General Herbicide & Pesticide Updates: Forage Weed Management

District 8 Farm & Ranch Seminar
December 9th, 2021

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The Best Weed Management Program is a Good Forage Stand!

- ✓ Fertilize according to soil test recommendations
- ✓ Take care of weed problems early
- ✓ Control stock density and grazing
- ✓ Prevention is usually the most cost effective

2

When Do Weeds Occur?

3

Tips for Cost-Effective Weed Control

1. Identify the weed problem
   - Herbicides and recommended application rates will vary by weed species and timing
2. Use a calibrated sprayer
   - Calibration prevents the waste and expense of over-application, and reduced control from under-application
3. Spray at the right time with the right rate
   - Annual weeds are easiest to control when they're small
4. **Follow label directions for application and mixing**

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Rezilon™ Herbicide

- Indaziflam, Group 29
- Residual preemergence herbicide
- 0.25-0.5" of rainfall or irrigation required for activation
- Make applications early, well before seed germination
- Long residual without photodegradation

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Rezilon™ Herbicide

APPLICATION USE RATES

- 3-5 fl oz/A per application
- 6 fl oz/A is MAX in a 12-month period
- At rates over 3oz, don't harvest hay for 40 days
- No grazing restrictions following applications

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Mixing Order is Important!

COMPATIBILITY TESTING WITH OTHER PESTICIDES

A compatibility test must be conducted with any potential tank mix partner with Rezilon. Using a clear container, conduct the test as described below:

Fill the container three-quarters full with water.

1. Add the appropriate amount of tank mix partner in the following order: (a) wettable powders (b) dry flowables (c) fertilizers, (d) **Rezilon** (e) aqueous suspensions, (f) soluble liquids, (g) emulsifiable concentrates, and (h) adjuvants. Shake or gently stir after each addition to mix thoroughly.
2. After adding all ingredients, let the mixture stand for 15 minutes and look for separation, large flakes, precipitates, gels, and heavy oily film or other signs of incompatibility.
3. If the compatibility test shows signs of incompatibility, DO NOT tank mix the product tested with Rezilon.

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Mixing Order is Important!

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Rezilon – Target Weeds

- Crabgrass
- Ryegrass
- Goosegrass
- Annual foxtails
- Sandbur
- Approximately 60 broadleaf & annual grass weeds

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Rezilon™ Herbicide

Use Precautions

- Only apply to well established forages/pastures
  - At least 1 growing season, may restrict new stolons
- 18 Month plant-back for Winter forages
- 22 Months for other crops

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Annual Ryegrass - 3 MAT

2016 – College Station
Applications made on 10/26/16

85-91% Control
Rezilon 3oz Sept/Oct
Add glyphosate if ryegrass has emerged
Rezilon 3oz Feb

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Rezilon™ Herbicide

Sandbur control

Rezilon @ 3oz in February fb 3oz after 1st cutting

- Perennial/overwintered Sandbur
  - Add Roundup (glyphosate) to February application
- Sandbur escapes
  - Need Pastora in 2nd shot to increase control
- $$

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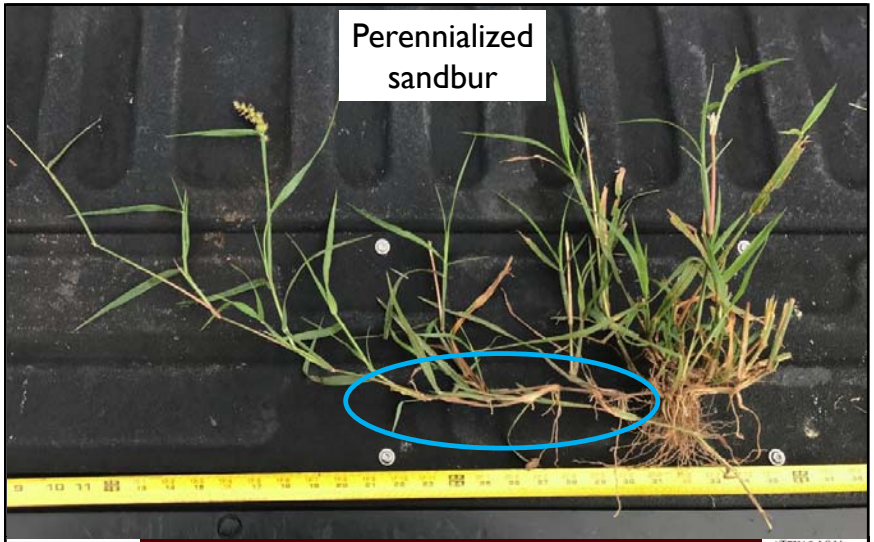

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Weed Control and Forage Safety

- Overall, much longer residual control on ryegrass and crabgrass
- Greater consistency of control on sandbur compared to pendimethalin across a variety of years and environments
- Our tests show comparable forage safety to other products
- Ongoing work is being done to evaluate activity on seedling perennial grass species

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DuraCor™
HERBICIDE

- Aminopyralid + Florpyrauxifen-benzyl (Rinskor®)
- Non-Restricted – No applicator license required
- 12-20 fl oz/acre use rate
- No grazing restrictions
- Adjuvant recommendations:
  - NIS 0.25% v/v
  - MSO 1% v/v

CORTEVA™ agriscience

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DuraCor™ Details

- Non-volatile, low odor
- Broadcast foliar
- Mixed w/UAN, or on dry fertilizer

- ~$95/gallon ($7.42-14.84/ac)

- Per Acre cost comparison:
  - GrazonNext ~$48/gallon* ($9/ac) @ 24oz/ac
  - Grazon P+D ~$30/gallon* ($7.5/ac) @ 1qt/ac

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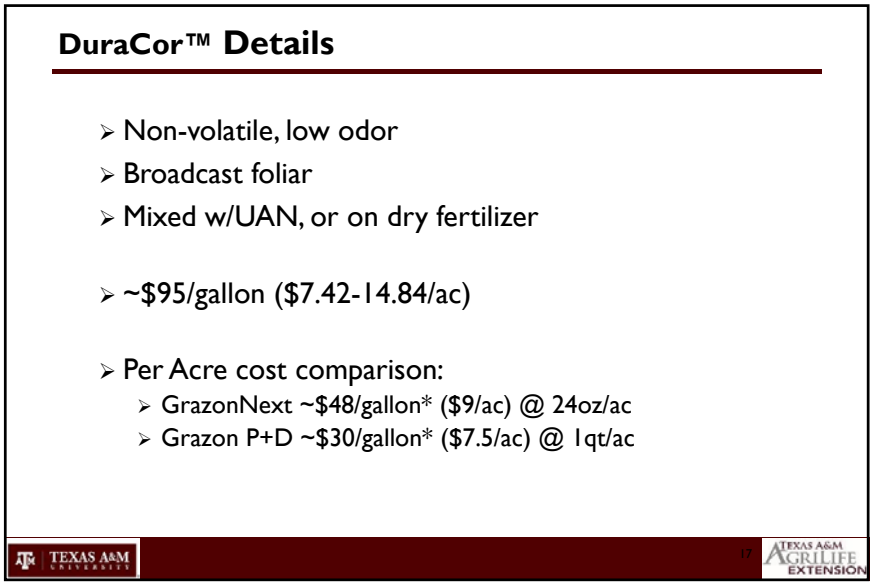

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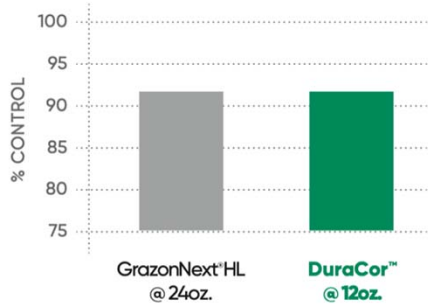
DuraCor™ Control **Comparison** to GrazonNext® HL **on Core Weeds**



3-4 MONTHS AFTER APPLICATION ON THESE WEEDS

Buttercup	Canada Thistle	Common Broomweed	Common Cocklebur
Common	Curly Dock	Musk Thistle	Silverleaf Nightshade
Ragweed	Wooly Croton	Spotted Knapweed	Early Season Tall Ironweed [4]
Early Season Western Ironweed [5]			

[1] *Before the four leaf (V4) stage* [2] *Beyond the four leaf (V4) stage and up to flowering*
[3] *After flowering* [4,5] *Prior to bud stage*

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DuraCor 16 oz
Snow-on-the-Mountain and Mature Broomweed

Sprayed on June 20, 2019

Picture taken on September 4, 2019
76 Days after Treatment

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DuraCor Applied via dry fertilizer Western Ragweed Control

Applied on May 28, 2019

Picture taken on September 3, 2019
98 Days after Treatment

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WeedMaster XHL on Texas Thistle

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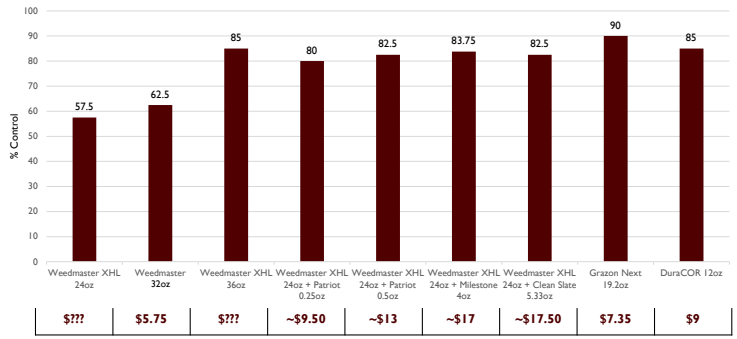
Texas Thistle Control 30 DAT



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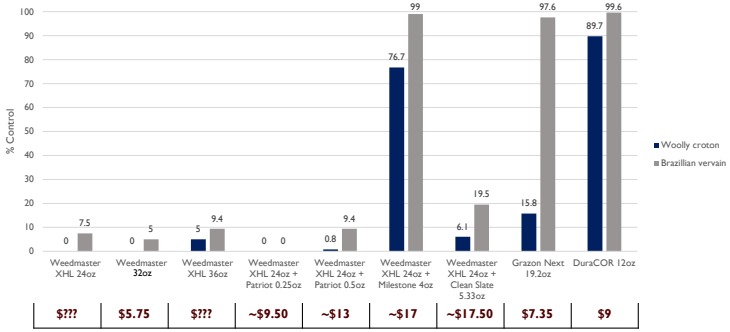
Weed Control 90 DAT



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Native Species Tolerance Studies

Thanks to Nick Bamert and Bamert Seed for funding and seed

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Native Tolerance - Greenhouse Testing: 7 DAE

- 10 Species Tested:
  - Galleta
  - Blue Grama
  - Side Oats Grama
  - Little Bluestem
  - Buffalo Grass
  - Sand Lovegrass
  - A.B. Sunflower
  - Green Sprangletop
  - Hooded Windmill Grass
  - Illinois Bundleflower
- 11 Herbicides Tested:
  - Calvacade 4L
  - Talinor
  - Anthem Flex
  - Valor SX
  - Derigo
  - Telar
  - Invora
  - Outlook
  - Beyond
  - Esplinade
  - Duracor

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Trends

- Anthem Flex
  - High Mortality
  - High Necrosis
- Derigo
  - Moderately High Necrosis
- Duracor
  - Varying Degrees of Epinasty
  - Minimal Stunting
- Telar
  - Relatively Low Mortality

Green Sprangletop Treated with Duracor

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Native Species – Field Trial

Treatment Number	Treatment Name	Active Ingredient(s)
1	Untreated Check	N/A
2	Beyond	Imazamox
3	Duracor	Aminopyralid, Florpyrauxifen-benzyl
4	Telar	Chlorsulfuron

Galletta

Little Bluestem

Blue Grama

Sideoats Grama

Buffalograss

Green Sprangletop

Hooded Windmillgrass

Sand Lovegrass

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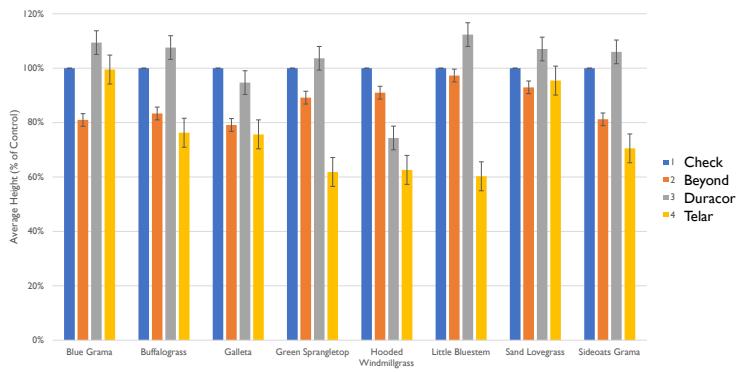
14 Days After Treatment



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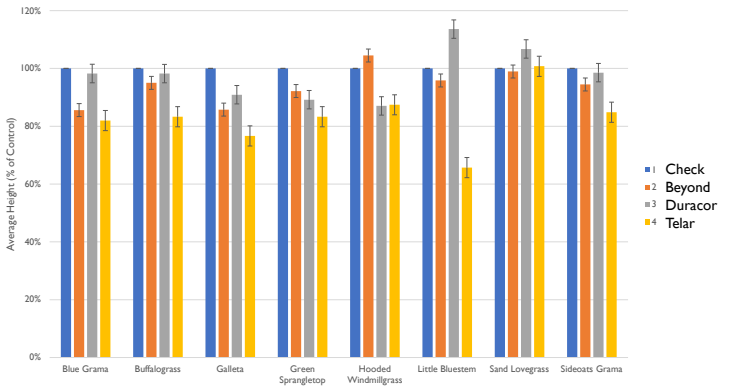
30 Days After Treatment



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Potential Recommendations

- Hooded Windmillgrass
  - Beyond
  - Duracor
  - Possibly Telar
- Galleta
  - All Treatments
- Little Bluestem
  - Possibly Beyond and Duracor
- Buffalograss:
  - Beyond
  - Duracor
- Blue Grama
  - Duracor
  - Possibly Beyond
- Sideoats Grama
  - Duracor
- Green Sprangletop
  - None that Were Statistically Similar
  - Hesitant Recommend Beyond and Duracor

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Smutgrass Control in Perennial Pasture

Zachary Howard

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Key Field Trial Takeaways

Rate

- 4.5 pt/ac of (Velpar L) on clay soils is an appropriate rate
  - 3 pt/ac is NOT sufficient for most East Texas soils

Rainfall

- **Summer applied Velpar** > Spring > Fall applied – HIGHLY correlated to rainfall!
  - Label states 0.25 - 0.5" rainfall needed
  - Recent research suggests 0.4 - 3" w/in 7 days may be needed & moist soil at the time of application.

Delivery

- IPT treatments hand applied are very effective
  - Liquid and Pellet Hexazinone cause the least injury

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Key Field Takeaways

Rate

- **4.5 pt/ac of (Velpar L)** on clay soils is an appropriate rate
  - 3pts/ac is NOT sufficient for most East Texas soils
  - Control will be marginal and residual limited

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Key Field Takeaways

Rainfall

- **Summer applied Velpar** > Spring > Fall HIGHLY correlated to rainfall!
  - Label states 0.25 - 0.5" rainfall needed
  - Research suggests 0.4 - 3" w/in 7 days & moist soil at the time of application

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Key IPT Trial Takeaways

Delivery

- 5% glyphosate provide effective control
  - Spray to wet; most effective over hexazinone; most injury
- 2% hexazinone provide effective control
  - Spray to wet; more expensive over glyphosate
- Pronone Powerpellets (hexazinone) offer an easy, effective way to eliminate individual plants
  - One whole tablet or ½ table per plant
    - Better for light infestations; least injury

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Thank you!

- **Contact Info**
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Minimizing Drift and Off-Target Pesticide Movement

District 8 Farm and Ranch Seminar
December 8, 2021

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Why is Staying On-Target Important?

Weed Control!

2

Why is being On-Target important?

- Reduces cost
  - Lost herbicide/reduces rate
  - Reduced productivity
  - Respray
  - Labor/Time

3

Why is being On-Target important?

- EPA Requirement
  - Listed on every label
  - Scrutiny is only increasing
- Public perception
- Neighboring crop damage

VALENT

OutRider® Herbicide

8.0 SPRAY DRIFT MANAGEMENT

Avoiding spray drift at the application site is the responsibility of the applicator. The interaction of many equipment- and weather-related factors determines the potential for spray drift. The applicator and the grower are responsible for considering all these factors when making decisions. The following drift management requirements must be followed to avoid off-target drift movement from aerial applications. These requirements do not apply to forestry applications.

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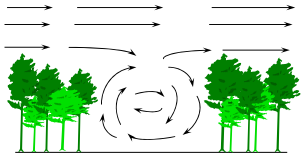
Be Aware of Your Surroundings

- Wind
  - Direction (changes rapidly)
  - Wind speed of 3-15mph
  - Gusting?
- Know your surroundings
  - What is downwind?
  - What is beyond what you can't see?
- Application direction
- Topography



Adapted from Survey of Climatology:
Griffiths and Driscoll,
Texas A&M University, 1982

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Be Aware of Your Surroundings

- Sensitive Areas
  - Residential Areas
  - Bodies of Water
  - Habitat for threatened or endangered species
  - Non-Target Crops
- Management
  - Some labels have required buffer distance from application
  - Spray only when wind is blowing away from sensitive areas
  - Read the label!

