Pecan Disease Management

2019 Beginner's Pecan Production Course

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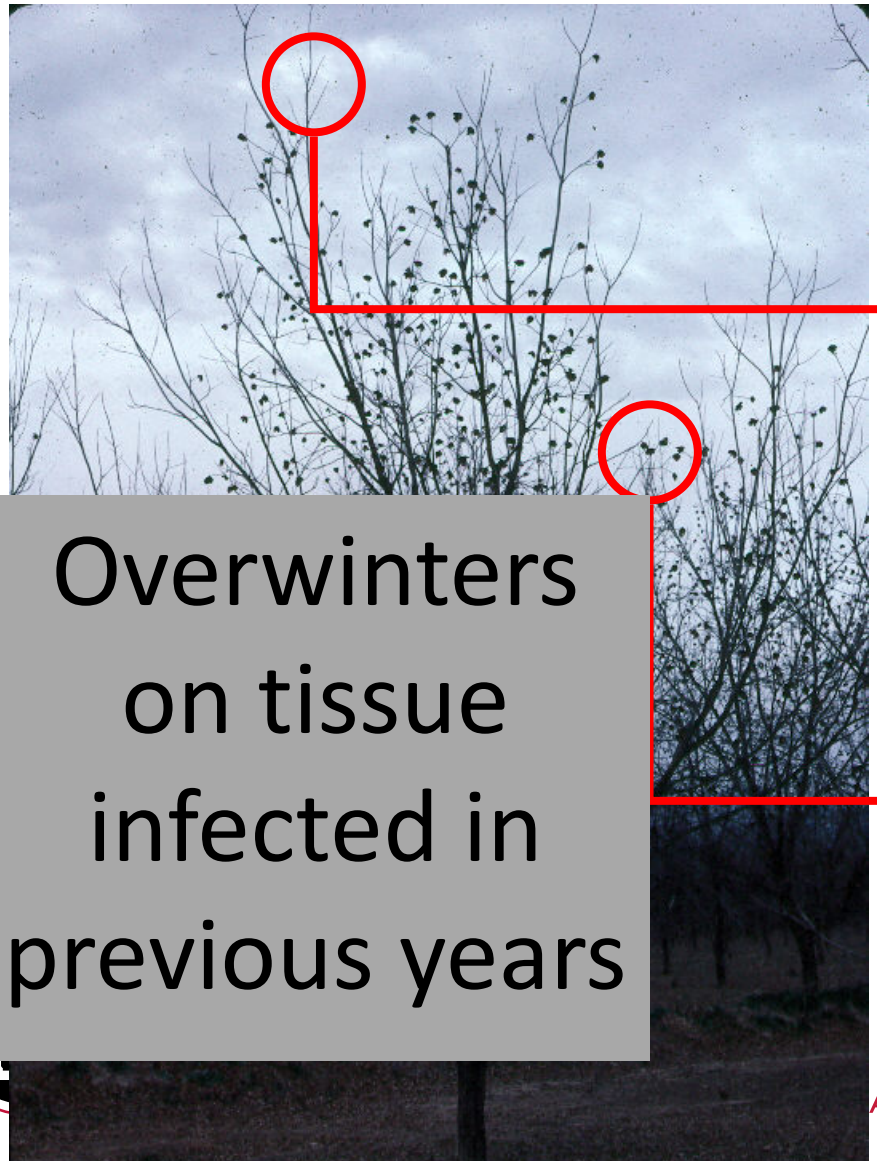
Pecan Diseases

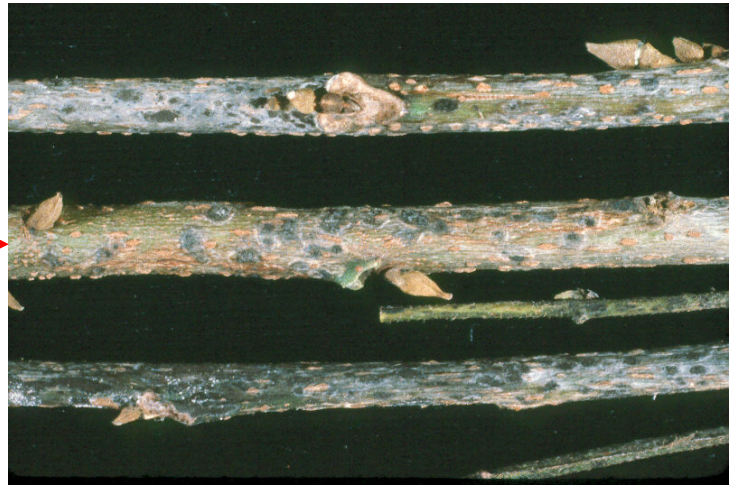
- Scab
- Bacterial leaf scorch
- Downy spot
- Zonate leaf spot
- Powdery mildew
- Anthracnose
- Phytophthora shuck rot
- Many other minor diseases

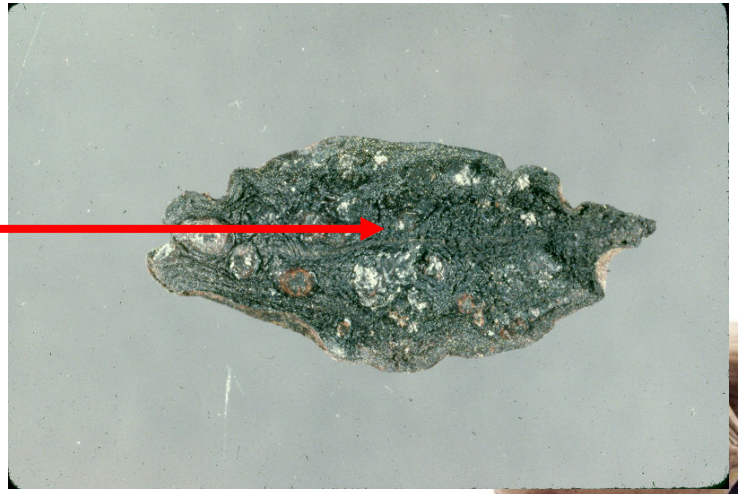
Pecan Scan

- Caused by the fungus *Venturia effusa* (*Fusicladium effusum)*
- a known problem since 1888
- the driving force in pecan disease management

Pecan Scab







Overwinters on tissue infected in previous years

Pecan Scab

- Temperature range: 50-95 ˚F
- 12 hours of wetness required?
  - Reported to occur within 4-6 hours
- Combined effects of duration of wetness & temperature not fully understood.

