Managing Insects in Cucurbits

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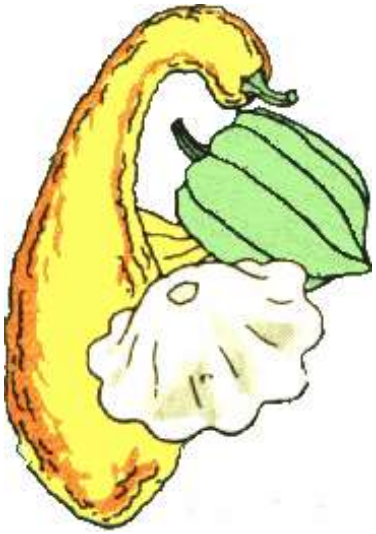
Entomology and Nematology



UF UNIVERSITY of FLORIDA

IFAS Extension

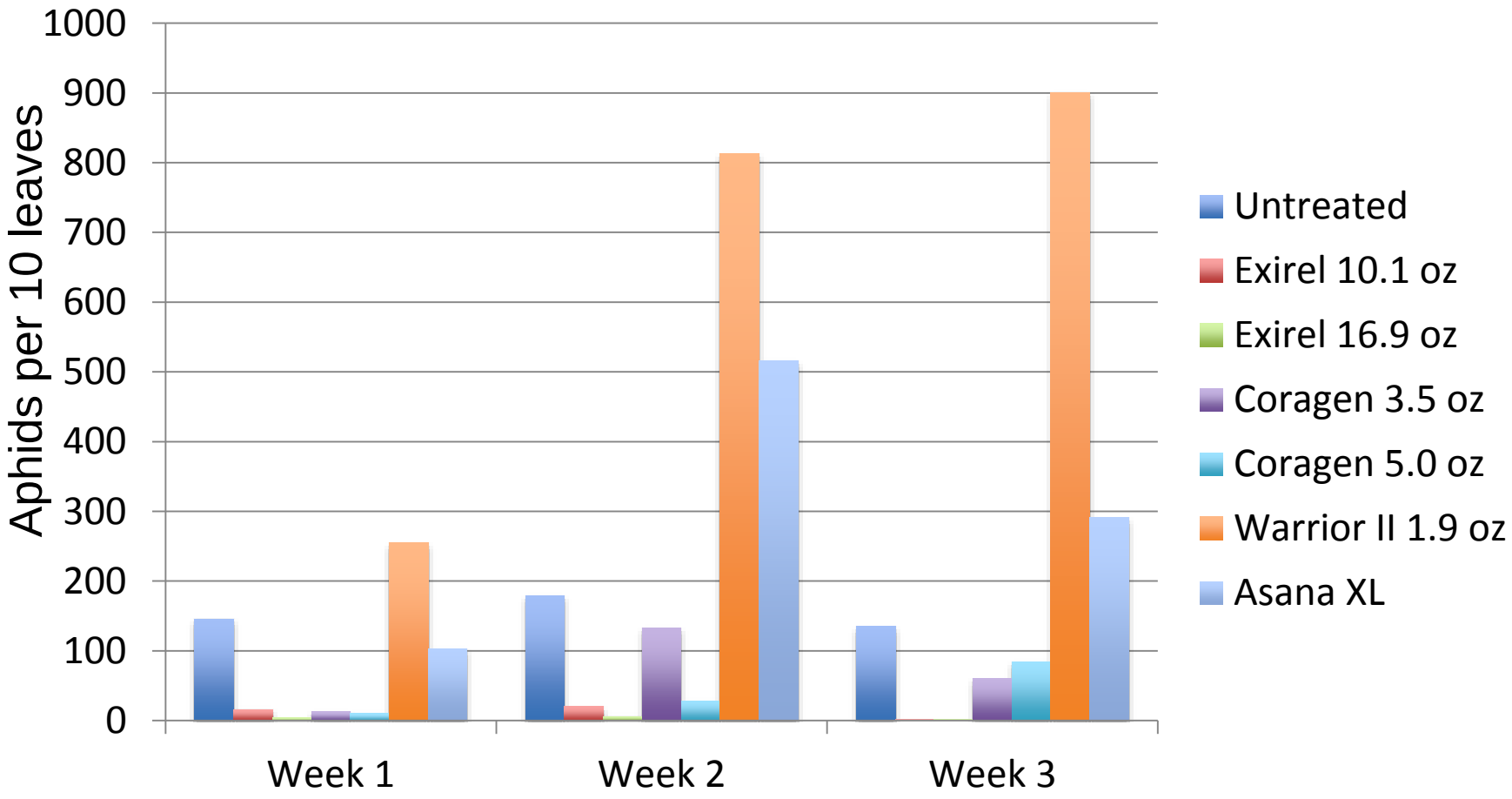
Overview

- New products
- Protecting bees from pesticides
- Managing insect pests of cucurbits
- Insect-vectored pathogens and their management

