

The University of ARIZONA  
COLLEGE OF AGRICULTURE AND LIFE SCIENCES

## A Grower Initiated Approach for Sustaining Neonicotinoid Efficacy Across Commodities

John C. Palumbo  
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### Sweetpotato Whitefly

*Bemisia tabaci* – B biotype

From 1991-1993 in AZ and CA, outbreaks of whiteflies caused > \$ 500 million worth of damage to cotton, melons & vegetables.

- Adults very mobile

### Whitefly “cloud” over newly established produce field

Imperial Valley – Fall 1991

*J. Hatch*

### Highly Mobile Pest in Diverse, Cropping system

Shared Whiteflies Among Key Whitefly Hosts

### Imidacloprid **Admire**<sup>®</sup> Neonicotinoid

**Ideal Whitefly Control :**

- Pre-plant injection
- Drip Chemigation
- Immediate plant protection

45-60 d residual control






### Synergized Pyrethroids in Arizona Cotton -1995

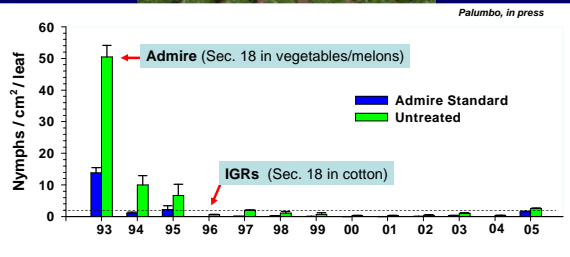
- Documented reduction in susceptibility in lab bioassays
- Reports of poor field performance in Central Arizona
- Prompted the Section 18 registrations of IGRs in 1996




### Impact of Admire and IGRs on Whitefly Suppression




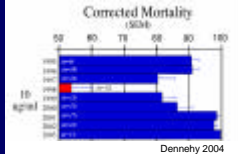
*Palumbo, in press*



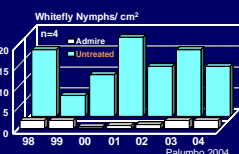
### Sustained Susceptibility



### Sustained Efficacy in Commercial Broccoli

*Dennehy 2004*



*Palumbo 2004*



Whiteflies have not affected *Yield or Quality* in Yuma for the past 13 years where **Admire** has been applied properly.

## Passive “de facto” Management

### Cropping system

- Large acreages of untreated host plants serve as refugia
- Alfalfa, seed crops, weeds, ornamental landscape

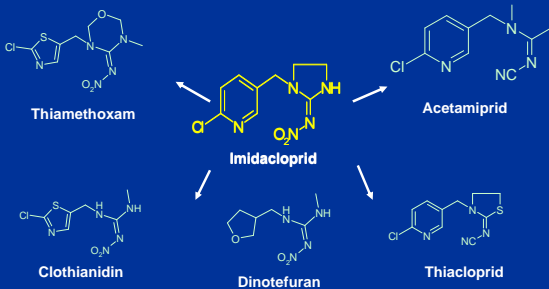
### Whitefly biology and ecology

- Polyphagy, mating behavior, and dispersal capability

### IPM Practices

- Limitation and segregation of chemistries
  - 1 use of imidacloprid in vegetables and melons
  - 1 use of IGR's in cotton
- Spatial and Temporal Insecticide Rotations
- Exposure to other non-neonicotinoid a.i.s for other pests. (acephate, chlorpyrifos, endosulfan, methomyl)
- **Foliar Neonicotinoids (Provado) not used in cotton, Not labeled in melons**

## Expansion of the Neonicotinoid Chemistry



## Neonicotinoid Registrations in Arizona - 2005

| A.I.         | Product           | Application  | Crops Uses             |
|--------------|-------------------|--------------|------------------------|
| acetamiprid  | Assail , Intruder | Foliar       | Lettuce, Cole, Cotton  |
| dinotefuran  | Venom             | Foliar, Soil | All                    |
| imidacloprid | Admire, etc.      | Soil         | Melons, Lettuce, Cole  |
| imidacloprid | Gaucho, etc.      | Seed         | Cotton                 |
| imidacloprid | Provado, etc.     | Foliar       | Lettuce, Cole (Cotton) |
| thiamethoxam | Centric           | Foliar       | Cotton                 |
| thiamethoxam | Cruiser           | Seed         | Cotton                 |
| thiamethoxam | Platinum          | Soil         | Melons                 |

