

# CIVITAS in the Transition Zone

## Efficacy proven in the Transition Zone.

- CIVITAS has been tested at leading institutions across North America
- Testing in the transition zone proved compatible and efficacious for disease control

### Transition Zone Testing:

- Virginia Tech
- North Carolina State University
- University of Tennessee
- University of Florida

### Additional Testing:

- University of Massachusetts
  - Cornell University
  - Penn State University
  - Rutgers
- Year round turf quality improved with the use of CIVITAS
  - For more information on CIVITAS visit [www.civitasturf.com](http://www.civitasturf.com)



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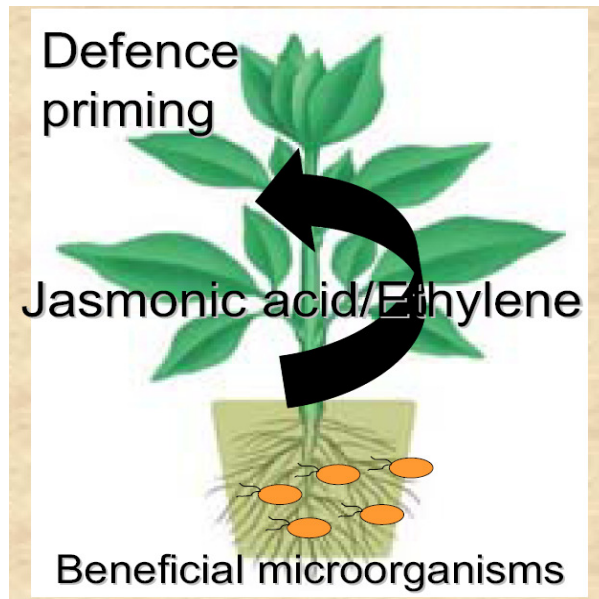
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LUB2458E 04.09

# The CIVITAS Mode of Action

CIVITAS uses Induced Systemic Resistance Mode of Action to trigger the plants natural defenses to fight off fungus.

## ISR



Mode of action unraveled by University of Guelph team

- Part of a post graduate dissertation
- Peer reviewed articles being readied for publication.

# What is CIVITAS?

1. Civitas is a **plant health inducer** that has a pathogen suppressing effect. It acts by inducing a resistance response in grass.
2. Totally novel soft chemistry and mode of action.
  - Patent pending.

