

TRANSFORM[®] INSECTICIDE UPDATE

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Dow AgroSciences

Solutions for the Growing World

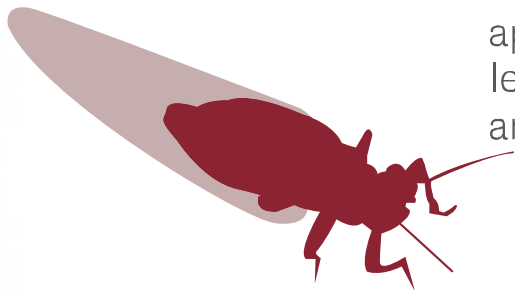
Outline

- Transform Insecticide
 - > Molecule attributes
 - > Use recommendations
- Efficacy Data
- Regulatory Update



CONTROL of
sap-feeding insects

including
aphids
leafhoppers
and more



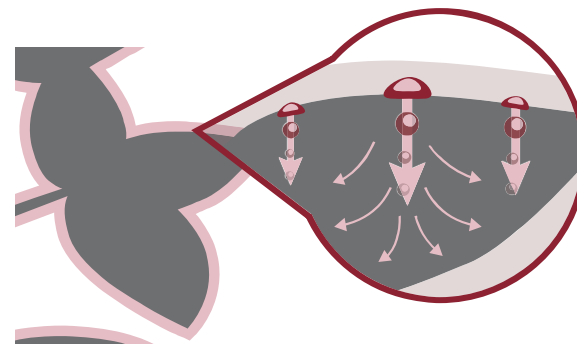
easy on
beneficial insects
does not flare mites or aphids

NEW
class of chemistry

Group 4C

A UNIQUE mode of action

Systemic and
translaminar activity



Contact **and** Ingestion Control



Dow AgroSciences

Solutions for the Growing World

®Trademark of The Dow Chemical Company ("Dow") or an affiliated company of Dow
Transform is not registered for sale or use in all states. Contact your state pesticide
regulatory agency to determine if a product is registered for sale or use in your state.
Always read and follow label directions.

Sulfoxaflor

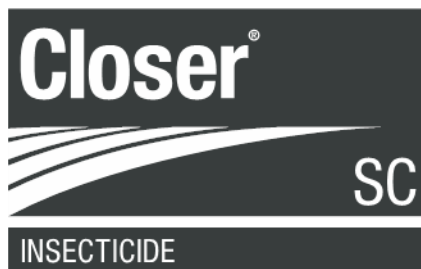
- First insecticidal molecule from the new sulfoximine class of insecticides
- Discovered by Dow AgroSciences scientists, proprietary chemistry
- Controls sap-feeding insect pests - very effective against aphids, plant bugs, whiteflies and more





Solid (Pounds)
Everywhere (CA*)

Row Crops



Liquid (Gallon)
NO AZ, CA, HI

Specialty



Liquid (Gallon)
ONLY AZ, HI, CA*

Specialty

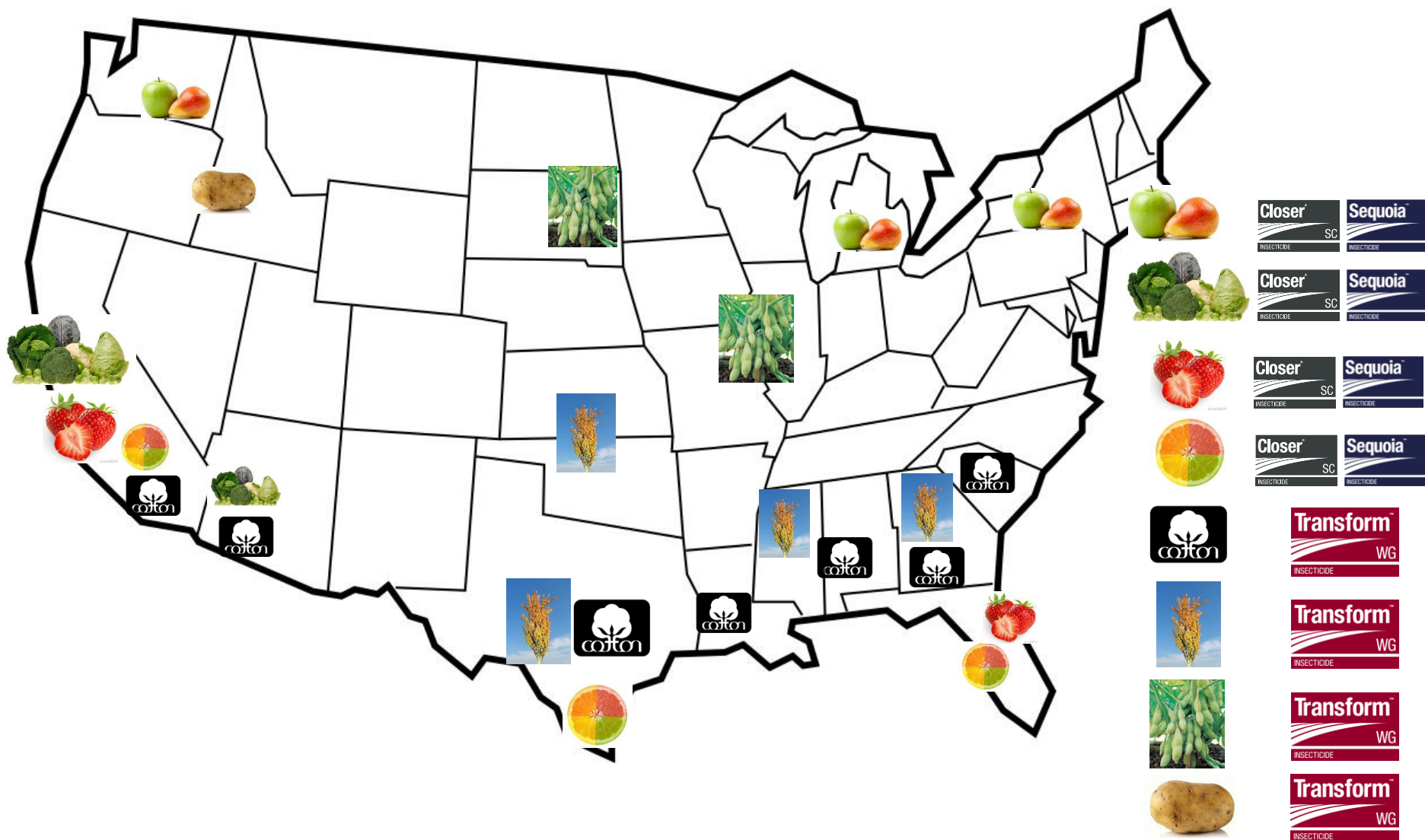
ISOCLAST[™]
ACTIVE

New Class of Chemistry that targets sap feeding insects. Highly selective to maintain beneficial insect population and not flare secondary pests