Pecan Scab

- Rain frequency is more important than total rainfall.
- Heavy rain at any time of day favors scab.
- Light evening rain that keeps trees wet all night lead to more scab than rainfall ending early enough to allow trees to dry.

Pecan Scab Symptoms

On current-season twigs

- Infected in the rapid growth stage
- Lesions are elongated
- Dieback is uncommon except in very susceptible cultivars
- Will serve as inoculum source in following years

Pecan Scab Symptoms

On immature, expanding leaves

- black spots (1-5 mm)
- appear velvety or rough
  when sporulating
- More common on lower surface
- Upper & lower lesions
  do not always match.

Pecan Scab Symptoms

- Leaves are most susceptible 7 – 21 days after bud-break
- New leaves & shoot elongation for ~ 90 days
- March – April – May

Leaf Scab Damage

- Reduced photosynthesis
- Leaf retention in the fall

- Source of inoculum

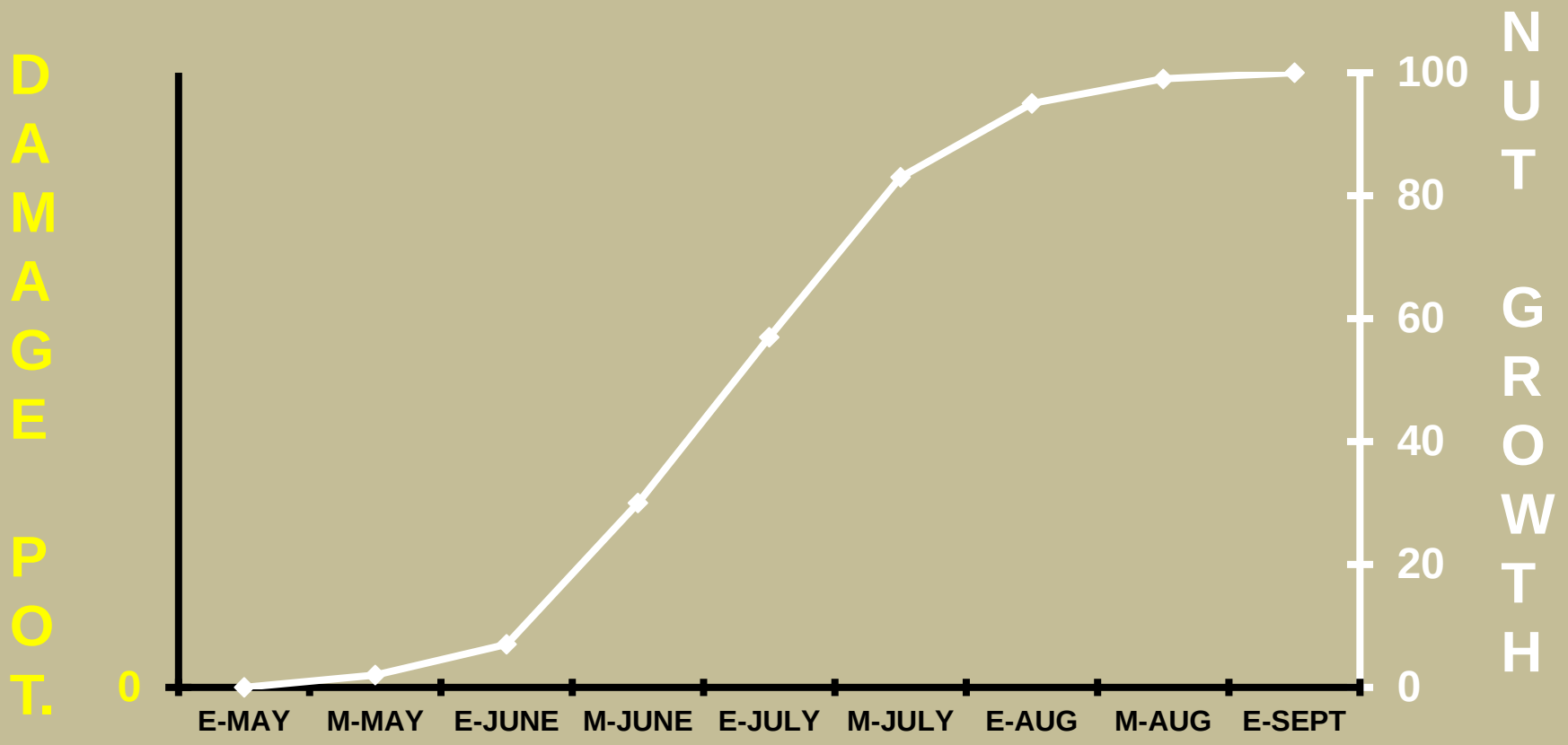
Pecan Scab Symptoms

On shucks

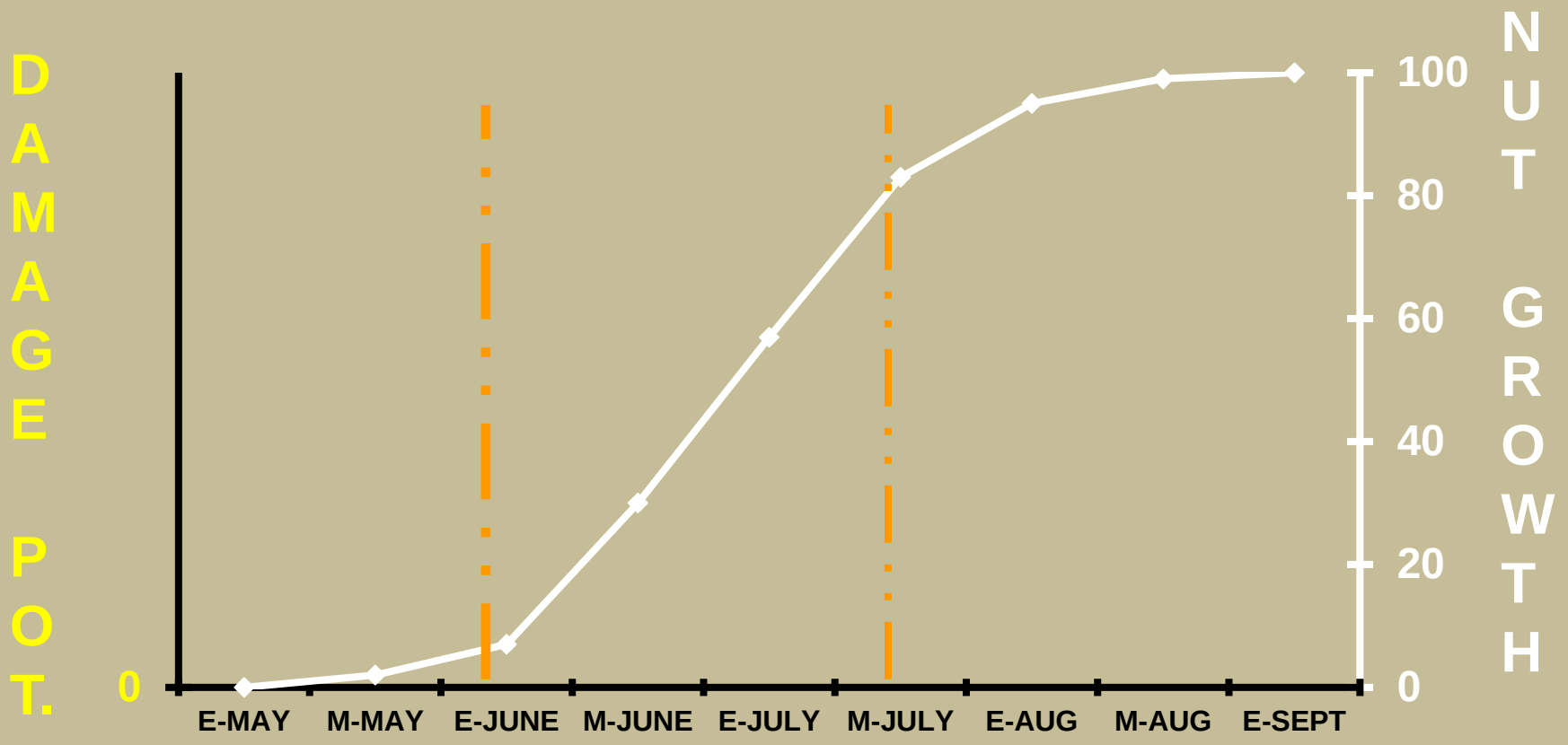
- lesions are circular (2-8 mm)
- Once the shell hardens,

subsequent infection is apparently more cosmetic then damaging.

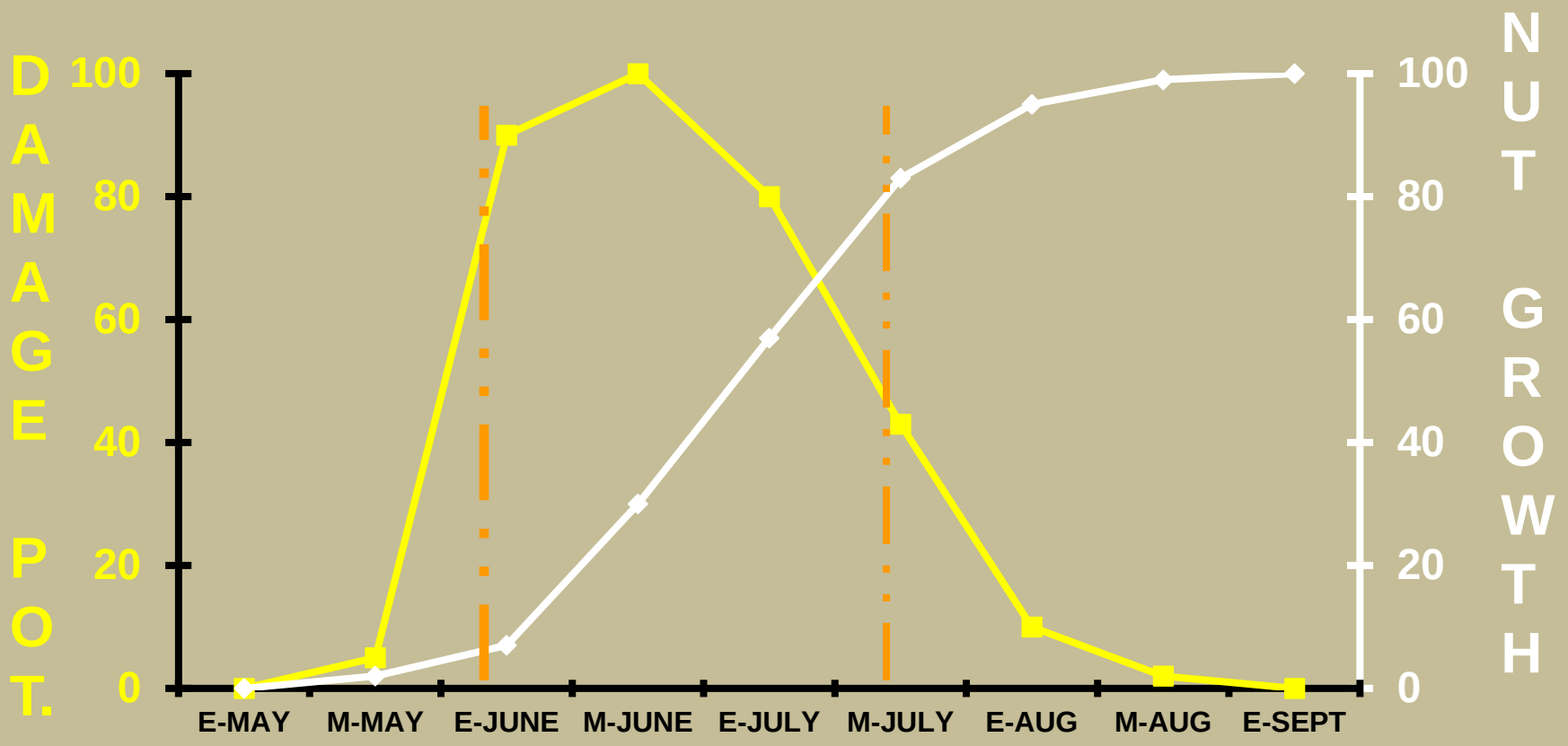
Nut Growth & Damage Potential



Nut Growth & Damage Potential



Nut Growth & Damage Potential



Pecan Scab Symptoms

- Early infections
  - tremendous yield and crop quality reductions
- Late infections
  - less damaging to both yield and quality.
- Critical period = early June - early August

Pecan Scab Symptoms

Pecan Scab Symptoms

Pecan Disease Management

Pecan Disease Management

- Resistant Cultivars
  - Scab has multiple races
  - Most economical and practical measure
  - Host resistance is not always durable
  - Cultivar recommendations are available.

