · Twitter for iPhone

2 Likes

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6:11 PM · Sep 15, 2020 from Waihee-Waiehu, HI · Twitter for iPhone

2 Likes

Jurors give $289 million to a man they say got cancer from Monsanto's Roundup weedkiller

By Holly Yan, CNN
Updated 9:28 PM ET, Sat August 11, 2018

More from CNN

Rudy Giuliani's Sunday show appearance was a total disaster

Winona Ryder says she and Keanu Reeves got married during...

Herbicide Discovery & Development @HerbicideDisco1 · Sep 21

A few months behind, this site gives "unrestricted access to the various parts of the robust scientific **dossier** submitted on 8 June 2020 [to the AGG] proving that **glyphosate** does not pose a risk to human health and the environment when used as instructed"

The Glyphosate Dossier Is Now Available: We Listened, We Learnt - Glyphosate Renewal Group

glyphosate.eu

15 13

Glyphosate

Glyphosate is a widely used herbicide that controls broadleaf weeds and grasses. It has been registered as a pesticide in the U.S. since 1974. Since glyphosate's first registration, EPA has reviewed and reassessed its safety and uses, including undergoing registration review, a program that re-evaluates each registered pesticide on a 15-year cycle.

In January 2020, after receiving and considering public comments on the glyphosate proposed interim decision, EPA released the interim decision for registration review. As part of this action, EPA continues to find that there are no risks of concern to human health when glyphosate is used in accordance with its current label. EPA also found that glyphosate is unlikely to be a human carcinogen. EPA is requiring management measures to help farmers target pesticide sprays to intended pests, protect pollinators, and reduce the problem of weeds becoming resistant to glyphosate.

- Read the glyphosate interim decision.

Related Information

- Read EPA's press release on glyphosate and California Propostion 65
- Letter to glyphosate registrants on California Proposition 65
- EPA Releases Draft Risk Assessments for Glyphosate
- Draft Human Health and Ecological Risk Assessments for Glyphosate
- Registration of Enlist Duo

Frequently Asked Questions: Glyphosate

Jim Brosnan, Associate Professor, Department of Plant Sciences
Greg Breeden, Extension Specialist, Department of Plant Sciences
Robert Hayes, Professor, Department of Plant Sciences
Tom Mueller, Professor, Department of Plant Sciences
Neil Rhodes, Professor, Department of Plant Sciences
Ginger Rowsey, Communications Specialist, UT Institute of Agriculture
Scott Senseman, Professor and Head, Department of Plant Sciences
Larry Steckel, Professor, Department of Plant Sciences

What is glyphosate?

Glyphosate is an herbicide found in many commercial and residential products used for weed management, the most well-known being Roundup. It controls weeds by inhibiting a biological process only found in plants.

Does glyphosate increase cancer risk in humans?

There are presently no published scientific studies that **directly** link glyphosate use to cancer development in humans. To that end, the United States Environmental Protection Agency (EPA) released a report in December 2017 concluding that glyphosate was not carcinogenic to humans: www.epa.gov/pesticides/epa-releases-draft-risk-assessments-glyphosate. They reaffirmed this finding in April 2019, a conclusion that is consistent with other regulatory agencies worldwide (www.epa.gov/newsreleases/epa-takes-next-step-review-process-herbicide-glyphosate-reaffirms-no-risk-public-health).

A 2015 report from the International Agency for Research on Cancer (IARC) classified glyphosate as a "probable human carcinogen." Also on that list are many other items including:

- Red meat
- Indoor emissions from burning wood
- High-temperature frying
- Late-night work shifts

In addition to these items classified as "probable human carcinogens," the IARC listed the following as "known human carcinogens:"

- Processed meat
- All alcoholic beverages
- Sunlight
- Engine exhaust
- Outdoor air pollution

A complete copy of the IARC report on "probable" and "known" human carcinogens is available at monographs.iarc.fr/list-of-classifications-volumes.

Does UT Extension recommend glyphosate?

UT Extension recommends glyphosate in accordance with federal and state regulations. The EPA and Tennessee Department of Agriculture have registered glyphosate for weed management in Tennessee. This registration is based upon a rigorous review of scientific experiments conducted to establish product safety. All pesticides, including glyphosate, are regularly reviewed by the EPA using modern methods to ensure continued safety to end-users. All UT Extension recommendations are based upon sound science and the regulatory process.

How can glyphosate be used safely?

All pesticides, including glyphosate, should be used according to label directions. Labels provide specific application directions that must be followed to ensure proper product use. Additionally, labels require users to wear appropriate personal protective equipment (PPE) such as long pants, shirts, gloves, etc.

Where can more information on glyphosate be found?

A thorough summary of all published studies exploring glyphosate safety to humans is available at plantoutofplace.com/2018/08/glyphosate-and-cancer-revisited.

INSTITUTE OF AGRICULTURE
THE UNIVERSITY OF TENNESSEE

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Real. Life. Solutions.™

W 827 06/19 19-0249 Programs in agriculture and natural resources, 4-H youth development, family and consumer sciences, and resource development. University of Tennessee Institute of Agriculture, U.S. Department of Agriculture and county governments cooperating. UT Extension provides equal opportunities in programs and employment.

eliever in everyone
st when self-taught.

WikiScholar
A book? I can find all the info I need online for free, thank you very much.

THE DEATH OF EXPERTISE

AGeniusIRL
Is that really how you spell expertice?

AnAmPatr
According to my
little reason to as

The Campaign Against Established Knowledge and Why it Matters

DrMom_312
This title just sounds like yet another elitist appeal to authority.

TOM NICHOLS

Luv2Read
And why do we care what this so called "expert" has to say???

WebSurfBum
ck out this great cat video from

II

116TH CONGRESS
2D SESSION

S. 4406

To amend the Federal Insecticide, Fungicide, and Rodenticide Act to fully protect the safety of children and the environment, to remove dangerous pesticides from use, and for other purposes.

IN THE SENATE OF THE UNITED STATES

AUGUST 4, 2020

Mr. UDALL (for himself, Ms. WARREN, Mr. BOOKER, and Mr. SANDERS) introduced the following bill; which was read twice and referred to the Committee on Agriculture, Nutrition, and Forestry

---

A BILL

To amend the Federal Insecticide, Fungicide, and Rodenticide Act to fully protect the safety of children and the environment, to remove dangerous pesticides from use, and for other purposes.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled,

SECTION 1. SHORT TITLE.

This Act may be cited as the "Protect America's Children from Toxic Pesticides Act".

SEC. 2. FINDINGS.

Congress finds that—

An The Issue Isn't Going Away

Connecticut's Lawn Care Pesticide Ban

Information for Schools and Day Care Centers

1. Why no pesticides?

The Connecticut legislature passed a law (P.A. 09-56) banning lawn care pesticide applications on the grounds of day care centers, elementary and middle schools (grade 8 and lower) as a result of residents' concerns about children's health and the environment. This ban went into effect for day care centers on October 1, 2009 and for K-8 schools on July 1, 2010. Some Connecticut municipalities have gone beyond the requirements of the law and have stopped using pesticides to manage turfgrass on all their municipal properties.

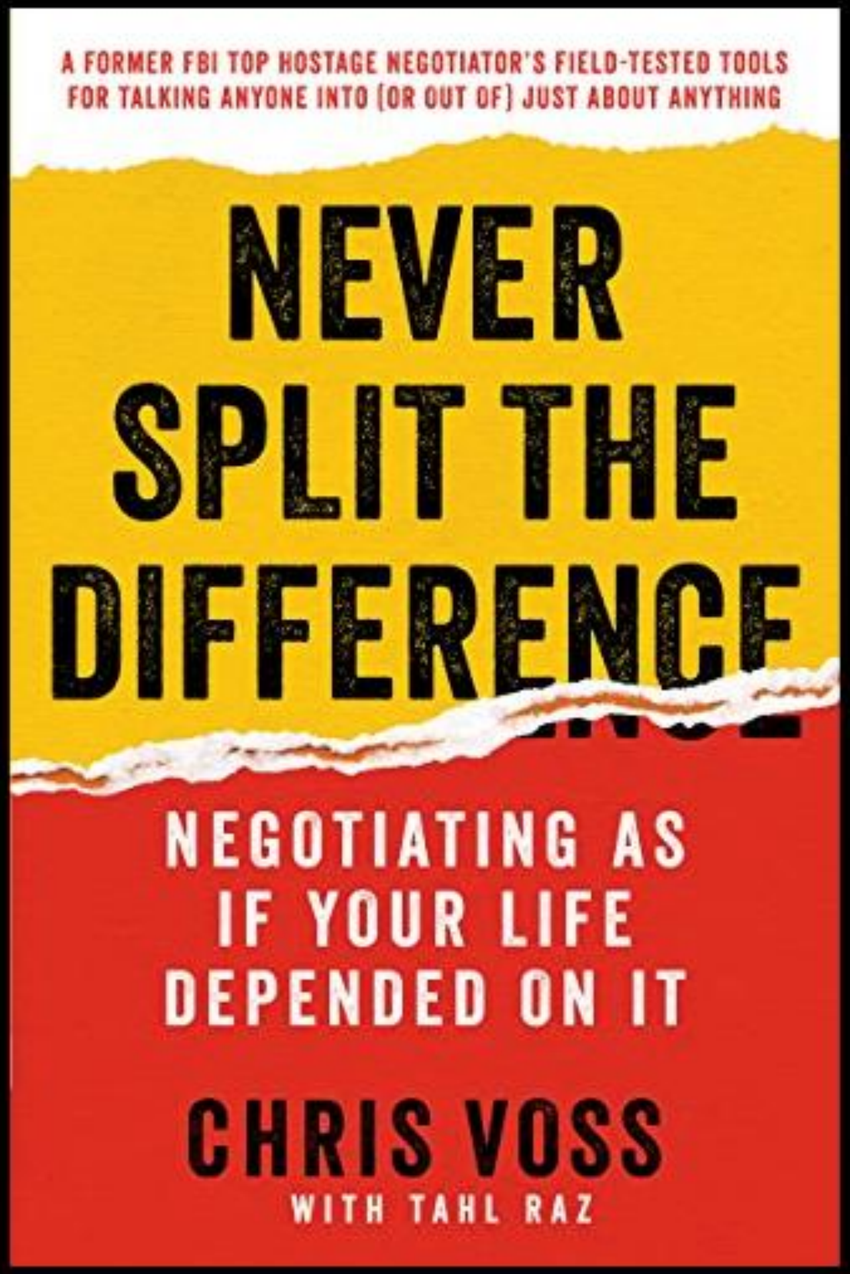
2. What does Connecticut's pesticide ban cover?

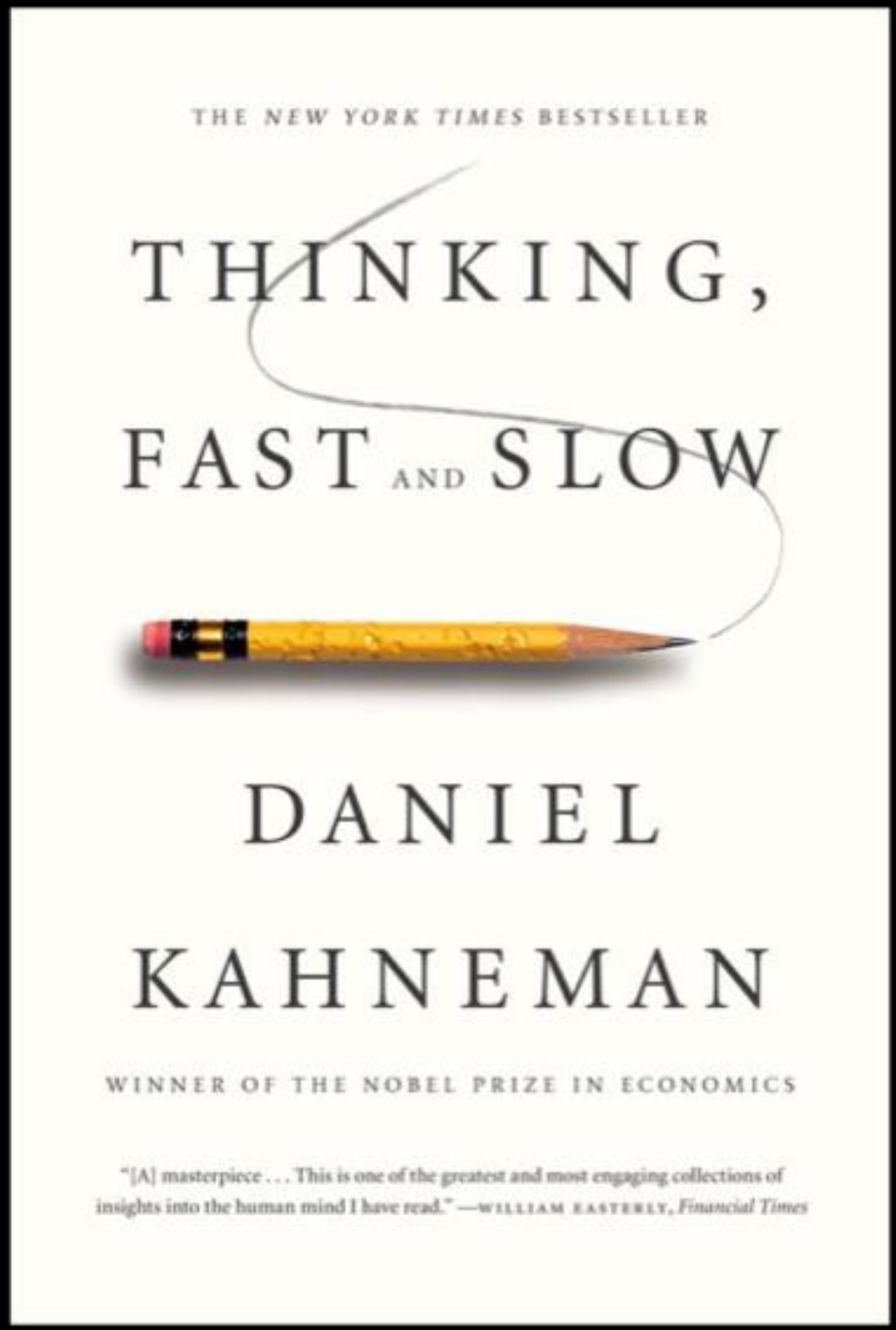
Connecticut's pesticide ban prohibits the use of all U.S. Environmental Protection Agency (EPA) registered pesticides labeled for use on lawn and/or ornamental sites at

