

### **Welcome to the webinar!**

- The webinar will start at the top of the hour.
- Find a handout of the slides and a fact sheet at <http://www.extension.org/pages/71270>
- To type in a question, use the question box on your control panel. We will read the questions aloud after the c. 45 minute presentation.
- The webinar is being recorded and you can find it in our archive in the coming week at <http://www.extension.org/pages/25242>



## **IPM of Crucifer Crops: Focus on the Yellow-margined Leaf Beetle**

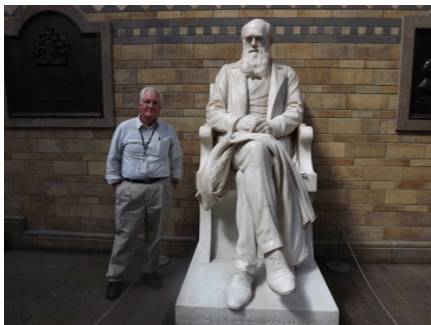
Rammohan Balusu and Ayanava Majumdar,  
Auburn University. Ron Cave, University of Florida

December 2, 2014





Rammohan Balusu



Ron Cave



Ayanava Majumdar

## IPM in Crucifers: Focus on Yellowmargined Leaf Beetle

Presenters:

Rammohan Balusu<sup>1</sup>, Ronald D. Cave<sup>2</sup>, and  
Ayanava Majumdar<sup>3</sup>

Co-authors:

Henry Fadamiro<sup>1</sup>, Oscar Liburd<sup>2</sup>, and Elena Rhodes<sup>2</sup>

<sup>1</sup>Auburn University

<sup>2</sup>University of Florida

<sup>3</sup>Alabama Cooperative Extension



December 2, 2014



(USDA – NIFA Award # 2011-51300-30634)

## Presentation Layout

- Introduction
- Research findings from Alabama
- Research findings from Florida
- Combined IPM recommendation
- Extension IPM resources

## Topic Relevance

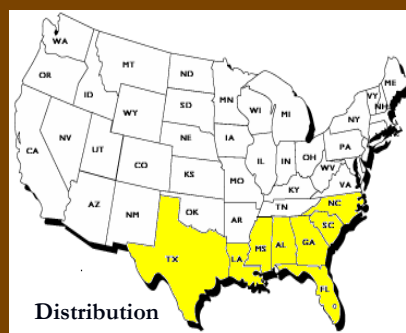
- Organic crucifer production is a challenge in southern U.S.
  - Low number of **certified** organic acreage (USDA, 2008)
- Major problems with crucifer production:
  - Pests destroy or contaminate produce at **critical point** of production resulting in yield or quality loss.
  - Insect pests like the Yellowmargined Leaf Beetle (YMLB) are year-round problem in the hot and humid South.
  - Lack of effective organic integrated pest management (IPM) tactics.

## OAREI Objectives: YMLB Focus

1. Research objectives (based on NOP standards):
  - Level 1: System-based practices: Trap crops and biological control agents
  - Level 2: Mechanical and Physical practices
  - Level 3: OMRI approved bio-insecticides
2. Producer training (ongoing)
3. Developing new IPM educational resources (ongoing)

## Key pest of organic crucifers in the South

- Yellowmargined leaf beetle or YMLB, *Microtheca ochloroma* (Coleoptera: Chrysomelidae)
- Native to South America
  - First reported in Mobile, AL in 1947