Cyazypyr™ (Exirel)

- DuPont product controls whitefly, Dipteran leafminers, fruit flies, foliage-feeding beetles, Lepidoptera
- Also gives control of aphids, psyllids, and leafhoppers
- Direct contact will kill bees—apply when bees are not foraging
- Foliar and systemic activity
- Called Verimark for soil application
- Moves in xylem so soil applications are effective

Melon aphid control in squash

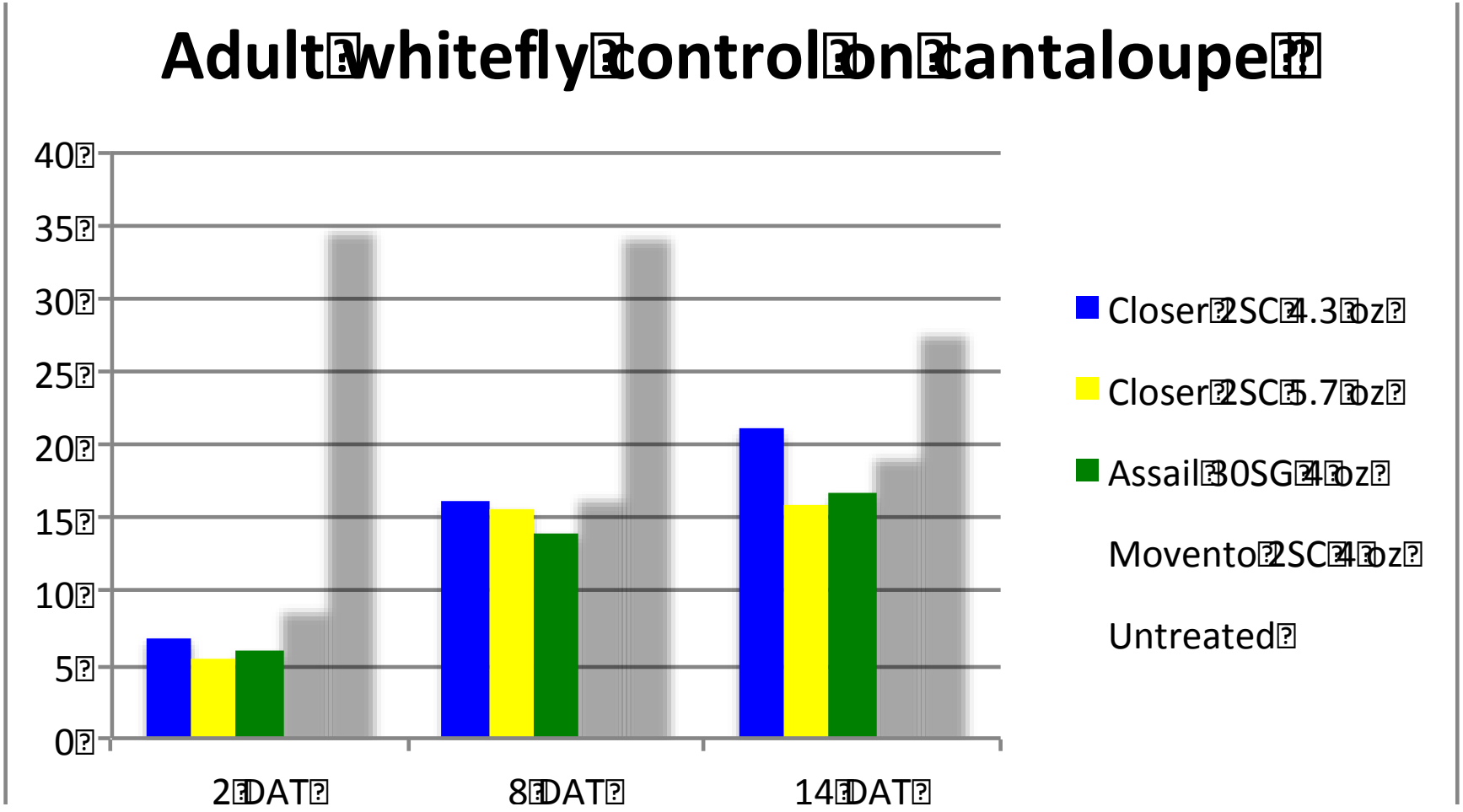


Thomas Kuhar, Virginia Tech, Blacksburg, VA

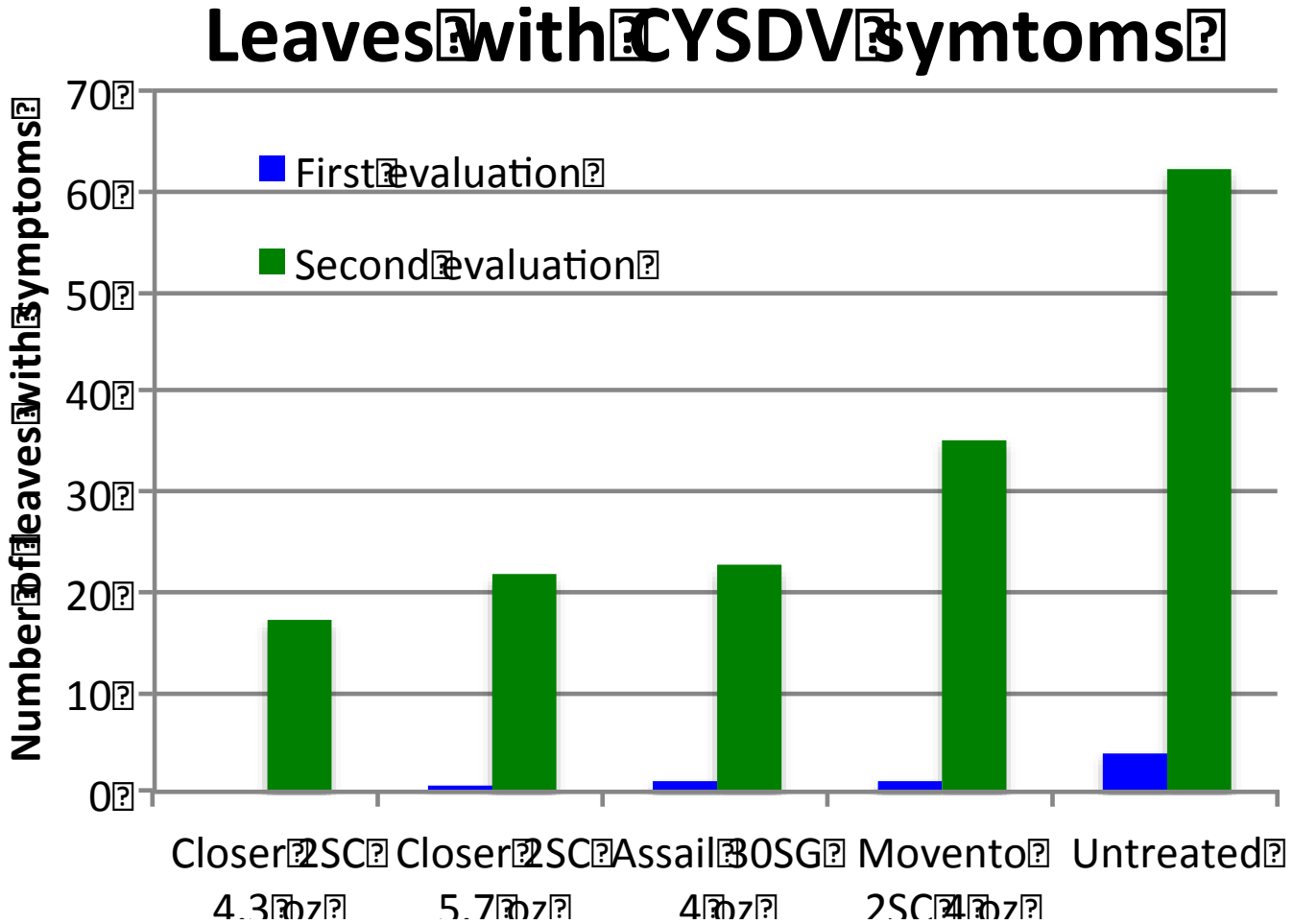
Closer SC (sulfoxaflor)

