Early Season Control of Citrus Leafminer, *Phyllocnistis citrella* (Stainton) Lepidoptera: Gracillariidae)

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Citrus leafminer – ***Phyllocnistis citrella*** Stainton (CLM) – Why is it important?

- Damage by leafmining leads to:
  - Reduction in photosynthetic capacity (Pena et al. 2000)
  - Malformation of leaves
  - Increased susceptibility to the Asiatic citrus canker pathogen, *Xanthomonas axonopodis* pv. *citri* (Bergamin-Filho et al. 2000).

cisr.ucr.edu

http://www.ipmimages.org

garden-view.com

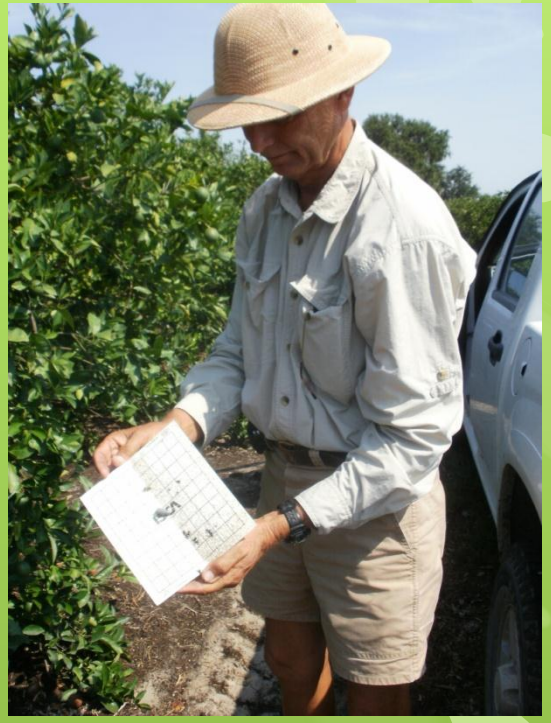
http://www.freshfromflorida.com/pi/enpp/ento/clm.html

Overall Project Objectives

- *Evaluate effectiveness of early season sprays for CLM to reduce subsequent generations of CLM*
- *Evaluate insecticides and application methods in field trials*

Pheromone Traps

- Monitor adult flight and peaks
- Assess how well management programs are working
- Trap uses:
  - Correlate leafminer damage to moth trap captures
  - Provide a ‘baseline’ for future management decisions
  - Determine if any changes need to be made in management practices.

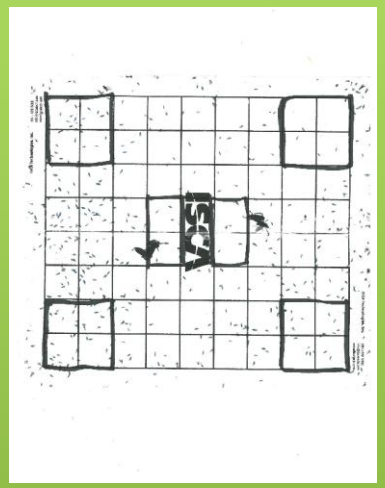


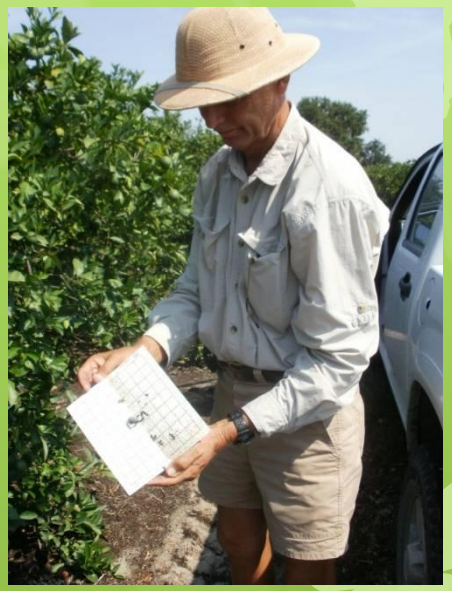
http://www.iscatech.com/exec/testimonials.htm

