

# **Drip Irrigation Delivery of Reduced Risk Insecticides**

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Vegetable Crop Management – Mendota I

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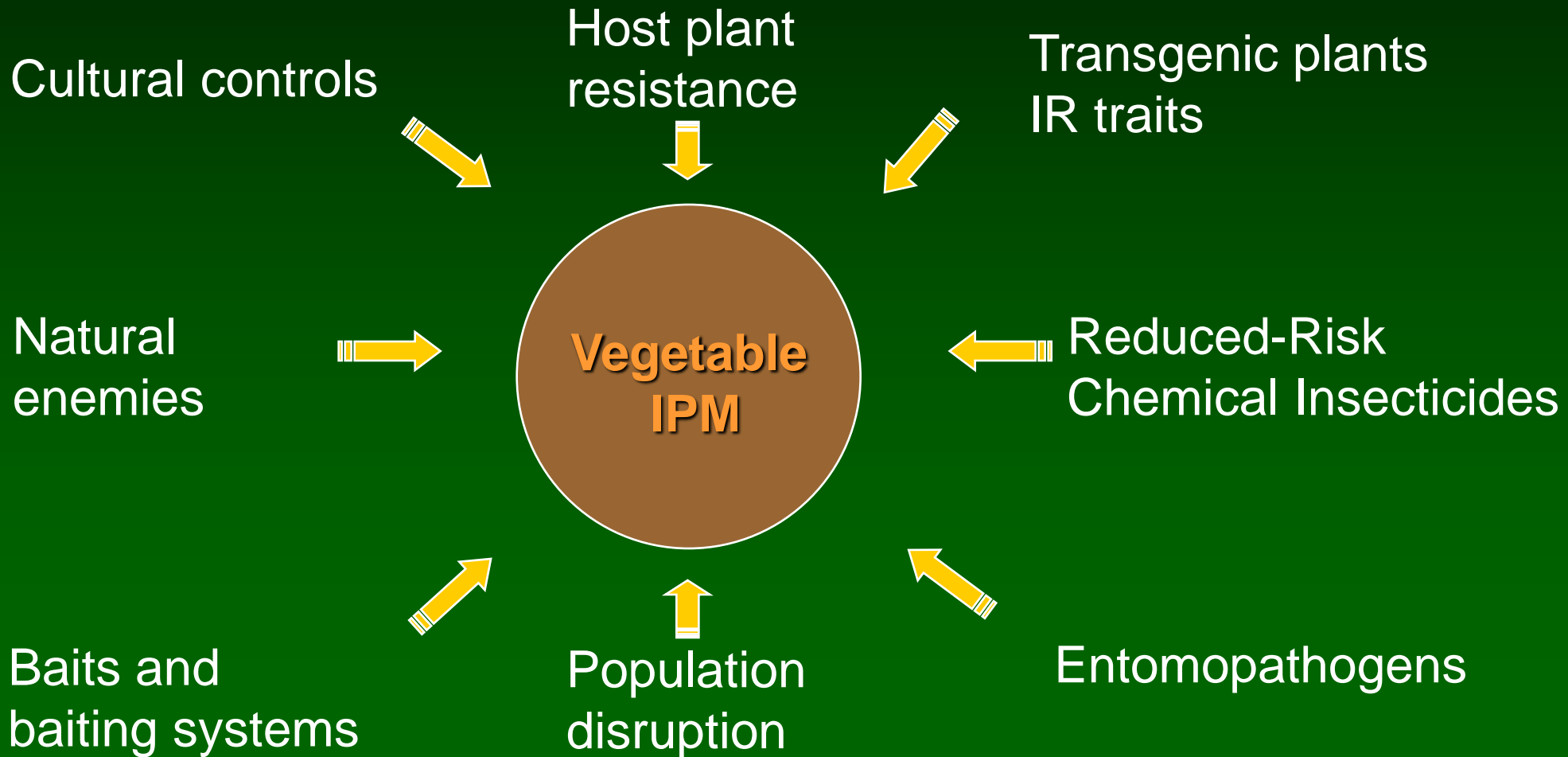
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# Wisconsin Vegetable Pest Management

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Options for Insect Pest Management – *More than ever before!*



# Factors Influencing Insect Pest Management

## 'Water Quantity and Quality'

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- **Decreasing availability of water for agriculture**
  - **Agriculture is the overwhelming user of fresh water.**
  - **Increasing urban demand will drive irrigation efficiency.**
- ***Drip irrigation, micro-sprinklers, hydroponics.***
- ***Targeted application of water increases opportunity to use irrigation as a delivery system.***



# **Drip Application for Insect Control (Cucurbits, Fruiting Vegetables, Brassicas)**

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- **Why use drip irrigation for insecticide applications?**
- **What insects are controlled with drip application?**
- **Regulations and tips for best results of drip chemigation.**

# Pesticide Drift

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- Amount of pesticide lost due to drift estimated at 5 to 65%.
  - Less than 0.1% of pesticide reaches target insect.
  - Consequences of pesticide drift
    - Exposure of humans
    - Exposure of water resources
    - Exposure of wildlife
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- A green tractor pulling a sprayer through a field, creating a large mist of pesticide drift. The tractor is in the center, moving from left to right. The sprayer has long arms extending across the field, and a thick white mist is being released from the nozzles. The field is filled with green plants, and the background shows a grassy hillside under a clear sky.

# Advantages of Drip Application of Insecticides

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- **Reduced risk to environment and farm workers**
  - Drift to non-target areas is eliminated
  - Farm workers do not come into contact with residues on exterior of plant
  - Beneficial organisms not directly exposed
- **Longer residual activity**
  - Not subject to loss from rain and UV light
  - Not subject to plant growth dilution effects
- **More cost-effective**

# **Drip Application for Insect Control (Cucurbits, Fruiting Vegetables, Brassicas)**

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- Why use drip irrigation for insecticide application?
- **What insects are controlled with drip irrigation applications?**
- Regulations and tips for best results of drip chemigation.