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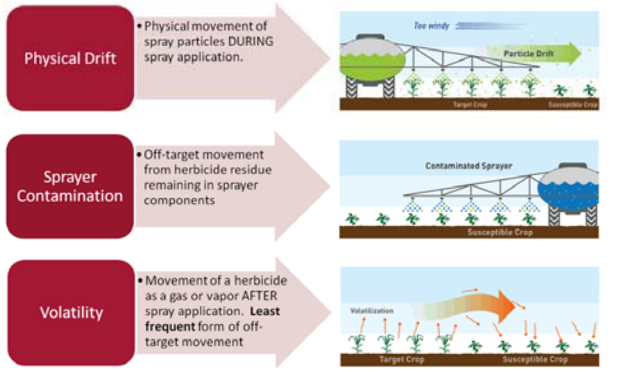
Off-Target Movement Types



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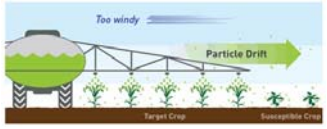
Physical Drift

- Most common type of off-target movement
- Physical movement of spray particles
  - Occurs during application
  - Impact to adjacent or near-by fields
- Influenced largely by:
  - Droplet size (Nozzle & Pressure)
  - Boom Height
  - Wind speed
  - Sprayer ground speed



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Nozzle Selection
First & most important decision made by an applicator

9

Droplet size

- Smaller the droplets, slower they fall, drift farther
- Larger droplets reduce likelihood of drift
- Measured in microns (1/25,400 inch)

Influence of droplet size on drift potential

Droplet Size in Microns	Droplet type	Time to fall 10ft	Distance travelled during fall in a 3 mph wind
5	Fog	66 min	3 miles
20	XF	4.2 min	1,100 ft
100	VF	10 sec	44 ft
240	M	6 sec	28 ft
400	C	2 sec	8.5 ft
1000	UC	1 sec	4.7 ft

Adapted from: Akesson & Yates, Kingman, and Potts.

Table 1. ASABE S572.1 droplet size classification.

Category	Symbol and Color Code	Approximate VMD (μm)*
Extremely Fine	XF	<60
Very Fine	VF	61-144
Fine	F	145-235
Medium	M	236-340
Coarse	C	341-403
Very Coarse	VC	404-502
Extremely Coarse	XC	203-665
Ultra Coarse	UC	>665

* Estimated from sample reference graph provided for ASABE S572.1.

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Nozzle Selection

- Nozzle selection is the controllable part of the equation
  - Nozzle and pressure combined determine droplet size and % of driftable fines (<141 microns)

AIXR TeeJet® (AIXR)

	PSI									
	15	20	25	30	35	40	50	60	70	75	90
AIXR110015	XC	XC	VC	C	C	C	C	M	M	M	M
AIXR11002	XC	XC	XC	VC	VC	C	C	C	C	M	M
AIXR110025	XC	XC	XC	XC	VC	VC	C	C	C	C	C
AIXR11003	XC	XC	XC	XC	VC	VC	C	C	C	C	C
AIXR11004	UC	XC	XC	XC	XC	XC	VC	VC	C	C	C
AIXR11005	UC	XC	XC	XC	XC	XC	VC	VC	C	C	C
AIXR11006	UC	XC	XC	XC	XC	XC	VC	VC	VC	C	C

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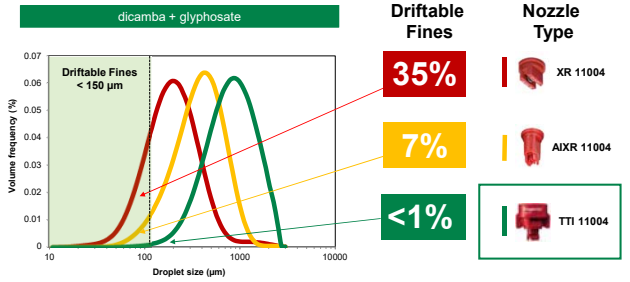
Nozzle Selection
First & most important decision made by an applicator



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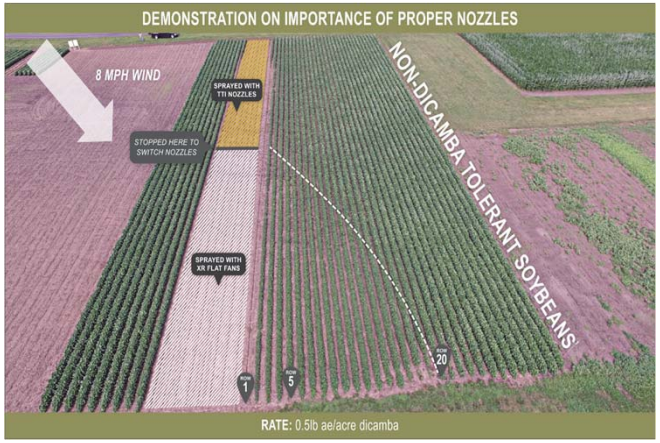

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Boom Height
Key for consistency of nozzle performance

24” **Boom Height Above Target**

48” height can increase drift potential by 5.6 times*

*Based on AGDISP modelling comparing 24” vs.48” above target with approved TTI 11004 at 60 PSI

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Wind Speed

Influence on physical spray drift

Doubling wind speed
(i.e. from 10 to 20 MPH)
can increase potential drift
by 3.4 times*

*Based increased deposition at 110° in AGDISP modelling comparing 10 vs. 20 mph with approved TTI 11004 at 60 PSI

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Wind Speed & Direction

- Wind speed of 3-15mph
  - Gusting?
  - Less chance of suspended droplets
- Less than 3 mph
  - Risk of inversion increases
  - More changes in wind direction
  - Small droplets can remain suspended

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Hooded Sprayers

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TEMPERATURE INVERSIONS

A layer of cool air trapped below a layer of warmer air

- Inversions can be identified by the movement of smoke from a ground source or an aircraft smoke generator.
- Smoke that layers and moves laterally during low wind indicates an inversion
- Smoke that moves upward and rapidly dissipates indicates good vertical air mixing.

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Temperature Inversions

Impact on physical spray drift

During an inversion small droplets remain suspended in air and move great distances horizontality for as long as inversion lasts

- Larger area potentially impacted
- Symptomology possible over large area
- Direction & distance of movement is unpredictable

DO NOT make applications when an inversion exists at the field level

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Temperature Inversions

Impact on physical spray drift

- Inversions typically dissipate with increased winds (>3 mph) or at sunrise when the surface air begins to warm (~3˚F from morning low)

- 1 hour after sunrise until 2 hours before sunset
  - Typical time you can spray without inversion

DO NOT make applications when an inversion exists at the field level

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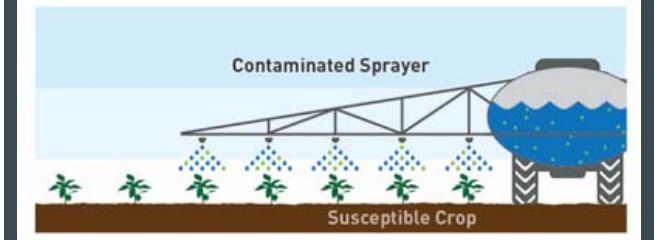

Sprayer Contamination

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Sprayer Contamination

- Triple-rinsing required
- Use tank cleaner
- Remove end caps
- Clean tips & screens

Sprayer Contamination: Symptoms

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SPRAYER PARTS THAT CAN TRAP HERBICIDE

Figure 1. Filters and screens should be cleaned to remove residues.

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Dicamba Visual Sensitivity Scale

Lower	Moderate	Severe	Extreme
Broccoli	Cantaloupe	**Cotton**	**Grapes***
Cabbage	Canola*	Pepper	Lima bean
Kale	Cucumber	Tomato	Snap bean
Mustard	Peach	Watermelon	Southern pea
Pecan	Peanut		**Soybean**
Turnip	Squash		Sweet potato*
			Tobacco*
> 1/75X	1/75-1/300X	1/300-1/800X	< 1/800X

Herbicide Rate of <u>Visually</u> Detectable Injury

Adapted from Dr. Stanley Culpepper, UGA Cooperative. *Data from literature; all other data generated in GA field studies.

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2,4-D Visual Sensitivity Scale

Lower	Moderate	Severe	Extreme
Broccoli	Cantaloupe	Pepper	**Cotton**
Cabbage	Canola	Tomato	**Grapes***
Kale	Cucumber	Watermelon	Sweet potato*
Mustard	Soybean		Tobacco*
Onions	Squash		
Peaches			
Peanut			
Pecan			
Turnip			
> 1/75X	1/75-1/300X	1/300-1/800X	< 1/800X

Herbicide Rate of Visually Detectable Injury

Adapted from Dr. Stanley Culpepper, UGA Cooperative. *Data from literature; all other data generated in GA field studies.

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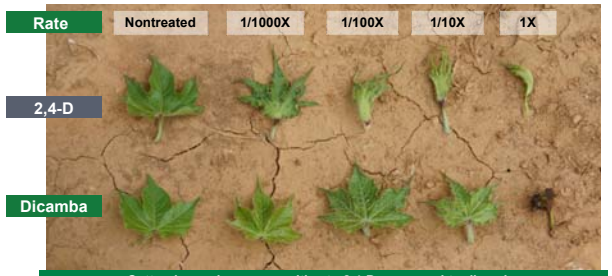
Cotton Sensitivity To Herbicides



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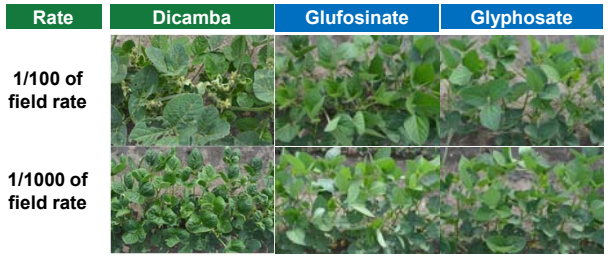
Soybean Sensitivity To Herbicides



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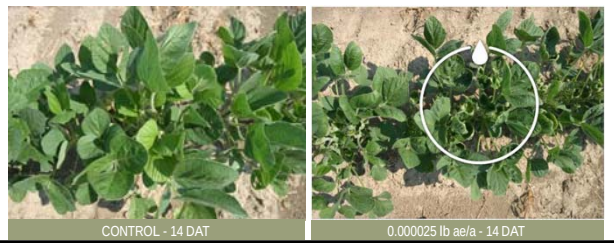
Crop Sensitivity

1/20,000th of the 1x Use Rate (0.000025 lb ae/A dicamba) – 14 days after vegetative stages (V3) application on non-dicamba tolerant soybeans



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How much does it take to potentially contaminate a sprayer?

3 ml of formulated product

12 fl oz of spray solution

Commercial sprayer with
1000 gallon tank
Application volume: 10 GPA

Hygiene is critical to preventing spray system contamination

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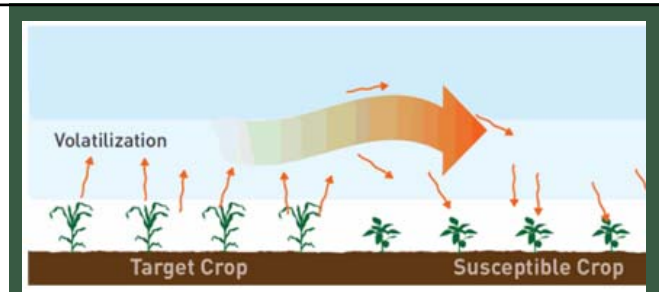

Volatility

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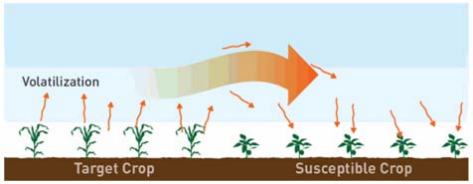
Volatility

- Secondary movement of herbicide in the volatilized (gas/vapor) form
- Occurs after the spray application
  - Can happen up to 3 days after application



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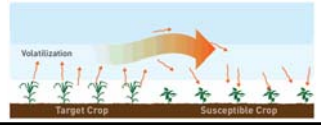
Volatility

- Dependent on herbicide formulation
  - 2,4-D ester > amine
  - Banvel > Clarity > Xtendimax, Engenia
- Conditions that increase volatility
  - AMS or ammonia containing products (with dicamba)
  - Temperature over 85
  - Low relative humidity



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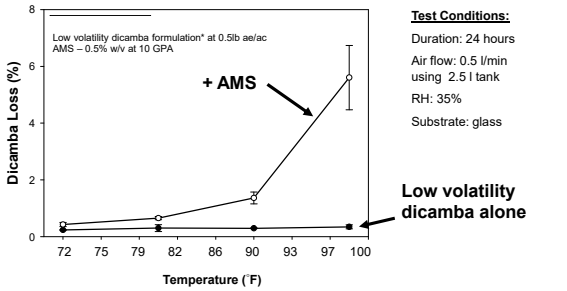
Impact of AMS on Dicamba Volatility



Test Conditions:

Duration: 24 hours

Air flow: 0.5 l/min using 2.5 l tank

RH: 35%

Substrate: glass

*BASF Lab Study
Engenia herbicide: 12.8 fl oz/A

AMS increases potential volatility by 20 times

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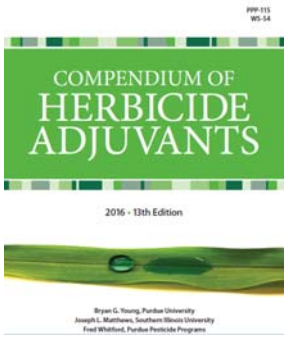
Adjuvants

1. Water Conditioning Agents
2. Surfactants
3. Oil Concentrates
4. Humectants (slow evaporation)
5. Ammonium fertilizer solutions
6. Compatibility agents
7. Defoamers/Anitfoamers
8. Scents (Masking agents)
9. Marking Agents
10. Formulated tank cleaners
11. Stickers
12. pH Adjusters
13. Drift Reduction Agents



www.herbicide-adjuvants.com

34

1. Water Conditioners

- Water conditioners bond with dissolved hard water ions
- Provide "sacrificial" molecules to keep the pesticide from bonding to the hard water molecules

How Much AMS Do You Need?

To know how much ammonium sulfate (AMS) you need to add to water in order to overcome antagonistic ions first requires a water test. Once you know how much potassium (K+), sodium (Na+), calcium (Ca+), magnesium (Mg+), and Iron (Fe+) are in the water, you can calculate the dose this way:

(0.002 x ppm K+) + (0.005 x ppm Na+) +(0.009 x ppm Ca+) + (0.014 x ppm Mg+) + (0.042 x ppm Fe+) = pounds of AMS to add per 100 gallons of water =

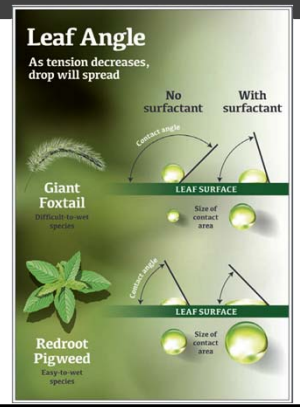
Let's say a water test of a farm well indicated that the water had K at 2.37 ppm; Na at 30.9 ppm; Ca at 55; Mg at 26.1; and Fe at 0.07. So:

(0.002 x 2.37) + (0.005 x 30.9) +(0.009 x 55) + (0.014 x 26.1) + (0.042 x 0.07) = 1 pound of AMS to add per 100 gallons of water

35

2. Surfactants

- Also called wetter-spreaders these are adjuvants that lower surface tension of spray droplets.



36

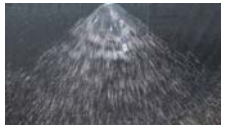
12. pH Adjusters

- Acidifiers – lower the pH of the tank solution.
- Buffer or Buffering Agent
  - Causes the solution to resist change in pH.
  - Each buffer has a limited range of pH over which it is effective.
  - Recently added as a requirement for new dicamba labels
    - Specific to use over DT cotton and DT soybean

37

13. Drift Reduction Agents

- Many products available
- Not EPA regulated – but increased research recently
- Pump shear problems
- Pattern collapse
- 50 – 80% reduction in off-target movement




38

Questions?

