

Translaminar Insecticides for Aphids and Casebearer in Pecan

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Evolution of Insecticides for Pecan Pests (Simple)

- Legacy pecan-insecticides were primarily classified in three categories:
 - Organophosphates (chlorpyrifos-Lorsban, malathion)
 - Carbamates (aldicarb-Temik, sevin)
 - Pyrethroids (Mustang-Max)
- Majority contact/surface ingestion (direct or indirect)
- Application concerns related to wash-off, coverage, beneficial reductions



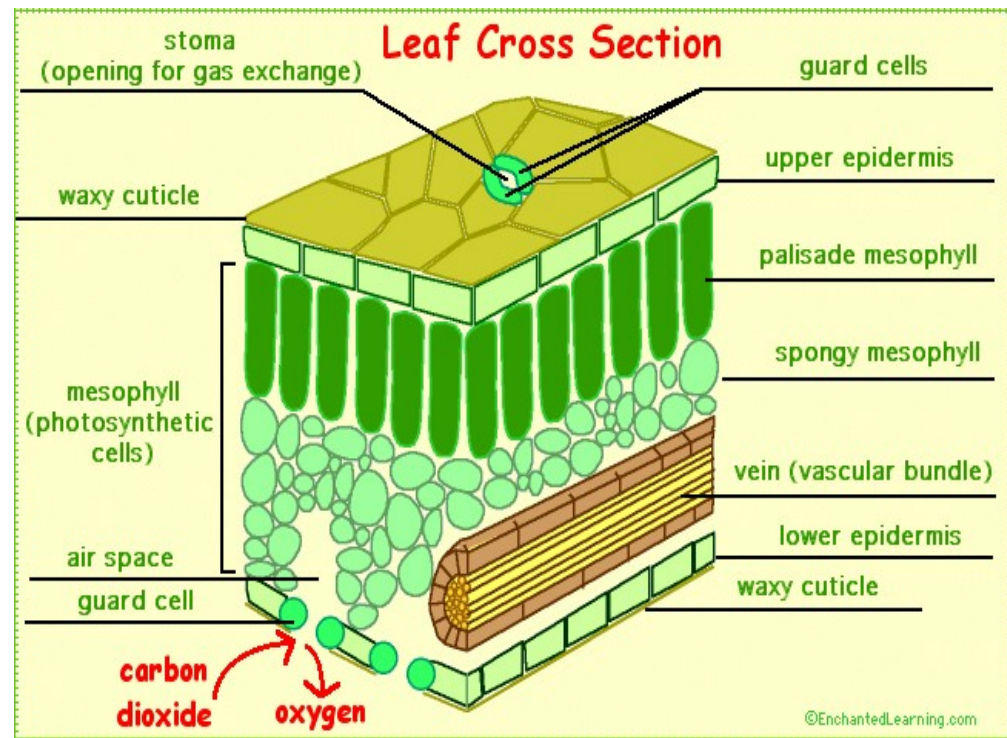
Advantages of Newer Chemistries

- Better environmental toxicity profile
- More selective
- Longer residual (may be prone to resistance issues)
- Most exhibit either translaminar or systemic properties
 - Translaminar phloem/Translaminar xylem
 - Translaminar activity lends itself to higher efficacy when aerially applied
 - Ground coverage not as crucial as contact only