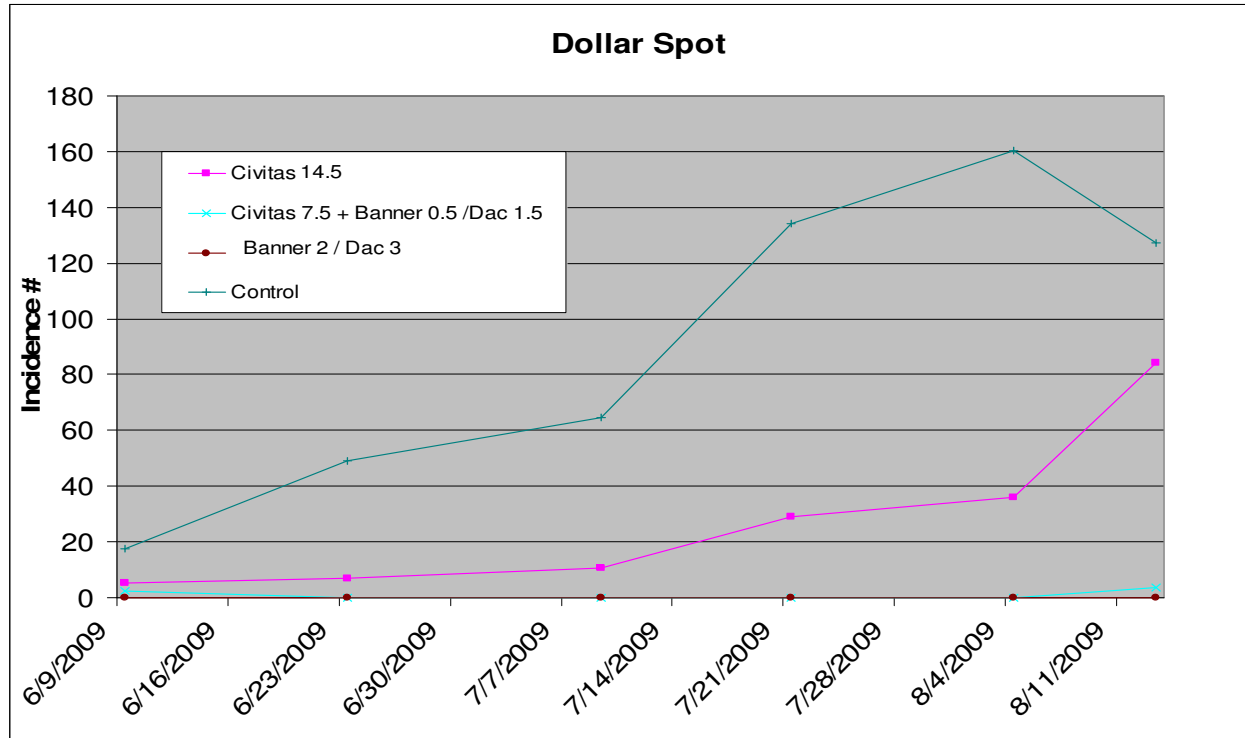


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# 2009 Dollar Spot

**CIVITAS tank mix with sub-lethal doses of Propiconazole/ Chlorothalonil provides excellent Control Under Severe Pressures**



Dr. Lane Tredway, North Carolina State, Lake Wheeler Turfgrass Field Laboratory in Raleigh, NC, 'Crenshaw' Creeping Bentgrass, Bi-Weekly Applications May through July 22



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# 2009 Dollar Spot

**CIVITAS tank mix with sub-lethal doses of Propiconazole/ Chlorothalonil provides excellent Control Under Severe Pressures**

	Rate, fl oz	Frequency	Dollar Spot incidence (Infection Centres)				
			9-Jun	23-Jun	9-Jul	21-Jul	4-Aug
1 1-Pack Civitas	17.3	AC/BOIK*	7	12	9.8	13	25.8
2 Civitas Hamolizer	14.5 0.9	AC/BOIK	5.5	7	10.8	29	35
3 Civitas Hamolizer Bahner MAXX 1.3ME Daconil Ultrex 82.5MG	14.5 0.9 0.5 1.5	AC/BOIK	2	0.5	0	0	0
4 Civitas Hamolizer Bahner MAXX 1.3ME Daconil Ultrex 82.5MG	7.25 0.45 0.5 1.5	AC/BOIK	2.3	0	0	0	0.0 b
5 Hamolizer Hamolizer Bahner MAXX 1.3ME Daconil Ultrex 82.5MG	14.5 0.9 0.5 1.5	AC/BOIK+BOIK	3.5	3.5	0	0	0
6 Bahner MAXX 1.3ME Daconil Ultrex 82.5MG	2 3	AC/BOIK	0	0	0	0	0
7 Untreated Control.....			17.5	49	64.8	134.3	160.3



