



# An Introduction to Lawn care and Agriculture Products

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Technical Services.





## Outline

- Safety Moment
- About Suncor and Petro Canada
- Lawn Care and Agriculture Product Overview
- PureSpray
- Clear Choice
- CIVITAS
- Questions

# Safety Moment

- Emergency exits

# Suncor operations





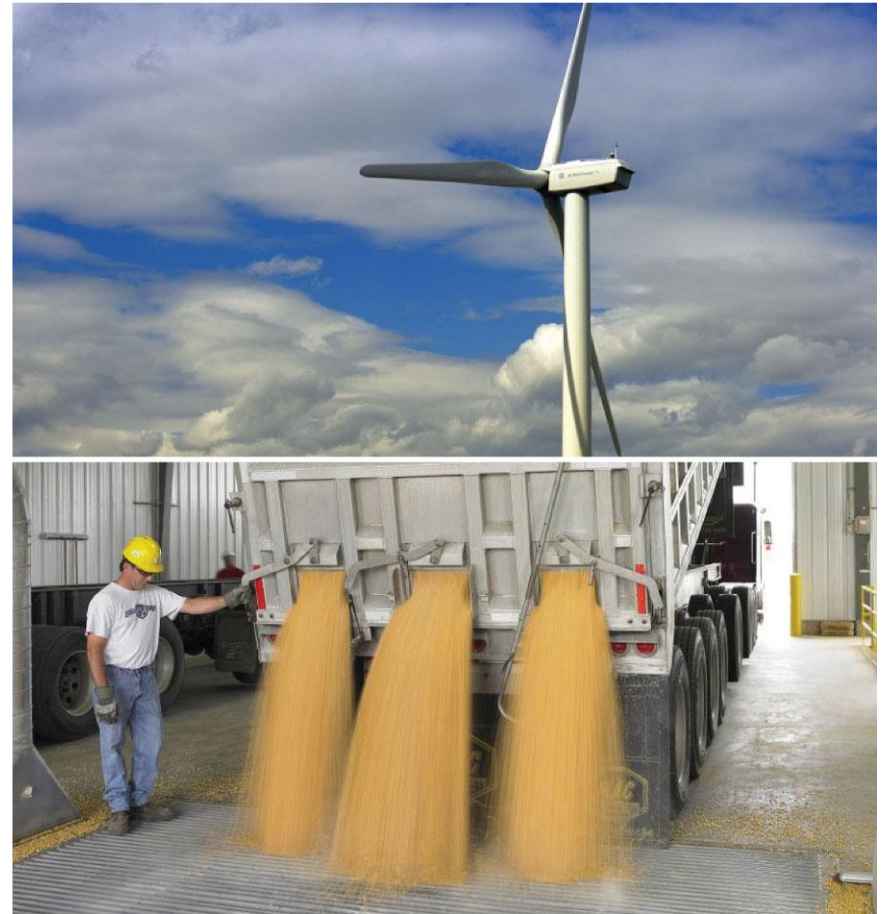
# Refining and Marketing

- A leading branded retail marketer in Canada
- Approximately **1,500 Petro-Canada branded retail service stations across Canada**
- Produces and distributes lubricant products to more than **70 countries**



# Suncor and renewable energy

- Six operating **wind power projects**: Ripley, Ontario; Kent Breeze, Ontario; Chin Chute (near Taber), Alberta; Magrath, Alberta; Wintering Hills, Alberta, Gull Lake, Saskatchewan
- **Canada's largest ethanol facility**, St. Clair Ethanol Plant, in Sarnia-Lambton Region of Ontario



# Community Investment and the Suncor Energy Foundation

- At Suncor, we are committed to **enhancing quality of life** through community investments
- Suncor Energy Foundation created in 1998 to manage our significant charitable donations
- **Have invested more than \$118 million in last 10 years in charitable and non-profit organizations** in key operating communities



# Petro-Canada Lubricants



- ❖ \$25 billion company that is growing its strategic portfolio of **safe and eco-friendly products**
- ❖ Selling 350 products in 72 countries
- ❖ State of the art manufacturing process produces 99.9% pure base fluids
- ❖ **Largest manufacturer of white oils worldwide**
- ❖ Over **2 decades of international crop protection expertise**
- ❖ **State of the art Research and Development** facilities and personnel that have developed **Patent Pending** technology:





# Lawncare & Agriculture Strategy



# Lawncare and Agriculture

## 3 innovative product lines

- **PureSpray Agricultural Spray Oil** – 25 years experience in regions such as Chile, Argentina, California, Canada
- **Clear Choice Herbicide**– Consumer retail reduced risk weed control product in the US
- **CIVITAS Fungicide** – 5 years experience



SEGMENT

Golf Course

Consumer

High Value Agriculture

# Brand Portfolio

## Portfolio Level

## Product Level

### Purpose

Transforming plant protection  
for more resourceful growth.



#### Promise

CIVITAS is professional turf protection that uses fewer inputs to create unparalleled turf conditions. With CIVITAS, turf managers cultivate more desirable turf using active ingredients more efficiently.



#### Promise

PureSpray is commercial crop protection that wards off multiple threats to help growers do more with less. With PureSpray, gives growers maximum flexibility in the way they grow and more wholesome harvests.



#### Promise

Clear Choice/ PureSpray GREEN Concentrate provide highly effective home lawn and garden protection that uses active ingredients more efficiently to manage threats. With Clear Choice/PSGC people can take pride in the lawns and gardens they grow and love.



**PureSpray™ GREEN**

Integration Strategies

***Apples Cherries Grapes***

*A Suncor Energy business*





# PureSpray™ GREEN

**Start Pure. Finish Strong.**



**The purest oil in the world**

## **Great efficacy and knock down**

- Broad spectrum control

## **No known pest resistance**

- Excellent rotational tool with chemicals

## **Safe on plants and the environment**

- No phytotoxicity
- Readily biodegradable

## **Proven technology**

- Not a new class of chemical
- Its been around for over 100 years
- BC summer use in 2011



# PureSpray™ GREEN

**Start Pure. Finish Strong.**



**The purest oil in the world**

## **Safety for humans and food**

- 0 days pre-harvest interval
- 12 hours restricted entry interval (REI)
- No residues

## **Spreader / sticker**

- Enhances other chemicals / nutrients

## **Inventory control**

- One oil for dormant and summer use

## **Organic**

- Recognized by Pro-cert, Eco-cert, PACS
- OMRI listed in U.S.