Translaminar Insecticides

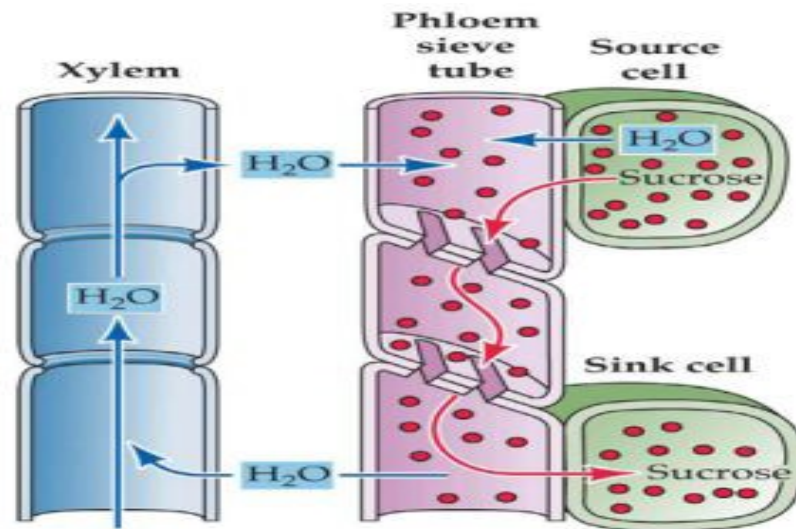
- Trans- “*across*”
+ Laminar-
“*plate like*”
- Practical
definition:
 - An insecticide
sprayed on one
side of the leaf
will pass through
the leaf and have
activity on the
other side.

Basic Leaf Structure



Benefits of Systemic Mobility

Insecticide moves from point of contact to other parts of the tree



- Full systemic
- Translaminar-Xylem mobile insecticides move UP the tree
- Translaminar-Phloem mobile can move either direction

NOTE: Translaminar xylem and phloem are limited movement

Translaminar Pecan Aphid Insecticides



Aphid Translaminar Insecticides

Product Name	Ac.ve Ingredient	Contact, Systemic, or Translaminar
Leverage 360	Beta-cyfluthrin + Imidacloprid	Contact/Translaminar/Xylem
Brigadier	Bifenthrin, Imidacloprid	Contact/Translaminar/Xylem
Fulfill	Pymetrozine	Contact/Translaminar
Distance	Pyriproxyfen	Contact/Translaminar
Assail	Acetamiprid	Translaminar
AZA-Direct	AzadirachEn	Translaminar
Beleaf	Flonicamid	Translaminar
Gladiator	AvermecEn B1; Zeta Cypermethrin	Translaminar/Contact
Azera	AzadirachEn + Pyrethrins	Translaminar/Contact
Admire Pro; MANY OTHERS	Imidacloprid	Translaminar/Xylem
Kilter	Imidacloprid, Lambdacyhalothrin	Translaminar/Xylem/Contact
Endigo ZC	Lambdachalothrin;Thiamethoxam	Translaminar/Xylem/Contact
Belay	Clothianidin	Translaminar/Xylem
Mainspring	Cyantraniliprole	Translaminar/Xylem
Sivanto	Flupyradifurone	Translaminar/Xylem
Closer	Sulfoxaflor	Translaminar/Xylem
Centric	Thiamethoxam	Translaminar/Xylem
Movento	Spirotetramat	Translaminar/Xylem/Limited Phloem

The Neonicotinoids

Chemistries

- Imidacloprid
- US patent in 1986
- First EPA registration in 1994
- Many trade names (Admire, Provado, Aria, etc.)
- Translaminar, xylem mobile and contact

- Family includes acetamiprid, thiamethoxam and others

Properties

- Translaminar
- Xylem mobile
- Slower than earlier contact insecticides, but much longer residuals
- May be prone to resistance

Closer (Sulfoxaflor)



- Registration Status
 - November 12, 2015, US EPA issued a cancellation order for sulfoxaflor containing products in response to a September 10th ruling by the 9th Circuit Court of Appeals
 - Dow — expects full Sec 3 label for Closer by the end of March or early April (per communications from the EPA).
 - Dow – Closer will be available for pecan growers in the coming use season
- Translaminar and limited xylem
- Fast acting
- Effective on the black pecan aphid and the yellow pecan aphid complex
- IRAC Class 4 C



Movement

(Spirotetramat)

- Translaminar, xylem and limited phloem
- Effective on black pecan aphid and the yellow pecan aphid complex
- Adjuvants
 - Must use a spreader/penetrant
 - Must not use a sticker
- IRAC Class 23



Sivanto (Flupyradifurone)

- Translaminar and limited xylem
- Effective on black pecan aphid and the yellow pecan aphid complex
- Registered for foliar and soil applications
- Bees—application recommended in late afternoon, evening or at night
- IRAC Class 4D

Beleaf (Flonicamid)

