



AGRO SOURCE™



CMNP Abscission Agent

**CMNP Mechanical Harvesting
Field Day Briefing**

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SWREC, Immokalee, Florida

Presentation Agenda

- **CMNP Label**
 - Formulation and use rates
 - Things to consider prior to making an application
 - What to expect – discussion of past performance
- **Using CMNP Successfully**
 - Things to consider
 - Key benefits
 - The bottom line
- **Summary and Conclusions**

CMNP Label Recommendations

Varieties	Application Time	Product Rates for Various Application Volumes		
		300 gpa	250 gpa*	200 gpa*
Early & Mid Season Varieties	Oct – Dec	48 fl. oz.	39 fl. oz.	32 fl. oz.
	Jan – Feb	38 fl. oz.	32 fl. oz.	25 fl. oz.
Early Season Valencia	Feb – April	48 fl. oz.	39 fl. oz.	32 fl. oz.
Late Season Valencia	May - July	56 fl. oz.	48 fl. oz.	38 fl. oz.

*These volumes for use only with multi-head sprayer

CMNP Label Recommendations

- Formulation is 17EC containing 1.7 lbs/gallon CMNP
- Complete coverage of mature fruit required for optimal performance
- If applied with airblast sprayer, recommend 300 GPA
- If applied with Oxbo sprayer, may reduce to as low as 200 GPA based upon tree size, foliage, and fruit load
- Spray adjuvant may be used to enhance CMNP performance
- Rainfast within 8 hours
- Night temperatures below 60 F within 24 hours of application may reduce speed of CMNP activity
- Midday applications (10AM-4PM) should enhance CMNP activity
- Do not apply more than one time per season

What to Expect from CMNP Use

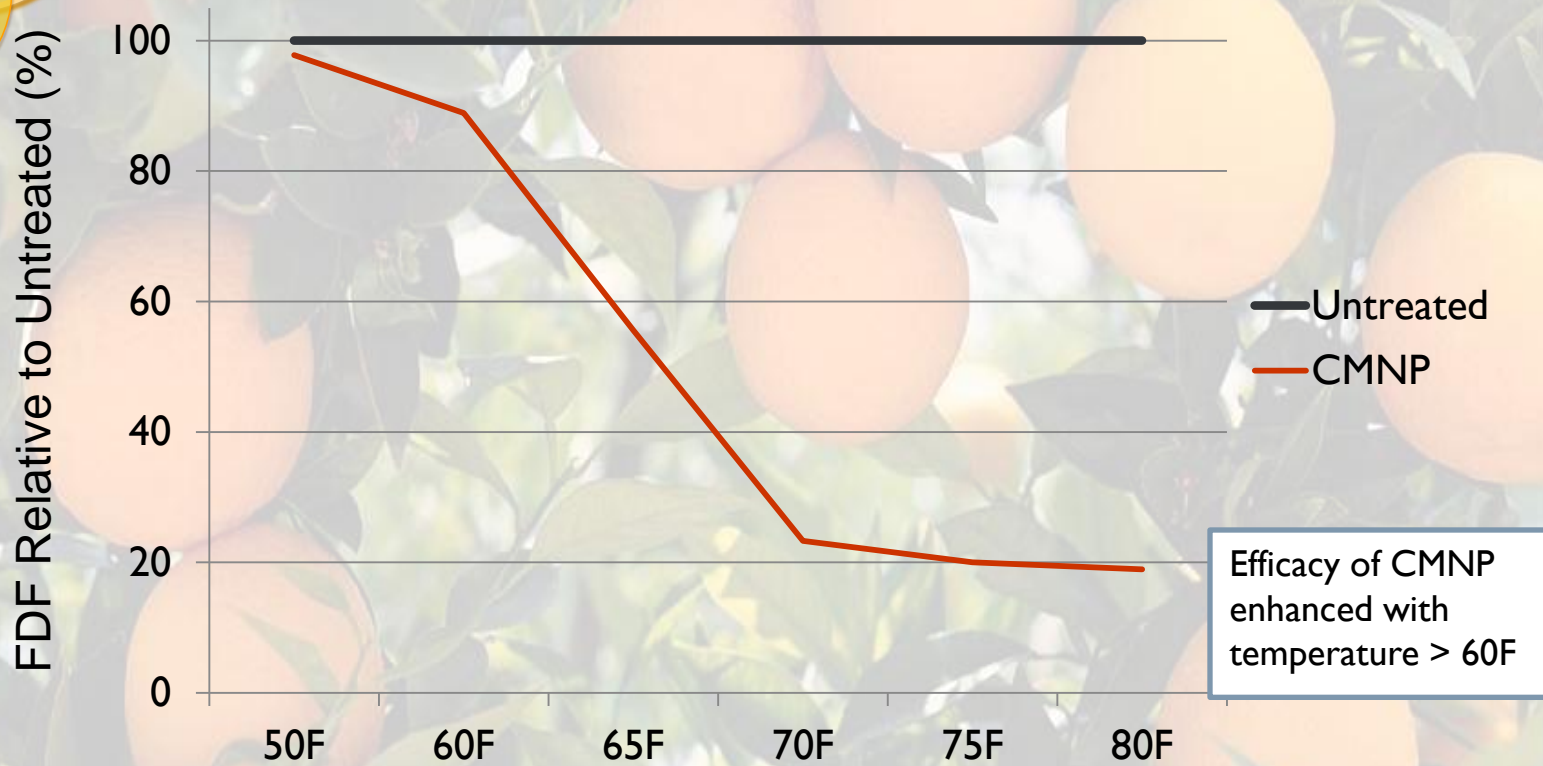
- Based upon 10+ years of IFAS research:
 - CMNP enhances formation of abscission layer in mature fruit
 - Fruit detachment force reduction should begin to occur at 48 hours after application and reaches maximum levels 72-96 hours after spraying
 - CMNP should not impact leaves, blossoms, or immature fruit
 - Under most conditions, optimal harvest timing should be 3 to 4 days after spraying.
- PHI is 3 days. Do not harvest earlier than 3 days after treatment.