- New class of chemistry from Dow AgroSciences, but cancelled as of Nov. 12, 2015. Grower stocks can be used up.
- 3 to 7 day knockdown of adult whiteflies, most effective for aphids
- Translaminar activity
- Highly toxic to bees through direct contact and up to 3 hours after application—apply in early evening when bees are not foraging

Data from Arizona- John Palumbo



Arizona cantaloupe- J. Palumbo

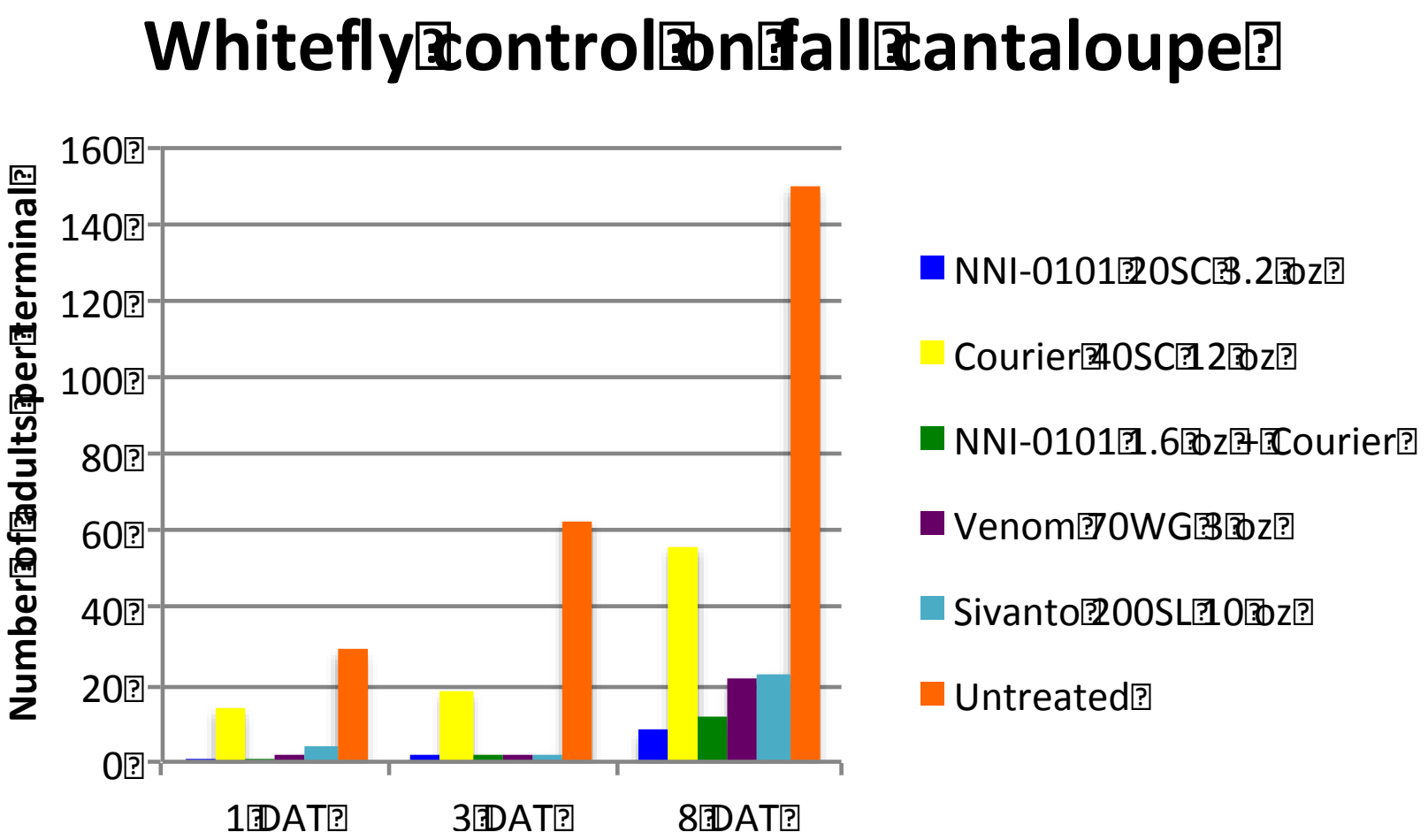


Flupyradifurone (Sivanto)