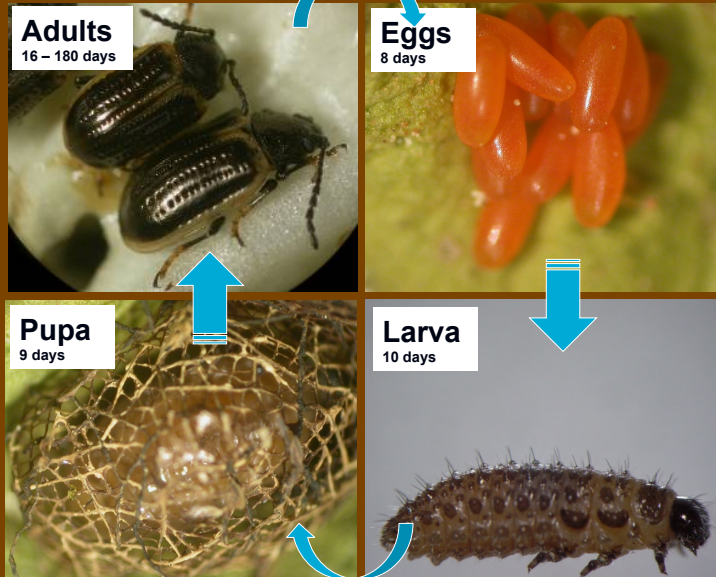




## YMLB Biology

Multiple generations

~30 days to complete life cycle at 22°C



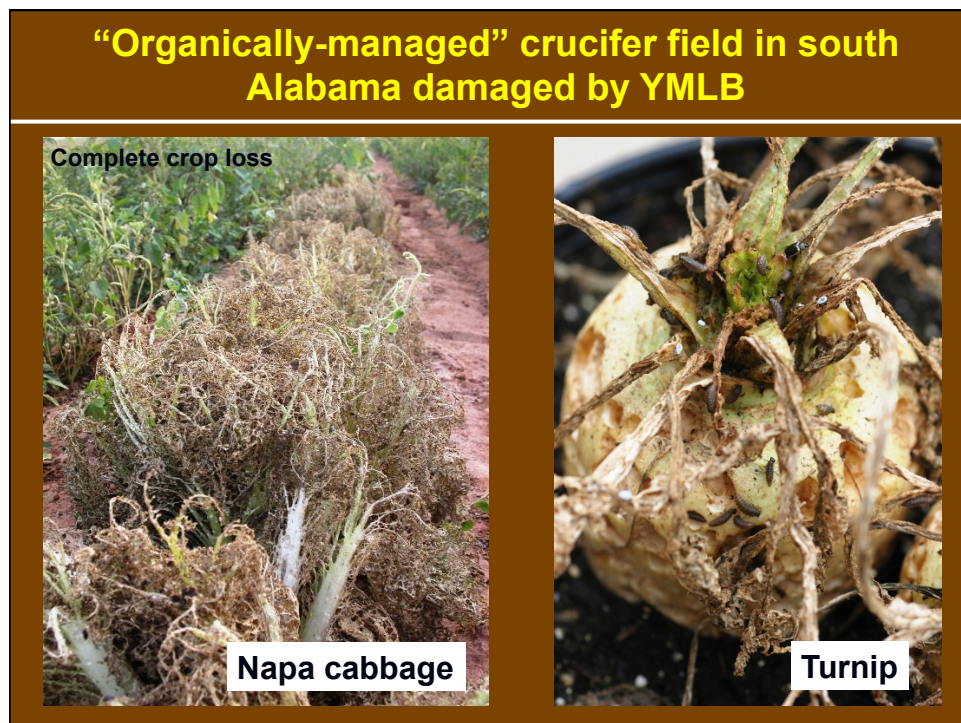
## YMLB Damage



Larvae on turnips

Adults on napa cabbage

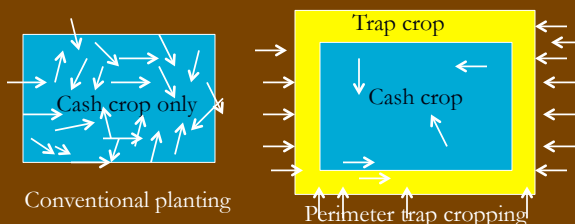




## Level 1: System-based practices

### Trap cropping for YMLB

- Perimeter trap cropping - planting a more attractive crop on field borders to protect the main cash crop.
  - Intercepts and concentrates the pest population in the border.
- YMLB is a good candidate for trap crop management
  - ✓ Show host preference
  - ✓ Migrate into the field
  - ✓ Exhibit strong edge effect
  - ✓ Limited mobility



## Methods

- Could we use turnip as trap crop to manage YMLB?
- Trap crop: Turnip
- Cash crops: Cabbage/ Mustard/ Napa cabbage
- Data collection
  - Larvae
  - Adult
  - Damage rating at harvest

#### Damage rating scale

- 1 = very light defoliation (< 10%)
- 2 = light defoliation (10-30%)
- 3 = moderate defoliation (30-50%)
- 4 = heavy defoliation (50-70%)
- 5 = very heavy defoliation (70-90%)
- 6 = complete defoliation (> 90%)

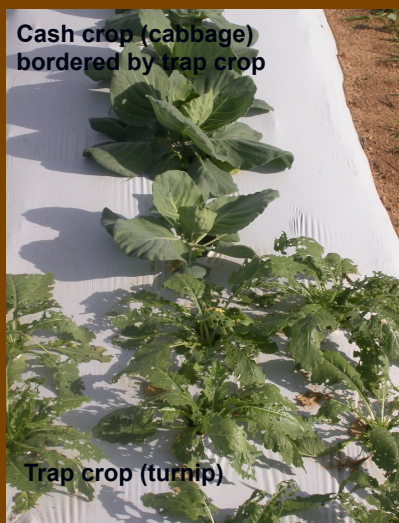


## Field layout

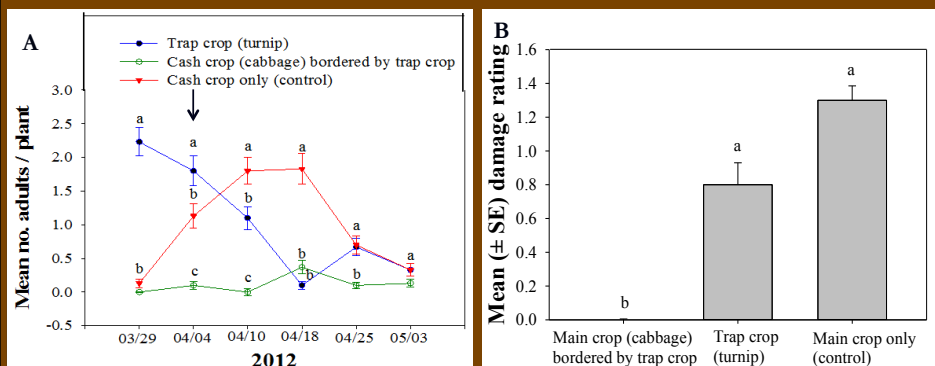


- Turnip trap crop was planted two weeks ahead of cabbage cash crop

## Is turnip an effective trap crop for YMLB?



## Results



- Perimeter trap cropping with turnip attracted beetles away from cabbage cash crop.