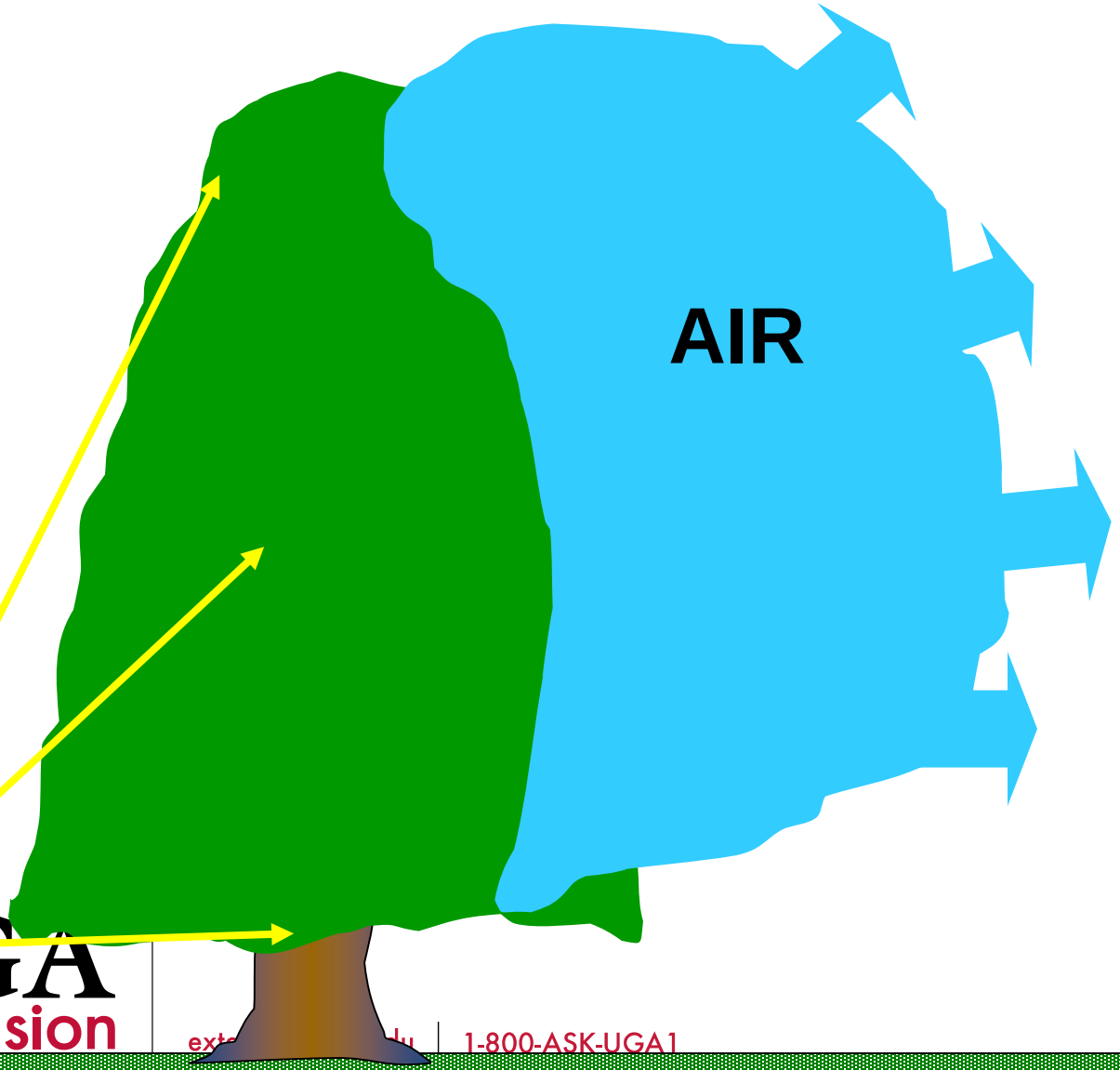
Pecan Disease Management

- Cultural considerations
  - Plant more resistant cultivars
  - Increase cultivar diversity
  - Improve air flow
    - Spacing
    - Thinning
    - Pruning
  - Maintain tree health