# What Insecticides Can Be Applied in Drip Irrigation Systems

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- Must move systemically through plant.
- Label must specifically state that product can be applied via drip irrigation

## Neonicotinoids

Admire

Platinum

Venom

## Diamides

Coragen

Synapse

**\*\*HGW86**

## Carbamates

Vydate



Durivo



# Thiamethoxam & Imidacloprid



- **Platinum 75SG – Admire Pro**
  - Brassicas, Cucurbits, Fruiting Veg, Leafy Veg, Potato



- **Spectrum of Activity**
  - Cucumber beetles, squash bug, flea beetle, seed maggots, & CPB
  - Suppression of aphids, thrips, whiteflies



- **Systemic activity**



- Labeled for foliar and drip irrigation application

# Chlorantraniliprole (Rynaxypyr)



## ■ Coragen 1.67SC

- Brassicas, Cucurbits, Fruiting Veg, Leafy Veg, Potato



## ■ Spectrum of Activity

- Lepidopterans, some beetles (CPB)
- Whitefly suppression at higher rates



## ■ Systemic activity

- Labeled for foliar and drip irrigation application

# Chlorantraniliprole + Thiamethoxam

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## ■ Durivo 1.67SC

– 2:1 mixture of thiamethoxam & chlorantraniliprole

– Brassicas, Cucurbits, Fruiting Veg, Leafy Veg

## ■ Spectrum of Activity

– Lepidopterans, leafhoppers, cucumber beetle

– Aphids, Beetles, Plant & Stink Bug, Thrips, Mealybug, Whitefly

■ Drip application only, 1 application/year.

■ 5-day REI for honeybees.



# Drip Irrigation of Insecticides

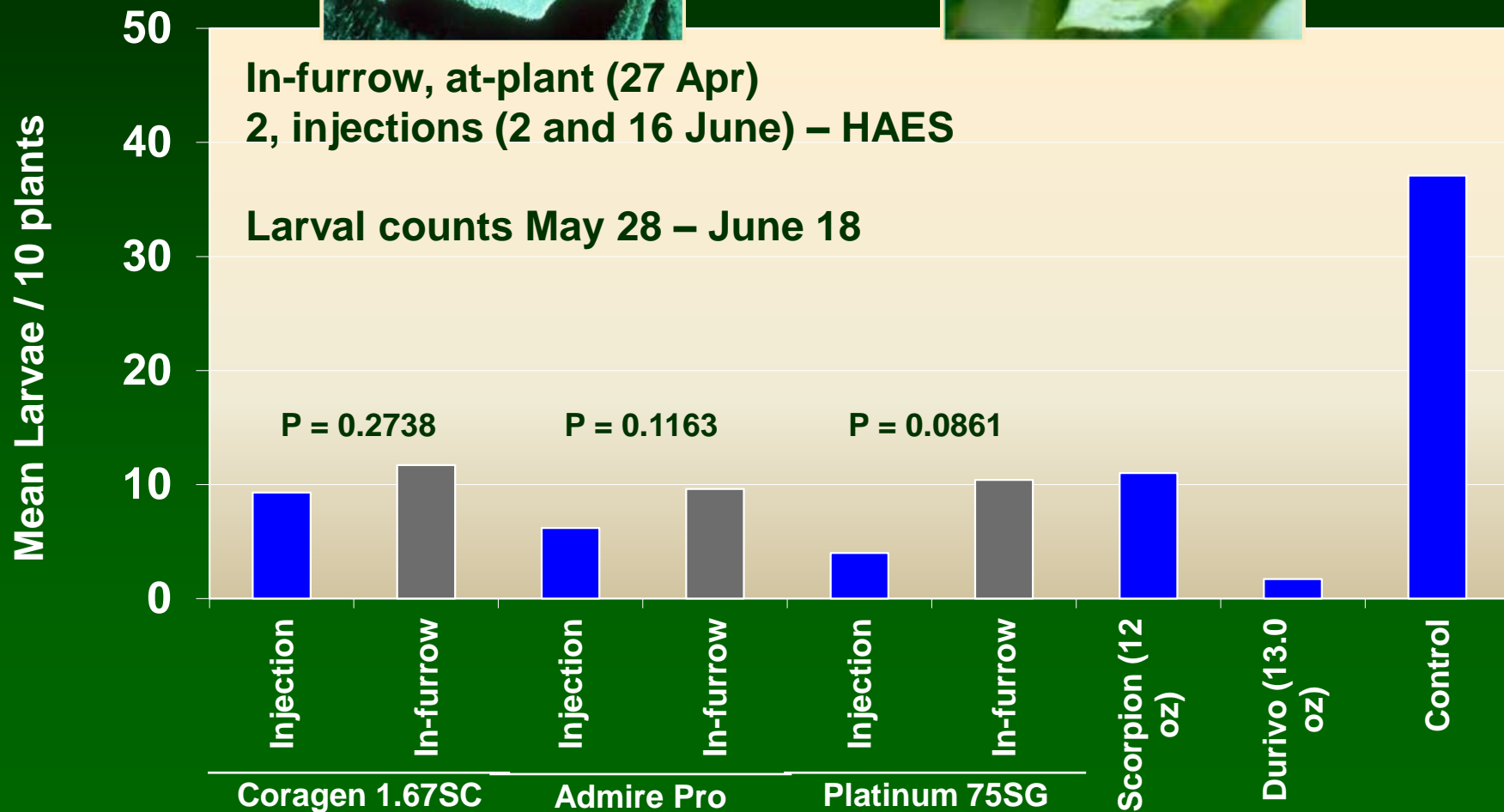


# Potato Insect Pest Management Drip Irrigation Injection Trials, HAES 2010

Treatment	Insecticide	Rate	Application Type
1	chlorantraniliprole (Coragen®)**	7.0 fl oz / A	In-furrow
2		3.5 & 3.5 fl oz / A	Injection
3	imidacloprid (AdmirePro®)	8.7 fl oz / A	In-furrow
4		5.0 & 3.7 fl oz / A	Injection
5	thiamethoxam (Platinum®)	2.67 oz / A	In-furrow
6		1.67 & 1.0 fl oz / A	Injection
7	dinotefuran (Scorpion®)	6.0 & 6.0 fl oz / A	Injection
8	chlorantraniliprole + thiamethoxam (Durivo®)**	6.0 & 7.0 fl oz / A	Injection
9	Untreated Control	N/A	N/A