Methods: Trap monitoring and Damage Assessment

- 4 groves (oranges/grapefruit)
  - Trial 1: Compared applications of Intrepid 28 Feb (first flush) 14 March (peak flight) and grower standard. 15 traps/block. 1trap/ac.,
  - Trial 2: Compared 2 spray timings of Intrepid before and after peak flight activity. 20 traps/block. 1 trap/ac.
  - Trial 3. Compared trap densities: 1trap/2.5 ac (Flame grapefruit), 1trap/3.5 ac (Ray Ruby grapefruit), 1trap/5 ac (Ray Ruby grapefruit)
  - Replicated trial: Compared aerial and ground applications of Intrepid to Delegate and Untreated (Hamlins), 3 traps/13ac plot
- Moth flight monitored to determine seasonal spatial and temporal flight patterns, and relative density
- CLM damage assessed by using modified Horsfall Barratt Scale
  - Randomly selected 50 trees/stop; two stops per pheromone trap row
  - Graded damage on upper/lower surfaces of 5 terminal leaves of flush

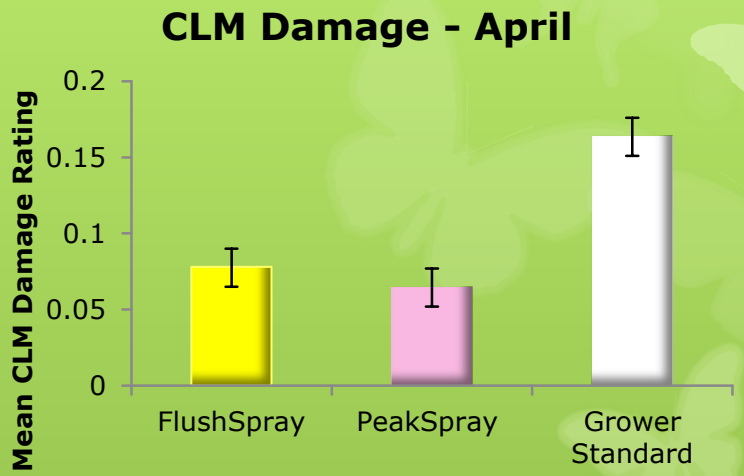
Count these 20 squares, multiply by 4.5

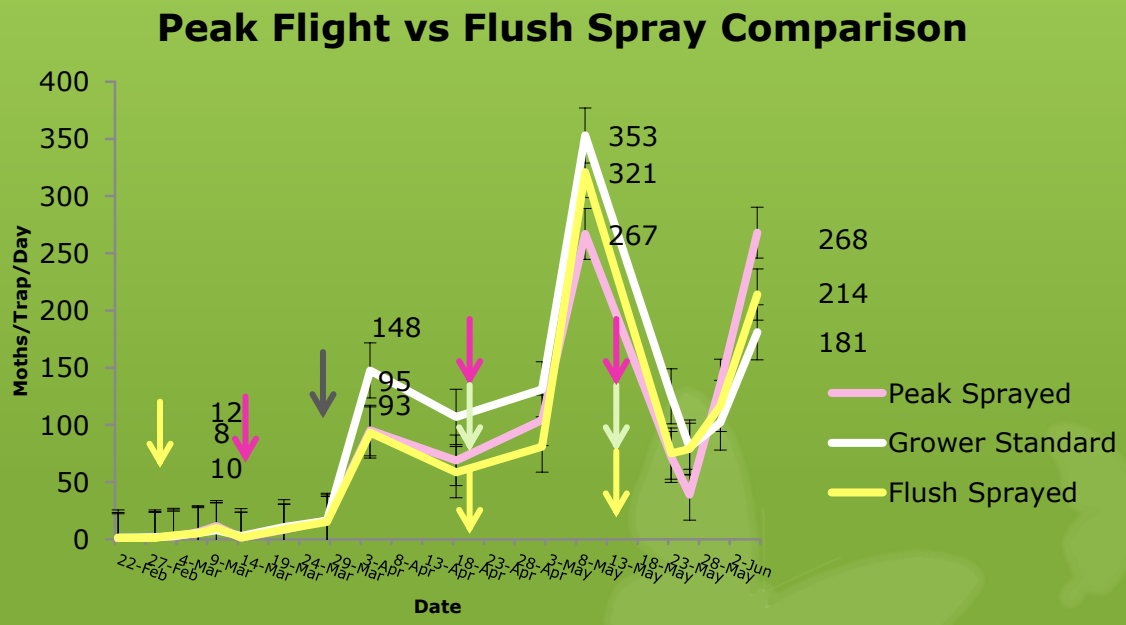




Three Application Timings of Intrepid

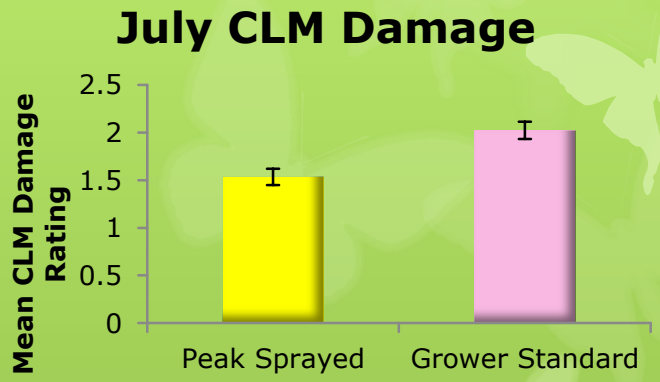
- **Treatment 1**: Sprayed at first spring flush Intrepid 2F + 435oil (2/28)
- **Treatment 2**: Sprayed according to trap count Intrepid 2F + 435 oil (3/14)
- **Grower standard**

