
Live Oak
Living Extension
IPM Field Laboratory
Suwannee Valley

Index

Background:

Increased interest among small farmers in Florida to adopt innovative pest management strategies, led a group of University of Florida Research and Extension faculty, allied agencies, and organizations under the leadership of County Extension Agent, Robert Hochmuth, and Extension IPM Specialist, Dr. Norm Leppla, to initiate a new long range plan to teach hands-on IPM principles and practices. The group secured a three year Extension IPM grant from USDA, NIFA to transform a 330 acre farm at the University of Florida's Suwannee Valley Agricultural Extension Center in Live Oak, FL into a teaching field laboratory. The IPM grant has been used to leverage an additional funding from the University of Florida and Suwannee County Conservation District in three years.

Goals and Objectives:

The overall goal of this project is to create a unique, hands-on, whole farm approach to teaching IPM with specific objectives to: 1) create a field laboratory by transforming an existing farm into a model that can be used to teach IPM principles and techniques beyond the classroom, 2) teach clientele whole farm IPM approaches, and 3) build a sustainable education infrastructure and networking capacity for future IPM information delivery.

Development Phase of the Living IPM Lab:

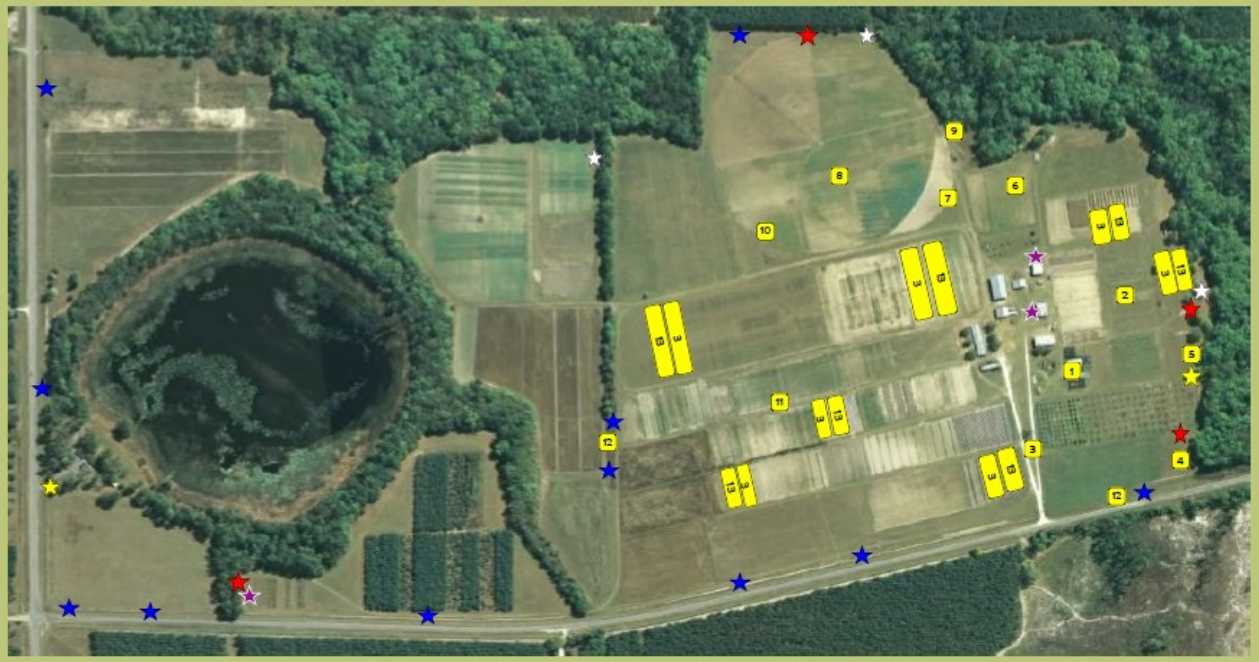
The 330 acre field laboratory includes, but is not limited to: maintaining annual and permanent plantings that attract beneficial organisms and provide year round habitats, demonstrating strategic trap cropping systems, providing beneficial vertebrate habitats (e.g., bat houses, bluebird houses, chickadee houses, and brush piles), utilizing banker plant systems (especially in greenhouse programs), demonstrating how to increase natural pollinators, and enhancing the ecological contribution of the lake, surrounding forest and other natural resources on the farm. The farm is set up for drip irrigation, overhead sprinklers and larger pivot irrigation systems for many vegetable and agronomic crops. The site has a seven-acre demonstration orchard with at least a dozen sustainable fruit crops, a two-acre organic production field, and several greenhouse and other protected agriculture structures. Additional valuable teaching resources available at this site include: two covered trolleys to tour attendees on the farm, a conference room, a large covered pole barn, fifteen dissecting microscopes, a reference pest and beneficial insect specimen collection, sweep nets as well as other insect collecting equipment, and educational kiosks at several key locations on the farm.