- Bayer CropScience product for control of aphids, whiteflies, and leafhoppers
- Registered in 2015
- New class of insecticides
- Safe for beneficials and pollinators
- Translaminar activity

Arizona melons-John Palumbo

3rd application of foliar treatments



Protecting bees from pesticides

- Need 8 bee visits (1000 grains of pollen) per flower to get good melons
- Protecting bees from pesticides is essential
- Work with your beekeeper
- Apply pesticides in the evening
- Bees may need to be moved

Photograph: Sean McCann, UF/IFAS Honey Bee Research and Extension Laboratory.

New language on labels—this is just the first page!

APPLICATION RESTRICTIONS EXIST FOR THIS PRODUCT BECAUSE OF RISK TO BEES AND OTHER INSECT POLLINATORS. FOLLOW APPLICATION RESTRICTIONS FOUND IN THE DIRECTIONS FOR USE TO PROTECT POLLINATORS.

Look for the bee hazard icon  in the Directions for Use for each application site for specific use restrictions and instructions to protect bees and other insect pollinators.

This product can kill bees and other insect pollinators.

Bees and other insect pollinators will forage on plants when they flower, shed pollen, or produce nectar.

Bees and other insect pollinators can be exposed to this pesticide from:

- Direct contact during foliar applications, or contact with residues on plant surfaces after foliar applications
- Ingestion of residues in nectar and pollen resulting from foliar applications.

When Using This Product Take Steps To:

- Minimize exposure of this product to bees and other insect pollinators when they are foraging on pollinator attractive plants in and around the application site.
- Minimize drift of this product on to beehives or to off-site pollinator attractive habitat. Drift of this product onto beehives or off-site to pollinator attractive habitat can result in bee kills.

Information on protecting bees and other insect pollinators may be found at the Pesticide Environmental Stewardship website

Protecting bees from pesticides

- Check pesticide label under “Pollinating Insect Hazard Warning” or “Environmental Hazards”
- Do not use on blooming plants
  - Organophosphates (Dimethoate)
  - Carbamates (Lannate, Sevin)
  - Pyrethroids (Asana, Baythroid, others)
  - Abamectin (Agri-Mek)
  - Neonicotinoids (foliar—Actara, Venom, Belay)

Still bad but not as long lasting

Apply only in late evening

- Malathion

Apply late evening, night, or early morning

- Assail (a neonicotinoid)
- Neemix, Azatin (azadirachtin)
- Acramite (bifenazate)
- Radiant, SpinTor, Entrust (spinosad)
- Trigard (cyromazine)
- Fulfill (pymetrozine)
- Avaunt (indoxacarb)

Relatively safe for bees

- Bacillus thuringiensis
- Intrepid (methoxyfenozide)
- M-Pede (insecticidal soap)
- Knack and Courier, Rimon (IGRs)
- Beleaf (flonicamid)
- Zeal and Portal (miticides)
- Sulfur
- Coragen, Synapse, Vetica

IPM for cucurbits

- Be able to identify your pests
- Develop a regular scouting program or hire someone to do it
- Use reduced-risk, specific insecticides and use only when needed, rotate between MOAs
- Conserve beneficial insects
- Flowering plants in borders for beneficials
- Rye grown as windbreaks can have aphids that attract beneficial insects but don’t harm crop
- Cultural controls (sanitation, location, planting date, reflective mulches)

Cultural Controls

- Reflective mulches can repel aphids, thrips, and whiteflies
- Essential for fall production
- May reduce the incidence of insect-transmitted plant viruses

Conserving beneficials

- Even products for organic production can be harmful to beneficial insects
- Provide flowering plants throughout the season as pollen and nectar sources
- Hover fly at left

Aphid predators

- Lacewing larva
- Lady beetle larva
- Hover fly larva

Other general predators

- Robber fly
- Green lynx spider
- Bigeyed bug

More predators

- Spined soldier bug
- Minute pirate bug
- Assassin bug

Parasitoid wasps—aphid mummies on watermelon

Deciding to treat or not and what to use

- Pests increasing or decreasing?
- Natural enemies present?
- Damage increasing?
- Crop growth stage
- Weather
- Efficacy of control measure

