

## Modes of Action of Turfgrass Defense Activators



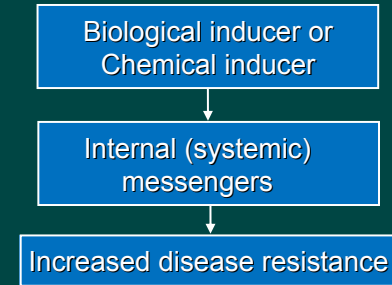
## Activated defense

- Utilize a plant's **natural** resistance responses
  - against abiotic stresses
  - against insects
  - against diseases

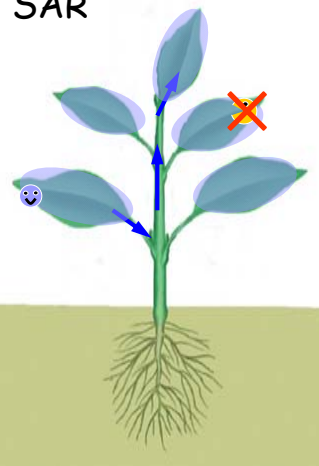


## Stimulating disease resistance response

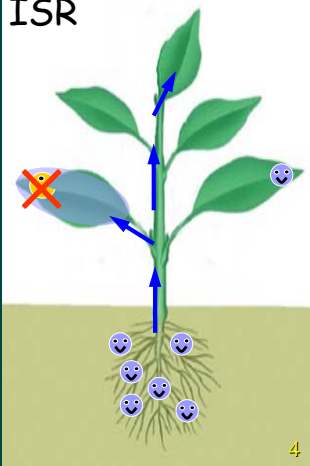
- Two main forms:
  - Systemic acquired resistance (**SAR, induction**)
  - Induced systemic resistance (**ISR, priming**)



### SAR



### ISR



## Resistance Activators

- Phosphites** (SAR)
  - Aliette, Appear, SwardPhite, Magallan, Alude...
- Benzothiadiazole/Acibenzolar** (SAR)
  - Actigard
  - Dac Action (Daconil + Actigard)
- Chelated metals?** (ISR)
  - Chelated iron (e.g. Fiesta)
- Civitas** (mineral oil) + **Harmonizer** (chelated Cu) (ISR)
- Silicon, butanediol**, humic acid... (ISR)

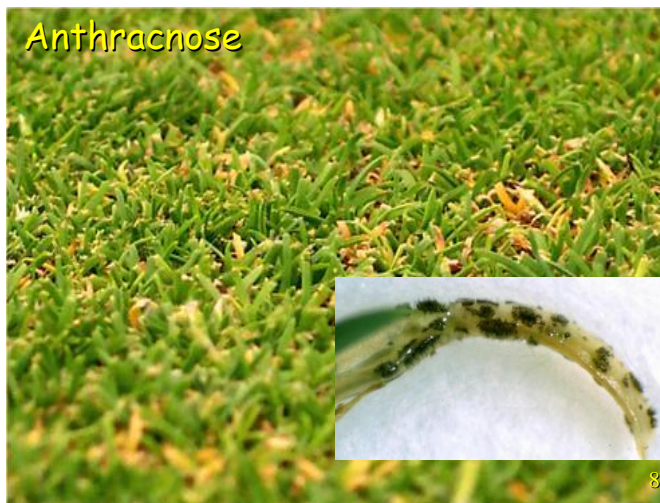
## Activating defenses - consequences

- can reduce growth rates
- can slow plant development
- can lower crop yield
- stressed plants show even more negative effects
- can cause plant death (if too much)
- Think of activators like steroids

## Relative effectiveness of conventional fungicides vs. defense activators



## Anthracnose



## Anthracnose control (4=excellent)

DMI's	Strobies	Civitas	Phosphite
Banner, Eagle, Premis, Triton, Tourney, etc	Heritage, Insignia, Compass		
2.5	3.0	3.0	2.5

Fungicide efficacy from Vincelli (2015), PPA-1, summarizing hundreds of tests



## Brown Patch



10

## Brown patch control (4=excellent)

DMI's	Strobies	Civitas	Phosphite
Banner, Eagle, Premis, Triton, Tourney, etc	Heritage, Insignia, Compass		
<b>2.6</b>	<b>3.8</b>	<b>??</b>	<b>??</b>

Fungicide efficacy from Vincelli (2015), PPA-1, summarizing hundreds of tests

11

## Dollar Spot



12

## Dollar spot control (4=excellent)

DMI's	Strobies	Civitas	Phosphite
Banner, Eagle, Premis, Triton, Tourney, etc	Heritage, Insignia, Compass		
<b>3.8</b>	<b>2.0</b>	<b>2.0</b>	<b>??</b>

Fungicide efficacy from Vincelli (2015), PPA-1, summarizing hundreds of tests

13

## Pythium blight



14

## Pythium blight control (4=excellent)

DMI's	Strobies	Civitas	Phosphite
Banner, Eagle, Premis, Triton, Tourney, etc	Heritage, Insignia, Compass		
<b>0</b>	<b>2.3</b>	<b>??</b>	<b>2.3</b>

Fungicide efficacy from Vincelli (2015), PPA-1, summarizing hundreds of tests

15

## Fusarium patch



16

## Fusarium patch control (4=excellent)

DMI's	Strobies	Civitas	Phosphite
Banner, Eagle, Premis, Triton, Tourney, etc	Heritage, Insignia, Compass		
<b>2.3</b>	<b>2.8</b>	<b>1</b>	<b>??</b>

Fungicide efficacy from Vincelli (2015), PPA-1, summarizing hundreds of tests

17

## Conclusions

- Resistance activators can provide suppression of some diseases in certain circumstances, but may not work as well as conventional fungicides
- Their advantage is greater societal and hence governmental acceptance, and within a framework of increasing restrictions on synthetic fungicides, they may become more important in turf management

18