## Summary

- Turnip is highly attractive trap crop for YMLB in organic cabbage production system
- Perimeter planting of turnip in the border of cabbage field limit YMLB infestation on the border.
- Trap crop management is necessary – single application of insecticide on turnip trap crop effectively reduced YMLB damage on cabbage cash crop.

### Level 3: Biorational insecticides: Biopesticides for YMLB

- Biopesticides and botanical insecticides were tested as last resort therapeutic tools for control of YMLB

- PyGanic®

- Entrust®

- NOFLY™

- Grandevo™

- Entrust® alternated with NOFLY™

- Entrust® alternated with PyGanic®

- Control



PyGanic®



Entrust®

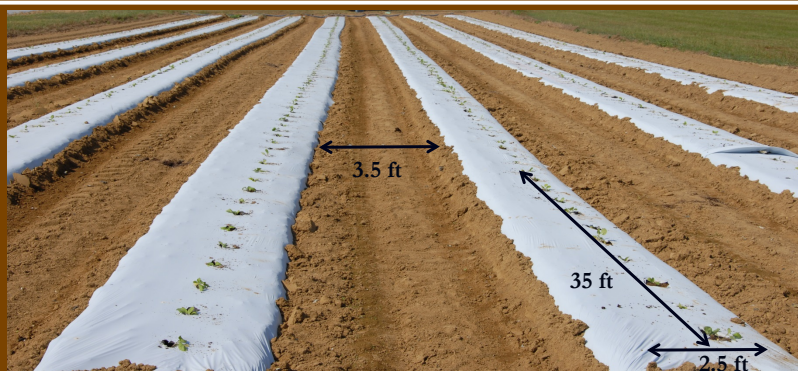


NOFLY™



Grandevo™

### Field layout



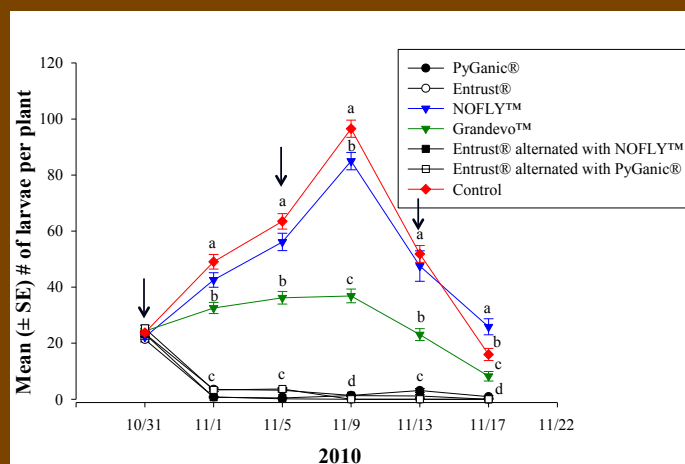
#### ■ Data collection:

- Larvae
- Adult
- Damage rating at harvest

#### Damage rating scale

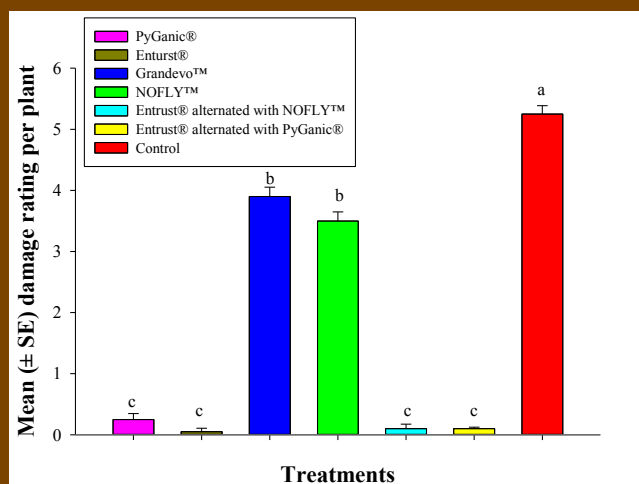
- 1 = very light defoliation (< 10%)
- 2 = light defoliation (10-30%)
- 3 = moderate defoliation (30-50%)
- 4 = heavy defoliation (50-70%)
- 5 = very heavy defoliation (70-90%)
- 6 = complete defoliation (> 90%)