\*\*Note: not currently registered

# Colorado Potato Beetle Control (1<sup>st</sup> Generation)

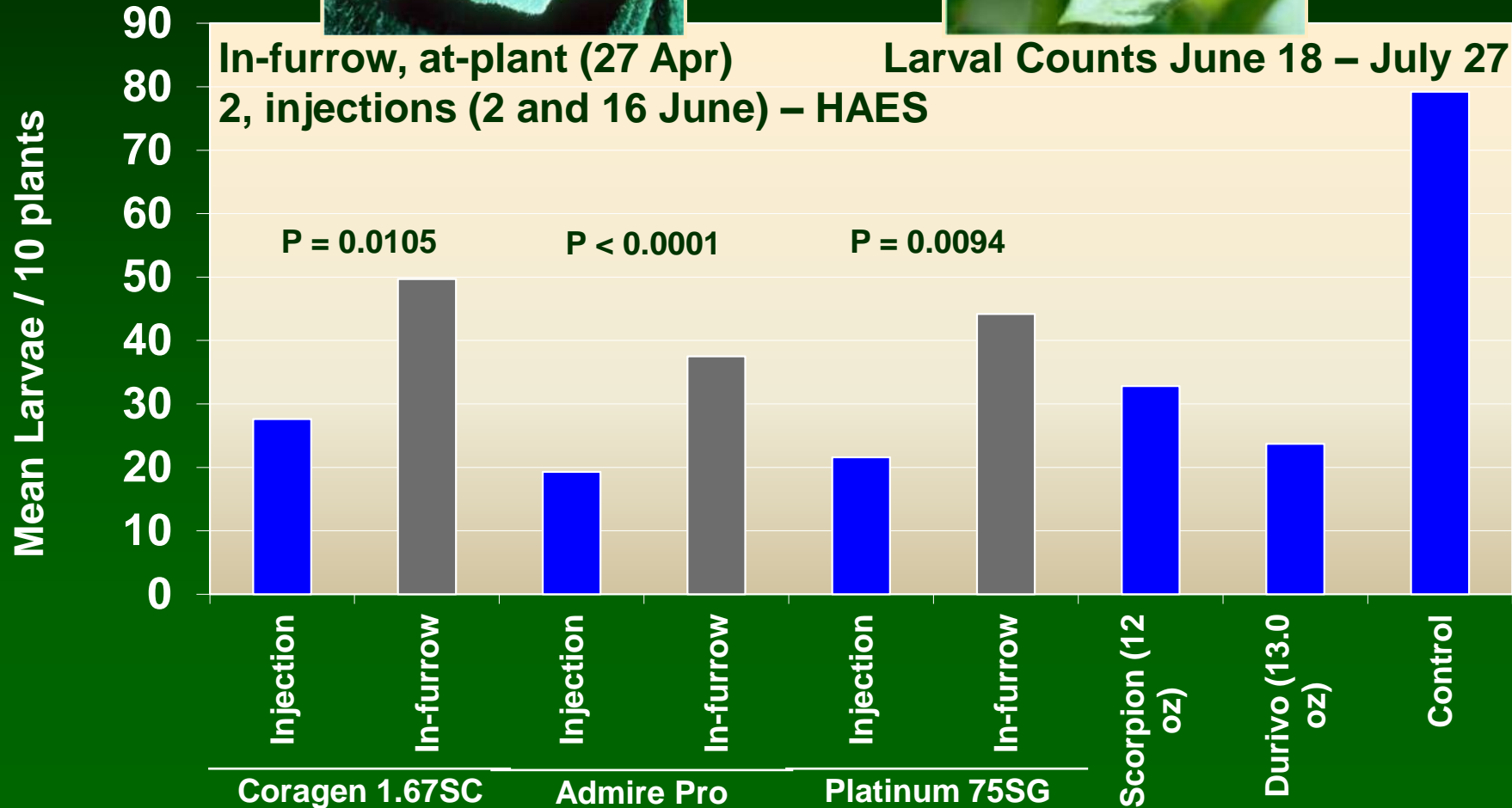


# Colorado Potato Beetle Control (2<sup>nd</sup> Generation)

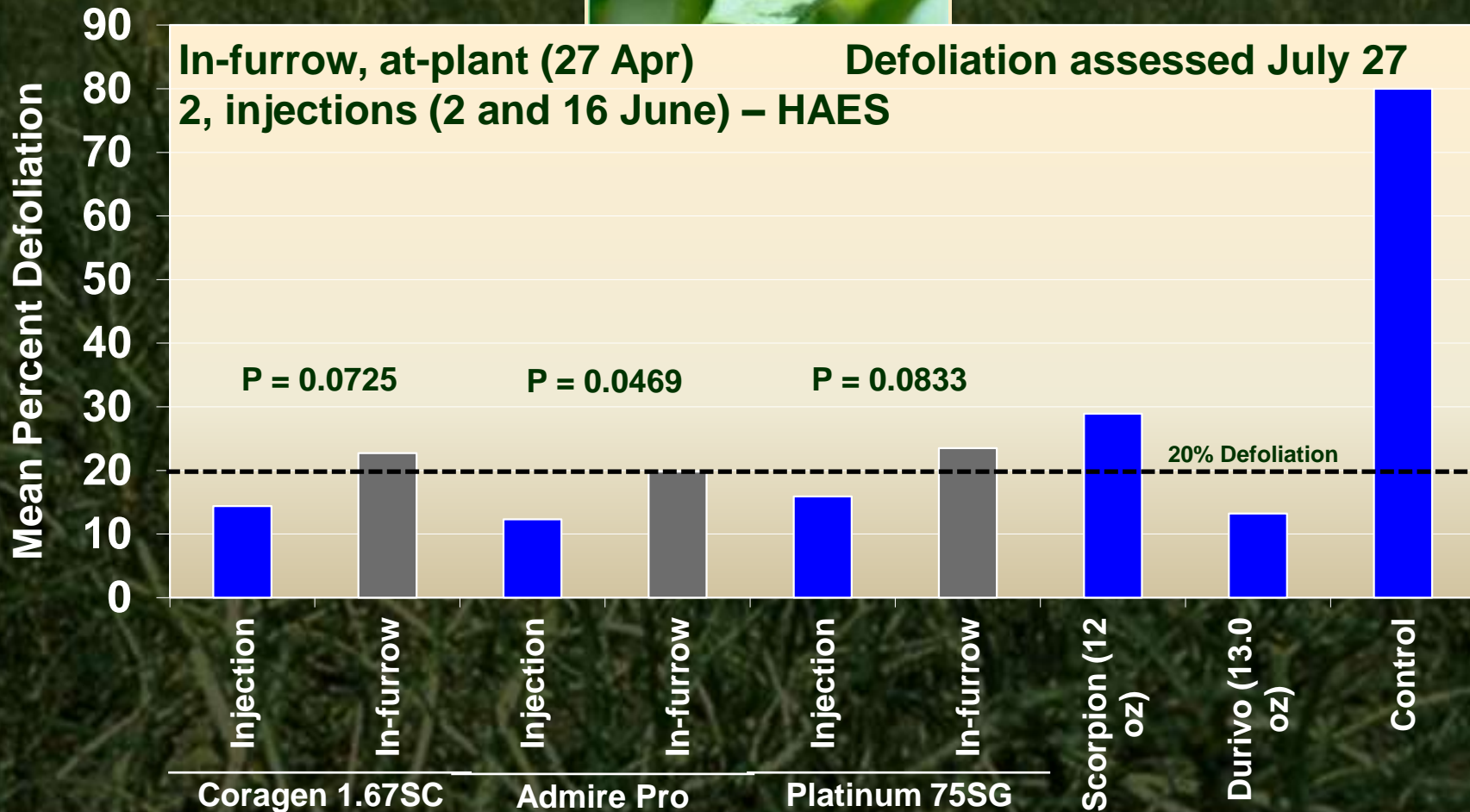


