Insect + Mite Management Updates

Bob Curtis, Moderator

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2010
38th Annual
Almond Industry
Conference

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Insect + Mite Management Updates

Presenters:

David Haviland, UCCE Kern County

Frank Zalom, Entomology, UC Davis

Franz Niederholzer, UCCE Sutter/Yuba Counties

Gabriele Ludwig, ABC

Arthropod IPM Opportunities

David Haviland, UC Cooperative Extension, Kern County

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Arthropod IPM Opportunities

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Alice: Would you tell me, please, which way I ought to go from here?

Cheshire Cat: **That depends a good deal on where you want to get to.**

Alice: I don't much care where.

Cheshire Cat: **Then it doesn't much matter which way you go.**

"Alice's Adventures in Wonderland"
Lewis Carol, 1866

Arthropod IPM Opportunities

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Where do you want to go?

Healthy, nutritious, flavorful, affordable almonds

Minimal insect damage

Minimal management costs

- **Monitoring and decision-making**
- **Costs of mitigation practices**

Minimal pesticide use

Negligible risk to air/water quality

Negligible risk to field workers

Negligible risk to consumers

10 years ago	Currently
Navel Orangeworm	
Sanitation, early harvest, hard-shelled varieties Guthion-based systems Old generation pyrethroids	Sanitation, early harvest, hard-shelled varieties IGRs, Diamides, Spinosyns New generation pyrethroids Mating Disruption
Spider Mites	
Preventative systems based on Agri-mek Follow-up defoliation prevention with Omite, Vendex, Nexter	Threshold-based systems based on abamectin and growth regulators Follow-up as needed with Zeal, Envidor, Fujimite, Acramite

10 years ago	Currently
Peach Twig Borer	
Dormant oil, plus OPs, carbamates, or pyrethroids Bloom/May sprays as needed (broad spec.)	Dormant oil plus… IGRs, diamides, spinosyns as well as broad spectrum products Bloom/May sprays
San Jose Scale	
Dormant oil, plus OPs, carbamates, or pyrethroids Low to moderate reliance on parasitoids	Dormant oil Heavy reliance on parasitoids Growth regulators if needed every 2-3 years or longer

Arthropod IPM Opportunities

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Balanced Almond Orchard's Possible

PTB- dormant oil + reduced-risk insecticides

NOW- sanitation, early harvest, hard shell varieties, reduced-risk insecticides, mating disruption

San Jose Scale- parasitoids, dormant oil, reduced-risk growth regulator every few years

Mites- scouting and treatments as needed

Ants- reduced-risk bait programs

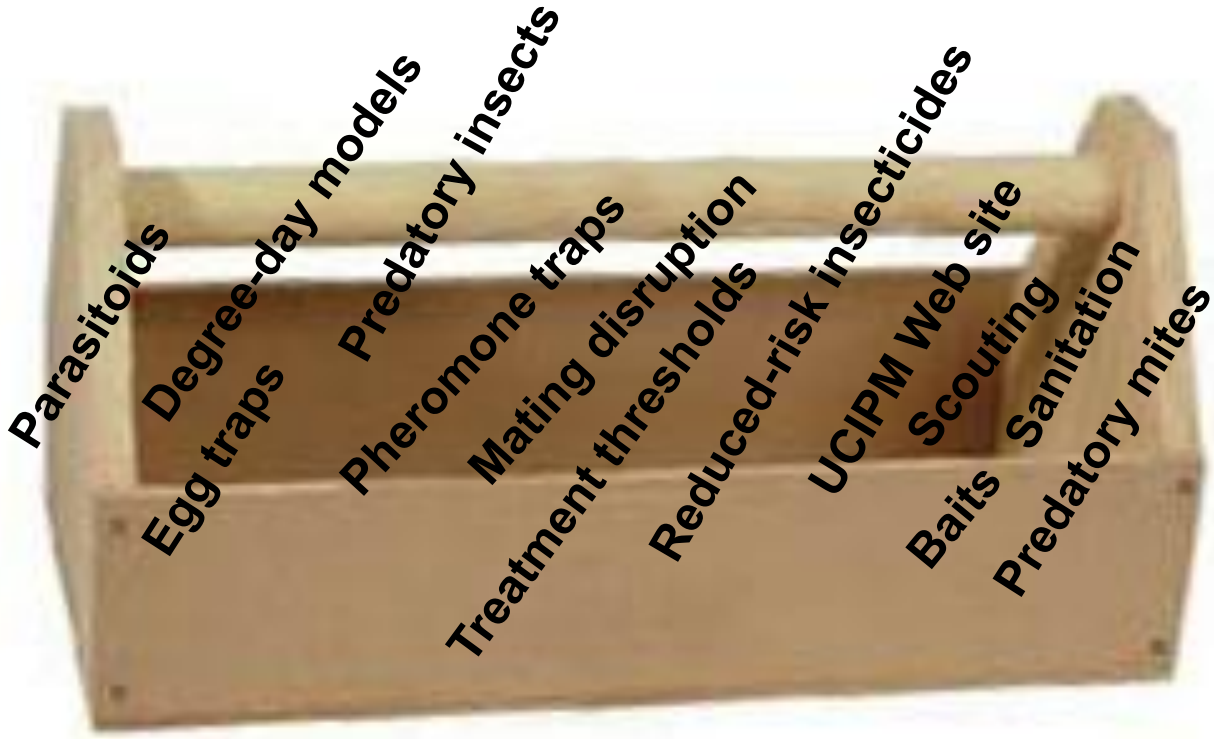
Arthropod IPM Opportunities?

Why so many opportunities/tools?

- Long history of industry investment in research
- History of collaboration between almond producers, University and USDA researchers, manufacturers and regulatory agencies.
- Grower willingness to adopt new practice
- Lack of new exotic pests
- Lack of treatment requirements for export

Arthropod IPM Opportunities…

The IPM toolbox is getting full…



Arthropod IPM Opportunities…

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The IPM toolbox is getting full…

…but tools are only valuable if they are used.

Arthropod IPM Opportunities

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Mating Disruption for NOW

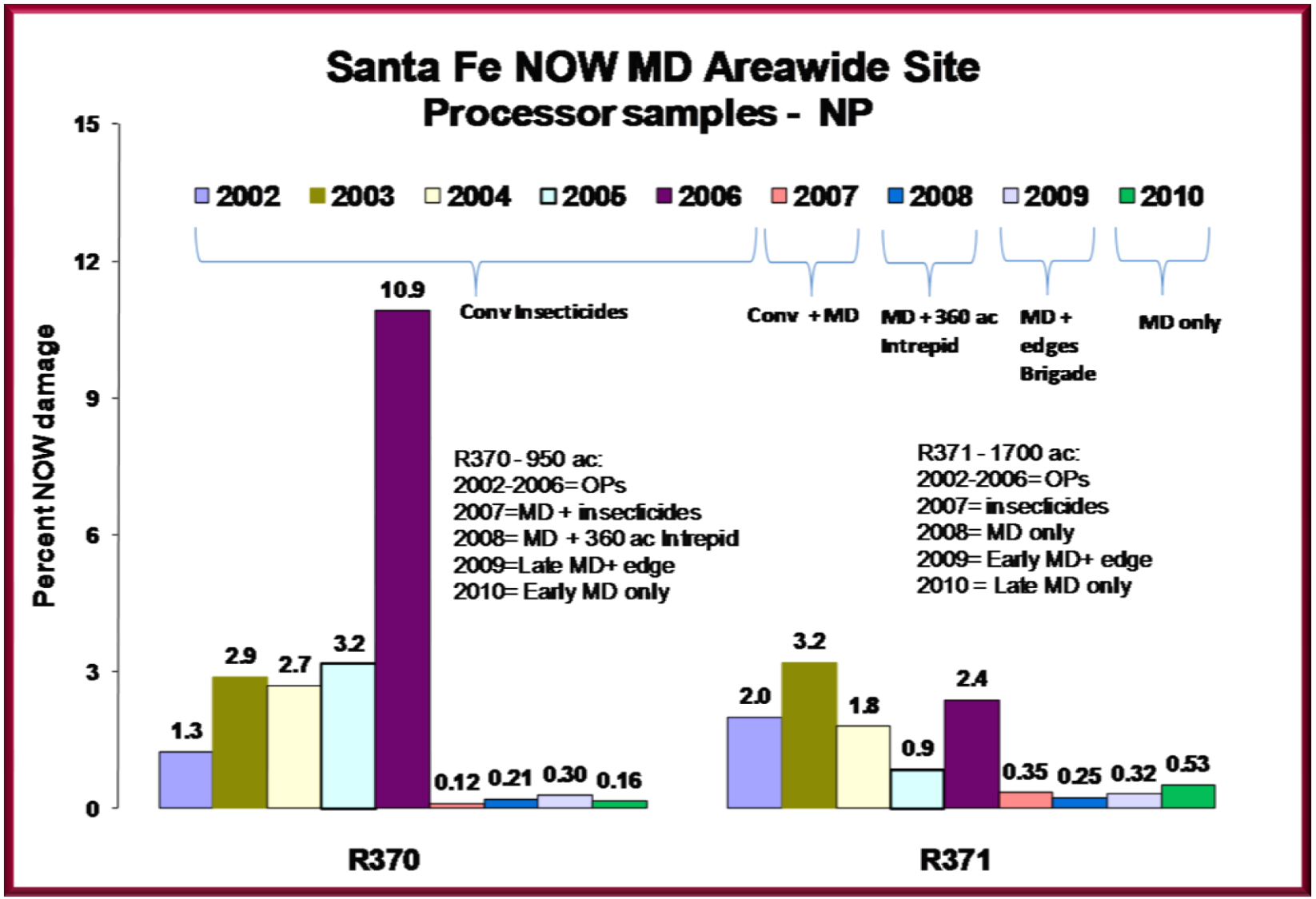
Based on the use of puffers

Long-term strategy requiring a phase-in period

Effectiveness increases with increased acreages

Still relatively expensive, but...

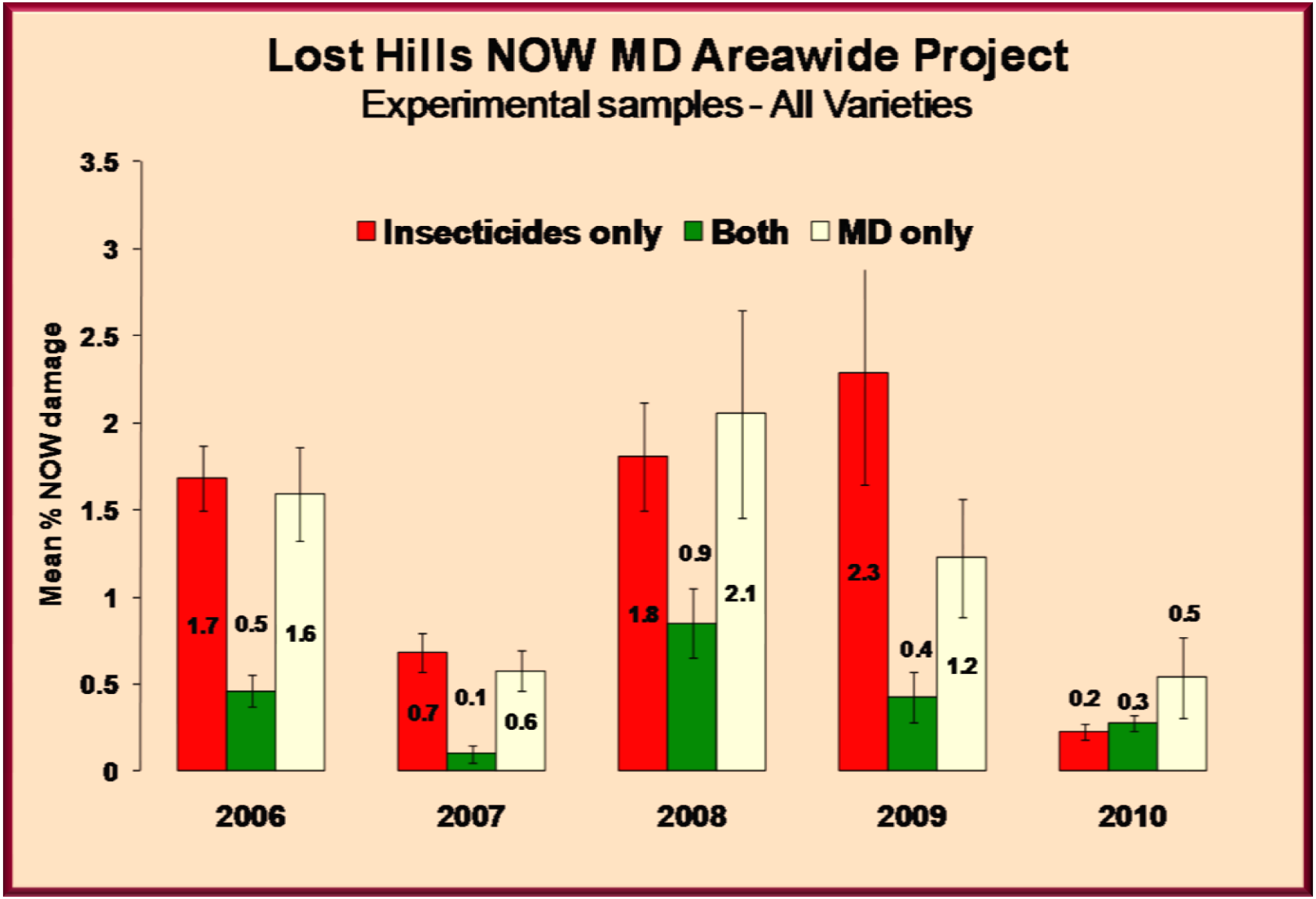
- proving to be effective
- potential to improve predictability
- avoid issues with treatment timing/equipment
- improved worker safety
- environmentalist/green stamp of approval
- prices often dictated by volume



Source: Higbee and Burkes, 2010- AIC 2010 Poster

Lost Hills NOW MD Areawide Project

Experimental samples - All Varieties



Source: Higbee and Burkes, 2010- AIC 2010 Poster

Arthropod IPM Opportunities

Presence/Absence sampling for spider mites

UC IPM
www.ipm.ucdavis.edu

Almonds—Webspinning Spider Mites Sampling

Supplement to UC IPM Pest Management Guidelines: Example Form

Directions:
1. Before July 1, monitor hot spot areas where mites develop first. After July 1, monitor the whole orchard by dividing it into sampling areas that can be treated separately.
2. Within each sampling area, sample a minimum of 5 trees. Select 15 leaves from each tree, randomly picking leaves from both the inside and outside of the canopy as you walk aroun it.
3. Using a hand lens, examine both sides of each leaf carefully. Look for spider mites and eggs, western predatory mites and eggs, sixspotted thrips, and other predators. Look closely since there may be only 1 to 2 mites or predators on a leaf.
4. Count the number of leaves on each tree with pest mites or their eggs, and the number of leaves with predators, and record below. Do not count individual mites or predators.
5. As you move from tree to tree, keep a running total of leaves with mites on the form. Once you have sampled 5 trees, compare your total to the numbers in the "Don't Treat" and "Trea columns below.
6. If your numbers are the **SAME OR LESS** than the "Don't Treat" column, you can stop sampling. If your numbers are **AS MUCH OR MORE** than in the "Treat" column, stop samplin and treat. If your numbers are **IN BETWEEN**, continue sampling until a decision can be reached.