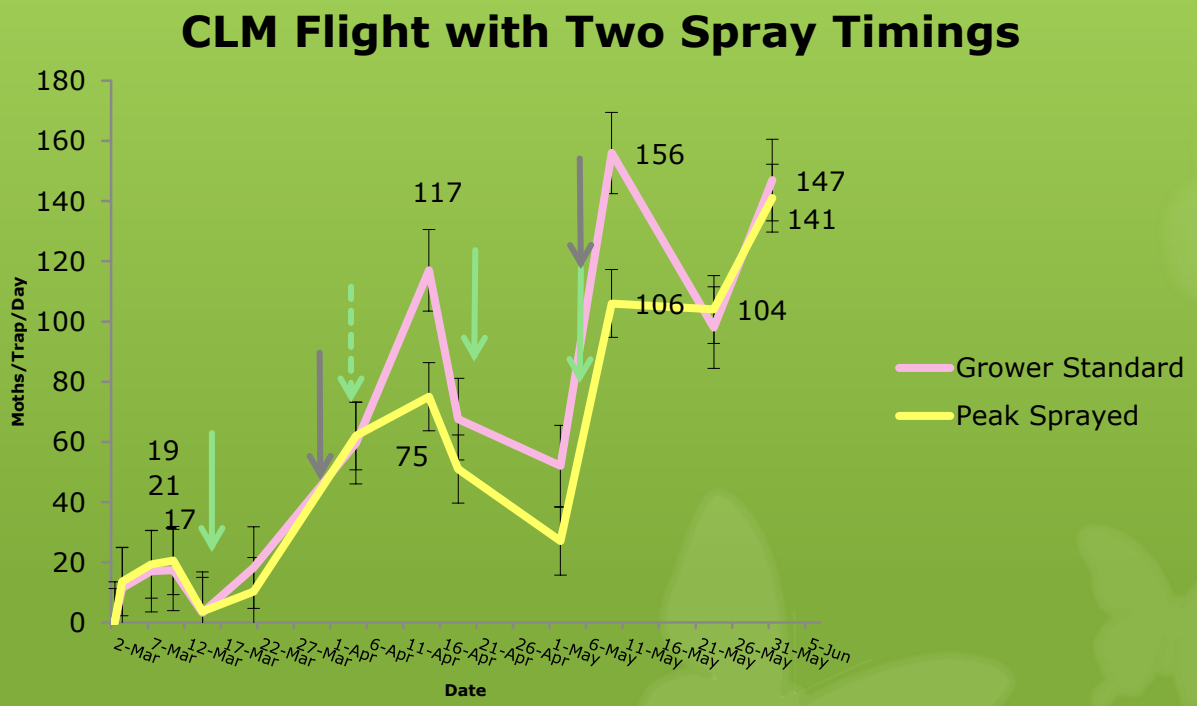




Two Spray Timings- Before and After Peak Flights

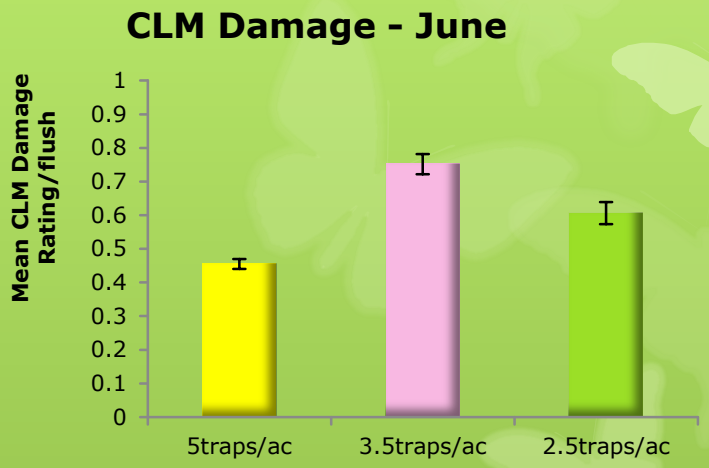
- Each block 20 acres
- Treatment: Sprayed according to pheromone trap counts
- Grower Standard: Sprayed according to calendar
- 1 rep, 20 traps each block