In-furrow, at-plant (27 Apr)  
2, injections (2 and 16 June) – HAES

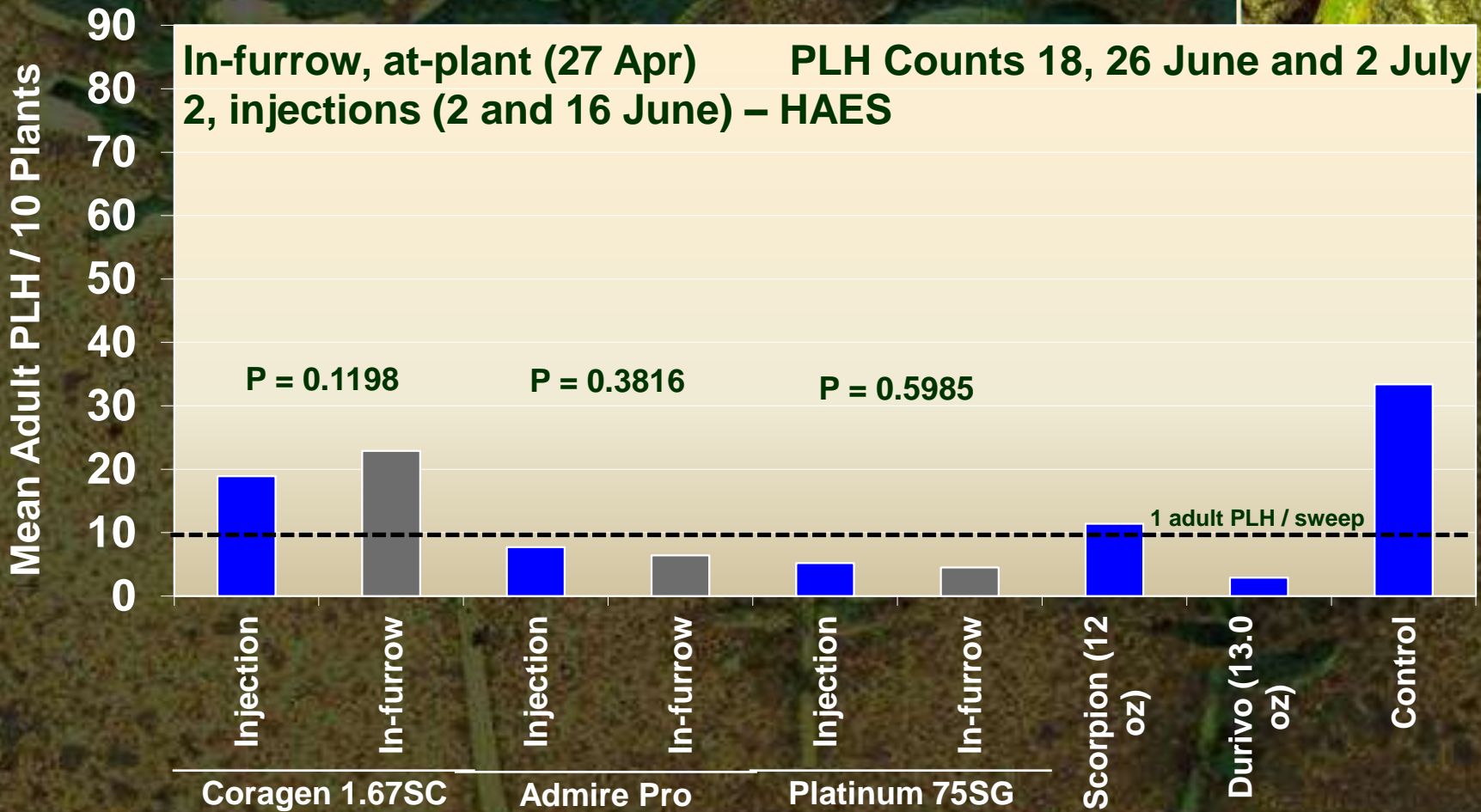
Larval Counts June 18 – July 27



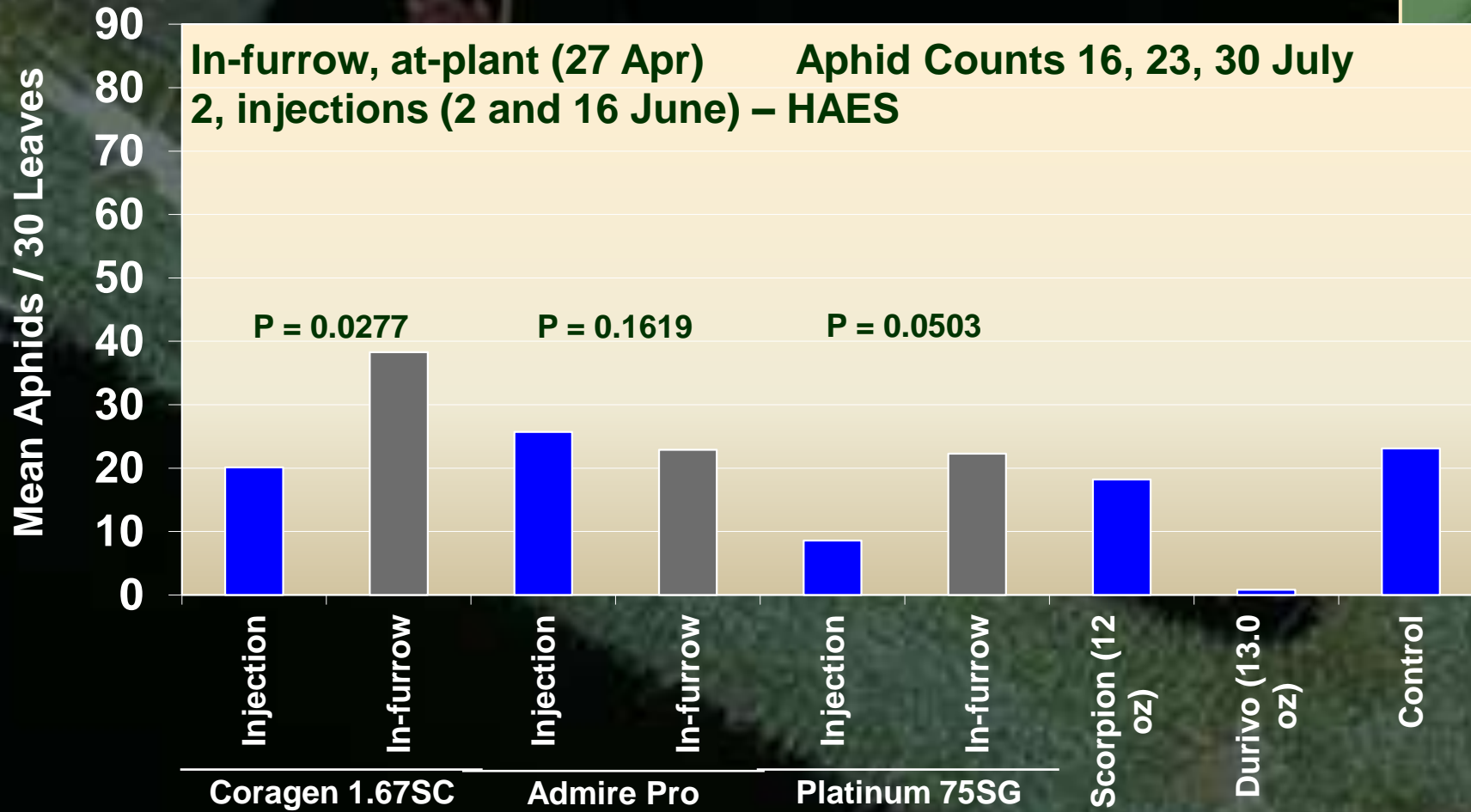
# Colorado Potato Beetle Control (Defoliation)