Date **July 6, 2009** Grower/Orchard **County Line R-135**

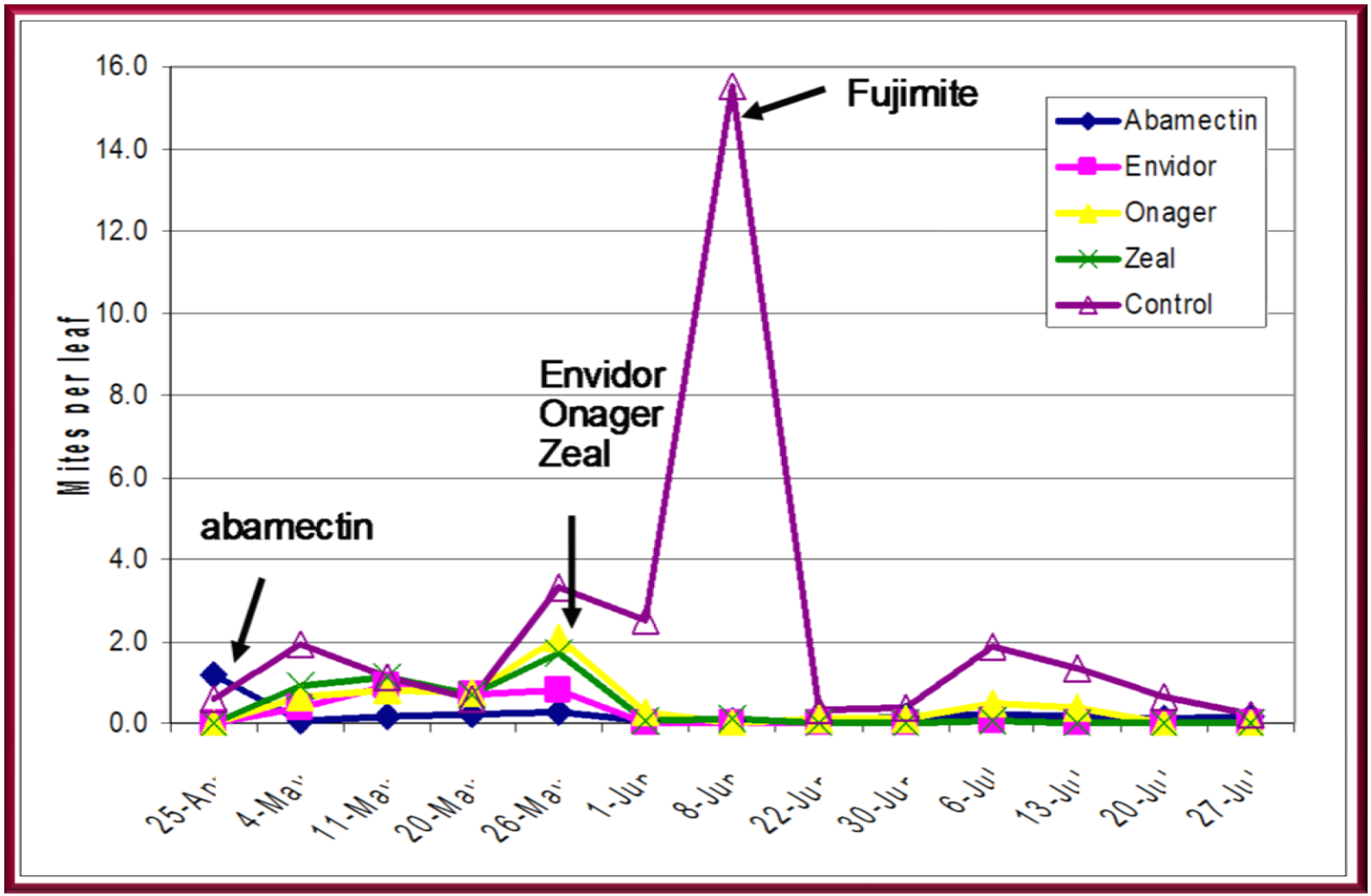
Tree number	Total number of leaves sampled	Number of leaves with mites (on each tree)	Total number of leaves with mites (on all trees)	Number of leaves with western predatory mite and/or sixspotted thrips	*If predators are present*		*If predators are absent*	
					Don't treat if total leaves with mites is:	Treat if total leaves with mites is:	Don't treat if total leaves with mites is:	Treat if total leaves with mites is:
1	15	**3**	**3**	**0**				
2	30	**1**	**4**	**0**				
3	45	**9**	**13**	**2**				
4	60	**3**	**16**	**0**				
5	75	**4**	**20**	**0**	≤ 27	≥ 40	≤ 12	≥ 24
6	90	**3**	**23**	**0**	≤ 33	≥ 48	≤ 15	≥ 28
7	105	**5**	**28**	**1**	≤ 39	≥ 55	≤ 18	≥ 31
8	120				≤ 45	≥ 62	≤ 21	≥ 35
9	135				≤ 51	≥ 69	≤ 23	≥ 39
10	150				≤ 57	≥ 76	≤ 26	≥ 43
11	165				≤ 63	≥ 83	≤ 29	≥ 46
12	180				≤ 70	≥ 90	≤ 32	≥ 50
13	195				≤ 76	≥ 97	≤ 35	≥ 54
14	210				≤ 82	≥ 104	≤ 38	≥ 57
15	225				≤ 88	≥ 111	≤ 41	≥ 61
16	240				≤ 94	≥ 118	≤ 45	≥ 65
17	255				≤ 101	≥ 125	≤ 48	≥ 68
18	270				≤ 107	≥ 132	≤ 51	≥ 72
19	285				≤ 113	≥ 139	≤ 54	≥ 75
20	300				≤ 119	≥ 146	≤ 57	≥ 79

(23 March 2009) Print copies of this form at www.ipm.ucdavis.edu/FORMS/

Produced by the UC Statewide IPM Program

Arthropod IPM Opportunities

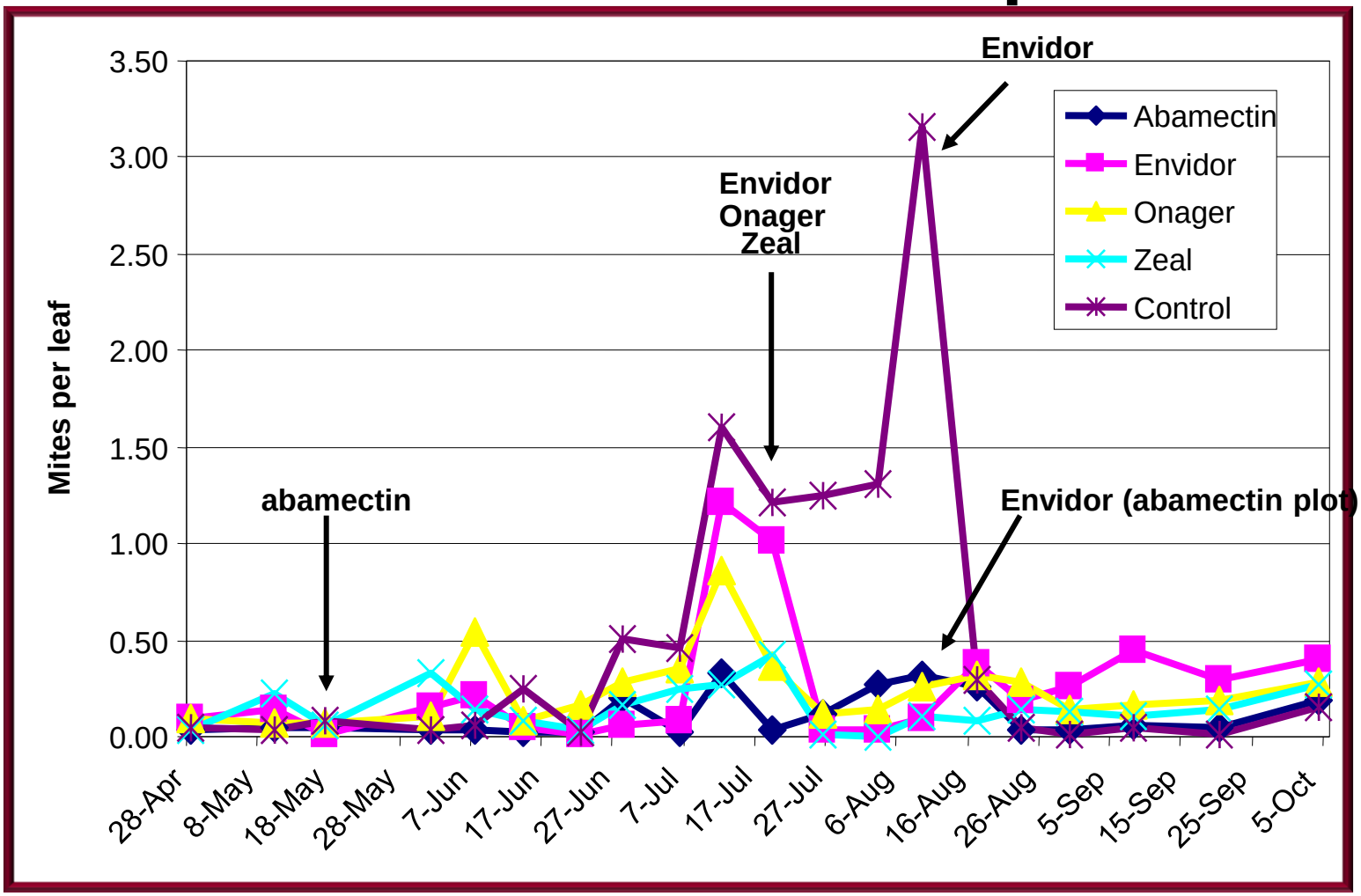
2009 Trials Kern Co- 17 ac. plots



Source: Haviland, 2010- AIC 2010 Poster

Arthropod IPM Opportunities

2010 Trials Kern Co- 17 ac. plots



Source: Haviland, 2010- AIC 2010 Poster

Two roads diverged in a wood, and I, I took the one less traveled by, And that has made all the difference

-*Robert Frost*

Source: The Road Not Taken", 1916

When you come to a fork in the road, take it!

-*Yogi Berra*

Source: Inspiration and Wisdom from One of Baseball's Greatest Heroes, Hyperion, 2002

Thank You

Arthropod IPM Opportunities

Frank Zalom, Dept. of Entomology, UC Davis

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Arthropod IPM Opportunities

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Effective but sustainable management of the key pest(s) of any crop is one of the most important factors in an arthropod IPM program…

- **A 'key pest' is one that requires some sort of intervention almost every year**
- **What is a 'key pest' often depends on location**

Key insect pests:

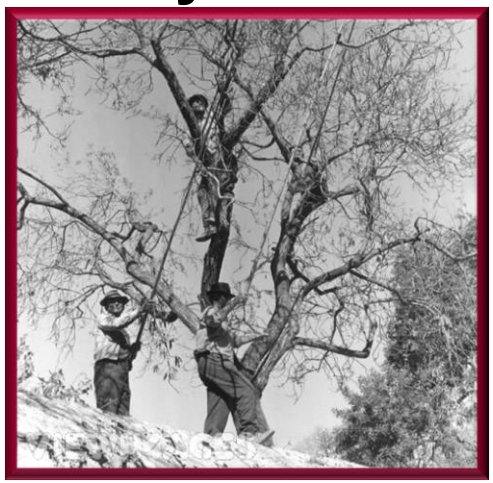
- Navel orangeworm
- Peach twig borer

Other important arthropod pests:

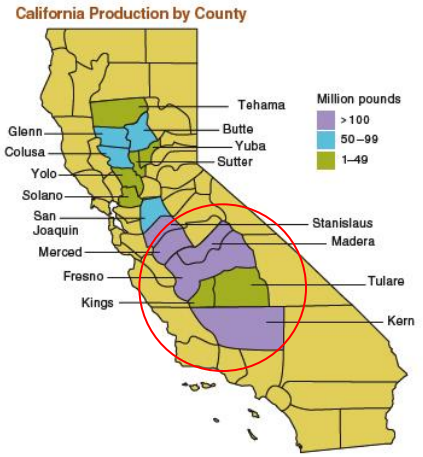
- Spider mites
- Ants
- San Jose scale
- Plant bugs
- Leafrollers
- Oriental fruit moth
- etc.

Arthropod IPM Opportunities

Navel orangeworm became the key pest of almonds in the late 1960s, probably because of a rapid change in mechanical harvesting practices and increased plantings in the central and southern San Joaquin Valley…



More nuts remained on the tree after harvest.



