

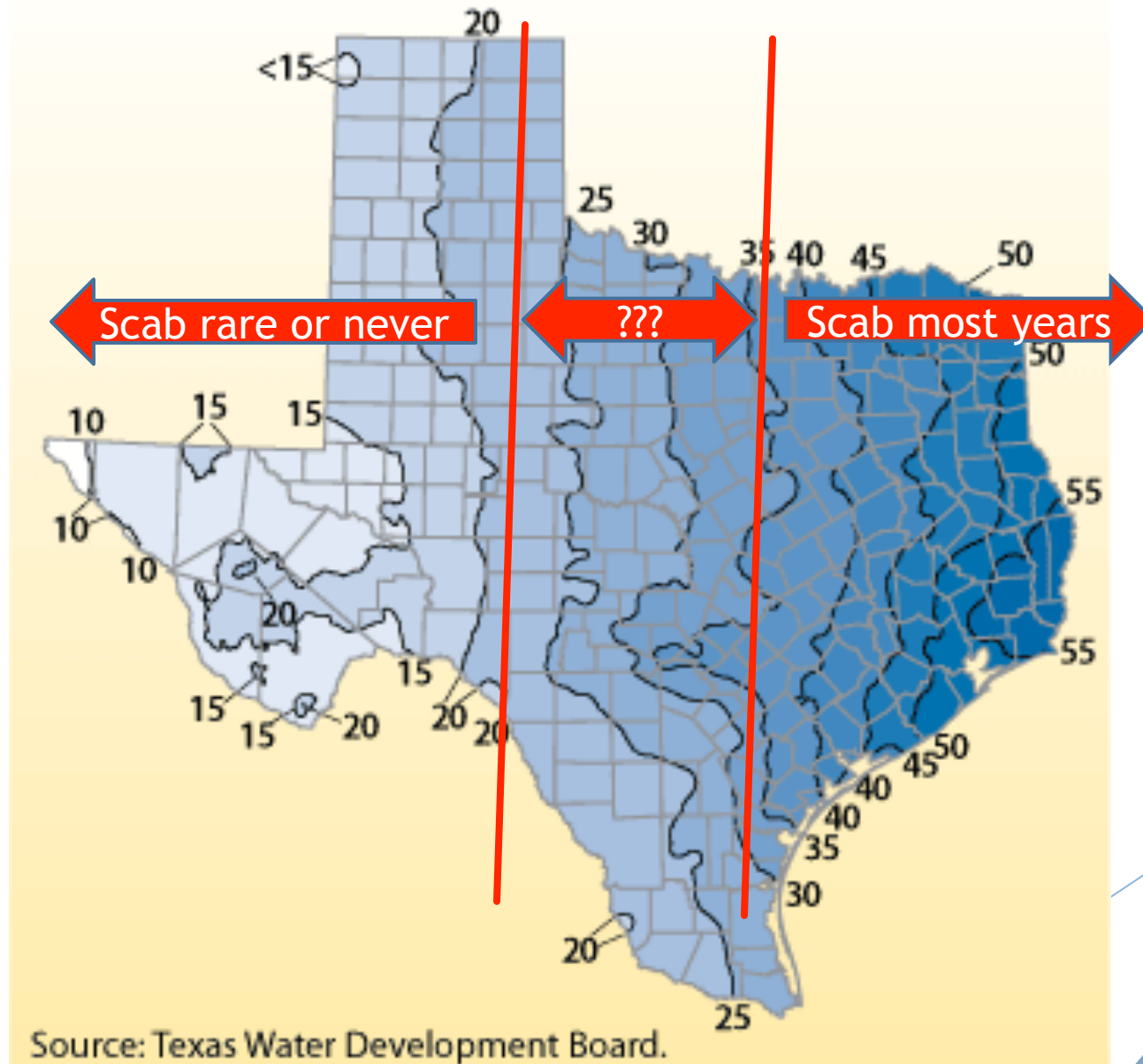
# *Pecan fungicides & herbicides*



Monte L. Nesbitt



# Texas Rainfall 30 year averages



# Downy Spot



# Scab



# Neofusicoccum





# Neofusicoccum (Terminal Dieback)—new problem occurring in unusually wet Spring/Summers





# Scab severity on Nuts Depends on Varietal resistance & Earliness/lateness of Infection



Nut Drop

Nut Shape,  
Size &  
Weight



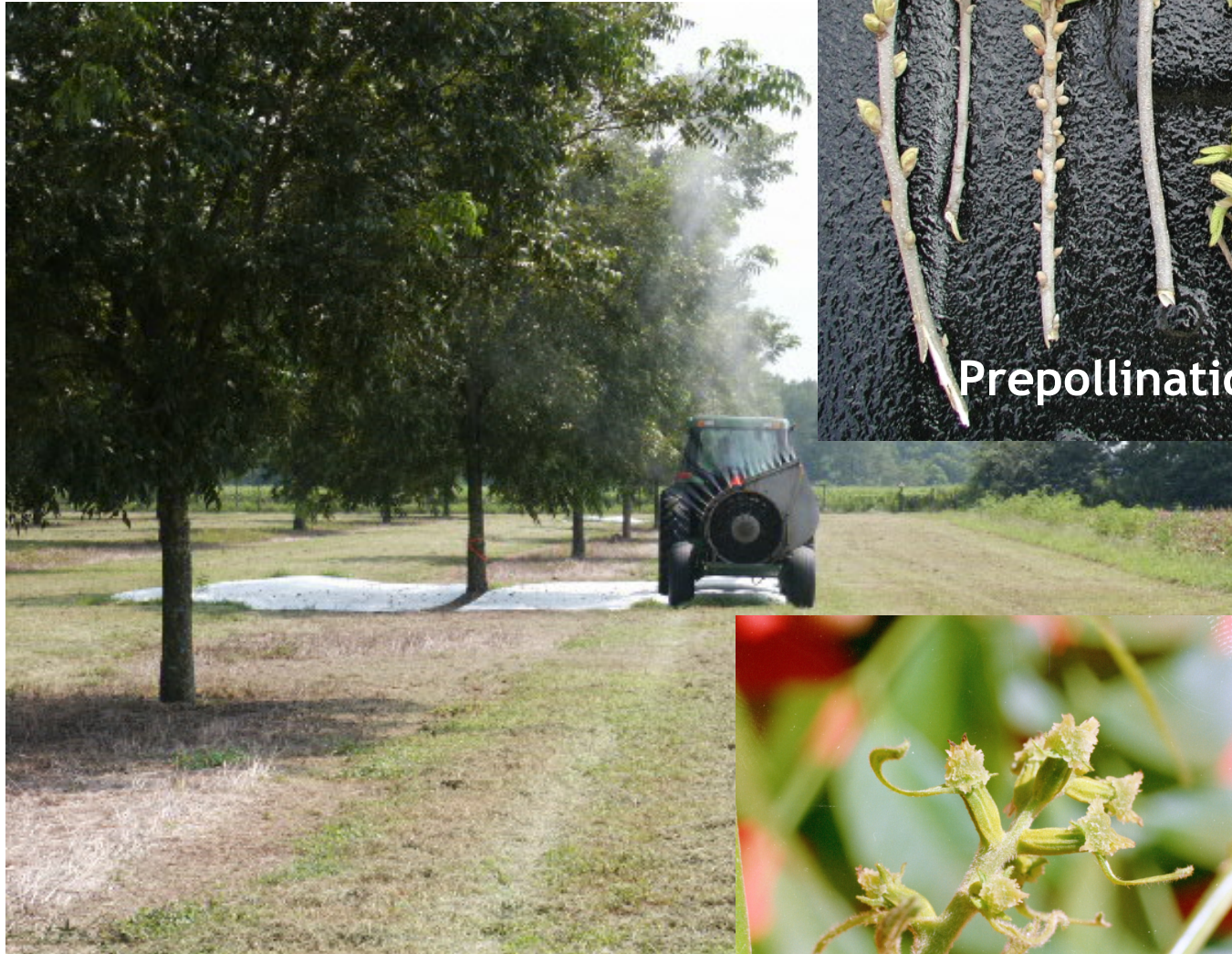
Kernel  
Percentage

Shuck  
Opening





# Spray Program



Prepollination



Postpollination

UGA1234015



# Scab control stops at shell hardening



INFECTIONS AFTER SHELL HARDENING ARE NOT  
ECONOMICALLY IMPORTANT



Active Ingredient	FRAC GROUP	Tradename(s)*	Max product per acre per application and total product per acre allowed per year**
Azoxystrobin	11	Abound (Syngenta)	12 oz/A; 73.8 oz/A/yr
Azoxystrobin + Difenconazole	11,3	Quadris Top (Syngenta)	14 oz/A; 56 oz/A/yr
Azoxystrobin + Propiconazole	11,3	Quilt (Syngenta), Quilt Xcel (Syngenta)	27.5 oz/A; 122 oz/A/yr 21 oz/A; 115 oz/A/yr
Dodine	12	ELast 400 (Aceto)	3 pt/A; 18 pt/A/yr
Fenbuconazole	3	Enable 2F (Dow)	8 oz/A; 48 oz/A/yr
Kresoxim-methyl	11	Sovran (BASF)	4.8 oz/A; 14.4 oz/A/yr
Metconazole	3	Quash (Valent)	3.5 oz/A; 14 oz/A/yr