# PureSpray™ GREEN

**Start Pure. Finish Strong.**



**The purest oil in the world**

## **A highly pure, broad spectrum pesticide**

- Severely refined to remove all impurities
- Virtually no aromatics
- Pharmaceutical white oil (CAS # 8042-47-5)
- Patented food grade emulsifier
- Safe on plants and the environment

## **Enriched with Hydrophobic IsoParaffins**

- Highest paraffin content in the industry
- Like a liquid wax
- Similar to waxes found on many plant leaves

## **The mode of action is suffocation**

- Smothers the pest
- Good coverage is paramount
- P.M. and Mites - spray must reach upper & lower leaf surfaces
- No known pest resistance

# Dormant Use

## Pests, Rate and Application

### *Apples*

#### Pests

- San Jose scale and many other scales
- European Red Mite

#### Rate is 2% in water

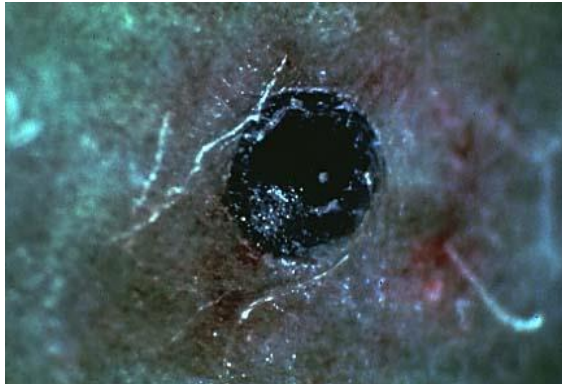
- 20 liters per 1,000 liters of water

#### Crops

- Apples, Pears, Peaches, Cherries, Plums
- Other crops

#### Application

- Apply mixture to bark until drip
- Refer to label for timing



**San Jose Scale  
Black Cap – First Instar**



**European Red Mite**



# APPLES - Summer Use

## Pests, Rate and Application

### Pests

- European Red Mites
- Powdery Mildew
- Excellent knockdown and control



### Rate is 10 L oil / ha

- Apply in 1,000 liters of water
- 1% at lower water rates

### Application

- Apply mixture to leaf until drip
- Good coverage is critical



# APPLE Integration Strategy

## Early season – most effective time

**Dormant  
Control**

***Early Season  
Control***

**Post Bloom  
Control**

Dormant

Green Tip

Bloom

Harvest

Use PureSpray™ GREEN: Half-inch Green to Pink

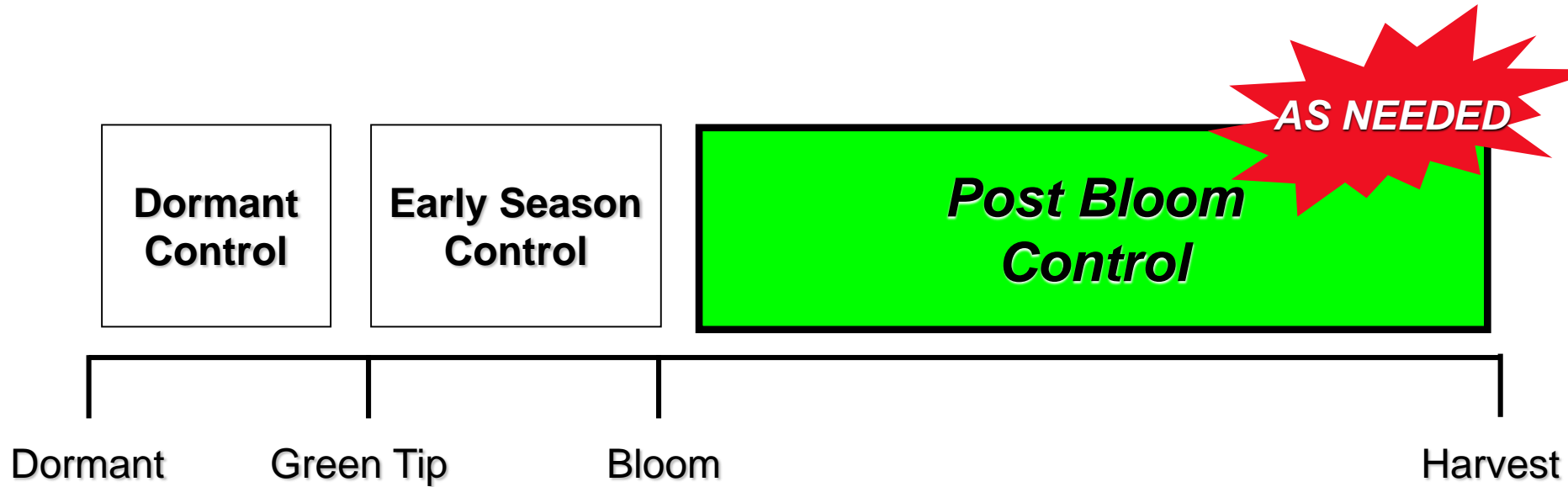
- European red mites
- Powdery mildew

Mix with Polyram (metiram), Dithane (mancozeb) or Manzate (mancozeb) for scab (see pub 360)





# APPLE - Mite and Powdery Mildew Flare Up



## PureSpray™ GREEN

- Summer mite and powdery mildew knock down
- Pre-harvest clean-up

## PureSpray™ GREEN (1%) + ReTain (Aviglycine hydrochloride)

*"PureSpray GREEN is an alternative to Sylgard where Sylgard is not an option (like in organic production)"*



# Integration Strategy - Cherries

## Powdery Mildew

Early Season

***Post Bloom  
Control***

Fruit  
Development

***Post Harvest  
Control***

Bloom

Petal Fall

Pit Hardening

Harvest

### Post Bloom Control

- Use PureSpray™ GREEN from Petal Fall to Pit Hardening
- Mix with synthetic fungicides to extend days of control
- Applications past pit hardening may affect fruit shine
- Broad spectrum control of powdery mildew and mites