Arthropod IPM Opportunities

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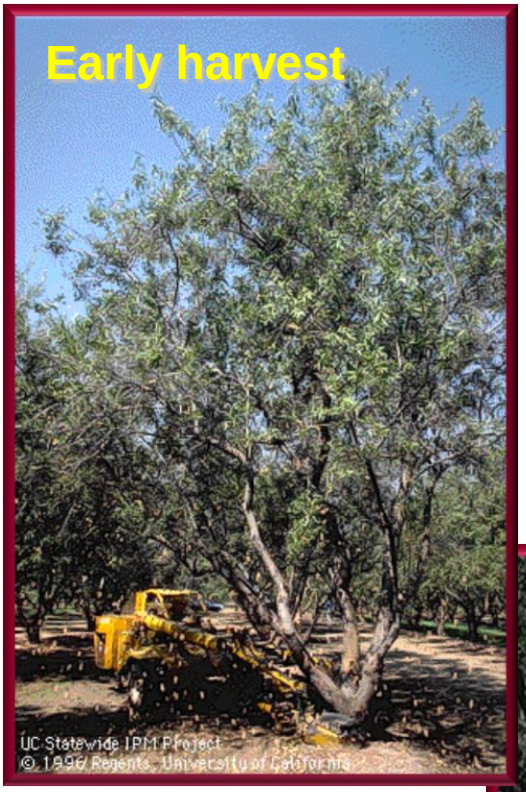
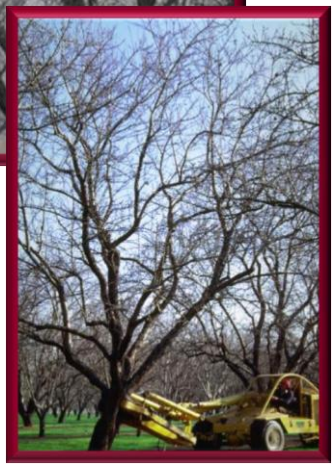
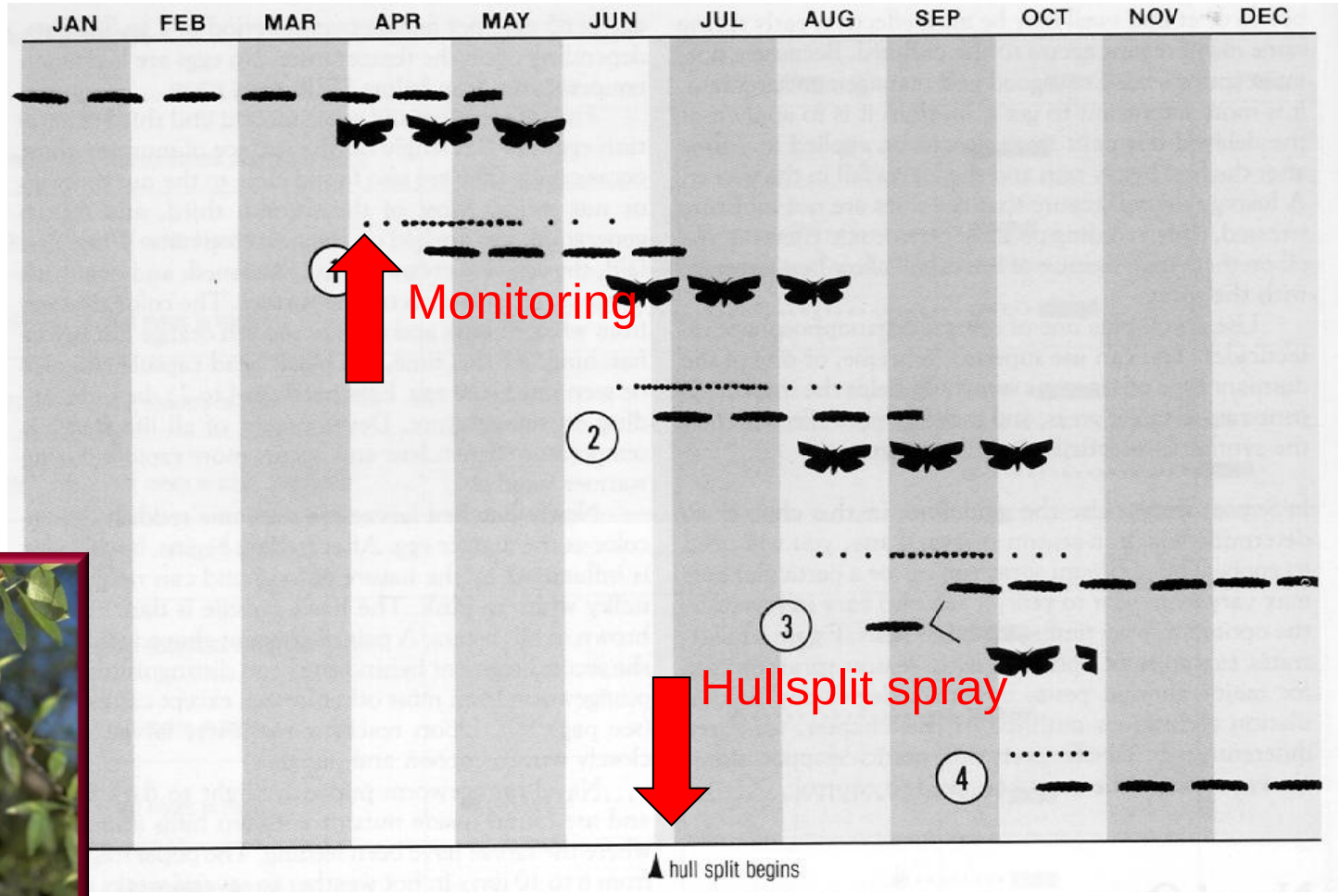
IPM for NOW is based upon cultural controls





Arthropod IPM Opportunities

Chemical control further lowers NOW damage



hullsplit spray timing with degree-days

Arthropod IPM Opportunities

Prior to the 1960s, peach twig borer was the ‘key pest’ of California almonds, and insecticide sprays were applied annually for its control…

Peach twig borer
Anarsia lineatella

Arthropod IPM Opportunities

Damage by peach twig borer (up to 10% in some years) led many growers to apply insecticides in May, *but*…

…depending on the insecticides applied, spider mite populations often increased to damaging levels.

Arthropod IPM Opportunities

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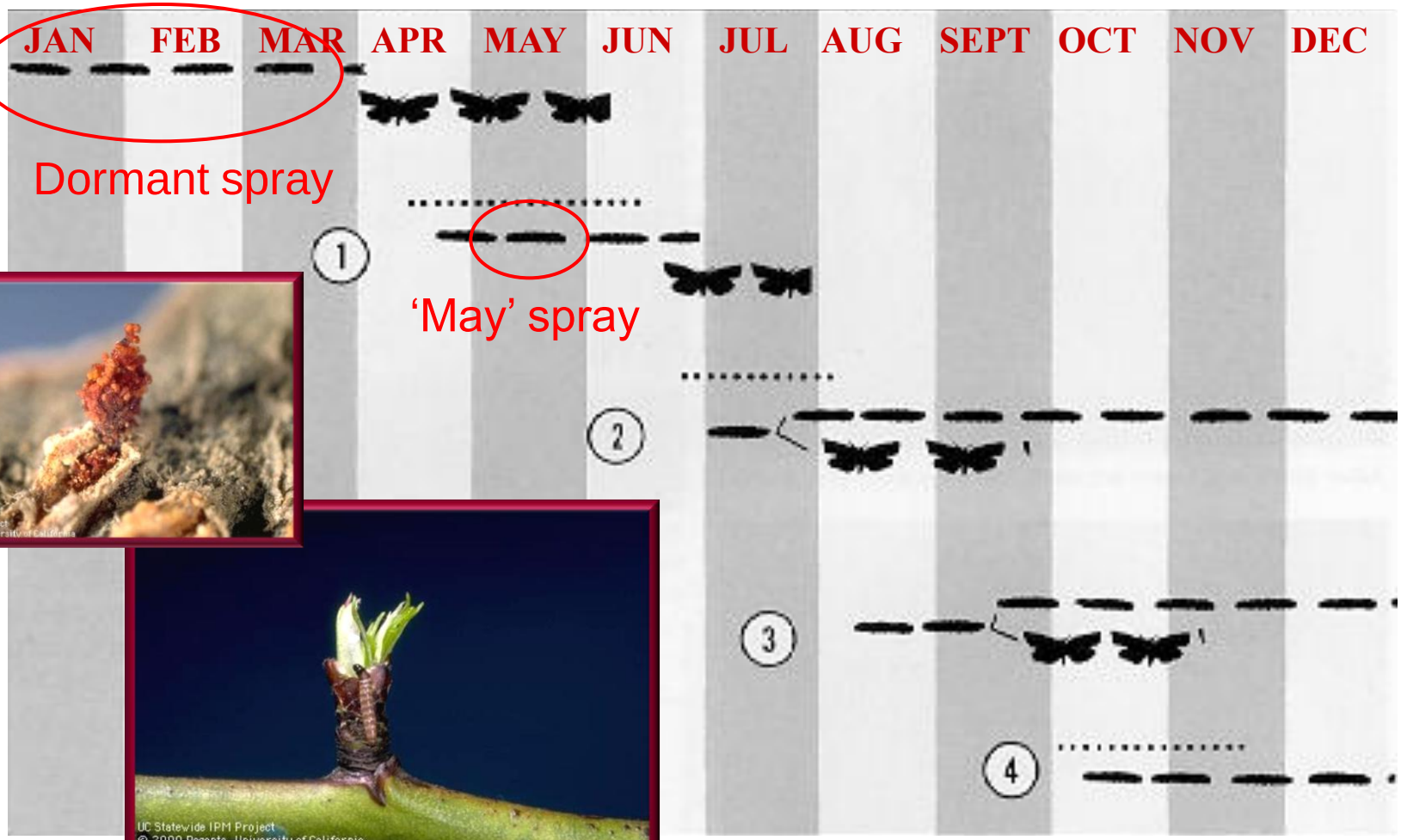
The peach twig borer's seasonal cycle is amenable to treatment during the dormant season, and in 'May'…



Arthropod IPM Opportunities

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A 1985 grower survey indicated that 93% of almond growers used an organophosphate and oil spray during orchard dormancy for peach twig borer control and 78% in May.

Broad spectrum pesticides like orgranophosphates and pyrethroids applied in May disrupt natural enemies of spider mites, scales and other insects, and were not recommended in an IPM Program.

***Aphytis* parasitoid of San Jose scale**

Predatory mite feeding on spider mite

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Runoff of organophosphates following dormant sprays became a concern to water agencies starting about 1990.

Between 1985 and 1999, growers using 'May' sprays dropped from 78% to 22%, and dormant sprays dropped from 93% to 66%.

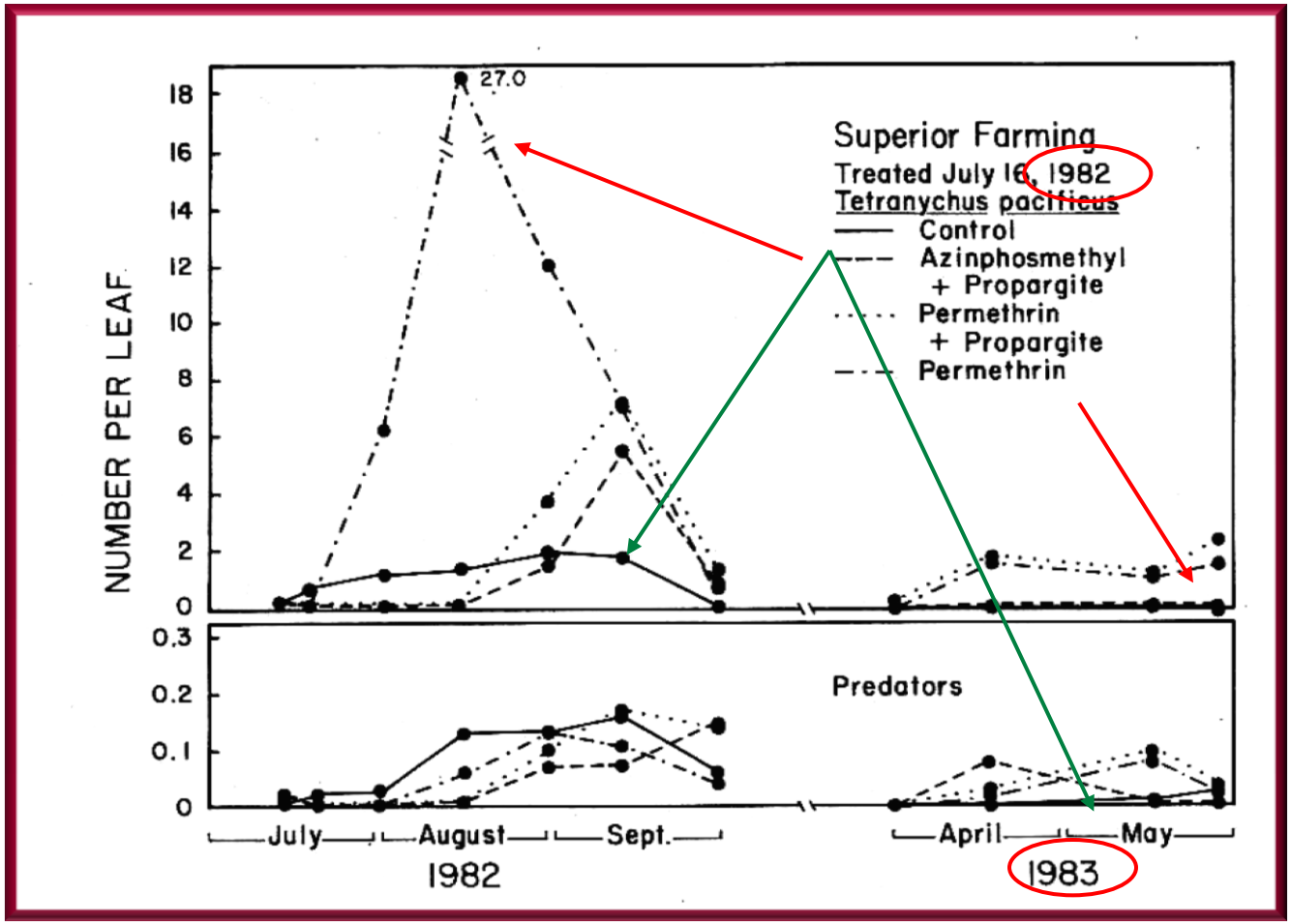
Starting in the 1990s, more growers were using pyrethroids (Asana, Pounce and Ambush) as dormant sprays and hullsplit sprays.

Now pyrethroids in waterways are also a concern.

Arthropod IPM Opportunities

Spider mites increase following inseason applications of pyrethroids…

…even in the next Spring.