Phosphorus acid	33	Phostrol	5 oz/A; n/a
Propiconazole	3	Orbit (Syngenta), Bumper (MANA), Tilt (Syngenta), Propimax (Dow), others	8 oz/A; 32 oz/A/yr
Propiconazole + Trifloxystrobin	11,3	Stratego (Bayer)	10 oz/A; 30 oz/A/yr
Pyraclostrobin	11	Headline (BASF)	7 oz/A; 28 oz/A/yr
Pyraclostrobin + Boscalid	11,7	Pristine (BASF)	14.5 oz/A; 58 oz/A/yr
Tebuconazole	3	Tebuzol (UPI), Folicur (Bayer), Toledo (Rotam), Monsoon (Loveland), Orius 3.6 F (MANA)	8 oz/A; 32 oz/A/yr
Tebuconazole + Azoxystrobin	11,3	Custodia (MANA)	17.2 oz/A; 69 oz/A/yr
Tebuconazole + phosphorous acid	3, 33	Viathon (Helena)	2.5 pts/A; 16.5 pts/A/yr
Tebuconazole + trifloxystrobin	11,3	Adament (Bayer), Absolute (Bayer)	8 oz/A; 32 oz/A/yr 7.7 oz/A; 46 oz/A/yr
Thiophanate-methyl	1	Topsin M WSB (UPI), others	1 lb/A; 3 lbs/A/yr
Triphenyl tin hydroxide	30	Agri Tin (Nu Farm) Super Tin 80 WP (UPI)	7.5 oz/A; 45 oz/A/yr



# Fungicide Groups, Names, Usage

FRAC Group #	Group	Best Use	Resistance Risk
3	Sterol Inhibitors or DMI's	Budbreak/ Pollination	Very High
11	Strobilurins	Budbreak/ Pollination	Very High
1	Benzimidazoles	Pre-Pollination	Very High
30	Tin Metal or TPTH	Post-Pollination	Low-Moderate
12	Dodine	Post Pollination	Low-Moderate
33	Phosphites	Tank Mix	Moderate