- Scott.Nolte@tamu.edu
- (979) 318-2358
- Weeds.tamu.edu
- bmcknight@tamu.edu
- (225) 454-0435
- cotton.tamu.edu

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Texas Department of Agriculture Laws & Regulations

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Director for Environmental and Biosecurity Programs
Perry.Cervantes@TexasAgriculture.gov
Office 512-463-7692
Cell 512-955-9336

1

PERRY CERVANTES
TDA CELL
512-955-9336

2

Today's Topics

- Licensing
- Continuing Education Units
- Recordkeeping
- WPS
- Direct Supervision
- Complaints
- Pesticide Waste Disposal

3

Licensing

4

Ag Pest License Types

- Private-$100/5 years
- Commercial-$200/Year
- Noncommercial-$140/Year
- Noncommercial Political-$75/Year

5

Certified Private Applicator

- Private applicators who obtained a TDA issued private applicator certificate under a voluntary program from 1977 – 1989
- These certificates never expire but applicators must earn 15 CEUs every five years in order to keep the certificate current
- Certified private applicators may not supervise an application of restricted-use or state-limited-use pesticides

6

Commercial Applicator

Operates a business or is employed by a business that applies restricted-use or state-limited-use pesticides to the property of another person for hire or compensation.

7

Commercial

1. Submit Application for Commercial Pesticide Applicator License (PA-401)
2. Submit $200 fee
3. Take General Standards exam ($64) + at least 1 category exam ($64 each) and pass with grade ≥ 70%
4. Submit Pesticide Applicator Business Registration form (PAB-300)
5. Recertify every year ($200 fee + 5 CEUs)

8

Non Commercial Political/Non Commercial Applicator

Non Commercial Political works for a company (like the state, a school, county or city) but does not charge for it, part of their job.

Non Commercial-Applicator , for example, someone on a private golf course

9

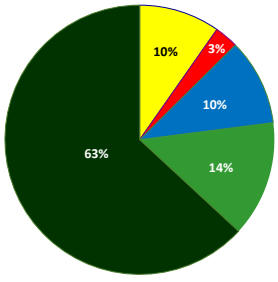
Private Applicator

Uses or supervises the use of restricted-use (RUP) or state-limited-use (SLU) pesticides or regulated herbicides to produce an **agricultural commodity** on:

- Personally owned property
- Property owned by the person`s employer
- Property under the person`s general control
- Property of another person if applied without compensation

10

Ag Pesticide Applicators Currently Licensed:



45,206 Total Applicators

- Commercial - 4,392
- Noncommercial - 1,291
- Noncommercial Political - 4,701
- Certified Private - 6,291
- Private - 28,531

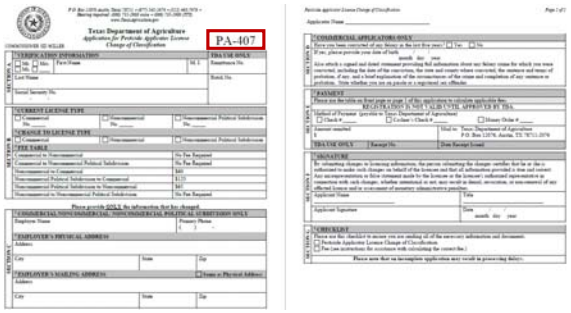
11

Pesticide Applicator Change of Information

Please submit any changes within **30** days

12

Pesticide Applicator Change of Classification



13

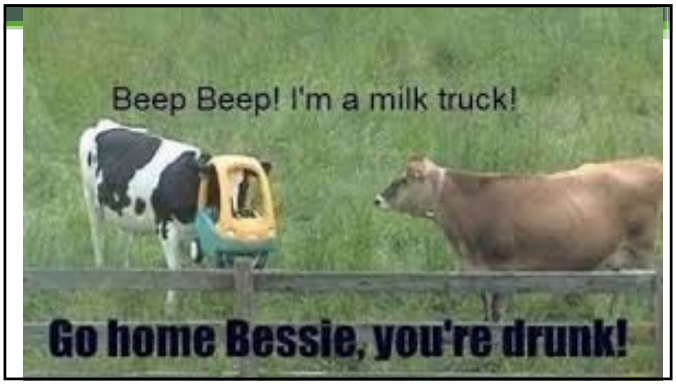
TexasAgriculture.gov/Forms

14

New Category-Category 13 Border Mosquito Control

- Only for counties that border Mexico
- Based on request by Senate Bill 1312
- Once an employee leaves that county job, must give up the category
- ONLY FOR MOSQITO SPRAYING
- Will be implemented early 2022

15



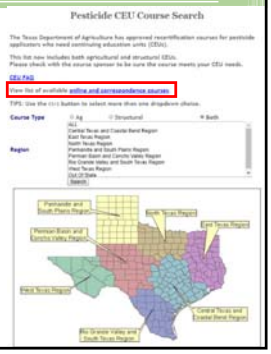
16

Continuing Education Units

17

CEUs

- CEUs must be obtained prior to the expiration of the license
- Commercial/Noncommercial applicators may take CEUs online every other year
- Private applicators may take 10 of the 15 CEUs online for each renewal
- **ceusearch.texasagriculture.gov**



18

CEUs

Commercial/Noncommercial	Aerial Category	Private / Certified Private
5 CEUs / 1 year	5 CEUs / 1 year	15 CEUs / 5 years
Minimum of 1 credit must be obtained from 2 of the following: Integrated Pest Management Laws and Regulations Drift Minimization	Minimum of 1 credit must be obtained from each of the following: Laws and Regulations Drift Minimization Pesticide Safety Factors	Minimum of 2 credits must be obtained from each of the following: Integrated Pest Management Laws and Regulations

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CEUs

- Self-certification program: the applicator is required to maintain proof of CEU credits (*RULE §7.24*)
- Certificates must be maintained by the applicator for 1 year after the most recent renewal of their license
- Extra CEU credits obtained during the licensing period will not carry over to the next renewal
- TDA may audit an applicator's CEUs during an onsite inspection or by request via mail

20

CEU Exemptions: COVID-19

- Applicators with licenses expiring through 12-31-2021 and 12-31-2022 may renew their license before CEU requirements met
  - CEUs must be made up for each licensing period, not exempt
- For Licenses expiring in 2021 and 2022only:
  - Commercial, Noncommercial, & Noncommercial Political applicators may take online or correspondence courses for 3 years consecutively
  - Private Applicators may take all their 15 CEUs thru online or correspondence courses, USED TO BE RESTRICTED TO ONLY 10 OF THE 15 REQUIRED CEUs COULD BE DONE THROUGH ONLINE OR CORRESPONDENCE COURSES.

21

CEU Exemptions AND 2021/2022 EXTENSION: COVID-19

AGRICULTURE LICENSES ONLY!!

- Applicators with licenses expiring through 12-31-2021 may renew their license before CEU requirements met
  - CEUs must be made up for each licensing period, not exempt
- **For Licenses expiring in 2021 AND 2022, WE ARE EXTENDING THE EXEMPTION**:
  - Commercial, Noncommercial, & Noncommercial Political applicators may take online or correspondence courses for 2-3 years consecutively **NOW DUE TO THE EXTENSION**
  - Private Applicators may take **all their 15 CEUs** thru online or correspondence courses

22

23

Record Keeping

24

Record Keeping Requirements:

- Commercial and noncommercial applicators must maintain records of **all** pesticide applications - this includes general use products
- Private applicators must maintain records of all regulated herbicides, state-limited-use pesticides, and restricted-use pesticide applications
- All records must be maintained for 2 years

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Record Keeping Form

Texas Department of Agriculture
Pesticide Applicator Record

TDA Q527
7/15

Business/Applicator Name _____ Address _____

Application Date	Time Started	Name of the person for whom the application was made	Location of Land Treated		Site Treated	Wind Direction	Wind Velocity	Air Temp

Product Trade Name	EPA Registration Number	Target Pest	Rate of Product Per Unit	Method or Type of Equipment Used To Make Application	FAA "N" Number for Aerial Application Equipment:

Is Application Applied in Regulated County: □ Yes □ No	Regulated Herbicide Permit Number:

Licensed Applicator's Name and License Number	Non-licensed Applicator's Name Working Under Licensee	Total Acres or Volume of Area Treated	Total Volume of Spray Mix, Dust, Granules or Other Materials Applied Per Unit

Documentation used to verify training of non-licensed applicator (Mark Applicable Box)
□ Direct Supervisor Affidavit □WPS Handler Card □Signed & Dated Label

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Record Keeping

- Date of application
- Time application was started
- Name of person or entity for whom the application was made
- Name and license number of the applicator responsible for the application and, if different, the name of the person actually making the application
- Total acres or volume of area treated (e.g., acre, square feet, number of head, etc.)

27

Record Keeping

- Site treated (e.g., name of crop, kind of animal, etc.)

28

Record Keeping

- Location of land where application was made <u>stated</u> in a manner that that would permit inspection by an authorized party
  - FSA #1234 plus map showing farm location
  - 123 County Road, Anytown, TX 78123
  - At the SW corner of intersection FM 1604 and Milam Rd,Anytown, TX 78123

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Record Keeping

- Application method or type of equipment used to make the application




30

Record Keeping

- Wind direction
- velocity (except for those applications made indoors or otherwise within a structure)
- Air temperature



31

Record Keeping

<u>for each pesticide applied:</u>

- Product name
- Product EPA registration number
- Rate of product per unit

32

Record Keeping

for each pesticide applied:

- Total volume of spray mix, dust, granules, or other materials applied per unit
- The name of the pest for which the product was used

33

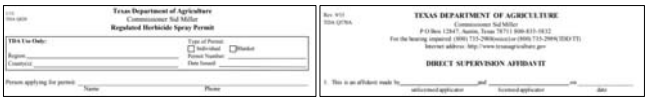
Record Keeping

- The FAA "N" number for aerial application equipment

34

Record Keeping

- The spray permit number for regulated herbicides applied in a regulated county
- Documentation to verify training of persons working under the supervision of a licensed pesticide applicator



Texas Department of Agriculture
Commissioner Sid Miller
Regulated Herbicide Spray Permit

TDA Use Only:

Type of Permit: ☐ Individual ☐ Blanket

Region _____ Permit Number: _____

County(s): _____ Date Issued: _____

Person applying for permit: _____

Name Phone

TEXAS DEPARTMENT OF AGRICULTURE
Commissioner Sid Miller
P O Box 12847, Austin, Texas 78711 800-835-5832
For the hearing impaired: (800) 735-2989(voice) or (800) 735-2989(TDD/TTY)
Internet address: http://www.texasagriculture.gov

DIRECT SUPERVISION AFFIDAVIT

I, _____ This is an affidavit made by _____ and _____ on _____

unlicensed applicator licensed applicator date

35

Record Keeping

Direct Supervision Training

Training for unlicensed pesticide applicators may be documented by one of the following:

1. Direct Supervision Affidavit
2. Signed and Dated label
3. Worker Protection Standard Handler Training

Maintain method of training for 2 years

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Worker Protection Standard

37

Worker Protection Standard

Primarily intended to reduce the risks of illness or injury to workers or handlers resulting from occupational exposures to pesticides used in the production of agricultural plants on agricultural establishments

38

Who has to comply with WPS?

- Farms
- Forests
- Nurseries
- Greenhouses

39

Worker Protection Standard (WPS)

AGRICULTURAL USE REQUIREMENTS

Use this product only in accordance with its labeling and with the Worker Protection Standard, 40 CFR 170. This standard contains requirements for the protection of agricultural workers on farms, forests, nurseries, and greenhouses, and handlers of agricultural pesticides. It contains requirements for training, decontamination, notification, and emergency assistance. It also contains specific instructions and exceptions pertaining to the statements on this label about personal protective equipment, restricted-entry intervals and notification of workers.

40

Agricultural Employer Duties

- Ensure that before a handler uses any equipment for mixing, loading, transferring, or applying pesticides, the handler is instructed in the safe operation of each equipment
- Ensure that before a handler uses any equipment used for mixing, loading, transferring or applying pesticide is inspected for leaks, clogging, and worn or damaged parts, and any damaged equipment is repaired or replaced
- Ensure that workers do not enter any area on the agricultural establishment where a pesticide has been applied until the applicable pesticide application and hazard information for each pesticide product applied to that area is displayed until after the REI has expired
- Provide any records or other information required by this part for inspection
- Provide decontamination supplies for workers and handlers

41

Requirements for Administering Training for Workers or Handlers

- Training must be provided either orally from written materials or audio-visually
- Training must be provided in a manner the work or handler can understand
- Training must be conducted on a yearly basis

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Direct Supervision

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Direct Supervision

- Licensed applicators may only supervise application of pesticides for categories in which they are certified
- A licensed applicator is not required to be physically present during application, unless specified by the label
- The supervising licensed applicator and the person working under their direct supervision must perform applications from the same local office, unless the supervising licensed applicator is physically present during the application

44

Direct Supervision

- Documentation to verify training of persons working under the supervision of a licensed pesticide applicator is required
- At minimum, training must include relevant sections of the Texas Pesticide Law and Regulations and the pesticide label
- Certified private applicators **cannot** perform direct supervision

45

Direct Supervision Affidavit

1. Printed name and signature of licensed & unlicensed applicator
2. Product name, EPA Reg. #, Activity, and Use
3. Licensed Applicator license number
4. Statement unlicensed applicator has been trained and is knowledgeable of the label requirements and the laws and regulations governing the use of the pesticides listed

Must be kept for 2 years

46

TEXAS DEPARTMENT OF AGRICULTURE

DIRECT SUPERVISION AFFIDAVIT

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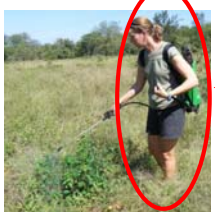
Direct Supervision Affidavit



Is this proper PPE?

The licensed applicator is responsible for the actions of the unlicensed applicators under his/her supervision.

48

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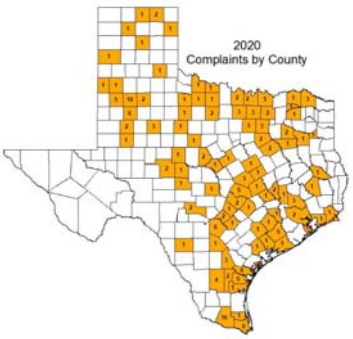
Complaints

50

Pesticide Complaints in Texas

- TDA's responsibility to investigate complaints of alleged pesticide misuse
- Enforcement actions may include:
  - Warnings
  - Fines
  - Suspending or revoking applicator license
  - Rereferral to other appropriate agency for further action
- Complainants do not receive compensation in TDA investigations

51

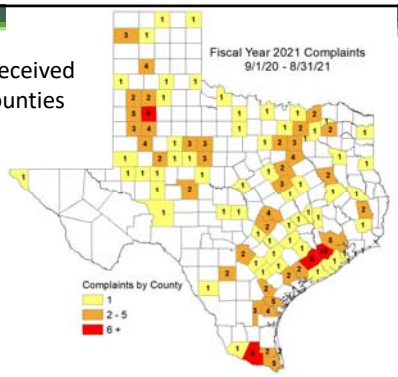


2020 Fiscal Year

- 201 Ag Complaints
- TDA has:
  - 27 Agricultural Inspectors
  - 15 Structural Inspectors
  - 254 Counties in Texas
- They also conduct thousands of routine inspections on applicators, dealers, and businesses every year

52

192 complaints were received in 97 out of 254 TX counties



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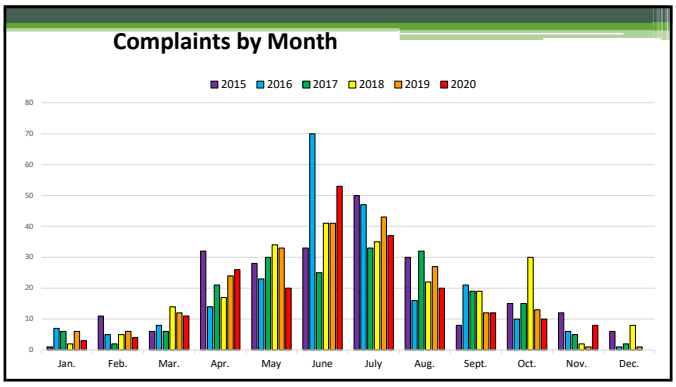

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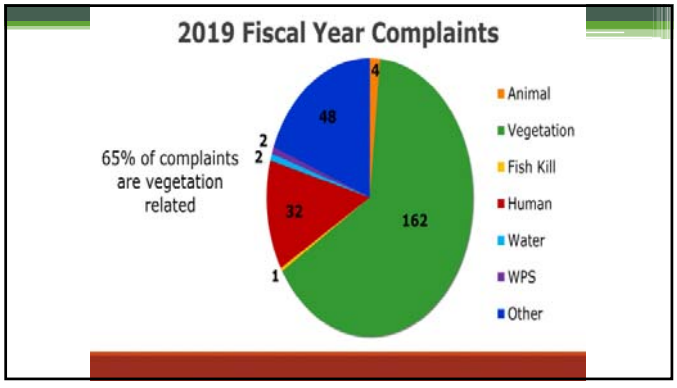

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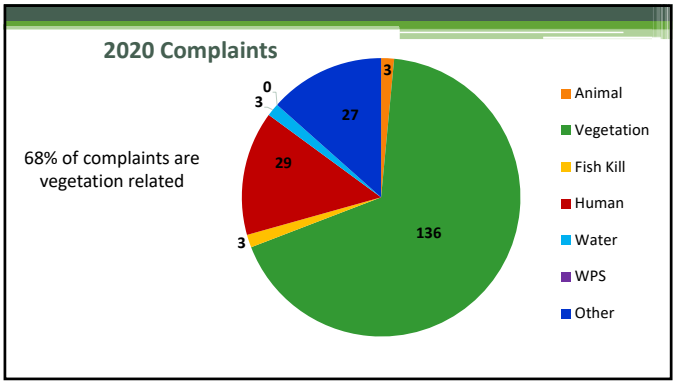

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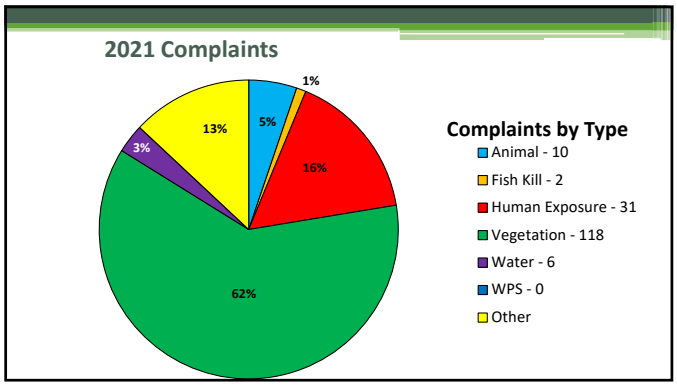

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Complaints 2020

- 24 of the 201 complaints included planes
- 51 were ground rigs
- 7 included Human Exposure
- 2 included vineyards

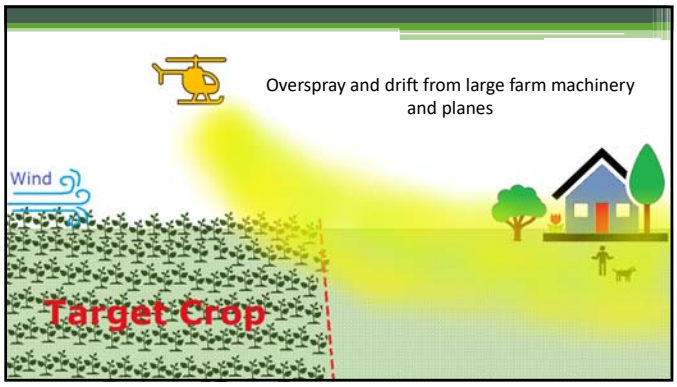
58

WHEN THE PUBLIC SEES YOU SPRAYING !!!