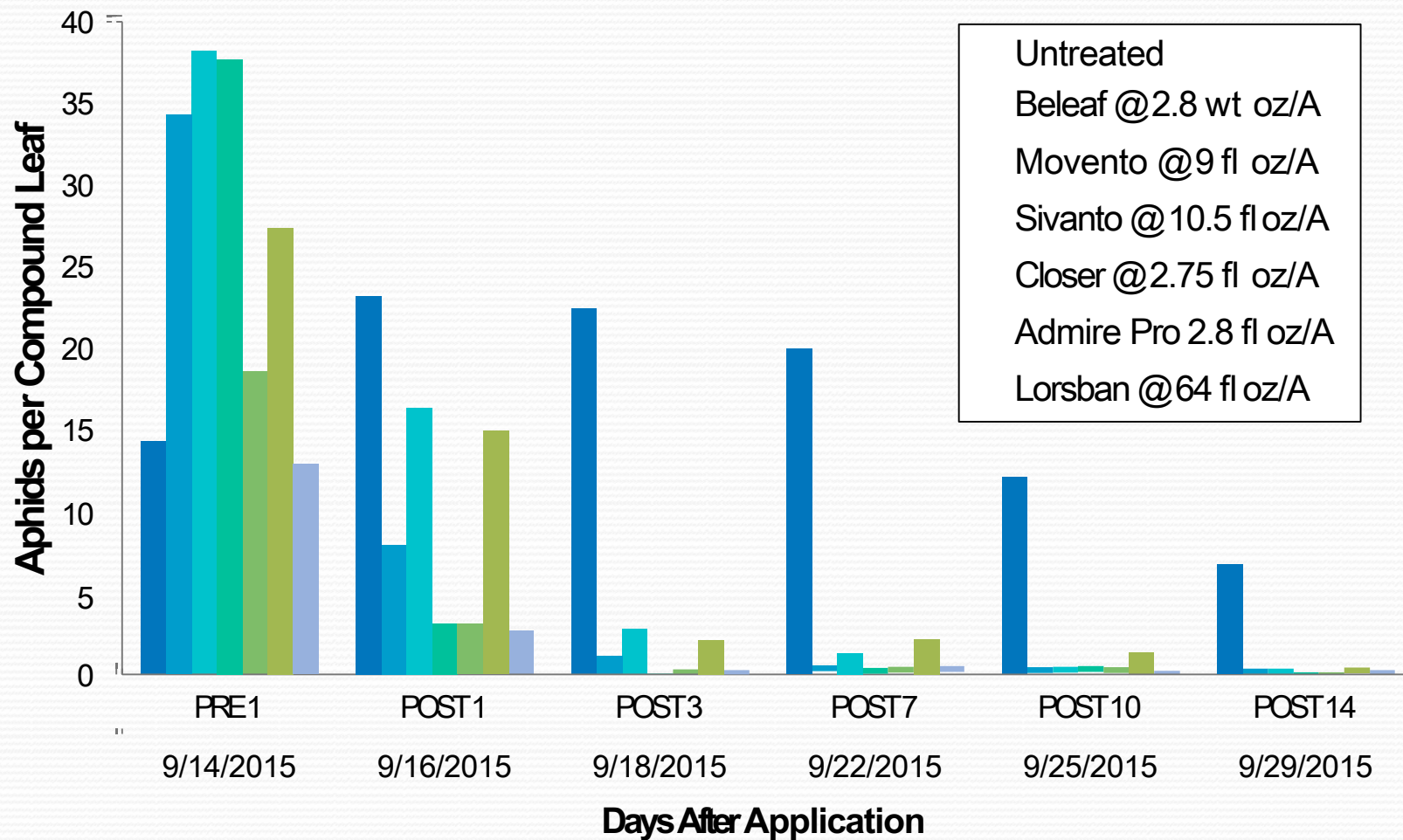


- Registered for pecan in 2014
- Translaminar and contact
- Feeding blocker—aphids stop feeding and starve
 - Feeding stops as soon as the aphid is exposed to flonicamid, BUT the aphid takes time to die
- Effective on black pecan aphid and the yellow pecan aphid complex
- IRAC class 9C