# RESISTANCE MANAGEMENT

- ▶ Pecan Scab reproduces itself with great frequency during each growing cycle.
- ▶ Chemicals with narrow mode of action that are repeatedly exposed to the organism ultimately can become non-effective.
- ▶ Follow EPA Guidelines and restrictions on annual product use per acre---All Orchards!
- ▶ Rotate Fungicides
- ▶ Spray with tank mixes with multiple modes of action
- ▶ Use Products with Reduced risk of resistance.



# Simplified Pecan Spray Guide

Spray	Timing	Problems	Materials	Fungicide Class
1	Budbreak Early April	Scab, Downy Spot	Fungicide & Zinc + Nitrogen	DMI_Group 3
2	14 days later April	Scab, Downy Spot	Fungicide & Zinc + Nitrogen	DMI/Strobilurin + Topsin M (Groups,3, 11, 1)
3	14+ days later May	Scab, Downy Spot , Pecan Nut Casebearer	Fungicide & Zinc + Nitrogen + Insecticide	DMI/Strobilurin + Topsin M
4	14-21 days later Late May, Early June	Scab	Fungicide & Zinc + Nitrogen	TPTH (Tin-based) Group 30
5	14-21 days later Late June, Early July	Scab	Fungicide & Zinc + Nitrogen	E-Last (Dodine) Group 12
6	21+ days later Late July, Early August	Scab	Fungicide	TPTH (Tin-based) Group 30



# Weed Control is Key to Faster Establishment and Development



Competition from water & nutrients.