Dow AgroSciences

Key Markets



Key Features

- **Fast-acting**
 - > Excellent knockdown AND residual control
- **Unique mode of action**
 - > Valuable rotational tool
- **Minimal impact on beneficials**
 - > Excellent fit for IPM
- **Very low use rates**



Speed of Activity Trials Dow Research Station Fresno, CA

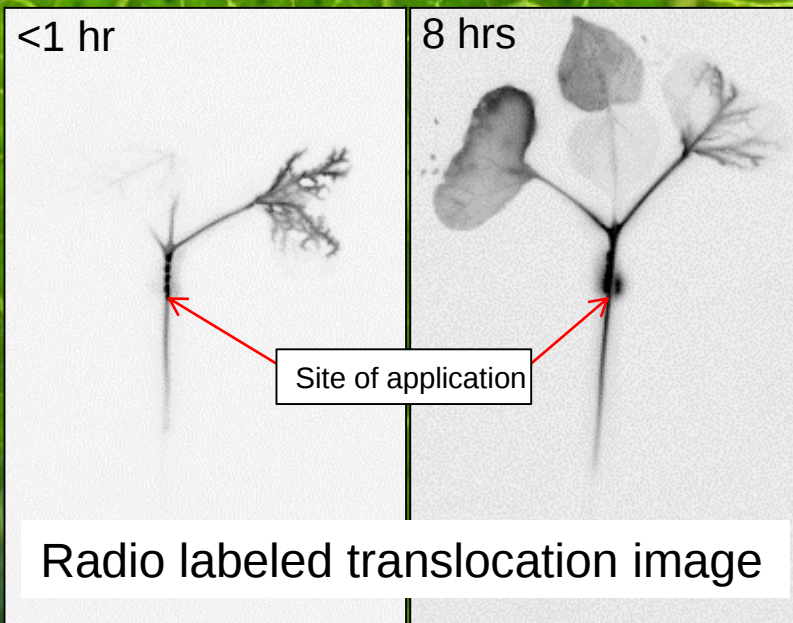
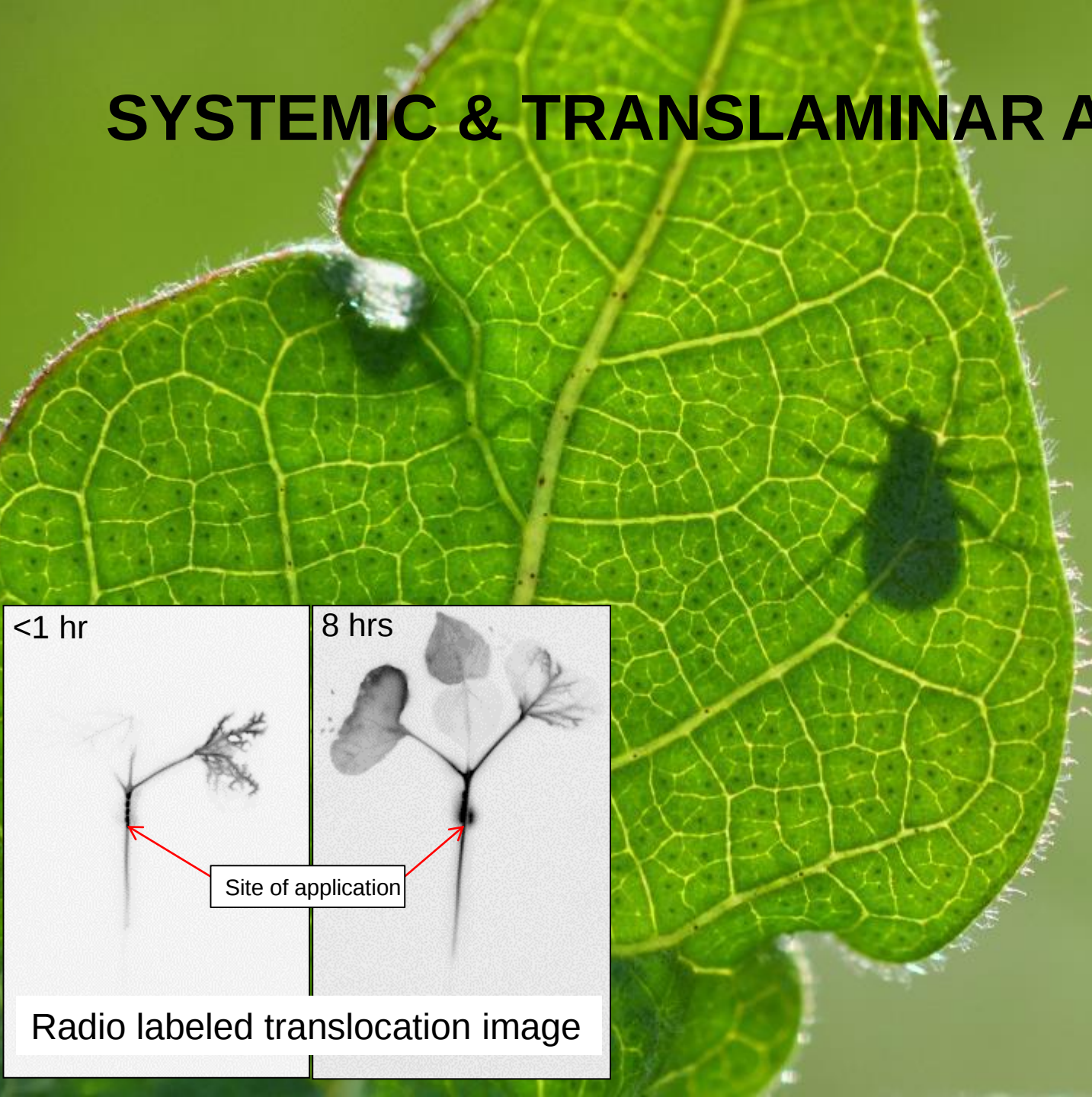