Arthropod IPM Opportunities

Predatory mites are reduced by persistent residues of pyrethroids…

Percent survival of *G. occidentalis* on pyrethroid treated almond twigs ~7 months after a dormant application

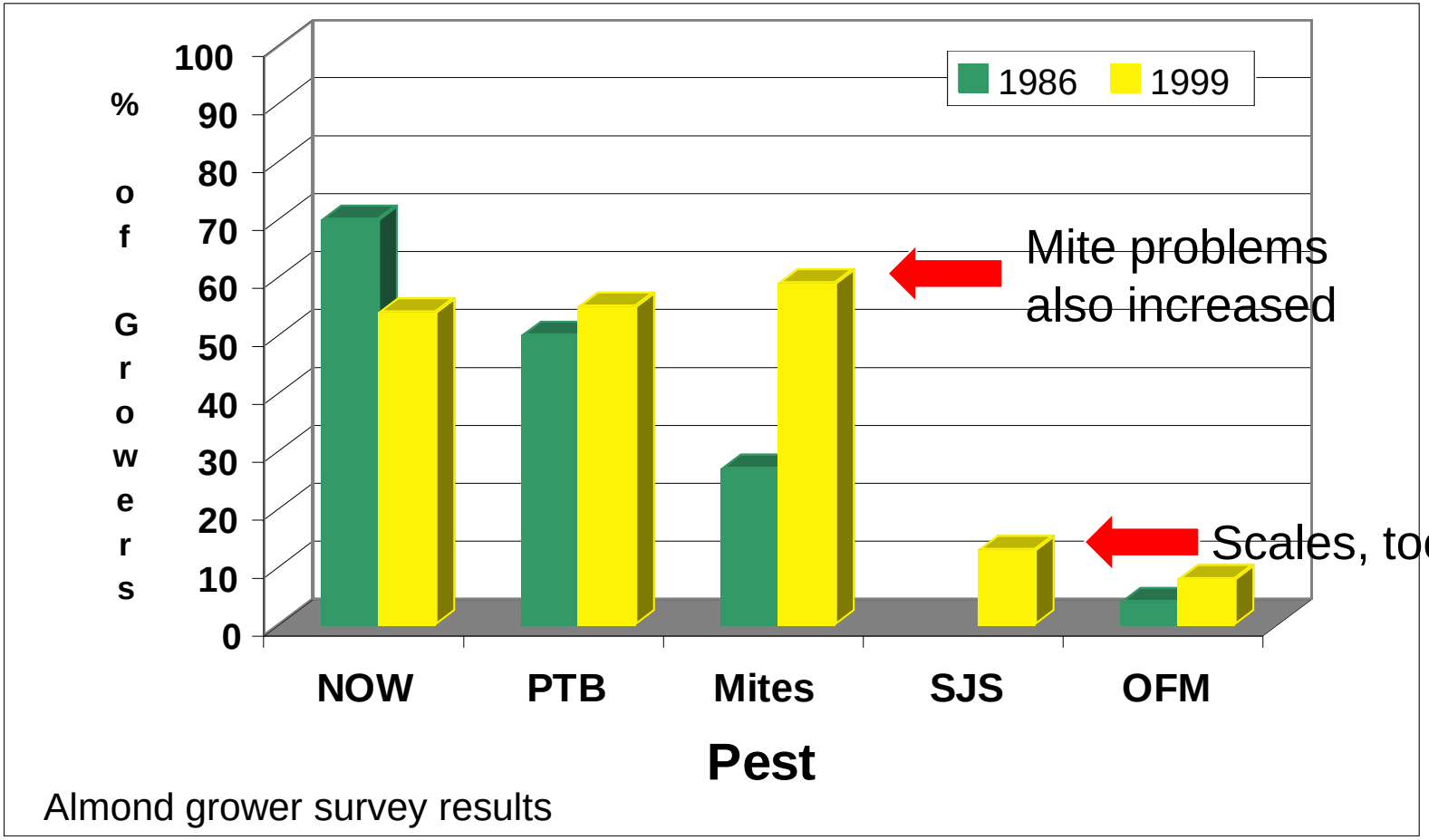
Pesticide and timing	Percent survival corrected for control mortality	
	24 hrs[1]	48 hrs[2]
Untreated	100.0 c	100.0 c
Esfenvalerate dormant	19.6 a	8.4 a
Permethrin dormant	53.6 b	48.1 b

Treatments applied 2/3/95
Bark samples collected 8/24/95
Treatment means followed by the same letter do not differ significantly ($p<0.05$) when compared by Fishers protected LSD.
[1] $F = 8.85$, df = 8, $p < 0.0001$
[2] $F = 8.36$, df = 8, $p < 0.0001$

Arthropod IPM Opportunities

Pyrethroid use as both dormant and inseason sprays began to increase during the 1990s…

Grower perception of insects and mites as problems requiring management



Almond grower survey results

Arthropod IPM Opportunities

New products are being registered for NOW and PTB control that offer alternatives to organophosphates and pyrethroids…

- **Some are presumably less toxic to natural enemies…**
  - **… useful to manage insecticide resistance**
    - **Can they be used as 'May' sprays to replace dormant sprays and to target both NOW and PTB?**

Arthropod IPM Opportunities

Some products registered for NOW and PTB control…

IRAC #	Chemical sub-group	Chemical(s)	Product(s)	Primary site of action
1b	Organophosphates	Chlorpyrifos, Phosmet	Lorsban, Imidan	Acetylcholinesterase inhibitors
3	Pyrethroids	Bifenthrin,	Brigade, Bifenture, Athena*,	Sodium channel modulators
		Cyfluthrin, Lamda-cyhalothrin,	Baythrioid, Warrior, Lambda-Cy, Volium Express*,	
		Esfenvalerate, Permethrin,	Asana, Ambush, Pounce,	
		Zeta-cypermethrin	Mustang	
4a	Neonicotinoids	Acetamiprid	Assail	Nicotinic acetylcholine receptor allosteric agonists
5	Spinosyns	Spinetoram, Spinosad	Delegate Entrust, Success	Nicotinic acetylcholine receptor allosteric activators

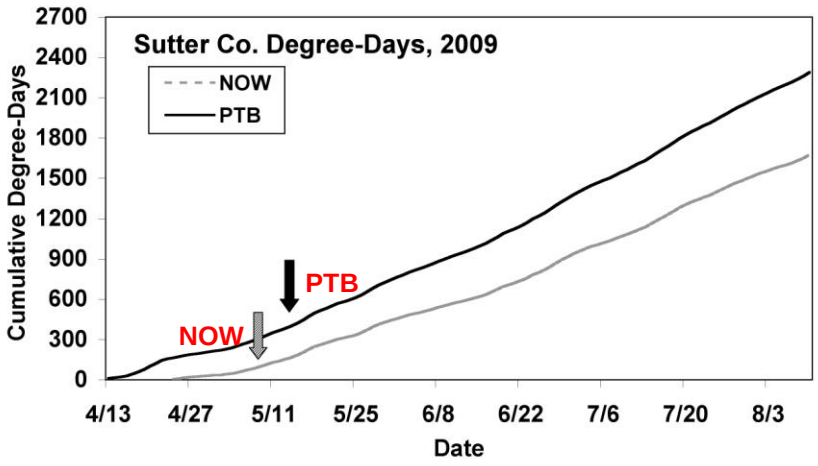
Arthropod IPM Opportunities

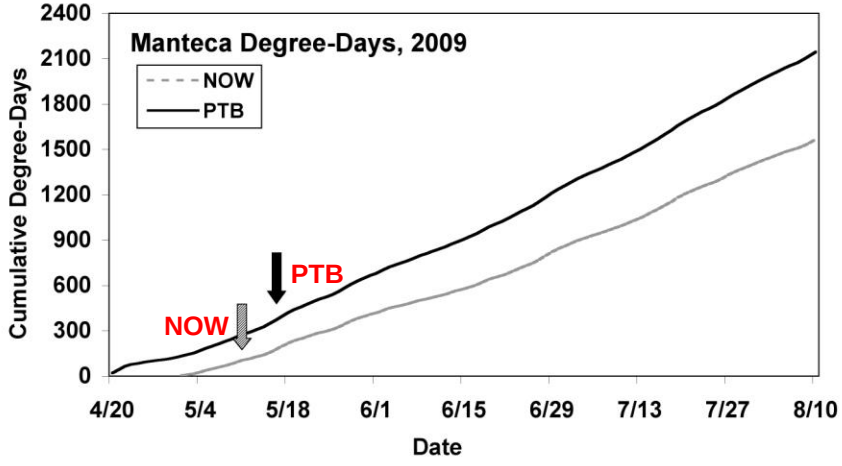
Some products registered for NOW and PTB control…

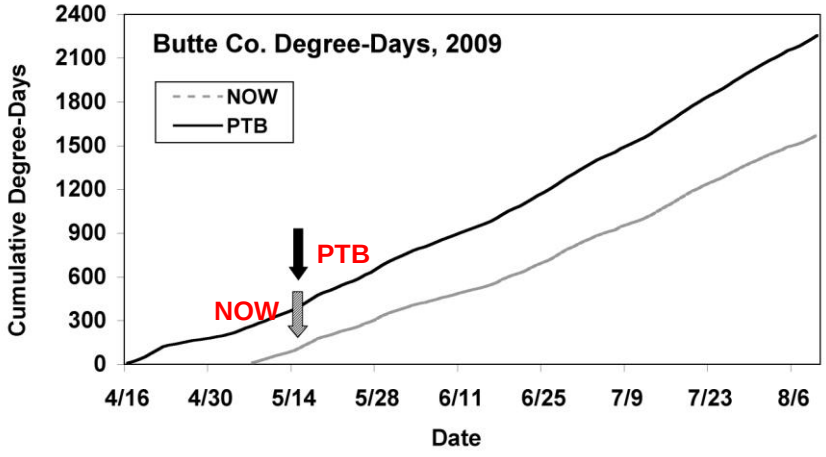
IRAC #	Chemical sub-group	Chemical(s)	Product(s)	Primary site of action
6	Avermectins	Emamectin benzoate	Proclaim	Chloride channel actovators
11	*Bacillus thuringiensis*	*Bacillus thuringiensis*	--	Microbial disruptors of insect midgut membranes
15	Benzoylureas	Diflubenzuron	Dimilin	Inhibitors of chitin biosynthesis, type 0
18	Diacylhydrazines	Methoxyfenozide, Tebufenozide	Intrepid Confirm	Ecdysone receptor agonists
28	Diamides	Flubendiamide, Chlornitraniliprole	Belt, Tourismo*, Altacor	Ryanodine receptor agonists

‘May’ Sprays?

Cumulative degree-days from NOW and PTB biofix dates and recommended May spray timing, 2009







‘May’ Sprays?

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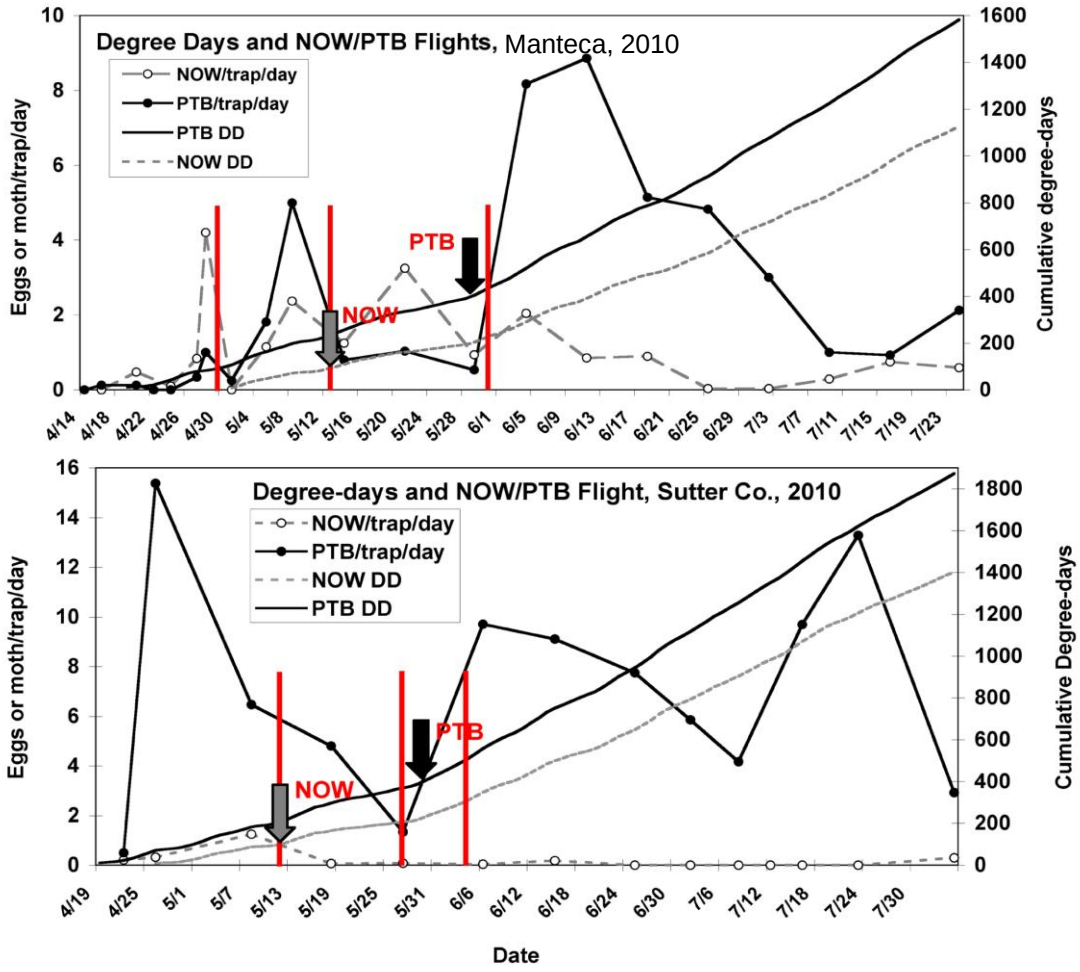

Proportion of navel orangeworm infested mummies, Manteca, 2010

Treatment	Chemical	Rate (form/ac)	Date	DD	Proportion infested nuts Mean ± SD[1]	
Control (water)			5/13	99 NOW	0.14 ± 0.1	A
Belt[2]	flubendiamide	4.0 oz	5/13	99 NOW	0.01 ± 0.0	B
Tourismo[2]	flubendiamide, buprofezin	14.0 oz	5/13	99 NOW	0.01 ± 0.0	B
Intrepid 2F[3]	methoxyfenozide	16 oz	4/30	0 NOW	0.00 ± 0.0	B
Intrepid 2F[3]	methoxyfenozide	16 oz	5/13	99 NOW	0.03 ± 0.1	B
Intrepid 2F[3]	methoxyfenozide	16 oz	5/31	441 PTB	0.02 ± 0.0	B
Delegate[3]	spinetoram	6.4 oz	4/30	0 NOW	0.01 ± 0.0	B
Delegate[3]	spinetoram	6.4 oz	5/13	99 NOW	0.01 ± 0.0	B
Delegate[3]	spinetoram	6.4 oz	5/31	441 PTB	0.01 ± 0.0	B
Altacor 35WG[3]	chlornitraniliprole	4.0 oz	4/30	0 NOW	0.00 ± 0.0	B
Altacor 35WG[3]	chlornitraniliprole	4.0 oz	5/13	99 NOW	0.02 ± 0.0	B
Altacor 35WG[3]	chlornitraniliprole	4.0 oz	5/31	441 PTB	0.02 ± 0.0	B
Proclaim	emamectin benzoate	4.0 oz	5/13	99 NOW	0.01 ± 0.0	B
Assail 30SG[2]	acetamiprid	6.4 oz	5/13	99 NOW	0.10 ± 0.1	A
Tourismo + Warrior	flubendiamide, buprofezin + lamda-cyhalothrin	14.0 oz + 5 oz	5/13	99 NOW	0.00 ± 0.0	B
Athena EW[2]	bifenthrin, abamectin	27.2 oz	5/13	99 NOW	0.01 ± 0.0	B
Voliam Xpress	lamda-cyhalothrin, chlorantraniliprole	7.0 oz	5/13	99 NOW	0.01 ± 0.0	B
Brigade 10WP	bifenthrin	0.5 lb	5/13	99 NOW	0.01 ± 0.0	B
Bifenture 10DF[2]	bifenthrin	16 oz	5/13	99 NOW	0.00 ± 0.0	B
Lambda-Cy 1EC	lambda-cyhalothrin	5.0 oz	5/13	99 NOW	0.00 ± 0.0	B

ANOV statistics, F=7.5143; df=19, 223; P<0.0001

[1] Means followed by the same letter do not differ significantly at P=0.05 by Student's t-test.