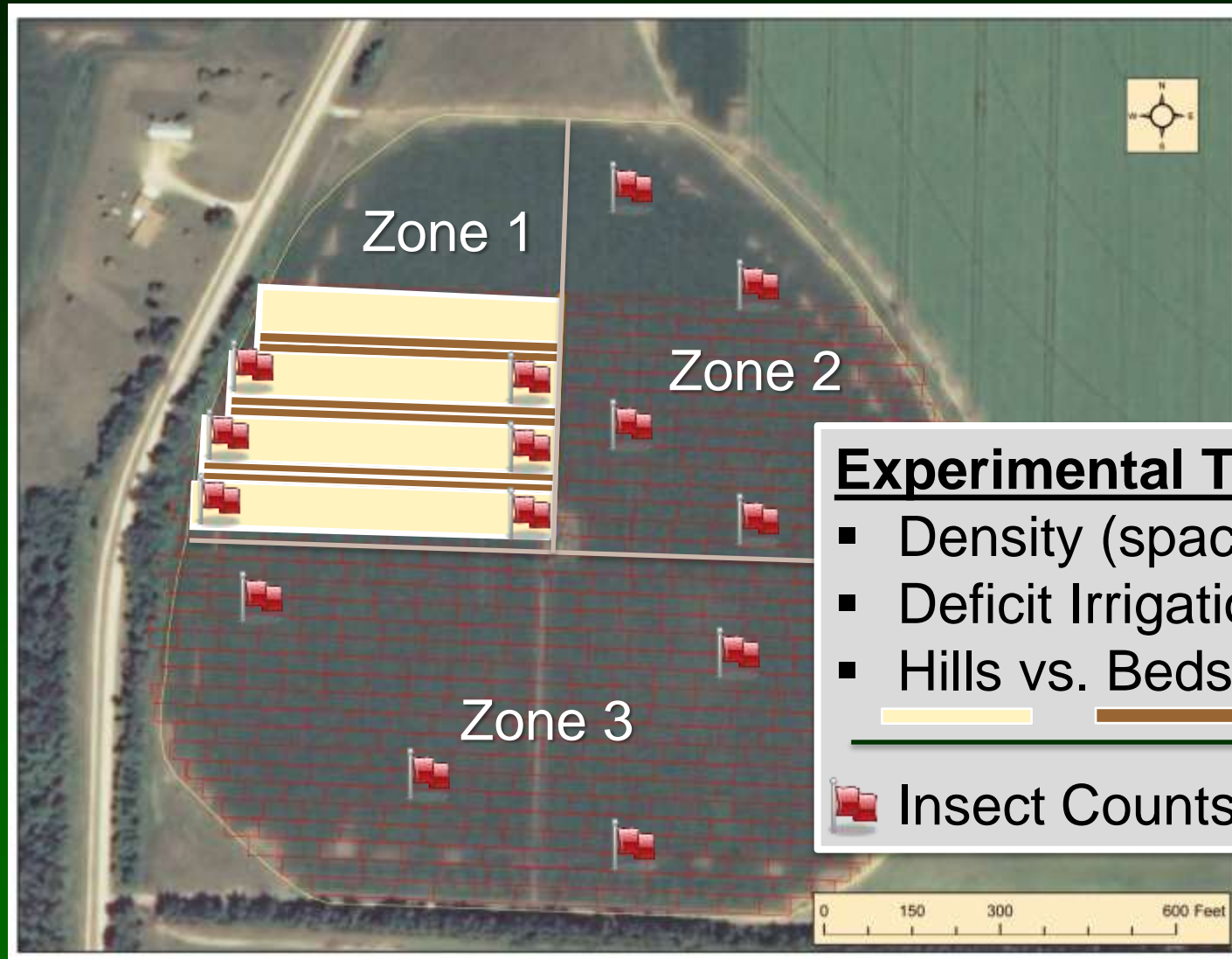
# Potato Leafhopper Control (Adult Counts)