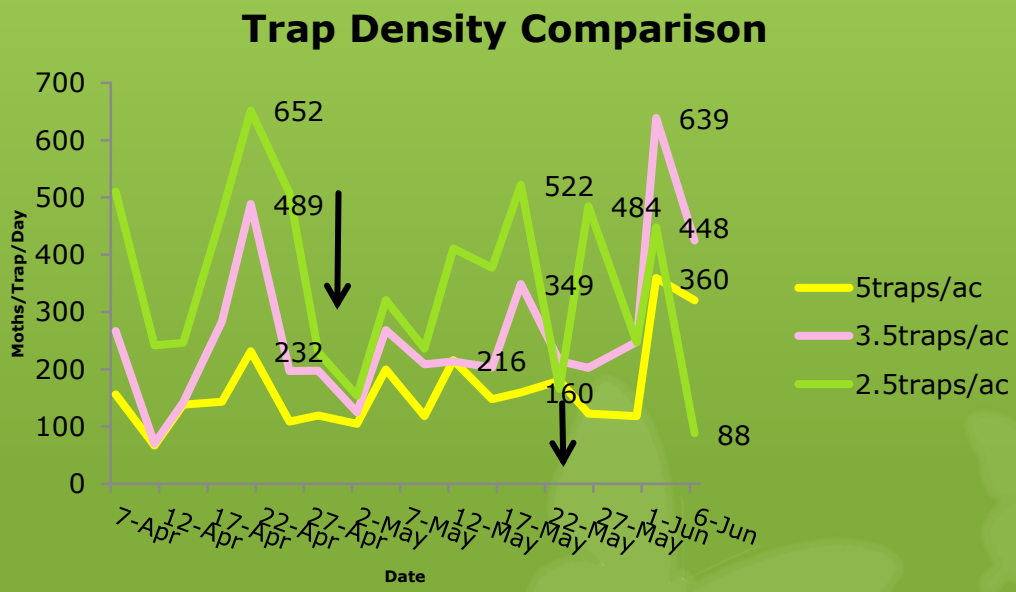




Efficacy of Pheromone Trap Spacing

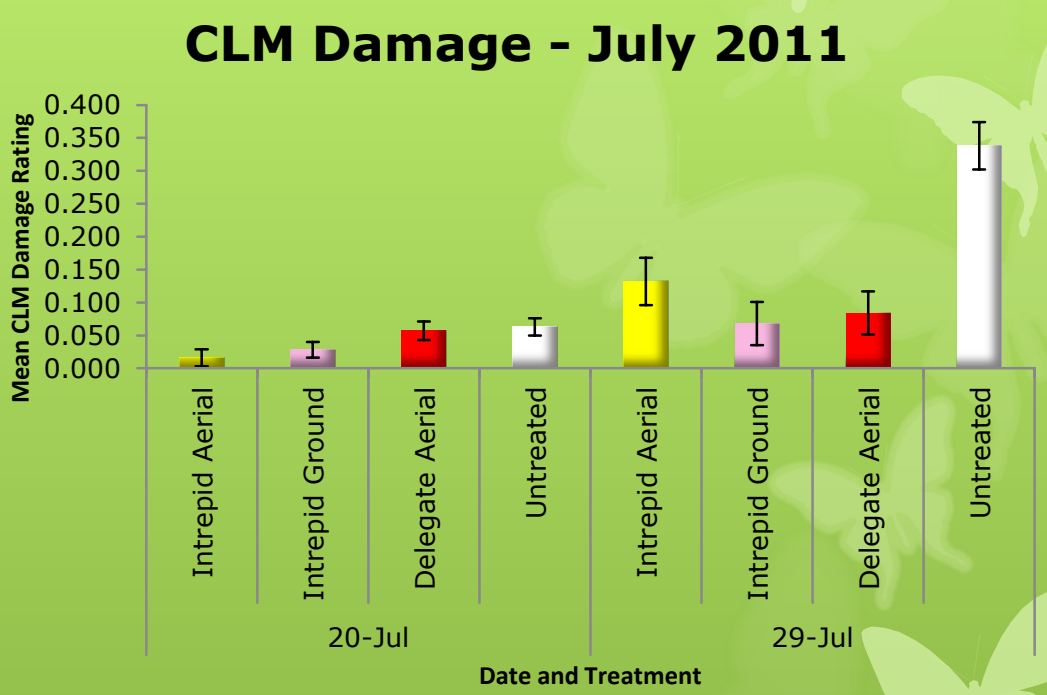
- No difference in spray application
- 3 sized blocks – one 60ac, 7ac, and 2.5ac
- Traps spaced 5ac, 3.5ac, and 2.5ac
- Sprayed according to peak flight