Deciding what to use

1. What pests are causing problems?
2. Are plants in bloom?
3. How many days to harvest?
4. How many times can the material be applied during a crop season?
5. What MOA code does the product have? What else can be used in rotation? Delay resistance!
6. Example: group 28 insecticides (Coragen, Synapse, Durivo, Vetica, Voliam Xpress, Voliam Flexi)

Caterpillar pests

Photo: Chad Hutchinson

- Cabbage looper and beet armyworm feed on rinds of watermelon (rindworms) as well as leaves
- Use Bts when worms are small, Avaunt (22), and Coragen, Belt, Exirel, Vetica (28), and Radiant (5) also available. Organic growers can use Bts and Entrust

Rindworm damage to watermelon

- Several species will feed on rind
- Beet armyworm (pictured)
- Granulate cutworm
- Cabbage looper
- Others

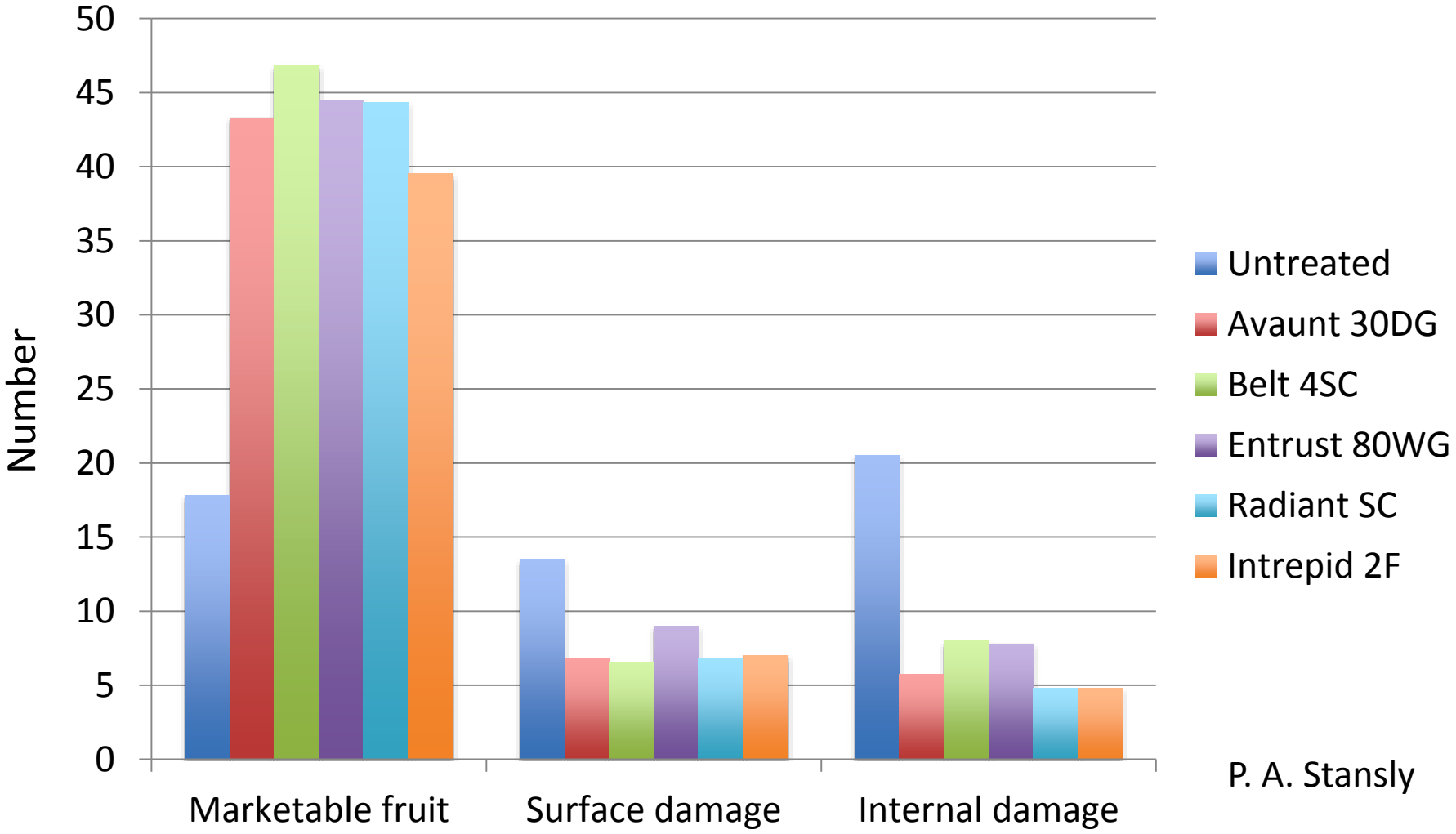
Photo: Warren Adlerz

Pickleworm and melonworm

Damage done by melonworm and pickleworm

- Melonworm is easier to control with pesticides
- Pickleworm is protected inside blossoms and fruit

Management of Pickleworm



Cucumber beetle biology

- Spotted and striped cucumber beetles most common in North Florida
- Larvae feed on roots and sometimes, in very wet conditions, on the underside of melons where they touch the soil
- Adults may transmit bacterial wilt to cucumbers and cantaloupe but not watermelon

Spotted and striped cucumber beetles

Managing cucumber beetles

- Control necessary when there are more than 5 beetles per plant, especially when plants are small
- Georgia threshold is 10% of plants infested
- Beetles should also be controlled if there is feeding damage on stems and fruit

Managing cucumber beetles

- If beetles are an annual problem, the best control is an application of a neonicotinoid insecticide to the soil at planting
- If no soil application of a neonicotinoid, can try a foliar application of Assail
- Other broad-spectrum insecticides labeled for cucumber beetle control can be used if needed, but heed pollinator warnings

Melon Aphid (*Aphis gossypii*)

- Melon aphid is mainly a direct pest of cucurbits but can also vector mosaic viruses
- Fulfill (9B) is effective (also Beleaf [9C]), also Assail and other Group 4A insecticides