Efficacy of Translaminar Insecticides on Black Pecan Aphid

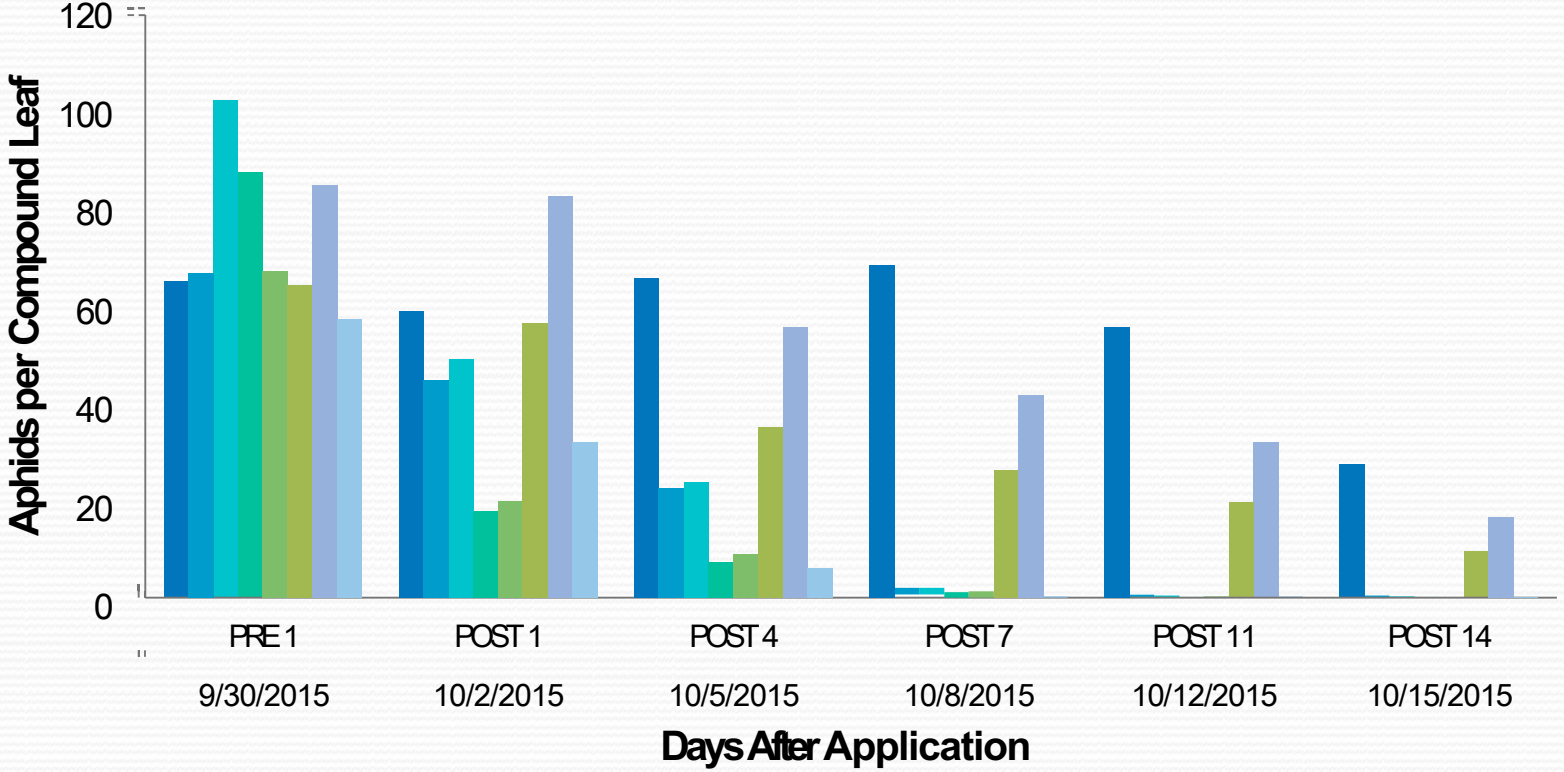
Branch Study

2015 Las Cruces, New Mexico



Efficacy of Translaminar Insecticides on Blackmargined Pecan Aphid

2015 Las Cruces New Mexico



- Untreated
- Sivanto @ 10.5 fl oz/A
- Closure @ 2 fl oz/A
- Closure @ 2 fl oz/A in 100 GPA
- Admire Pro @ 1.2 fl oz/A
- Beleaf @ 2.0 wt oz/A
- Movento @ 9 fl oz/A
- Closure @ 2 fl oz/A
- Admire Pro @ 1.2 fl oz/A
- Beleaf @ 2.0 wt oz/A