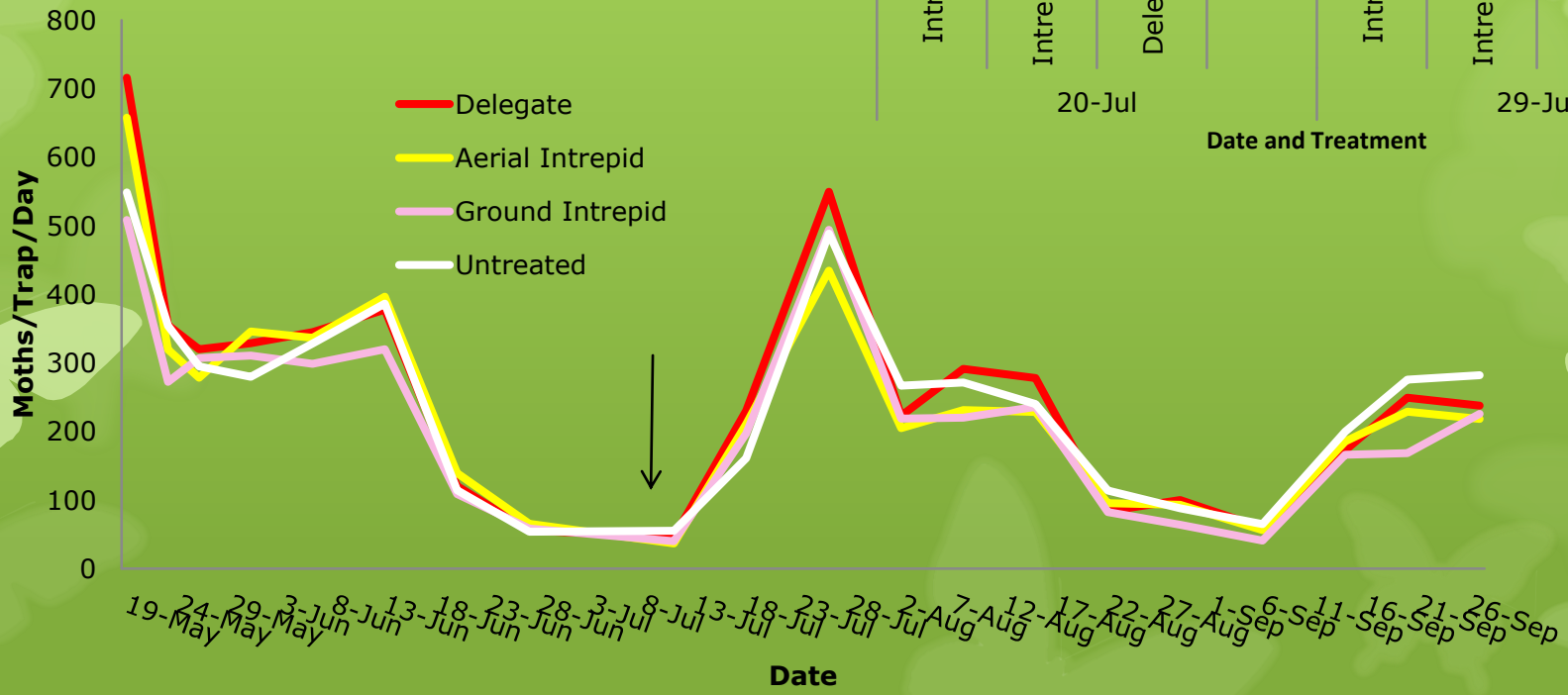




Aerial vs Ground Applications of Intrepid

- Delegate WG + 435 Oil (aerial) = Red
- Intrepid 2F + 435 oil (aerial) = Yellow
- Ground application of Intrepid 2F + 435 oil = Pink
- Untreated check = White
- 3 reps