Team Building and Increasing Awareness:

The Living IPM Laboratory has increased awareness of the opportunities to improve the adoption of IPM practices on a wide range of farm sizes and for a variety of cropping systems to farmers, land owners, internally to the University of Florida and associated agencies. The project has been implemented by a diverse multi-disciplinary team of over 25 members of University of Florida, Institute of Food and Agricultural Sciences faculty and staff members along with associated agency cooperators. Agency cooperators included: Natural Resources Conservation Service, Florida Department of Agriculture and Consumer Services, Suwannee River Water Management District, Florida Fish and Wildlife Conservation Commission, and Suwannee County Conservation District. This collaborative effort has far reaching future impact for the University of Florida as it brings many new members to the same table, all with a similar vision but varying specialized expertise. Because the project encompasses the entire farm, all associated project members are committed to the overall effort and embrace a new and unique approach to IPM on a whole farm scale. This approach includes the following IPM tactics: farmscaping and whole farm systems, trap crops, trapping arrays, native pollinator enhancement, scouting and selecting pesticides wisely, conservation tillage and cover crops, birds and bat utilization for pest reduction, establishment of “plants with a purpose”, fence lines and hedge rows, pest exclusion, and protected agriculture.

Living Extension IPM Field Laboratory

UF/IFAS Suwannee Valley Agricultural Extension Center



1. Greenhouse IPM
2. Mixed Fruit and Nut Orchard
3. Habitat for Beneficial Insects
4. Wildlife and Beneficial Habitat
5. Brush Pile
6. Organic Vegetables
7. Banker Plants
8. Agronomic Crops IPM Area
9. Invasive Plant Management
10. UF Weather Station (FAWN)
11. Mixed Vegetable Area
12. Hedgerow or Fencerow Habitat
13. Trap Cropping Systems

★ Bluebird Boxes

★ Chickadee Boxes

★ Kestrel Boxes

★ Barn Owl Boxes

★ Bat Houses

The Living Extension IPM Field Laboratory is a concerted effort to establish a unique, whole-farm, agro-ecological system to use as a demonstration environment for farmers and landowners. The goal is to transform this existing 300-acre outreach farm into a living, hands-on IPM teaching laboratory. This laboratory will be used to instruct clientele in systematic approaches to adopting IPM practices. These various workshops will be held in conjunction with the Florida UF/IFAS Small Farms Academy.

IPM Enhancement Features

Various areas where established with annual or perennial plants and houses were established for birds, bats. These areas serve as the primary features for the IPM Living Lab.

Trapping Pest

Attracting Beneficials

Wildlife Habitat

Pollinators

Banker plants

Blue Bird Box

Bats

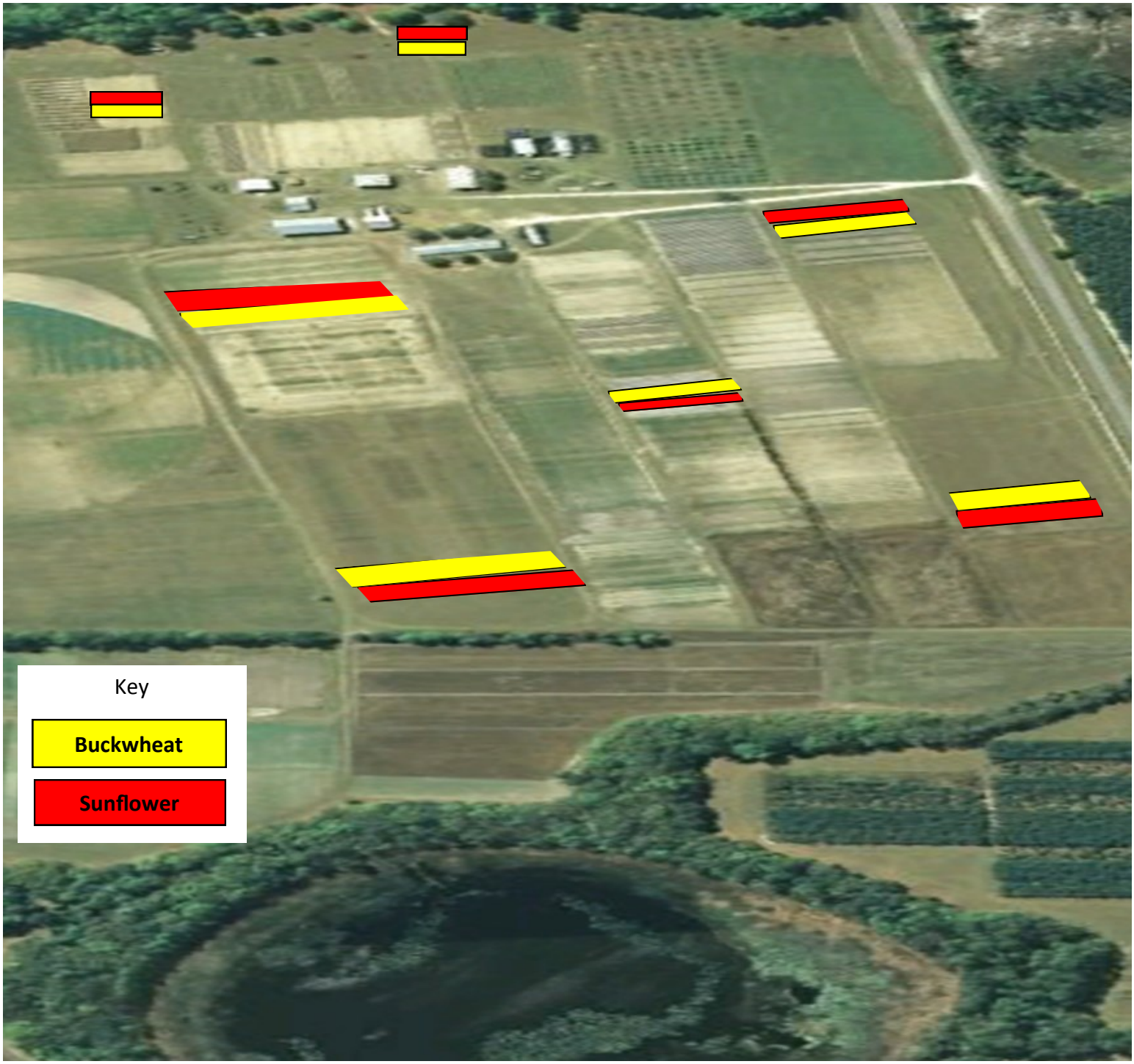
Encouraging birds & bats to help control invertebrates