- ▶ Smith and Wolf, 1999, determined that 1-2 cool season annual weeds followed by 1-2 warm season annual weeds in a 10 x 12 area around the tree reduced cumulative growth over 3 years from 51%-79%.
  - Allelopathic effects demonstrated.

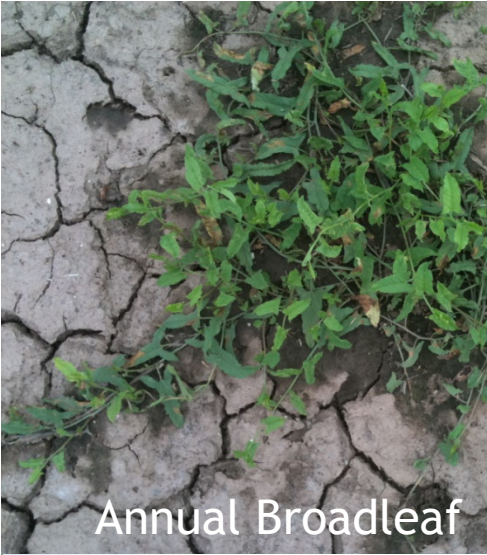




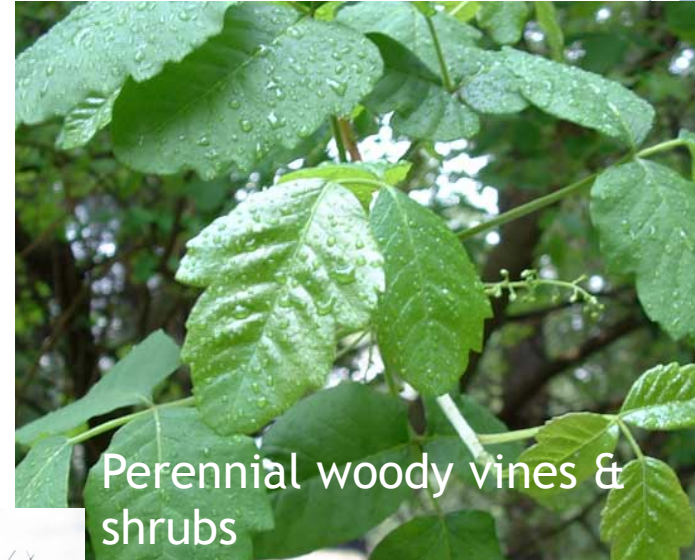
Research has not been similarly convincing with weed control effects on mature trees: Pecan trees over time become the dominant weed themselves....but weeds lengthen the time it takes for them to get there, and interfere with irrigation and harvest.



# Contending Weeds



Annual Broadleaf



Perennial woody vines & shrubs



Annual grasses



Perennial grasses



# Post-Emergence, Non-Selective

- ▶ Glyphosate—Systemic translocation, no contact kill, needs drying/absorption time.
  - ▶ Roundup, Honcho, many other generics
- ▶ Paraquat—Contact, burn-back, non-systemic
  - ▶ Gramoxone
- ▶ Glufosinate—More contact than systemic-best on small broadleaf weeds. avoid contact with foliage or trunks (unless tough, brown-colored bark has developed).
  - ▶ Liberty, Ignite, Rely 280
- ▶ Pelargonic acid (Scythe); soap-based herbicide

Stickers, spreader, crop oil, and ammonium sulfate may enhance uptake/rate of kill.  
Read Labels!