59

VINEYARD

60



61

2021 Complaints

- 10 vineyard damage complaints
- 4 complaints of drift from right-of-way applications
- 15 complaints of herbicide drift originating from cotton fields
- 6 bee kill complaints
- 4 complaints against the application of a pond dye
- 7 mothball misuse complaints

62

Dicamba Complaints

- 12 received between May – August of 2021
  - 6 – Complainant requested to cease investigation
  - 4 – Vegetation samples were positive for dicamba
  - 2 – still pending investigation
- Half were complaints concerning vineyard damage

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- Bee kills
- Spraying in high winds
- Applications before rainfall

64

WATER COMPLAINTS

- POND DYE
- POSSIBLE MISUSE
- FIELD APPLICATION OF INSECTICIDE OR HERBICIDES WITH IMMEDIATE RAIN THREAT LOOMING
- FISH KILLS

65

WATER COMPLAINTS

- FISH KILLS-WEATHER FACTOR SPEAK WITH PARKS AND WILDLIFE
- HERBICIDE APPLICATIONS ON STOCK TANKS/PONDS TOO MUCH AT ONE TIME
- USING WRONG PESTICIDES NOT LABELED FOR AQUATIC APPLICATIONS

66

WATER COMPLAINTS

AUTOMATIC PESTICIDE MISTING SYSTEMS AROUND BOAT SLIPS

67

WATER COMPLAINTS

STATE LIMITED USE PESTICIDE USED IN WATER CHANNEL

DRY PELLLETS SOLD IN A CONTAINER SIZE THAT MADE IT A STATE LIMITED USE PESTICIDE

COMPANY FINED FOR NO PESTICIDE DEALERS LICENSE

APPLICATOR COULD HAVE BEEN FINED FOR APPLICATION WITHOUT A PESTICIDE APPLICATOR LICENSE

68

Precious Texas Trees-4 Complaints

MESQUITE

69

ORNAMENTAL TREE-2

- CREPE MYRTLES

70

WIND TURBINES-
MAKE SURE YOU ASK LANDOWNER TO NOTIFY COMPANY-
MAY BE IN CONTRACT AGREEMENT

71

GARDENS

- WILL ALWAYS BE PLANTED NEXT TO THE FENCE LINE OF THE FIELD YOU ARE SPRAYING !! ALWAYS!!

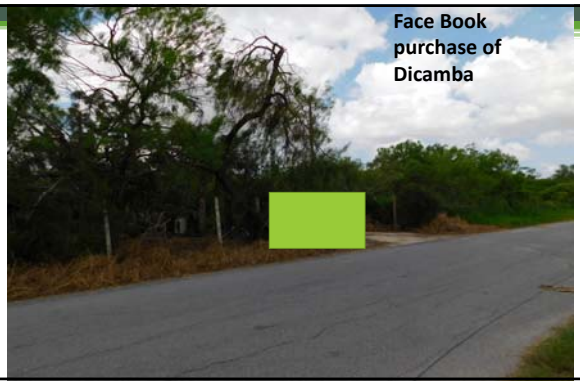
72

- Neighbor disputes over spraying fence lines with herbicides
- Herbicide runoff from golf course into creek causing fish kill
- Improper use of a pesticide to kill raccoons
- Improper use of mothballs to repel snakes and birds
- 2,4 D and dicamba drift complaints

73

- Overspray from orchard onto residence causing homeowner to get sick
- Employees working on wind turbines getting sprayed by aerial applicator
- Overspray from right-of-way applicators

74



75

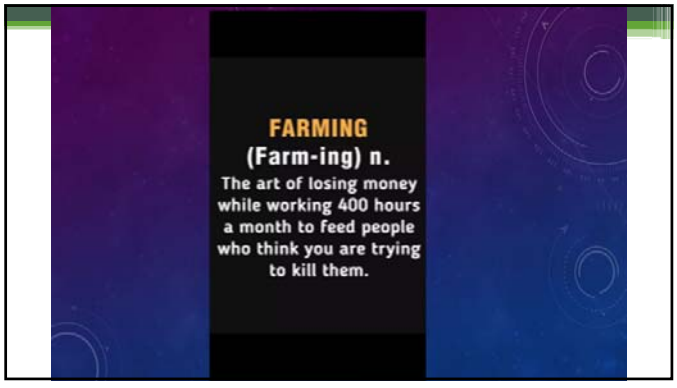
76


THE LEAVES DON'T LIE
THEY ARE LIKE DRUNKS AND LITTLE KIDS
THEY TELL THE TRUTH !!!

77


Cool Whip
ORIGINAL
COUNTRY CROCK
ORIGINAL

78


FARMING
(Farm-ing) n.
The art of losing money while working 400 hours a month to feed people who think you are trying to kill them.

79


Why country kids have good immune systems...

80

WHY WE DON'T TEXT AND DRIVE!!

81

82

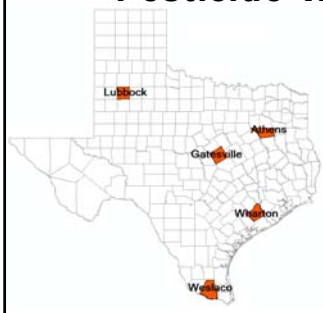
Missing labels, no problem, that's the 2,4 D container right? Go ahead and use it, that's why the next slide is so important to us all!!

83

Pesticide Waste Disposal

84

Pesticide Waste Disposal



TDA held first state-funded pesticide waste disposal event in ~ 8 years in November 2018

Free & anonymous

Events have been held in:

- Wharton
- Gatesville
- Weslaco
- Lubbock
- Athens

85

A total of 531,740 lbs. of waste has been collected between the 4 events

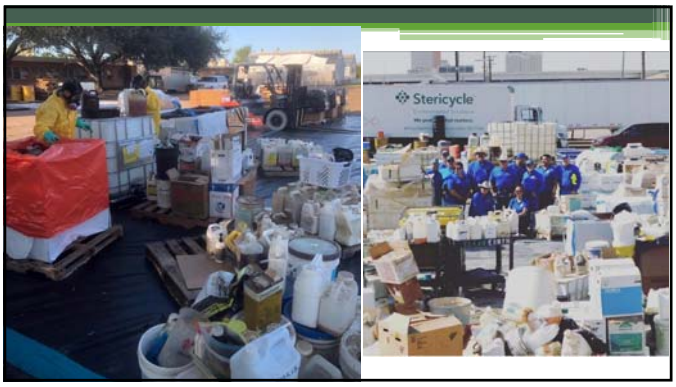
86

87

88

- 331 participant trucks between the 4 events
- Average waste per truck: ~ 1,600 lbs.

89



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Questions?

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Office 512-463-7692
Cell 512-955-9336

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PEST MANAGEMENT IN FORAGE & ROW CROPS

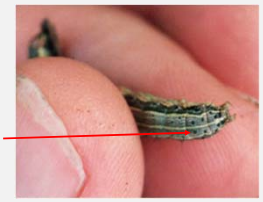
David Kerns
Department of Entomology
Texas A&M University

1

FALL ARMYWORM

INVERTED WHITE "Y" ON HEAD

Four dark, raised bumps on tail end



Late summer and fall

2

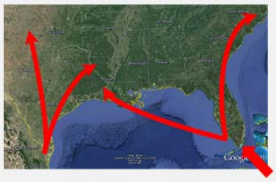
FALL ARMYWORM STRAINS

- There are multiple strains of fall armyworm.
- The two predominant strains are:
  - The rice strain (R-strain) predominates on rice, alfalfa, pasture grasses, and millet. Will move from grass onto other crops. Historically easy to manage with insecticides.
  - The corn strain (C-strain) is typically found on corn, sorghum, and cotton. Historically tolerant to some insecticides such as pyrethroids, and some Bt proteins.
- These strains can inter-breed, but it is not common.
- Has always been assumed that pasture infesting FAWs are R-strain.

3

FAW POPULATION DEVELOPMENT

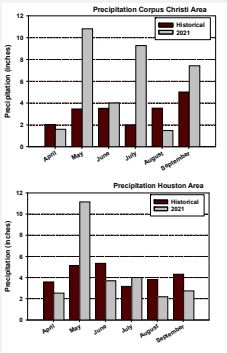
- Generation from egg to adult completed in about 4 weeks during summer
  - Much longer during cool weather
- Cannot survive freezing weather
  - Overwinter in south Texas
- Moths migrate north in summer
- FAW outbreaks can occur in mid-summer and fall after rains



4

FALL ARMYWORM OUTBREAKS

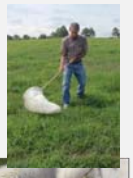
- Widespread fall armyworm outbreak beginning in early October 2017
- Biblical outbreaks in 2018 in September, and 2021 in June and July
- Most outbreaks occur following heavy rainfall events in Spring and Summer



5

MONITORING FALL ARMYWORM

- Early detection of armyworm infestations is the best defense against crop loss
- Look for outbreaks after summer rains
- Prefer dense, lush grasses (well fertilized)
- Inspect grassy areas along fence lines, tree lines, and waterways
- Pheromone traps have been used to monitor moth activity but there is effectiveness is uncertain
- Cattle egrets lingering in pasture
- Listen for reports of outbreaks
- Scout for worms and damage
  - Visually
  - Sweep net



6

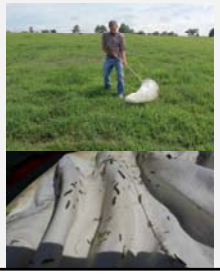
MAKING VISUAL INSPECTIONS

- Worms sticking to pants or boots
  - Scout these areas first, or area of dead grass
- Early signs of armyworm damage by small worms include leaves that are chewed on the underside only and fields with a slight "frosted" appearance
  - Slightly larger worms will create a windowpane effect
  - Large worms, grass is gone
- Pull back the thatch and look at the base of the base and soil for hiding worms and worm excrement (resemble dark grass seeds)
- Run your hands through the grass in a 1- to 2-square-foot area to knock the larvae to the soil and make them easier to see. Then part the grass to look for larvae on the soil.
- Pour soapy water over a patch of grass (1/2 oz. dishwashing soap/gallon water), the solution will irritate the larvae, which will drive them up from the soil surface very quickly.

7

USING A SWEEP NET

- Sweep net is the favored method
- Picks up easily missed small worms
- Use a standard 15-inch canvas sweep net
- Best used early morning or late afternoon
  - May miss them when hot and worms are near the soil surface
- Drag the net back and forth forcefully through the grass canopy as deep as possible without interfering with fluid motion or digging dirt
- Take 25 sweeps before checking the net for worms



8

DAMAGE INDICATORS

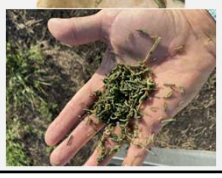
- Look for leaf feeding
- Small worms graze on green portion of leaf, resulting in windowpane effect
- Larger worms consume entire leaf

9

WHEN TO TAKE ACTION

- Early detection and control is necessary to avoid crop loss
  - Small worms are easier to kill
- Threshold varies with size of grass and size of worms
  - Big worms eat more
  - Seedling grass and new growth following cutting cannot tolerate as many worms
  - Thresholds are not written in the Gospels, nor did Moses bring them down from Mt. Sinai
- Threshold
  - Visual: 3 or more ½ inch or larger worms per square foot
  - Sweep net (15-inch): 2 or more ½ inch worms per sweep

** count 2 smaller worms as 1 big worm*



10

INSECTICIDES

Class	Active ingredient	Trade names	Pre-grazing Interval (days)	Pre-harvest interval (days)
Pyrethroids	Cyfluthrin	Tombstone	0	0
	Beta-cyfluthrin	Baythroid XL, Sultrus	0	0
	Zeta-cypermethrin	Mustang, Mustang Maxx	When dry	0
	Lambda-cyhalothrin	Calvary, Firestone, Grizzly, Kendo, L – C Insecticide, Lambda T, Lambda-Cy, LambdaStar, Lamcap, Paradigm, Province, Ravage, Silencer, Warrior	0	7 for hay, 0 for forage
	Gamma-cyhalothrin	Declare	0	7
Benzoylureas	Diflubenzuron	Dimilin, Durant, Micromite, Unforgiven	0	1
	Methoxyfenozide	Intrepid, Invertid, Troubadour, TurnStyle, Zylo	0	7
Carbamates	Methomyl	Lannate, Nudrin	7	3
	Carbaryl	Sevin, Carbaryl	14	14
Diamide	Chlorantraniliprole	Vantacor (Prevathon)	0	0
Spinosyn	Spinosad	Blackhawk	When dry	3
Diamide + Pyrethroid	Chlorantraniliprole + Lambda-cyhaolthrin	Besiege	0	7 for hay, 0 for forage

11

INSECTICIDE PROPERTIES

Class	Active ingredient	Trade names	Properties
Pyrethroids	Cyfluthrin	Tombstone	• Fast acting • Short residual (3-5 days) • All worm sizes • Not rainfast • Contact only • Non-systemic • Inexpensive • Low toxicity • Broad spectrum
	Beta-cyfluthrin	Baythroid XL, Sultrus	
	Zeta-cypermethrin	Mustang, Mustang Maxx,	
	Lambda-cyhalothrin	Calvary, Firestone, Grizzly, Kendo, L – C Insecticide, Lambda T, Lambda-Cy, LambdaStar, Lamcap, Paradigm, Province, Ravage, Silencer, Warrior	
	Gamma-cyhalothrin	Declare	

12

Class	Active ingredient	Trade names	Properties	
Benzoylureas	Diflubenzuron	Dimilin, Durant, Micromite, Unforgiven	• Slow acting (3-4 days) • Dimilin provides good residual (10-14 days) • Others provide decent residual (5-7 days) • Not rainfast • Diflubenzuron only small worms • Others get all sizes	• Must be eaten • Non-systemic • Inexpensive • Very low toxicity • Target specific
	Methoxyfenozide	Intrepid, Invertid, Troubadour, TurnStyle, Zylo		
Carbamate	Methomyl	Lannate, Nudrin	• Fast acting • Short residual (3-5 days) • All worm sizes • Not rainfast • Contact only • Non-systemic • Very toxic • Moderately expensive • Broad spectrum	
	Carbaryl	Sevin, Carbaryl		

13

Class	Active ingredient	Trade names	Properties
Diamide	Chlorantraniliprole	Vantacor (Prevathon)	• Fairly fast acting (several days) • Good residual (14-20+ days) • Rainfast • Must be eaten • All worm sizes • Translaminar systemic • Expensive • Very low toxicity • Target specific
Spinosyn	Spinosad	Blackhawk	• Fairly fast acting (several days) • Short residual (4-7 days) • Rainfast • Must be eaten • All worm sizes • Translaminar systemic • Expensive • Very low toxicity • Target specific
Diamide + Pyrethroid	Chlorantraniliprole + Lambda-cy	Besiege	See Vantacor but faster