[2] Mixed with Dyne-Amic at 0.25% v/v

[3] Mixed with Induce at 1.0% v/v

Mean (±SD) peach twig borer shoot strikes per tree, Sutter, 2010

Treatment	Chemical	Rate	Date	DD	Shoot strikes/tree Mean ± SD[1]			
untreated					10.4	±	2.6	A
Belt[2]	flubendiamide	4.0 oz	5/28	376	3.0	±	2.4	EFG
Tourismo[2]	flubendiamide, buprofezine	10 oz	5/28	376	3.8	±	1.5	DEFG
Tourismo[2]	flubendiamide, buprofezine	14 oz	5/28	376	2.5	±	1.6	EFG
Intrepid 2F[3]	methoxyfenozide	16 oz	5/12	211	8.1	±	3.8	B
Intrepid 2F[3]	methoxyfenozide	16 oz	5/28	376	8.7	±	5.1	AB
Intrepid 2F[3]	methoxyfenozide	16 oz	6/4	507	6.8	±	4.3	BCD
Delegate[3]	spinetoram	6.4 oz	5/12	211	1.5	±	1.4	G
Delegate[3]	spinetoram	6.4 oz	5/28	376	1.7	±	2.3	FG
Delegate[3]	spinetoram	7 oz	6/4	507	1.2	±	1.0	G
Altacor 35WG[3]	chlornitraniliprole	4.0 oz	5/12	211	2.0	±	1.1	FG
Altacor 35WG[3]	chlornitraniliprole	4.0 oz	5/28	376	1.7	±	1.9	FG
Altacor 35WG[3]	chlornitraniliprole	4.0 oz	6/4	507	1.3	±	1.4	G
Proclaim	emamectin benzoate	4.0 oz	5/28	376	3.7	±	2.6	EFG
Assail 30SG[2]	acetamiprid	6.4 oz	5/28	376	2.7	±	2.8	EFG
NAI-2302 EC[2]	tolfenpyrad	14 oz	5/28	376	7.5	±	4.5	BC
NAI-2302 EC[2]	tolfenpyrad	21 oz	5/28	376	5.2	±	1.8	CDE
Voliam Xpress	lamda-cyhalothrin, chlorantraniliprole	7.0 oz	5/28	376	1.5	±	1.5	G
Lambda-Cy 1EC[2]	lamda-cyhalothrin	5.0 oz	5/28	376	4.7	±	3.1	CDEF
Athena EW[2]	bifenthrin, abamectin	27.2 oz	5/28	376	5.3	±	2.8	CDE
Brigade 10 WP	bifenthrin	0.5 lb	5/28	376	1.0	±	1.3	G
Bifenture 10DF[2]	bifenthrin, abamectin	16 oz	5/28	376	1.7	±	1.5	FG

ANOV statistics, F=9.027; df=21,143; P<0.0001

[1] Means followed by the same letter do not differ significantly at P=0.05 by Student's t-test.

[2] Mixed with Dyne-Amic at 0.25% v/v

[3] Mixed with Induce at 1.0% v/v

Nontarget effects? Mean ± SD *G. occidentalis* mortality and fecundity following residue and contact exposure.

		Survival		Fecundity	
Treatment	Exposure	Adj. mean	p^1	Adj. mean	p^1
Control	Contact	0.86 ± 0.08	-	1.81 ± 0.5	-
	Residue	0.75 ± 0.08	-	3.04 ± 0.8	-
Brigade	Contact	0.57 ± 0.12	0.25	0.76 ± 0.3	0.46
	Residue	- ± -	- ★	- ± -	- ★
Altacor	Contact	0.67 ± 0.12	0.54	0.69 ± 0.4	0.44
	Residue	0.67 ± -	0.97	3.83 ± 0.6	0.17
Dimilin	Contact	0.38 ± 0.12	0.04★	1.30 ± 0.5	0.98
	Residue	0.76 ± 0.05	1.00	4.67 ± 0.7	0.64
Avaunt	Contact	0.62 ± 0.11	0.37	0.33 ± 0.2	0.18
	Residue	0.10 ± 0.08	0.00★	3.00 ± 1.0	0.28
Intrepid	Contact	0.38 ± 0.12	0.04★	0.20 ± 0.2	0.22
	Residue	0.38 ± 0.08	0.04★	3.50 ± 0.7	0.14
Delegate	Contact	0.48 ± 0.12	0.10	1.83 ± 0.6	1.00
	Residue	0.14 ± 0.08	0.00★	1.00 ± 0.5	0.81

[1] Comparisons between treatment groups and control were made using Dunnett's method following adjustments for over-dispersion.

Arthropod IPM Opportunities

Summary

- Use cultural controls for NOW
- Target 'key' pests with less disruptive products that have lower environmental concerns
- New products can be used with NOW mating disruption to further reduce damage
- Consider applying 'May' sprays with less disruptive products as a replacement for dormant sprays for PTB
- Pyrethroids are 'cheap', but consider the additional costs of miticides and environmental mitigation

Thank You

Smart Spraying Makes Sense

Franz Niederholzer, UC Farm Advisor, Sutter/Yuba Counties

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⚠ WARNING

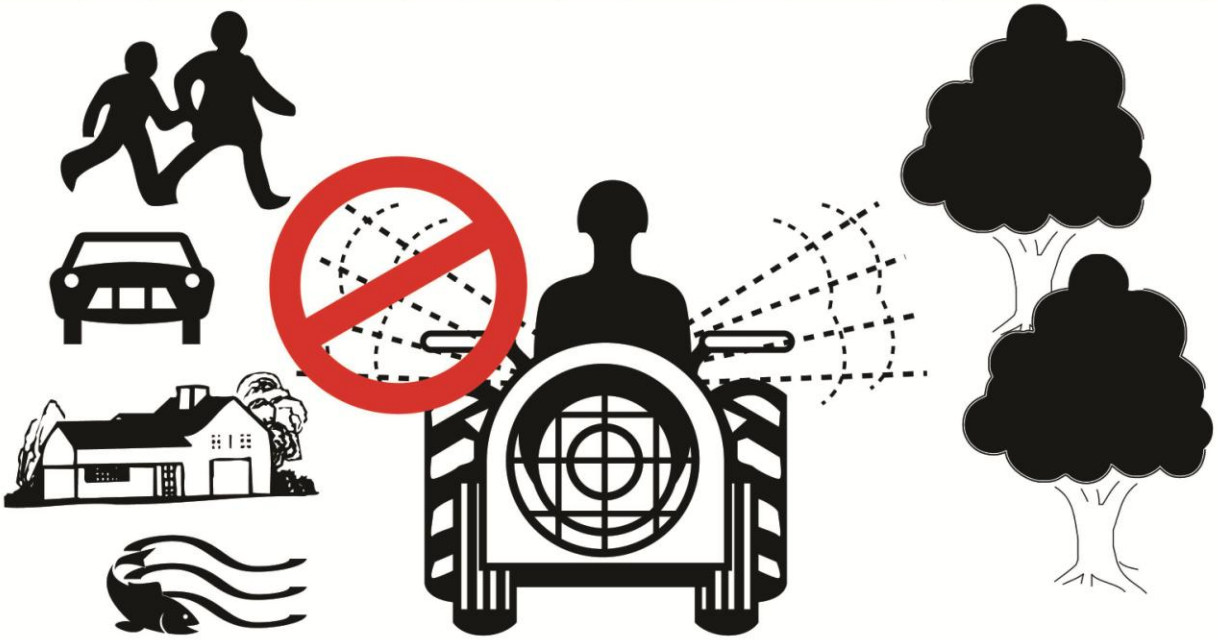
KEEP PESTICIDES ON THE CROP

¡ALERTA!