# Potato Aphid Control



# Potato Insect Pest Management, Drip Irrigation Injection Field Trials, Coloma Farms 2010



## Experimental Treatments

- Density (spacing)
- Deficit Irrigation (emitter)
- Hills vs. Beds

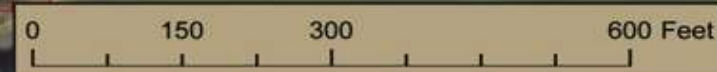
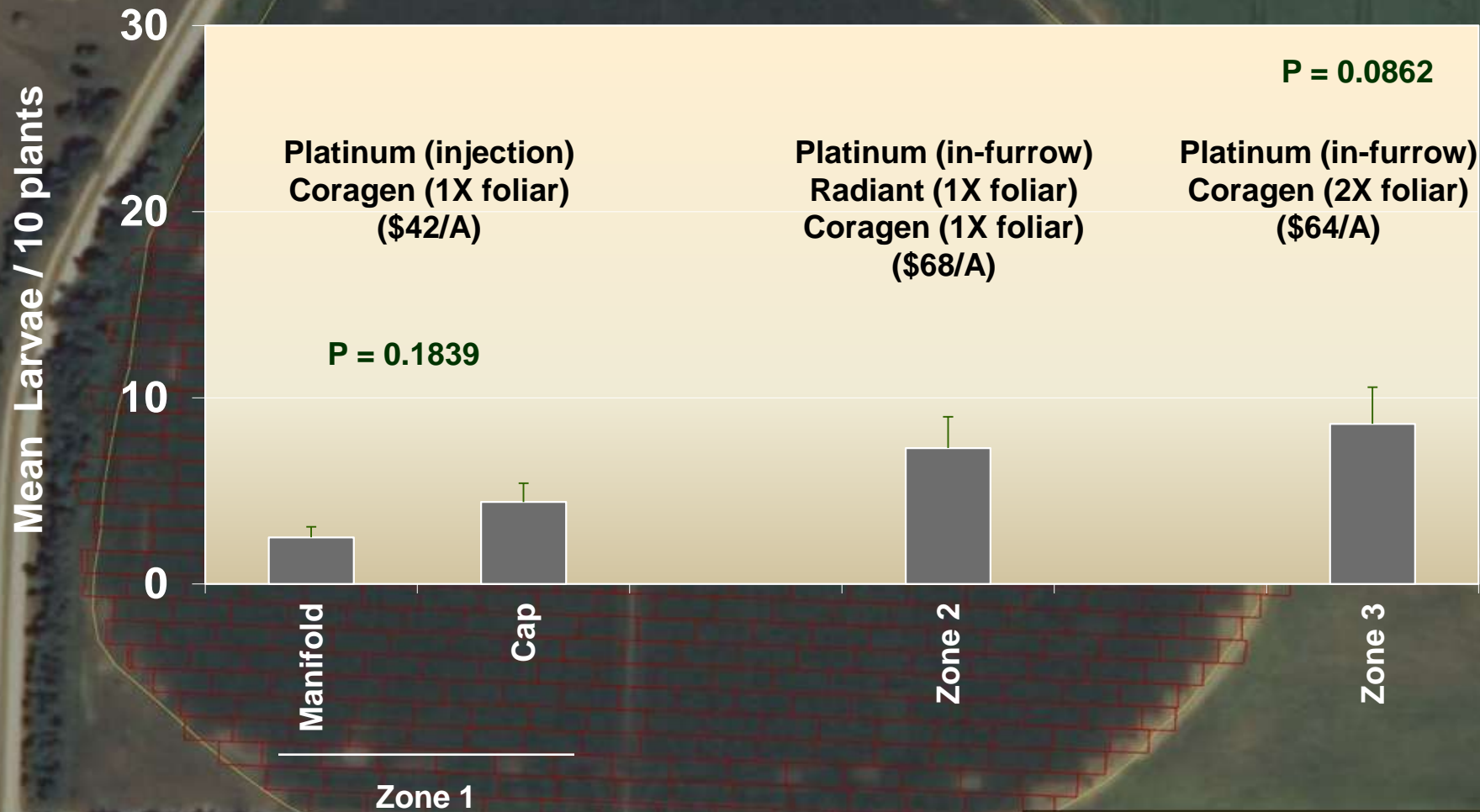
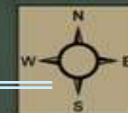


 Insect Counts (3 zones)

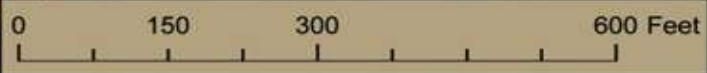
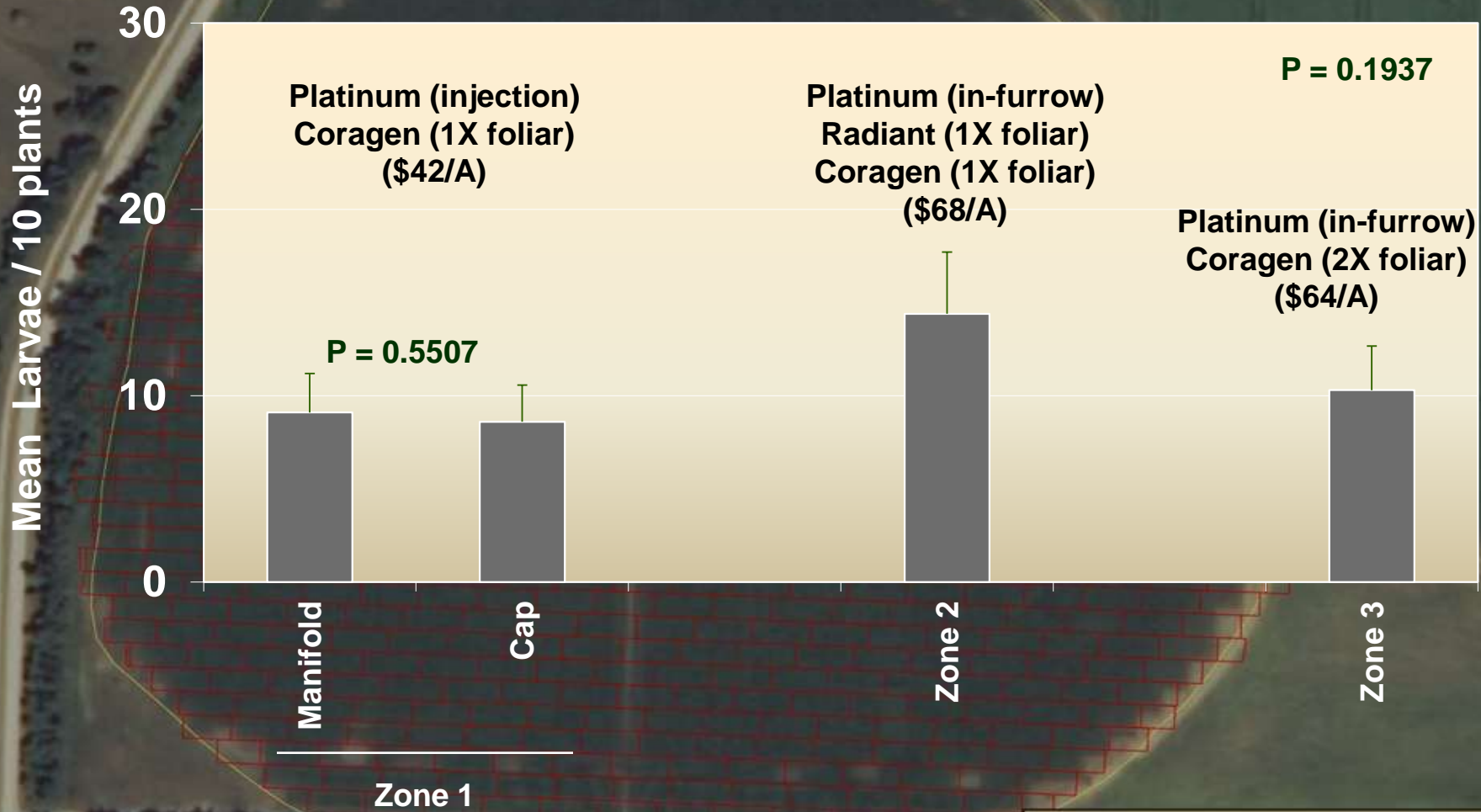
# Potato Insect Pest Management, Drip Irrigation Injection Field Trials, Coloma Farms 2010