### Post Harvest Control

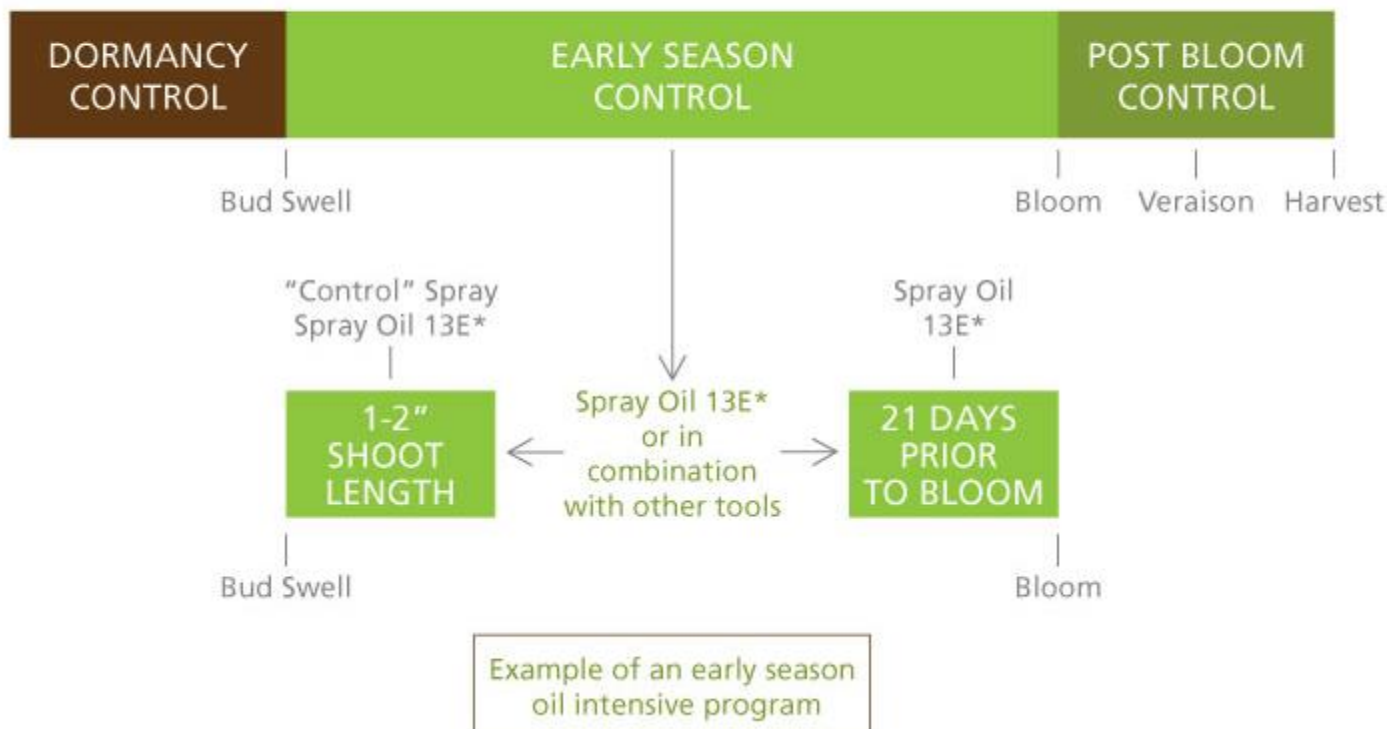
- Use PureSpray™ GREEN past harvest to reduce population of overwintering cleistothecia
- Start applications 7-10 days after harvest
- Apply every 2 weeks

***Summer spray for mites – as needed***



# Grapes-Powdery Mildew Control Periods

Early season is the most effective time to control powdery mildew.





# Summer Mite and Powdery Mildew Flare Up

Grapes

AS NEEDED

Dormant  
Control

Early Season  
Control

Post Bloom  
Control

Dormant

Bud Swell

Bloom

Veraison

Harvest

PureSpray™ GREEN alone, or with a miticide

- Immediate knockdown + plus days of control with systemic

No phytotoxicity – follow label use instructions

Oil will change waxy grape bloom

Do not use oil and copper together on fruit

Multiple late season use may slow brix formation

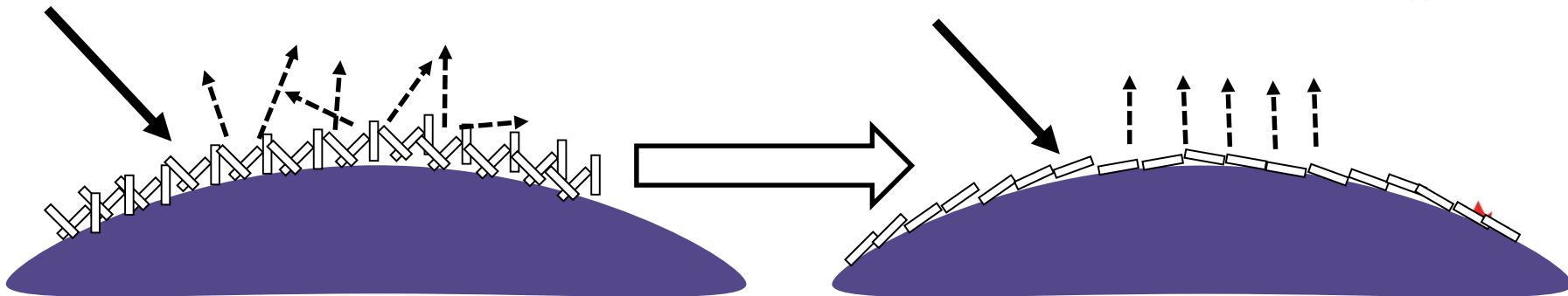


# Effect on Bloom

- Spraying PureSpray™ GREEN after berry set will effect fruit finish at harvest
  - Morphology of wax is changed...NOT removed
  - Oil causes wax platelets to lie down flat
  - Wax reflects light rather than scatters causing shiny appearance
  - “Removal” of bloom does not increase disease susceptibility