CMNP Performance Overview

All data presented is based upon work conducted by IFAS since 2003

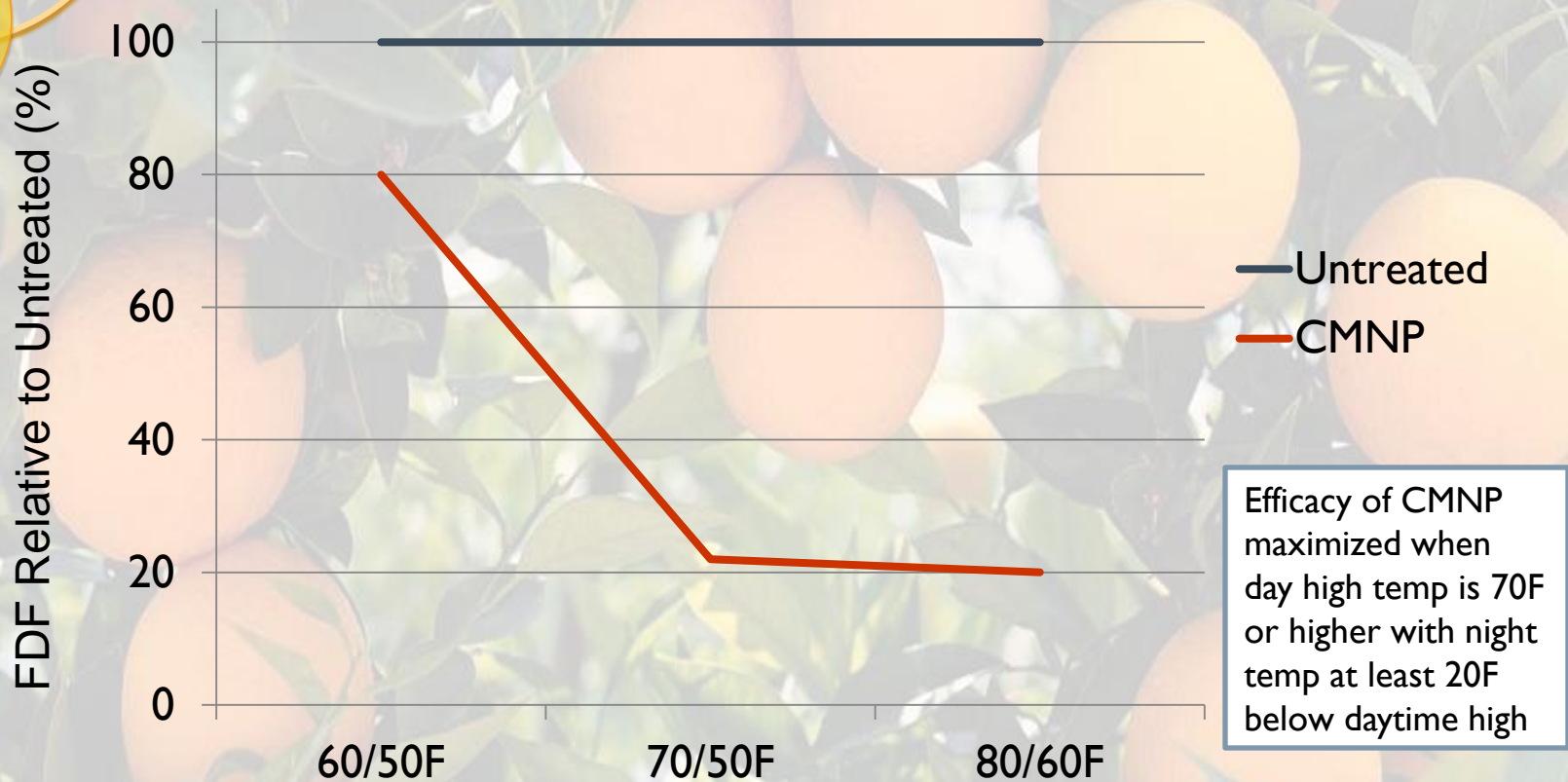
- Total of 29 unique large scale trials with various objectives
 - Temperature impact on CMNP performance
 - Harvest equipment comparison
 - Sprayer comparison
 - Late season trials
 - CMNP rate
 - Harvest timing
- Objectives
 - Identify optimum conditions for CMNP performance as well as those conditions which adversely affect CMNP performance