Treatment	Insecticide	Rate	Generation	Application Type (Date)
Zone 1 (\$42/A)	thiamethoxam (Platinum® 75SG)	2.67 oz / A	1 <sup>st</sup> generation	Injection (June 6)
	chlorantraniliprole (Coragen® 1.67SC)	5.0 fl oz / A	2 <sup>nd</sup> generation	Foliar (July 12)
Zone 2 (\$68/A)	thiamethoxam (Platinum® 75SG)	2.67 oz / A	1 <sup>st</sup> generation	In-furrow (May 4)
	spinetoram (Radiant® SC)	8.0 fl oz / A	1 <sup>st</sup> generation	Foliar (June 13)
	chlorantraniliprole (Coragen® 1.67SC)	5.0 fl oz / A	2 <sup>nd</sup> generation	Foliar (July 17)
Zone 3 (\$64/A)	thiamethoxam (Platinum® 75SG)	2.67 oz / A	1 <sup>st</sup> generation	In-furrow (May 4)
	chlorantraniliprole (Coragen® 1.67SC)	5.0 fl oz / A	1 <sup>st</sup> generation	Foliar (June 13)
		3.5 fl oz / A	2 <sup>nd</sup> generation	Foliar (July 12)

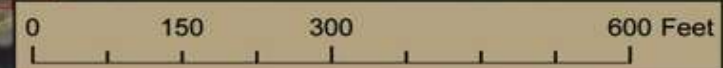
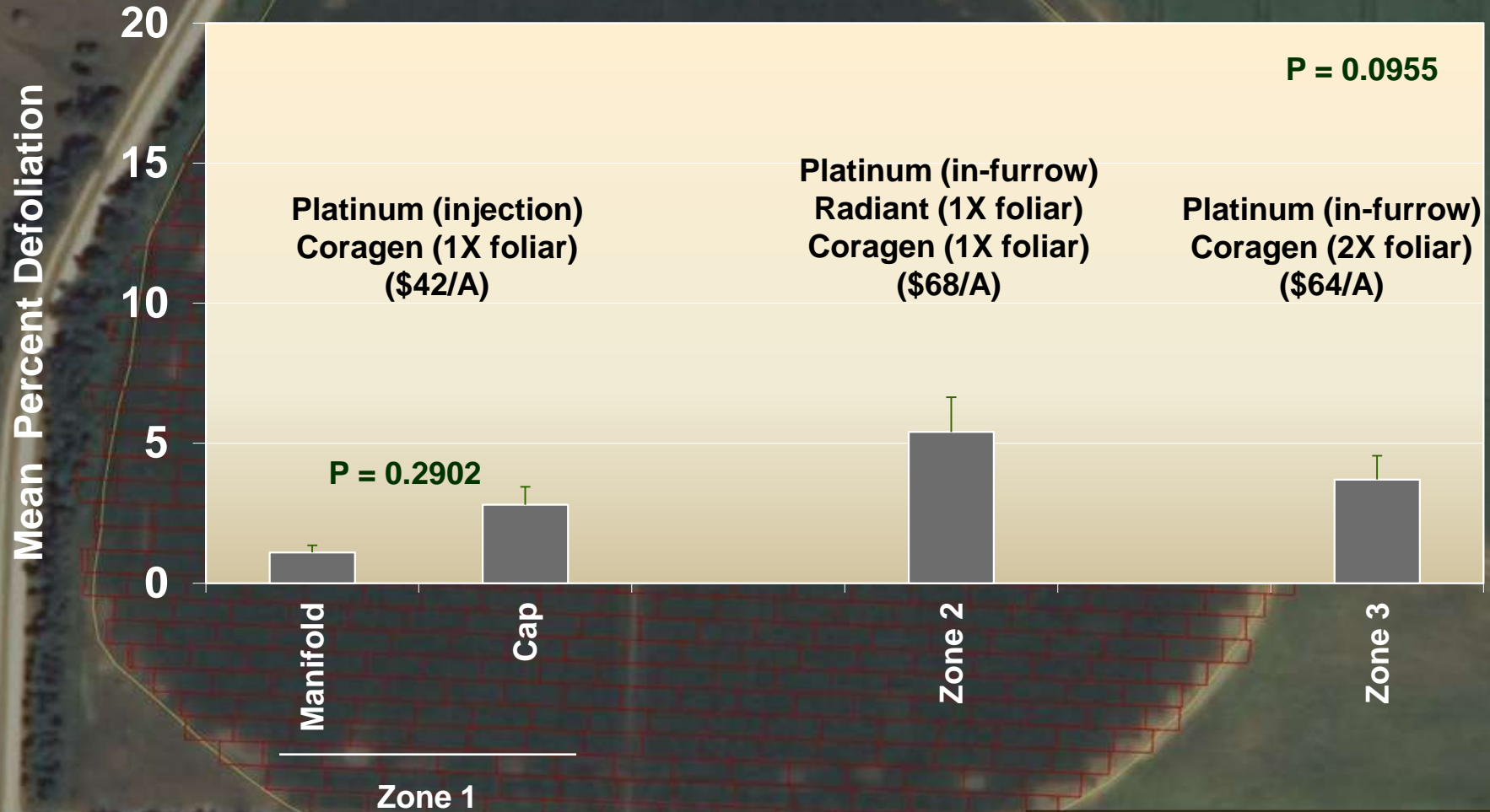
# Coloma Field Trial (1<sup>st</sup> Generation CPB)



# Coloma Field Trial (2<sup>nd</sup> Generation CPB)



# Coloma Field Trial (Defoliation - CPB)



# Drip Insecticide Program on Fruiting Vegetables

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Time	Insecticide (PHI)	Rate/Acre
Pre-plant transplant	AdmirePro (21)	0.44 oz / 10,000 plants
28 days after planting*	Coragen +	3.5 - 5 oz/acre
	Admire Pro or...	7 - 10.5 oz/acre
	Platinum (30)	5 - 11 oz/acre
	<b>or</b>	
	Durivo (30)	10 - 13 oz/acre

\*Application of AdmirePro, Plantinum or Durivo must be timed not to violate PHI.