## Results

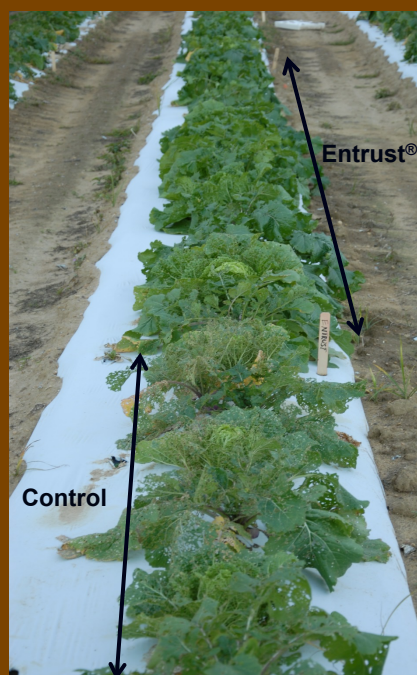


Entrust®, PyGanic® > Grandevo™ > NOFLY™

## Results



## Entrust® Vs Control



## Summary

- Entrust® and PyGanic® consistently performed well in suppressing YMLB adults, larvae and crop damage
- Grandevo™ was effective against larvae
- Entrust® can be applied in rotation with NOFLY™ and PyGanic®



# BIOLOGICAL CONTROL OF THE YELLOWMARGINED LEAF BEETLE

---

**Ronald D. Cave, PhD**  
**Indian River Research and Education Center**  
**Ft. Pierce, Florida**



[rdcave@ufl.edu](mailto:rdcave@ufl.edu)

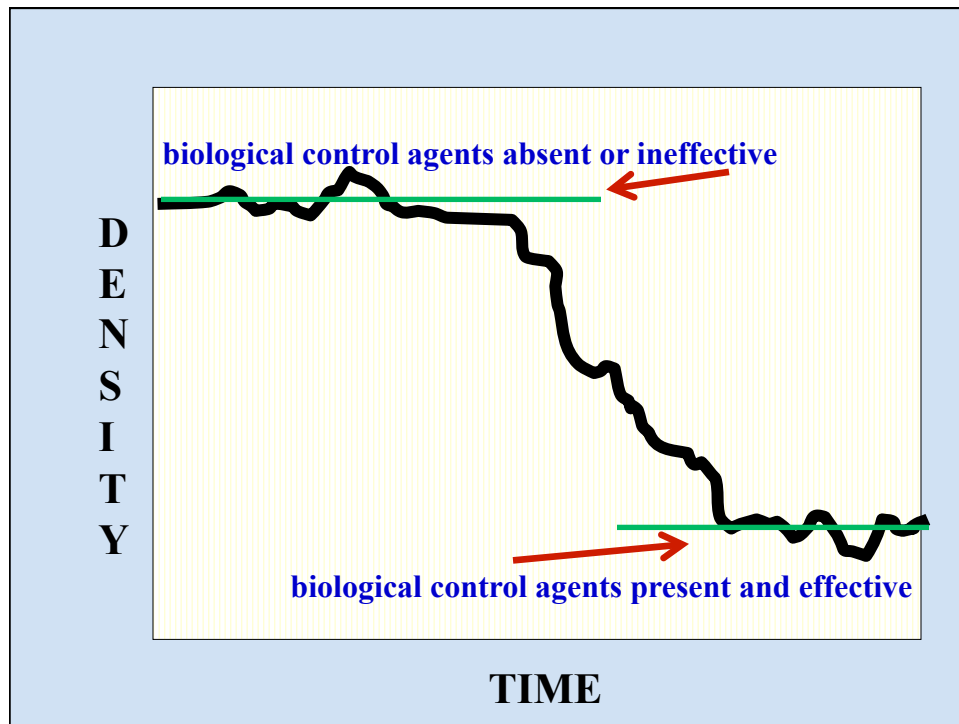


25

## BIOLOGICAL CONTROL:

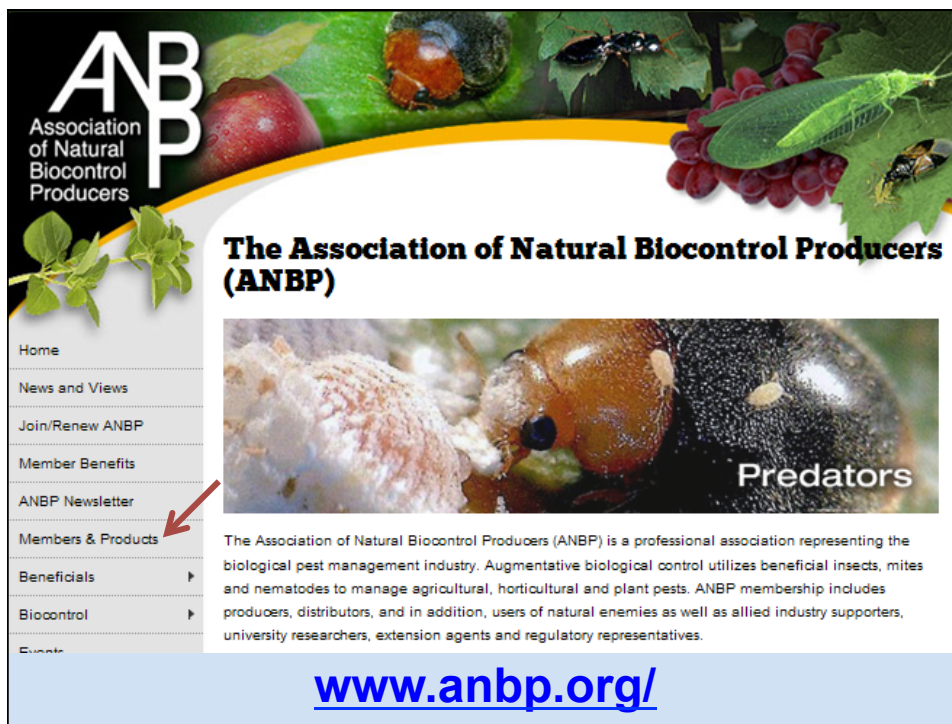
---

**the direct action of parasites,  
predators, and pathogens  
("natural enemies") that  
maintain and regulate an  
organism's population density at  
an average level lower than  
would exist in their absence**