DR. KEVIN FOLTA

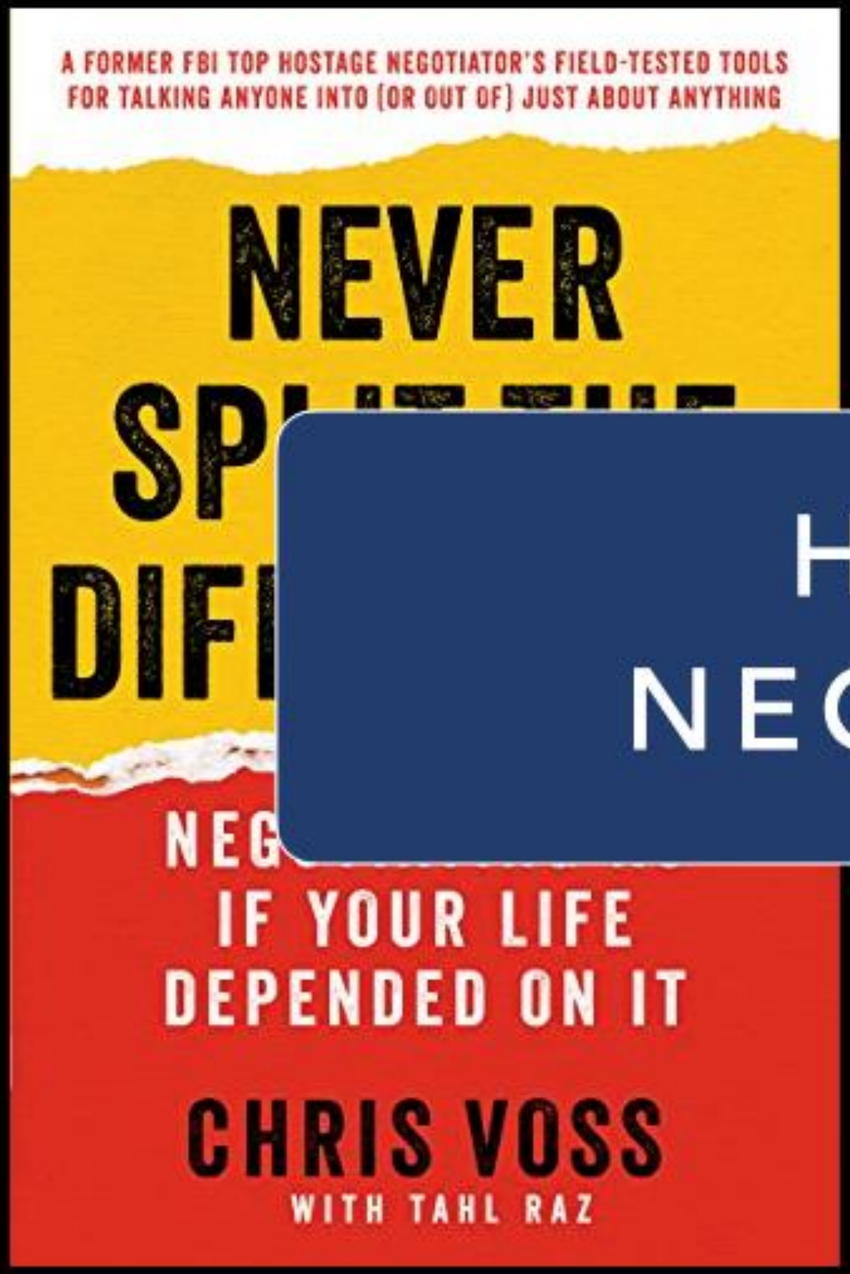
- Professor and Dept. Chair at University of Florida
- Accomplished researcher in strawberry genomics
- USRTK (funded by Organic Consumers Association) filed an FOIA against him for views on biotechnology
- Has become an outspoken advocate for scientific communication

A DIFFERENT APPROACH

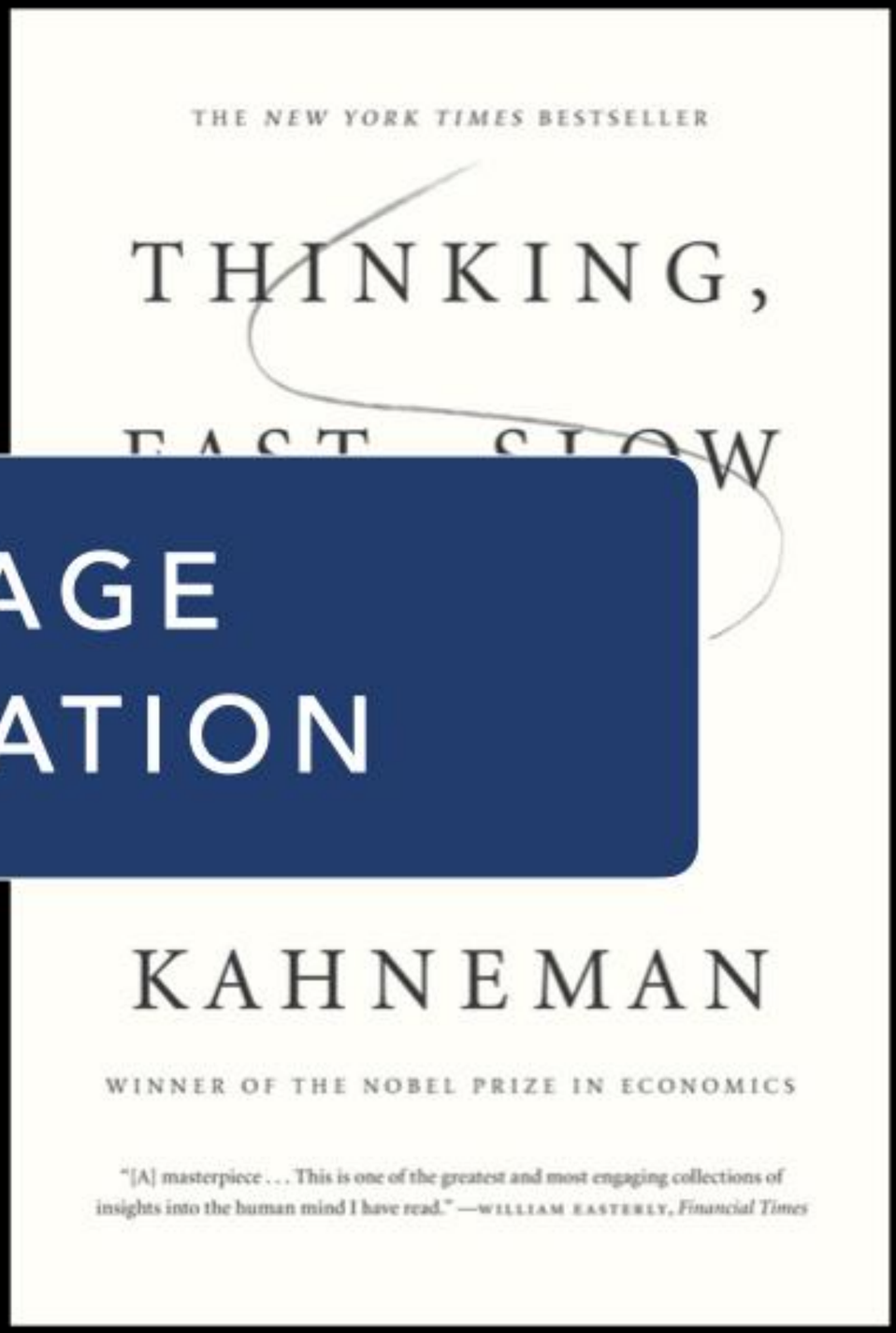




A DIFFERENT APPROACH



HOSTAGE NEGOTIATION



Highly Emotional

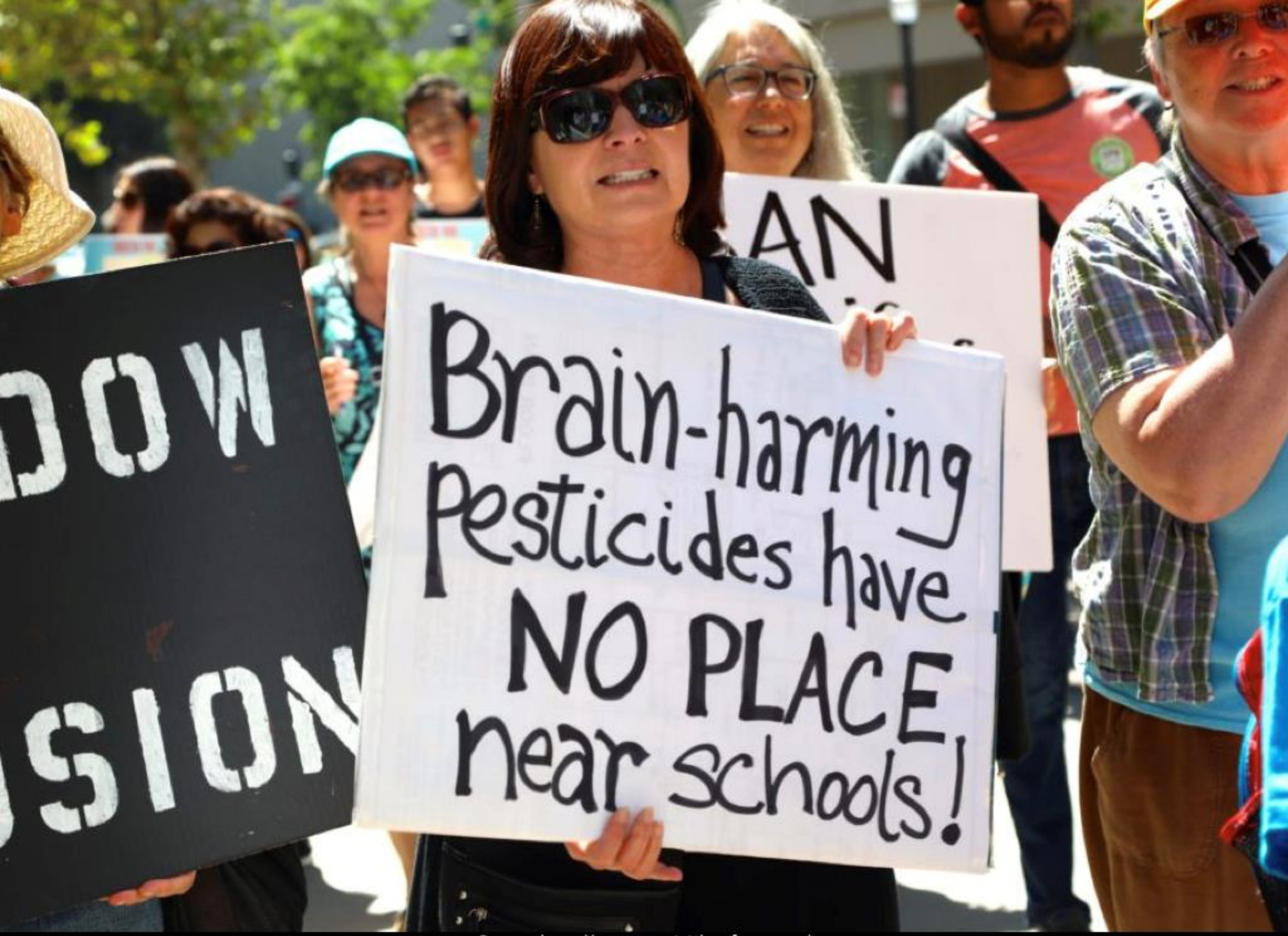
Highly Emotional

Lack of Rational Thought

Highly Emotional

Lack of Rational Thought

Overly Aggressive Worsens the Problem



Source http://www.pesticidereform.org/

AS A TURF MANAGER

WHAT CAN YOU DO?

BE A BETTER COMMUNICATOR

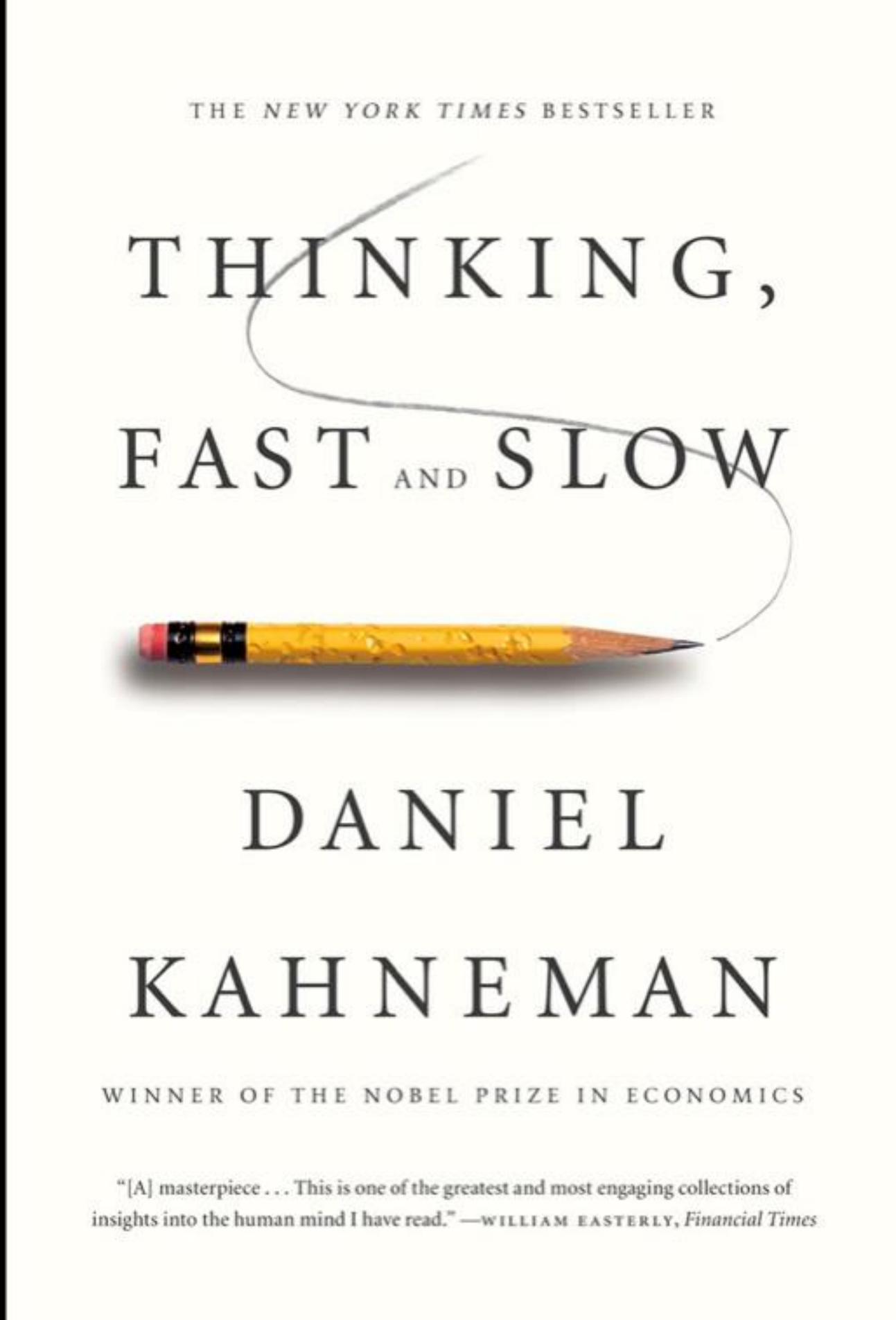
- We often talk to ourselves
- Ample training in science related to turfgrass
    - Little training in how to discuss what we do with a public audience (that is largely uninformed)
- Tactics to be effective —> same tactics NGOs are using with the public at large

TACTIC #1

UNDERSTAND HUMAN NATURE

DECISION MAKING

- Nobel prize winner
- Study decisions pertaining to economic investments
- Parallel all decisions in general



TWO SYSTEMS

- Two systems in brain
    - System 1 - what causes you to turn head at loud noise
    - System 2 - what allows you to solve
      X = 2+5+(10/2)
- **Nearly all decisions** come from System 1

TWO SYSTEMS

- Two systems in brain
  - System 1 - what causes you to turn head at loud

DATA (AND SCIENTIFIC LOGIC) DON'T MATTER

X = 2+5+(10/2)

- **Nearly all decisions** come from System 1


AN
Brain-harming
pesticides have
NO PLACE
near schools!

"THE EMOTIONAL TAIL WAGS THE RATIONAL DOG"

HUMAN NATURE

- **Overestimation** - people overestimate likelihood of rare events ….because…..