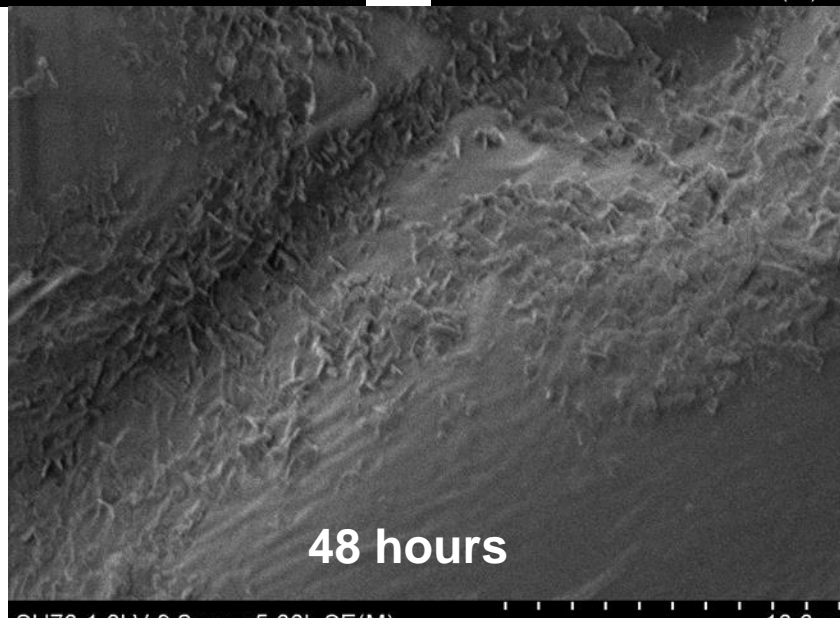
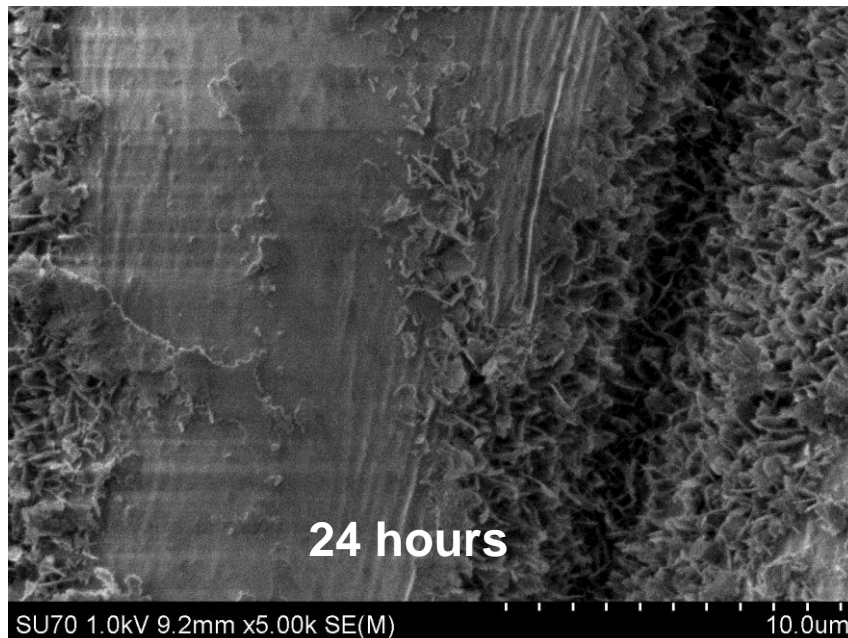
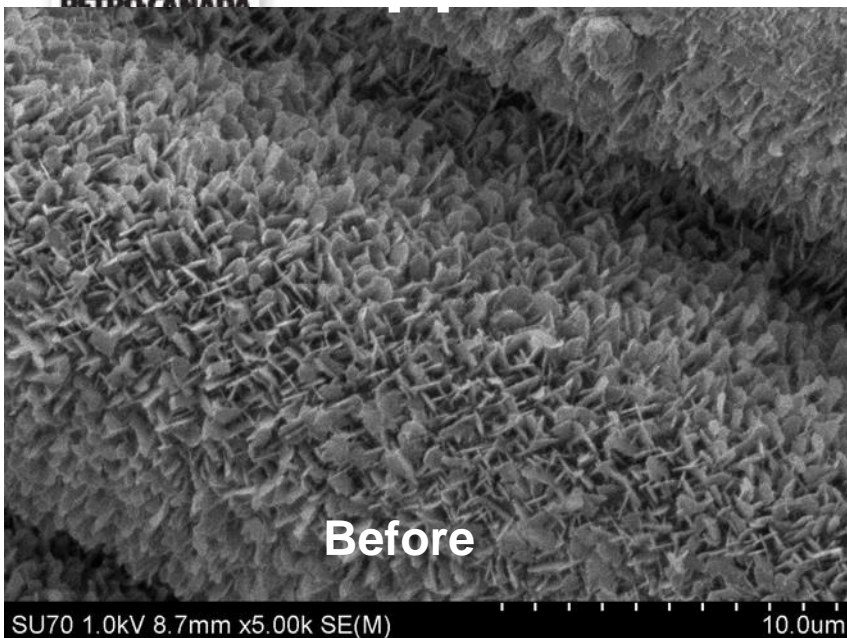


Oil at 2%





# Turfgrass Leaf after CIVITAS application 5000x







# Mineral Oils are not all the same

## PureSpray GREEN - Competitive Oil Comparison

	Typicals	
	PureSpray GREEN	Competitive Oil
CASRN of Technical Active*	8042-47-5	72623-84-8
Technical Active	IsoParaffin	Oil
Paraffin Content, wt%	100	92
Aromatic Content, wt%	0	8
Emulsifier	EPA List 4**	EPA List 3 or 2**
Organic OMRI Status	Listed	No
US National Organic Program Status	Approved	No
Patented Formulation	Yes***	No





# Comparison

## Oil vs. Sulphur

	<b><i>PureSpray GREEN</i></b>	<b><i>Sulphur</i></b>
<b><i>Operating Range</i></b>	<b><i>Wide 0C to 35C</i></b>	<b><i>Narrow 18C to 29C</i></b>
<b><i>Potential Plant Burn</i></b>	<b><i>Nil</i></b>	<b><i>More</i></b>
<b><i>Powdery Mildew Function</i></b>	<b><i>Eradicant Some Protectorate</i></b>	<b><i>Protectorate</i></b>
<b><i>Mites and Mite Eggs</i></b>	<b><i>Excellent Control</i></b>	<b><i>Limited Control</i></b>
<b><i>Organic</i></b>	<b><i>Yes</i></b>	<b><i>Yes</i></b>
<b><i>Environmental Impact</i></b>	<b><i>Low</i></b>	<b><i>Moderate</i></b>

# Precautions General



*PureSpray™ GREEN*

## **Captan / Oil interval**

- Do not use within 14 days before or after captan

## **Sulfur / Oil interval**

- Do not apply oil within **14 days** Sulfur spray
- Do not apply Sulfur within **10 days** of an oil spray

## **Cold temperatures**

- Do not spray within 24 hours of freezing (0°C)



<http://purespraygreen.com>



*Please Select a Crop*

*Grapes*



*Apples & Pears*



For information on PureSpray GREEN household products, please visit [todaysclearchoice.com](http://todaysclearchoice.com).





# Clear Choice Broadleaf Herbicides

Formulations

Consumer- RTU, Concentrate

Commercial- Concentrate

# Clear Choice™ Ready-to-Use Selective Herbicide eradicates broadleaf weeds while doing no harm to surrounding vegetation.



Before Treatment



2 Days After Treatment



15 Days After Treatment



University of Guelph, 2007

Clear Choice™ Selective Herbicides **reduces** the active ingredients (including 2,4-D) in comparison to other competitive products.

Controls broad-leaved plantain, narrow-leaved plantain, black medic, and white clover. Suppresses dandelion.

Low odor formulation



Active ingredients  
in other Conventional  
Herbicides



Active ingredients  
in **Clear Choice™**



# Canadian Label Comparison

## 3-way herbicide

**CAUTION**

**POISON**

**DANGER - EYE IRRITANT**

2,4-D (isomer specific) .....	190 g/L
Mecoprop (d-isomer) .....	100 g/L
Dicamba .....	18 g/L

## Clear Choice™ Concentrate Selective Herbicide

### PRECAUTIONS:

KEEP OUT OF REACH OF CHILDREN.