CMNP Temperature Impact



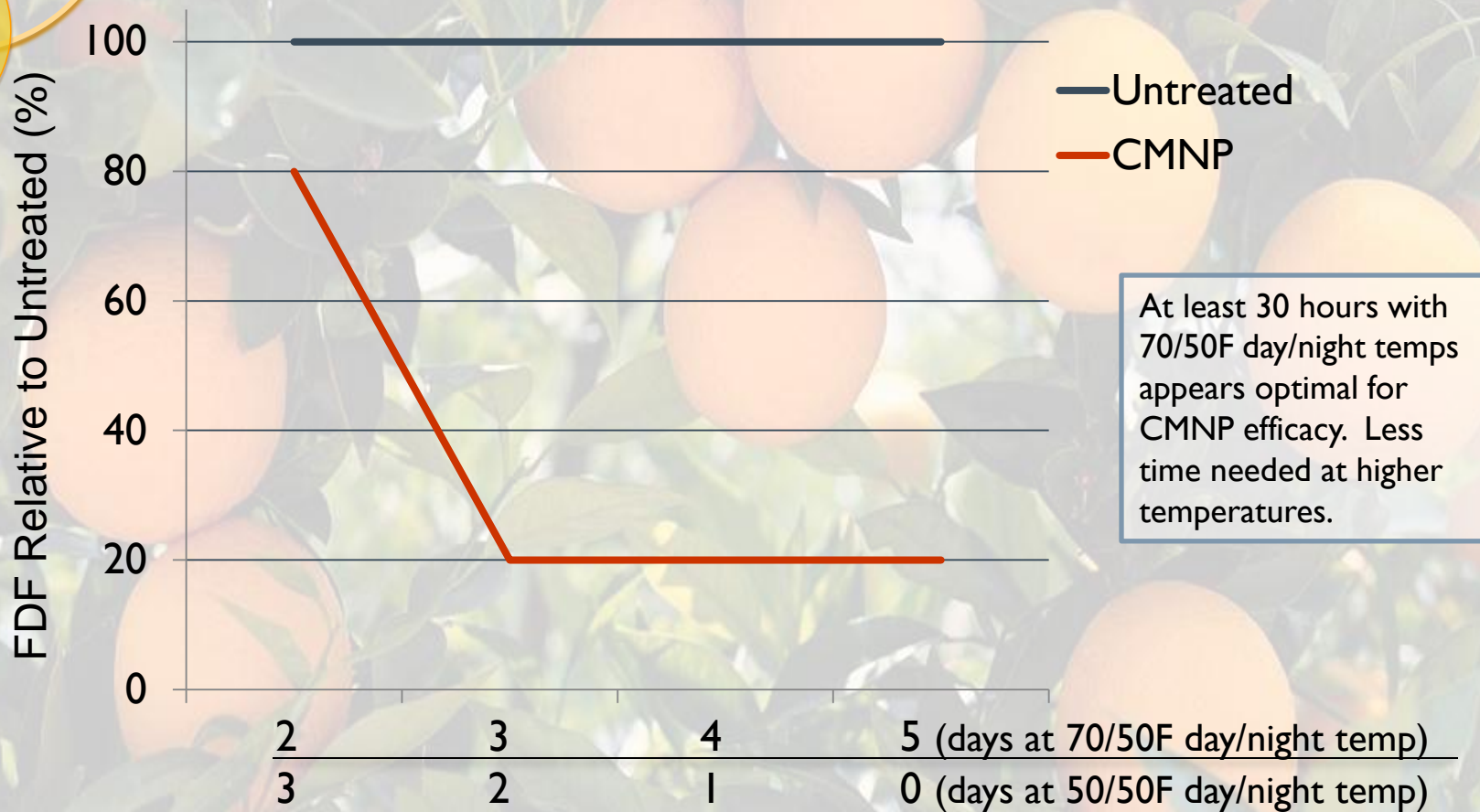
All constant temperatures regimes held constant for 5 days

CMNP Temperature Impact

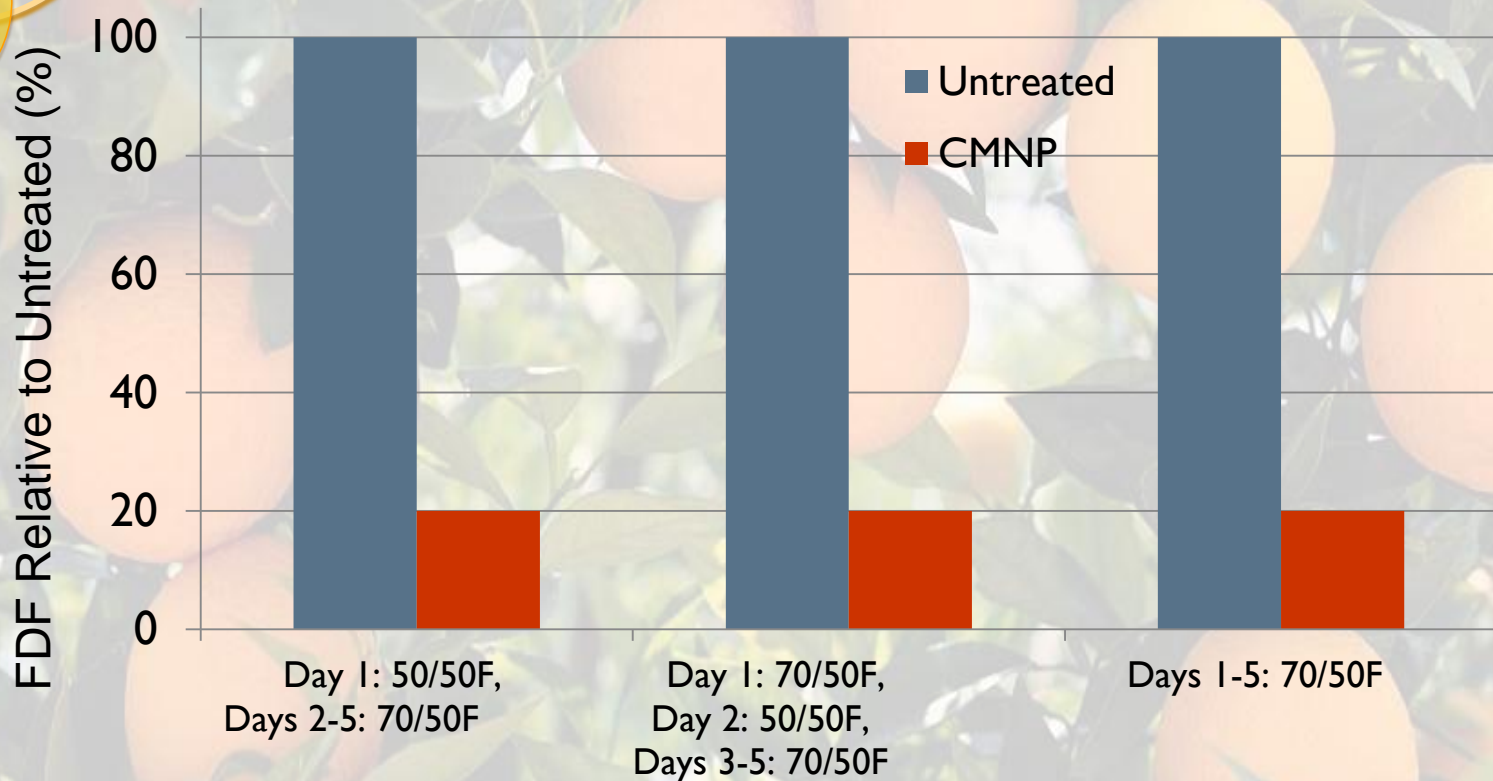


All day/night temperatures regimes held constant for 5 days

CMNP Temperature Impact



CMNP Temperature Impact



Impact of one day at 50/50F day/night temperature does not affect reduction of FDF by CMNP