- System #1 doesn't understand probability

    - Example: Two cities under attack

        - City #1 notified that two bombers are in different locations

        - City #2 notified of a single bomber

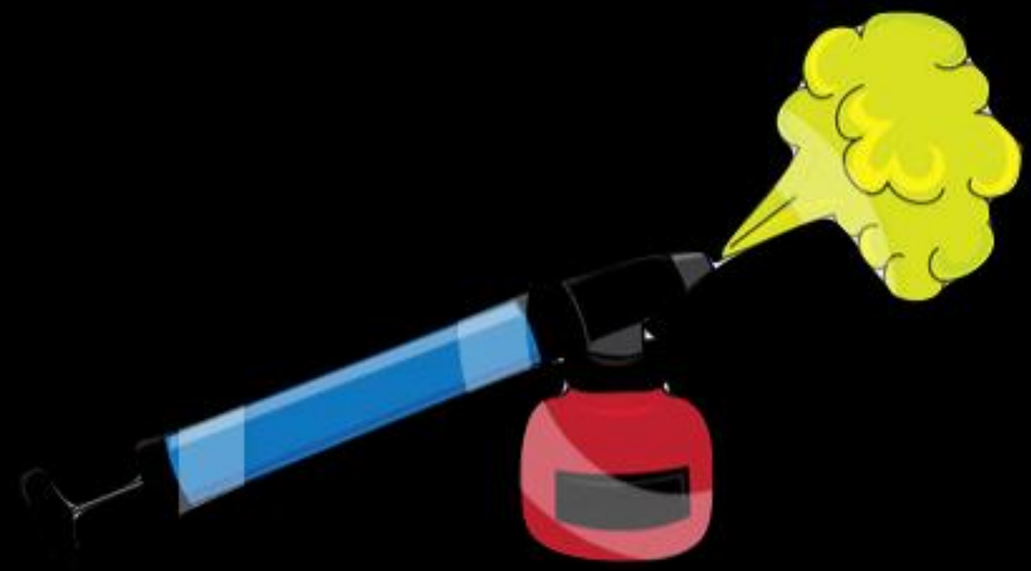
        - Citizens in City #2 had risk lowered by half, but do they feel safer?

HUMAN NATURE

- **Loss aversion** - people prefer avoiding loss rather than acquiring a gain
    - Dissatisfaction of losing $100 is greater than gain from finding $100
    - Estimates that a loss is weighted 2x more than a gain
    - Regret and responsibility are powerful emotions

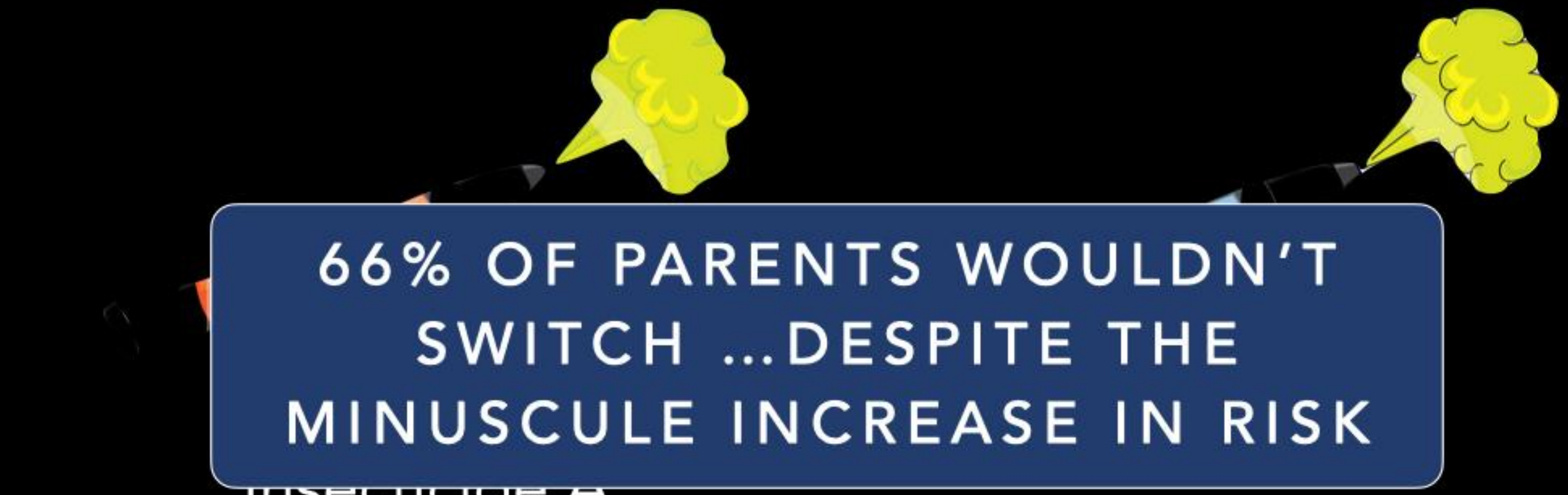
Pesticide Example from Thinking Fast & Slow

Insecticide A
Risk of Child Harm
15/10,000 bottles



Insecticide B
Risk of Child Harm
16/10,000 bottles
Lower Cost

Pesticide Example from Thinking Fast & Slow



66% OF PARENTS WOULDN'T SWITCH ...DESPITE THE MINUSCULE INCREASE IN RISK

Insecticide A
Risk of Child Harm
15/10,000 bottles

Risk of Child Harm
16/10,000 bottles
Lower Cost

PRECAUTIONARY PRINCIPLE

- Prohibition of any action that could cause harm
- Scientific data showing no damage not a sufficient justification for risk taking
    - (think GMOs in Europe)
- List of innovations **that would not exist** include:
    - Airplanes, air conditioning, antibiotics, automobiles, chlorine, measles vaccine, open-heart surgery, radio, refrigration, smallpox vaccine, and X-rays
- Dominant theme of 2020!

AS A TURF MANAGER

HOW DO WE NAVIGATE THROUGH THIS

COGNITIVE EASE

"You build the best possible story from the information available to you, and if it is a good story, you believe it."

"The amount of evidence and quality do not count for much, because poor evidence can make a very good story."

— *D. Kahneman, Thinking Fast & Slow*

DAILY TIMES

$1.60

EVENING EDITION

FAKE NEWS

"Lorem ipsum dolor sit amet, cons ectetuer adipiscing elit, sed diam nonummy nibh euismcorper suscipit lobortis nisl ut aliquip ex ea commodo consequat."

ur next vacation.

NEWSFEED

These Are Some of the Most Beloved Heroes and Villains You'd Never Know Without Stan Lee

POLITICS

House Republicans Are Facing a Brain Drain of Legislative Leaders

U.S.

A Paradise Escape Fro Camp Fire

POLITICS • SOCIETY

How Your Brain Tricks You Into Believing Fake News

Wineburg et al. 2018. Stanford University

OFFICIAL SELECTION 2020

sundance

film festival

/the social dilemma

WE NEED TO GET BETTER

TELLING OUR STORY

Who Is Going to Be Our Champion?

Who Is Going to Be Our Champion?

MOST SPRAY AS INFREQUENTLY AS POSSIBLE —> WHO IS GOING TO TELL THAT STORY?

PROACTIVE MESSAGING

- **Knowing that people are risk averse** — Talk about the risk of NOT managing pests

….rather than the benefits/safety of doing so

"We need to spray the field for grubs. The treatment is completely safe and won't harm the kids at all. Hundreds of research trials have shown this response"

"We need to spray the field for grubs. The treatment is completely safe and won't harm the kids at all. Hundreds of research trials have shown this response"

"If we don't do something about the insects, kids are going to get hurt. I'm worried kids might injure themselves on weak turf from insect damage"

PROACTIVE MESSAGING

- Realize the emotional framing is important in decision making
    - Talk about numbers of successful applications rather than small % of something harmful
    - Don’t use data (with no human component). Rather, frame using vivid, human imagery to connect emotionally

"Chances of harm from this application are less than 0.01%"

"Chances of harm from this application are less than 0.01%"

"Child is more likely to die in a grand prix race than being harmed from this treatment"

"Chances of harm from this application are less than 0.01%"

"Child is more likely to die in a grand prix race than being harmed from this treatment"

May seem silly but it's clear that word choice matters

THIS ALONE

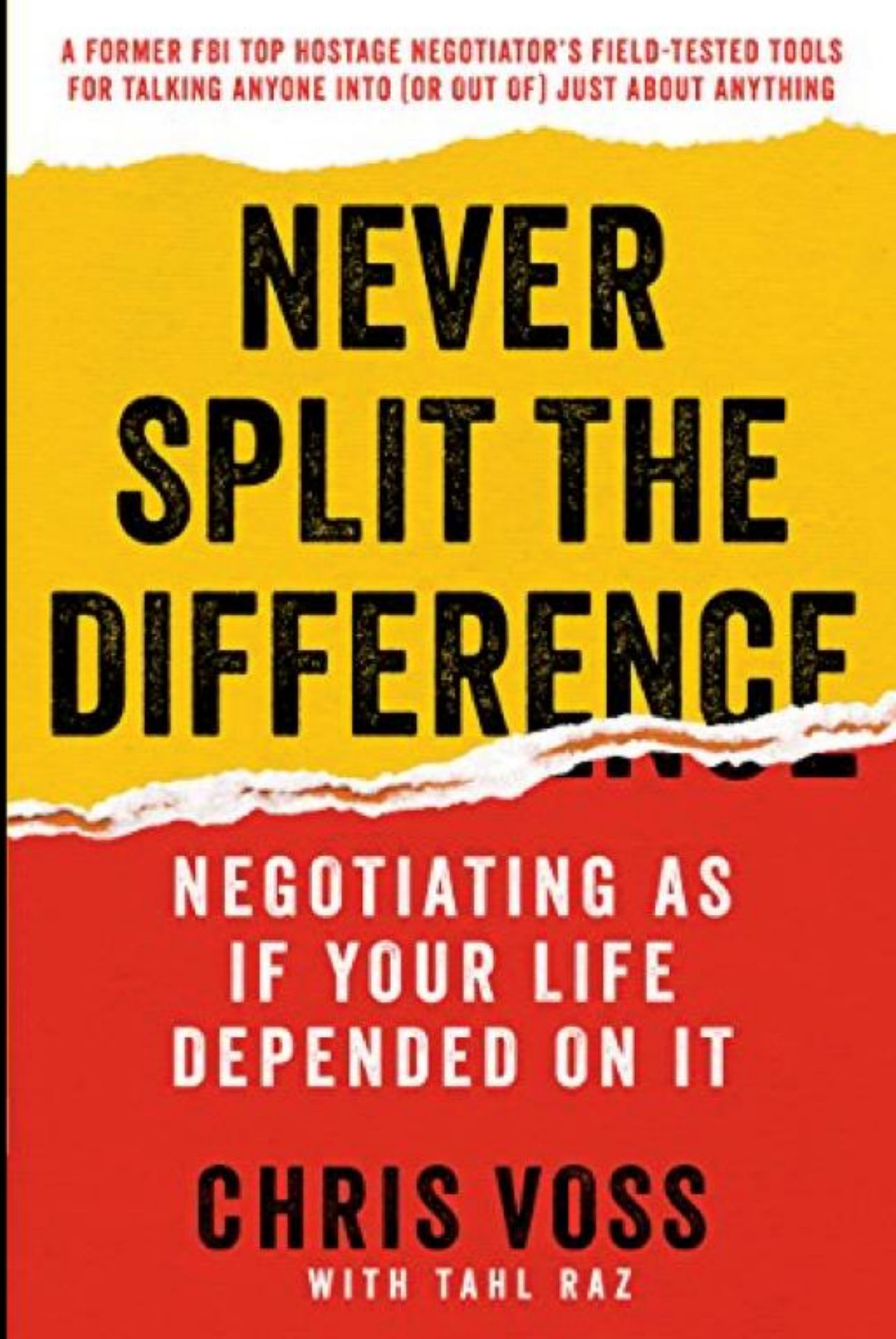
WILL NOT WORK!

HANDLE THINGS

IN THE HEAT OF THE MOMENT

CHRIS VOSS

- FBI Hostage Negotiator for 24 years
- Chief international hostage and kidnapping negotiator from 2003 to 2007
- Adjunct Professor at Georgetown University
- **Lessons from FBI apply everywhere**



"The majority of the interactions we have at work and at home are negotiations that boil down to the expression of a simple, animalistic urge: *I want.*"

"I want you to free the hostages"

"I want you to accept this contract"

"I want to pay $20,000 for this car"

"I want a 10% raise"

"I want you to go to sleep at 9pm"

—*Chris Voss, Never Split the Difference*

DETAILS MATTER: 7-38-55 RULE

- Albrecht Mehrabian, UCLA pyschology professor
- **7%** of a message based on words
- **38%** based on tone of voice
- **55%** based on body language
- Late night FM DJ voice

MIRRORING

- Repeat key points the other person said in a soft voice and don't rush —> **play the long game**
- **People are drawn to what's similar**
- Doing this encourages other person to bond with you—> **shows you understand them**

BUILDING "TACTICAL EMPATHY"

- Label your counterparts emotions/points **to show them you're listening** —> relationship need to diffuse situation.
- Focus on your counterpart's fears. The faster you can interrupt action in the amygdala (the part of the brain that generates fear), the faster you can convey feelings of safety and trust.

EXAMPLES

"It looks like you're concerned about the fact we are using a pesticide"

"It sounds like you think the childrens' safety will be compromised"

"It seems like you have some alternative thoughts on how to manage this field to keep children safe"

EXAMPLES

"It looks like you're concerned about the fact we are using a pesticide"

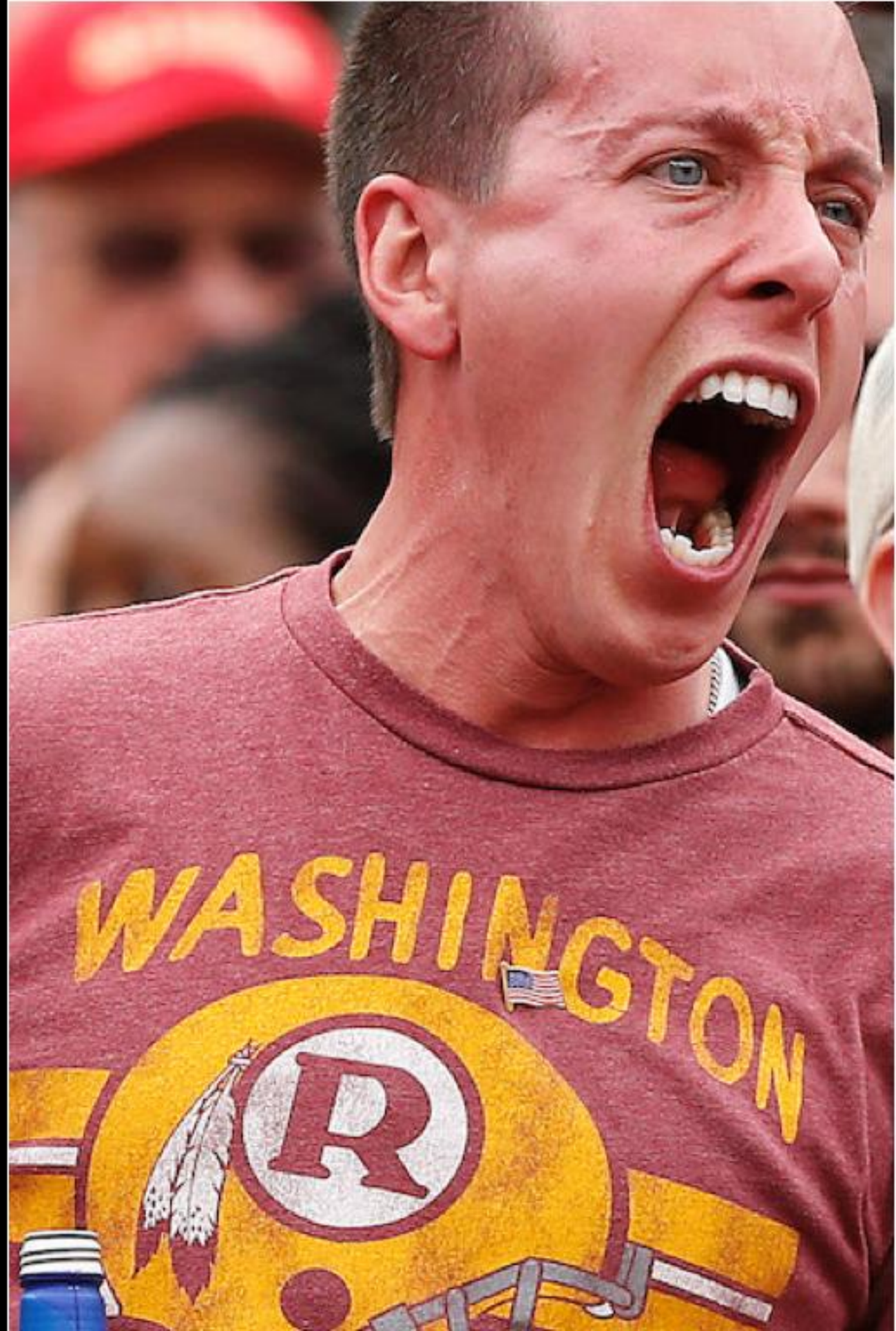
"It sounds like you think the childrens' safety will be compromised"

"It seems like you have some alternative thoughts on how to manage this field to keep children safe"

Don't use "I" —> tells person you're more interested in yourself than them

WHAT THE $%#@!