Pecan Nut Casebearer

Translaminar Insecticides

<http://northernpecans.blogspot.com/>



<http://www.ipmcenters.org/cropprofiles/docs/kspecan.pdf>



www.chemtica.com



Lab photo - NMSU



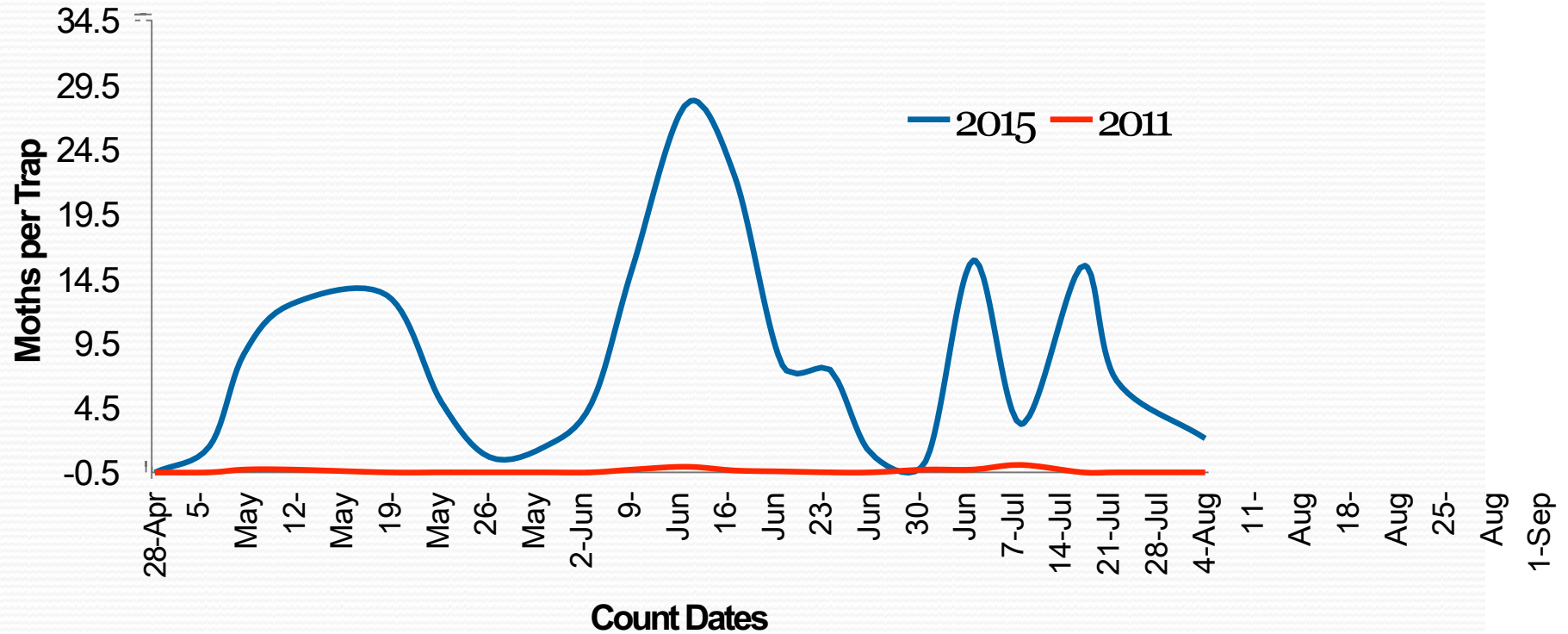
Lab photo - NMSU

Pecan Nut Casebearer

- Overwinter as larvae
- Emerge in Late May/Early June
 - Lay eggs on pecan nutlets soon after pollination
 - Hatch in 4 to 5 days
 - Feed on secondary bud at base of pecan leaf for 1 or 2 days before burrowing into base of nutlet
 - Feed inside nutlet for 4 or 5 weeks and then pupate inside nutlet
 - Adult moth emerges 9 to 14 days later
- Second generation about 6 weeks after the first
 - Again, eggs on nutlets
 - Feed on shuck if nut shell has hardened
- Third and (sometimes) fourth generation
 - Some larvae continue cycle
 - Some larvae begin overwintering process

PNC in 2011 and 2015

Pecan Nut Casebear Pheromone Trap Counts
Mesilla Valley
2011 and 2015



Contact Insecticides versus Translaminar

Contact

- Will kill adult moths and larvae
- Typically a pyrethroid (Mustang)
- Short lived with little residual activity
- Broad spectrum – will kill beneficials

Translaminar

- Only kills larvae
- Longer residual than contact insecticides
- Applications should still be timed to a peak larvae before burrowing into stems/nutlets
- Narrow spectrum – preserves beneficials
- Good environmental toxicity profile