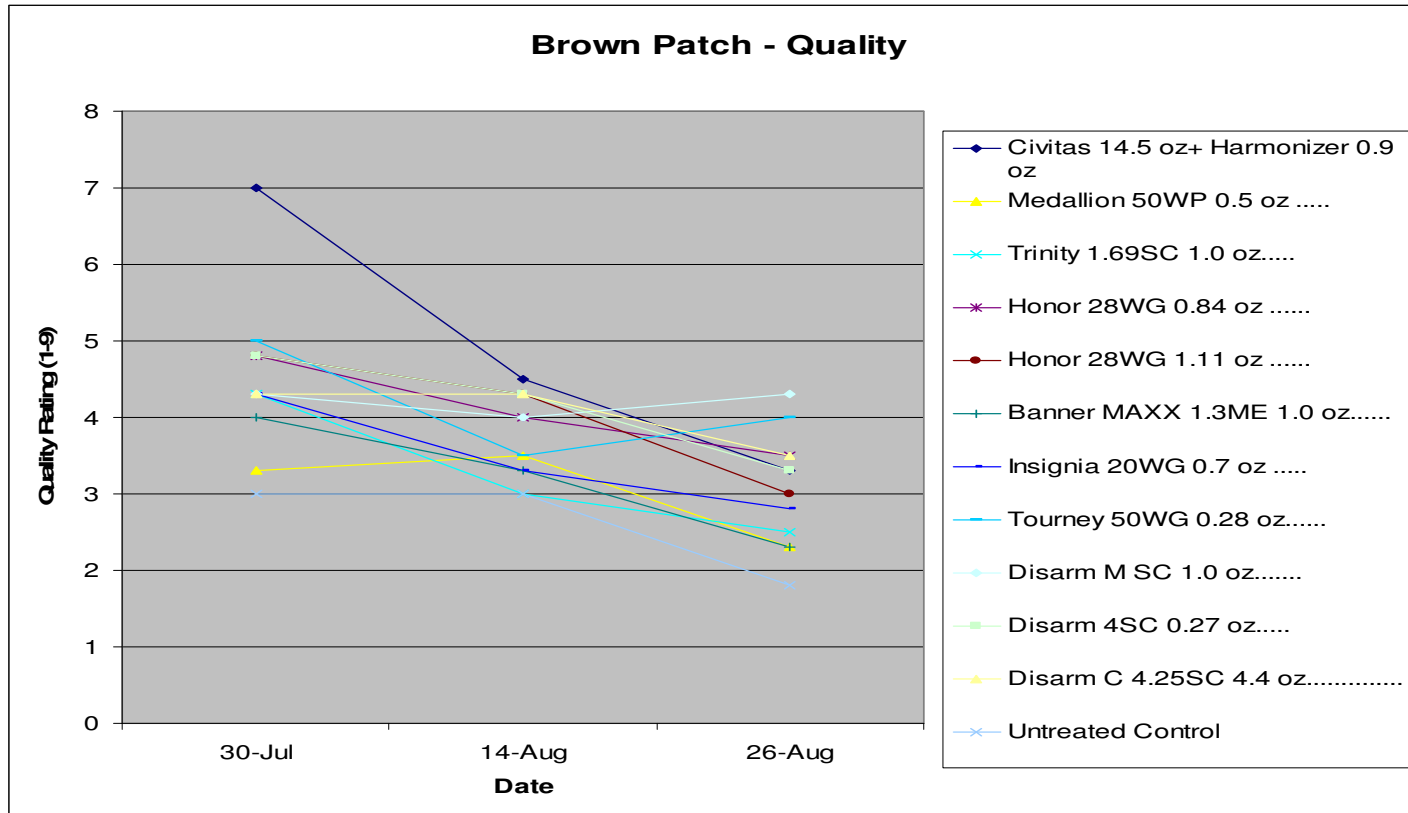
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Dr. Lane Tredway, North Carolina State, Lake Wheeler Turfgrass Field Laboratory in Raleigh, NC, 'Crenshaw' Creeping Bentgrass, Bi-Weekly Applications May through July 22

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# 2009 Brown Patch

## CIVITAS Greatly Improves Turf Quality



Dr Lane Tredway of North Carolina State University, 'L-93' creeping bentgrass Jackson Springs at the Sandhills Research Station Bi-Weekly applications from June 4 through August 14



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# 2009 Anthracnose Basal Rot

**CIVITAS provides excellent control**

Anthracnose						
Trt	Product	Rate / 1000 sq ft	Turf Area Infested (%)			
		fl oz	Schedule, days	03-Jul	14-Jul	24-Jul
1	Untreated Check		-3	13	21.3	44.3
2	CIVITAS	14.5	14	0	0	0
3	CIVITAS	14.5	14	0	0	0
	Banner MAXX 1.3ME	0.5				
	Daconil Ultrex 82.5WDG	1.8				
4	CIVITAS	7.25	14	0	0.3	0.3
	Banner MAXX 1.3ME	0.5				
	Daconil Ultrex 82.5WDG	1.8				
5	Banner MAX 1.3 ME	2	14	0	0.3	4
	Daconil Ultrex 82.5WDG	3.6				
6	Banner MAX 1.3 ME	0.5	14	0.3	1.8	10.5
	Daconil Ultrex 82.5WDG	1.8				
7	Dew Cure	4	14	2.3	7.3	16.3

Dr Bruce Clarke, Rutgers University, Annual Bluegrass Rutgers University  
Bi-Weekly applications from May through July