THEY NEED UNDERSTAND ME



Detach

DISCIPLINE IN NEGOTIATION

"It's about the other party convincing themselves that the solution you want is their own idea. So don't beat them with logic or brute force. Ask them questions that open paths to your goals. *It's not about you.*"

- C. Voss, Never Split the Difference

ACCUSATION AUDIT

- List the **worst things** your counterpart could say about you before they can.

- Gets them on the table so you can prevent them from being used in the negotiation

- Often sound exaggerated when said aloud —> counterpart will likely talk them down

ACCUSATION AUDIT

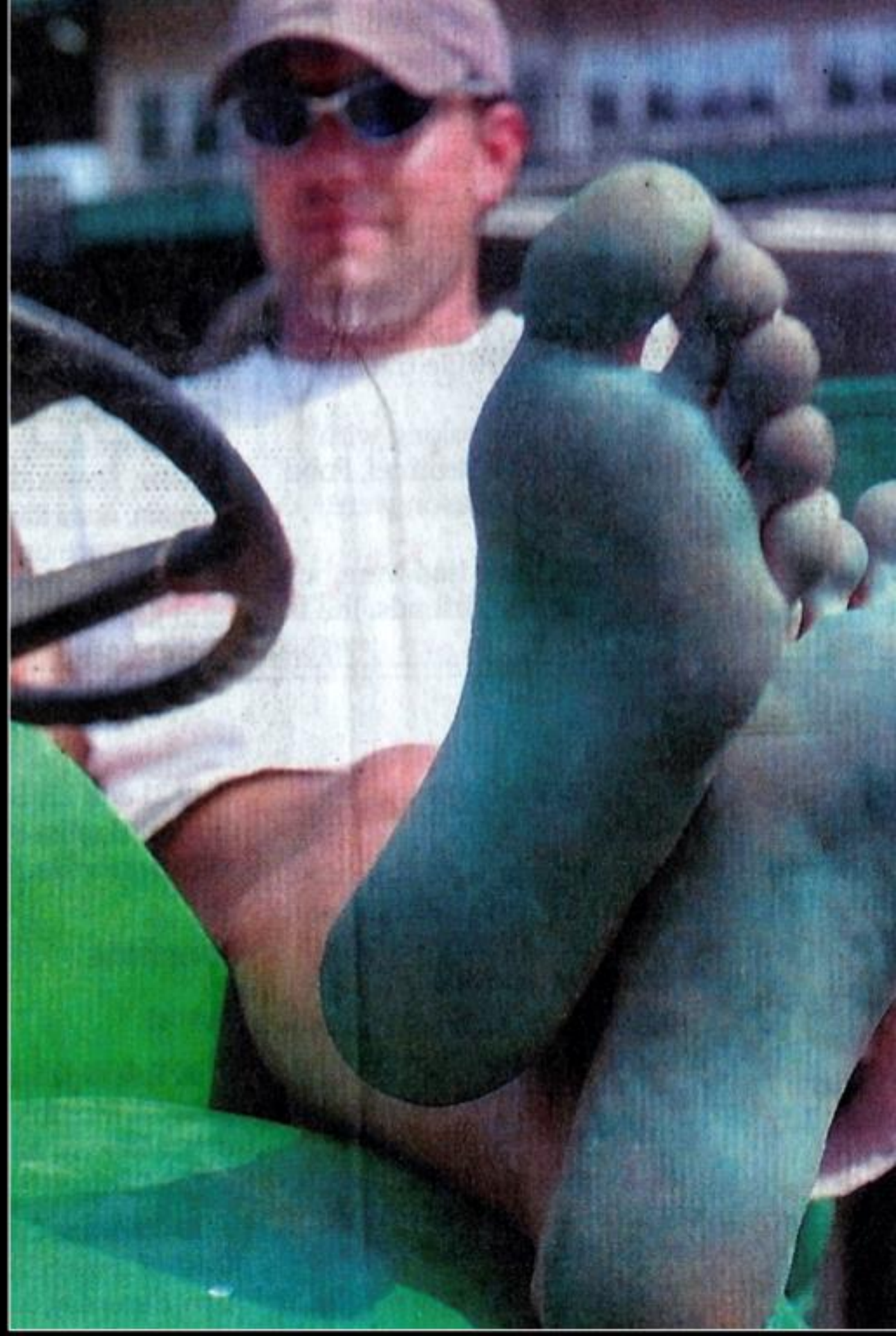
- List the **worst things** your counterpart could say about you before they can.
  - Gets them on the table
    from being used in t
  - Often sound exagg
    counterpart will like

DON'T FORGET
7-38-55 RULE

FM DJ VOICE

EXAMPLE

- "It seems like you think I love spraying chemicals and do so as often as possible"
- "It sounds like you think I'm just an uneducated guy who cuts grass and sprays chemicals"



CREATE ILLUSION OF CONTROL

- Don’t force counterpart to admit that you’re right
- Don’t ask questions that can be answered with “Yes”
  —>requires little thought from opponent
- Ask calibrated questions that begin with “How” or “What” —> asking for help gives the illusion of control

QUESTIONS: WHAT & HOW

- What is important to you?
- How can I help make this better for us?
- How would you like me to proceed?
- How can we solve this problem?
- What is it that brought us to this situation?
- How am I supposed to do that? — often a replacement for NO

QUESTIONS: WHAT & HOW

- What is important to you?
- Ho
- Ho
- Ho
- Wh
- How am I supposed to do that? — often a replacement for NO

MAKES COUNTERPART FIND A SOLUTION — THAT THEY'LL FEEL IS THEIR OWN

YOU CAN STEER THE NEGOTIATION

"He who has learned to disagree without being disagreeable has discovered the most valuable secret of negotiation"

- Robert Estabrook, Former Editor, Washington Post

CONCLUSIONS

- Understanding the audience
    - System 1 vs. System 2 decision making
    - Loss aversion, emotional thinking, cognitive ease - not based on fact
- Hostage example
    - Tone of voice, calibrated "How" and "What" questions
    - It's not personal (even though it may seem that way)

Polling Question

Questions?

- BREAK –

We will reconvene at 11:00am

Support Turfgrass Research & Education at OSU

For Tickets: Scan QR code or visit: www.oregonturfgrassfoundation.org

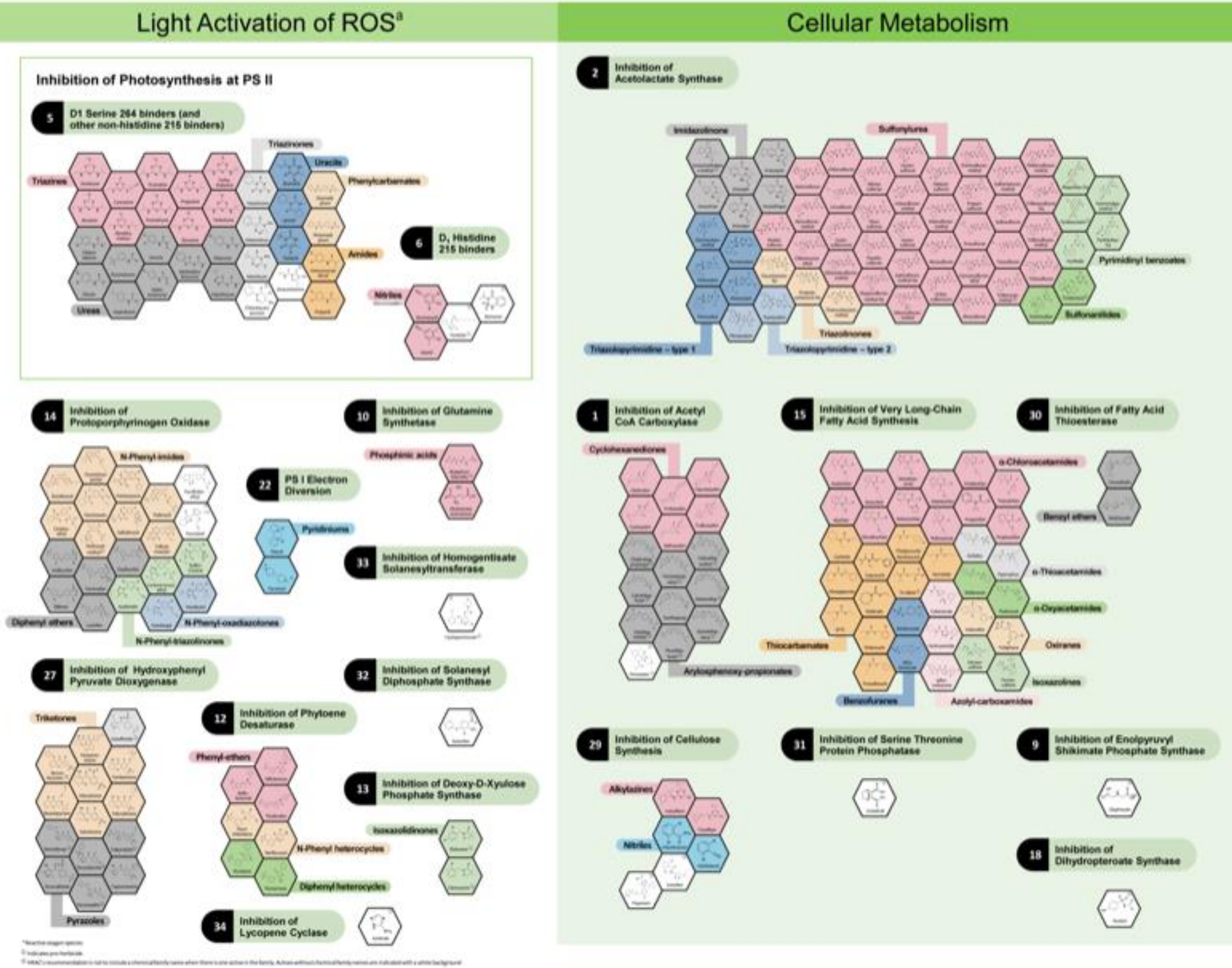
Break – We will reconvene at 11:00am

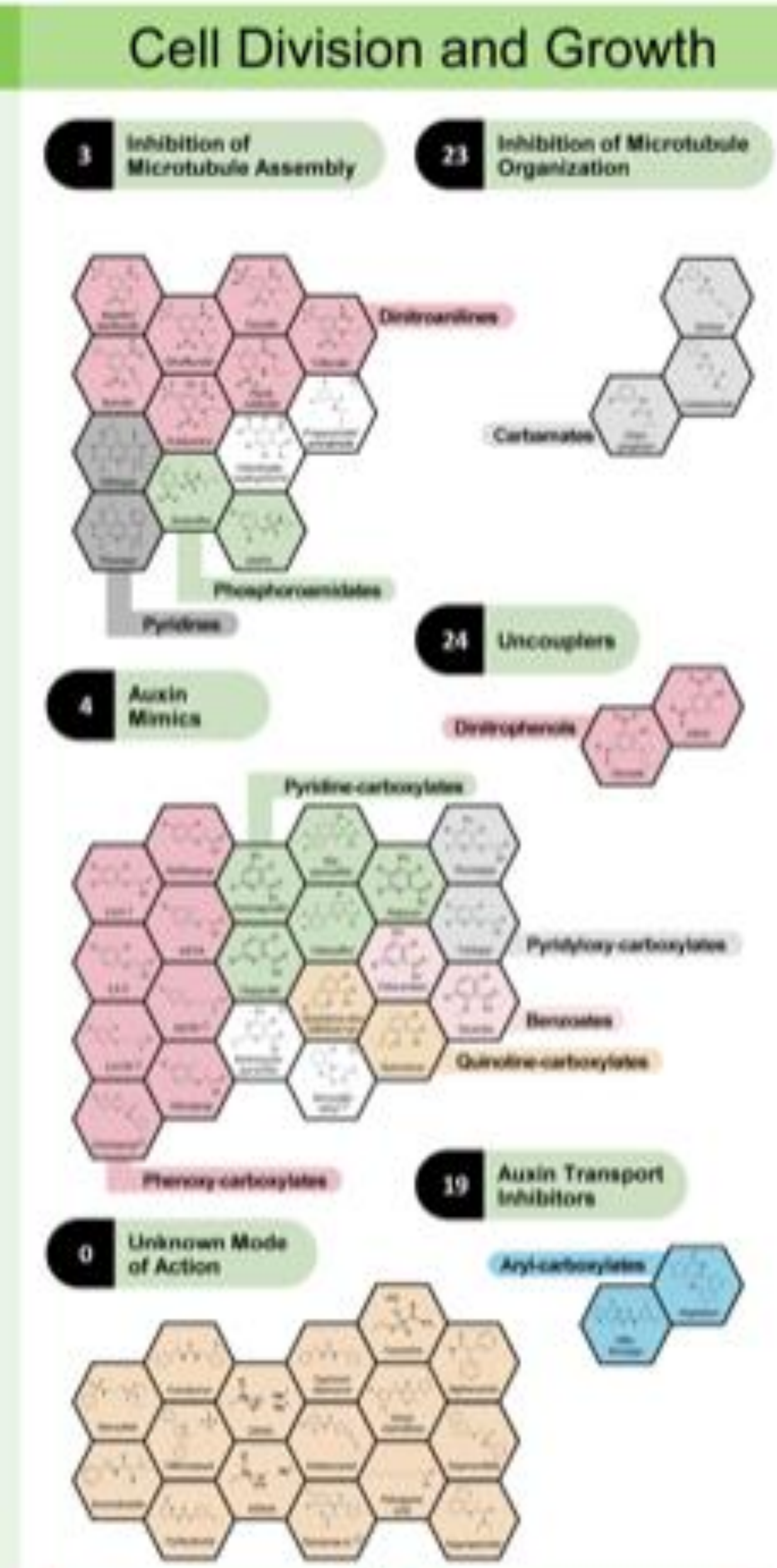
NEW HERBICIDES FOR COOL-SEASON TURFGRASS