2,4-D (present as dimethylamine salt)	6.33 g a.e./L
Mecoprop-P (present as dimethylamine salt)	4.04 g a.e./L
Dicamba (present as dimethylamine salt)	0.78 g a.e./L



# US Label Comparison

## Popular 3-way herbicide

**KEEP OUT OF REACH OF CHILDREN**  
**DANGER**

**ACTIVE INGREDIENTS:**

Dimethylamine salt of 2,4-dichlorophenoxyacetic acid . . . . . 25.93%  
Dimethylamine salt of (+)-(R)-2-(2-methyl-  
4-chlorophenoxy)propionic acid . . . . . 6.93%  
Dimethylamine salt of dicamba: 3,6-dichloro-o-anisic acid . . . . 2.76%

**INERT INGREDIENTS:** . . . . . 64.38%

TOTAL 100.00%



## Clear Choice™ Concentrate Selective Herbicide

**KEEP OUT OF REACH OF CHILDREN**

**ACTIVE INGREDIENTS:**

2,4-D, dimethylamine salt\* . . . . . 0.885%  
Mecoprop-p, dimethylamine salt\*\* . . . . . 0.573%  
Dicamba, dimethylamine salt\*\*\* . . . . . 0.109%  
**OTHER INGREDIENTS:** . . . . . 98.433%  
**Total** . . . . . **100.000%**

# Application rate

Composition Clear Choice Concentrate Selective Herbicide - Canada (aka PRO)				
	2,4-D, acid, g/L	Mecoprop-P, acid g/L	Dicamba, acid g/L	Total AI, g/L
Clear Choice Concentrate S.H.	6.33	4.04	0.78	11.15
Killex commercial g/L	190	100	80	370

## Application Rates

	Herbicide Rate (L/ha))	Water (L/ha)	Total AI (g/Ha)	AI Reduction
Clear Choice Concentrate S.H.	40	281-468	446.00	<b>78%</b>
Clear Choice Concentrate S.H.	50	281-468	557.50	<b>73%</b>
Clear Choice Concentrate S.H.	60	>468	669.00	<b>67%</b>
*Clear Choice Concentrate S.H.	70	>468	780.50	<b>62%</b>
Killex commercial	5.5	299-1497	2035.00	<b>0%</b>

Approved rate by  
PMRA

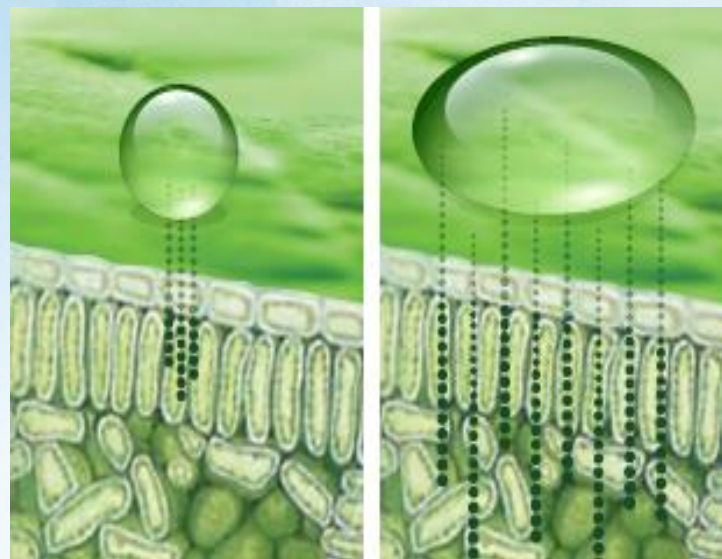
(\* Rate currently approved by PMRA)

# Microtechnology



## **More Surface Contact**

Clear Choice droplets cover more surface area of the plant.



## **More Absorption**

Carrier system delivers solution deeper into the plant, requiring less active ingredients.



## **Less Run-Off**

Clear Choice droplets cling to the surface of the plant reducing run-off.







# Consumer Trends

- Consumers who are wary of conventional lawn care and gardening products are **searching for effective, eco-friendly alternatives**
- **Safety benefit is important** and a motivating purchase factor.
- Connected to safety is environmental or green products.  
**Green products may be preferred but don't always work.**



<http://thegardeningrevolution.ca>

Join the Gardening  
**REVOLUTION**  
Finally, no compromise.

ABOUT THE  
REVOLUTION

OUR  
PRODUCTS

FIND A  
RETAILER

MEDIA  
CENTRE

RETAILER  
LOGIN

**YOU CAN'T GO WRONG WITH CLEAR CHOICE™\***  
**FINALLY, THERE'S A CLEAR CHOICE FOR BROADLEAF WEED CONTROL.\*\***



\*Clear Choice references the trademarked brand and captures the Clear Choice Ready-To-Use Herbicide product.

\*\*For control of white clover, broadleaf plantain, narrow-leaf plantain, black medick and suppression of dandelions. Always read and follow the label before using.

#### Join the movement

More and more people today are demanding a change for their lawns and gardens. They still want grass that's weed-free and they don't want insects infesting their plants. But they're increasingly concerned about the risks to their family, their pets and the environment from chemical solutions with high levels of active ingredients.

We call it The Gardening Revolution and we're proud to be at the forefront of it.

HOME

OUR PRODUCTS

WHERE TO BUY



# CIVITAS



™ Trademark of Suncor Energy Inc. Used under license.



# CIVITAS Sizes Available in Canada

Original 2 part CIVITAS and Harmonizer



CIVITAS 20 Liter pail

CIVITAS 1040 Liter intermediate bulk container (IBC)

2X1.25 Liter Harmonizer



National Partner





# CIVITAS™ Overview

- Contains white oil grade isoparaffins and food grade emulsifiers (OMRI certification)
- Mix with Harmonizer™ in a 16:1 ratio
  - Green pigment dispersion
- Effective against several turf diseases



# Antimicrobial activity

- Fungitoxic compound (tested against *R. solani*)