CMNP Temperature Impact - Summary

- CMNP impact on Fruit Detachment Force (FDF) is temperature dependent
- Cooler temperatures slow the speed of CMNP activity and may reduce overall activity
- Cool night temperatures should not inhibit CMNP activity when daytime temperatures are favorable
- A single day with cool day & night temperature should not inhibit CMNP activity if temperature rebounds to favorable levels
- A 30 hour exposure to 70F or 10 hour exposure to 80F within 5 days of application was sufficient to promote FDF reduction by CMNP

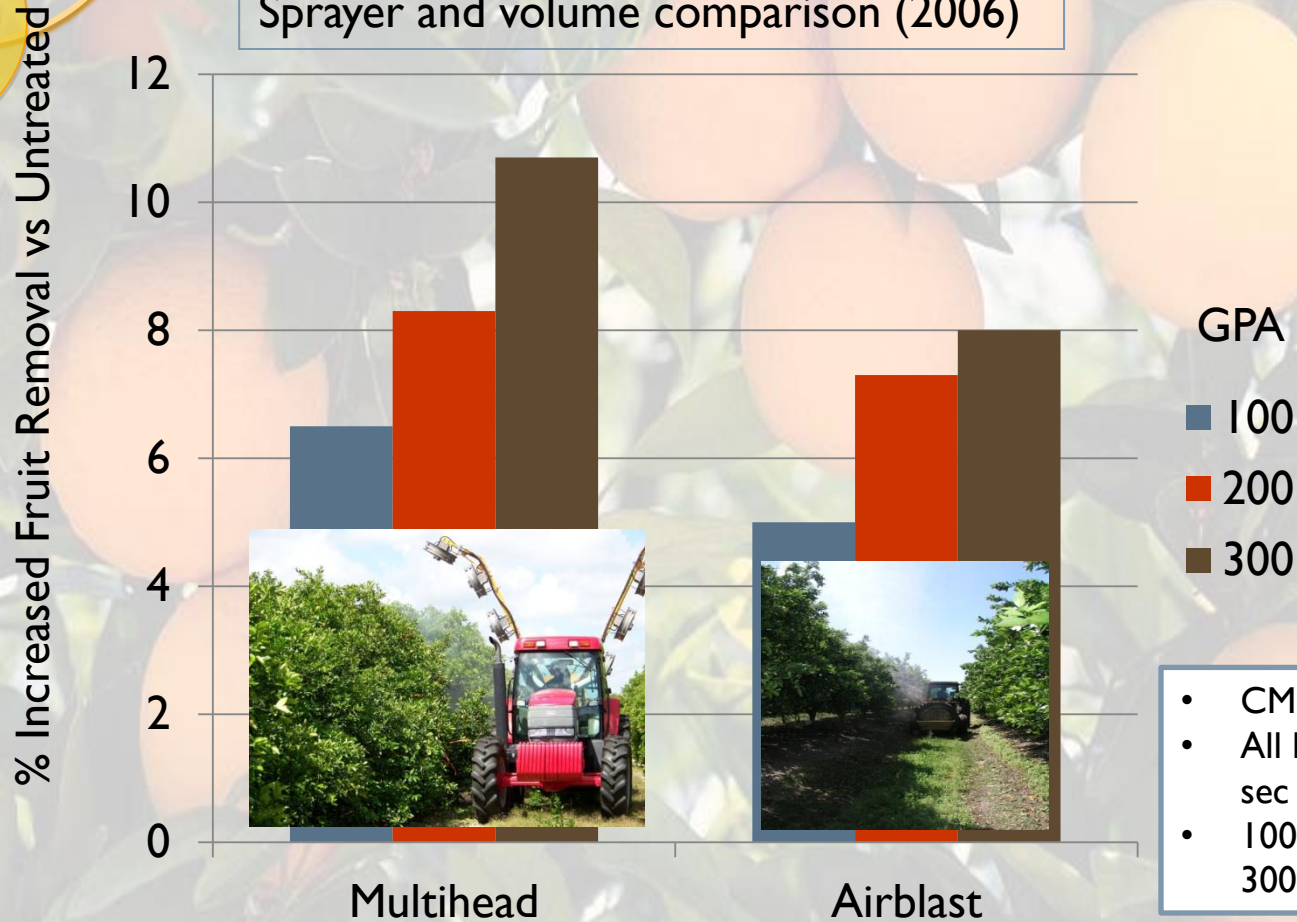
Harvester Comparison

- Early IFAS trial focus was harvester comparison (2003-2004)
- Trunk shaker resulted in better fruit removal than canopy shaker across two years testing
- Trunk shaker is better suited to use in small plot research
- However, on a commercial basis trunk shaker:
 - Harvesting speed is less than that of a continuous canopy shake & catch system
 - Concern for tree injury due to trunk damage where trunk shaker grips tree and root injury from vigorous shaking
- Based upon these factors, industry has moved towards canopy shaker as preferred mechanical harvesting system