Brush piles assisting with rodent control

Owls

Enhancement Plots

Enhancement plots with buckwheat to attract pollinators and beneficials insects.
Sunflowers, and sorghum as a trap crop for stink bugs.



Seven plots, five within the vegetable fields and two on the south end of farm, by organic area and fruit orchards. The plantings are buckwheat, sunflowers, and millet/sorghum. Each crop will be approximately 5' wide. The areas will be sprayed with Roundup to kill the sod areas, fertilized (10-10-10 or similar analysis at 300 lbs/acre rate) and then the seeding will be done with the no till drill or JD row crop planter. First three crops to be sown with the planting of the same crops consecutively 3 to 5 weeks later. When the first planting is spent it will be sprayed with Round Up to prepare for another planting. Consecutive plantings will be repeated throughout the warm weather season.

Sunflowers as a trap crop

Sunflowers were initially planted between crops

It was known that sunflowers would have many uses.

- Attract pollinators to help pollinate crops
- Attract birds by offering perches for them to scout for bugs

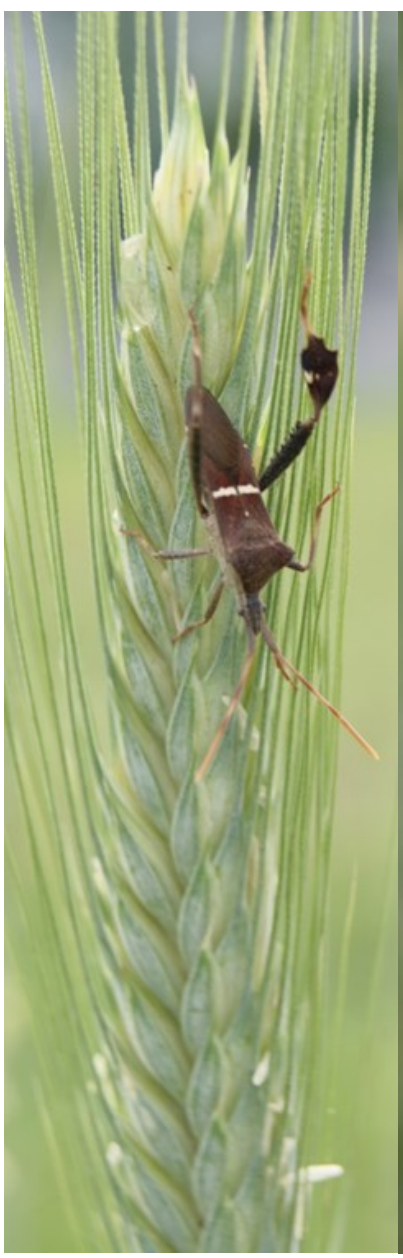
It became obvious that stink bugs , mostly the **Leaf-footed bug - *Leptoglossus oppositus,*** were very attracted to the larger type sunflowers

The discovery of the Leptoglossus attraction caused a change in the strategy to planting sunflowers on the perimeter of the crops so the pest would not be drawn into the crop area and when necessary the sunflower could be used as a trap plant that can be sprayed when the stink bug populations were high. If proper spraying and timing are used the pollinators are not effected.