J.T. BROSNAN, PH.D.
UNIVERSITY OF TENNESSEE
@UTTURFWEEDS

Silver Bullet is on the Way

HRAC Mode of Action Classification 2020


Light Activation of ROS[a]
Inhibition of Photosynthesis at PS II
5 D1 Serine 264 binders (and other non-histidine 215 binders)
Triazines
Triazinones
Uracils
Phenylcarbamates
Amides
Ureas
6 D1 Histidine 215 binders
Nitriles
14 Inhibition of Protoporphyrinogen Oxidase
N-Phenyl-imides
Diphenyl ethers
N-Phenyl-oxadiazolones
N-Phenyl-triazolinones
10 Inhibition of Glutamine Synthetase
Phosphinic acids
22 PS I Electron Diversion
Pyridiniums
33 Inhibition of Homogentisate Solanesyltransferase
27 Inhibition of Hydroxyphenyl Pyruvate Dioxygenase
Triketones
Pyrazoles
32 Inhibition of Solanesyl Diphosphate Synthase
12 Inhibition of Phytoene Desaturase
Phenyl-ethers
N-Phenyl heterocycles
Diphenyl heterocycles
13 Inhibition of Deoxy-D-Xylulose Phosphate Synthase
Isoxazolidinones
34 Inhibition of Lycopene Cyclase
Cellular Metabolism
2 Inhibition of Acetolactate Synthase
Imidazolinone
Sulfonylurea
Pyrimidinyl benzoates
Sulfonanilides
Triazolinones
Triazolopyrimidine – type 1
Triazolopyrimidine – type 2
1 Inhibition of Acetyl CoA Carboxylase
Cyclohexanediones
Aryloxyphenoxy-propionates
15 Inhibition of Very Long-Chain Fatty Acid Synthesis
α-Chloroacetamides
α-Thioacetamides
α-Oxyacetamides
Oxiranes
Isoxazolines
Azolyl-carboxamides
Benzofuranes
Thiocarbamates
30 Inhibition of Fatty Acid Thioesterase
Benzyl ethers
29 Inhibition of Cellulose Synthesis
Alkylazines
Nitriles
31 Inhibition of Serine Threonine Protein Phosphatase
9 Inhibition of Enolpyruvyl Shikimate Phosphate Synthase
18 Inhibition of Dihydropteroate Synthase


Cell Division and Growth
3 Inhibition of Microtubule Assembly
Dinitroanilines
Phosphoroamidates
Pyridines
23 Inhibition of Microtubule Organization
Carbamates
24 Uncouplers
Dinitrophenols
4 Auxin Mimics
Pyridine-carboxylates
Pyridyloxy-carboxylates
Benzoates
Quinoline-carboxylates
Phenoxy-carboxylates
19 Auxin Transport Inhibitors
Aryl-carboxylates
0 Unknown Mode of Action

HRAC & WSSA	Legacy HRAC	
1	A	Inhibition of ACCase
2	B	Inhibition of ALS
3	K1	Inhibition of microtubule assembly
4	O	Auxin mimics
5	C1/2	Inhibition of photosynthesis PS II - Serine 264
6	C3	Inhibition of photosynthesis PS II - Histidine 215
9	G	Inhibition of EPSP synthase
10	H	Inhibition of glutamine synthetase
12	F1	Inhibition of PDS
13	F4	Inhibition of DOXP synthase
14	E	Inhibition of PPO
15	K3	Inhibition of VLCFAs
18	I	DHP inhibition

HRAC & WSSA	Legacy HRAC	
19	P	Auxin transport inhibitors
22	D	PS I electron diversion
23	K2	Inhibition of microtubule organization
24	M	Uncouplers
27	F2	Inhibition of HPPD
29	L	Inhibition of cellulose synthesis
30	Q	Inhibition of fatty acid thioesterase
31	R	Inhibition of serine threonine protein phosphatase
32	S	Inhibition of solanesyl diphosphate synthase
33	T	Inhibition of homogentisate solanesyltransferase
34	F3	Inhibition of lycopene cyclase
0	Z	Unknown mode of action

A free copy of this poster can be downloaded at www.hracglobal.com

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Selective Herbicide

For Postemergent Annual and Perennial Grass and Broadleaf Weed Control in Turfgrass; including Golf Courses, Athletic Turf, Commercial Turf and Residential Turf.

ACTIVE INGREDIENTS:	
Fenoxaprop-p-ethyl*	2.70%
Fluroxypyr MHE**	3.89%
Dicamba acid***	2.70%
OTHER INGREDIENTS	90.71%
TOTAL:	100.00%

*Equivalent to 0.25 lbs/gallon Fenoxaprop-p-ethyl
**Equivalent to 0.25 lbs/gallon Fluroxypyr acid equivalent
***Equivalent to 0.25 lbs/gallon Dicamba acid

"New" combination of older MOAs

SPECIMEN

Group 27 Herbicide

Pylex™

herbicide

For postemergence control of broadleaf and grass weeds in select turfgrass species on golf courses, sod farms and residential turfgrass

Active Ingredient:	
topramezone: [3-(4,5-dihydro-isoxazolyl)-2-methyl-4-(methylsulfonyl) phenyl](5-hydroxy-1-methyl-1*H*-pyrazol-4-yl)methanone.	29.7%
Other Ingredients:	70.3%
Total:	100.0%

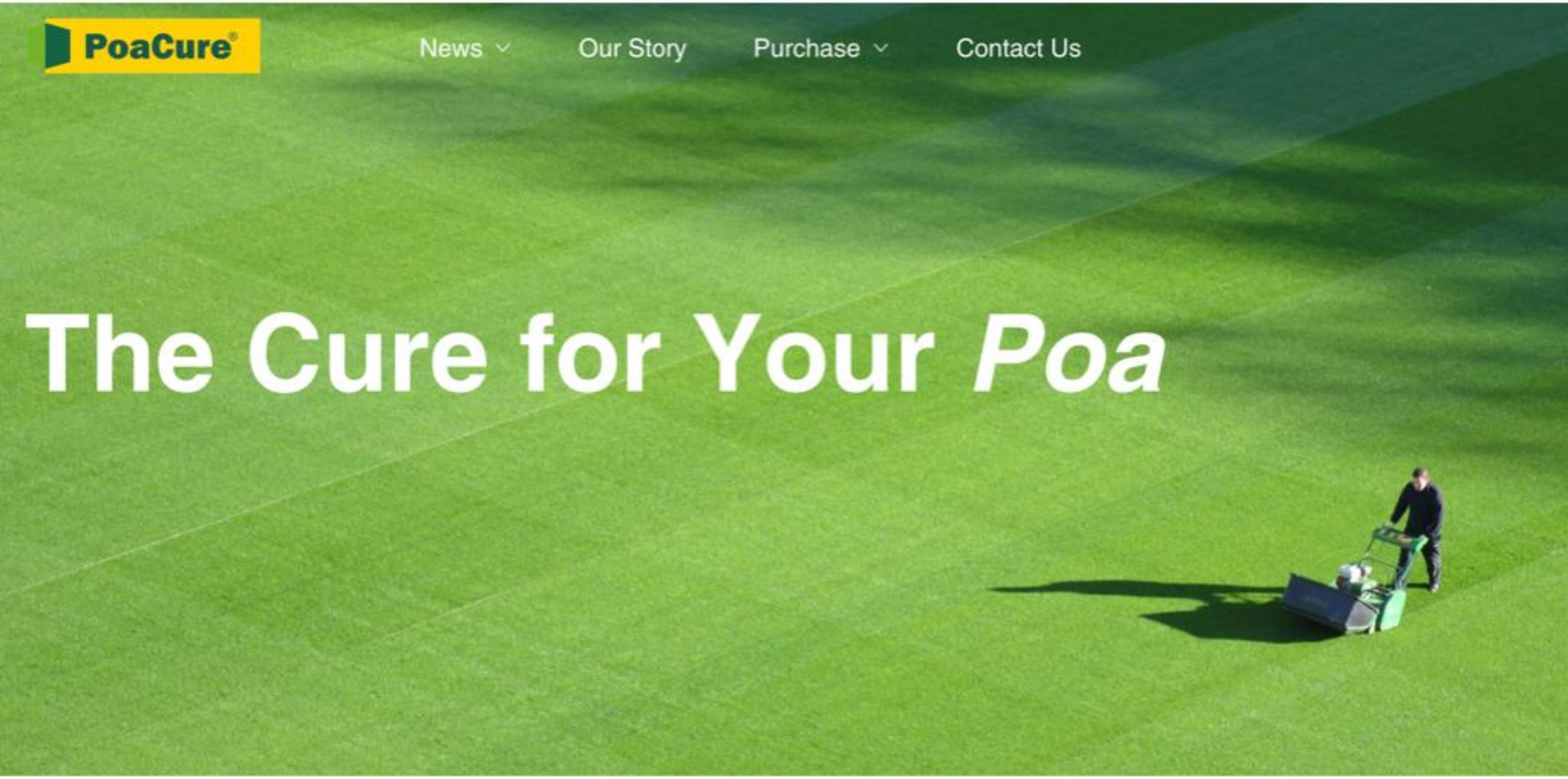
1 gallon contains 2.8 pounds of topramezone free acid.

EPA Reg. No. 7969-327

EPA Est. No.

"New" = MOA not widely used in turf


MJ
Dream



DECEMBER 9, 2019

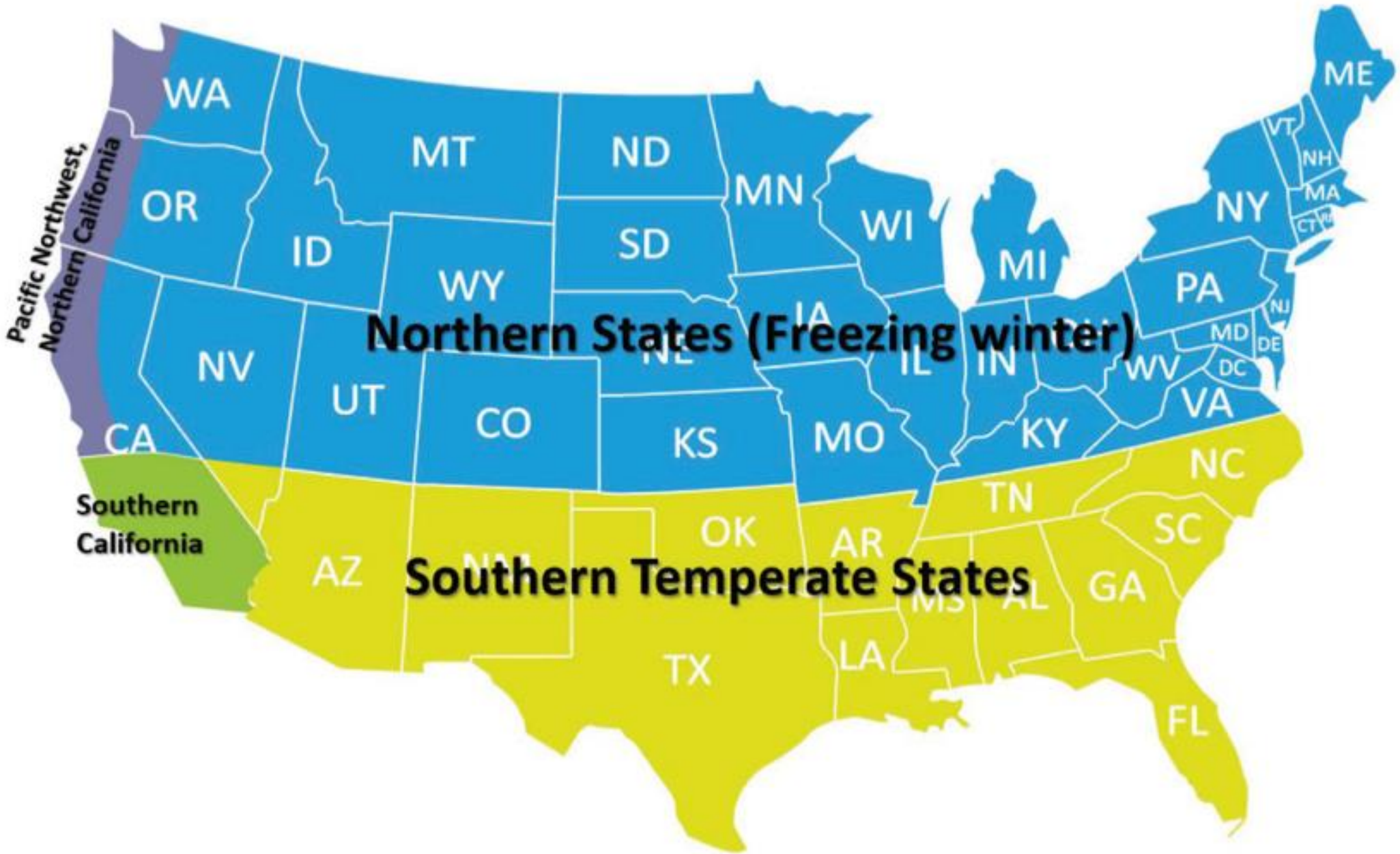
PoaCure Finally Arrived

POACURE SC

- Methiozolin
- WSSA Group #30
  - Inhibitor of fatty acid thioesterase (FAT)
- Labeled for **golf course use only** (greens, tees, fairways, roughs)
- ABG & Poa Triv POST
- Crabgrass, goosegrass, winter BLWs (PRE)

Methiozolin 14 DAT

Application Rate & Regime Vary By Location



Application rate (gallons per acre/lbs. ai per acre)	Region**	Application time	Number of applications	Re-treatment interval (Weeks)	Maximum annual application rate (gallons per acre per year/lbs. ai per acre per year)
0.2*/0.46	Northern States (Freezing winter)	October to November	1 to 2	2 to 3	1.0/2.3
		April to June	1 to 3		
	Southern Temperate States	November to February	1 to 5		1.0/2.3
	Pacific Northwest, Northern California	February to November	1 to 6		1.2/2.76
	Southern California	November to May	1 to 6		1.2/2.76

*This rate is equivalent to 0.6 fluid ounces ***PoaCure® SC*** per 1,000 ft^2, or 1.9 liters per ha, or 0.46 lbs. active ingredient (ai) per acre.

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0.6 fl oz/1000 ft^2 (NOV, DEC) on 21 Feb. 2011

0.6 fl oz/1000 ft^2 (NOV, DEC) on 31 March 2011

Long Term Methiozolin Efficacy for Poa Control
Treatments Initiated Fall 2010
Image Taken February 1, 2013

PoaCure at 27.4 fl oz
(Nov, Dec. 2010)

Untreated

PoaCure at 54.7 fl oz
(Nov, Dec. 2010)

Long Term Methiozolin Efficacy for Poa Control
Treatments Initiated Fall 2010
Image Taken February 1, 2013

PoaCure at 27.4 fl oz
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Untreated

PoaCure at 54.7 fl oz
(Nov, Dec. 2010)

POACURE TAKE-AWAYS (SO FAR)

- Begin program after recovery from fall aerification
- May see greater activity in older, heavier greens than USGA spec. profiles
- Benefits to third application in spring?

Spring Applications Effective, Not as Practical ?