Sprayer Comparison

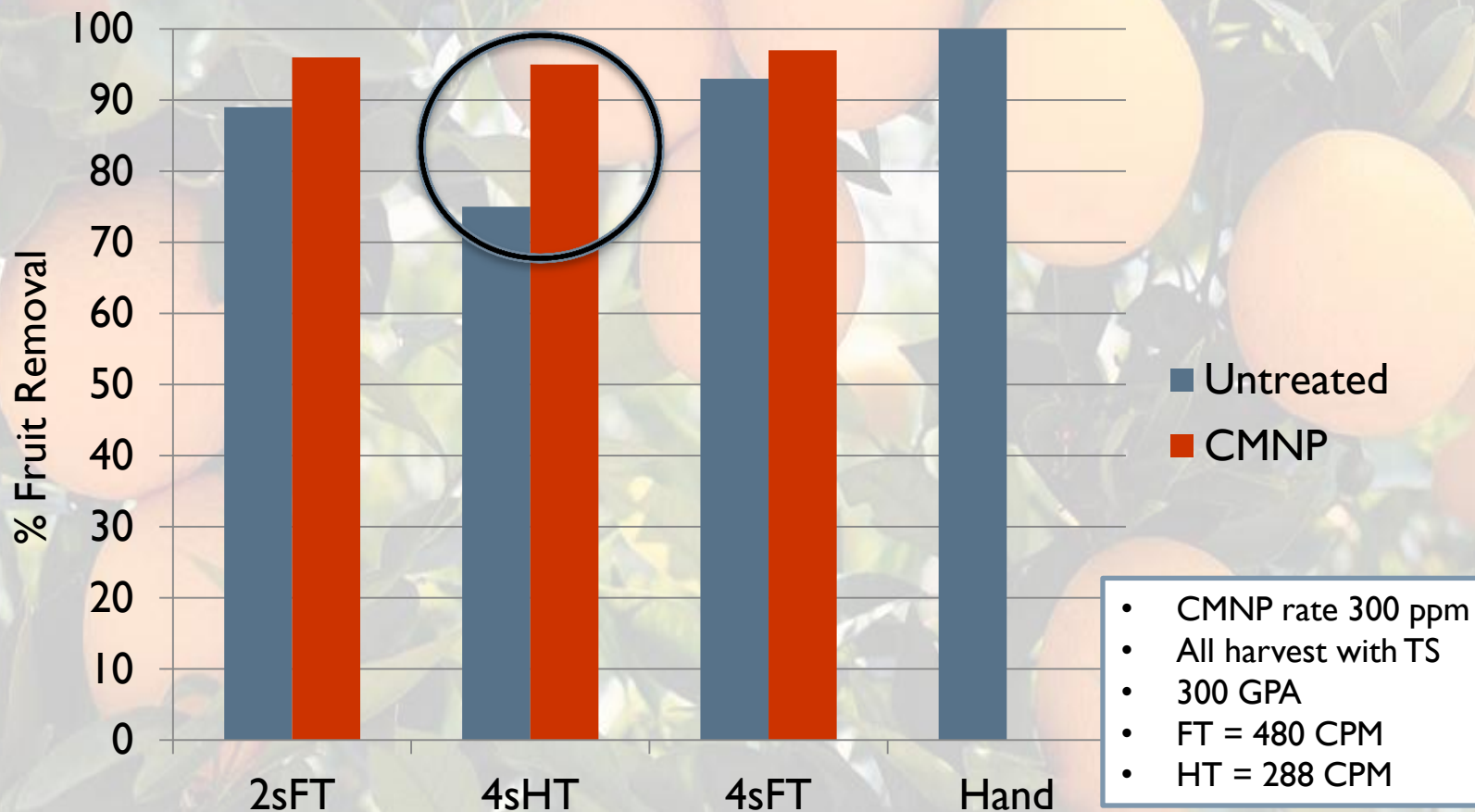
Sprayer and volume comparison (2006)



- CMNP rate 200-250 ppm
- All harvest with TS with 4 sec shake time
- 100 GPA 2 trials; 200 & 300 GPA 3 trials