Triticale as a trap crop for cool season

Triticale is a cross between wheat and rye.

This crop was planted in the winter season as a trap crop near spring cropping areas and around the stone fruit. When populations of stink-bugs increased very early in the spring, only the triticale was sprayed. This was very effective in deceasing the spring populations of stinkbugs.



Buckwheat to attract beneficials

For vegetables

For the orchard

At the end of the field

Buckwheat attracts many types of pollinators and beneficial insects

Beneficials insects

This is a sample of the common beneficials that have increased due to IPM practices adopted

Lady Bird Beetle (Lady Bug)

Minute Pirate bug
Orius spp

Big Eyed Bug *Geocoris*

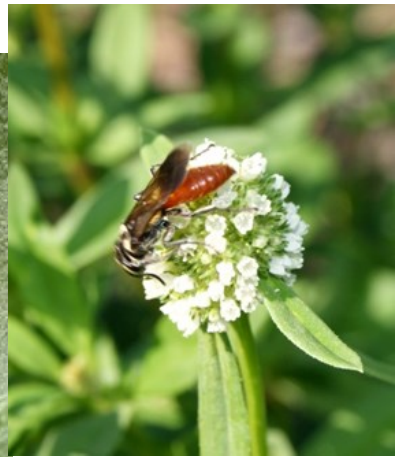
Lacewing

Mealy bug destroyer

Assassin bug

Asilidae (Robber Fly)

Parasitic Wasp



Larra Bi-color wasp

Promoting Pollinators

Although many crops attract various pollinators, some crops attract specific ones. Traits like the depth or shape of the flower and how the pollen or nectar are offered in the flower affect the types of pollinators attracted.

Partridge Pea

Sunflower

Crape Myrtle

Native pollinator houses

Spotted Horsemint

Shrubby False Buttonweed

Sesame

Buckwheat

Conservation practices

Using conservation practices including cover crops, enhances the overall IPM program by: conserving moisture, reducing weed pressure and erosion, and helps to increase soil organic matter. These practices cause less disturbance of the ground which also promotes our native ground dwelling pollinators.

70% of Florida's native pollinators are ground dwellers

Crimping cover crop

A sample of a hole of a ground dwelling pollinator

Planting seeds with a no till drill

Cover crop blend

Many Plants Have Extrafloral Nectaries Helpful to Beneficials

Few people are aware of the extrafloral nectaries (EFN), nectar-producing glands physically apart from the flower, that have been identified in more than 2000 plant species in more than 64 families. When deciding on plants for enhancement considering plants with Extrafloral nectaries was an added benefit. Below are just a few plants use that had this benefit.

Elderberry
(stipules)

Sunflower
(Flower bracts and phyllaries)

Beautyberry
(adaxial surface near veins at leaf base)

Wild plum
(petiole)

For more information on this subject
http://edis.ifas.ufl.edu/in175

Native Pollinators

Collected at SVAEC, Live Oak, FL in spring of 2013

Identification and organization by Matt Thom

Many more different types were found throughout the year as different flowers bloomed.

Order: Hymenoptera

Bees

Family: Apidae

Xylocopa virginica 2 Carpenter bees

Tribe: Eucerini 1 Longhorn bee

Bombus pensylvanicus 2 Bumble bees

Apis mellifera 5 Honeybees

Subfamily Nomadinae

Triepeolus sp. 2

Epeolus sp. 1

Family: Halictidae

Agapostemon splendens 5 (all ♂) Sweat bees

Two unidentified halictid sp. 2 green sweat bees

Halictus poyei 12

Family: Megachilidae

Unidentified species 5 Leaf-cutter bees

Family: Andrenidae

Unidentified species 2

Order: Lepidoptera

Family: Sphingidae

Unidentified species 2 Sphinx Moths

Order: Diptera

Flies

Family: Tachinidae

Unidentified species 1

Family: Syrphidae

Unidentified species 6

Family: Sarcophagidae

Unidentified species 2

Family: Dolichopodidae

Unidentified species 1

Wasps

Family: Chrysididae

Unidentified species 5 Cuckoo wasps

Family: Pompilidae

Unidentified species 1

Family: Formicidae

Unidentified species 1 Ant

Family: Scoliidae

Unidentified species 11

Family: Tiphiidae

Unidentified species 10

Family: Vespidae

Unidentified species 20

Family: Sphecidae

Unidentified species 7

Family: Philonthidae

Unidentified species 15

Family: Crabronidae

Unidentified species 3

Family: Nyssonidae

Unidentified species 2

Family: Ampulicidae

Unidentified species 1

Enhancement of habitat for the Larra Wasp

Identified by H. Frank as a Larra bicolor on September 11, 2012

Shrubby False Buttonweed
Spermacoce verticillata

The shallow flowers on the plant attracts many pollinators looking for this feature. The main reason this plant was planted, was due to it's attractiveness to the Larra Wasp, which uses the mole cricket as a host to reproduce

Wasps of the genus *Larra* (Hymenoptera: Crabronidae) have a worldwide distribution in the tropics; few exist in temperate regions. They are solitary wasps, have no communal nests to guard, and are not "aggressive." All of them are parasitoids, and all, so far as is known, attack only mole crickets (Orthoptera: Gryllotalpidae) but, to each *Larra* species, not all mole cricket species are acceptable hosts (Bohart and Menke 1978, Menke 1992).