Push-up Green

3% Gravel, 72% sand, 21% silt, 4% clay

G	3%
VCS	6%
CS	27%
MS	27%
FS	6%
VFS	6%
Silt	21%
Clay	4%

2% Organic Matter

F1632, F1647

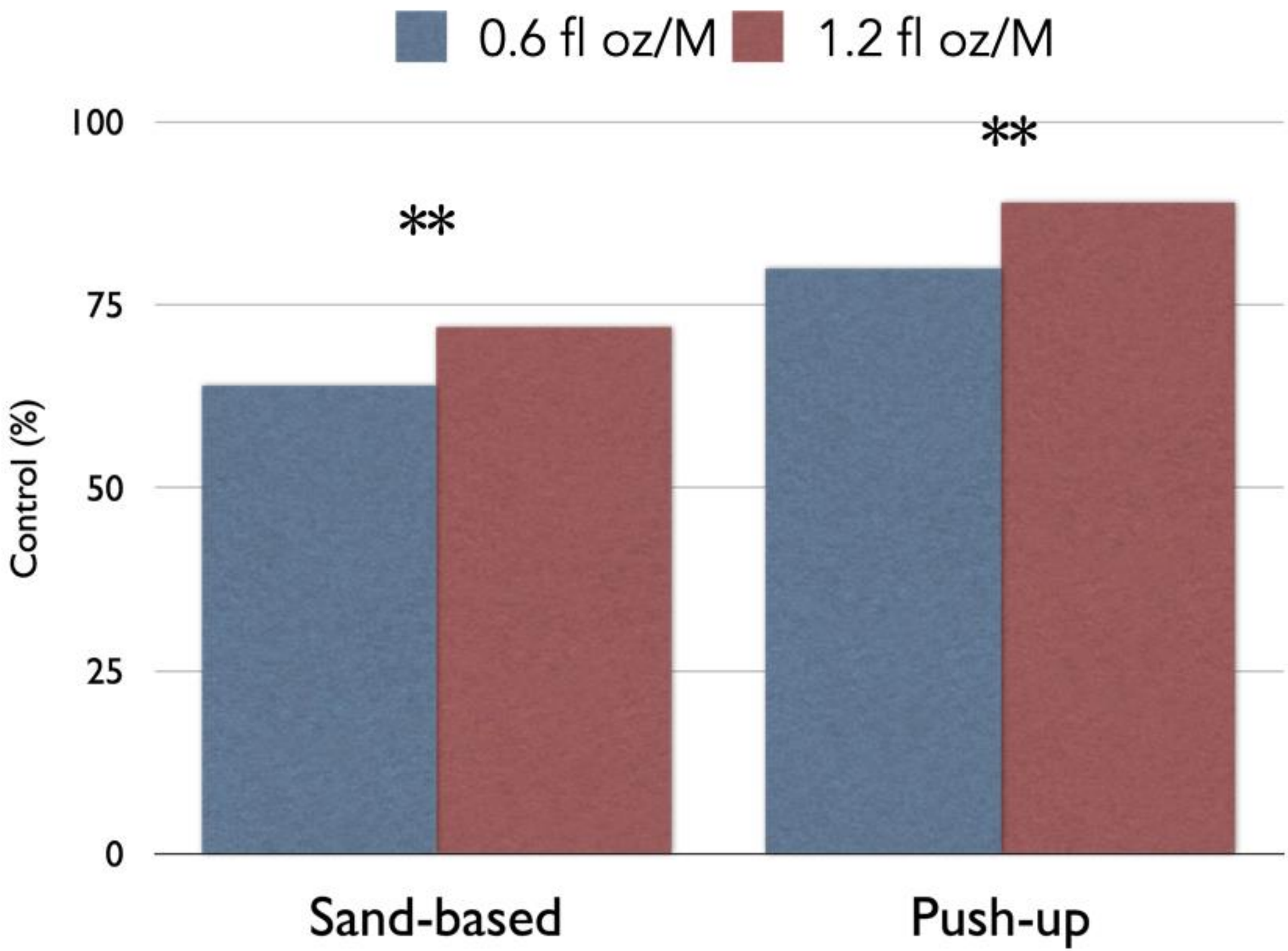
Sand-Based Putting Greens

Multiple Sites in Lubbock, TX in 2011

G	0%
VCS	8%
CS	21%
MS	41%
FS	21%
VFS	6%
Silt	1%
Clay	1%

1% Organic Matter

F1632, F1647



Annual Bluegrass Control 161 DAIT

Weed Technology 2013 27:310–316

Weed Management—Other Crops/Areas

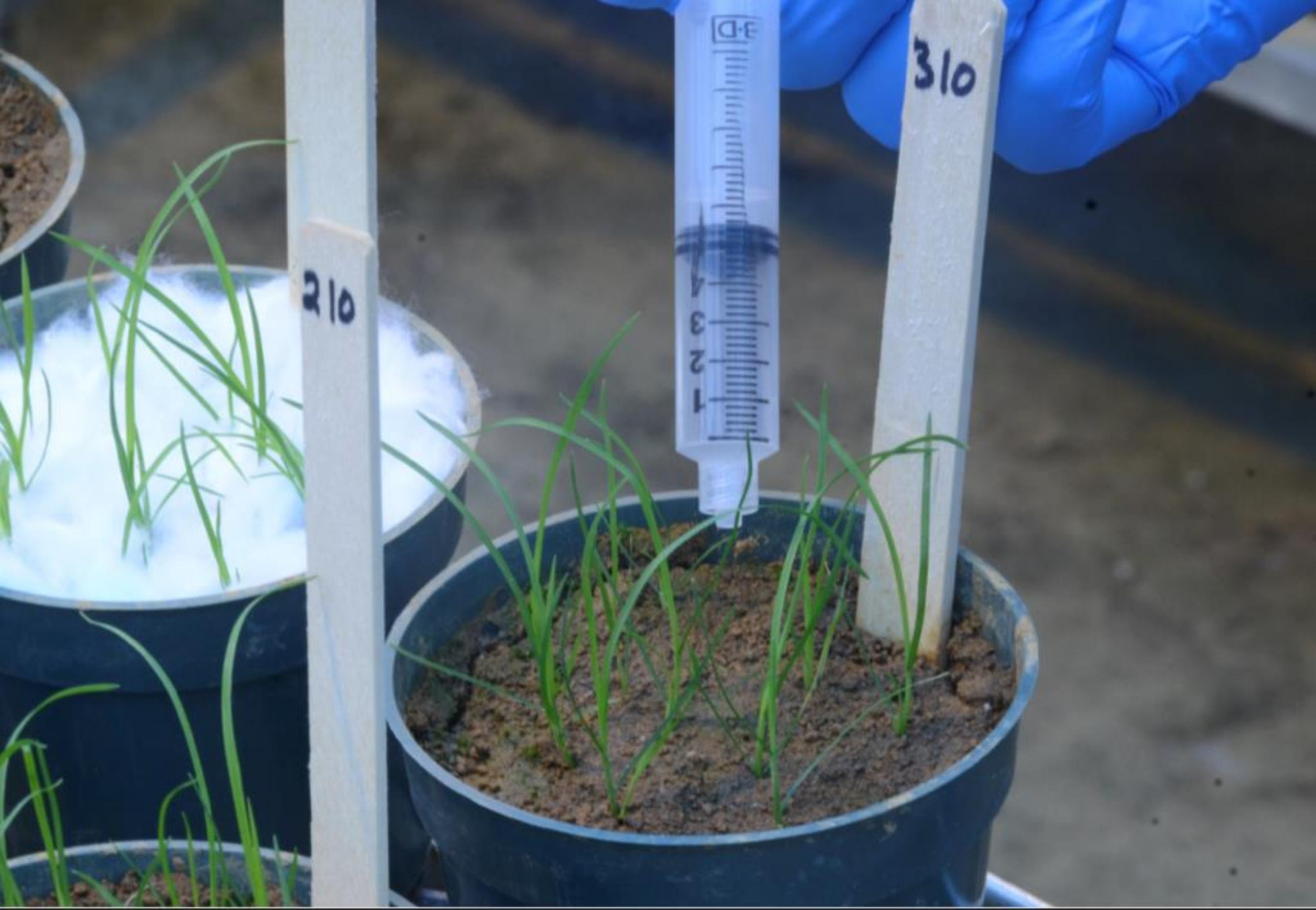
Methiozolin Efficacy for Annual Bluegrass (*Poa annua*) Control on Sand- and Soil-Based Creeping Bentgrass Putting Greens

James T. Brosnan, Gerald M. Henry, Gregory K. Breeden, Tyler Cooper, and Thomas J. Serensits*

Methiozolin is a new isoxazoline herbicide being investigated for selective POST annual bluegrass control in creeping bentgrass putting greens. Glasshouse and field research was conducted from 2010 to 2012 in Tennessee and Texas to evaluate annual bluegrass control efficacy with methiozolin. Application placement experiments in the glasshouse illustrated that root absorption was required for POST annual bluegrass control with methiozolin at 1,000 g ai ha^{-1}. Soil-plus-foliar and soil-only applications of methiozolin reduced annual bluegrass biomass greater than treatments applied foliar-only. Field experiments evaluated annual bluegrass control efficacy with two application rates (500 and 1,000 g ha^{-1}) and six application regimes (October, November, December, October followed by [fb] November, November fb December, and October fb November fb December) on sand- and soil-based putting greens. Annual bluegrass control with methiozolin at 1,000 g ha^{-1} on sand-based greens ranged from 70 to 72% compared to 87 to 89% on soil-based greens. Treatment at 500 g ha^{-1} controlled annual bluegrass 57 to 64% on sand-based greens compared to 72 to 80% on soil-based greens. Most sequential methiozolin application regimes controlled annual bluegrass more than single applications. On sand-based greens, sequential application programs controlled annual bluegrass 70 to 79% compared to 85 to 92% on soil-based greens. Responses indicate that methiozolin is a root-absorbed herbicide with efficacy for selective control of annual bluegrass in both sand- and soil-based creeping bentgrass putting greens.

Nomenclature: Methiozolin [5-(2,6-difluorobenzyl) oxymethyl-5-methyl-3-(3methylthiophen-2-yl)-1,2-isoxazoline]; annual bluegrass, *Poa annua* L.; creeping bentgrass, *Agrostis stolonifera* L.

Key words: Application placement, rootzone, soil-plus-foliar, soil physical properties, soil texture, turf, weed control.



PoaCure Uptake is Root Driven - No Control w/ Foliar Only

DESPITE THE NAME

THIS IS NOT A CURE-ALL

PoaCure Label Items

RESTRICTIONS

- Do not apply when creeping bentgrass is in heat stress or has poor root development.
- Do not apply prior to or during creeping bentgrass winter dormancy and until fully greened up and there is active plant growth (Northern States).
- Do not over-seed creeping bentgrass within 45 days after the last application.
- Do not apply to putting greens consisting of velvet bentgrass or colonial bentgrass.
- Do not apply to hybrid bermudagrass putting greens over-seeded with rough bluegrass (*Poa trivialis*).

PoaCure Label Items

RESTRICTIONS

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- Do not apply to hybrid bermudagrass putting greens over-seeded with rough bluegrass (*Poa trivialis*).

Image 20 March 2013

Untreated

PoaCure (0.6 fl oz/M)

PoaCure Label Items

RESTRICTIONS

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PoaCure Label Items

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‘Pure Eclipse’ Creeping Bentgrass (4 WAS)

‘Pure Eclipse’ Creeping Bentgrass (4 WAS) —>
PoaCure (0.6 fl oz/1000 ft^2)

ALARMING NUMBERS

- 64% Glyphosate resistant
- 58% Barricade resistant
- 21% Revolver resistant
    - No greens
- >90% Princep resistant
- 25% multiple resistance
  (e.g., Princep + Revolver)
- 4% Resistant to EVERYTHING


Resist Poa
USDA-SCRI ANNUAL
BLUEGRASS COLLECTIVE
UNITED STATES
Total Land Area : 9 166 600 sq. km
(3 550 224 sq. miles)
POPULATION
over 5 000 000
over 1 000 000
over 500 000
over 100 000
over 50 000
over 10 000
under 10 000
ATLANTIC
OCEAN
GULF OF MEXICO
BAHAMAS
400 km
400 miles

Weed Technology 2017 31:470–476

Controlling Herbicide-Resistant Annual Bluegrass (*Poa annua*) Phenotypes with Methiozolin

James T. Brosnan, Jose J. Vargas, Gregory K. Breeden, Sarah L. Boggess, Margaret A. Staton, Phillip A. Wadl, and Robert N. Trigiano*

Methiozolin is an isoxazoline herbicide being investigated for selective POST annual bluegrass control in managed turfgrass. Research was conducted to evaluate methiozolin efficacy for controlling two annual bluegrass phenotypes with target-site resistance to photosystem II (PSII) or enolpyruvylshikimate-3-phosphate synthase (EPSPS)-inhibiting herbicides (i.e., glyphosate), as well as phenotypes with multiple resistance to microtubule and EPSPS or PSII and acetolactate synthase (ALS)-inhibiting herbicides. All resistant phenotypes were established in glasshouse culture along with a known herbicide-susceptible control and treated with methiozolin at 0, 125, 250, 500, 1000, 2000, 4000, or 8000 g ai ha^{-1}. Methiozolin effectively controlled annual bluegrass with target-site resistance to inhibitors of EPSPS, PSII, as well as multiple resistance to EPSPS and microtubule inhibitors. Methiozolin rates required to reduce aboveground biomass of these resistant phenotypes 50% (GR_{50} values) were not significantly different from the susceptible control, ranging from 159 to 421 g ha^{-1}. A phenotype with target-site resistance to PSII and ALS inhibitors was less sensitive to methiozolin (GR_{50} = 862 g ha^{-1}) than a susceptible phenotype (GR_{50} = 423 g ha^{-1}). Our findings indicate that methiozolin is an effective option for controlling select annual bluegrass phenotypes with target-site resistance to several herbicides.

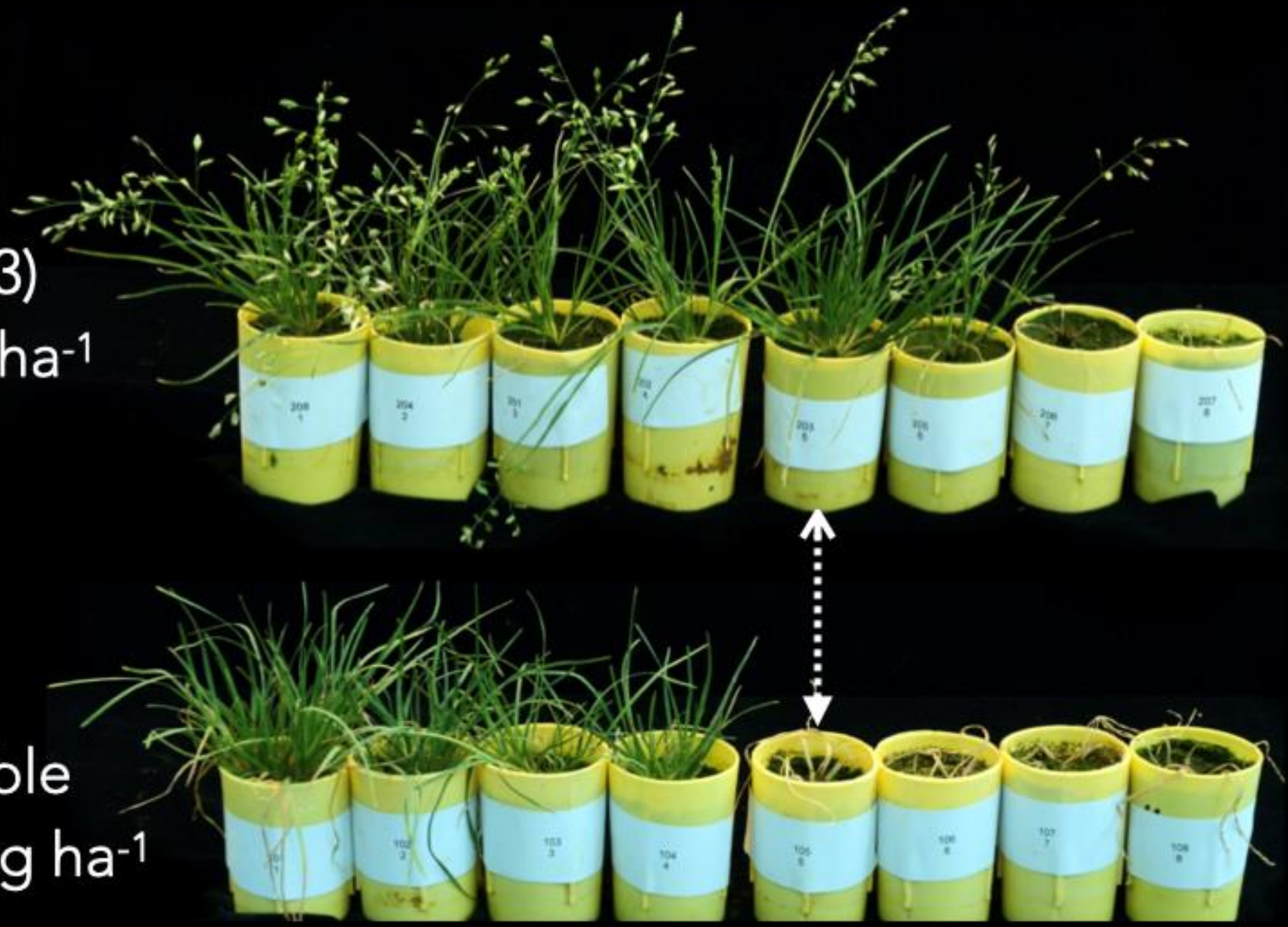
Nomenclature: Methiozolin, annual bluegrass, *Poa annua* L.