\*\*Season scouting program to determine need for supplemental insecticide sprays should focus on thrips, mites and possibly stink bugs.

# Drip Insecticide Program on Brassicas

Time	Insecticide (PHI)	Rate/Acre
Pre-plant transplant	AdmirePro (21)	0.44 oz / 10,000 plants
14-21 days after planting	Coragen (14)	3.5 - 5 oz/acre
30 days after planting*	Coragen + Admire Pro or... Platinum (30) <b>or</b> Durivo (30)	3.5 - 5 oz/acre 7 - 10.5 oz/acre 5 - 11 oz/acre  10 - 13 oz/acre

\*Application of AdmirePro, Plantinum or Durivo must be timed to not violate PHI.

\*\*Season scouting program to determine need for supplemental insecticide sprays should focus on thrips, mites and possibly stink bugs.

# Drip Insecticide Program on Cucurbits

Time	Insecticide (PHI)	Rate/Acre
Pre-plant transplant	AdmirePro (21)	0.44 oz / 10,000 plants
14 - 21 days after planting*	Coragen + Admire Pro or... Platinum (30)  <b>or</b> Durivo (30)	3.5 - 5 oz/acre 7 - 10.5 oz/acre 5 - 11 oz/acre  10 - 13 oz/acre
28 - 35 days after planting*	Coragen (14)	3.5 - 5 oz/acre

\*Application of AdmirePro, Platinum or Durivo must be timed to not violate PHI.

\*\*Season scouting program to determine need for supplemental insecticide sprays should focus on thrips, mites and possibly stink bugs.

# Drip Application for Insect Control

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- Why use drip irrigation for insecticide application?
- What insects are controlled with Drip Application?
- Regulations and tips for best results of drip chemigation.

# **Drip Application System Requirements of Injection of Insecticides (READ LABEL)**

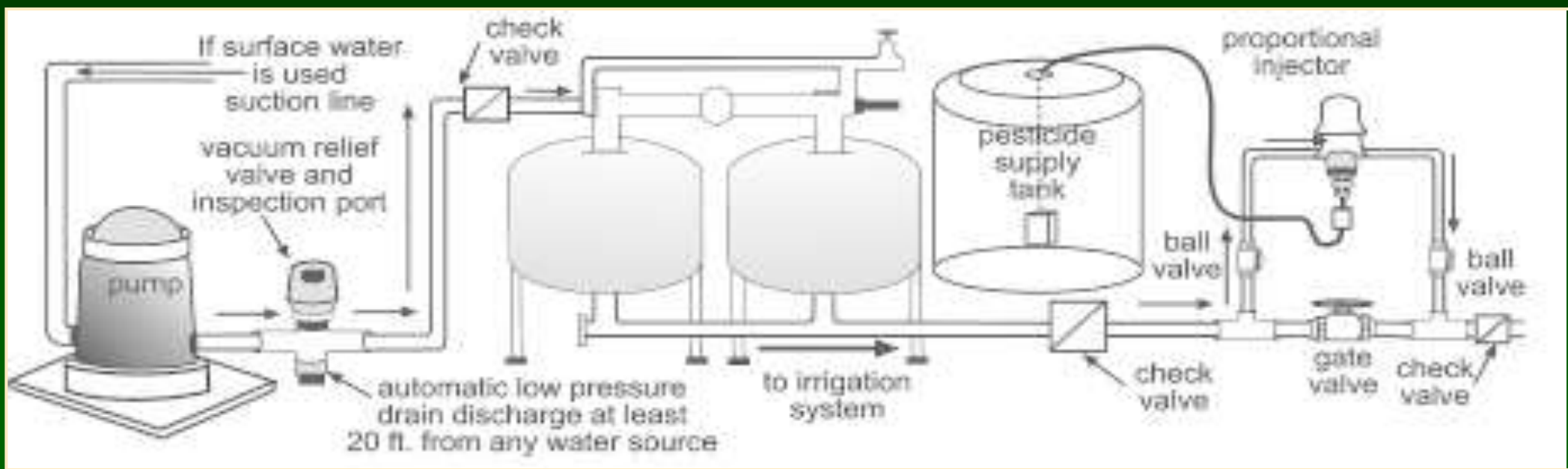
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- **Check valve, vacuum relief valve, and low pressure drain.**
- **Automatic, quick closing check valve in injection pipeline.**
- **Solenoid-operated valve on intake side of injection pump.**
- **Interlocking controls to shut off injection pump when water pump stops.**
- **Irrigation or water pump must contain pressure switch to stop water pump when pressure drops.**

# ATCP 29 Rule, Pesticide Use and Control, Revised September 2009. ATCP 29.54 Chemigation.

[http://datcp.state.wi.us/cp/consumerinfo/cp/cp\\_laws/pesticides/pesticide\\_use.pdf](http://datcp.state.wi.us/cp/consumerinfo/cp/cp_laws/pesticides/pesticide_use.pdf)



# For Best Results with Drip-Applied Insecticides

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- Repair all leaks before chemigating.
- Before injection of insecticide begins, system must be fully pressurized.
- Minimum injection time should be time for water to move from injection point to most distant emitter.
- Water solubility and soil texture affects movement in soil, and timing of injection.
  - Low solubility = limited movement
  - High solubility = readily moves in soil

# Water Solubility of Insecticides Registered for Drip Chemigation

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Insecticide	Water solubility (g/L)
Coragen (chlorantraniliprole)	0.001
Imidacloprid (AdmirePro)	0.58
Platinum (thiamethoxam)	4.1
Venom (dinotefuran)	39.83
Vydate (oxamyl)	229.0

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# Conclusions

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- **Drip application of insecticides offers several advantages over foliar application, including safety, flexibility and longer residual control.**
- **Combinations of several insecticides with different MoA can achieve broad spectrum insect control.**
- **Be sure irrigation system is legal for chemigation, and provides uniform distribution of water.**

## Collaborators

AJ Bussan, UW Horticulture  
Mick Holm, DuPont Crop Protection  
Roberts Irrigation, Plover, WI  
Steve and Andy Dierks, Coloma  
Farms, Coloma WI

## Technical Support

Scott Chapman  
Anders Huseth  
Jolyn Rasmussen



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