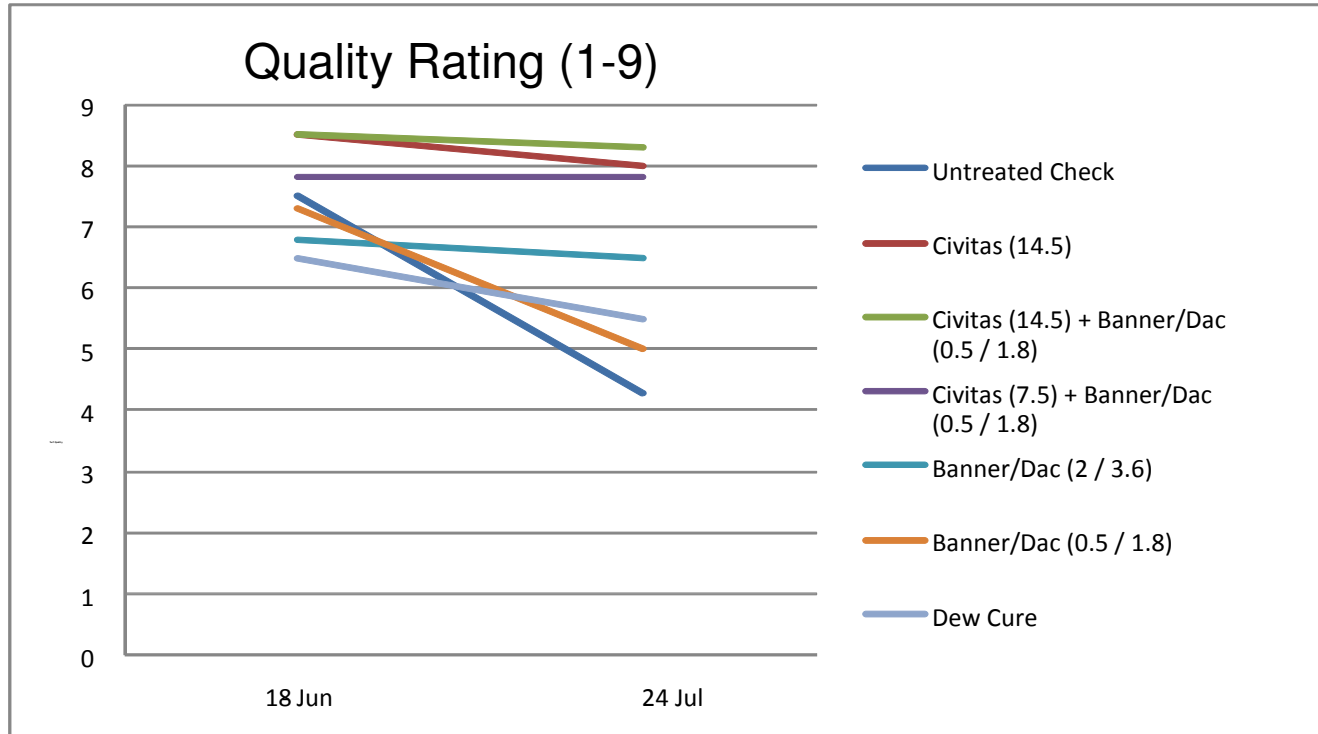


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# 2009 Anthracnose Basal Rot

## Outstanding Turf Quality after CIVITAS treatment



Dr Bruce Clarke, Rutgers University, Annual Bluegrass Rutgers University  
Bi-Weekly applications from May through July



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# 2009 Gray Leaf Spot

## Under Mild and Moderate Conditions CIVITAS Performs Well

Gray Leaf Spot				Disease Severity (0-10)				
Treatment	Application Rate (fl oz)	Application Interval	Jul-23	Aug-06	Aug-19	Aug-28	Sep-03	
Disarm C	Fluoxastrobin/ Chlorothalonil	4.4	14	0.3	0.3	0.7	0	0
Triton FLO	Triticonazole	1.1	14	0.7	1.7	0.3	0.3	0.3
Insigna	Pyraclostrobin	0.9	14	0.7	0	0	0.7	0
CIVITAS		16	14	0	0	0.3	0.3	0
CIVITAS		16	14	0	0.7	0.7	1.3	0.7
3336		2	14					
3336	Thiophanate methyl	4	14	1	1.3	1.7	1.7	1.3
Untreated Control				0.7	1.7	3	4	3.7

Dr. Wakar Uddin, Penn State, Ryegrass fairway, Range End Golf Course Harrisburg PA.  
14 day schedule July through Sept