PNC Translaminar Insecticides

Typical Product	Ac.ve Ingredient	IRAC	Signal Word	Stage	Notes
DELEGATEWG; ENTRUST	Spinetoram; Spinosad	5	CauEon	larvae	long residual, fast knockdown; quick knockdown, some residual
ENFOLD	EmamecEn benzoate	6	CauEon	larvae	some contact, mainly ingested
ASSAIL 30 SG INSECTICIDE; BELAY INSECTICIDE	Acetamiprid; Clothianidin	4A	CauEon	larvae; adults	mainly ingested, but also contact
INTREPID EDGE	Methoxyfenozide + Spinetoram	18 + 5	CauEon	larvae	Pre-mix of a translaminar and a surface ingested: long residual , fast knockdown
LEVERAGE360; BRIGADIER; ENDIGO ZC; KILTER	Beta-cyfluthrin + Imidacloprid; Bifenthrin + Imidacloprid; Lambda-cyhalothrin + Thiamethoxam; Lambda-cyhalothrin + Imidacloprid	3A + 4A	CauEon; Warning; Warning	larvae; adults	Premix of contact and translaminar : contact and ingested
GLADIATOR	Avermectin B1 + Zeta-cypermethrin	6 + 3A	CauEon	larvae; adults	Premix of contact and translaminar : contact and ingested
Belt	Flubendiamide	28	CauEon	larvae	Contact and Translaminar

Rethinking Foliar Applications Using Translaminar Insecticides

- Most growers conditioned with ‘the greater the total volume of water, the better the spray will be’
 - Origins in zinc applications, older technology sprayers, and use of primarily contact insecticides
- Is more total volume reducing uptake of translaminar insecticides???
 - Impact residual activity?

Spray Volume Study

Label Rate:

1.2 fl oz of Admire Pro per acre for aphid control

In 100 GPA total volume 0.01% Admire Pro

In 50 GPA total volume 0.02% Admire Pro



More uptake with 0.01% Admire Pro

Or

With 0.02%

Or

No difference

Spray Volume Study

Objective

Compare leaf concentration of imidacloprid at three spray volumes

Treatments

Admire Pro Systemic at 1.2 fl oz/A in

- 50 gallons per acre
- 75 gallons per acre
- 100 gallons per acre

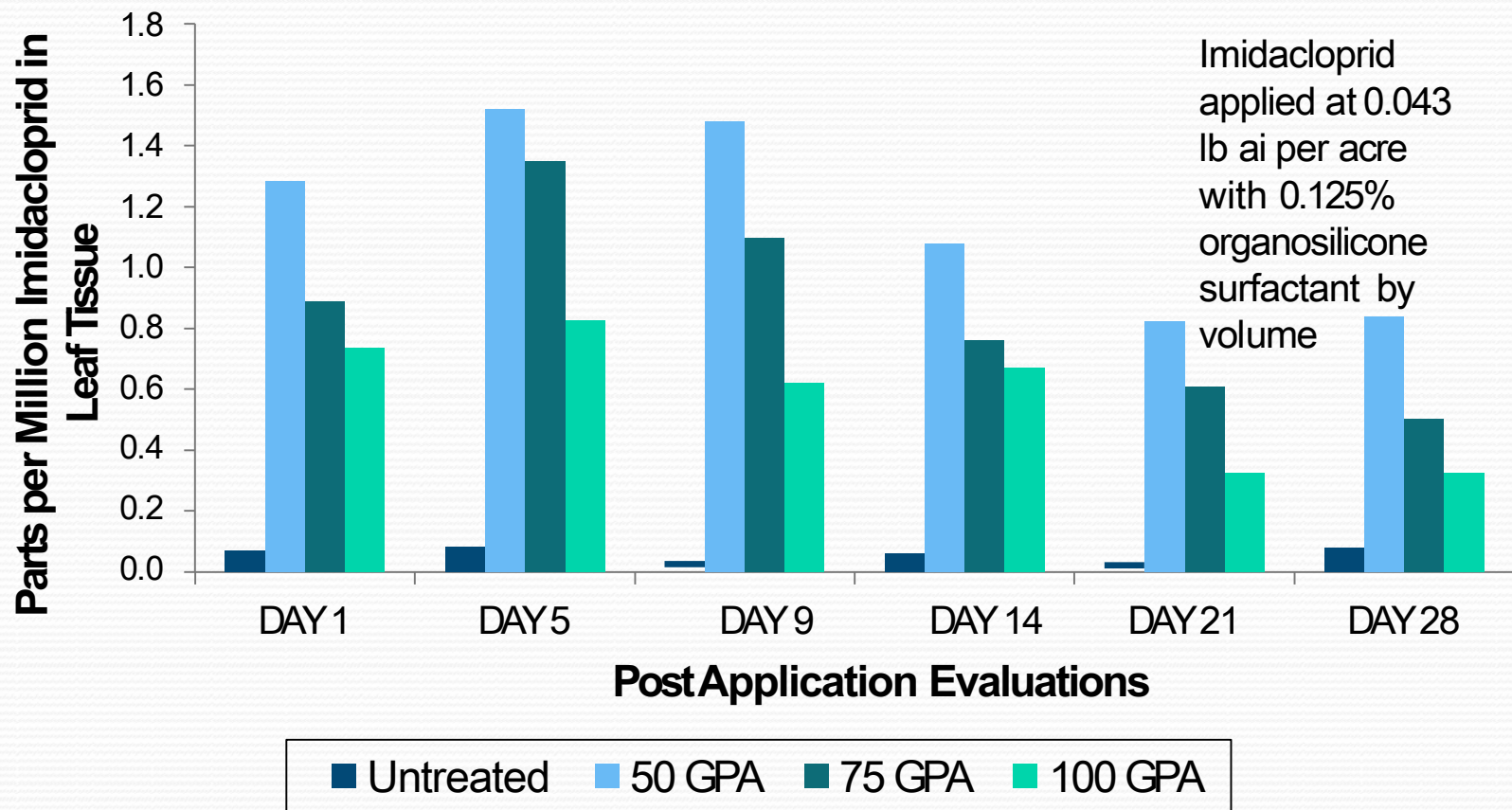
Methodology

Small air-blast sprayer

Changed flow rate NOT speed to vary spray volume



Effect of Spray Volume on Leaf Concentrations of Imidacloprid



Summary

Aphids

Previous insecticide chemistries:

Worked well on the yellow complex but not as efficacious on black pecan aphid or visa versa

Primarily contact activity with some xylem systemic

Broad spectrum with significant impact on beneficial insects

ApplicaEon coverage was very important

New chemistries:

Appear to work well on both complexes

Contact, systemic and translaminar

ApplicaEon coverage may be less important

Casebearer

Contact insecticides

Work well on adult moths

Short residual

Broad spectrum with significant impact on beneficial insects

Translaminar insecticides

Only kill larvae

Longer residuals

Narrow Spectrum with little impact on beneficial insects



Questions?