Control



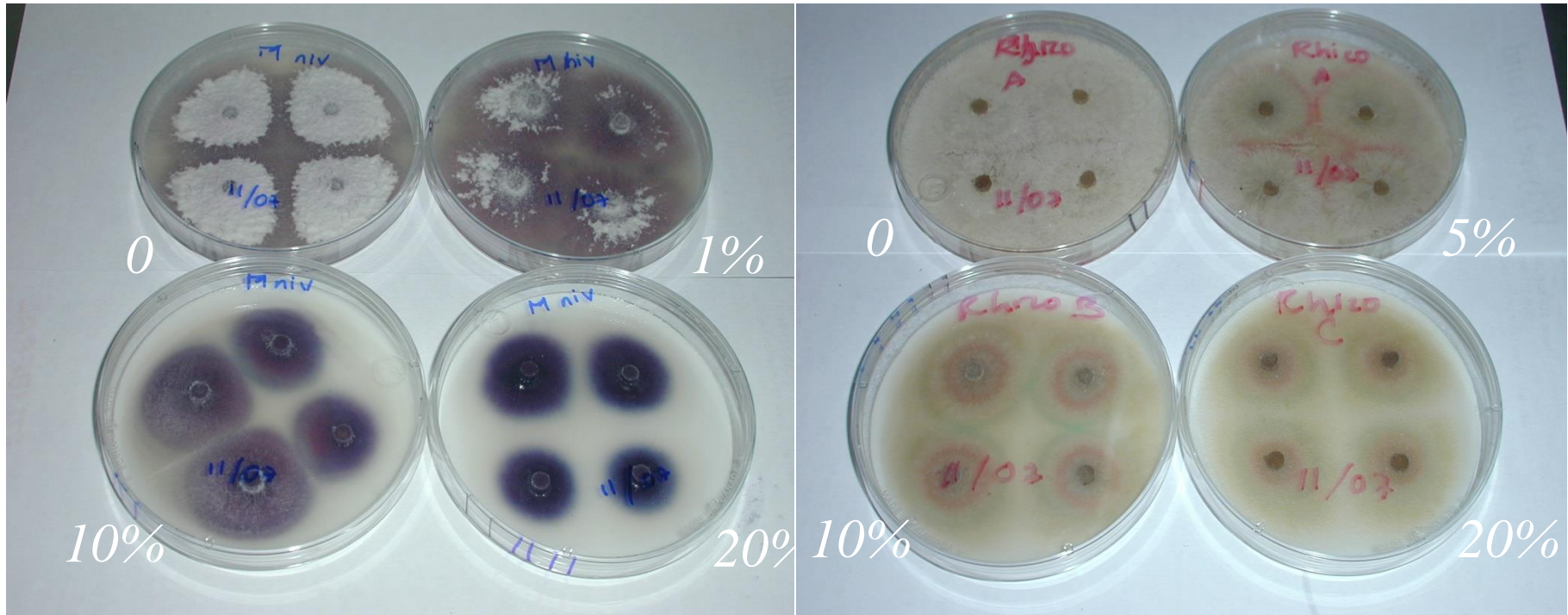
Amended





# Antimicrobial activity

- 16 turfgrass pathogens were tested on media amended with 0, 1%, 5%, 10% or 20% CIVITAS







# Field test: Aug 2006 Dollar spot trial

Treated

Un Treated

Image courtesy of T. Hsiang



# University of Guelph

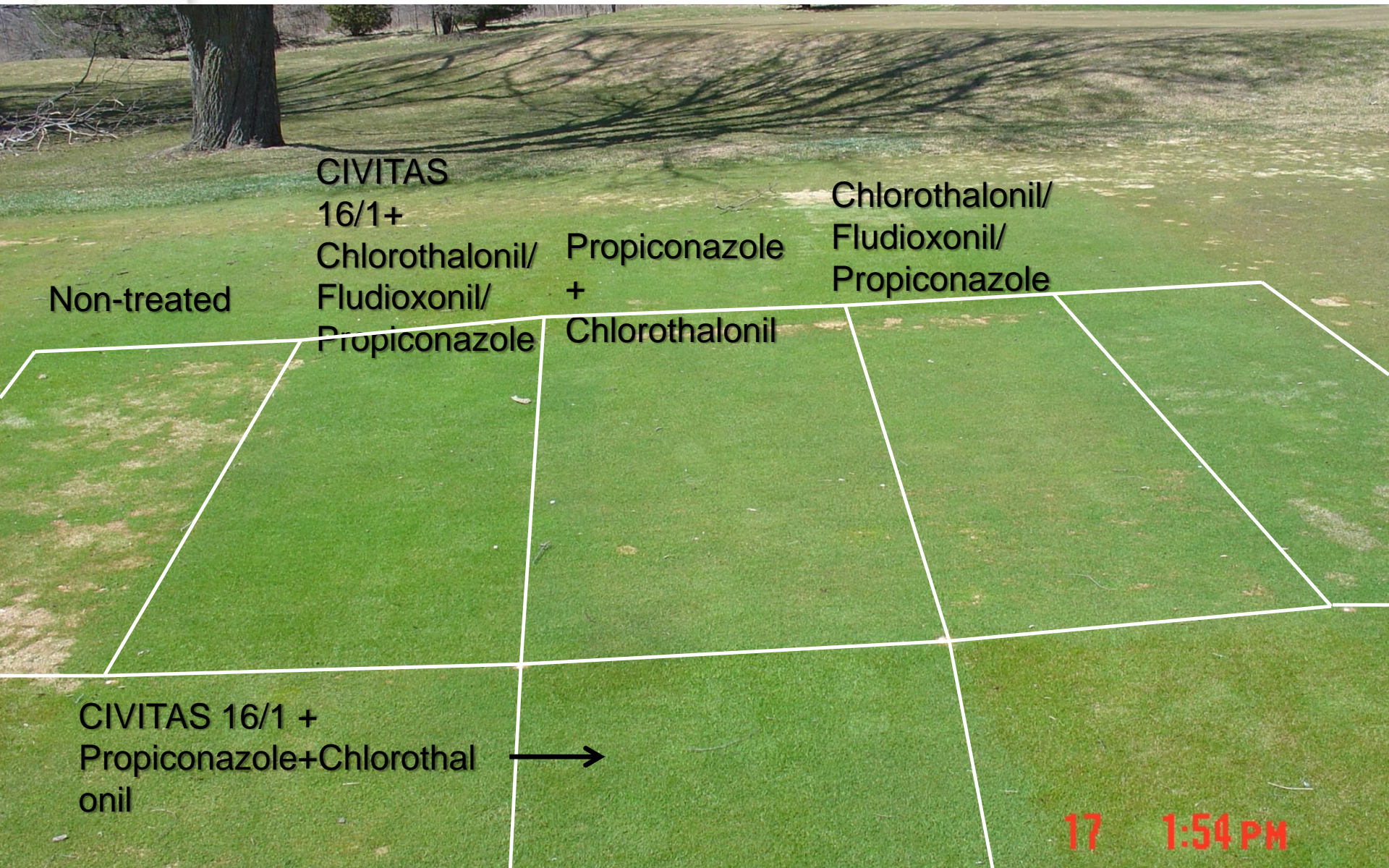
- Trial conducted at Guelph Turfgrass Institute
  - Creeping bentgrass green
- Plots inoculated with 3 snow mold pathogens
  - *Typhula incarnata*
  - *Typhula ishikariensis*
  - *Microdochium nivale*
- Plots covered with tarps to simulate winter snow cover and to prevent desiccation of snow mold inoculum







# 2012/2013 University of Guelph Snow Mold Trial







# 2012/2013 University of Guelph Snow Mold Trial

Treatment	Product/100 m <sup>2</sup>	Water/100 m <sup>2</sup>	Application Date		Turf Quality (1 – 9)*	
			6 Nov	20 Nov	22 April**	30 April**
1. Non-treated	-	-	-	-	2.5f	3.4g
2. Instrata	Experimental	10 L		x	6.3c	7.3c
3. Banner/Daconil Ultrex	Experimental	10 L		x	7.3b	7.6bc
4. CIVITAS/Harmonizer	460 ml/28.75 ml	10 L	x	x	5.4de	5.6def
5. CIVITAS/Harmonizer	Experimental	10 L	x	x	5.5d	6.3de
6. CIVITAS/Harmonizer	Experimental	10 L	x	x	5.8cd	6.4d
7a. CIVITAS/Harmonizer	460 ml/28.75 ml	10 L	x	x	8.5a	8.4ab
7b. Instrata	300 ml	10 L		x		
8a. CIVITAS/Harmonizer	460 ml/28.75 ml	10 L	x	x	8.6a	8.0ab
8b. Instrata	Experimental	10 L		x		
9a. CIVITAS/Harmonizer	460 ml/28.75 ml	10 L	x	x	8.8a	8.8a
9b. Banner/Daconil Ultrex	Experimental	10 L		x		

\*Turf quality assessed using the National Turfgrass Evaluation Program (NTEP) rating system, where 9 = ideal/high quality turf, 1 = dead/brown turf, and 6 = acceptable turf quality.