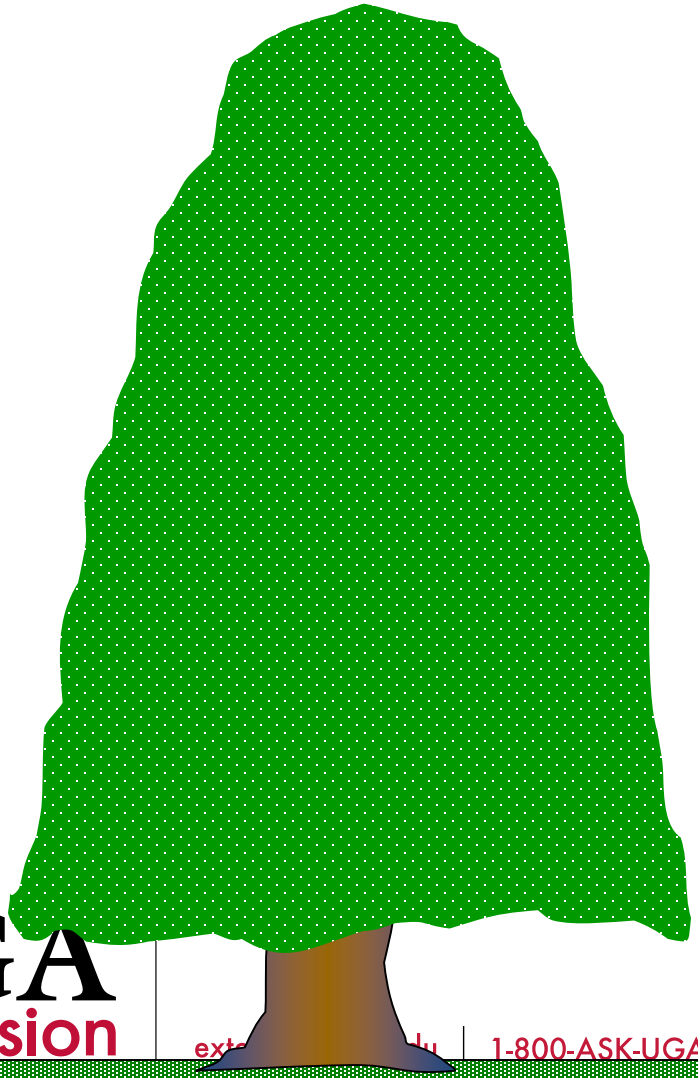
Pecan Disease Management

- Fungicide Applications – producing trees
  - Budbreak (early April) through shell hardening (mid August)
  - 7 to 11 sprays possible (15-20 not uncommon)
  - Air blast sprayers
  - Coverage will become the biggest challenge.
    - Tree size
    - Tree spacing
    - Sprayer operation

AIR BLAST SPRAYING



AIR BLAST SPRAYING



Uniform
Coverage
Top to Bottom
&
Side to Side

Pecan Disease Management

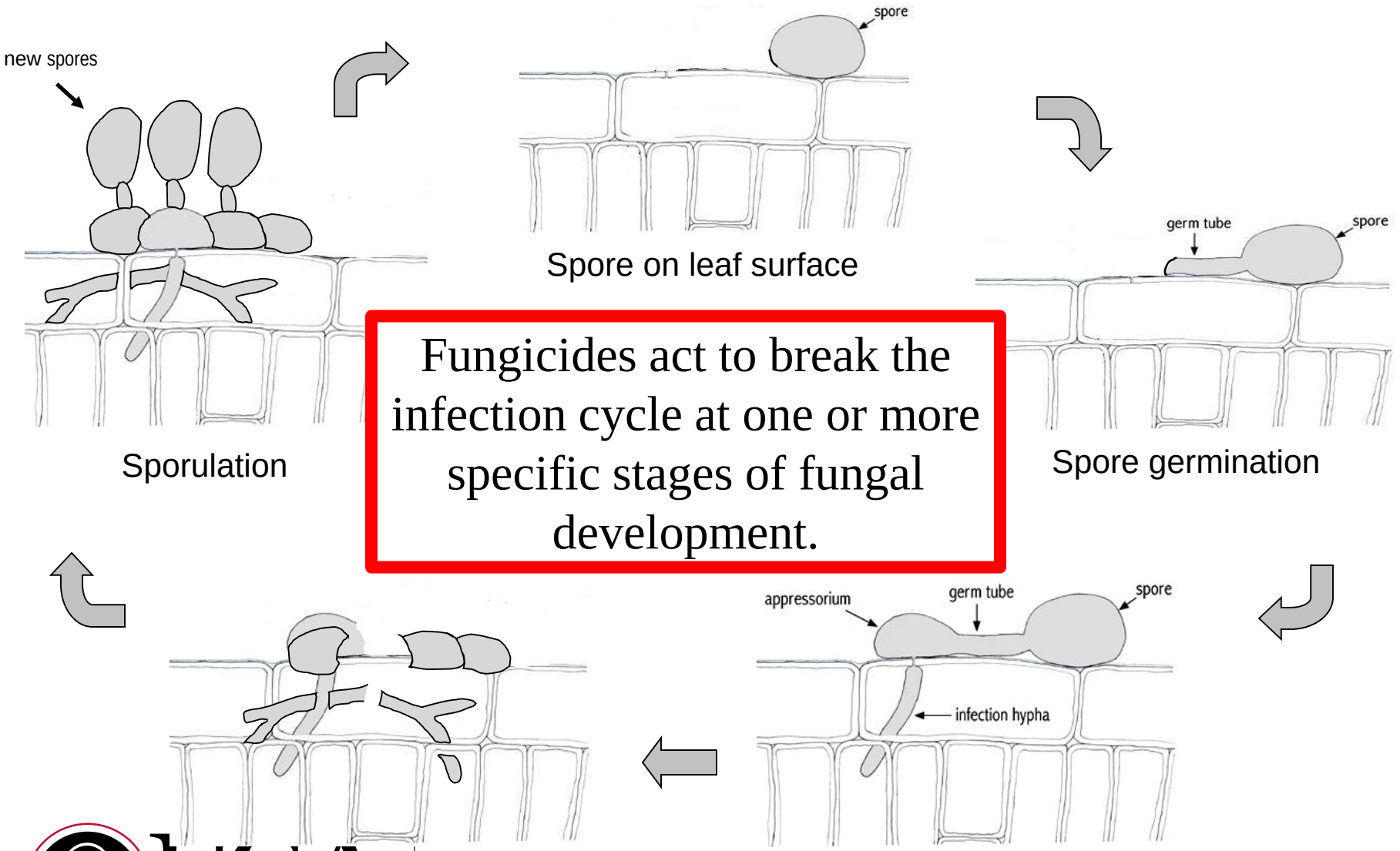
- Fungicide Applications – young trees
  - Benefits from air movement & sunlight
  - Fewer fungicide applications
  - Shorter protection window
    - Protect leaves & new growth

AU Pecan

- Pecan weather for the Southeast
- Registration of a farm is free; provided to pecan growers by AWIS Weather Services.
- Provides advice on timing of fungicide sprays based on recorded rainfall and the 5-day forecast.
- www.awis.com or search “AU Pecan”