Key words: Alpha tubulin, golf course, mutation, resistance, target site, turf, turfgrass.

Resistant (R3)

GR_{50} = 862 g ha^{-1}

*



Susceptible

GR_{50} = 423 g ha^{-1}

0 125 250 500 1000 2000 4000 8000

g ha^{-1}

POACURE SC

- Best option for control on bentgrass greens
- Sole reliance on just this herbicide not advisable
    - All other cultural practices to discourage Poa should remain in place
- May not be a fit for all scenarios
- Lots to learn

POWERED BY VEXIS™ TECHNOLOGY

GameOn™
Arylex™ active
SPECIALTY HERBICIDE

VALENT PROFESSIONAL PRODUCTS

Celero®
HERBICIDE
TURF HERBICIDE
A SELECTIVE HERBICIDE
FOR THE CONTROL OF NUTSEDGE AND OTHER WEEDS IN ESTABLISHED TURFGRASS.

Relzar™
Arylex™ active
SPECIALTY HERBICIDE

Crew™
SPECIALTY HERBICIDE

Dismiss® NXT
Herbicide

SurePower™

EPA approved

AI: **Pyrimisulfan**

ALS inhibitor, sulfonanilide

Effective against sedge species

Initial products will be granular alone and in combination with other AIs

Can be applied to wet or dry turf

Slide via: Dr. Matt Elmore, Rutgers Univ.

CELERO

- New product from NuFarm
- imazosulfuron
- Labeled for CBG, FF, KBG, PR, TF, B, C, Z, St. A
- 8 - 14 oz/A
- Sedge and Kyllinga control via ALS inhibition

GROUP 2 HERBICIDE

PROFESSIONAL VALENT PRODUCTS

Celero®

HERBICIDE

TURF HERBICIDE
A SELECTIVE HERBICIDE FOR THE CONTROL OF NUTSEDGE AND OTHER WEEDS IN ESTABLISHED TURFGRASS.

Active Ingredient	By Wt.
*Imazosulfuron	75.0%
Other Ingredients	25.0%
Total	100.0%

*2-chloro-*N*-[[(4,6-dimethoxy-2-pyrimidinyl)-amino] carbonyl]imidazo[1,2-*a*]pyridine-3-sulfonamide

Dismiss® NXT

Herbicide

DISMISS NXT

- Carfentrazone (3.5%) + sulfentrazone (32%)
    - 1:9 ratio of carfentrazone to sulfentrazone
- 3.5 lb active/gallon formulation
- Cool-season turfgrass: 5.1 to 10.2 fl oz/A
- Residential & Commercial Lawns, Golf (Fairway and Rough), Sod Farms, Rights-of-Way, Other Non-Crop Areas

DISMISS NXT CONVERSION

NXT RATE	SULFENTRAZONE LOAD	DISMISS EQUIVALENT
10.2 FL OZ	0.25 LB	8 FL OZ

Non-treated yellow nutsedge 24 HAT in 2016

Dismiss NXT 15.5 fl oz/A. 24 HAT in 2016

A NEW APPROACH

Dismiss NXT (10 fl oz)

Sedgehammer (1.25 oz)

Celero (8 fl oz)

GDD50F PER WEEK	CALENDAR DATE FOR TN
100	APRIL 11
150	MAY 2
175-200	MAY 20
>200	JUNE 26
>17 CDD	OCTOBER 9

HALAUXIFEN-METHYL

- Synthetic auxin herbicide, Group #4
    - Similar to fluroxypyr and triclopyr in structure, different binding site
- Potential tool to replace 2,4-D in synthetic auxin herbicide mixtures
        - Need for this as public pressure against 2,4-D use increases
- Foliar and root absorption, moves through both xylem and phloem
- Rainfast in 1 hour, low volatility
- No drip line issues on trees —> rapidly degrades in soil and plant tissue

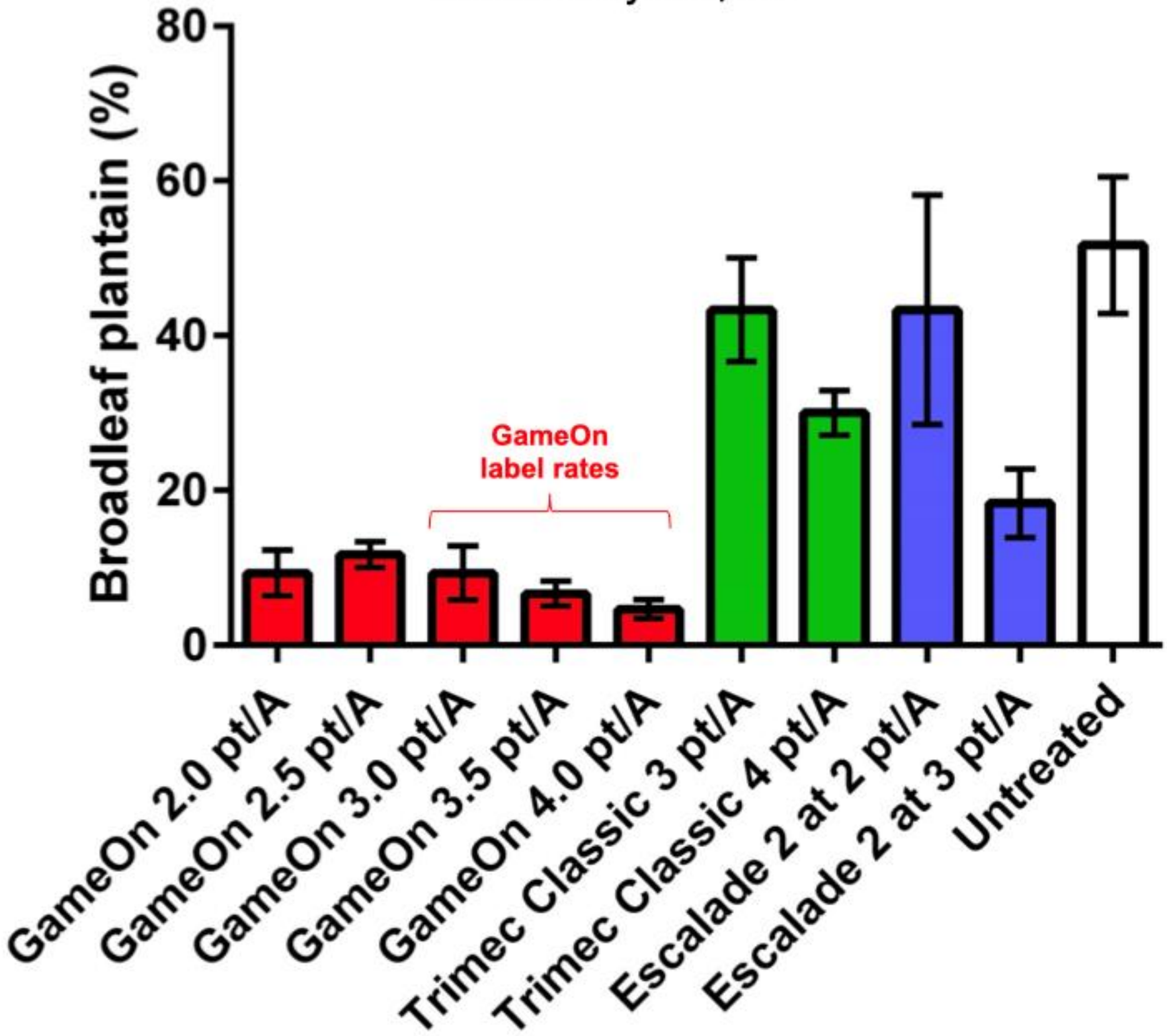
GameOn Components

- **Halauxifen-methyl** with **2,4-D choline** and **fluroxypyr** containing:
  - > Acid Equivalent for halauxifen acid is 0.02 pounds per gallon
  - > Acid Equivalent for 2,4-D Choline is 2.01 pounds per gallon
  - > Acid Equivalent for fluroxypyr methylheptyl is 0.28 pounds per gallon

GameOn™
Arylex™ active
SPECIALTY HERBICIDE

- Use in established turfgrass (commercial and residential), commercial sod farms, ornamental and sports turf, golf course fairways, aprons and roughs, tee boxes, campgrounds, parks, recreation areas, cemeteries and unimproved turfgrass areas
- GF-3566 is expected to have a signal word of "**Warning"**
  - > Most often, 2,4-D amine combination products carry a "Danger" signal word
- Application rates range from **3.0- 4.0 pints/A** based on weeds and turfgrass species present

Broadleaf plantain coverage 10 WAA on July 24 2015. Application on 14 May 2015, West Lafayette, IN.



Dr. Aaron Patton - Purdue

Relzar - Formulation and Use Sites

- Relzar is a 1:1 ratio of new **halauxifen-methyl** plus **florasulam**
  - > Contains 0.2 pounds of florasulam + 0.2 pounds halauxifen acid per pound
  - > Halauxifen-methyl (WSSA group 4) PLUS florasulam (WSSA group 2)
  - > **Application rate: 0.72 oz/A**
  - > Proposed use in established turfgrass (commercial and residential): commercial sod farms, ornamental and sports turf, golf course fairways, aprons and roughs, tee boxes, campgrounds, parks, recreation areas, cemeteries and unimproved turfgrass areas

Relzar™

Arylex™ active

SPECIALTY HERBICIDE

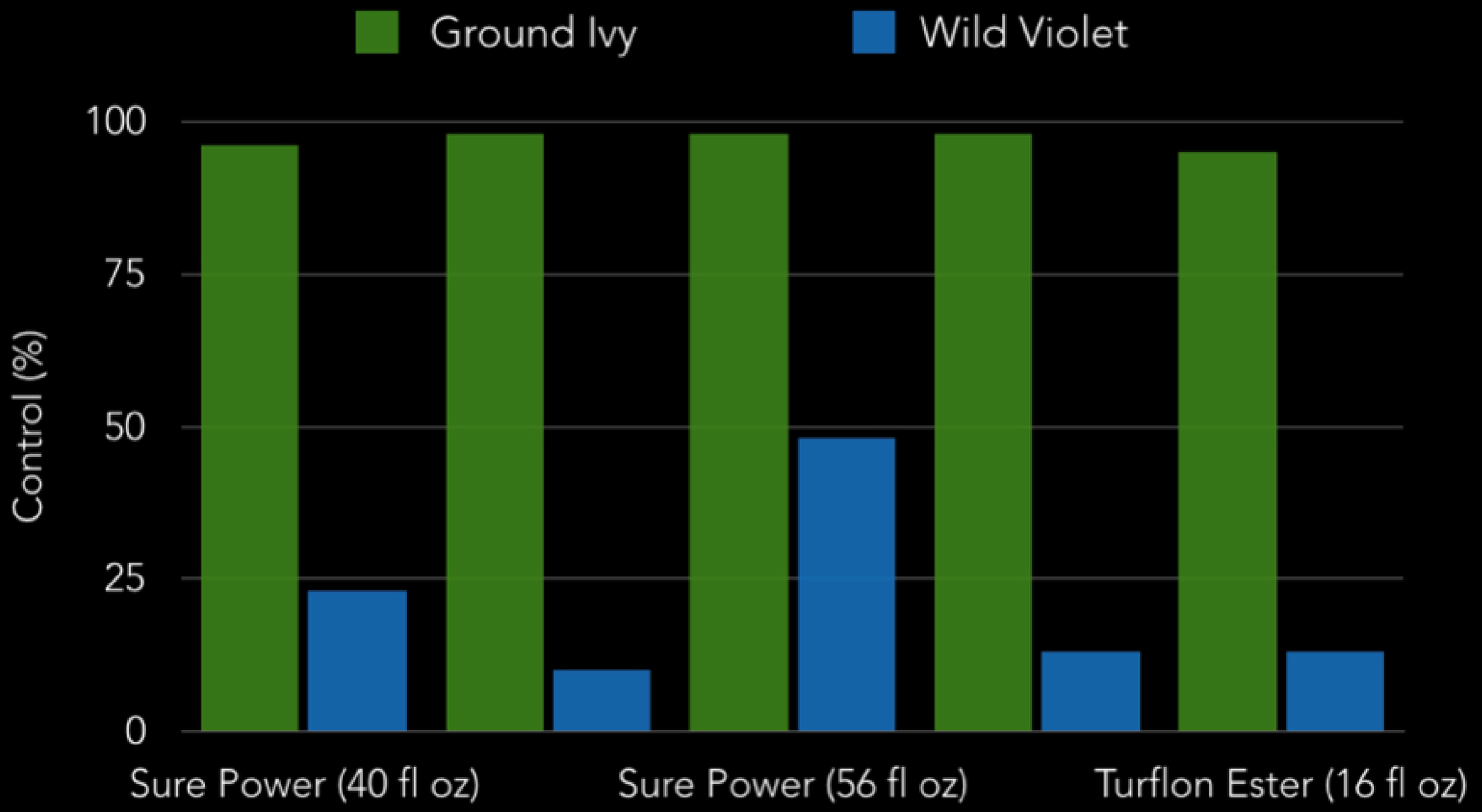
2017 RESEARCH - *PARSLEY PIERT*

Treatments applied 7 February 2017 in Rockford, TN.
Means sharing the same letter are not significantly different from one another using Fisher's protected LSD at $\alpha = 0.05$

SureFlower™

- NuFarm herbicide launched in 2018
- 2,4-D (36.3%) + triclopyr (3.6%) + fluroxypyr (3.6%) + flumioxazin (0.2%)
- Cool season option (TF, FF, KBG, PR) designed for BLW control
    - Ground ivy and wild violet