- Avoid Ambush and Pounce, other pyrethroids (3)
- Insecticides won't stop spread of aphid-vectored viruses

Photo: Warren Adlerz

Silverleaf whitefly

- High populations can reduce yield
- Sooty mold grows on honeydew excreted by whiteflies
- Silverleaf of squash
- A virus vector!

Silverleaf whitefly

- Can use Admire, Platinum, Venom, Scorpion, or Verimark at planting or use Venom or Assail as a foliar **before flowering** (all 4A)
- Knack (7C) and Courier (16) are IGRs that target nymphs
- Portal, Exirel
- Oberon (23) controls immature stages
- Fulfill (9B) will give some control, also oils, and products containing neem

Squash bugs
Anasa tristis

- Feed on cucurbits, especially squashes and pumpkin
- Overwinter as adults in leaf litter and other sheltered places
- Mulches act as shelter in crop

Eggs and young nymphs

Feeding damage to squash

- Feed mainly on leaves
- Highly toxic saliva causes wilting and necrosis-”anasa wilt”
- Damage is more severe when population is high
- Destroy crop immediately after harvest, so bugs starve

Mites

- Broad mites can cause bronzing and stunting
- Twospotted mites can be a problem in dry weather
- Acramite and Zeal control twospotted mite, Portal will control broad mites

Whitefly-transmitted cucurbit viruses

- *Squash vein yellowing virus* (SqVYV)
- *Cucurbit leaf crumple virus* (CuLCrV)
- *Cucurbit yellow stunting disorder virus* (CYSDV)
  - All transmitted by

  Bemisia tabaci (B)

  (silverleaf or

  sweetpotato whitefly)

Whitefly-transmitted viruses

- *Cucurbit leaf crumple virus*
  - A whitefly transmitted geminivirus that has been a problem in western US
  - Once acquired by whitefly, may be transmitted for the rest of its life
  - Has been found to infect snap beans in Florida
  - Has been a problem in north Florida in the fall, mixed with PRSV-W

Cucurbit Leaf Crumple Virus

Cucurbit leaf crumple virus

Photo: Chad Hutchinson, UF-Horticulture

- First found in Hastings and Citra, FL
- Now widespread, often present in mixed infections

Cucurbit leaf crumple virus

Photo: S. Adkins, USDA, Fort Pierce

- Crumpling and yellowing are typical of this Begomovirus (whitefly-transmitted geminivirus)
- Watermelon outgrows symptoms if not infected with any other virus