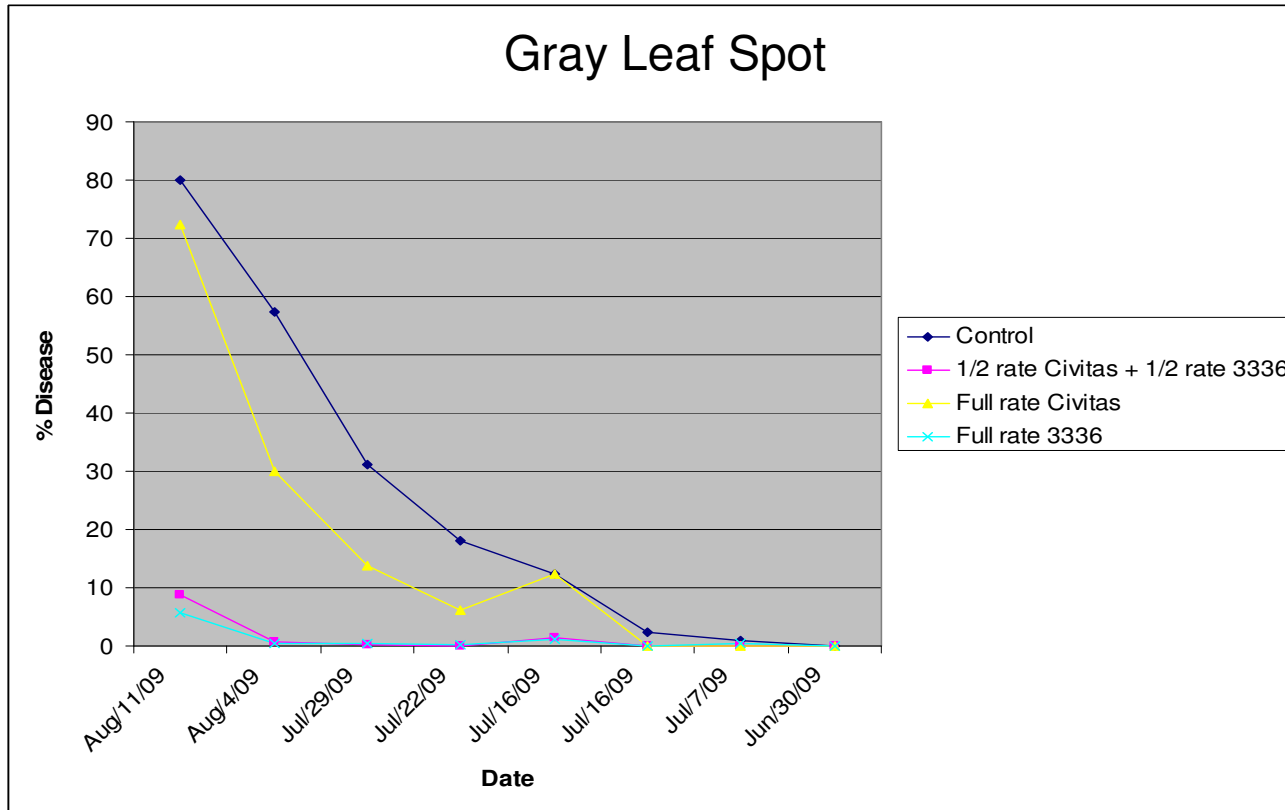


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# 2009 Gray Leaf Spot

## Tank Mix Works Under Severe Conditions



Dave McCall, Virginia Tech, Golf Course Virginia, ryegrass fairway, biweekly applications from June through Aug

# 2009 Dollar Spot

**CIVITAS alone and CIVITAS tank mixes (with sub-lethal dose tank mix partners) demonstrates outstanding results when compared with a full rate tank mix of Banner and Daconil**

	Rate, oz/1000	# of Spots					
		18-Jun*	2-Jul	17-Jul	31-Jul	14-Aug	28-Aug
Untreated Control		0.5	1.5	3	6.25	6.75	8.5
Civitas	14.5	0.25	0	0	0	0	0
Civitas Banner Maxx Daconil	7.25 0.5 1.5	1.25	0	0	0	0	0
Banner Maxx Daconil	2 3	0.5	0	0	0.5	0	0
Civitas Curlan	7.25 0.5	0.5	0	0	0	0	0
Curlan	1	1	0	0	0	0.25	0

Dr Brandon Horvath, UoTenn, Bentgrass Green, biweekly applications from June through Aug



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\*June 18<sup>th</sup> data variances considered statistically insignificant

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# 2009 Dollar Spot

The best turf quality is achieved when CIVITAS is applied.