## Arizona Cross-Commodity Working Group

- Arizona Cotton Growers Association
- AZ Cotton Research & Protection Council
- Cotton Incorporated
  
- Western Growers Association
- Arizona Veg Growers Association
- Yuma Vegetable Shippers Association
  
- Arizona Crop Protection Association
- Arizona Department of Agriculture
- University of Arizona
- AgriChemical Industry

## Proactive Management



The UNIVERSITY OF ARIZONA  
Cooperative Extension  
ipm.arizona.edu/pubs/insect/az1319.pdf

IPM Series No. 17  
AZ1319 - 5-2003

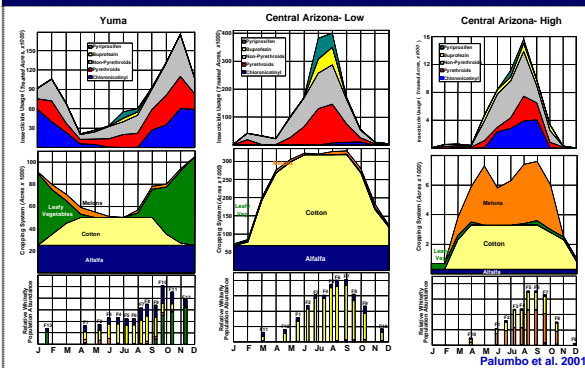
# Cross-commodity Guidelines for Neonicotinoid Insecticides in Arizona

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Developed in collaboration with and endorsed by  
Arizona Crop Protection Association  
Arizona Cotton Growers Association  
Cotton Incorporated  
Western Growers Association

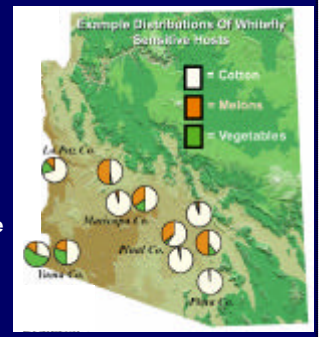
## Understanding Cropping Systems

- Insecticide Use Patterns
- Seasonal Crop Diversity
- WF Population Dynamics



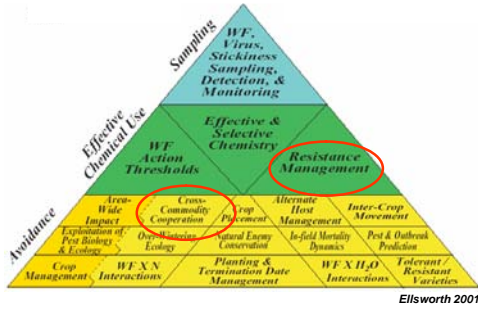
## Defining a Crop Community

- 1) Multi-crop Community
  - Cotton
  - Melons
  - Vegetables
- 2) Cotton Intensive
- 3) Melon / Cotton Intensive



## 1. Fundamentals of Whitefly Management

- Avoid Problems through Cultural Controls
- Scouting, Sampling and Detection
- Ensure Effective Chemical Use



*Summary Guidelines: Maximum number of uses per crop season for neonicotinoids in three different cropping communities.*

| Community        | Cotton | Melons | Vegetables |
|------------------|--------|--------|------------|
| Multi-Crop       | 0      | 1*     | 1**        |
| Cotton / Melon   | 1      | 1*     | —          |
| Cotton-Intensive | 2      | —      | —          |