Banker Plants

A good example of a banker plant is the Crape Myrtle a common landscape plant . Planted in dry corner of pivot and other surrounding areas of the farm.

These are plants that attract pest that only feed on these plants and do not migrate and feed on other surrounding crops and plants. The plants bank the pests which attract their predators. As these predators (beneficials) multiply in population and begin to exhaust there food or host supply they move to surrounding crops and plants looking for more.

The banked pest for the Crape Myrtle is the Crape Myrtle aphid

Lady beetle eggs

Various immature stages of the Lady Beetle

Adult Lady Beetle

Long Legged Fly *Dolichopodidae*

Spiders

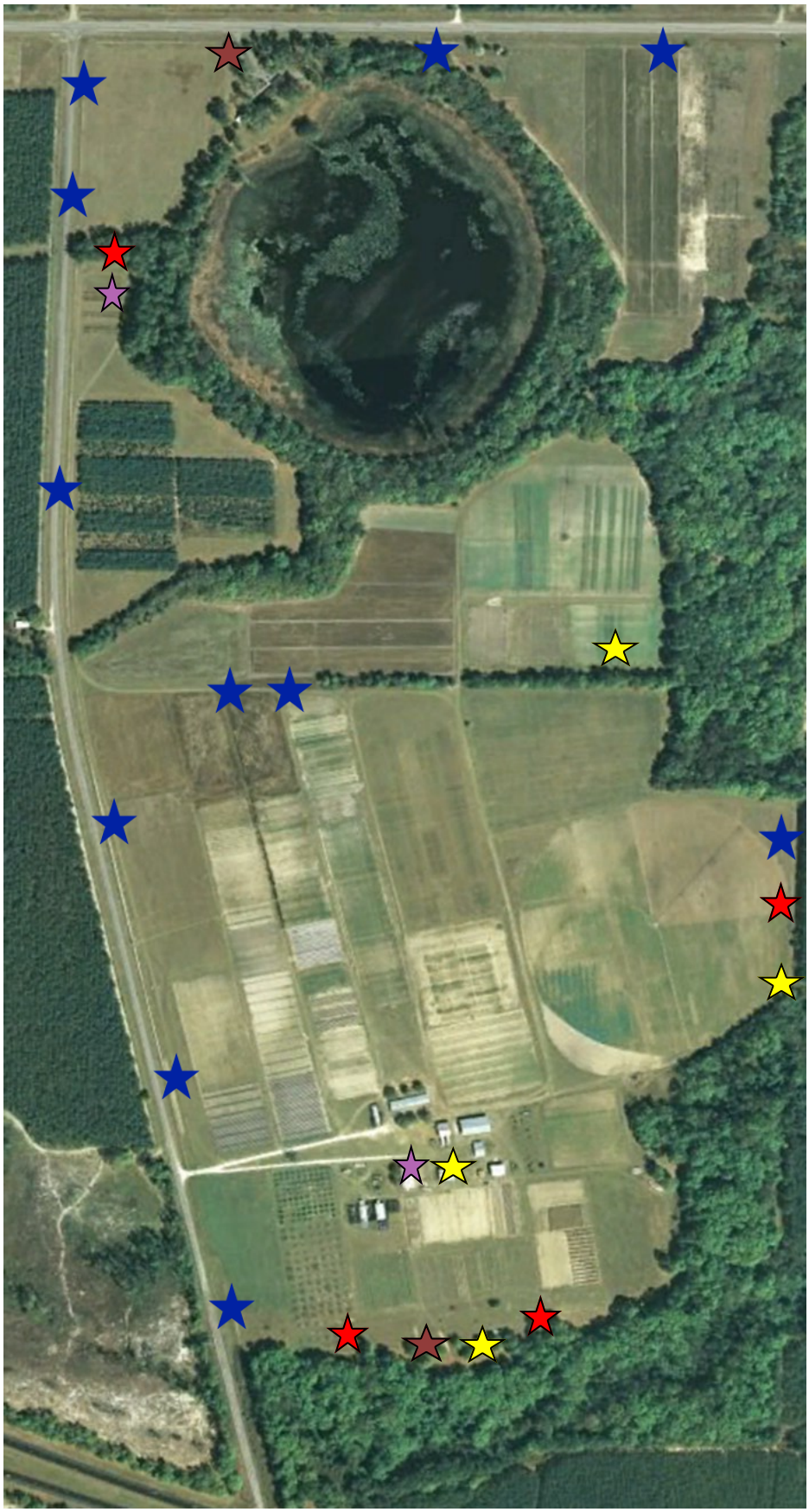
Parasitic wasp using aphid as host.