	Rate, oz/1000	Turf Quality (1-9)					
		<u>18-Jun</u>	<u>2-Jul</u>	<u>17-Jul</u>	<u>31-Jul</u>	<u>14-Aug</u>	<u>28-Aug</u>
Untreated Control		7.5	7	6.63	6.38	6.25	6.13
Civitas	14.5	7.5	7.25	7.5	7.38	7.38	7
Civitas	7.25	7.5	7.38	7.38	7.63	7.38	7
Banner Maxx	0.5						
Daconil	1.5						
Banner Maxx	2	7.5	6.5	5.5	5.38	5.63	5.63
Daconil	3						
Civitas	7.25	7.5	7	7.25	7.25	7	7
Curlan	0.5						
Curlan	1	7.5	6.88	7	7.25	6.38	6.38

Dr Brandon Horvath, UoTenn, Bentgrass Green, biweekly applications from June through Aug



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# 2009 Resistance Study

There is No Negative Impact on Resistance when less than lethal doses of traditional fungicides are mixed with CIVITAS.

## **Objective:**

Determine whether using CIVITAS alone or in-combination with less than label rates of Propiconazole would cause the resistant population of dollar spot pathogen to increase.

## **Conclusions:**

- 1.No increase in resistant population was observed.
- 2.CIVITAS can be applied as often as one pleases without resistance development.

Dr. Geunhwa Jung, UMass, Joseph Troll Turf Research Center,  
South Deerfield MA

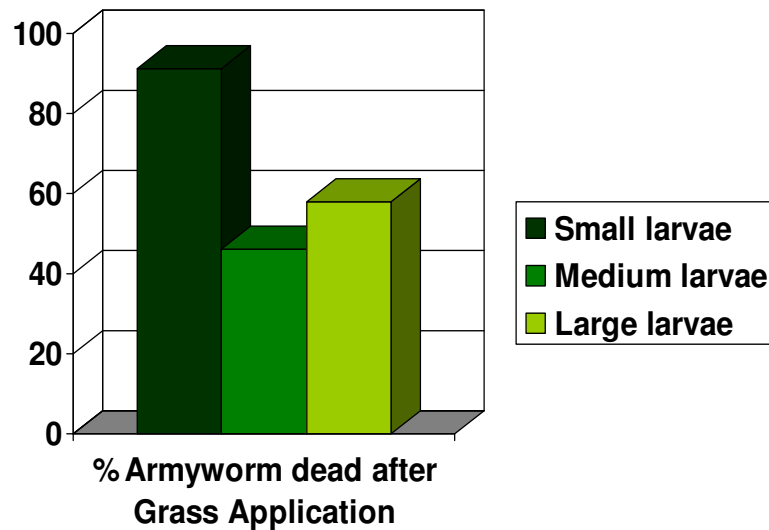


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# CIVITAS Insect Control, University of Florida

## CIVITAS significantly decreases Armyworm pressure on Bermuda Grass



*After just one application of CIVITAS, 94% of small larvae were knocked down\*\**

**Notes:**

Test conducted at the University of Florida by Dr. Ron Cherry, 2007 & 2009

CIVITAS was applied at 17oz/1000 sq ft.

\* CIVITAS is recommended for cool grass application. Warm grass and transition zone trials are underway. Bermuda efficacy shown for illustration purposes only.

\*\* Tested by Dr. Ron Cherry at the University of Florida in 2007.



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# Fertility Data

Preliminary data suggests CIVITAS decreases Fertilizer requirement by up to 50%

<u>Treatment</u>	Quality Rating (1-9)				
	<u>0%</u>	<u>25%</u>	<u>50%</u>	<u>75%</u>	<u>100%*</u>
<u>Untreated Control</u>	4.5	4.7	5	5.5	6.5
<u>Civitas 8oz-14day</u>	5.6	5	6.2	6.3	6

Dr Frank Rossi, Cornell University, 2009

*“Depending on the rate and interval reductions can be as great as 75% from existing levels, however conservatively most superintendents could reduce their fertilizer programs by 50% without any significant loss in turf quality or disease incidence.”*