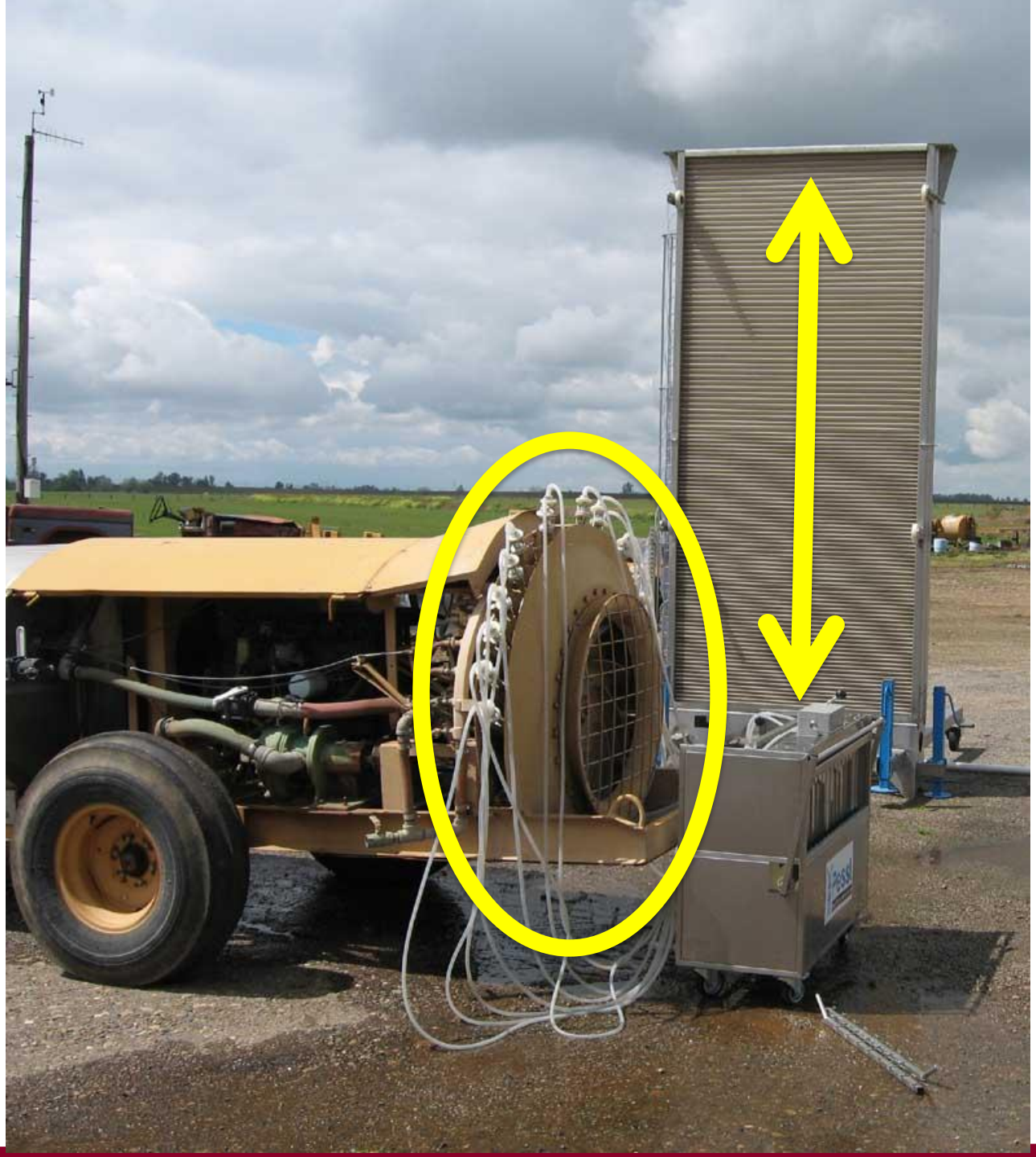
Aplique los pesticidas sobre el cultivo

ਸਾਵਧਾਨ

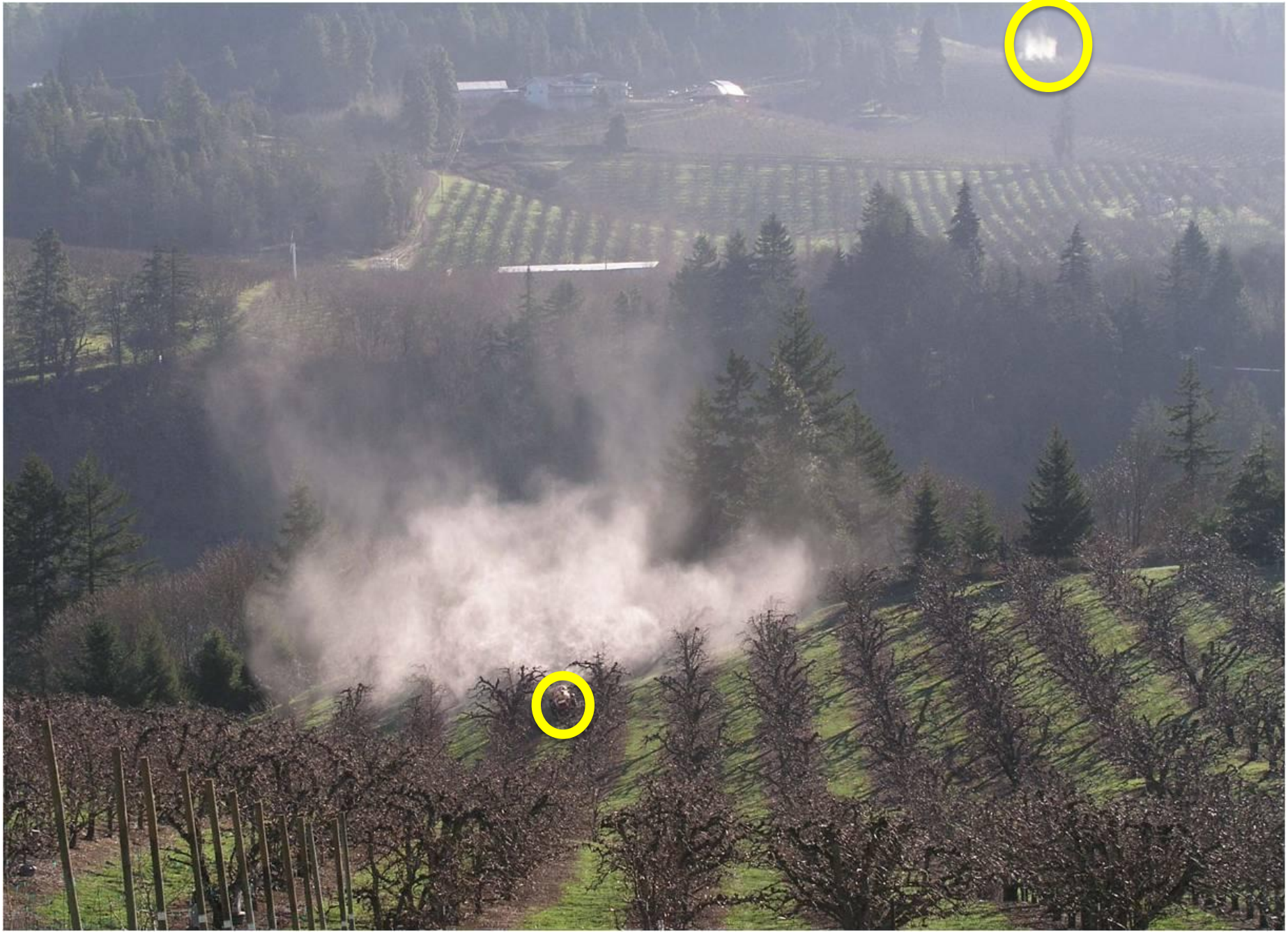
ਕੀਟਨਾਸ਼ਕ ਦਵਾਈਆਂ ਬੂਟਿਆਂ ਤੇ ਪਾਉਣ ਲਈ ਤਿਆਰ ਰਖੋ



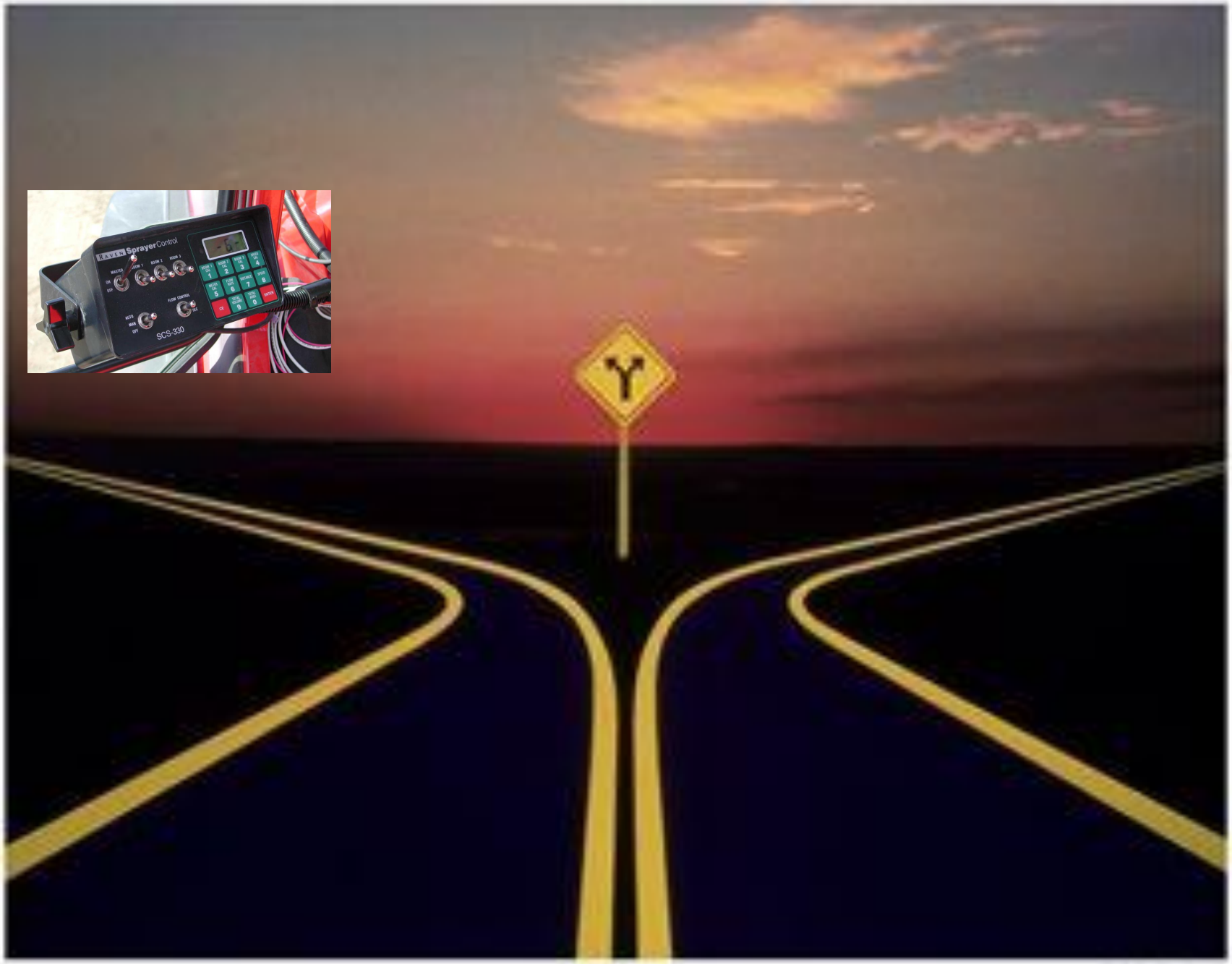

SMALL
MEDIUM
LARGE
MEDIUM
SMALL



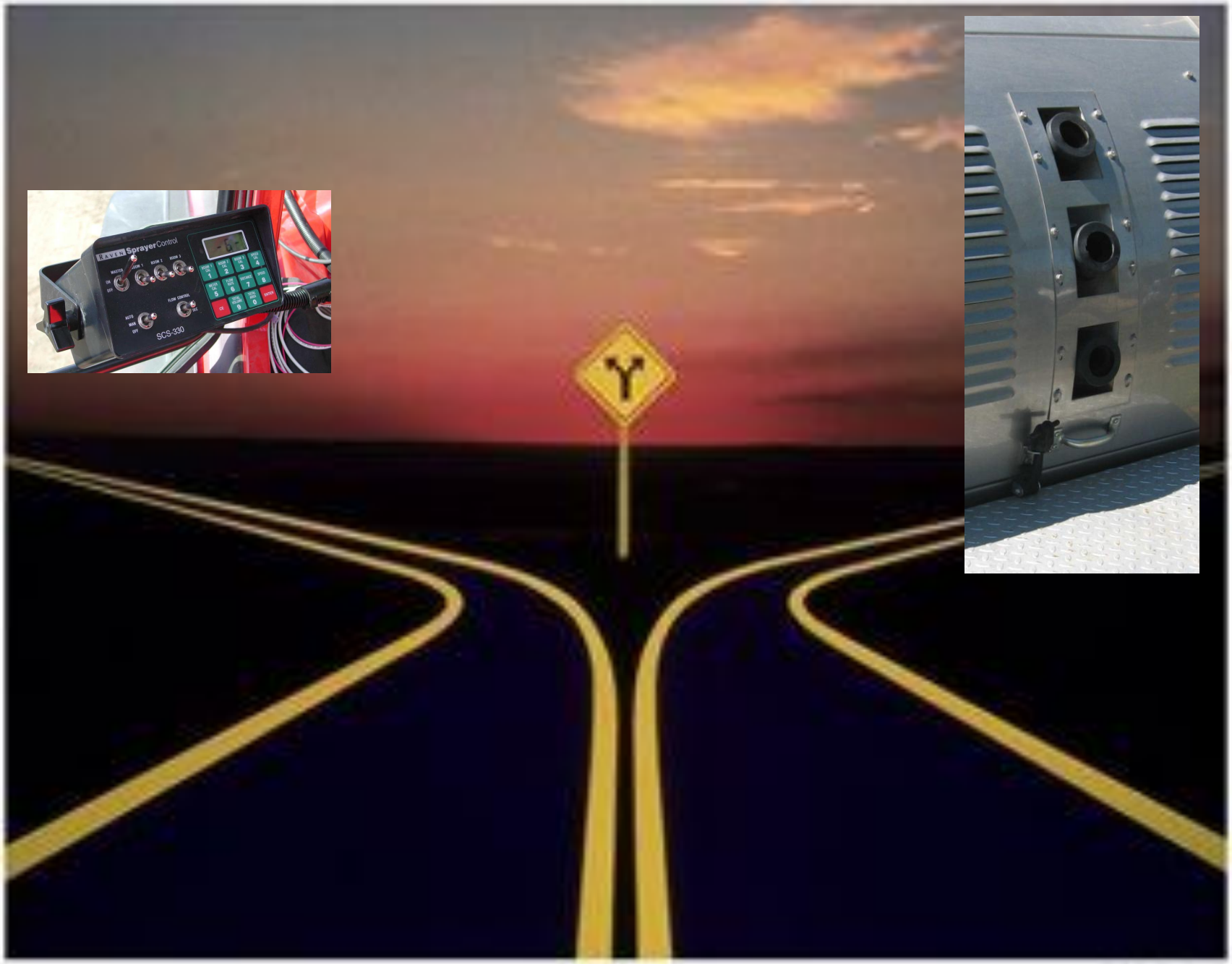
http://www.nysaes.cornell.edu/ent/faculty/landers/pestapp



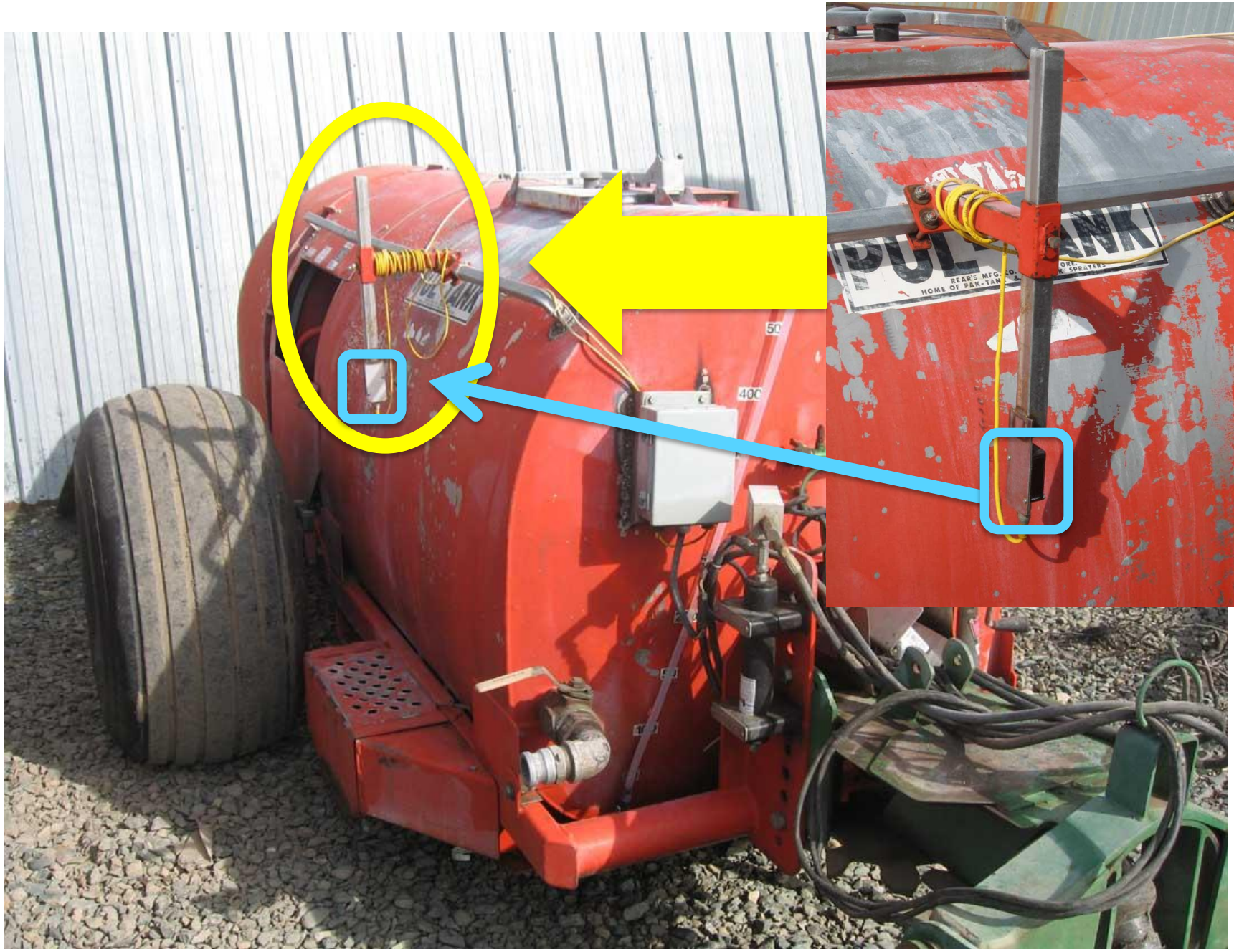
Jeff Jenkins, Oregon State Univ. -- photo credit


RAVEN SprayerControl
SCS-330


RAVEN SprayerControl
MASTER
ON
OFF
BOOM 1
BOOM 2
BOOM 3
FLOW CONTROL
AUTO
MAN
OFF
INC
DEC
SCS-330
BOOM 1 CAL 1
BOOM 2 CAL 2
BOOM 3 CAL 3
SPEED CAL 4
METER CAL 5
FLOW RATE 6
DISTANCE 7
SPEED 8
TOTAL VOLUME 9
TOTAL AREA 0
ENTER
CE


RAVEN SprayerControl
SCS-330

Smart sprayers use ultrasonic or laser sensors to “see” and target the tree.