Green peach aphid,
Broccoli May 2012
Elapsed time 30 min



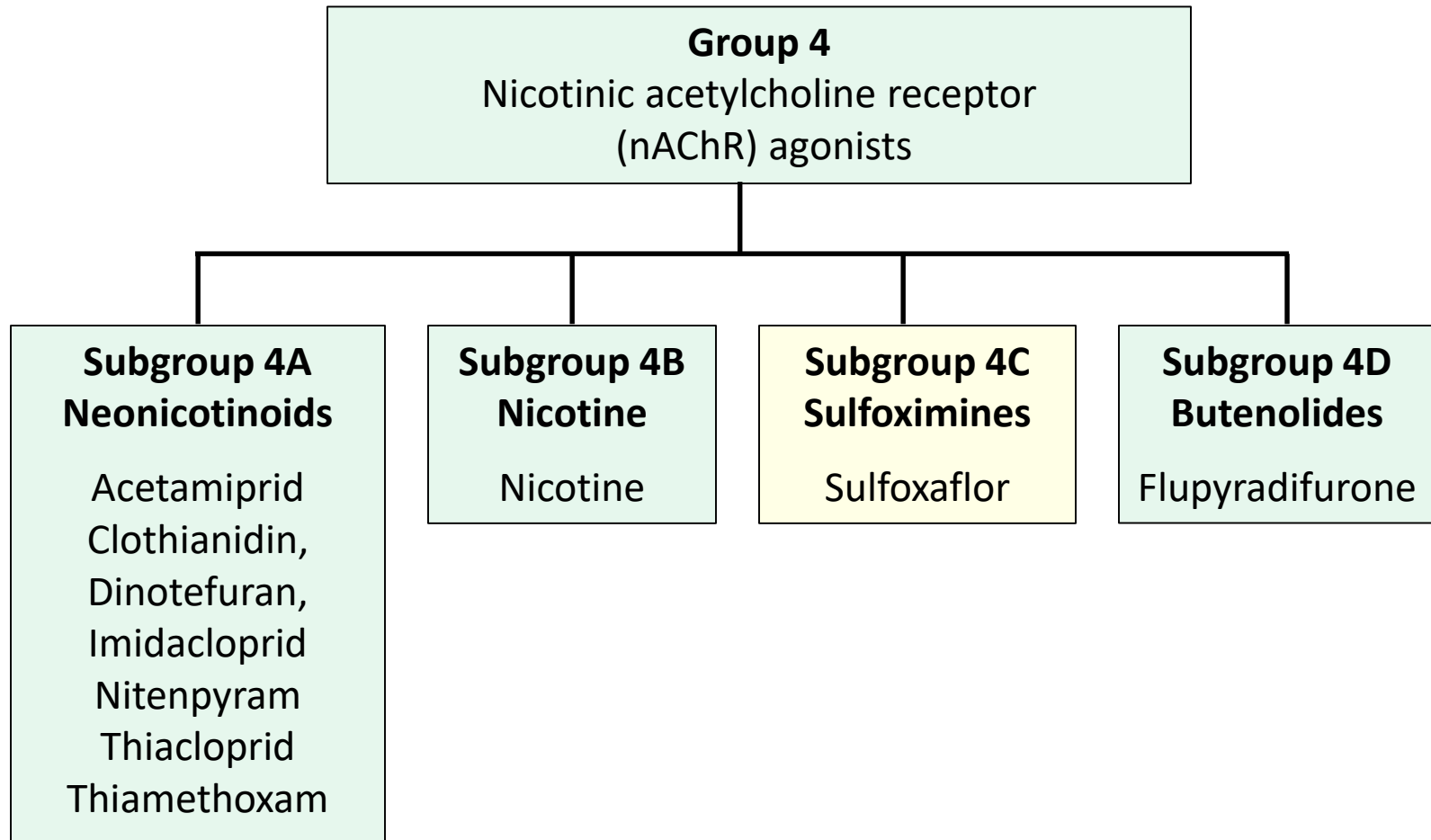
Cotton aphid, cotton
Aug 2011
Elapsed time 1 hour