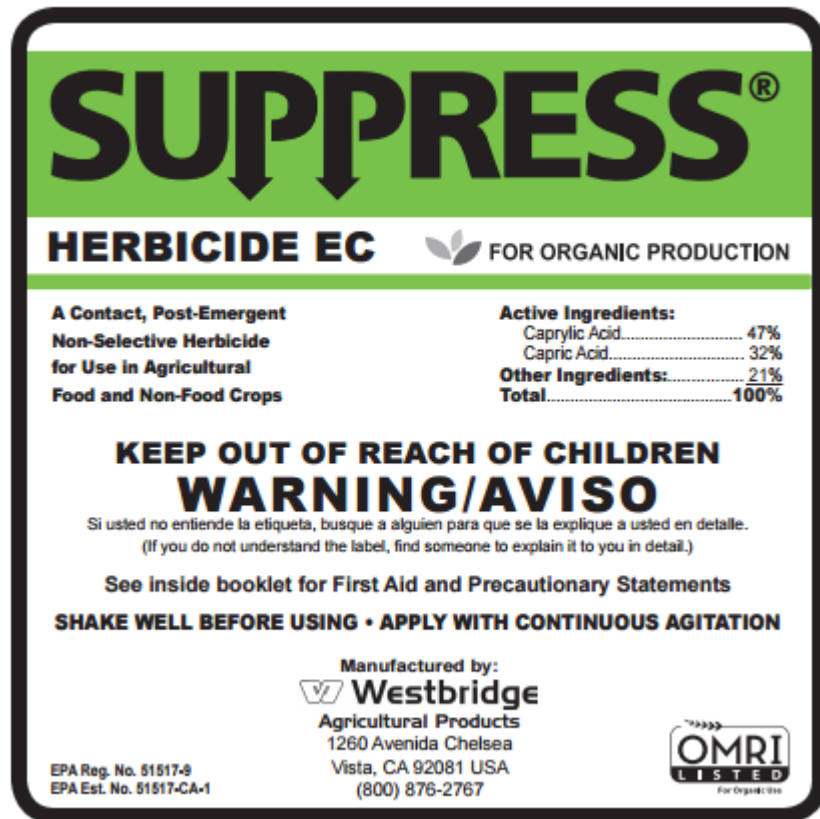
# Weed resistance problems



Glyphosate-resistant pigweed (and other species) has developed from an abundance of farms over-relying on a single product for broad-spectrum weed control.



# OMRI Approved Non-selective, burn-down herbicides



Shown as example: Product Endorsement not implied.

# Venue Herbicide



## Pyraflufen-ethyl

- ▶ Non-selective contact herbicide, especially good for Control of Broadleaf Weeds in Non-bearing and Bearing Orchards
- ▶ Can be used for sucker management.
- ▶ Will Burn Back Green, Non-callused tissue

## Approved Crops

- Dates
- Feijoa
- Figs
- Grapes
- Kiwi fruit
- Mango
- Olive trees
- Persimmons
- Pome fruits
- Pomegranates
- Stone fruits
- Tree nuts
- Nonbearing fruit, tree nuts, and vines





# Brush Herbicides-

## None labeled for pecan orchards

- ▶ **Remedy** (Triclopyr)—
  - ▶ can move through soil;
  - ▶ uptake through pecan roots is possible
    - ▶ Direct brush application, rather than boom spray
  - ▶ Soil Half Life=up to 90 days
  - ▶ Negative effects from sublethal dosing may be long lasting
- ▶ **Grazon P+D** (picloram + 24D)---Bad news for pecan orchards
- ▶ **Grazon NextHL** (aminopyralid + 2,4-D-Amine)—Significant risk for pecan orchards, not labeled, 18 month residual



# Selective, Post-Emergence

- ⊙ Sethoxydim (**Poast**); controls annual & perennial grasses (Pre-Harvest Interval varies by crop;—some=1 year).
- ⊙ Fluazifop-P-butyl (**Fusilade DX**) (non-bearing fruits only)
- ⊙ Clethodim (**Select**); controls grasses (non-bearing fruits only)
- ⊙ Carfentrazone-ethyl (**Aim**): contact broadleaf burndown, sucker control (labeled for olives, many other fruits).





# Should 2,4-D be used in orchards??

- ▶ Effective post-emergent control for broadleaf weeds in sod, turf or pasture situations.
- ▶ Can deform, stunt, and kill fruit plants and trees if sprayed on foliage or volatilization and wind drift moves to foliage.
- ▶ High temperatures (>85 F) and windy conditions are absolute disaster for orchards!
  - ▶ “2,4-D-Ready Cotton” could cause problems for orchards.
- ▶ Dormant season use with low volatile forms (Amines) under calm wind conditions can be used with success.