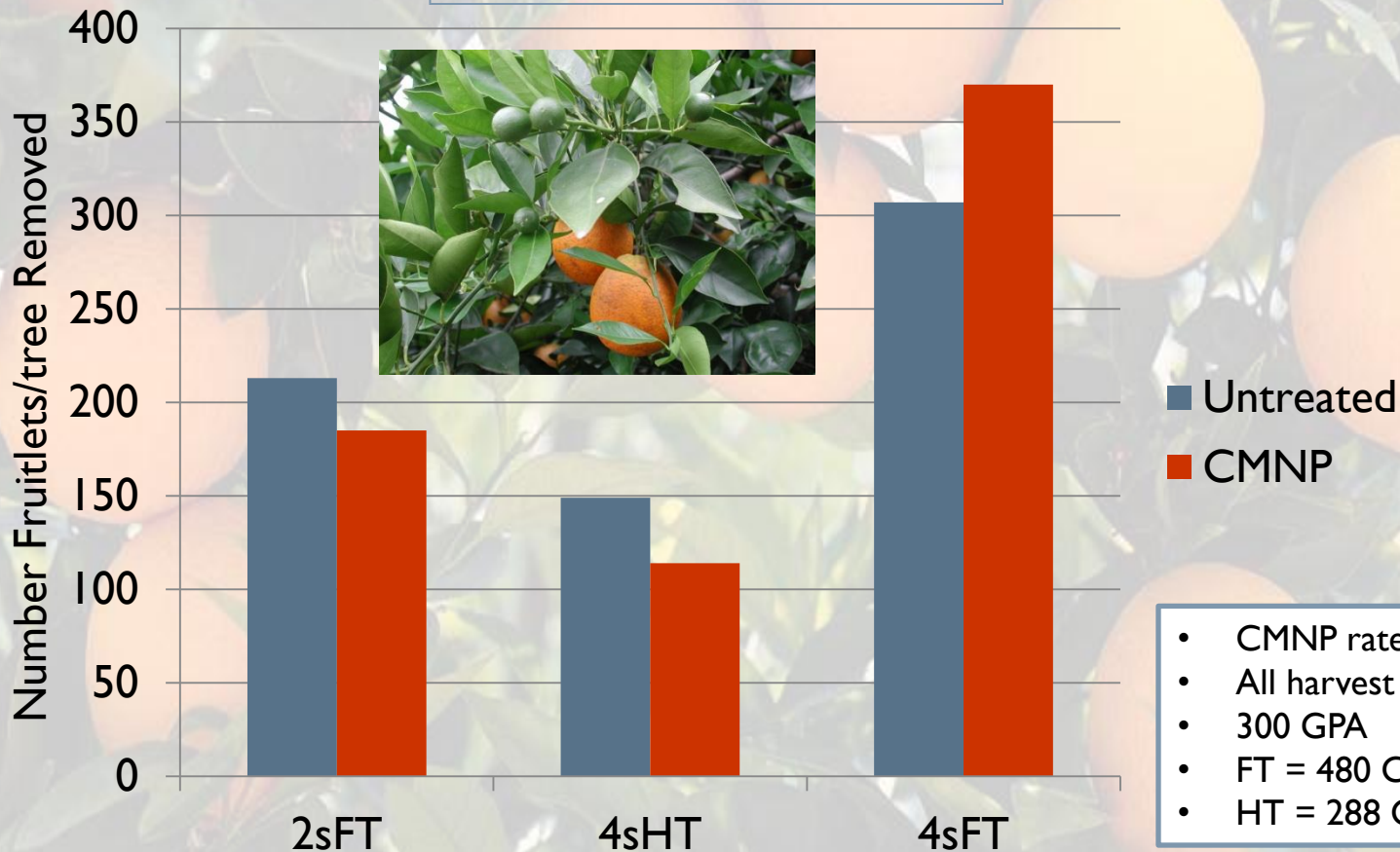
Late Season

Fruit Removal (2004)



Late Season

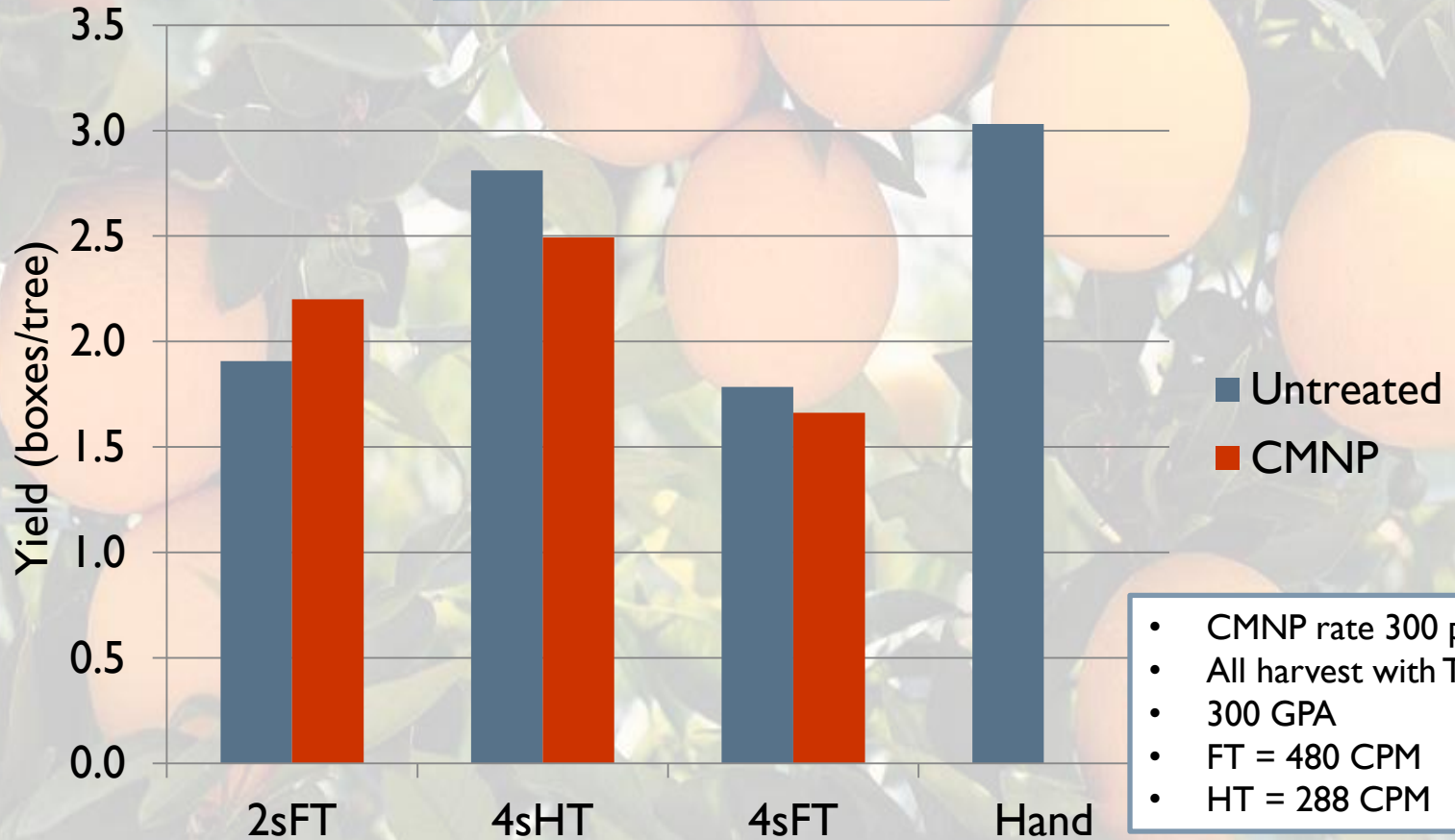
Young Fruit Removal (2004)



- CMNP rate 300 ppm
- All harvest with TS
- 300 GPA
- FT = 480 CPM
- HT = 288 CPM

Late Season

Next Season Yield (2005)