\*\*Numbers within columns followed by a letter in common are not significantly different.

CIVITAS improved early season turf quality when applied in combination with conventional snow mold chemistries.



National Partner



## Anthracnose

Fungicide (Some product names)	FRAC Code <sup>a</sup>	Efficacy <sup>a</sup>	Interval (days)
<b>azoxystrobin</b> (Heritage)	11	3	14-28
<i>Bacillus licheniformis</i> (EcoGuard)	NC	L	3-14
<i>Bacillus subtilis</i> , strain QST 713 (Rhapsody)	NC	L	7-10
chlorothalonil (Daconil Ultrex, Manicure, Concorde SST, Chlorostar, Echo, Pegasus L)	M5	3	7-14
fenarimol (Rubigan)	3	2	30
fludioxonil (Medallion)	12	2+	14
fluoxastrobin (Disarm)	11	3	14-28
fosetyl-AI (Chipco Signature)	33	NA <sup>c</sup>	14
hydrogen dioxide (Zerotol)	NC	L	7
iprodione (Chipco 26 GT)	2	NA <sup>c</sup>	Unspecified
metconazole (Tourney)	3	3	14-21
mineral oil (Civitas)	NC	3	7-21
myclobutanil (Eagle)	3	2	14-21
penthiopyrad	7	4 <sup>d</sup>	14
phosphite (salts of phosphorous acid) (Alude)	33	2 to 3 <sup>e</sup>	14
polyoxin D (Affirm)	19	3	7-14
propiconazole (Banner, Spectator, Savvi)	3	2	14-28
pyraclostrobin (Insignia)	11	3	14-28
tebuconazole (Torque)	3	3	28
thiophanate-methyl <sup>b</sup> (Cleary's 3336, Fungo, Systec 1998, Cavalier, T-Storm)	1	2	10-14
triadimefon (Bayleton, Proturf Fungicide VII)	3	1+	14-45
trifloxystrobin (Compass)	11	3+	14-21
triticonazole (Trinity, Triton)	3	3	14-28

<sup>a</sup> NC = Not classified.

<sup>b</sup> Isolates of *C. cereale* resistant to azoxystrobin (and related Qol fungicides) and/or thiophanate methyl are very common in numerous locations.

<sup>c</sup> NA = not applicable. The Chipco 26GT and Chipco Signature labels require tank-mixing with selected fungicides for anthracnose control; poor control can be expected from each product when sprayed alone.

<sup>d</sup> More effective when used preventively as compared to curatively.

<sup>e</sup> More effective for controlling anthracnose on *Poa annua* than on creeping bentgrass.



# Plant Activator Products

- Use the plants natural defense system
- Involves local and systemic signaling
  - Responses induced with biotic or abiotic activators
- Two main types studied
  - SAR (systemic acquired resistance)
  - ISR (induced systemic resistance)
- Some also have direct antimicrobial activity





# Contrast in terminology associated with resistance inducing agents and fungicides

What an induction agent does	What a fungicide does
Activates defense responses	Controls pathogens
Defense mechanisms remain active for ... days	Has residual activity for ... days
Activated plants defend against ...	The compound is active against ...

Tally A., Oostendorp M., Lawton K., Staub T., Bassi B. 2000. Commercial Development of Elicitors of Induced Resistance to Pathogens. Induced Plant Defenses Against Pathogens and Herbivores. APS Press. Pg. 367.





# ISR Induced Systemic Resistance

- Initially identified in cucumber
  - Beneficial bacteria on roots provided protection against foliar pathogen
- Involves signaling hormone ethylene and jasmonic acid
- Signal moves from initially infected/treated leaf to rest of plant
- Primes plant for defense-related protein production