SYSTEMIC & TRANSLAMINAR ACTIVITY



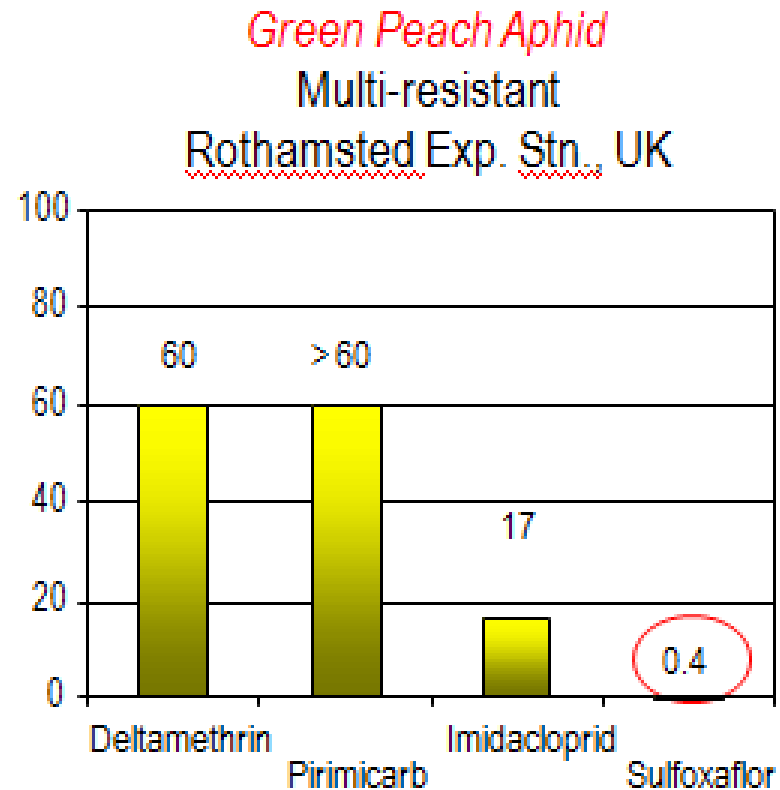
Unique Mode of Action

IRAC Classification



Distinctions between Sulfoximines and Neonicotinoids

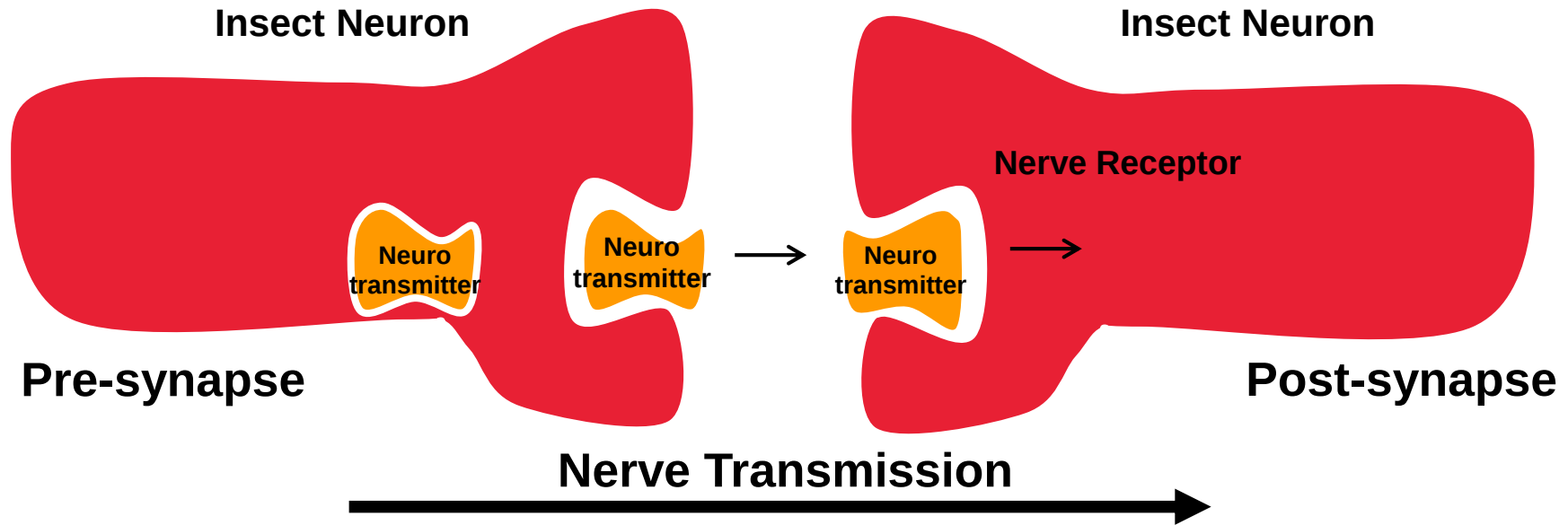
- No cross-resistance
- IRAC concluded that sulfoximines (4C) are distinct from neonicotinoids (4A)



Mode of Action

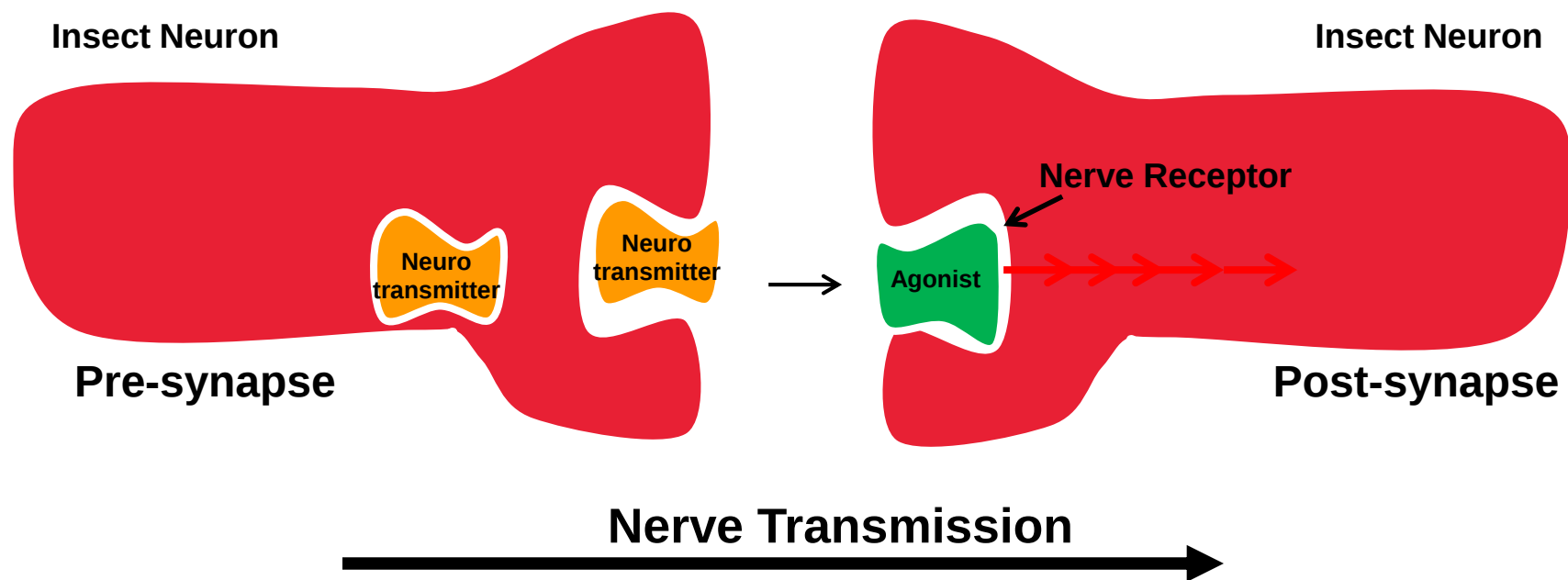
- The sulfoximines (sulfoxaflor) activate a response at a specific site in the insect nervous system
 - > (nicotinic acetylcholine receptor - nAChR)
- The general site of action for sulfoxaflor is similar to other insecticides, including the neonicotinoids, which may cause some confusion

Normal nervous system signal transmission



Neurotransmitter binds to receptor for short time resulting in controlled nerve stimulation

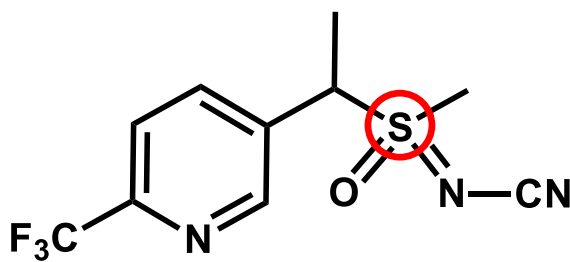
Nervous system with an insecticide agonist (“activator”)