Banker plants are also use in protected culture.

The picture on the right was taken during training showing different banker plants that are commonly used in the greenhouse.

Some of the plants shown here include papaya plants which host a white-fly which only feeds on papaya. There are also corn and grains which hosts various mites. Once the pests are established the predators are introduced so they establish then the plants are put in the greenhouse with crops such as tomatoes, peppers or cucumbers so as the beneficials increase they go into the crop looking for more food.

Bird and Bat Houses



Bluebird

Chickadee

Kestrel

Barn owl

Bat

All bird boxes are at least 30 feet from crops.

Bluebird boxes are at least 300 feet from each other.

The importance of birds in controlling insect pests and rodents

Holly Ober an Associate Professor and Extension Specialist in the Department of Wildlife Ecology and Conservation during a field day, which was filmed while she explained issues and preferred habitat for birds and bats.

Katie Sieving with Bob Hochmuth
During an IPM filming segment on the benefits of encouraging birds on the farm.

Using bird houses to attract insect-eating birds

Blue Birds have been easy to establish in various houses

Some houses are used by various birds such as the one above, which was used in the same season at different times by blue birds and chickadee

Chickadee eggs

Chickadee nest

Bluebird eggs

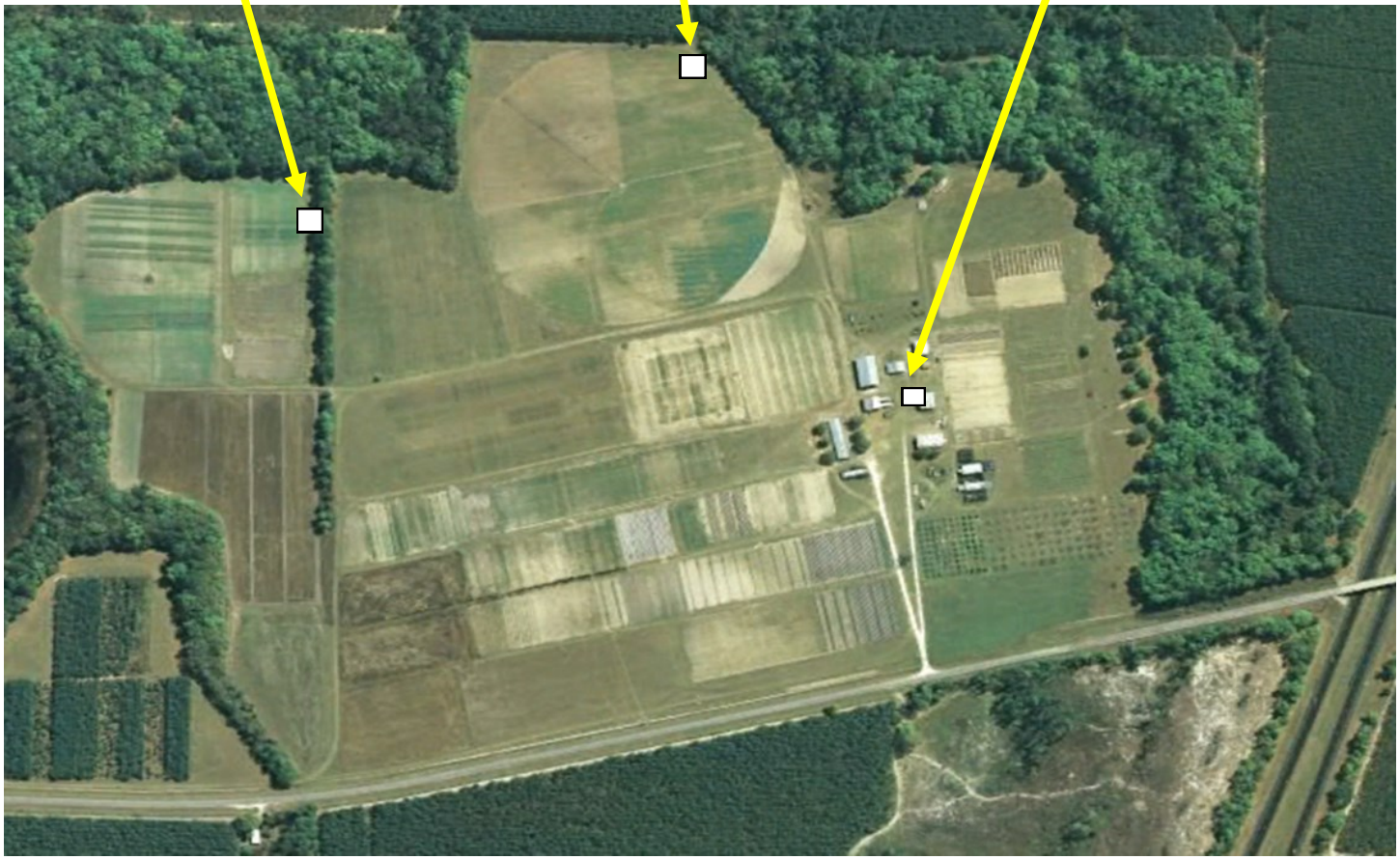
Learn to identify eggs and nests