14

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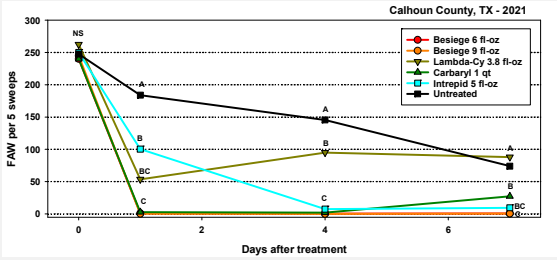
FAW INSECTICIDE EFFICACY – LOWER GULF COAST 1



Stephen Biles, Texas A&M AgriLife Extension

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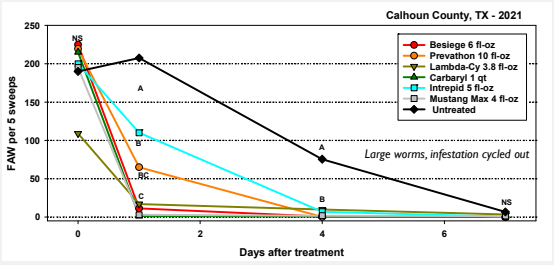
FAW INSECTICIDE EFFICACY – LOWER GULF COAST 2



Stephen Biles, Texas A&M AgriLife Extension

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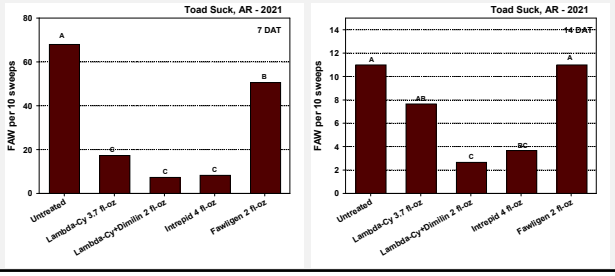
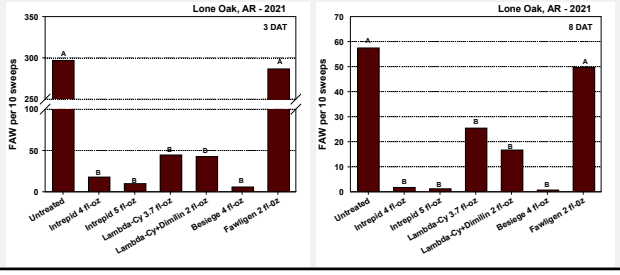
FAW INSECTICIDE EFFICACY – ARKANSAS 1



18

FAW INSECTICIDE EFFICACY – ARKANSAS 2



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APPROXIMATE COSTS OF SOME INSECTICIDES

Insecticide	Rate	$/gallon	$/acre
Besiege	4 fl-oz/ac	$293.11	$9.16
	6 fl-oz/ac		$13.74
	9 fl-oz/ac		$20.61
Lambda-Cy	3.8 fl-oz/ac	$62.00	$1.84
Carbaryl	32 fl-oz/ac	$44.50	$11.13
Intrepid	4 fl-oz/ac	$237.00	$7.41
	5 fl-oz/ac		$9.26
Dimilin	2 fl-oz/ac	$250.00	$3.90
Vantacor (Prevathon)	0.7 fl-oz/ac (8 fl-oz/ac)*	$1,800 (sold in qts)	$9.84
	1.2 fl-oz/ac (14 fl-oz/ac)		$16.88
	1.7 fl-oz/ac (20 fl-oz/ac)		$23.90

Lambda Cy + Dimilin = $5.74/ac

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WHAT IS UP WITH PYRETHROID EFFICACY CONSISTENCY?

- Poor insecticide coverage or improper sprayer calibration.
- Overlapping eggs lays resulting in hatches after insecticide has worn off.
- Population is not moving from the lower canopy to the upper to become exposed to the in insecticide.
- Rainfall after an application.
  - Light rainfall may actually help move the insecticide into the canopy where the worms reside.
  - Heavy rainfall may wash the insecticide off.
- If FAW are corn strain, they are naturally more tolerant to pyrethroids.
- Pyrethroid resistance has developed.

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SITUATIONAL INSECTICIDE SELECTION

- Going to cut hay soon
  - Pyrethroid
    - Short residual
    - Fast and cheap, but risky
- Most worms very small
  - Dimilin products
    - Only gets little worms (so usually tank-mixed)
    - Will get hatching eggs
    - Cheap
- No rain in forecast but need fair residual
  - Intrepid products
    - Will get hatching worms for 3-4 days
    - Fairly inexpensive
- Rain in forecast and/or need long residual
  - Vantacor (Prevathon)
  - Besiege
    - Rainfast
    - Long residual
    - Will get hatching worms
    - Expensive
- No rain in forecast but need good residual
  - Pyrethroid + Dimilin product
    - Fast acting
    - Will get hatching worms for up to 14 days
    - Fairly inexpensive

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CORN PEST MANAGEMENT

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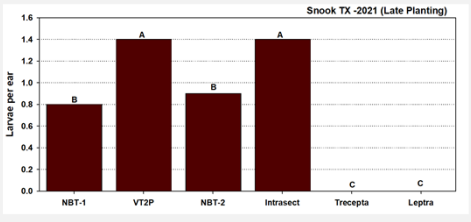
CORN EARWORM



Trait name	Above ground Bt proteins
NBT	None
VT2P	Cry1A.105 + Cry2Ab2
Intrasect	Cry1Ab + Cry1F
Trecepta	Cry1A.105 + Cry2Ab2 + Vip3A
Leptra	Cry1Ab + Cry1F + Vip3Aa

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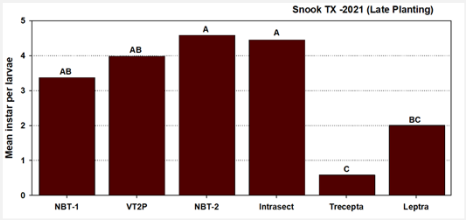
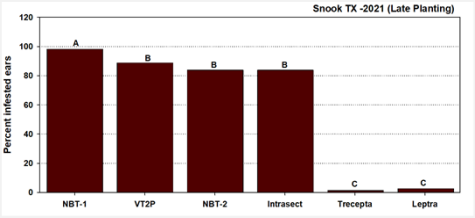
CORN EARWORM



Trait name	Above ground Bt proteins
NBT	None
VT2P	Cry1A.105 + Cry2Ab2
Intrasect	Cry1Ab + Cry1F
Trecepta	Cry1A.105 + Cry2Ab2 + Vip3A
Leptra	Cry1Ab + Cry1F +Vip3Aa

25

CORN EARWORM



Trait name	Above ground Bt proteins
NBT	None
VT2P	Cry1A.105 + Cry2Ab2
Intrasect	Cry1Ab + Cry1F
Trecepta	Cry1A.105 + Cry2Ab2 + Vip3A
Leptra	Cry1Ab + Cry1F +Vip3Aa

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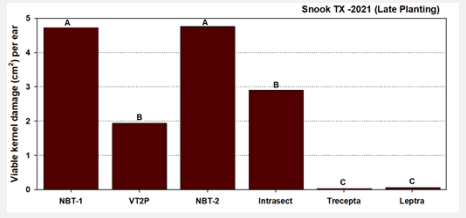
CORN EARWORM



Trait name	Above ground Bt proteins
NBT	None
VT2P	Cry1A.105 + Cry2Ab2
Intrasect	Cry1Ab + Cry1F
Trecepta	Cry1A.105 + Cry2Ab2 + Vip3A
Leptra	Cry1Ab + Cry1F +Vip3Aa

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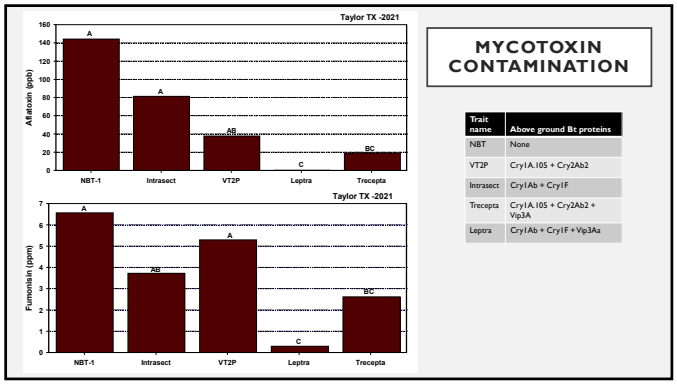
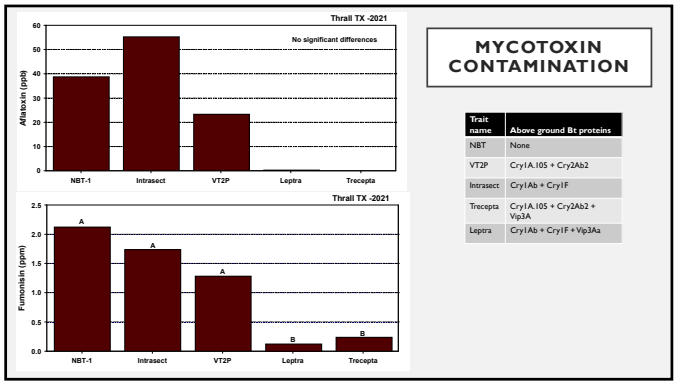
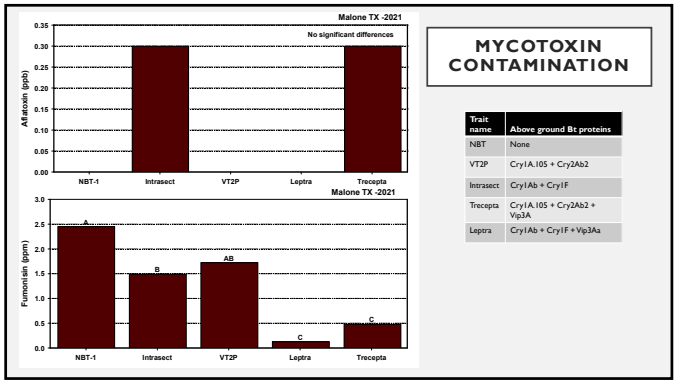

Taylor TX -2021
Aflatoxin (ppb)
NBT-1
Intrasect
VT2P
Leptra
Trecepta
Taylor TX -2021
Fumonisin (ppm)
MYCOTOXIN CONTAMINATION
Trait name
Above ground Bt proteins
NBT
None
VT2P
Cry1A.105 + Cry2Ab2
Intrasect
Cry1Ab + Cry1F
Trecepta
Cry1A.105 + Cry2Ab2 + Vip3A
Leptra
Cry1Ab + Cry1F + Vip3Aa

28


Thrall TX -2021
No significant differences
Aflatoxin (ppb)
NBT-1
Intrasect
VT2P
Leptra
Trecepta
Thrall TX -2021
Fumonisin (ppm)
MYCOTOXIN CONTAMINATION
Trait name
Above ground Bt proteins
NBT
None
VT2P
Cry1A.105 + Cry2Ab2
Intrasect
Cry1Ab + Cry1F
Trecepta
Cry1A.105 + Cry2Ab2 + Vip3A
Leptra
Cry1Ab + Cry1F + Vip3Aa

29


Malone TX -2021
No significant differences
Aflatoxin (ppb)
NBT-1
Intrasect
VT2P
Leptra
Trecepta
Malone TX -2021
Fumonisin (ppm)
MYCOTOXIN CONTAMINATION
Trait name
Above ground Bt proteins
NBT
None
VT2P
Cry1A.105 + Cry2Ab2
Intrasect
Cry1Ab + Cry1F
Trecepta
Cry1A.105 + Cry2Ab2 + Vip3A
Leptra
Cry1Ab + Cry1F + Vip3Aa

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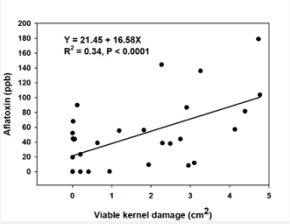
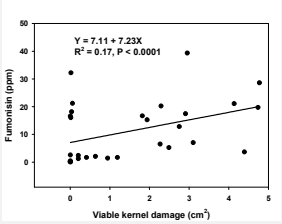
EAR FEEDING – MYCOTOXIN RELATIONSHIP

AFLATOXIN



FUMONISIN



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CORN ROOTWORM BT TRAITS

Company	Trait	Cry3Bb1	mCry3A	eCry3.1Ab	Cry34/35Ab1	RNAi	No. CRW traits
Bayer/DeKalb	Triple PRO or Rootworm	X					Single
Corteva/Pioneer	RW or Xtra				X		Single
Corteva/Pioneer	TRIsect		X				Single
Syngenta/Agrisure	RW or 3000GT or TRIsect or Viptera 3111		X				Single
Syngenta/Agrisure	Duracade		X	X			Two
Corteva/Pioneer	Xtreme or QROME		X		X		Two
Syngenta/Agrisure	3122		X		X		Two
Corteva/Pioneer & Bayer/DeKalb	SmartStax	X			X		Two
Bayer/DeKalb	SmartStax PRO	X			X	X	Three

Single CRW traits are going away

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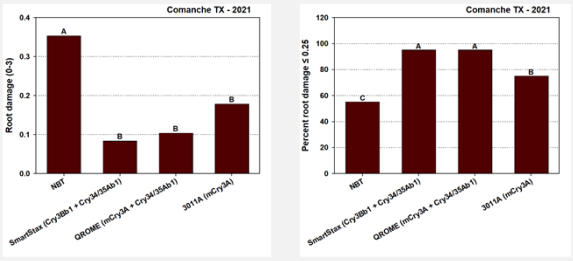
BT TRAITS EFFICACY



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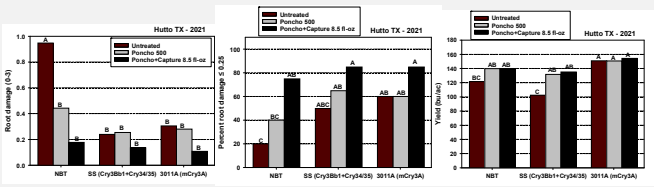
BT TRAIT X IST X CAPTURE LFR



All treatments contained 11-37-0 Pop-up

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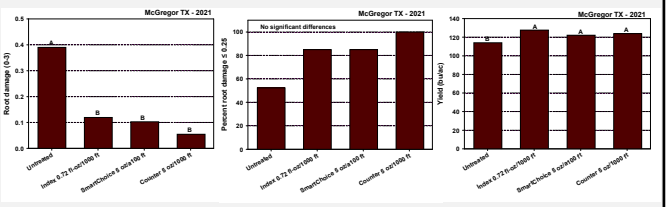
LIQUID AND GRANULAR INFURROW INSECTICIDES



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INSECTICIDE SEED TREATMENTS

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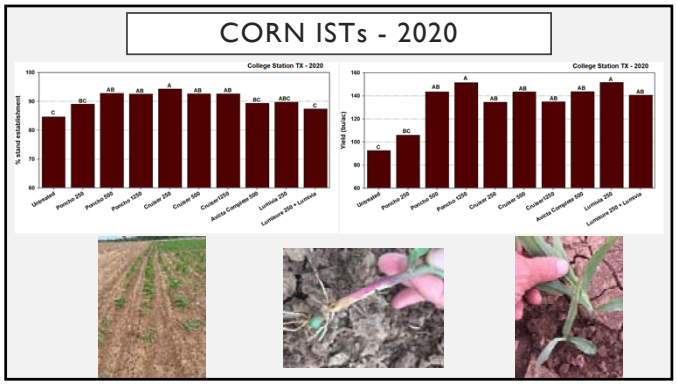
CORN ISTs - 2020
College Station TX - 2020
% stand establishment
Yield (bu/ac)
Untreated
Poncho 250
Poncho 500
Poncho 1250
Cruiser 250
Cruiser 500
Cruiser1250
Avicta Complete 500
Lumivia 250
Lumiwave 250 + Lumivia

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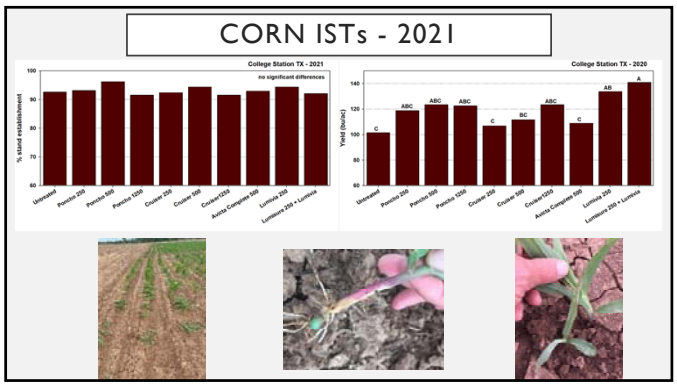
CORN ISTs - 2021
College Station TX - 2021
no significant differences
College Station TX - 2020
% stand establishment
Yield (bu/ac)
Untreated
Poncho 250
Poncho 500
Poncho 1250
Cruiser 250
Cruiser 500
Cruiser1250
Avicta Complete 500
Lumivia 250
Lumiwave 250 + Lumivia

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AGRICULTURAL PEST MANAGEMENT UPDATES

https://www.texasinsects.org/agriculture-audio-updates-home.html

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THANK YOU & QUESTIONS?