FRAC Code	common name	Trade Names
1	thiophanate-methyl	Topsin; T-methyl
3	fenbuconazole	Enable
3	metconazole	Quash
3	propiconazole	Orbit, Bumper, Propimax, Tilt
3	tebuconazole	Folicur, Monsoon, Orius, Tebuzol, Toledo
3	tetraconazole	Andiamo
11	azoxystrobin	Abound, Azaka
11	kresoxim-methyl	Sovran, Narvos
11	pyraclostrobin	Headline
30	triphenyltin hydroxide (TPTH)	Super Tin; Agri Tin
33	phosphite	Phostrol, ProPhyt, FungiPhite, Reliant, Fosphite, Kphite, Phiticide, Rampart, Topaz
U12	dodine	Elast
M	ziram	Ziram
3 + 11	difenoconazole + azoxystrobin	Quadris Top, Amistar Top
3 + 11	flutriafol + azoxystrobin	Topguard
3 + 11	propiconazole + azoxystrobin	Quilt
3 + 11	tebuconazole + trifloxystrobin	Absolute
3 + 11	tebuconazole + azoxystrobin	Custodia, Helmstar
3 + 33	tebuconazole + phosphite	Viathon
3 + 1	tebuconazole + thiophanate-methyl	Topsin XTR
3 + 30	tetraconazole + TPTH	Minerva Duo
3 + 11	tetraconazole + azoxystrobin	Brixen

Infection Cycle



Spore on leaf surface

Spore germination

Penetration/infection

Fungal growth/visible lesion

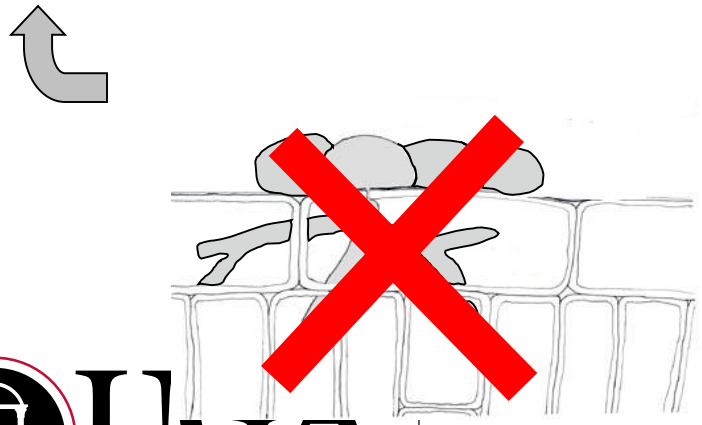
Sporulation

Fungicides act to break the infection cycle at one or more specific stages of fungal development.

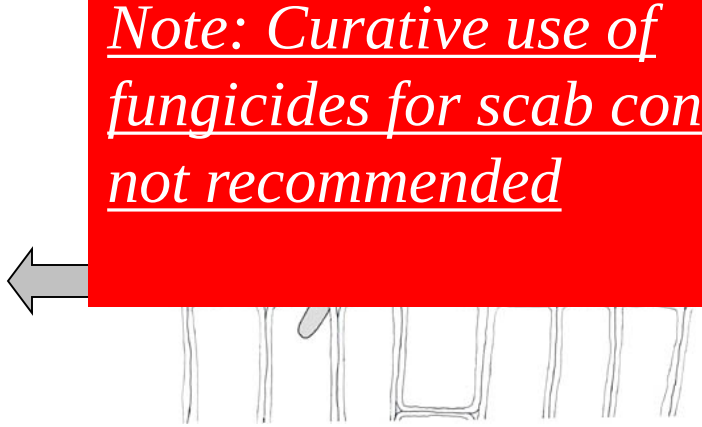
Curative Activity

Curative (eradicant or "kick-back") activity

- fungicide applied *after* infection has occurred prevents further growth and development of the fungus
- some systemics have both preventive and curative activity, and can be effective within 1-4 days after infection
- curative fungicide activity has not been conclusively demonstrated under field conditions for pecan scab



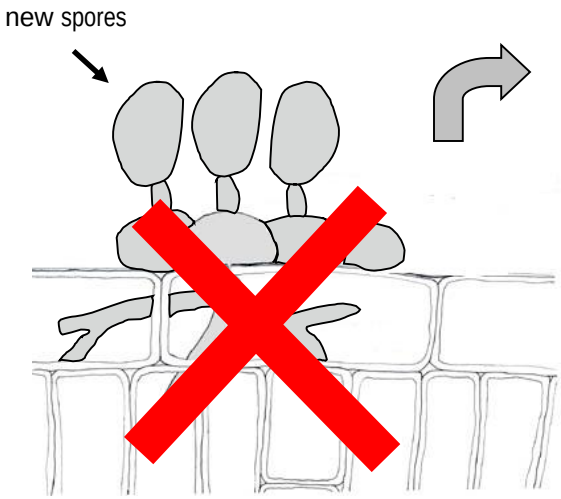
Fungal growth/visible lesion



Penetration/infection

Note: Curative use of fungicides for scab control is not recommended

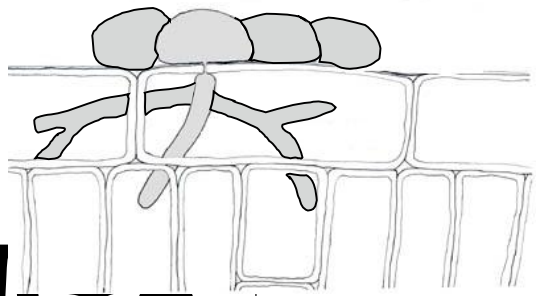
Anti-sporulant Activity



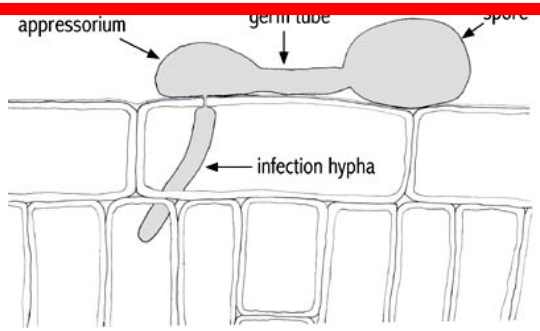
Sporulation

Anti-sporulant activity

- some systemics when applied to existing infections can effectively inhibit sporulation (spore production)
- there is little or no experimental data for pecans under field conditions