ONE
SHOT
NELSON HARDIE
SUPER


SMART SPRAY
AF505 CPS


$
$
$
$
$

In mature almonds (no skips), costs reduced 7-26%.

Ken Giles, UC Davis -- photo credit

Sensor systems require more maintenance – that will cost $.

Jeff Jenkins, Oregon State Univ. -- photo credit

Thank you

International Considerations

Gabriele Ludwig, Almond Board of California

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International Considerations

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Meeting International Food Standards

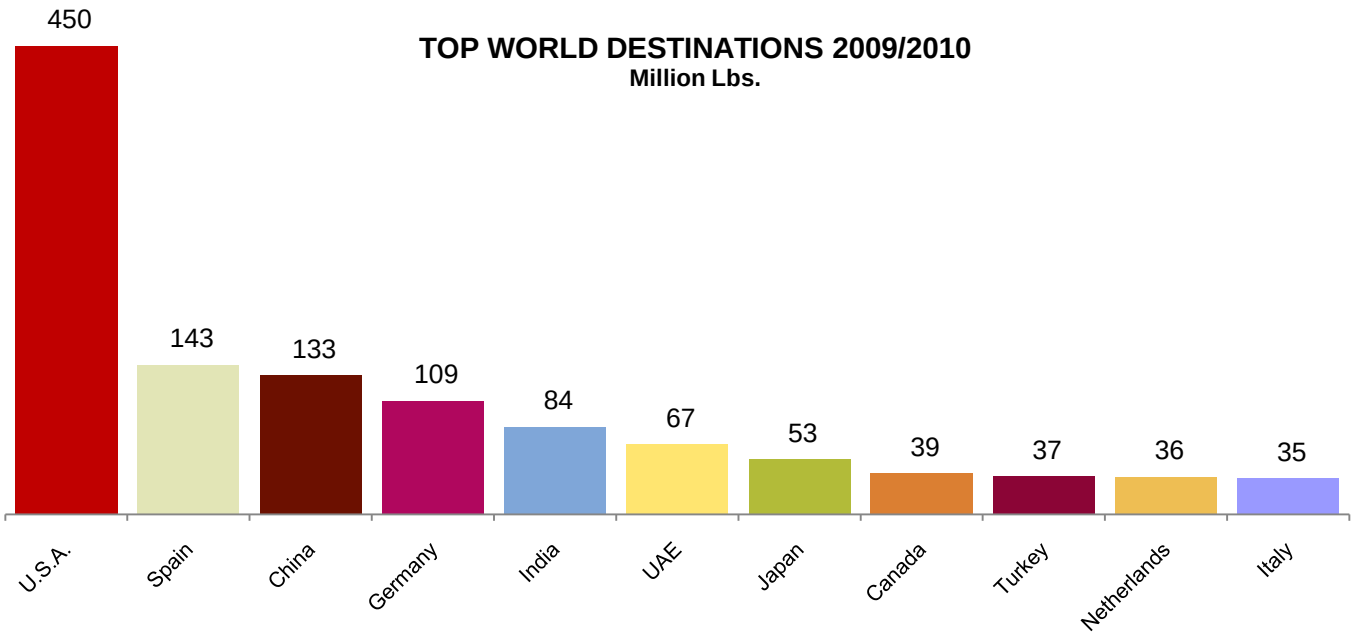
- Aflatoxins
- Maximum Pesticide Residue Levels

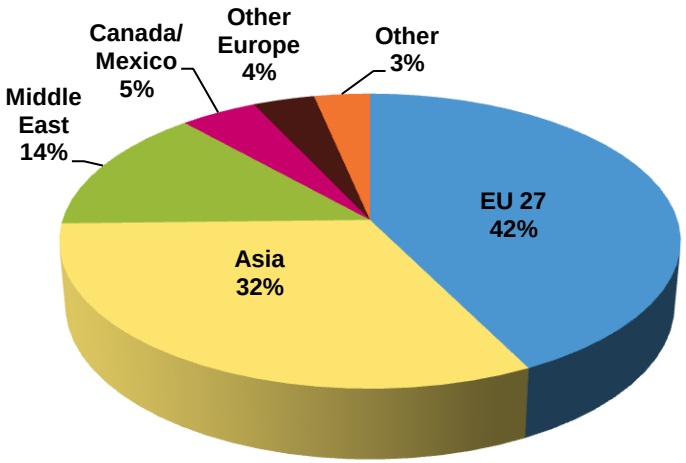
Almonds top US specialty crop for export value

- 60-70% of California almonds leave the US
- Exported to over 90 different countries.

➔Growers choices in pest management can affect market place

Direction of Almond Exports 2009-2010





Source: Almond Board of California

Example Aflatoxin Standards

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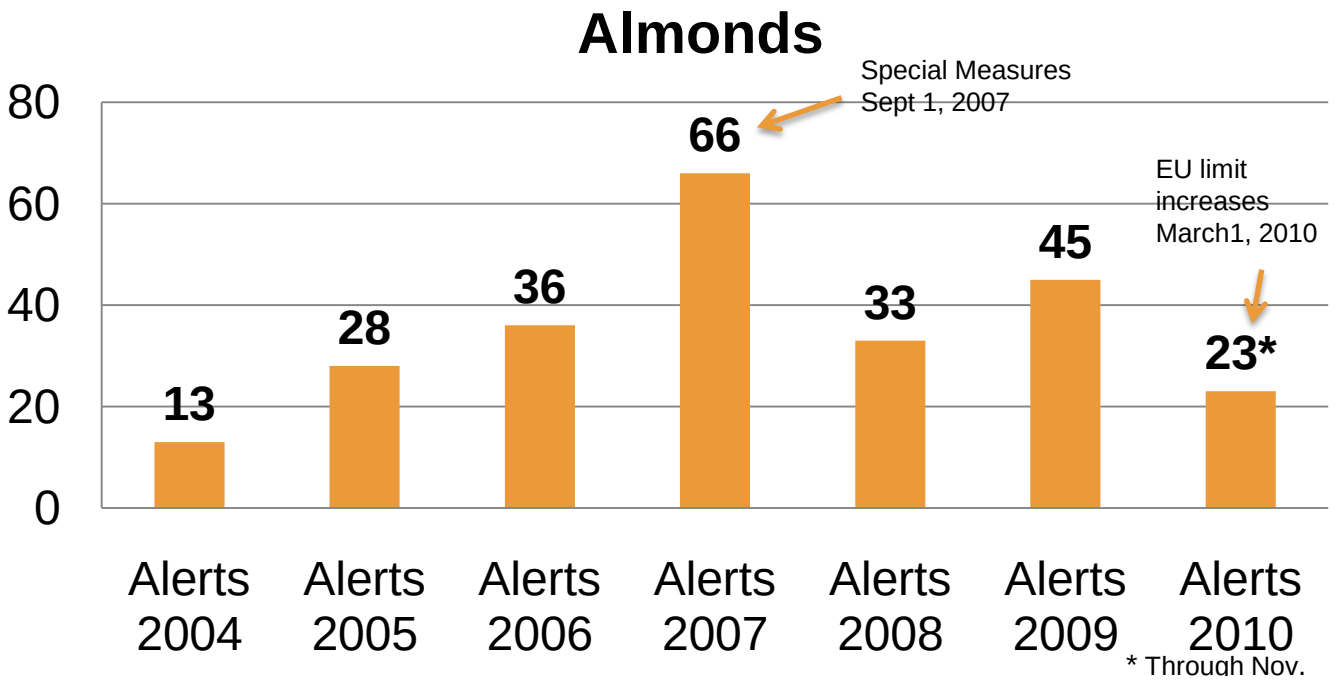
	ppb
United States:	20
Canada:	15
EU:	10 total/8 B1
Switzerland:	4 total/ 2 B1
China:	20
Hong Kong:	15
India:	30
Japan:	10 B1
United Arab Emirates:	10 total

EU Rapid Alerts: Aflatoxins in CA Almonds

The increase in EU rapid alerts detecting aflatoxin exceedances triggered the EU to place CA almonds on "special measures" in 2007 – *the first US crop ever to come under special measures*



Industry response to Special Measures

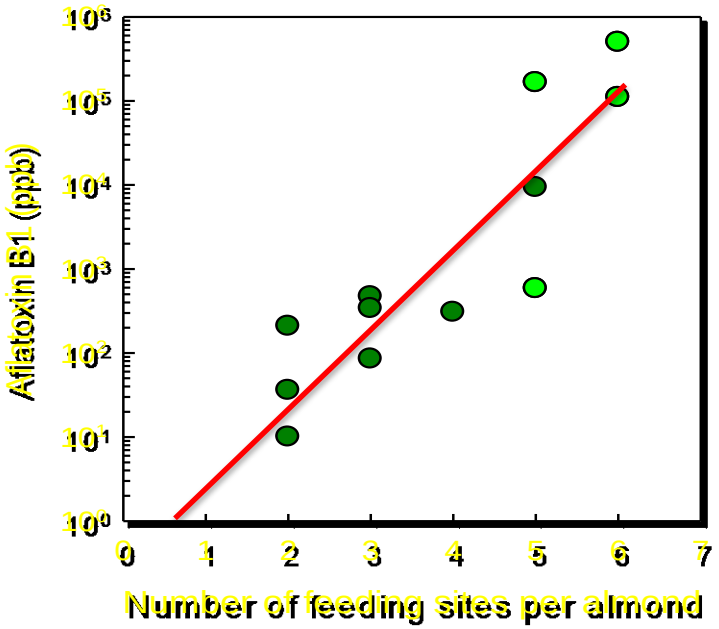
- **Stringent sorting to remove damage followed by testing and certification (VASP)**
- **Additional research – field, processing, detection**
- **Increased disposition of reject nuts into non-food / non-feed outlets**

EU increased maximum limits from 2/4 to 8/10 ppb, March 1, 2010

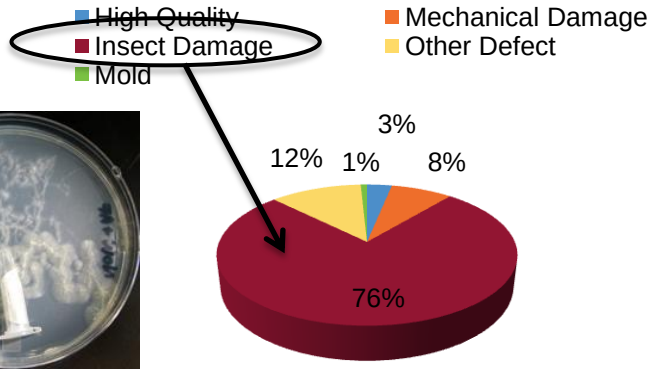
Understanding the Navel Orange Worm (NOW)-Aflatoxin Link

Over 30 years of ABC–funded research demonstrates a strong link between NOW damage and aflatoxin

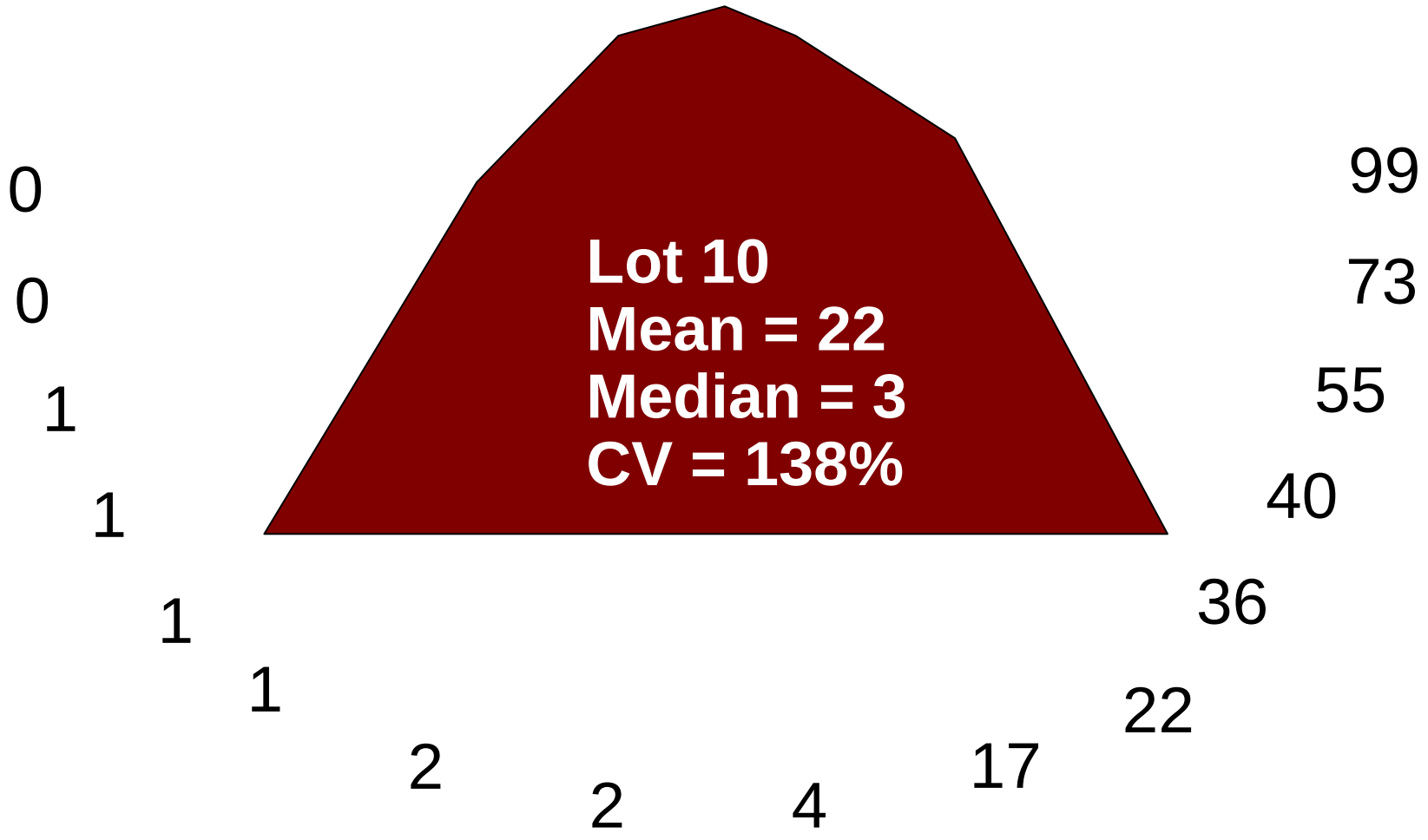
- **Aflatoxin most associated with rejected insect-damaged nuts**
- **NOW larvae and adults vector *Aspergillus* spores and increase the incidence of aflatoxin**
- **NOW larvae can survive aflatoxin concentrations 100x higher**
- **than other insects – *an important***
- ***survival advantage in nature***