David Kerns
Texas A&M University, College Station, TX
Email: David.Kerns@ag.tamu.edu
Phone: 318-439-4844

United States Department of Agriculture
National Institute of Food and Agriculture

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Managing Feral Hogs:

Basics of wild pig management

Texas A&M AgriLife Extension

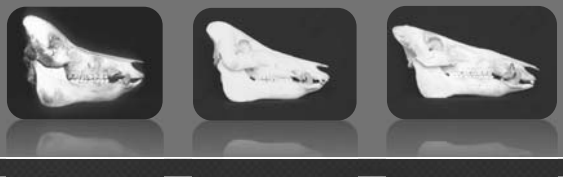
Overview

1. Know thy enemy
2. Know thy tools

Texas A&M AgriLife Extension

Know Thy Enemy: *Sus scrofa*

- Lots of common names!
- Domestic swine
  - Extensive in southeast Texas by 1830s
  - Subsequent releases and escapes
- Eurasian wild boar
  - Introduced to Texas in 1930s
- Domestic swine x Eurasian wild boar



Texas A&M AgriLife Extension

Diet

Omnivorous and opportunistic

"Will eat anything that contains a calorie."

– Dr. Billy Higginbotham

- Plants
- Mushrooms
- Invertebrates
- Mammals
- Birds
- Carrion
- Crops

Texas A&M AgriLife Extension

Social Structure

- Solitary males
  - Compete for breeding opportunities and food
- Sounders
  - Mature female(s) + litter(s)
  - 2-50+ individuals

Reproduction

- Females
  - Breed at 6-12 months
  - In heat every 18-24 days until bred
  - Gestation = 115 days
  - 4-6 piglets/litter, multiple litters per year
- Males
  - Breed at 12-18 months
  - Fight for opportunity to breed

Justin Stevenson, USDA

Lifespan

- Can live up to 8 years (average is 4-5)
  - Few natural predators
  - Sows aggressively defend piglets
  - Group vigilance and defensiveness

Habitat

- "The Ultimate Generalist"
- Food availability is the primary driver of habitat choice
  - Concentrate near mast trees and agriculture

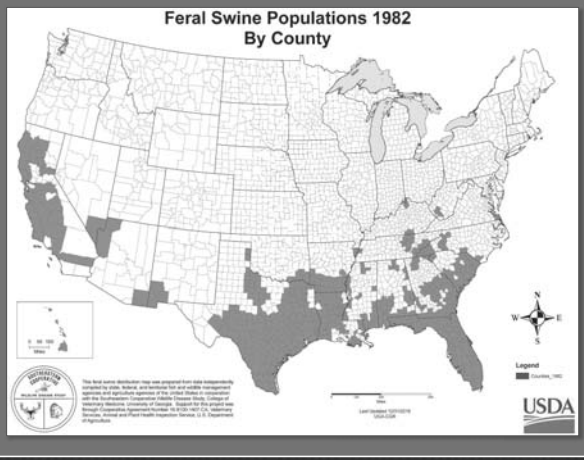
Habitat

- Thermoregulation is secondary driver
  - Wild pigs lack sweat glands
    - Wallowing
    - Using shaded areas
    - Feeding nocturnally
  - Prefer areas near permanent water

Janet and Phil (Flickr)

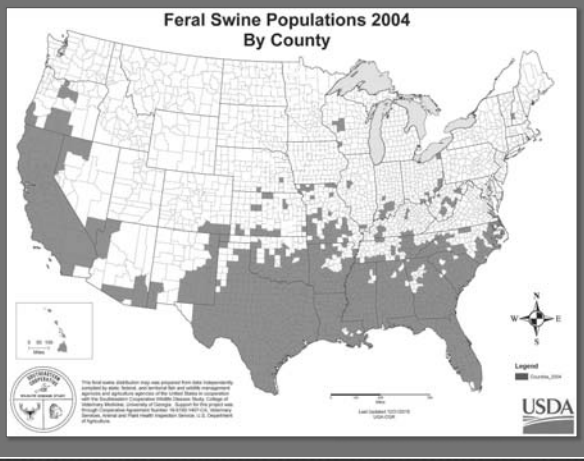
TEXAS A&M AGRILIFE EXTENSION

Historic Distribution



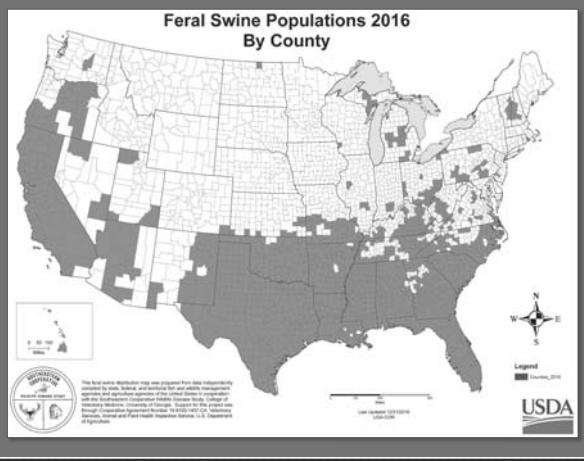
TEXAS A&M AGRILIFE EXTENSION

Historic Distribution



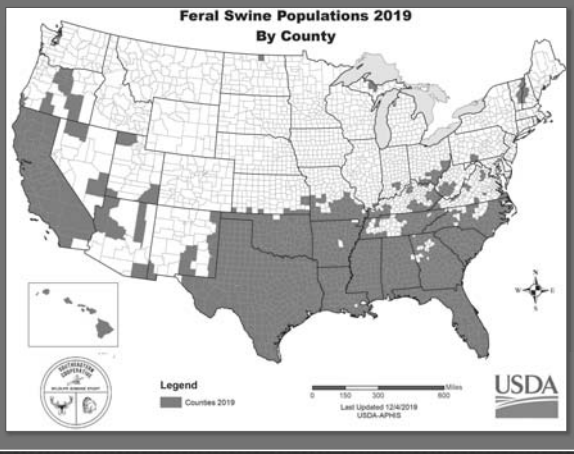
TEXAS A&M AGRILIFE EXTENSION

Historic Distribution



TEXAS A&M AGRILIFE EXTENSION

Current Distribution



Impacts

- Loss of riparian vegetation
- Increased runoff and sedimentation
- Erosion
- Bacterial contamination
- Watershed impairment
- Soil compaction
- Negative changes in plant communities

Bernard Dupont

Impacts

- Kill or wound trees
- Kill and eat wildlife
- Destroy critical habitat
- Compete with native species

USDA (all images)

Impacts

- Spread disease
- Competition with livestock
- Documented predation on lambs, kids, and calves
- Rooting and trampling of crops
- Soil erosion and compaction

Tyler Campbell, USDA

Justin Stevenson, USDA

Impacts

- Carry diseases that are transmissible to livestock, pets, and humans, such as swine brucellosis
- Vehicle collisions
- Damage property: cemeteries, lawns, sports fields

Scott Patrom

USDA

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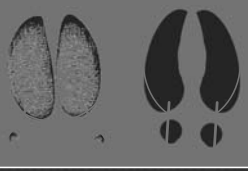
Tracks and Sign



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Tracks and Sign

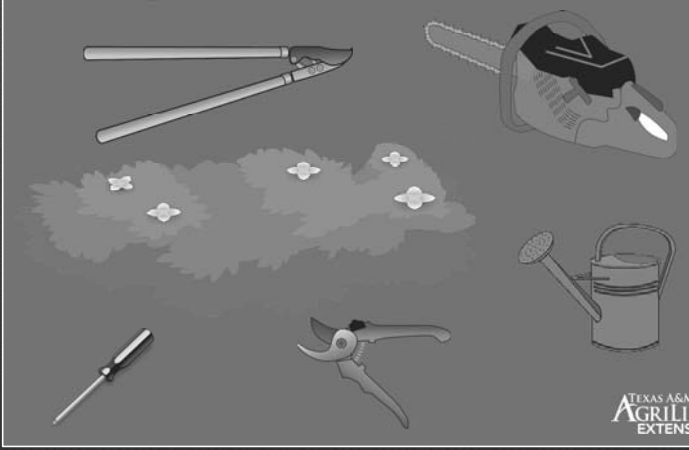
Craig Hicks, USDA

TEXAS A&M AGRILIFE EXTENSION

Know Thy Tools:
Integrated Pest Management

TEXAS A&M AGRILIFE EXTENSION

Why Tool Choice Matters



Know the Law

Janet and Phil (Flickr)

- Status: free-ranging livestock
- Ownership: the landowner
- Hunting
  - No license required
- Movement
  - Live movement is strictly prohibited, except:
    1. To an approved "hunting preserve": marked **males only**
       - Regulated by TPWD
    2. To an approved buying station: males and females
       - Regulated by TAHC

Put on Your Armor

Pigs are gross, y'all

- **Gloves** – double set
- Safety glasses or sunglasses
- Wash tools and work surfaces with bleach
- Wash your hands
- Cook meat thoroughly
  - 160° internal temperature

Before You Do Anything Else...

- Reduce wild pig access to wildlife supplement
  - Fencing 28-33" high

Tool: Box Traps

Box trap

- Catches 1-2 adult pigs or a small group of juveniles
- Mobile and easy to set
- Non-targets cannot escape
- Higher cost per pig captured

TEXAS A&M AGRILIFE EXTENSION

Pest & Disease Management for Fruit Trees

Tim Hartmann, Ph.D.
Assistant Professor & Extension Specialist
Texas A&M AgriLife Extension
College Station, TX

TEXAS A&M AGRILIFE EXTENSION

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Why don't we grow more fruit in Texas???

- Inconsistent chilling
- Spring freezes
- Disease & pest problems
- Hail Damage
- Labor, water, others

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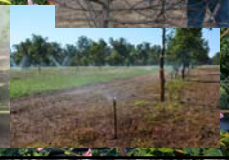
Not all fruit are created equal

- Low-input
  - Asian persimmon
  - Jelly Grapes (European-American hybrids)
  - Jujube/Chinese Date
  - Pomegranate???
- Medium-input
  - Blackberry
  - Blueberry
  - Fig
  - Pear (Asian-European hybrids)
  - Strawberry
- High-input
  - Apple
  - Citrus
  - Kiwifruit
  - Peach and other stone fruit
  - Pecan
  - Wine grapes



4

What is a Pest?

"An organism that diminishes the value of resources in which man is interested as they interfere with the production and utilization of crops and livestock used for food and fiber"

-U.S. Department of Agriculture

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What is a Pest?

- Arthropods
  - Insects
  - Arachnids
  - Crustaceans
- Vertebrates
  - Deer, rabbits
  - Raccoons, possums, squirrels
  - Gophers, voles
  - *Homo sapiens*???
- Weeds

6

What is a Disease?

"An abnormality in the structure and/or function of the host plant cells and/or tissue as a result of a continuous irritation caused by a pathogenic agent or an environmental factor"

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Plant Pathogen

Infectious biotic agent that can cause disease in a susceptible host under favorable conditions

- Microorganisms
  - Fungi
  - Bacteria
  - Viruses/viroids
  - Phytoplasma
  - Nematodes

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Abiotic "Disease"

Caused by an abiotic (non-living) or environmental agent (stress).

- Heat
- Cold
- Drought
- Hypoxia/anoxia
- Oxidative stress
- Salinity
- Nutrition
- Pesticides

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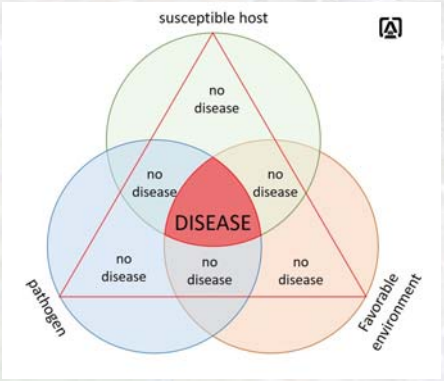
Why don't we always have disease?



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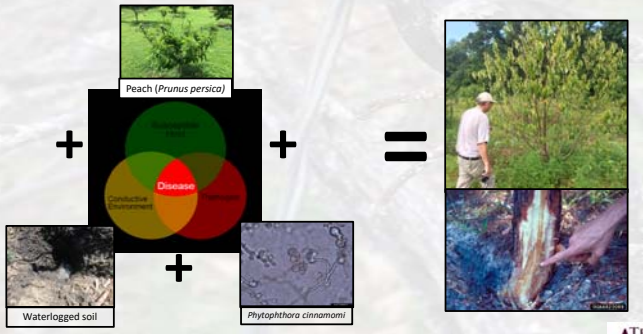
Example: *Phytophthora* Root and Crown Rot



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Diseases identified by:

- **Symptoms:**
  - Rusts
  - Spots
  - Rots
  - Scab
  - Blights
  - Cankers
- **Diagnostic:**
  - Morphological, ELISA, PCR

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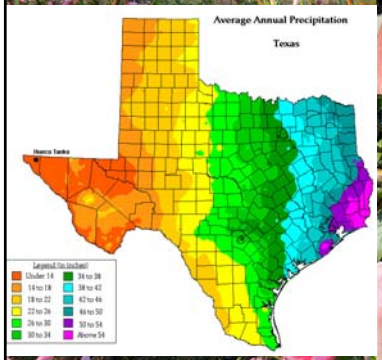
Disease pressure increases with rainfall & RH



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IPM = Integrated Pest Management

Advantages
- Less chemical used
- Less contamination
- Reduce problems with
  - Secondary pests
  - Pest resurgence
  - Pests developing resistance to chemicals

Disadvantages
- Requires monitoring of pests/diseases and environment
- Better spray timing and application needed

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Four Pillars of IPM

I. Cultural Control
- *Plant selection*
- *Plant management*
- *Orchard hygiene*

II. Biological Control
- *Re-introduction*
- *Preservation*
- *Limit broad-spectrum pesticide use*

III. Mechanical Control
- *Physical removal of agent*
- *Exclusion*

IV. Chemical Control
- *Should be last resort*
- *Accurate diagnosis*
- *Careful selection*

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Common Pests of Peach / Nectarine

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Catfacing Insects

- Group of sucking insects
  - Stink bugs
  - Leaf footed plant bugs
  - Squash bugs
  - Lygus bugs

STINK BUG

LEAF-FOOTED BUG

PLANT BUG

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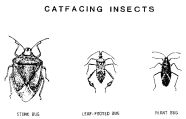
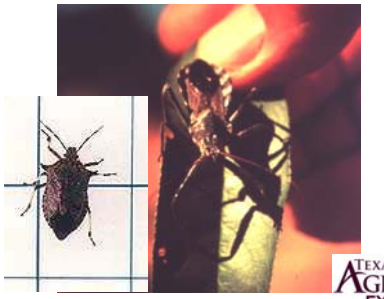
Catfacing Insects

- Feed on surface cells of fruit
  - Kill cells
  - Fruit develops dimples as grows
- Migrate in from surrounding fields
- Control: well timed spray in spring





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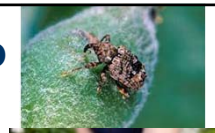
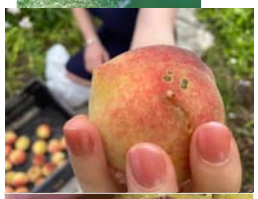
Plum Curculio

- Weevil punctures fruit and lays eggs under skin flap leaving a scar
- Larva feed on peach, plum, apple fruit
- Fruit is small, misshapen, or falls off tree
- Eliminate wild plums
- Well-timed insecticide sprays (petal fall/shuck-split)


22

Two-spotted Spider Mites

- Spider like anthropod
  - Not insects
- Feeding
  - Piercing sucking mout parts
- Seasonal infestations
  - Hot, dry weather
  - Excessive insecticide usage (carbaryl)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Two-spotted Spider Mites

- **Damage**
  - Bronzed, stippled
  - Devitalize tree
  - Reduced yield
  - Marked fruit
- **Control**
  - Minimize broad-spectrum insecticides
  - Treat only when necessary
  - Oils and smothering agents
  - Well-timed miticide applications
  - Rotate chemicals


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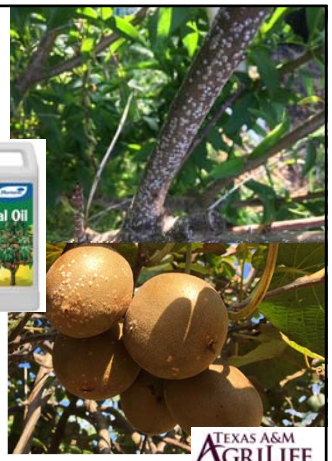
Scale Insects