Fungal growth/visible lesion

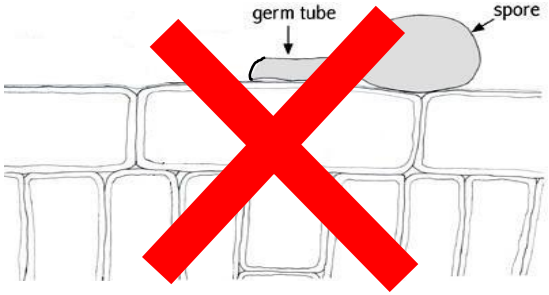


Penetration/infection

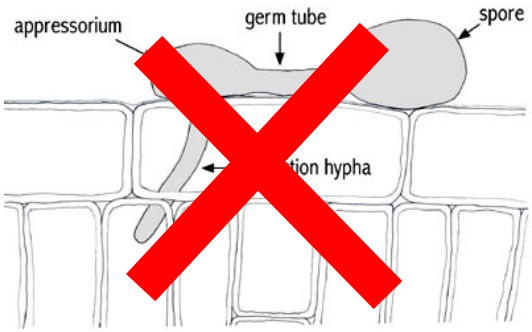
Preventive Activity

Preventive activity

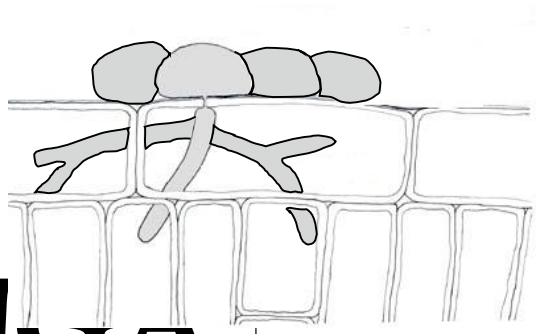
- fungicide acts on the plant surface to prevent spore germination and/or penetration and infection
- fungicide must be applied *before* infection occurs
- protectant fungicides have preventive activity *only*
- most systemic fungicides have preventive activity



Spore germination



Penetration/infection



Fungal growth/visible lesion

Pecan Disease Management

- Fungicide Resistance Risk
  - Fungicide mode of action (FRAC group)
    - All fungicides have SOME risk
    - Some have higher risk based on MOA
  - Fungicide use
    - Cumulative amount of fungicide with the sample MOA
    - Rate of fungicide used

Pecan Disease Management

- Fungicide Resistance Management
  - Use formulated mixtures or tank mixes
  - Alternate different MOA
  - Maintain effective rates
  - Use low-risk fungicides when possible
  - Use when most effective

MBCs (thiophanates)	1	Topsin; T-methyl, *TopsinXTR2*
DMIs (triazoles, sterol inhibitors)	3	Orbit, Orius, Propimax, Bumper, Enable, Quash, Folicur, Tebuzol, Toledo, Monsoon, Topguard, Andiamo *Absolute, Quilt, Quilt Xcel, Quadris Top, Custodia, Minerva Duo, TopsinXTR2, Viathon, TopguardEQ, Amistar Top, Brixen, Helmstar Plus*
QoIs (strobilurins)	11	Abound, Azaka, Sovran, Headline, Narvos, *Absolute, Quadris Top, Quilt, Quilt Xcel, Custodia, TopguardEQ, Amistar Top, Brixen, Helmstar Plus*
Guanidines	U12	Elast
Organo-metallics	30	Super Tin, Agri Tin, *Minerva Duo*
Phosphonates	33	Phostrol, ProPhyt, FungiPhite, Reliant, Fosphite, Kphite, Phiticide, Rampart, Topaz, *Viathon*
Ziram	M	Ziram

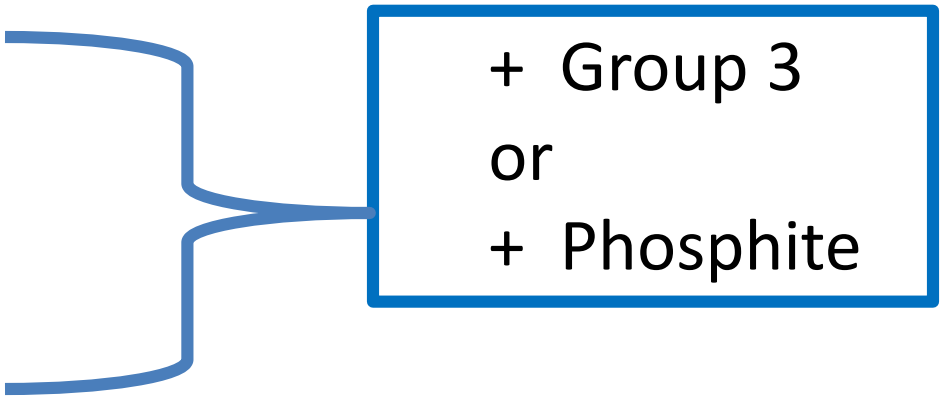
Fungicide class	FRAC group	Common name	Trade name(s)	Resistance risk
MBCs (benzimidazoles)	1	thiophanate-methyl		Use sparingly; strict limitations
QoIs (strobilurins)	11	azoxystrobin pyraclostrobin kresoxim-methyl trifloxystrobin		Best suited for foliar diseases Effective for diseases other than scab Combinations of 11 + 3 also excellent on nut scab Limitations on number of uses
DMIs (sterol inhibitors, triazoles)	3	propiconazole fenbuconazole metconazole difenoconazole tebuconazole		
Organotins	30	fentin hydroxide		Best suited for nut scab
Guanidines	U12	dodine		
Phosphonates (phosphites)	33	phosphorous acid and salts		3-5 applications; every other spray, starting on Apr/May

Pre-pollination Sprays

DMIs (triazoles, sterol inhibitors)	3	Andiamo, Bumper, Enable, Folicur, Monsoon, Orbit, Orius, Propimax, Quash, Tebuzol, Toledo, *Minerva Duo, TopsinXTR2, Viathon*
QoIs (strobilurins)	11	Abound, Azaka, Headline, Sovran, Narvos
	11 + 3	*Absolute, Amistar Top, Brixen, Quilt, Quilt Xcel, Quadris Top, Custodia, Helmstar Plus,TopguardEQ*
Phosphites	33	Phostrol, ProPhyt, FungiPhite, Reliant, Fosphite, Kphite, Phiticide, Rampart, Topaz, *Viathon*

Post-pollination Sprays

- Tin
- Elast
- Tin + Elast



- Groups 11+3
- Group 11

Pesticide Labels

- Label = information printed on or attached to the container


Crabgrass Preventer with eVade .375% Plus

KEEP OUT OF REACH OF CHILDREN

CAUTION

EPA Reg. No. 34704-776

PRECAUTIONARY STATEMENTS

HAZARDS TO HUMANS AND DOMESTIC ANIMALS

FIRST AID


18-0-5

GUARANTEED ANALYSIS

GENERAL APPLICATION GUIDELINES

BEMU

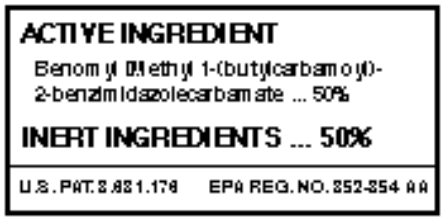
Loveland

LOVELAND PRODUCTS, INC.