# ISR

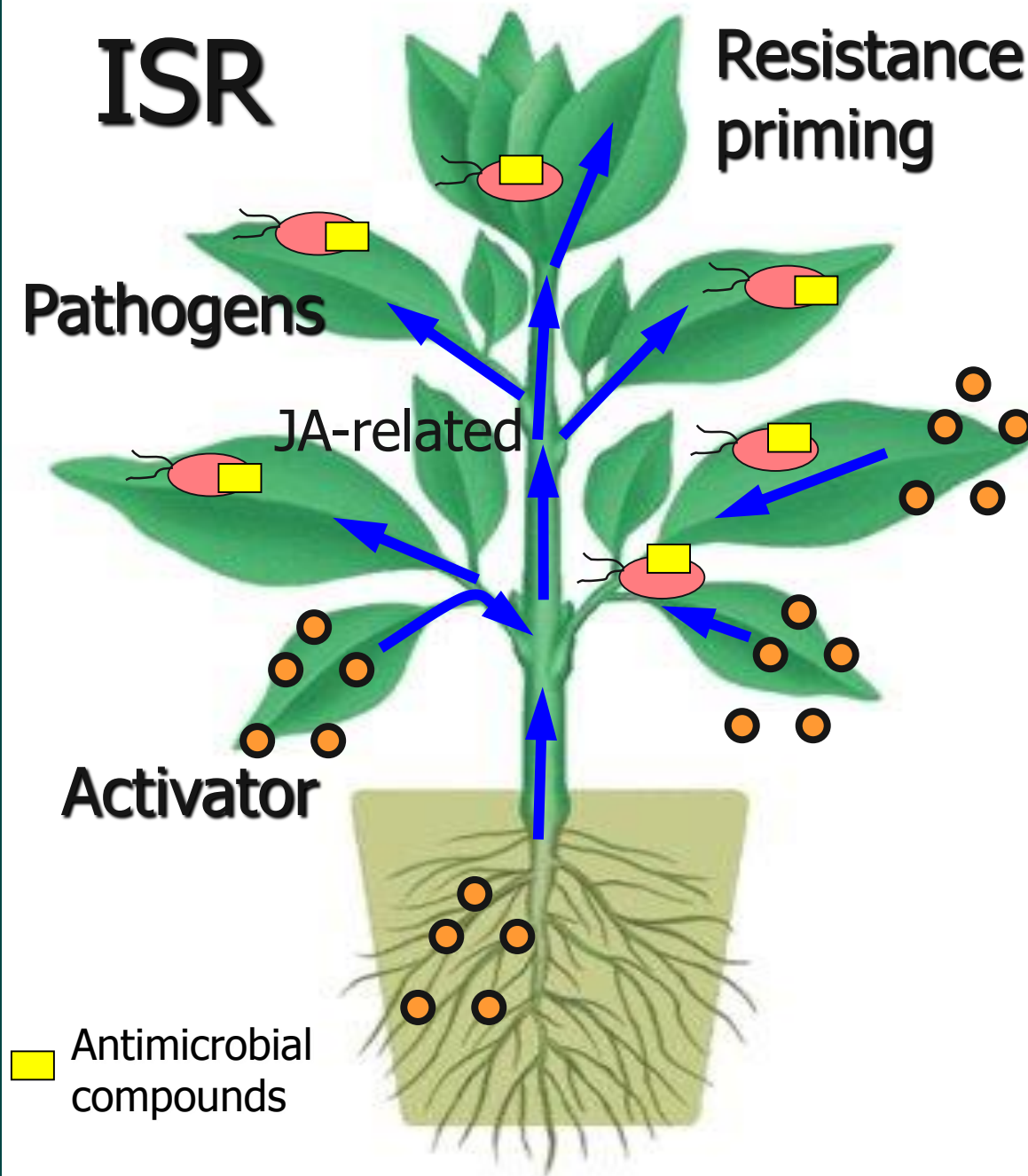
## Resistance priming

### Pathogens

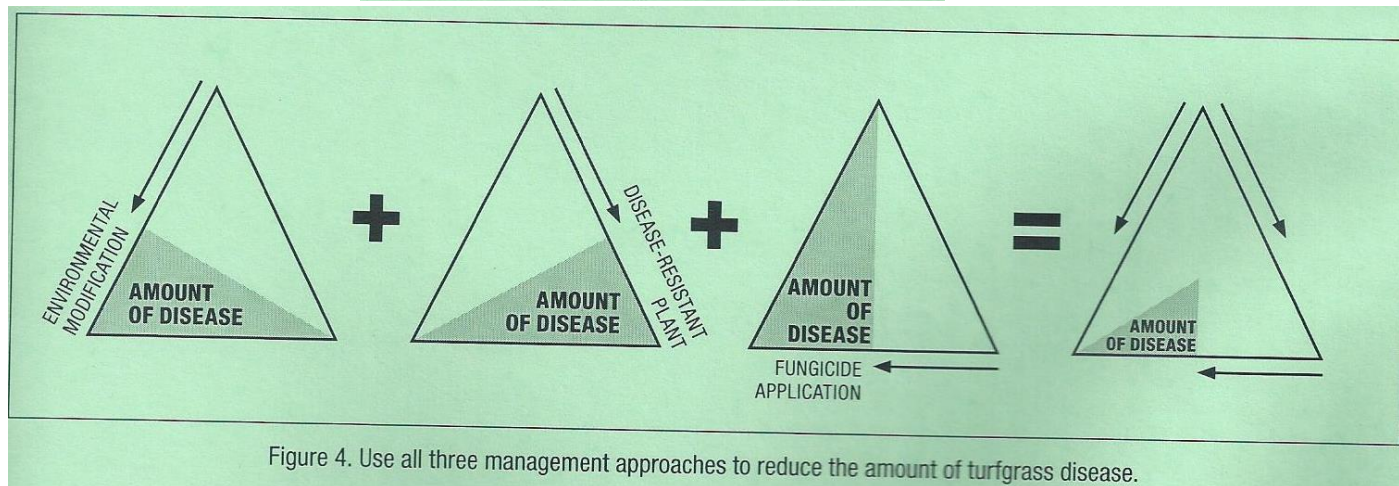
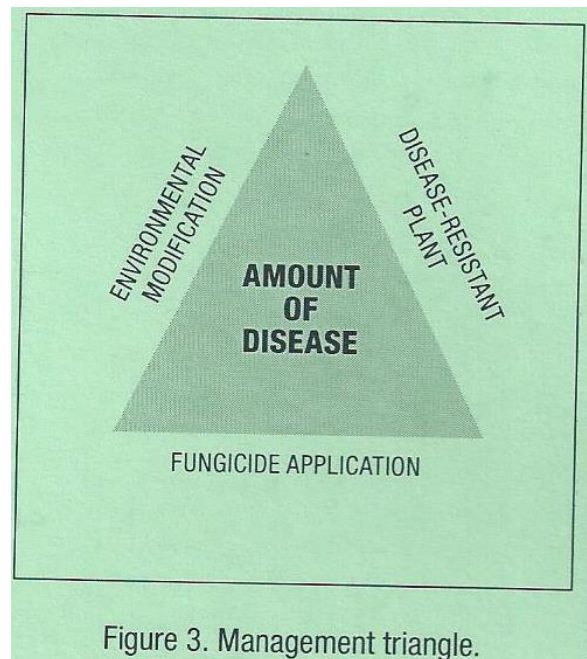
### JA-related

### Activator

 Antimicrobial  
compounds

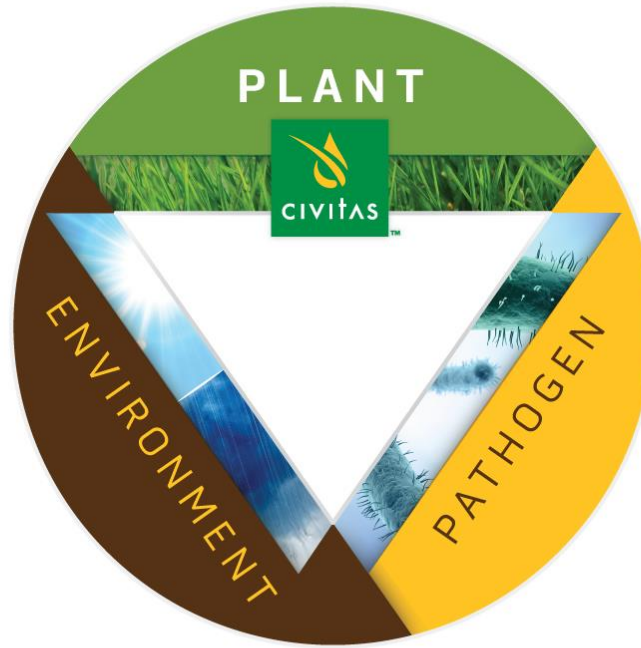


# Making it work - through IPM





# Two sides don't tell the whole story





# The Future

- Identity changes
- Re branding
- Regulatory







**Consumer Clear choice & PureSpray**

<http://thegardeningrevolution.ca>

**Commercial PureSpray**

<http://purespraygreen.com>

**CIVITAS**

<http://www.civitasturf.ca>

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