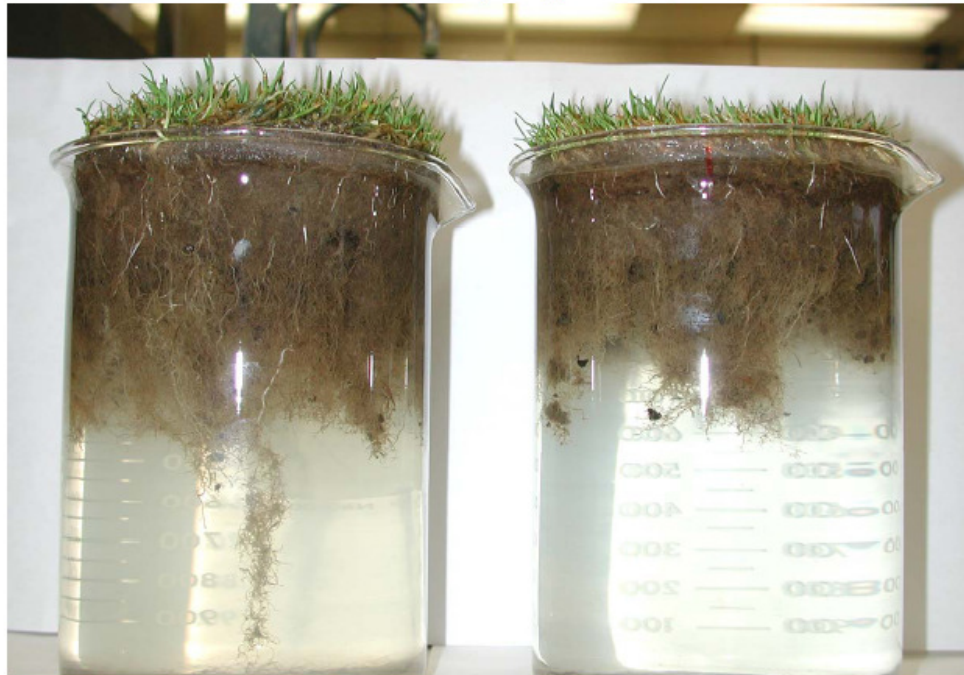


\* 2.5 lbs of actual nitrogen per 1000 square feet with ammonium sulfate, 0.25 lbs of actual phosphorus from monoammonium phosphate and 1.75 lbs of actual potassium from potassium sulfate. Supplemental iron was applied at 4 ounces of ferrous sulfate in each application. All fertilizer treatments were applied on a 10-14 day interval schedule commencing on June 14 and continued for 15 weeks to September 11; final Civitas treatments were made on September 27

# CIVITAS improves Plant Health

Preliminary data suggests CIVITAS enhances Root Length and Structure

Figure 3b:  
Comparison of Grass Core Samples (Civitas and Control) from Saginaw Golf Course –  
After Revealing Root System (April 03, 2009)



Civitas

April 03, 2009

Control

Saginaw Golf Course Core Sample (2009-04-01) – Root Density

April 19



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Discover your  
turfs inner strength.

# CIVITAS impacts Root Length

Preliminary data suggests CIVITAS enhances Root Length and Structure



Westin Golf and Country Club  
Ontario, Canada



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Discover your  
turfs inner strength.

# CIVITAS impacts turf recovery

**Preliminary data suggests CIVITAS provides better recovery from aeration, stress and damage**

Aeration recovery on Civitas Fairway (Nov 9)



Aerated Sept 24, 2009

Aeration recovery on other fairways (Nov 9)



Aerated Sept 24, 2009



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Discover your turf's inner strength.

# Recommended CIVITAS IPM Programs

- Dollar Spot
- Summer Patch
- Brown Patch
- Fusarium Patch
- Anthracnose
- Spring Leaf Spot/Melting Out
- Gray Leaf Spot
- Crown Rust

**NB.**

\* Civitas application rates do not include Harmonizer. This is added at a 16:1 ratio (Civitas:Harmonizer).