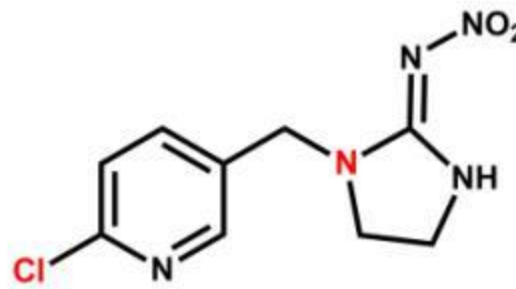
Agonist binds to receptor for longer time resulting in uncontrolled, excitatory nerve stimulation

Distinctions between Sulfoximines and Neonicotinoids

- Different chemical structures
 - > *Differential binding to receptor sites*
 - > Enzymes which metabolize neonicotinoids do not metabolize sulfoximines



sulfoxaflor

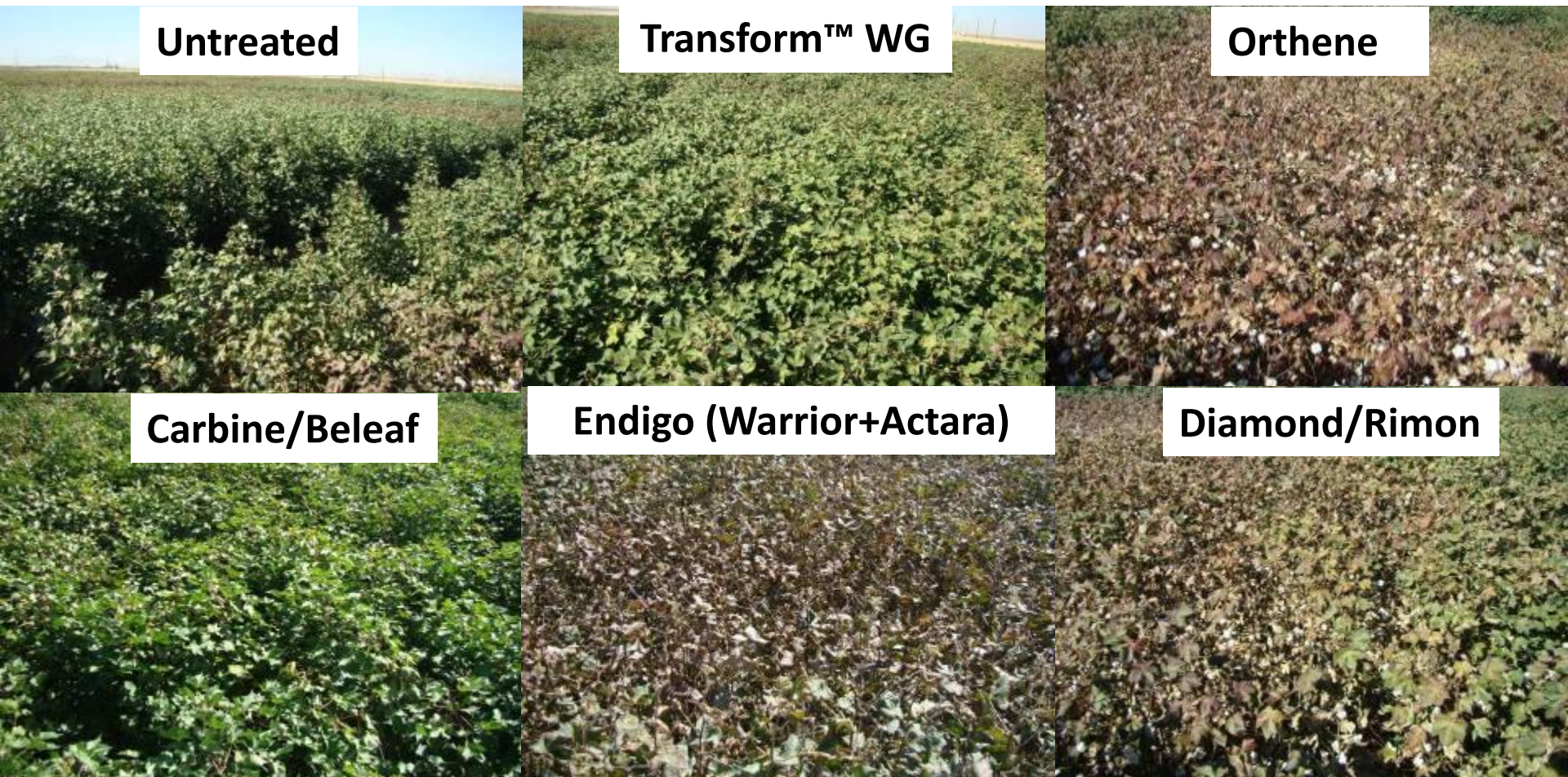


Imidacloprid

Mode of Action - Summary

- Sulfoximines (Group 4C) are a new class of insecticides
- Sulfoximines are different from neonicotinoids:
 - > Differences in binding to nAChR sites
 - > Different metabolism in insects
 - > Lack of cross-resistance

Minimal Impact on Beneficials



Brown-colored foliage in some treatments due to flaring of mite populations. Untreated shows excessive vegetative growth due to loss of fruit resulting from plant bug feeding (2009 trial).

Sulfoxaflor and Pollinators



- Contact toxicity if applied directly to bees
- After spray dries, minimal effect
- EPA registration decision
 - > When used according to label directions, no adverse effects to bees
- Sulfoxaflor is not a neonicotinoid
- Sulfoxaflor is labeled for application to blooming crops such as potatoes and fruiting vegetables

Transform® WG Insecticide

Primary Crops/Pests

Crop	Primary Pests	Rates
Canola	Aphids	0.75 oz/A
Cotton**	Aphids, cotton fleahopper, plant bugs	0.75–2.25 oz/A
Dry Beans	Aphids, Plant Bugs, Thrips (sp)	0.75–2.25 oz/A
Potatoes	Aphids, leafhoppers, potato psyllid	0.75–2.25 oz/A
Root & Tuber Veg. (sugar beet)	Aphids, leafhoppers	0.75–2.75 oz/A
Soybean**	Soybean aphid	0.75–1 oz/A
Wheat	Greenbug	0.75 oz/A
Sorghum**	Sugarcane aphid	0.75–1.5 oz/A
Alfalfa**	Plant bugs	1.5-2.75 oz/A