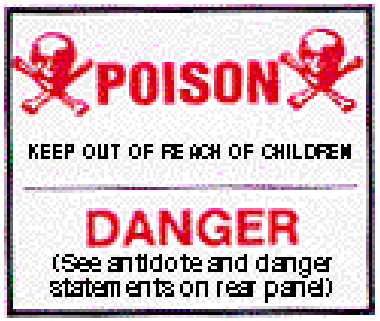
Pesticide Labels

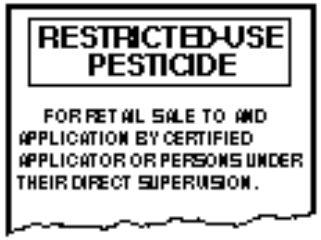
- To the manufacturer, the label is a "license to sell."
- To the state or federal government, the label is a way to control the distribution, storage, sale, use, and disposal of the product.
- To the buyer or user, the label is a source of facts on how to use the product correctly and legally.
- To physicians, the label is a source of identification and information or proper treatment for poisoning cases.

Pesticide Labels



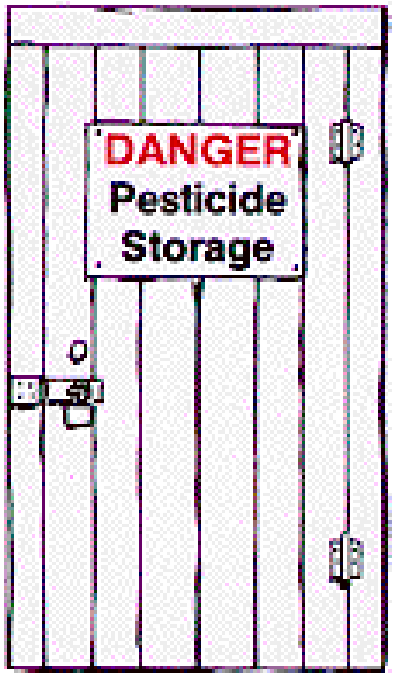
- Identifying information
  - pesticide's classification, names, contents, signal words, manufacturer's name and address, and the EPA registration ….
- Precautionary statements
  - environmental and other hazards, PPE, first aid treatments, …

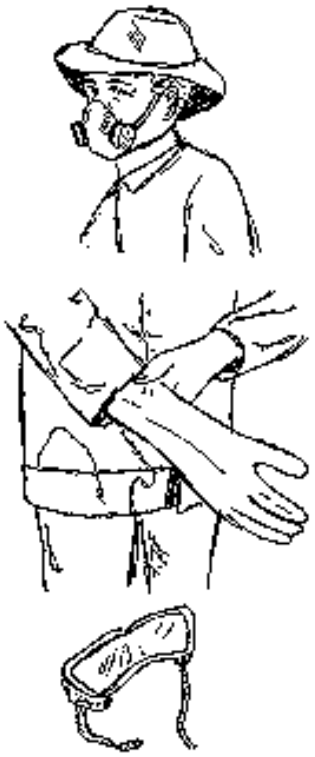




Pesticide Labels

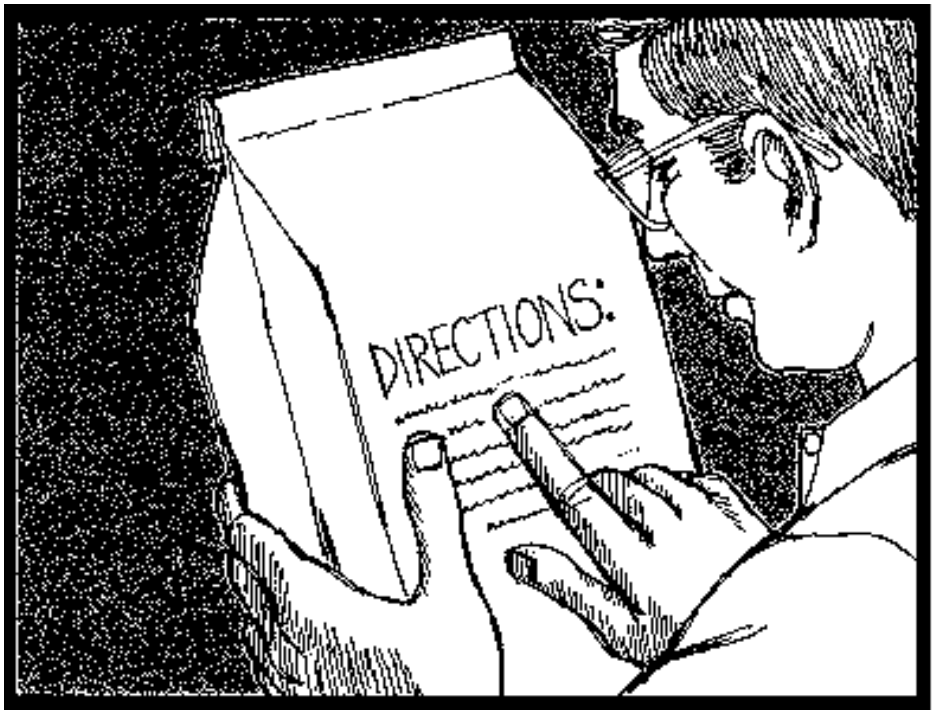
- Directions for use
  - Where, how, when, ….
- Storage and disposal





Pesticide Labels

- The label is the law!
- Read before
  - Buying
  - Mixing & applying
  - Storing
  - Disposing



Take Home Messages

- Cultivar selections
- Scab is the major concern.
- Fungicide classes and resistance management