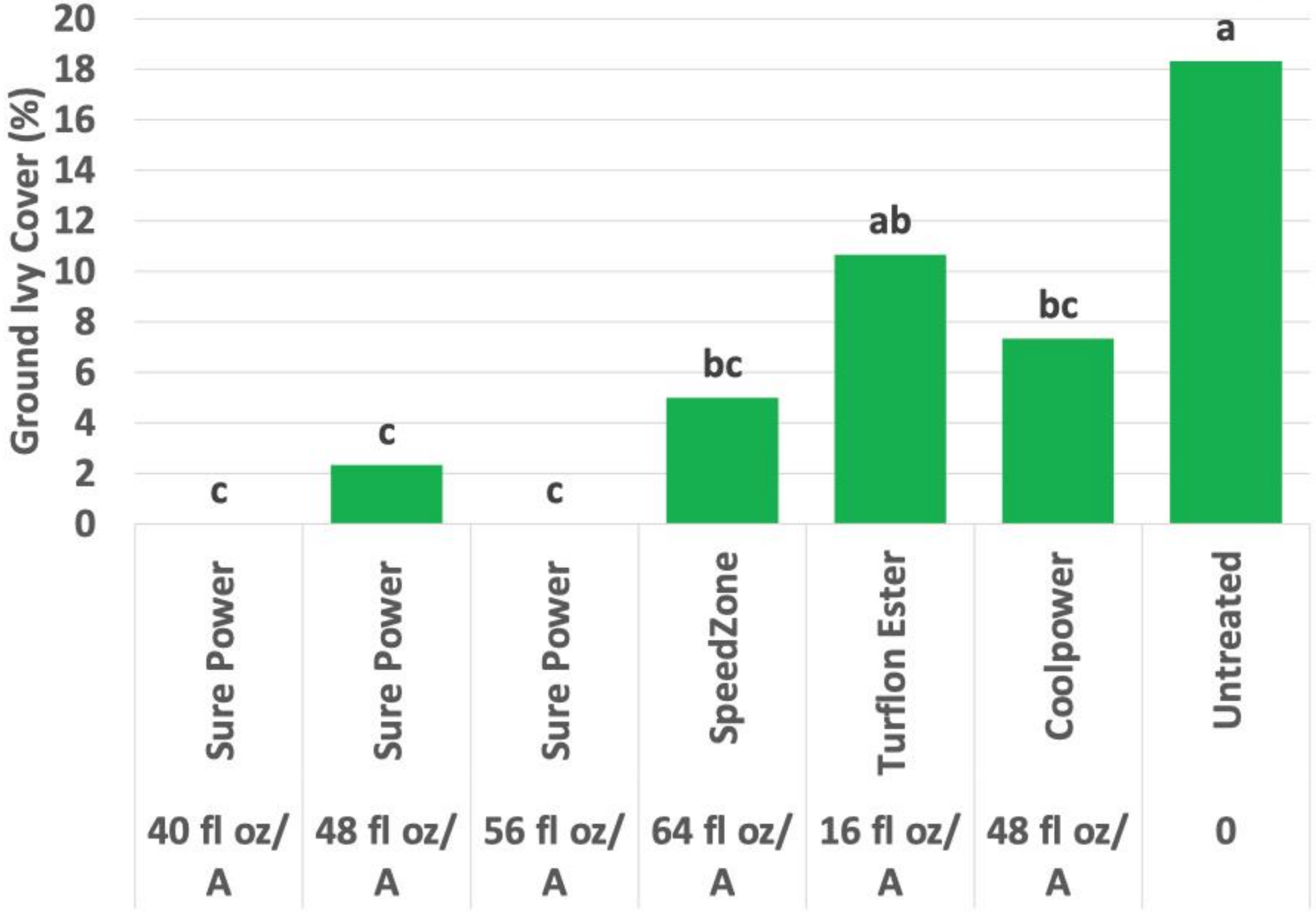
FIRST SURE POWER TRIAL - 55 DAT



All treatments applied 11 May 2018 in Knoxville, TN. No significant differences detected at $P \leq 0.05$

Ground ivy cover 35 DAA. Applied June 1, 2018, West Lafayette, IN

Dr. Aaron Patton - Purdue



USE PRECAUTIONS

Failure to observe all precautions may result in injury to turfgrass and/or susceptible plants. Avoid drift of spray mist to vegetables, flowers, ornamental plants, shrubs, trees and other desirable plants. Avoid fine mists. Use lawn type sprayer with coarse spray as wind drift is less likely. Avoid contact with exposed feeder roots of ornamentals and trees. Maximum control of weeds will be obtained from spring or early fall applications when weeds are actively growing. Use caution when applying to ensure no spray solution collects on the tires of application equipment. Also, assure that sprays completely dry prior to entering treated areas as accumulation on tires can lead to tracking. Avoid broadcast applications when daily high air temperature exceeds 80 degrees. Limit applications to spot treatments or directed applications when air temperatures exceed 80 degrees. When using small, spot treatment applications in temperature over 80 degrees, turf injury may occur. Avoid applications during excessive dry or hot periods unless irrigation is used. Avoid applications during foggy or high moisture and wet turfgrass foliage. For optimum results, do not apply if rainfall is expected within 1 hour of the application.

The suitable use of this product on non-recommended turf species may be determined by treating a small area at 1.5 pints per acre. The treated area should be observed for any sign of turf injury for a period of 7 days of normal growing conditions to determine the phytotoxicity and efficacy to the treated area.

Target Timing Spring/Fall

Avoid Traffic —> Tire Tracking

Avoid broadcast application at temperature ≥ 80F

Avoid applications when foggy/high moisture & wet foliage

MOMENTUM™ 4-SCORE™ HERBICIDE

- **Momentum 4-Score**
  - 2,4-D dimethylamine salt
  - triclopyr trimethylamine salt
  - fluroxypyr
  - sulfentrazone
- **Excellent clover, dandelion, prostrate knotweed control with single applications at 4 pt/A in Rutgers trials**
- Application rate: 3.5-4.5 pts/A
- Available in 2018

Slide via Dr. Matt Elmore, Rutgers Univ.

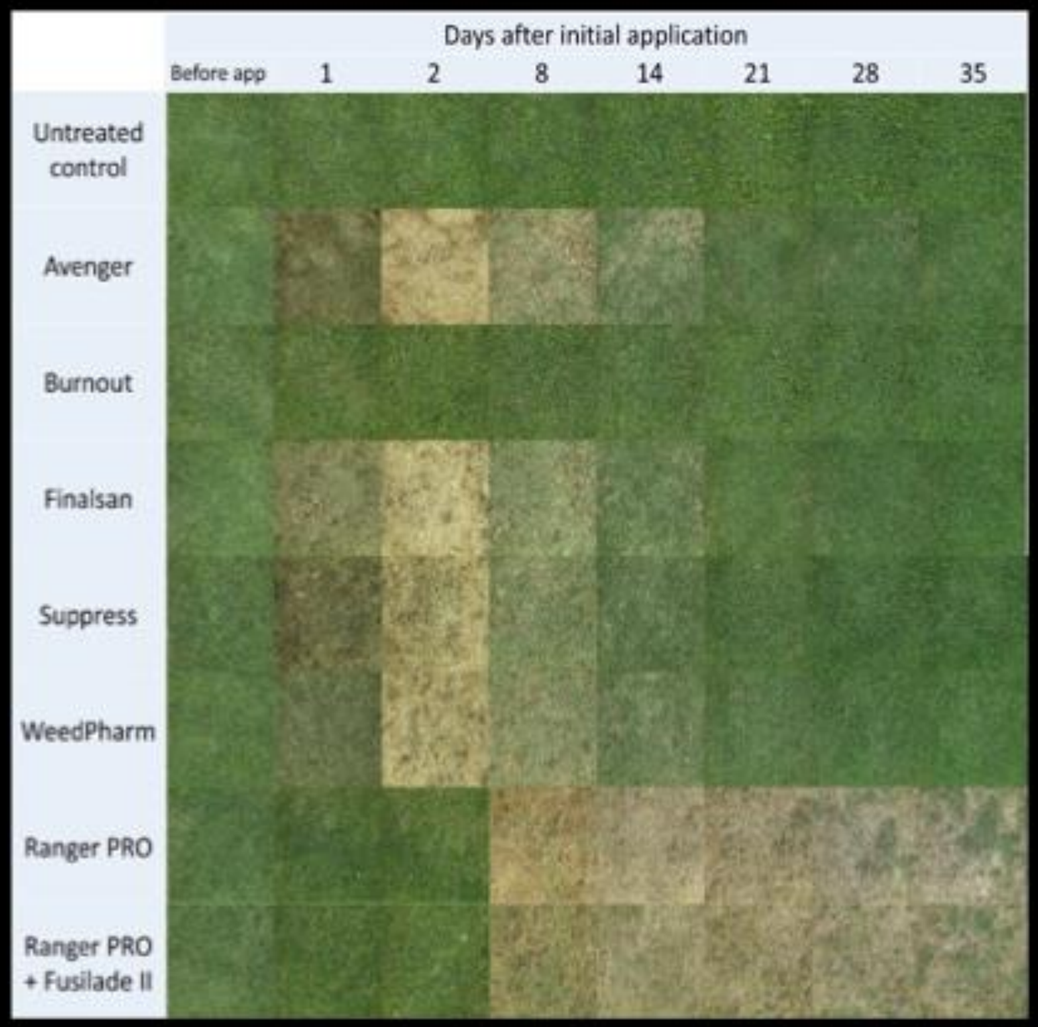
- New PRE option in 2019
- AI - dithiopyr + isoxaben
    - Group 3 + Group 29
- Golf Course (non-greens), sports turf, lawns, sod, etc

Crew™

SPECIALTY HERBICIDE

- KBG, TF, PR, CBG, some FF
- 200 lb/A application max, 600 lb/A yearly cap
- Smooth crabgrass control in 2019 TN trials > FreeHand, Specticle G
- Currently evaluating in *Poa* programs

Alternative Options



- Avenger (70% d-limone citrus oil)
- Finalsan (22% ammonium soap of fatty acid)
- Suppress (47% caprylic acid + 37% capric acid)
- WeedPharm (20% acetic acid)

Injury to bermudagrass (*Cynodon* spp.) within one day of application.

Photo credit: Maggie Reiter, Ph.D., University of California cooperative extension advisor.

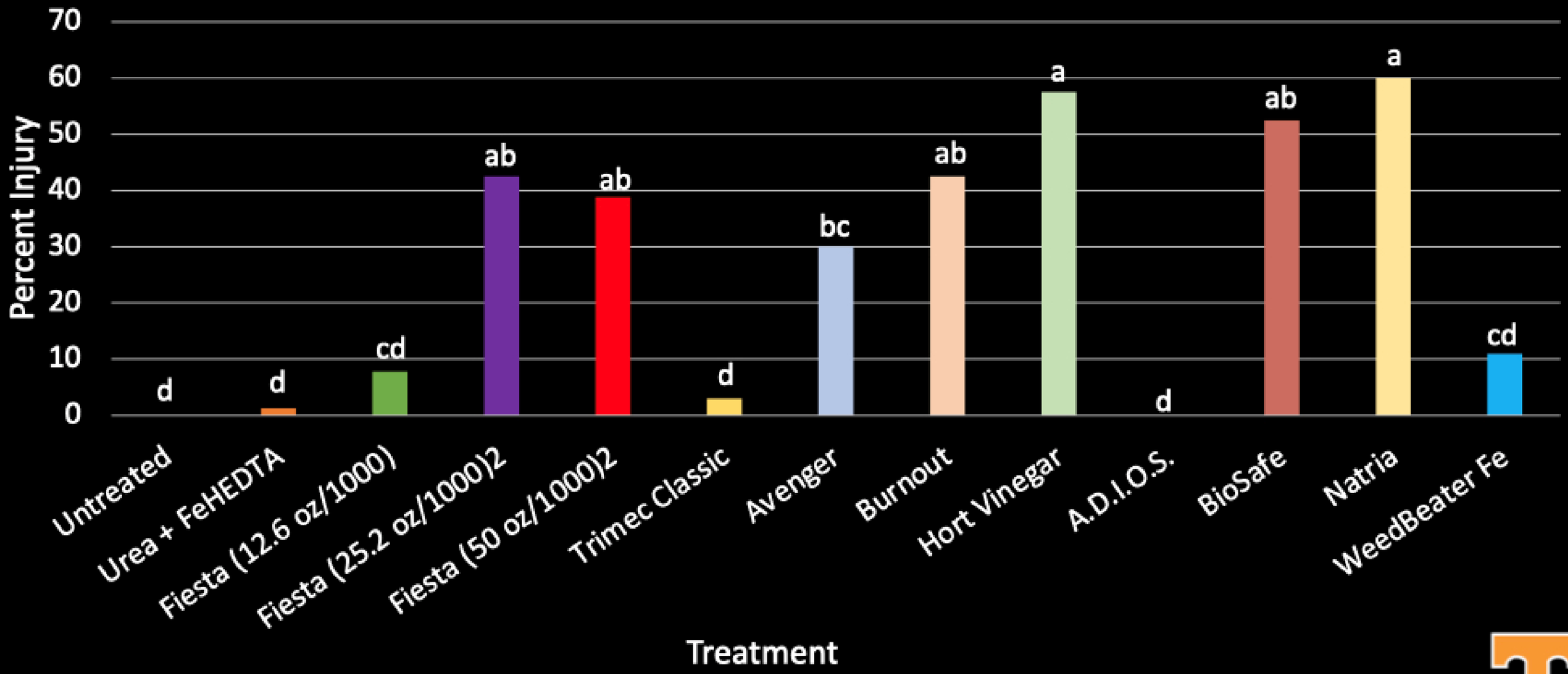
Slide by Devon Carroll, Univ. of TN

Product AI + Rates

Product	a.i.	Rate
Urea + Chelated Iron		6 fl oz/1000 ft2
Fiesta	26.52 FeHEDTA	12.5 fl oz/1000 ft2
Fiesta	26.52 FeHEDTA	25.2 fl oz/1000 ft2
Fiesta	26.52 FeHEDTA	50 fl oz/1000 ft2
Trimec Classic	2,4-D + MCPP +Dicamba	3 pt/A
Avenger	70% d-limone citrus oil	20% v/v
Burnout	24% citric acid + 8% clove oil	6% v/v
Horticultural Vinegar	30% acetic acid	50% v/v
A.D.I.O.S.	11.86% sodium chloride	33% v/v
BioSafe	40% ammonium nanonate	15% v/v
Natria	3.7% ammoniated fatty acid soap	20% v/v
Weed Beater Fe	1.5% FeHEDTA	100% v/v (pre-mixed)

Slide by Devon Carroll, Univ. of TN

Fine Fescue Injury 2 Days After Treatment



Slide by Devon Carroll, Univ. of TN

Alternative Herbicide

Fiesta
25 fl oz/1000 ft^2
June 15 fb
July 10

Photo:
August 15
(8 WAIT)
85% clover
control

Takeaways

- Some natural herbicides, such as Fiesta, can be effective weed control products
- Sequential applications should be made every 2-3 weeks
- **Organic herbicides are not an equal replacement to traditional synthetic herbicides**
- Organic herbicides are often non-selective and can be expensive
  - An application of Fiesta at 50 fl oz/1,000 ft^2 is approximately $25.40 per 1,000 ft^2, compared to $0.76 per 1,000 ft^2 for an application of 2,4-D + MCPP + dicamba at 4 pt/A
- Applications may be made as spot treatments to reduce cost and injury

Slide by Devon Carroll, Univ. of TN

University of Tennessee T

www.tennesseeturfgrassweeds.org/Pages/default.aspx

INSTITUTE OF AGRICULTURE
THE UNIVERSITY OF TENNESSEE

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Herbicide Resistance Field Day

Struggling with annual bluegrass control? Learn more about the UT Herbicide Resistance Field Day on April 7th, 2015 at Windyke CC

Hide Caption

Welcome to the online home of the University of Tennessee Turfgrass & Ornamental Weed Science program.

We work to provide green industry professionals science based information for controlling problematic weeds including dallisgrass, bermudagrass, and annual bluegrass. Herbicide resistance resources, field day information, weed identification tools, and mobile applications are all available here.

tnturfgrassweeds.org

Polling Question

Edit profile

Jim Brosnan, Ph.D.

@UTTurfWeeds

Professor, Univ. of Tennessee (@UTturfgrass) Director, UT Weed Diagnostics Center (@WeedDiagnostics) #Turf #Grass #Weeds #Science #Golf #Lawn #Resistance

University of Tennessee tnturfgrassweeds.org
Joined November 2013

2,706 Following **5,181** Followers

@UTTurfWeeds | jbrosnan@utk.edu


TENNESSEE
T
Volunteers


Hello, Friend

Questions?

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- Platinum -

FAZIO BROS. Sand Co., Inc.

TURF STAR WESTERN TSW EST. 1912

PACIFIC GOLF & TURF

RMT EQUIPMENT

Simplot PARTNERS

- Gold -

RAIN BIRD

TARGET SPECIALTY PRODUCTS

WILBUR-ELLIS

WINFIELD UNITED Professional

- Silver -

Amvac

BASF

Bayer

General Tree Service

Helena Agri-Enterprises

Nufarm

Pacific Sports Turf

Perfect Drive & Utility Vehicles

Pure Seed / Tee 2 Green

Syngenta

JNB Transport

- Bronze -

Baer Design Group

HD Fowler

Midstate Fertilizer

Milroy Golf System

Planet Turf

Schneider Water Services

The Andersons

December 8, 2020
GCSAA Education Points Code
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Thank You For Attending!

Question?

ogcsa@ogcsa.org

Oregon Chapter GCSAA
Golf Course Superintendents Association of America

OLCA
OREGON LANDSCAPE CONTRACTORS ASSOCIATION