- Pest of many crops (tree and fruit)
- Piercing-sucking mouthparts
- **Control:**
  - Horticultural oils in dormant season
  - Annual application for prevention
  - Multiple sprays may be necessary
  - Addition of contact insecticide



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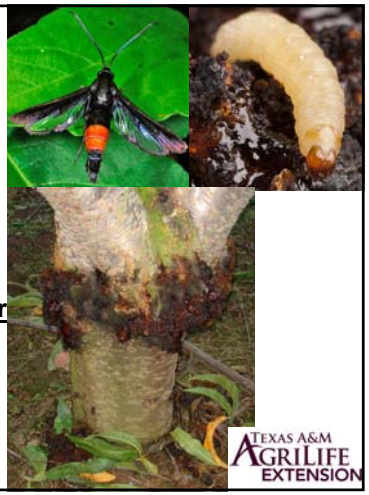
Peach Tree Borer

- Clear winged moth
- Eggs laid on trunk
- Larva feed on cambium of trunk
  - Gum and frass at tree base
  - Mainly older devitalized trees
- **Kill adults and eggs BEFORE entr to tree!**
  - Detect by trapping - pheromones
  - Mating disruption pheromones
  - Calendar spray (late-summer)
  - Lorsban (chlorpyrifos), malathion, pyrethroids)



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Common Diseases of Peaches / Nectarines

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Brown Rot of Stone Fruit

- **Attack fruit**
  - Blossom stage
  - As nears harvest
  - During storage
- **Wet, humid conditions**
  - Decay crop in 36-48 hours
- **Single greatest limitation to organic production in TX!**

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Brown Rot Control

- Cultural
  - Remove overwintering structures (mummies, twig cankers)
- Spores spread
  - Wind/rain
  - Insects
  - Spore germination after 3-7 hours wetting
- Preventative sprays
  - After petal fall/shuck split until harvest
  - Pay attention to fungicide PHI's
  - 10-14 day intervals when conditions are favorable
  - Contact agents (Captan, thiophanate, chlorothalonil, copper fungicides)
  - Systemic agents (myclobutanil, Pristine, propiconazole)

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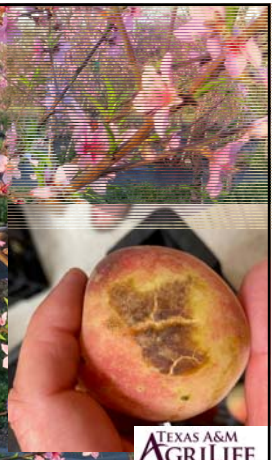
Peach Scab

- Primarily cosmetic lesions on fruit, twigs, leaves
  - Can deface fruit and lead to secondary problems
- Life Cycle
  - Overwinters in twig cankers
  - Spread by rain/wind in spring
  - 40 day latent period
- Control
  - Preventative fungicide sprays (early)
  - Captan, copper fungicides, chlorothalonil
  - Pristine



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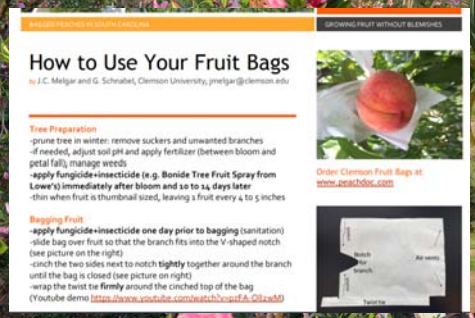
Bagging Fruit as an Alternative to Spraying?



How to Use Your Fruit Bags

by J.C. Melgar and G. Schnabel, Clemson University, jmelgar@clemson.edu

Tree Preparation

-prune tree in winter: remove suckers and unwanted branches
-if needed, adjust soil pH and apply fertilizer (between bloom and petal fall), manage weeds
-**apply fungicide+insecticide (e.g. Bonide Tree Fruit Spray from Lowe's) immediately after bloom and 10 to 14 days later**
-thin when fruit is thumbnail sized, leaving 1 fruit every 4 to 5 inches

Bagging Fruit

-**apply fungicide+insecticide one day prior to bagging** (sanitation)
-slide bag over fruit so that the branch fits into the V-shaped notch (see picture on the right)
-cinch the two sides next to notch **tightly** together around the branch until the bag is closed (see picture on right)
-wrap the twist tie **firmly** around the cinched top of the bag
(Youtube demo https://www.youtube.com/watch?v=pcFA-O8zwMI)

Order Clemson Fruit Bags at www.peachdoc.com

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Phytophthora Crown & Root Rot

- Water-mold fungus
  - Oomycetes
- Loss of vigor
- Wilting
- Eventual collapse
- Most noticeable in summer
- Rot of roots and crown

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Phytophthora Crown & Root Rot

- Management:
  - Site selection
  - Irrigation management
  - Resistant rootstocks
  - Fungicide drenches
    - Mefenoxam
    - Phosphorous acid
    - Zampro

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Fig Rust

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Armillaria (Oak) Root Rot

- Oak Root Rot or Mushroom Root Rot
- Wide host range
- Soil-borne
- Symptoms
  - Early reddening of leaves
  - Dieback
  - Tree death
  - Trees die in circular pattern

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Armillaria (Oak) Root Rot

- Oak Root Rot or Mushroom Root Rot
- Signs
  - Honey to white colored mushrooms at soil line
  - White fungal mat beneath bark
- Control
  - Site selection
  - Avoid areas previously in oak
  - Resistant rootstocks?

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Cotton Root Rot

- *Phymatotrichum omnivorum*
- Texas Root Rot
- Wide host range
  - Devastates apple
  - Okra and asparagus as indicator plants
- Prefer heavy calcareous soils
- Symptoms
  - Girdles the crown
  - Sudden wilting and tree death
  - Leaves usually remain on tree
- Control
  - Site/crop selection

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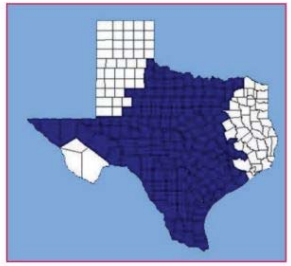

Figure 3. Texas counties where cotton root rot probably occurs (Source: S. D. Lyda)

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Root-knot Nematodes

- Microscopic round worms
  - *Meloidogyne spp.*
- Coarse sandy soils
- Vigor & yield loss
  - Wilting
  - Death in severe cases
- Site selection
- Rootstock selection

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Bacterial Canker

- **Entry by a wound**
  - Cold damage
  - Insect or other damage
- **Movement via**
  - Splashing rain
  - Insects
- **Symptoms**
  - Sunken, elongated, gummy cankers

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Bacterial Canker

- **Disease progression**
  - Tree leafs out normally
  - With 30-60 days
    - Withers, turns brown
    - Dies, frequently root suckering occurs
  - Infection seldom below the soil line
- **Control**
  - Avoid wounding
  - Proper pruning
  - Removal of infected material

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NOT Canker!!!

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Fireblight of Pome Crops

- Favorable conditions
  - Humid, rainy conditions
  - Temp 60 - 86 F
  - Tender tissue
  - Spread by rain, insects
- Limits pear production east of Rockies
- Attacks
  - Terminal buds/shoots
  - Blossoms
  - Spreads to rest of tree

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Fireblight of Pome Crops

- Symptoms
  - Burnt appearance
  - Stem cankers
- Control
  - Resistant varieties
  - Remove cankers
  - Bactericides at bloom and early growth stages
  - Control of sucking insects
    - Aphids
    - Plant bugs
    - Pear psylla

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https://agrilifeextension.tamu.edu/library/gardening/homeowners-guide-to-pests-of-peaches-plums-and-pecans/

Home > Library > Gardening > Homeowner's Guide to Pests of Peaches, Plums and Pecans

Homeowner's Guide to Pests of Peaches, Plums and Pecans

By: Allen Knutson, Kevin Ong, James Kamas, Bill Ree and Dale Mott

Insects and diseases can cause problems in peaches, plums, nectarines and pecans. Homeowners who grow these fruit trees can more easily identify the problems and select the proper control methods if they are familiar with insect pests and diseases, their life cycles and the damage they cause.

Because such problems vary from one area of Texas to another and from one year to the next, it is important that you keep records of pest and disease occurrences. These records can help you make wise control decisions, such as on the timing of pesticide applications.

Table 1. Homeowner's spray guide for peaches and plums

Timing	Pest	Pesticide	Remarks
Dormant season	Insects Scale insects	97% dormant oil	Apply when temperature is between 45 and 70 degrees F. Apply only if scales are observed. Repeat applications in 2-3 weeks. Agitate the spray mixture enough to prevent the oil and water from separating.
Late dormant	Diseases peach leaf curl	copper fungicide or chlorothalonil (see listing of products, Table 4A)	Apply if there is a history of leaf curl.
	Bacterial spot	copper fungicides	
Petal fall—when 75% of the petals have fallen, 3 days after bloom, combination products are an option—see Table 4.	Insects Plum curculio	malathion (malathion 50% EC) or carbaryl (Sevin® liquid) or permethrin 2.5% EC	Use insecticides only if there is a history of insect damage. Removal of wild plums can eliminate overwintering sites of plum curculio and reduce infestations. Repeated applications of permethrin may promote scale and mite outbreaks. Insecticides applied during bloom will kill honey bees.
	Peach twig borer Lesser peach tree borer	permethrin 2.5% EC	
	Diseases Scab	Captan or chlorothalonil or sulfur (see listing of products, Table 4) or thiophanate-methyl (Topsin-M® 70WP, 4SFP)	Treat where there is a history of disease problems.

Peaches and plums (continued)

Timing	Pest	Pesticide	Remarks
Shuck split—when the calyx separates from base of newly formed fruit, 14 days after bloom, combination products are an option—see Table 4.	Insects Catfacing insects, plum curculio	Same insecticides as for petal fall.	Treat where there is a history of catfacing insects and/or plum curculio.
	Diseases Scab	Same fungicide selection as at petal fall	
Cover sprays—repeat at 14-day intervals, combination products are an option—see Table 4.	Insects Catfacing insects, plum curculio	Same as for petal fall	Removing brown rot mummies (diseased fruit) during fall winter can reduce disease infection the following spring.

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AGRILIFE EXTENSION

Insect and Disease Pests of Peaches, Plums, and Blackberries in a Small Fruit Orchard

Allen Knutson[1], Kevin Ong[2], and Bill Ree[3]

Peaches, plums, and blackberries are among the most commonly grown small fruits in Texas landscapes and small fruit orchards. However, insects and diseases reduce fruit production and quality and threaten the plants' health. Identifying these pests and understanding their life cycles and damage can help you choose the most effective control practices. Pests of peaches and plums are especially difficult to control because the fruit are susceptible to many kinds of pests over a long period, from petal fall through harvest (Table 1).

This guide explains how to identify and manage some of the most damaging insects and diseases that attack peaches, plums, and blackberries. The focus is on integrated pest management practices for backyard and small, noncommercial orchards.

Fortunately, not all of the pests listed in this publication will increase to damaging levels every year in every orchard. Identify the pest problems in your planting and select the appropriate controls. To reduce the risk of pests, follow the cultural practices listed below and then monitor your plants for diseases and insect pests.

To be most effective, pesticides for some insects and diseases must be applied at specific stages of crop development (Table 2).

Table 1. Stages of fruit development in peaches and plums

Stage	Timing
Dormant	Late fall to early spring, before bud swell
Budbreak	Buds begin to swell
Bud swell	Buds are noticeably swollen, but no green tissue is present.
Pink	Just before the flower buds open
Bloom	Flowers open
Petal fall	Last petals are falling
Shuck split	Most of the developing fruit have split away from the remains of the dried flower

https://extensionentomology.tamu.edu/files/2019/01/ENTO-087-Insect-and-Disease-Pess-of-Peach-Plums.pdf

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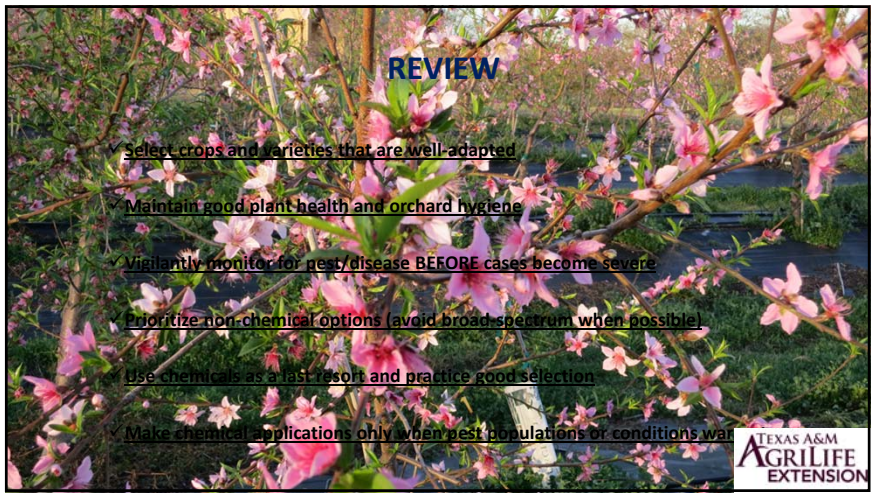

REVIEW

- ✓ Select crops and varieties that are well-adapted
- ✓ Maintain good plant health and orchard hygiene
- ✓ Vigilantly monitor for pest/disease BEFORE cases become severe
- ✓ Prioritize non-chemical options (avoid broad-spectrum when possible)
- ✓ Use chemicals as a last resort and practice good selection
- ✓ Make chemical applications only when pest populations or conditions war

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Questions?

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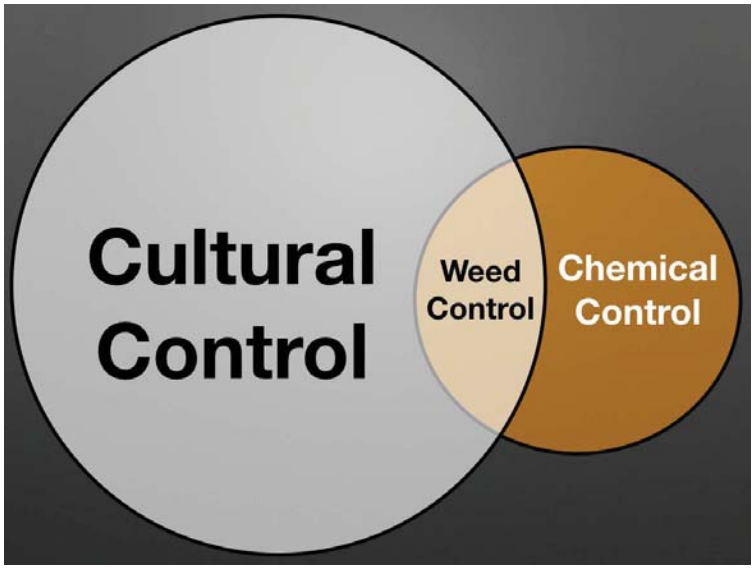
Texas A&M AgriLife Extension

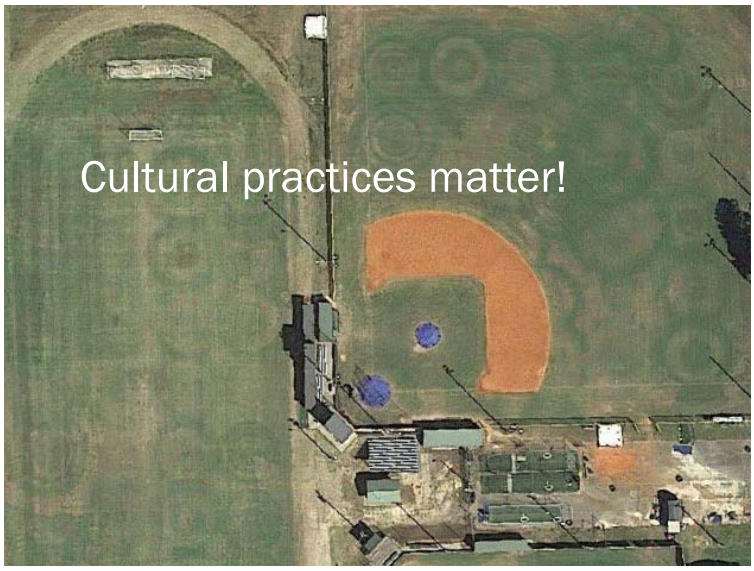
Turfgrass Pest Management

Weeds and Insects

CHRISSIE A. SEGARS, PH.D.