# Pre-Emergence Herbicides

- ▶ Oryzalin (Surflan, various generics); very safe, labeled for many fruit crops.
- ▶ Pendimethalin (Prowl); bearing & non-bearing broadleaf and grass prevention
- ▶ Norflurazon (Solicam); good for citrus. Use caution on coarse-textured soils. Provides some nutsedge control on citrus.
- ▶ Simazine; use after establishment for one year on gravelly soils.
- ▶ Dichlorfop (Exxon) Use after trees established at least three years, and with minimum 0.5% Organic Matter.

Texas (& Other States with high pH and/or coarse-textured soils run some risk of pecan tree injury!

# Newer Pre-Emergence Herbicides- Nonbearing Trees

- ▶ **Flumioxazin (Chateau)**- Apply Only After All Air Pockets Have Been Filled In Newly Planted Orchards. Excellent Control of Both Germinating Broadleaves and Grasses. Needs Rainfall Within 21 Days of Application
- ▶ **Isoxaben (Trellis)**- Control of Germinating Broadleaves Only. Needs Rainfall Within 21 Days of Application
- ▶ **Alion**---pecan growers in western US have had bad problems!!!



# For Successful outcomes with Preemergence herbicides.

- ▶ Identify your primary problem annual weeds
  - ▶ Not all weed species controlled equally among products.
- ▶ Understand your soil texture and how product rate may affect crop injury.
  - ▶ Follow label
- ▶ Calibrate your sprayer to deliver precise amounts per acre.
  - ▶ Efficacy depends on product applied per square foot.
  - ▶ Accuracy depends on constant travel speed.
- ▶ Read all label precautions!

# Understanding Herbicide Labels

- ▶ Apply Suflan AS as a directed spray to the soil surface over the top of plants.
- ▶ Use only a properly calibrated, low pressure sprayer that will apply the spray uniformly.
- ▶ Medium rate for field grown trees:
  - ▶ 3 Qts/Acre
  - ▶ 2.2 fl. Oz/1000 sq. ft.



Same Thing



# Calibration: application rate/area covered



Determine tractor speed and operating pressure setting.

MPH



Measure nozzle output (gallons/minute) at operating throttle setting.

GPM (total boom)



Measure length of boom coverage at proper height setting.

W: Total boom coverage width in inches

■ 
$$\text{GPA} = \frac{\text{GPM} \times 5940 \text{ (conversion constant)}}{\text{W} \times \text{MPH}}$$

# Plug in the Numbers

- ▶ MPH=2.8
- ▶ GPM (all nozzles on boom)=1.60
- ▶ W=7 ft (84")
- $$\text{GPA} = \frac{1.60 \times 5940 \text{ (conversion constant)}}{84 \times 2.8}$$
- GPA=40.4 (118.7 oz/1000 ft<sup>2</sup>)

We can also add 2.2 oz Surflan/  
every 118.7 oz (0.93 gal) water



If our spray tank is 100 gallons,  
then each full tank treats 2.5  
acres.

And we add 7.5 Qts Surflan AS to  
the tank and fill to 100 gallons.  
(3 Qts/Acre x 2.5 Acres/tank)



## Back-pack and other single boom sprayers can similarly be calibrated:

- ▶ Establish a consistent walking pace.
- ▶ Measure the effective spray swath, keeping the nozzle at a consistent height above ground.
- ▶ Determine how much spray volume is required to cover 1000 sq. ft, or use GPA formula.



# Summary

- ▶ Weed management is an ongoing challenge for all pecan growers.
- ▶ No one system works exactly the same for every orchard, due to inherent differences in weed populations, soil types, rainfall, irrigation method etc.
- ▶ Herbicide resistance (especially to glyphosate) is a growing problem.
- ▶ An integrated approach to weed management, avoiding reliance on one method of chemical weed control should be considered.





# Questions?



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# What do we know about control?

Not Much:

Appears to be a problem with disruption of pollination period fungicide sprays.

Control with preventative fungicide sprays—DMI's or Strobilurins