Mocking bird eggs

The Mocking birds were found nesting where ever they could find a spot. On the right they were found in a plant pot at a hose reel. Pictured left are eggs found in the top of a hydroponic system.

Encouraging barn owls for rodent control

Barn owl boxes set up on the farm of SVAEC in Live Oak In 2013



Bat Houses

In 2008 several single bat houses 24” wide x 26.5” tall were hung on the sides of a farm buildings

Two double houses, consisting of triple-chamber houses 17.5” wide x 31” tall one positioned north and south and the other east and west.

A simple way of monitoring the houses is to look for Gua-no under the house.

Research on identification of bat species

A count was done at dust on November 16th 2013 and it was determined that there were 483 bats in total, in the four triple boxes .

The center was working with Holly Ober with the monitoring of the bats on the farm. She contacted the center about a research project she was working on with Florida Fish & Wildlife Conservation Commission involving an endangered species of bat in south Florida called the Florida Bonneted Bat (Eumops florida-nus). The project involves tagging and it was believed our location was prefect for practicing on a closely related species. The next step was to identify the species at SVAEC.

Arrangements were made for Melissa Tucker a biologist with FWC to make this determination.

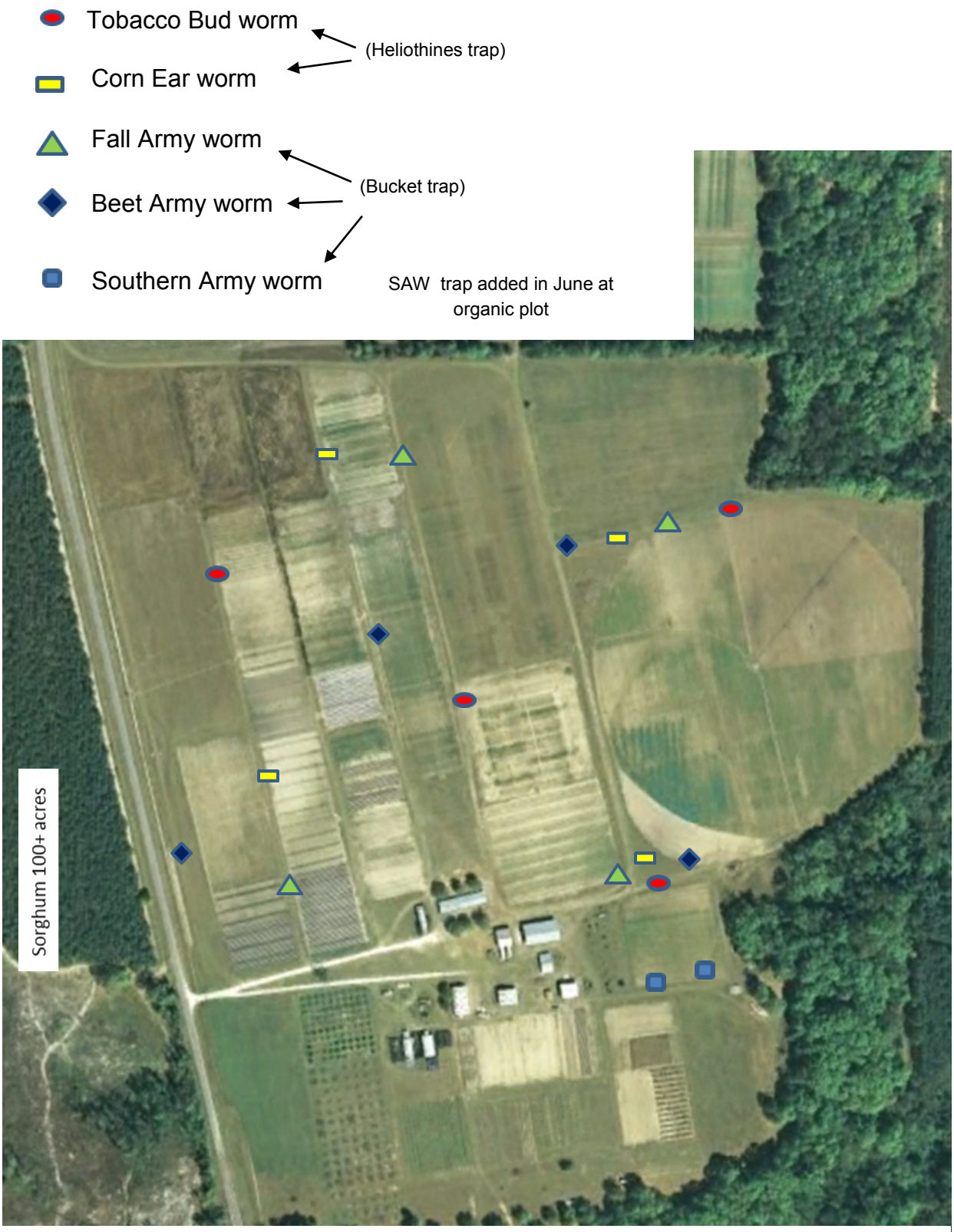
Melissa Tucker with Florida Wildlife Conservation