## APPLIED BIOLOGICAL CONTROL TACTICS

1. classical biological control
2. conservation biological
3. augmentation biological control



**ANBP**  
Association of Natural Biocontrol Producers

**The Association of Natural Biocontrol Producers (ANBP)**

Home  
News and Views  
Join/Renew ANBP  
Member Benefits  
ANBP Newsletter  
Members & Products  
Beneficials  
Biocontrol  
Events

**Predators**

The Association of Natural Biocontrol Producers (ANBP) is a professional association representing the biological pest management industry. Augmentative biological control utilizes beneficial insects, mites and nematodes to manage agricultural, horticultural and plant pests. ANBP membership includes producers, distributors, and in addition, users of natural enemies as well as allied industry supporters, university researchers, extension agents and regulatory representatives.

[www.anbp.org/](http://www.anbp.org/)

## BIOLOGICAL CONTROL OF THE YELLOWMARGINED LEAF BEETLE

1. No known specific parasitoids or predators.
2. Insufficient information on ecology of resident natural enemies.
3. Generalist predators are in the marketplace.



spined soldier bug

Native North American species

## SPINED SOLDIER BUG KILLING RATES

**Nymphs:**

**1-7 YMLB larvae / day**

**59 YMLB larvae total**

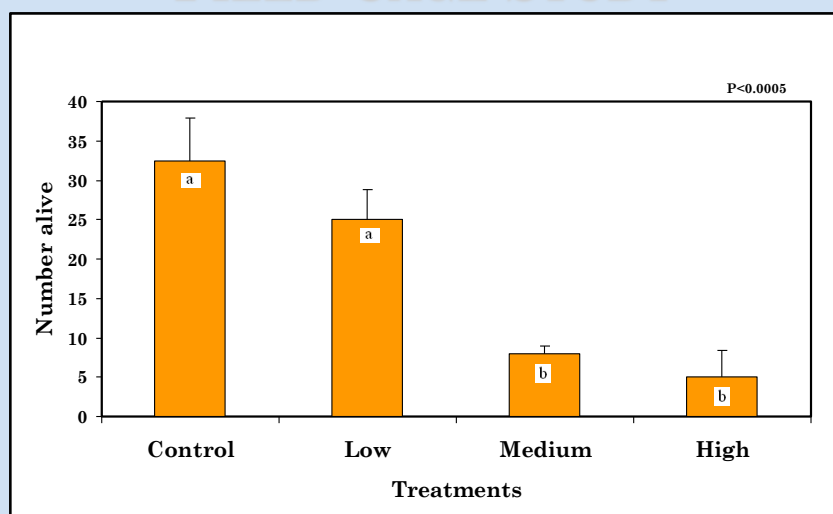
**Adults:**

**5-6 YMLB larvae / day**

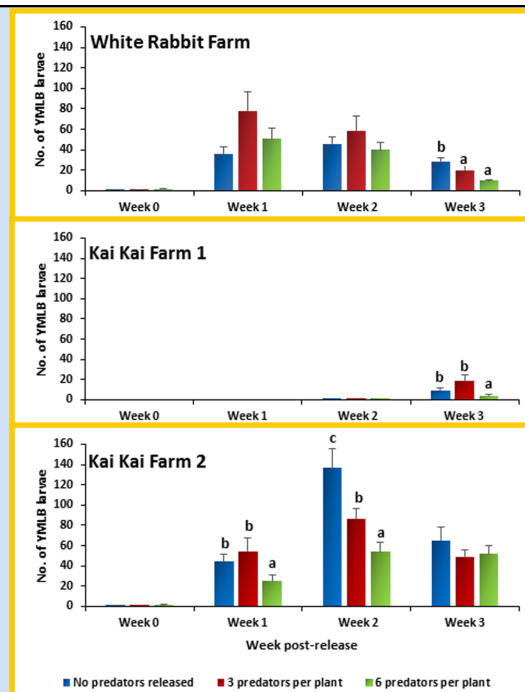
**13 YMLB larvae / 10 days**



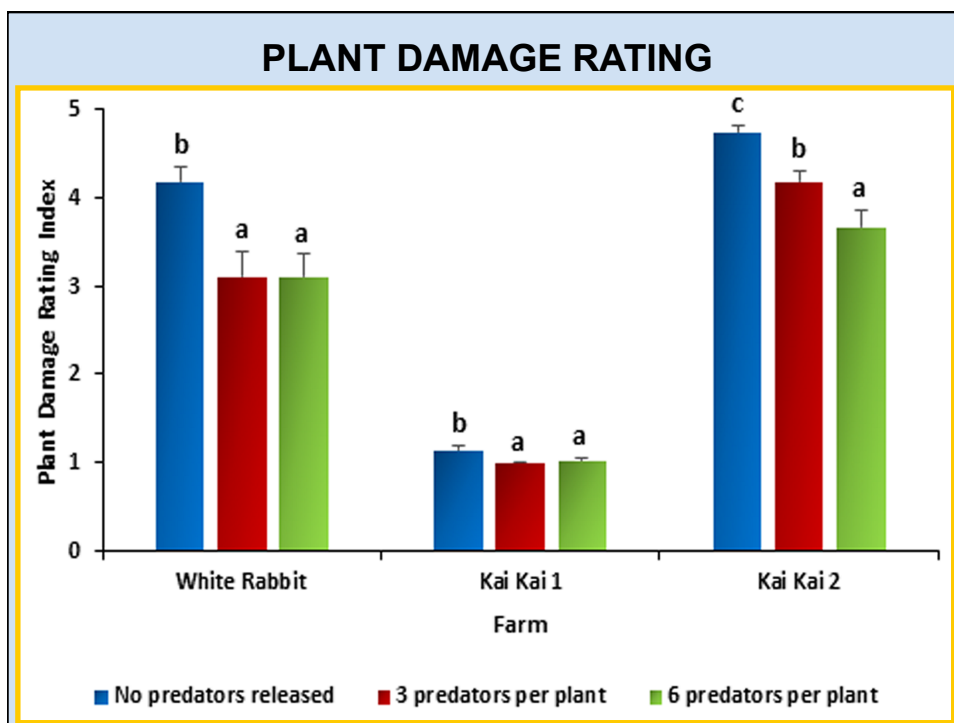
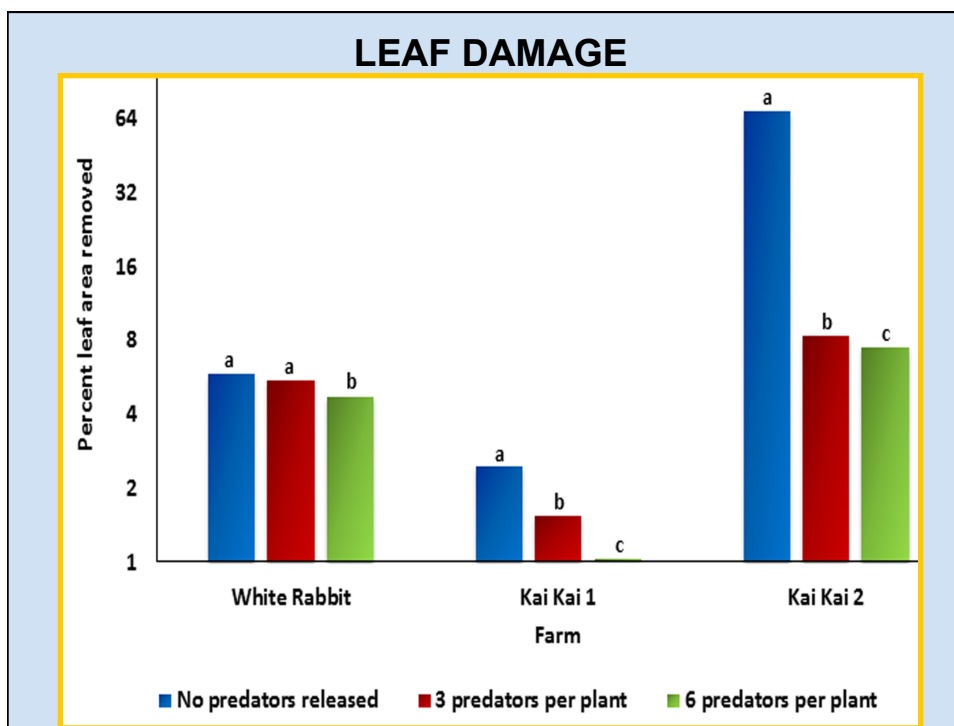
## FIELD-CAGE STUDY



**Population of the YMLB was reduced 75% and 84%**



**Number of YMLB larvae per plant in plots receiving SSB was significantly less in some weeks.**





### GREEN LACEWING LARVAE KILLING RATES

---



**YMLB eggs:**

**3-67 / day**

**500-600 / larva**

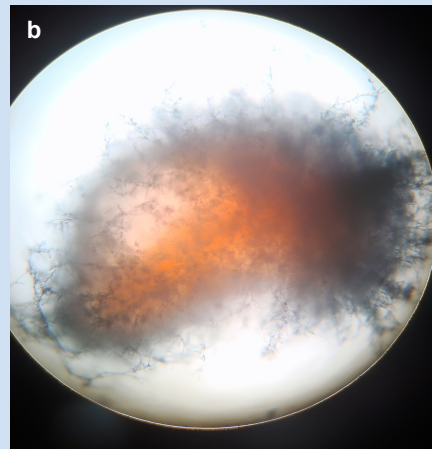
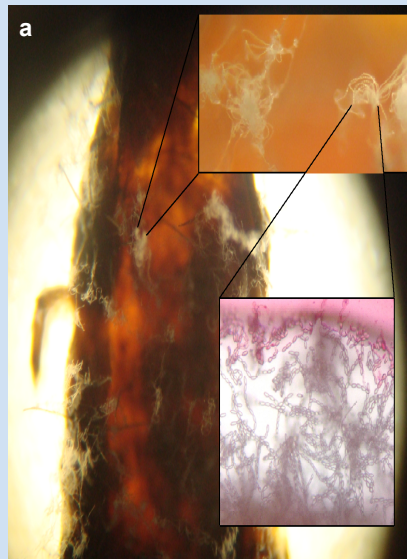
---