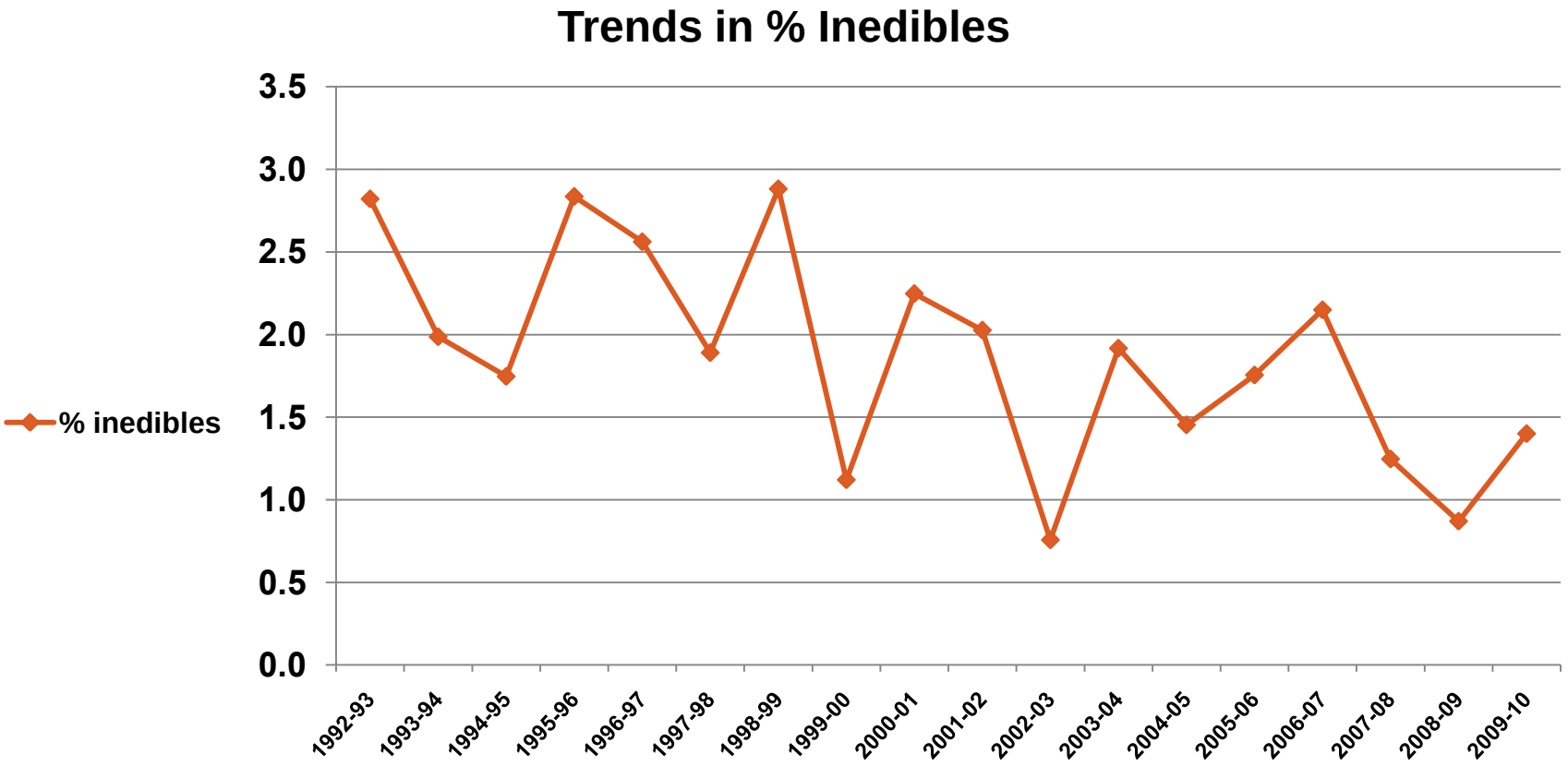
Grade Factor vs. Aflatoxin Mass %



Pulling 16x10 kg Samples from a Single Lot



Trends in % Inedibles



Using inedibles as surrogate for insect damage (ABC data)

➔Grower pest management efforts are paying off

Generally less than 2% inedibles

In the Orchard: The Bar Has Been Raised

Anyone with more than 2% NOW damage should take a hard look at their control program

- **Utilize winter sanitation and early harvest**
- **Monitor frequently, understand treatment/action thresholds**
- **When sprays are needed**
  - **Understand correct timing**
  - **Be familiar with modes of action**
  - **Use good application techniques (drive speed, water volume, etc.)**

Additional Information at:

- ***Hard copy*** **- "Seasonal Guide to Environmentally Responsible Pest Management Practices in Almonds" – at ABC Booth in tent**
- ***Electronic*** **- "Year Round IPM Program for Almonds" at UC IPM: *www.ipm.ucdavis.edu*.**

New Challenges: International Pesticide MRLs

MRLs = Maximum Residue Limits (aka: tolerance)

- US now registering new pest control tools faster than other countries.
- More testing being done globally
  - China has changed the odds
- Analytical methods detect ever lower levels
- Private Standards

MRLs and Residues Detected for some Almond Insecticides

		PDP 07-08		ABC 09-10			MRL (ppm)				
Compound	*Brandname*	# of samples	# of detects	# of samples	# of detects		*US*	*Canada*	*Codex*	*EU*	*Japan*
Bifenthrin	*Brigade*	547	0	242	0		0.05	def 0.1	--	0.05	0.05
Chlorantraniliprole	*Altacor*		no data		no data		0.04	def 0.1	--	0.05	def 0.01
Chlorpyrifos	*Lorsban*	547	232	242	6		0.2	**def 0.1**	**0.05**	**0.05**	0.2
Cyfluthrin	*Baythroid*	547	0	242	0		0.01	def 0.1	--	0.02	0.02
Diflubenzuron	*Dimilin*	547	0	242	0		0.06	def 0.1	--	0.1	0.06
Esfenvalerate	*Asana*	547	2	242	0		0.2	**def 0.1**	0.2	**0.02**	0.2
Flubendiamide	*Belt*		no data		no data		0.06	def 0.1	--	**0.01**	def 0.01
Methoxyfenozide	*Intrepid*	547	34	242	26		0.1	def 0.1	0.1	**0.02**	0.1
Permethrin	*Ambush, Pounce*	547	0	242	0		0.05	def 0.1	0.1	0.05	0.1
Phosmet	*Imidan*	547	27	242	1		0.1	def 0.1	0.2	2	0.2
Spinetoram	*Delegate*		no data	50	0		0.1	def 0.1	**0.01**	**0.05**	def 0.01
Spinosad	*Success*		no data	242	0		0.02	def 0.1	**0.01**	1	0.02
Spirotetramat	*Movento*		no data		no data		0.25	0.25	0.5	**0.1**	0.5
Zeta-Cypermethrin	*Mustang (field)/ Demon (structural)*	547	2	242	0		0.05	def 0.1	--	0.05	**0.03**

PDP = USDA-AMS Pesticide Data Program. www.ams.usda.gov.
2007 and 2008 reports based on almond retail samples taken July 1, 2007- March 31, 2008

def = Default MRL, used if no MRL is established

MRLs and Residues Detected for some Almond Insecticides

		PDP 07-08		ABC 09-10			MRL (ppm)				
Compound	*Brandname*	# of samples	# of detects	# of samples	# of detects		*US*	*Canada*	*Codex*	*EU*	*Japan*
Azoxystrobin	*Abound*	547	0	242	2		0.02	0.02	**0.01**	0.1	0.02
Boscalid	*Pristine*	547	72	242	9		0.7	0.7	**0.05**	1	0.7
Iprodione	*Rovral*	547	4	242	24		0.3	**def 0.1**	**0.2**	**0.02**	1
Oryzalin	*Surflan*		no data	242	1		0.05	def 0.1	--	**0.01**	0.08
Glyphosate	*RoundUp*		no data	50	9		1	**def 0.1**	**--**	**0.1**	1
2,4-D	*Orchardmaster*		no data	50	9		0.2	**def 0.1**	0.2	**0.05**	0.2
Paraquat	*Cyclone, Herbiquat*		no data	50	1		0.05	def 0.1	0.05	**0.02**	0.05
Endosulfan/ metabolites	*Thiodan*	547	2	242	0		0.3	def 0.1	--	**0.1**	0.5
Pyriproxifen	*Esteem*	547	1	242	0		0.02	**def 0.1**	--	0.05	0.02

PDP = USDA-AMS Pesticide Data Program. *www.ams.usda.gov*.
2007 and 2008 reports based on almond retail samples taken July 1, 2007- March 31, 2008

Def = Default MRL, used if no MRL is established

Why Are MRLs So Different?

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MRLs are not harmonized

- **Different use patterns**
- **Different risk assessments**
- **Different ability to process applications**
- **Different residue definitions**

- **Information on current MRLs**

www.mrldatabase.com

What Can You Do?

1) Contact your handler to better understand where your almonds might go
2) Review the status of international MRLs by using *www.mrldatabase.com*
   - Need to know product's chemical name
3) Assess the chances of residues being present
   - Look at USDA – PDP data – public

     (note not all compounds were tested for, especially not newer compounds)
   - Materials used close to harvest
   - Materials that remain in soils

What We Don't Want in the Newspapers!


DER TAGESSPIEGEL Verbraucher

STARTSEITE | POLITIK | BERLIN | WIRTSCHAFT | SPORT | KULTUR

VERBRAUCHER | BERLINER WIRTSCHAFT | KARRIERE | IMMOBILIEN | ENERGIE & UM

25.11.2007 10:28 Uhr | Kommentare: 6

Verbraucher

"Öko-Test" warnt vor Supermarkt-Mandarinen

Wer Mandarinen bei den großen Supermarktketten kauft, bekommt häufig Pestizide und Schalenbehandlungsmittel gratis dazu. Doch wo kann man bedenkenlos Südfrüchte erwerben?

Die Verbraucherzeitschrift "Öko-Test" ha

Verbraucher davor gewarnt, ihre

▲Oeko-Test warns against consumption of Supermarket mandarins (*Berlin Newspaper, 11/25/2007*)

- Due to widespread pesticide residues


英文中國郵報 The China Post

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Taiwan > National

Updated Sunday, June 20, 2010 0:19 am TWN, CNA

U.S. cherries fail pesticide test: DOH


Pistazien: Gesund oder krebserregend?

Pistazien: Leider nicht immer gesund ...

Wohl kaum eine Nuss steht so oft im Kreuzfeuer der öffentlichen Berichterstattung wie di Pistazie. Dabei sind die Dinger doch so unheimlich lecker und durch die noch vorhandene Schale auch haptisch äusserst stilvoll. Die Gefahr droht aber von einem unsichtbaren Fein

...

Die Krebsgefahr

Eigentlich sind die kleine Nüsse sogar ziemlich gesund: Hochwertige Fette, Vitamine und

"Pistachios: Healthy or cancer-causing ▶ (*website, 2009* based on 1999 Oeko-Test and more recent testing)

Thank You

Wrap-Up, Discussion and Q&A

Gala Dinner Speaker

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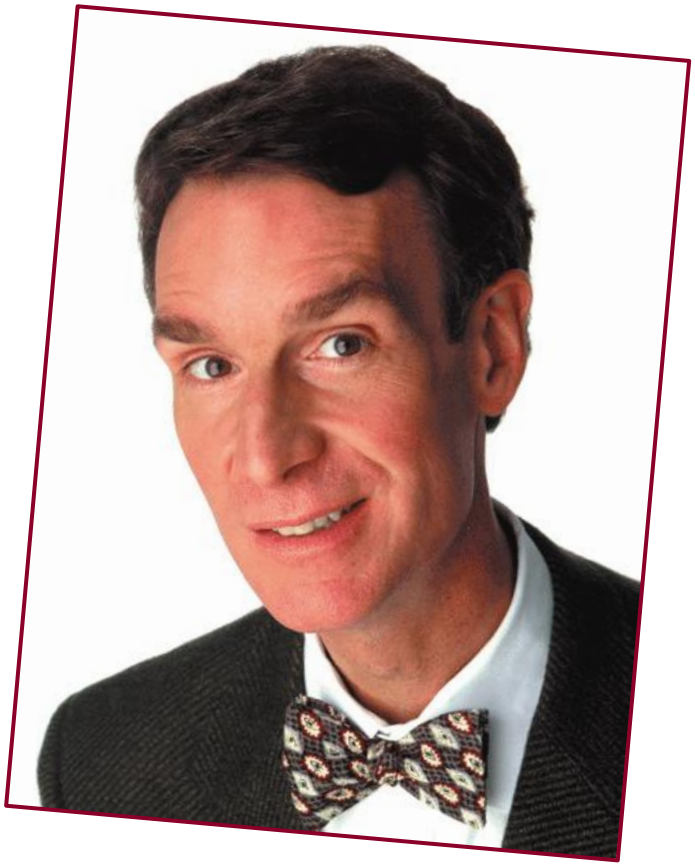
Bill Nye
The Science Guy



Wednesday at
7:00 pm

Please check with the registration desk for ticket availability.

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