****Not on Section 3 Label**

****Section 18 emergency exemptions in 2017:**

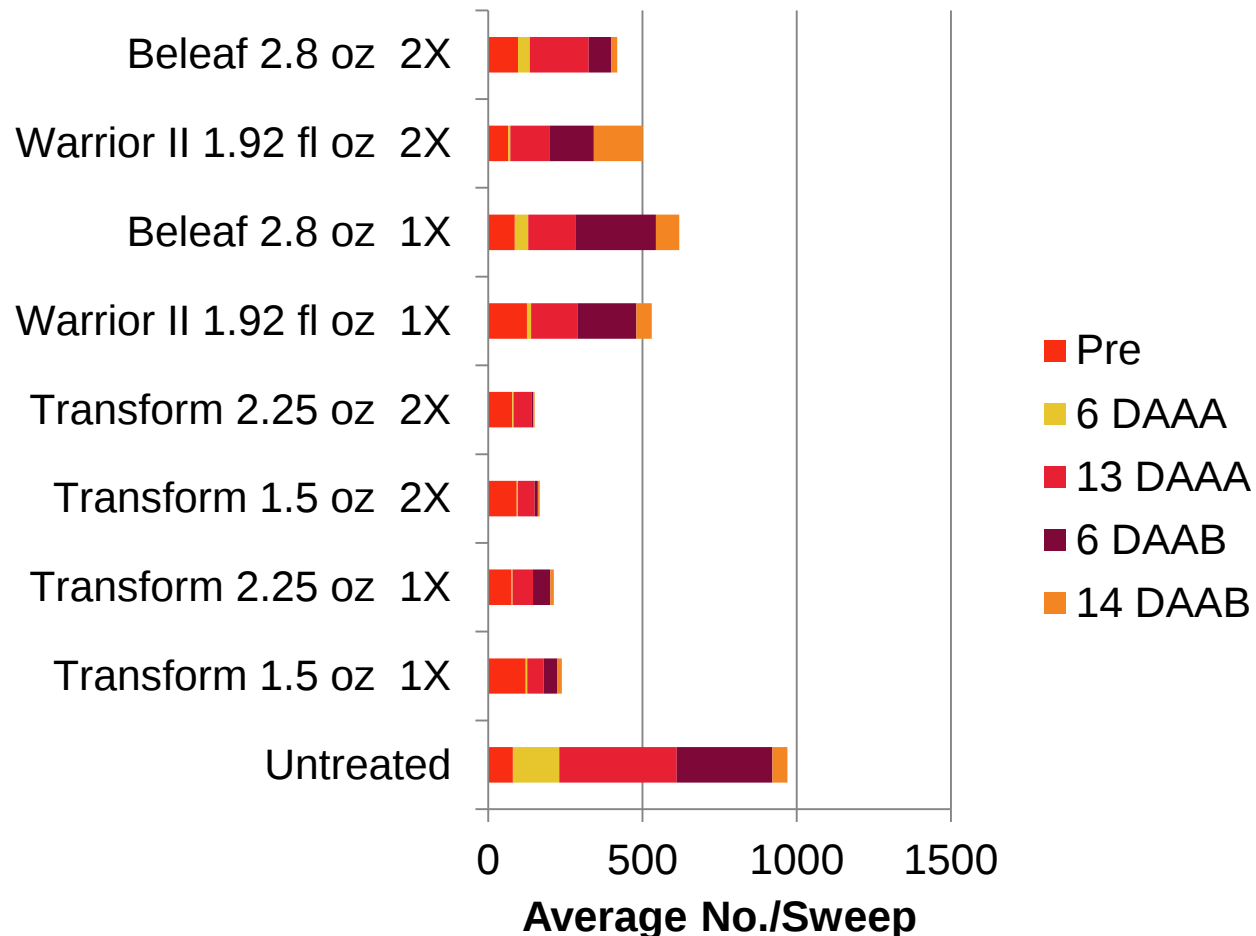
Cotton: AL, AR, AZ, LA, MO, MS, TN, TX

Sorghum: AL, AR, AZ, CO, GA, KS, LA, MO, MS, NC, NM, OK, SC, TX, VA

Leafy Veg: CA

Control of Blue Alfalfa Aphid in Alfalfa Grown for Seed

J. Barbour, U of ID, Parma - 2012





Transform® WG (Idaho 24c SLN ID-150007)

Alfalfa Grown For Seed

Pests	Transform WG (oz/acre)
Plant bugs (Lygus)	1.5 – 2.75

Transform[®] WG (Idaho 24c SLN ID-150007)

Alfalfa Grown For Seed - Restrictions

- Minimum Treatment Interval – 7 days
- Do not apply more than 5.5 oz./acre/year
- If 5 or more blossoms per square yard are present on average, do not apply between sunrise and sunset
- Do not use alfalfa for feed or fodder, or allow livestock to graze on treated area.