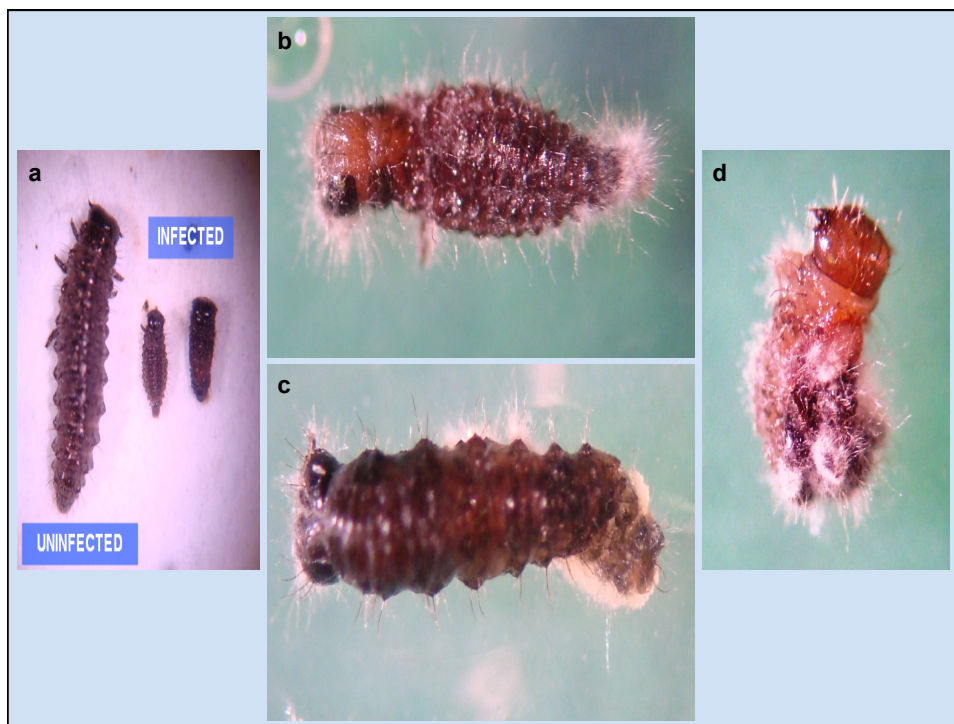
**YMLB 1<sup>st</sup> instars:**

**2-42 / day**

**220-225 / larva**

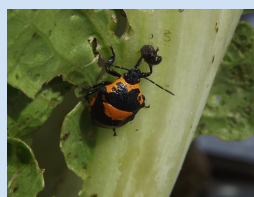
### ENTOMOPATHOGENIC FUNGUS *Isaria fumosorosea*





## CONCLUSIONES

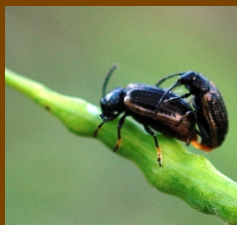
1. Exploration in Argentina is needed.
2. Ecology of resident natural enemies needs to be studied.
3. Releases of spined soldier bugs and green lacewing larvae (maybe) show potential, but more trials and economic analysis are necessary.
4. More investigation of entomopathogenic fungi.







## Crucifer IPM Recommendations and Educational Resources



### IPM Recommendations: Scouting for YMLB



- Look for adult beetles – one adult per plant is a warning!
- Host preference:  
Turnip > napa cabbage > mustard > cabbage > collard
- Look for early defoliation on turnips



*This is too late!*

## IPM Recommendations: Prevent buildup/outbreak!

- **Field sanitation** is important
- **Larvae** are more susceptible to freezing temps.
- Protect or release **natural enemies**



*Don't leave them uncontrolled!*

## IPM Recommendations: Trap Cropping



- Trap cropping (TC) strongly recommended:
  - Perimeter TC with turnips: Plant TC two-weeks before main crop
  - Control YMLB on trap crop
    - Weekly scouting
    - Treat when numbers exceed 1 adult per plant
    - Biopesticides listed on next slide

## IPM Recommendations: Biopesticides

- Effective biopesticides:
  - Spinosad (Entrust ®): Adults, larvae
  - Pyrethrin (PyGanic ®): Larvae
  - *Chromobacterium subtsugae* (Grandevo ®): Larvae
  - *Isaria fumosorosea* (NoFly ®): Larvae
- PyGanic, Grandevo, and Isaria good for rotation
- On trap crop, one or two appl. of spinosad may be enough...
- Spray main crop as needed - do NOT overspray to protect natural enemies!