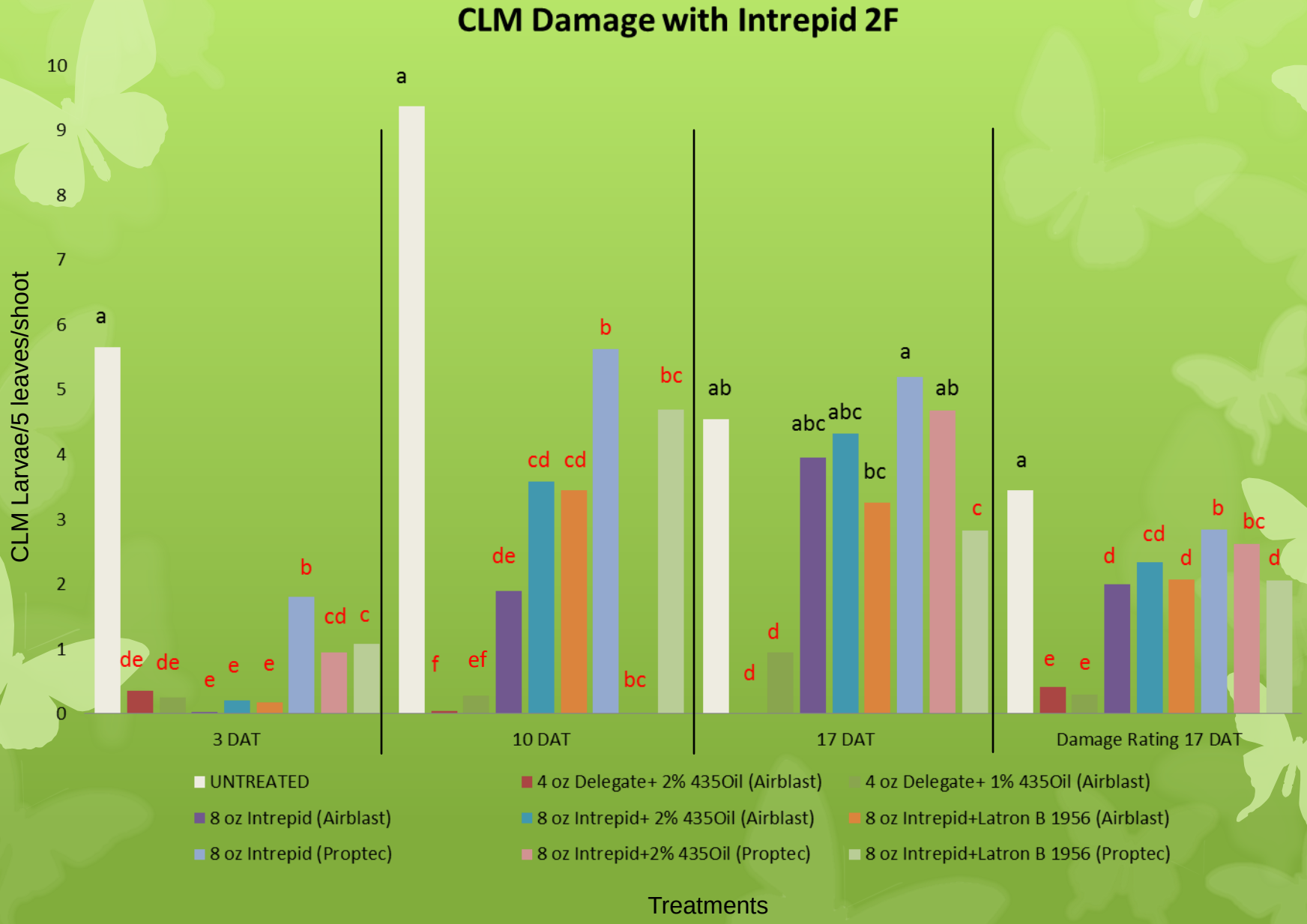




Evaluation of Spray Volume & Sprayer Type on Efficacy of Insecticides

- Trial conducted by: Barry Kostyk and Scott Croxton
- Pringle Farm, Immokalee FL; 22 yo Murcott trees @ 151 trees/acre
- Sprayers – Airblast (100gpa) vs Proptec (5gpa)
- Treatments – Delegate, Untreated, Intrepid 2F (with and without Latron B1956)
- Rates – 4oz and 8oz
- Larvae examined 3dat (21 Jul), 10dat (28 Jul), and 17dat (4 Aug)
  - 10 randomly selected new shoots
  - 5 leaves per shoot
- Leaf surface damage rated – 0 = none
  1 = < 10%
  2 = 11 – 25%
  3 = 26 – 50%
  4 = > 51%