\* Do not apply CIVITAS and Chlorothalonil on Ryegrass

\* Maximum recommended rate of 1.5oz Chlorothalonil in tank mix with CIVITAS



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*This product should be tested on a small area prior to broad spectrum application.*

civitasur19.com

# Recommended CIVITAS IPM Programs

## Dollar Spot

Normal disease pressure (for early and late season)

<b>Preventative</b>	<b><u>Product</u></b>	<b><u>oz / 1000</u></b>	<b><u>Frequency, days</u></b>
	CIVITAS	16	14
<b>Curative</b>	<b><u>Tank Mix</u></b>	<b><u>oz / 1000</u></b>	<b><u>Frequency, days</u></b>
Option 1	CIVITAS	16	14-21
	Propiconazole (14.3% ai)	0.5	
Option 2	CIVITAS	8	7-14
	Propiconazole (14.3% ai)	0.5	
	Chlorothalonil (82.5% ai)	1.5	

## Summer Patch

<b>Preventative / Curative</b>	<b><u>Sequencing for Greens</u></b>	<b><u>oz / 1000</u></b>	<b><u>Frequency, days</u></b>
	CIVITAS	8	7
	Propiconazole (14.3% ai)	0.5	14
	Chlorothalonil (82.5%)	1.5	14

### **NB.**

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- \* Do not apply CIVITAS and Chlorothalonil on Ryegrass
- \* Maximum recommended rate of 1.5oz Chlorothalonil in tank mix with CIVITAS



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civitasur20.com

# Recommended CIVITAS IPM Programs

## Brown Patch

<b>Preventative</b>	<b><u>Product</u></b>	<b><u>oz / 1000</u></b>	<b><u>Frequency, days</u></b>
Option 1	CIVITAS	16	14
Option 2	CIVITAS	16	14
	Fludioxonil (50% ai)	0.25	
Option 3	CIVITAS	8	14
	Propiconazole (14.3% ai)	0.5	
	Chlorothalonil (82.5% ai)	1.5	
<b>Curative</b>	<b><u>Tank Mix</u></b>	<b><u>oz / 1000</u></b>	<b><u>Frequency, days</u></b>
	CIVITAS	16	14-21
	Propiconazole (14.3% ai)	0.5	

### **NB.**

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- \* Do not apply CIVITAS and Chlorothalonil on Ryegrass
- \* Maximum recommended rate of 1.5oz Chlorothalonil in tank mix with CIVITAS



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civitasur21.com

# Recommended CIVITAS IPM Programs

## Fusarium Patch

<b>Preventative</b>	<b><u>Product</u></b>	<b><u>oz / 1000</u></b>	<b><u>Frequency, days</u></b>
	CIVITAS	16	14
<b>Curative</b>	<b><u>Tank Mix</u></b>	<b><u>oz / 1000</u></b>	<b><u>Frequency, days</u></b>
	CIVITAS	16	21
	Propiconazole (14.3% ai)	0.5	

## Anthracnose

<b>Preventative</b>	<b><u>Product</u></b>	<b><u>oz / 1000</u></b>	<b><u>Frequency, days</u></b>
Option 1	CIVITAS	16	14
Option 2	CIVITAS	8	14
	Propiconazole (14.3% ai)	0.5	
	Chlorothalonil (82.5% ai)	1.8	

### **NB.**

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- \* Do not apply CIVITAS and Chlorothalonil on Ryegrass
- \* Maximum recommended rate of 1.5oz Chlorothalonil in tank mix with CIVITAS



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*This product should be tested on a small area prior to broad spectrum application.*

civitasur22.com

# Recommended CIVITAS IPM Programs

## Spring Leaf Spot / Melting Out

<b>Preventative and Curative</b>	<b><u>Tank Mix</u></b>	<b><u>oz / 1000</u></b>	<b><u>Frequency, days</u></b>
Option 1	CIVITAS	16	14
Option 2	CIVITAS Chlorothalonil (29.9% ai)	8 1.8	14

## Gray leaf Spot

### **Preventative and Curative**

<b><u>Tank Mix</u></b>	<b><u>oz / 1000</u></b>	<b><u>Frequency, days</u></b>
CIVITAS	8	14
Thiophanate methyl (50% ai.)	2	

## Crown Rust

<b>Preventative / Curative</b>	<b><u>Product</u></b>	<b><u>oz / 1000</u></b>	<b><u>Frequency, days</u></b>
	CIVITAS	16	14
<b>Preventative / Curative</b>	<b><u>Tank Mix</u></b>	<b><u>oz / 1000</u></b>	<b><u>Frequency, days</u></b>
	CIVITAS	16	21
	Propiconazole (14.3% ai)	0.5	

### **NB.**

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- Testing in the transition zone proved compatible and efficacious for disease control

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### Additional Testing:

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