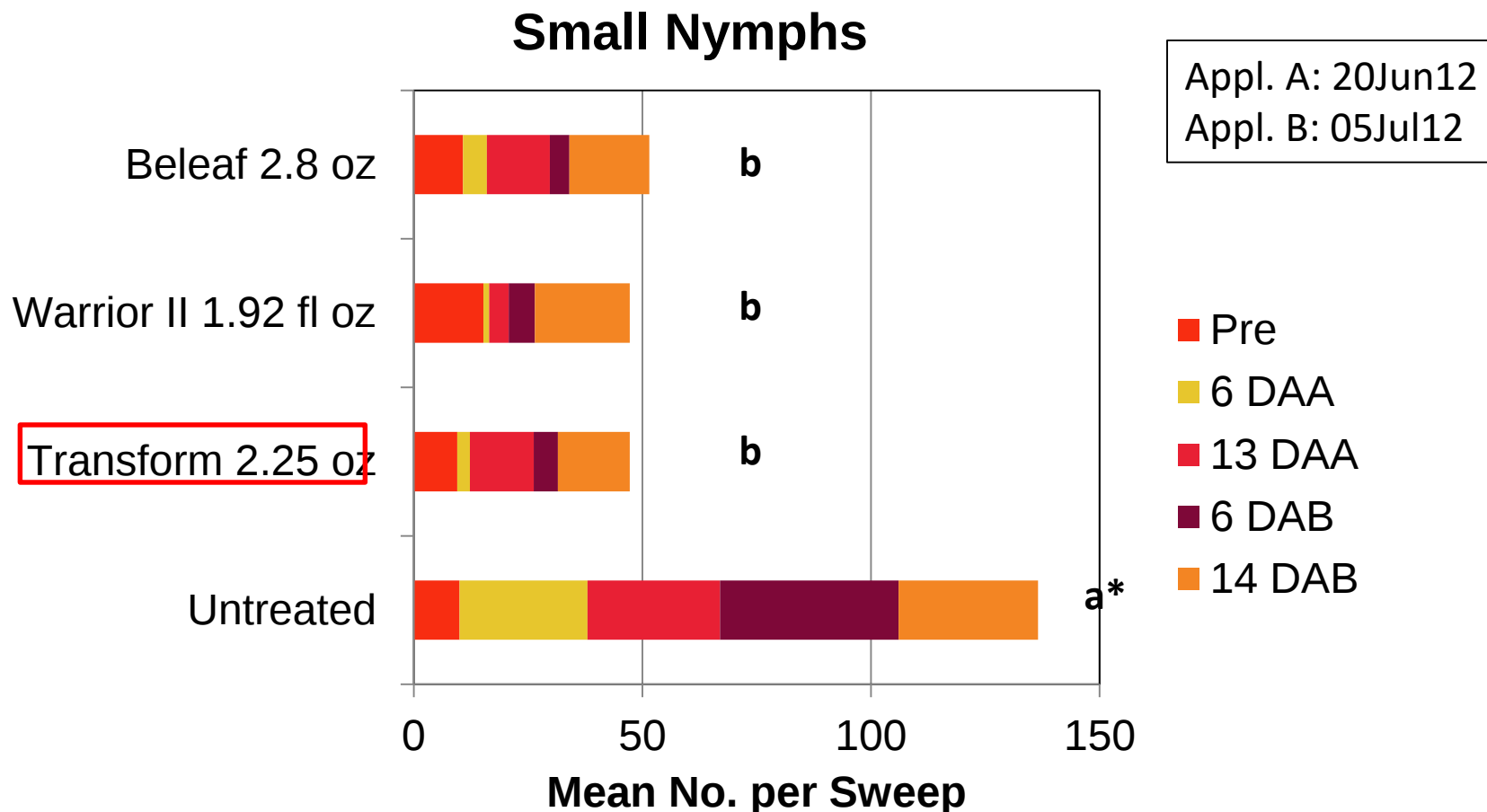
Transform lygus recommendations

- Lygus rate range of 1.5 – 2.25 oz/A
 - > 2.25 oz/A has become the standard in AZ
- Contact activity is not as dramatic as aphids
 - > Rely more on residual and ingestion
- May see symptoms soon if contacted directly
 - > For non-contact application 3-4 days for maximum effect



Control of *L. hesperus* in Alfalfa Seed

J. Barbour (Univ. of ID) – 2012, Parma, ID

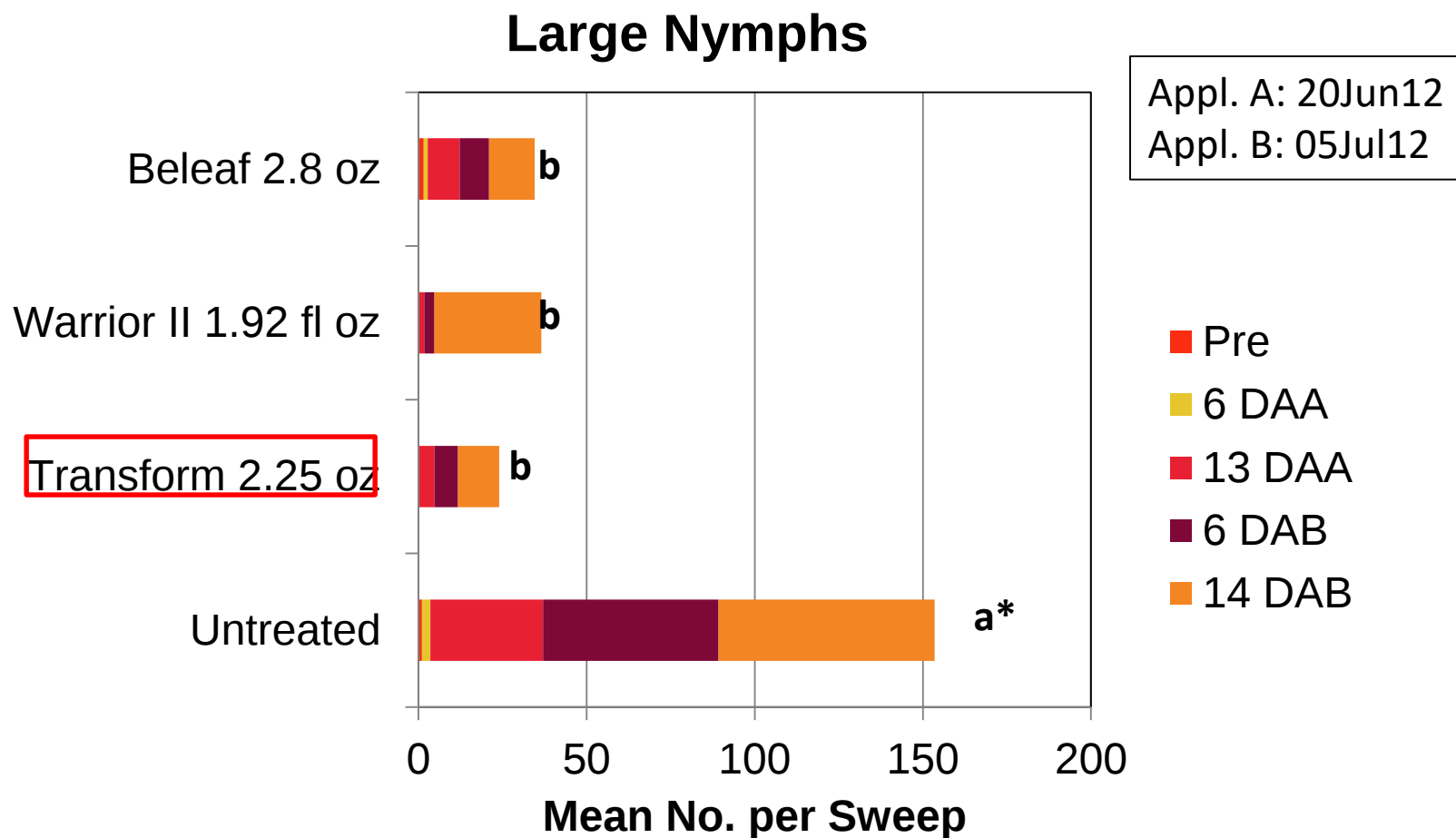


*Mean season total post-treatment

Means sharing same letters are not significantly different, Tukey's HSD ($p = 0.05$)