Treatment Results



Evaluation of Spray Volume & Sprayer Type on Efficacy of Insecticides - Results

- Significantly fewer larvae observed with all treatments compared to untreated at 3 and 10 DAT
- Only the 2 Delegate treatments and Intrepid sprayed with Latron B1956 at 5gpa had significantly fewer larvae at 17 DAT
- All treatments reduced leaf damage caused by CLM
  - Least damage – Delegate
  - Intrepid (100gpa) with or without Latron or at 5gpa with Latron
  - Generally better results spraying Intrepid with Airblast compared to Prop Tec

CLM Management – Recommended Products

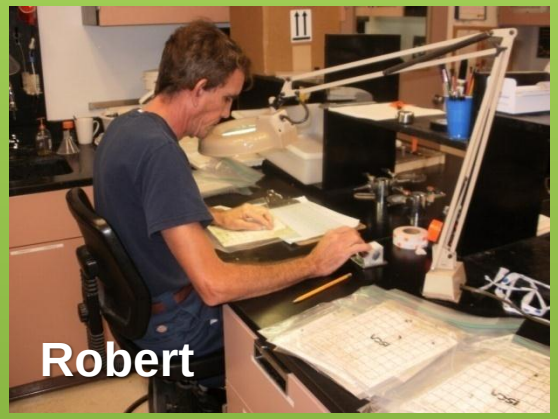
A.I.	Product	Restricted Entry Interval	Pre-harvest Interval	Psyllid	Leafminer
Abamectin + oil	Agri-mek 0.15EC	12h	7d	++	+++
Diflubenzuron + oil	Micromite 80WGS	12h	21d	++	+++
Methoxyfenozide	Intrepid 2F	4h	1d		+++
Petroleum oil	435	12h	0	+	++
Spinetoram + oil	Delegate WG	4h	1d	+++	+++
Thiamethoxam	Actara 25WG	12h	0	+++	+
Thiamethoxam	Platinum 75SG	12h	0	+++	+++
Imidacloprid (soil drench)	Admire Pro	12h	0	+++	+++
Thiamethoxam+ Abamectin + oil	Agri-Flex	12h	7d	??	??
Chlorantraniliprole +Thiamethoxam	Voliam-Flexi	12h	1d	??	??

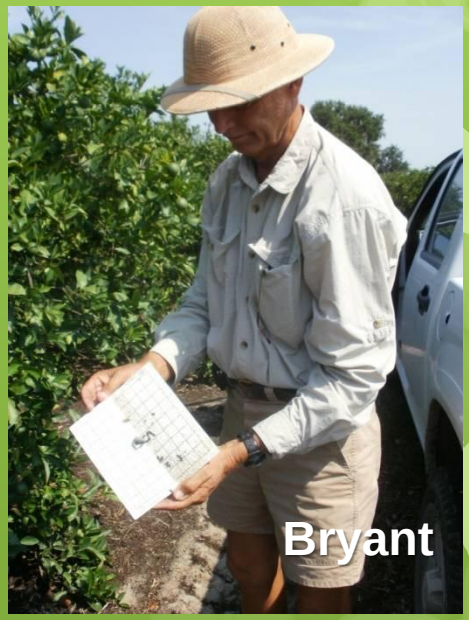
Preliminary Conclusions

- An early spray (March) of Intrepid 2F lowered numbers of adult moths caught for 2 months.
- Timing CLM sprays at first flush or at first peak flight significantly lowered adult moth catch. There was also significantly less CLM damage in spring flush assessment
- Pheromone traps spaced between 1 per 2.5ac - 5ac can be used to time insecticide sprays
- Aerial applications of Intrepid worked almost as well as ground applications in controlling CLM
- Moth flight and CLM damage information can be used as a baseline for future management decisions
- Intrepid performed best when applied at 100gpa or at 5gpa with a non-ionic surfactant

Thanks to:

- Bryant Cawley
- Robert Riefer
- Miriam Ortez
- Kat Perez
- Zack Lahey





Additional Thanks to:

Coffee!!!

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Questions?