\*Soil only; \*\*Soil or Foliar

<http://ag.arizona.edu/crops>

## 2. Limit Neonicotinoid Use

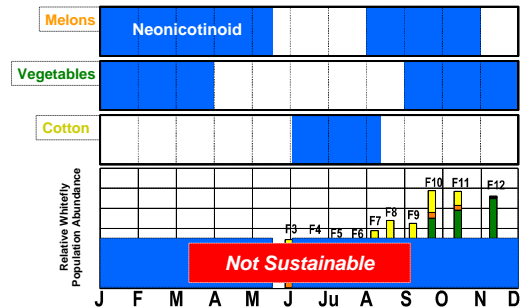


### Multi-crop Community

- **Not more than one** use per crop in melons and vegetables.
- Soil at-planting recommended.
- Split applications are not recommended
- **Do not apply any neonicotinoid product to cotton**



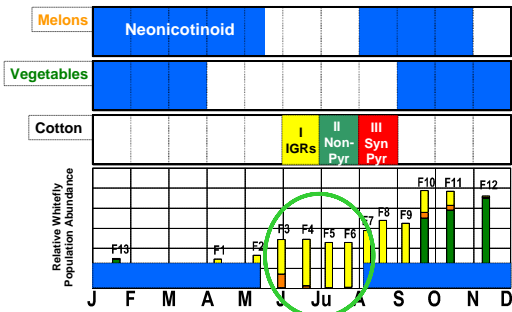
## Resistance Risks Associated with Shared Neonicotinoid Uses in a Multi-Crop Community (eg., Yuma – potential usage)





### 3. Exclusion

#### Preserve a Neonicotinoid-free Period in MCC



### 3. Exclusion

- Do not apply a foliar applied neonicotinoid following the use of a soil applied neonicotinoid



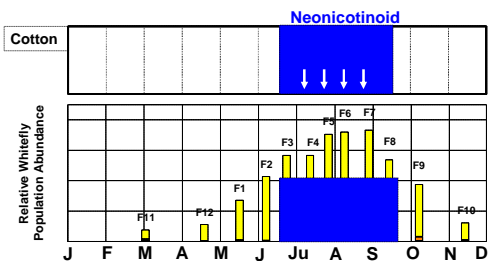
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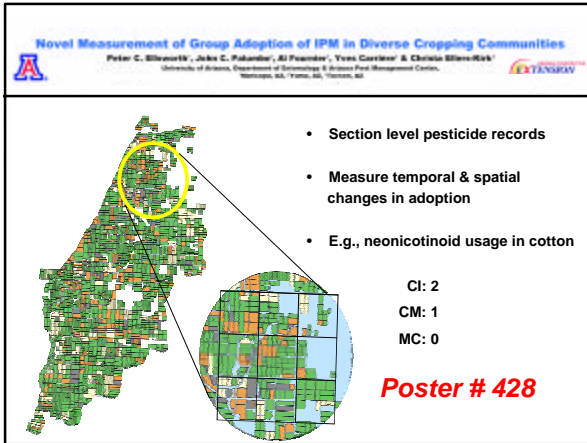
### Cotton- Intensive Community

- No more than two neonicotinoid uses per cotton crop
- This includes *seed treatment*
- Sprays should not be applied consecutively, but rotated with alternative chemistry

### Resistance Risks Associated with Neonicotinoid Uses in a Cotton-Intensive Community







### Challenges and Constraints to Sustained Efficacy

**A. Generic imidacloprid**

- Lower cost could mean more use or higher rates
- Confusion in class recognition

**B. Expansion of neonicotinoid labels**

- Products – effective seed and foliar alternatives
- Crop labels– acetamiprid on melons
- New A.I.s - clothianidin

**C. Market forces**

- Cotton - cost of IGR's relative to cotton prices  
 - free demo product
- Lettuce/Cole/ Melons – cost of Admire vs. Generics

### Challenges and Constraints to Sustained Efficacy

**D. New Chemistry in the Pipeline**

- Trends toward selective chemistries
- Grower: " Industry always comes through with new technology"
- Industry: " Resistance is a source of innovation "

**E. Grower-consultant complacency and apathy**

- " Little Suzy Needs New Shoes "
- Reduced rates / split (multiple) applications
- Sloppy soil applications on vegetables and melon