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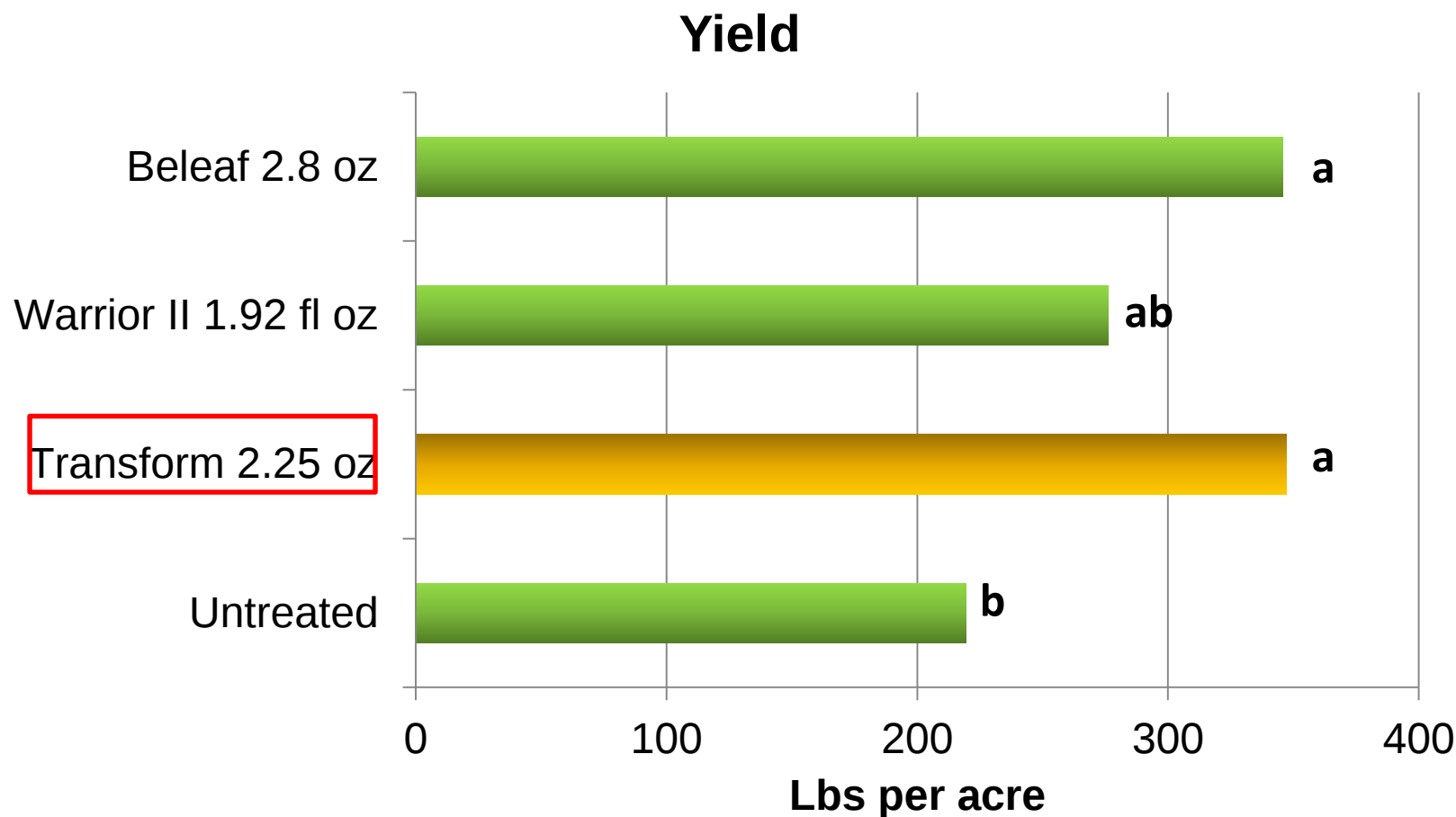


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Control of *L. hesperus* in Alfalfa Seed

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Questions?



Transform® Alfalfa Status

- Alfalfa seed Section 24c for 6 states in 2015
 - > Excellent lygus control feedback
- Alfalfa seed Section 18 in Washington in 2017
 - > Excellent lygus control feedback
- Federal label revoked by EPA – 11/15
- Modified Federal label renewed by EPA – 10/16
- Alfalfa federal label still under review at EPA
 - > Forage and seed – not likely in time for 2018 use season
- Any alfalfa seed labels for 2018?
 - > All depends on EPA
 - > Contact NAFA or WASGA representatives to provide input

Alfalfa Representation

- Western Alfalfa Seed Growers Association (WASGA)
 - > Shane Johnson, Administrator - shanej@agmgt.com
 - > www.wasga.org
- National Alfalfa & Forage Association (NAFA)
 - > Beth Nelson, President – nafa@alfalfa.org
 - > www.alfalfa.org
- Represent grower needs for production management to local, state and federal governmental bodies (EPA, USDA)

Summary

- Why use Transform?
 - > Fast activity – stop disease transmission
 - > Unique mode of action – 4c
 - > Less impact on beneficials – IPM
- Alfalfa seed
 - > Unmatched lygus control
- Regulatory Status
 - > Still under review by EPA
 - > Reach out to representatives

QUESTIONS?



Question Follow-up

- Q: Surfactants
 - > Are there surfactants in the formulation?
 - No
 - > Which surfactants are best to use?
 - None needed most of the time, but a good quality NIS if needed
 - > Were surfactants used in the trials?
 - None in earlier trials. 2017 – NIS or MSO blend
- Q: If Transform dries and rewets, is there heightened concern for pollinator toxicity?
 - > Transform moves very rapidly into the lead or stem tissue. After drying and resetting actual amount of material “free” on the leaf available for pollinators to pick up would be minuscule.
- Q: What is the maximum # of applications per year?
 - > Hard to tell without current label. Looking at 2017 WA section 18 or 2015 ID SLN would be a good reference point

-
- Q: Will the new label likely have the same ground restriction as the WA Section 18?
 - > Hard to tell without current label. Another section 18 label would likely look the same as 2017 WA
 - Q: In the slide shown with Systemic and Translaminar activity, was the product injected or applied foliar?
 - > Applied on surface, not injected
 - Q: Is the efficacy affected when it is applied later in the season to stressed plants?
 - > Contact to pests will not be affected. Stressed plants are less able to take in and move products, so uptake may be slower
 - Q: What is the residual? Will it protect new growth?
 - > Depends on a lot of factors, however, spraying every 7-10 days for lygus is recommended. Transform will move up the plant, however, if there is an increased amount of new growth, concentration will start to dilute.