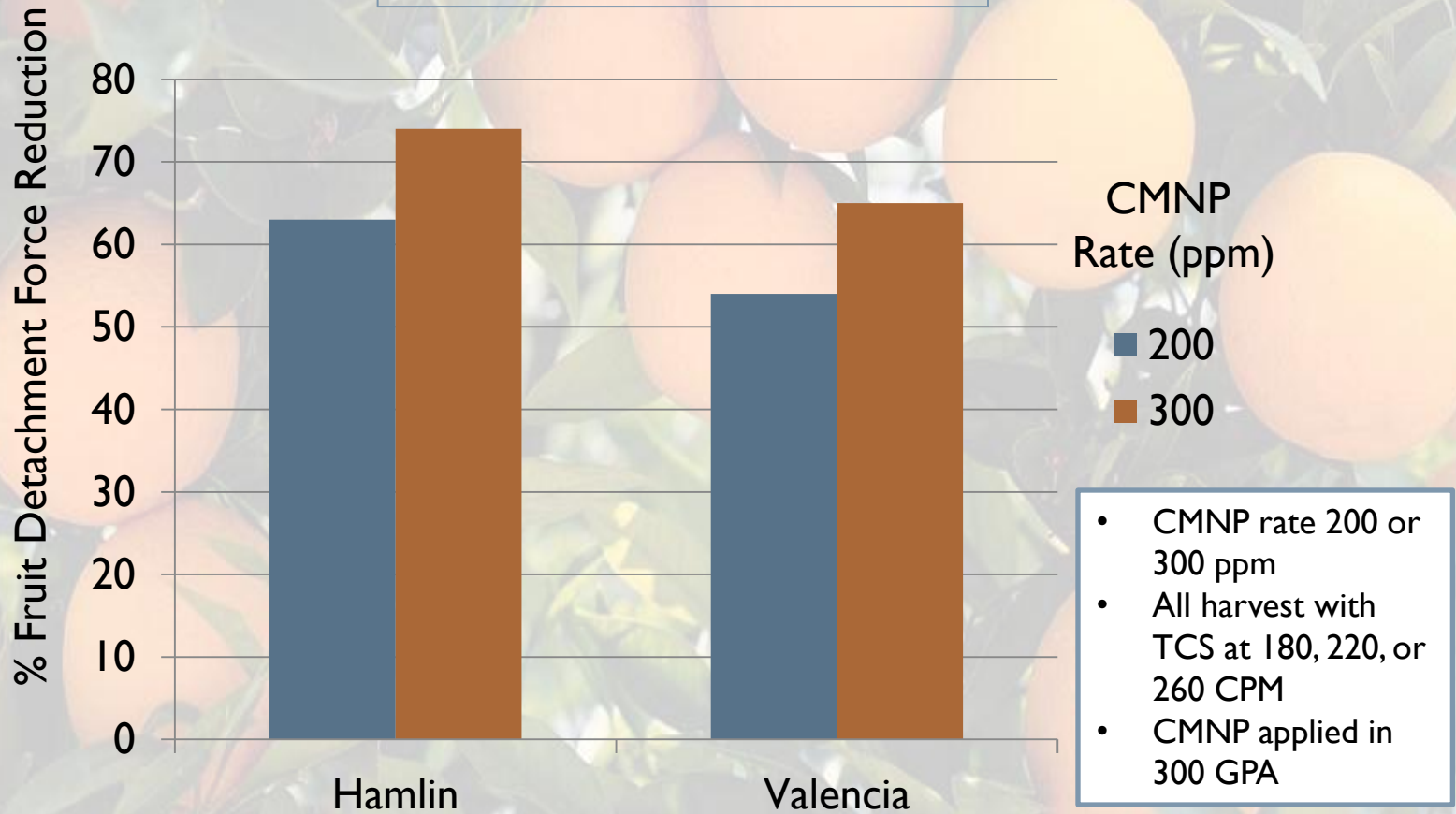


Late Season - Summary

- Key limiter to full season use of mechanical harvesting in Valencia is impact on immature fruit
- Trunk shaker data demonstrates reduced harvester intensity with CMNP achieved >90% fruit removal and helps to mitigate late season yield effects
- Reduced CPM and increased ground speed with canopy shaker should reduce yield impact as well
- Additional trials planned to further verify these expectations