TEXAS A&M AGRILIFE EXTENSION TURFGRASS SPECIALIST

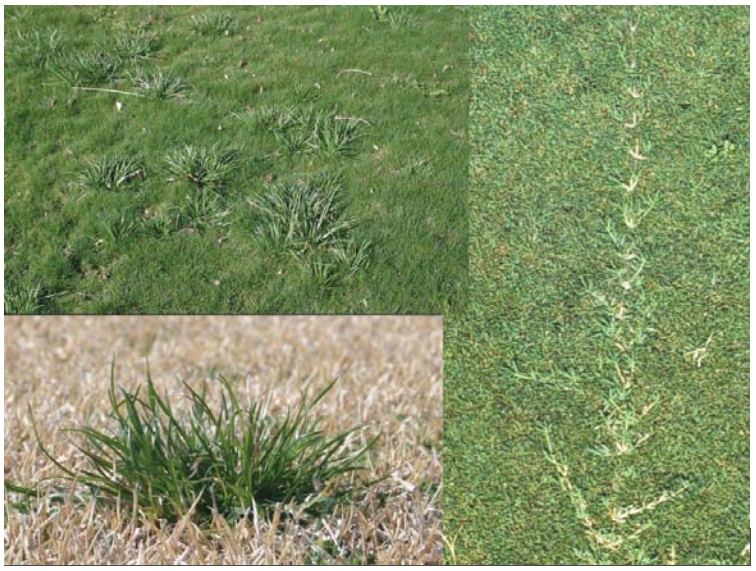




Mowing quality matters!

What is a Weed?

- A plant out of place
- A plant deemed unwanted by a Human



Weeds are difficult to control because…

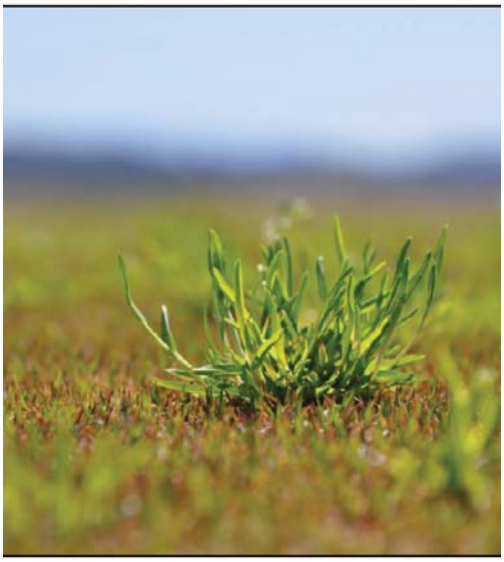
- Ability to spread
- Ability to produce seeds
- Herbicide tolerance
- Biology
- Other?

Seeds

Photo Courtesy of Bob Raley

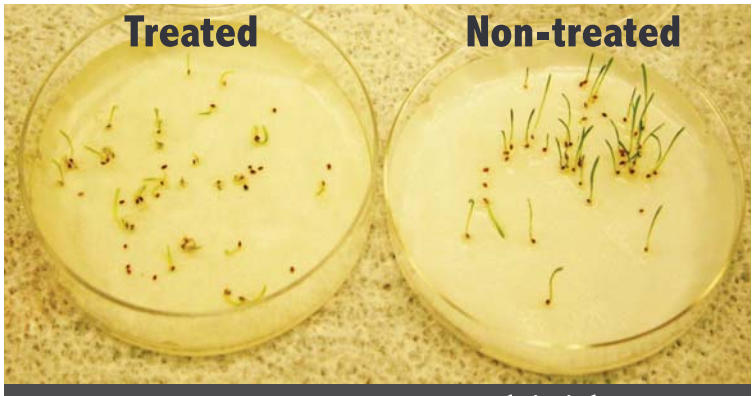
Weeds are difficult to control, therefore…

- More specific approach or strategy may be required.
- Site-specific recommendations



Warm Season Weed Control Thoughts

- Should rely upon Pre-Emergence herbicides
- Prime considerations: What season?
- What are historic weed problems?
- Do you want to seed or overseed?
- What is the condition of your area?



Pre-Emergence Herbicides

Effective against annual weeds

Timing is critical

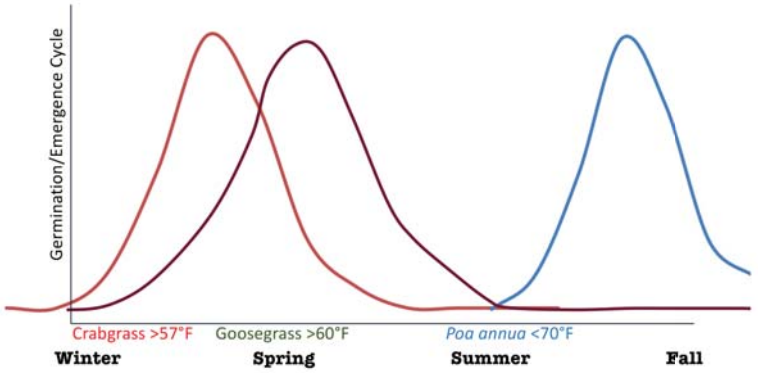
Prevent seeds from emerging as new plants

Could my PRE inhibit rooting?

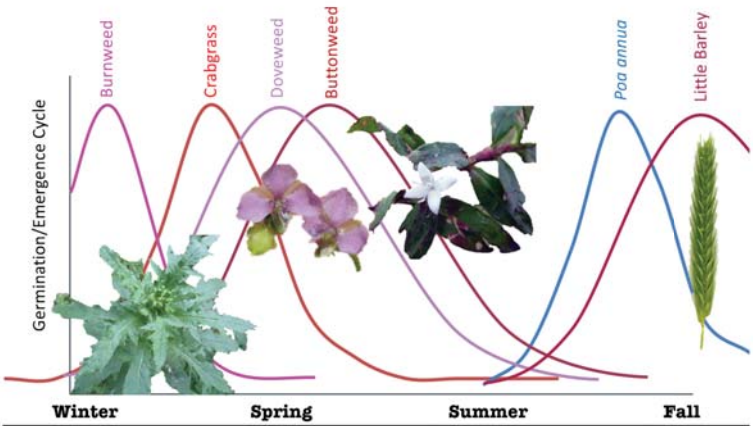
Common Homeowner PRE-Treatments

Group No.	Active Ingredient	Label Seeding Interval
3	prodiamine	6 weeks to 4 months
3	pendimethalin	3 months
3	dithiopyr	6 to 8 weeks
3	oryzalin	3 to 4 months
5	atrazine	6 months
5	simazine	6 months
21	Isoxaben (broadleaves)	2 to 3 months
29	indaziflam (warm-season)	12 months

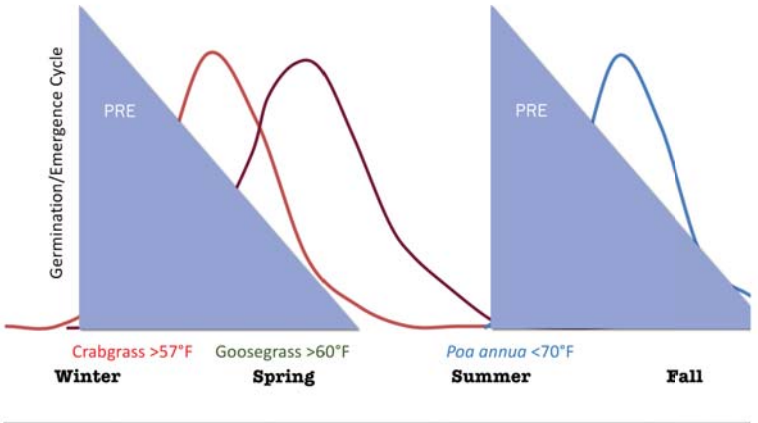
Key Weeds for Preemergence Control

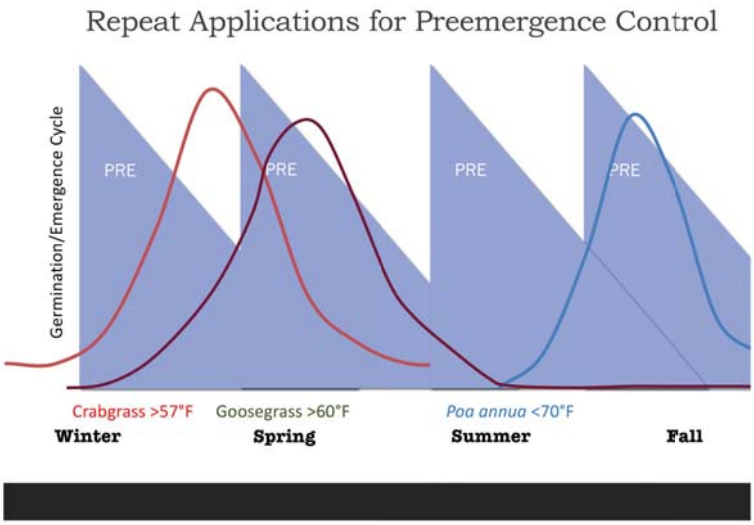


Other Weeds for Preemergence Control



Typical Applications for Preemergence Control





General Tips for Post-Emergence Herbicides

Most broadleaf weeds are best treated in the spring or fall when air temperatures are between 65 and 85 °F. During hotter temperatures, turf damage is more likely to occur.

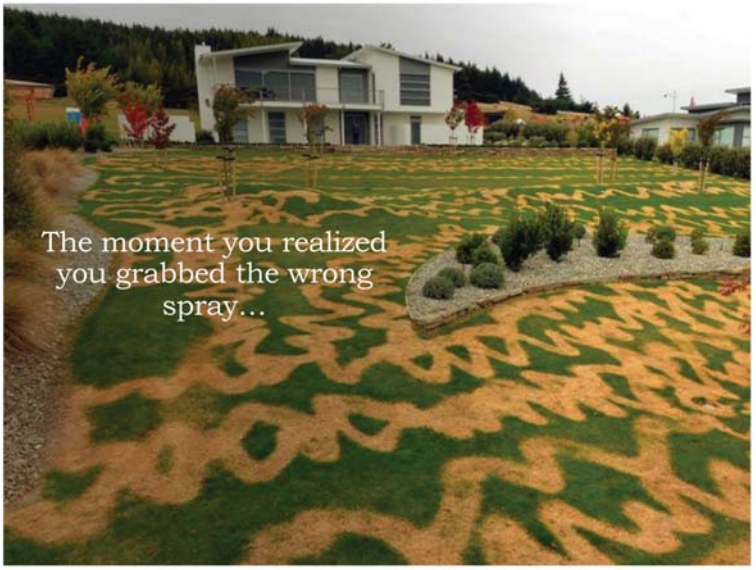
Do not mow immediately prior to or after application. Mowing lessens the amount of herbicide that contacts weed leaf surface area.

At the time of treatment, soil moisture should be adequate. When stressed by drought, weed control is poor and turf damage may occur.

General Warnings

- Atrazine can damage bermudagrass
- 2,4-D and Dicamba can damage St. Augustinegrass
- Glyphosate will injure most plants and should be used with great caution
  - Will not work on clover or sedge
- Be mindful of drift, off-target movement, and nearby plants.
- If using Weed-N-Feed products, consult your local extension agent for proper timing.

ALWAYS FOLLOW THE LABEL



Insect Management in Turf




Other Forms of Weed Control

Proper Identification

KNOW YOUR ENEMY

Beneficial Insects


Parasitoids


Decomposers


Predators


Pollinators


Weed feeders

Thatch/Root-Infesting Pests

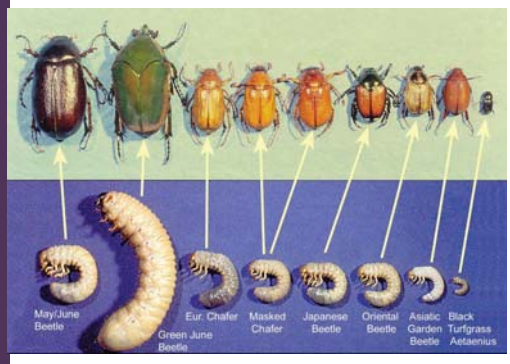
White Grubs

White Grub Biology

-Larval stage of scarab beetles

-Many species that are active at different times of the year

-Grubs are cream colored, c-shaped, with brown head capsules



White Grubs

- Underground root feeder
  - -5-10 grubs per ft^2
- One generation per year
  - -Adult emergence in June, July
  - -Best treatment time is July

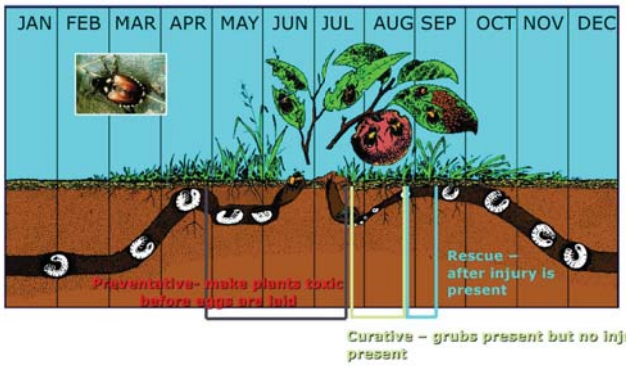
Management of White Grubs

Inspect for injury, and count numbers per square foot

Check species
- Check those butt hairs!
- Turf can tolerate more annual white grubs than Phyllophaga spp.

Make sure chemical treatments are applied for maximum efficacy
- Proper timing
- Moist soil conditions
- Water in insecticide
- Follow label directions

Life Cycle



Preventative Grub Insecticides (May/June/July application)

- Halofenozide (Natural Guard)
  - Molt accelerating compound (insect growth regulator, IGR)
- Neonicotinoids
  - Thiamethoxam (Meridian)
  - Imidacloprid (Merit)
  - Clothianidin (Arena)
- Chlorantraniliprole (Acelepryn)
- Not generally recommended unless area is consistently infested

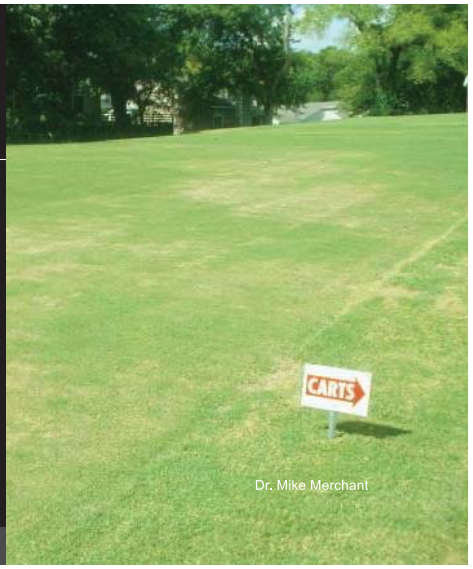
Late season or "Rescue treatments"

Imidacloprid

Clothianidin

Trichlorfon

Carbaryl



Tips for a Successful Curative Treatment

-Water lawn 24 hours before application with 1 to 1.5 inches of water; brings grubs closer to the surface

-Whenever possible, apply a granular insecticide rather than a liquid

-Water lightly immediately to activate the insecticide and wash it to the soil surface

Leaf/Stem-Infesting Pests


Dr. Mike Merchant

Chinch Bugs

Chinch Bug Biology

Chinch bug nymphal instars and adult
D. S. Reiland

Chinch bug damage in St. Augustinegrass.
B. Royals, NC State University

Found in sunny, open areas of St. Augustinegrass

Populations concentrated near soil surface

Adults have black triangles on wings, early nymphs are orange, later nymphs are red, last instar resembles adult

Nymphs feed on turfgrass by using needle-like mouthparts to extract plant liquids

- Initial feeding damage appears as yellowing of turf, which turns brown as turf dies from continued feeding
- Present as irregular patches of dead turfgrass

Damage greatest in summer and fall, when conditions are hot and dry

Chinch Bug Damage & Thresholds

Damage occurs from sap-feeding and (suspected) toxin

Threshold 25 bugs/ft^2

Examine areas next to dead spots or along edges of pavement

Chinch Bug Scouting

Monitoring

- Examine turfgrass near damaged and undamaged areas
- Place turfgrass core in plastic bag; sit in sun
- Insert 6” dia coffee container in ground; fill with water

Chinch Bug- Chemical Control

- Bifenthrin
- Cyfluthrin
- Lambda-cyhalothrin
- Permethrin

Leaf/Stem-infesting Pests (Chewing)

- Green, brown or almost black, with a yellow inverted "Y" on the head capsule
- Up to 1.5 inches long, grow through 6 instars in as little as 21 days after hatching
- Multiple generations; adults will lay eggs in short turf

Fall Armyworm

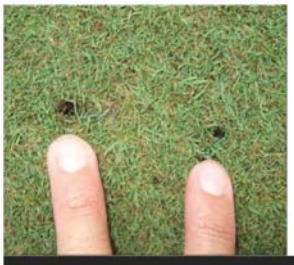
Management of Fall Armyworm

- Control is more effective on small larvae
- Look for "windowpaning"
- Use of disclosing solution on lawn can give an indication of infestation
- Infestations more likely in the fall
- Threshold is same as for cutworms
  - (5 per square yard)

Doug Akers: Purdue

Armyworms

Most conventional insecticides: bifenthrin, carbaryl, malathion



Disclosing Solution

1 Tbsp dish soap per 1 gal water

- Lemon-scented soap works best
- Could also use a pyrethroid insecticide

Apply with watering can to infested area

Insects should emerge from ground within 1 minute

Conclusion

A DENSE, HEALTHY STAND OF TURFGRASS IS THE BEST DEFENSE AGAINST PESTS!

Aggieturf.tamu.edu

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