## Intensive Producer Training and Rapid Response IPM Campaign

*Farmer-to-farmer*



*Resolving urgent pest issues*



*50% or more crop saved by timely intervention*

## Alabama IPM Communicator – a major resource for producers



Team publication since 2010

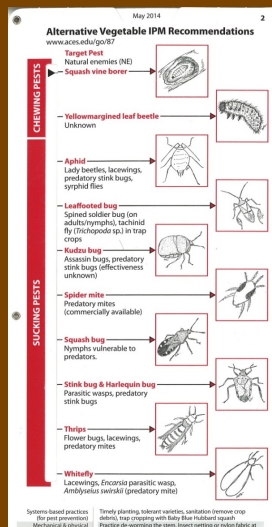
1450 subscribers

Available as PDF (numbered  
Ext. bulletin) and...



Web-based for mobile devices!

## New Extension Resources in Alabama



New Producer Handbook and Alternative IPM Slide charts for use by  
small producers.

**extension**  
ALABAMA A&M HARBOR UNIVERSITY

**Commercial Horticulture**

Vegetable

Commercial Horticulture Comm Hort Blog For CommHort Staff **Vegetable IPM** Search this site...

**Alabama Vegetable IPM Project**

**BASIC RESOURCE AREAS**

Pest identification and scouting techniques

NRCS IPM Plan (PAMS Approach for Conservation Programs): [Click here](#) for EXCEL, contact Dr. A by email for queries if you have trouble downloading.

[IPM Communicator Newsletter](#)

[Extension Presentations](#) (Slide Share)

[Extension Bulletins](#)

[Magazine/Newspaper Articles](#)

[Educational Videos](#) (YouTube)

[Certified Horticultural Retailer Training](#)

[Alabama Organic Program - Alabama SARE](#)

[IPM Web Conference](#) (Archive)

[Vegetable IPM Funding Sources](#)

[IPM Evaluation Toolkit](#) (for educators)

**IPM TRAINING MODULES FOR PRODUCERS**

[Trap Crops For Leaf-footed Bug Control](#)

[Alternative Insecticides for Vegetable Production](#)

[Pest Exclusion Methods](#)

[Beneficial Insects](#) (coming soon!)

**STATEWIDE PRODUCER ORGANIZATIONS**

[Alabama Fruit & Vegetable Growers Association](#) (Click for 2015 Conference Details)

*Order your Alternative IPM Slide chart today!*

This is the ultimate pest management tool for small/organic producers. To order, contact your Commercial Horticulture Regional Ext. Agent or attend an educational event! It is that easy!!

*IPM Program Team Members*

Dr. Ayanava Majumdar, Ext. Entomologist, SARE Coordinator

Ann Chambliss, Program Assistant

[www.aces.edu/go/87](http://www.aces.edu/go/87)

For Ext. publications, please email [bugdoctor@auburn.edu](mailto:bugdoctor@auburn.edu)

## Vegetable IPM on Facebook!

**Alabama Vegetable IPM Project**  
Scout Without Doubt

**Alabama Vegetable IPM**  
Government Organization

Timeline About Photos Likes More

386 likes

Sonja Brannon Thomas, Karyl Hanisch and 82 others like this.

Reach a new milestone  
500 Likes  
[Promote Page](#)

Invite your friends to like Alabama Vegetable IPM

Udayan Kumar [Invite](#)

Omveer Singh [Invite](#)

See All Friends

What have you been up to?

Alabama Vegetable IPM shared a link.  
Posted by Ayanava Majumdar · 11 · November 20 ·

Attend the Fall Vegetable Growers Workshop (focus on cole crop production and pest management) on Dec 4 @ 1 to 3:30 p.m. in Clanton. Details at <https://sites.aces.edu/group/commhort/blog/Lists/Posts/Post.aspx?ID=203>

*Dr. Joe Kemble  
Dr. Ayanava Majumdar  
Jim Pate  
Gary Gray*

The CHSAC is located at  
130 County Road 756  
Clanton, AL 35045

For more information contact:  
Gary Gray  
Regional Extension Agent  
(334) 39-2128  
[grayg@aces.edu](mailto:grayg@aces.edu)  
or The Chilton County Extension Office

**"Top 10 BMPs for Successful Cole Crop Production"**  
Collards, Kale, Broccoli, Cabbage, Turnip, Mustard...  
varieties, double cropping on plastic, fertigation...

**Alabama Vegetable IPM Project**  
Scout Without Doubt

**Advantages: Rapid pest alerts, interactive, insect ID photos and videos, success stories, IPM contest**



## Acknowledgments

- ✓ Research funding provided by USDA-NIFA OAREI
- ✓ Grower participants in AL, FL and GA
- ✓ Field research staff at university farms
- ✓ Alabama Vegetable IPM Program Assistant: Ann Chambliss



- Find all upcoming and archived webinars at <http://www.extension.org/pages/25242>
- Find the recording and slides from this webinar at <http://www.extension.org/pages/71270>
- Have an organic farming question? Use the eXtension Ask an Expert service at <https://ask.extension.org/groups/1668/ask>
- We need your feedback! Please respond to an email survey about this webinar.
- Thank you for coming!