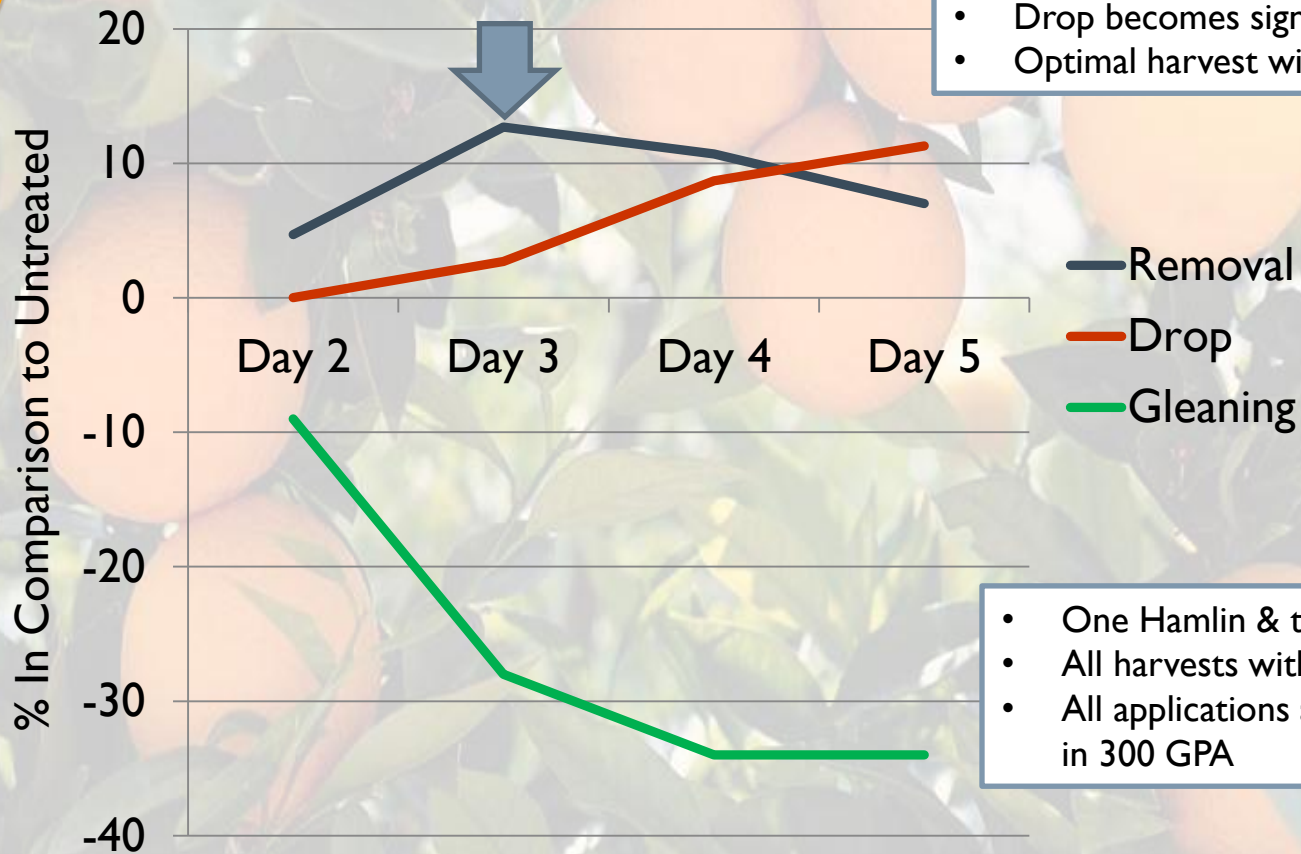
Rate Effect

CMNP Rate Study (2008-2009)



Harvest Timing

Optimal Harvest
Timing w/CMNP



- FDF reduction peaked on Day 3
- Drop becomes significant on Day 4 & 5
- Optimal harvest window is Day 3

- One Hamlin & two Valencia trials
- All harvests with TCS @ 220 CPM
- All applications at 300 ppm CMNP in 300 GPA

Debris & Mechanical Harvesting



- Processors have raised concerns that mechanically harvested fruit loads have increased debris
 - Potential damage to processing equipment
 - Cost of transporting debris
 - Cost of disposing of debris

Debris & Mechanical Harvesting

- IFAS conducted multiple trials from 2007 – 2009 on multiple varieties to assess debris in fruit and the impact that harvesting method and use of CMNP had on debris
 - Results indicate mechanical harvesting does increase debris by approximately 2X over hand harvesting
 - Leaves (60%) and small stems (38%) made up the bulk of debris
 - Use of CMNP reduced debris found in mechanically harvested fruit to levels equivalent to or below hand harvesting
- CMNP is the solution to debris issue

Using CMNP Successfully

- Things to consider
 - Weather may influence CMNP activity. Check weather forecast prior to application
 - Good application with thorough coverage key to performance. Use a surfactant for best results.
 - CMNP should not be tank mixed with other products
 - IFAS developing model to assist in timing of CMNP application and harvest
 - Do not apply CMNP to more acres than you can harvest. Fruit drop may become a problem if harvest is delayed
 - Be sure to coordinate closely with harvester regarding application and harvest schedules

Using CMNP Successfully

- Key Benefits

- CMNP will allow use of lower harvester intensity (CPM) which should:
 - Permit mechanical harvesting to be used in late season Valencia
 - Minimize tree injury related to mechanical harvesting
 - Reduce debris in fruit
 - Reduce harvesting equipment downtime
 - Allow higher harvester ground speed, improving productivity
 - May help alleviate Hamlin splitting with mechanical harvesting

Using CMNP Successfully

■ Key Benefits, continued

- Application of CMNP to mechanically harvested citrus can result in tangible economic benefits as well. Specifically, these benefits may be seen as –
 - reductions in harvesting costs
 - reduced reliance on hand labor
 - increased efficiency of mechanical harvesting equipment
 - increases in percent fruit removal, and simultaneously, a
 - reduction in gleaning costs

(the following slide illustrates a typical example of increased fruit removal and reduced gleaning costs)

Using CMNP Successfully

CMNP <u>not</u> Used					
Total Yield (boxes/A)	Fruit Removal	Harvested Fruit (boxes/A)	Fruit Left on trees (boxes/A)	Gleaning Cost (\$/box)	Total Gleaning Cost (\$/A)
400	80%	320	80	\$3.00	\$240

CMNP <u>Used</u>					
Total Yield (boxes/A)	Fruit Removal	Harvested Fruit (boxes/A)	Fruit Left on trees (boxes/A)	Gleaning Cost (\$/box)	Total Gleaning Cost (\$/A)
400	90%	360	40	\$3.00	\$120

Note: Data presented in these tables are hypothetical but are based on typically observed results in CMNP trials on Florida citrus.

CMNP – The Bottom Line

- When applied following label directions, research shows CMNP should result in a 10-15% increase in fruit removal.
- Factors influencing removal improvement achieved with CMNP are:
 - Weather, particularly temperature following application
 - Effective application ensuring thorough coverage of mature fruit
 - CMNP use rate
 - Surfactant and application time of day
 - Harvester settings
 - Length of time between application and harvest

Summary and Conclusions

- EPA actively reviewing both EUP and Sect 3 packages
- Trial work by IFAS shows CMNP reduces FDF consistently when used according to label instructions
- Reduction in FDF by CMNP should allow mechanical harvesting of late season fruit (Valencias)
- CMNP should enable lower harvester intensity settings
- CMNP should lead to decreased overall harvest costs and less reliance on hand labor



THANK YOU!