Here setting up equipment to record the ultrasonic bat calls to help identify what type of bats were using the bat houses.

After looking at the files it was determined that they were predominately Brazilian free-tailed bats.

Equipment used was a handheld Echometer
and a Pettersson D-240X

Monitoring insect pest populations with pheromone traps



This monitoring assisted the farm manager to as to when and where to expect possible worm populations in crops.

The monitoring was another tool use in the over all IPM scouting plan of the farm.

Various designs of pheromone traps

Yellow & White bucket traps were replaced with solid green because of concerns that higher populations of pollinators would be attracted and trapped in the yellow and white traps.

James Brown and Rob Meagher with USDA setting up heliothines trap

Four assembled pheromones ready for traps

Southern armyworm bucket traps After Sunn hemp was crimped and prepared for planting.

Part of the IPM protocol is to use various forms of scouting and monitoring of crops and the surroundings.

Robert L. Meagher Ph. D. Research Entomologist with USDA-ARS CMAVE offered to support our program by supplying us with appropriate traps and pheromones to help us monitor these pest. This support has helped our group to catch the migration of these pest at early stages so they can be managed in accordance with our BMP's. Dr. Meagher can also utilize the moths we catch for his research.

Live Oak Pheromone Trapping 2013 – R. Meagher

- Fall armyworm (FAW) (*Spodoptera frugiperda*; Lepidoptera: Noctuidae) – this migratory species overwinters in southern Florida and Texas and moves on the winds northward every spring. Our USDA labs, in cooperation with labs in Texas and Pennsylvania, are monitoring the annual movement of moths in the central and eastern U.S. through the Pestwatch system out of Penn State (http://www.pestwatch.psu.edu/index.htm). The results from the trapping in Live Oak will be added to Pestwatch so researchers can document movement of this species.

- Beet armyworm (BAW) (*Spodoptera exigua*; Lepidoptera: Noctuidae) – this species is also migratory but its movements are not as well known. It may be able to overwinter further north than FAW since it isn't a tropical species. This species may have a wider plant host range than FAW because it prefers dicot plants (broad leaves) over monocots (grasses). Presently, my lab is not doing much with this species although we do have it in colony.

- Corn earworm (CEW) (*Helicoverpa zea*; Lepidoptera: Noctuidae) – this very important pest species is known by several names, depending on the crop that it infests. In cotton it is known as the cotton bollworm; in tomatoes it is known as the tomato fruitworm. It is also a migratory species which overwinters much further north than FAW. Trapping data for this species will also be placed in Pestwatch. Additionally, researchers in Florida and Texas are interested in population variability of this species. Therefore, specimens will be frozen until shipped to the labs for DNA analysis.

- Tobacco budworm (TBW) (*Heliothis virescens*; Lepidoptera: Noctuidae) – another migratory species that's injury is sometimes confused with CEW. Young larvae of both species are difficult to separate and their feeding injury is also very similar. This species is also of interest to the population biologists and specimens will be sent to the labs.

Field Surveys for the Spotted Wing Drosophila in Florida

Lindsy E. Iglesias
liglesias@ufl.edu
(813) 956-8480
Graduate Research Assistant – SNRE
Fruit & Vegetable IPM Lab

Dr. Oscar Liburd
oeliburd@ufl.edu
(352) 273-3918

The spotted wing drosophila (SWD), *Drosophila suzukii* (Matsumura) was first observed in Florida in Hillsborough County in 2009. Since then it has spread to at least 26 counties in the state. SWD has a wide host range that includes strawberry, blueberry, raspberry, blackberry, and mulberries, all of which are important to Florida's small fruit industry. Blueberry is particularly susceptible to economic damage since blueberry fruits mature during moderate climate conditions favorable for SWD development. SWD females lay their eggs under the skin of healthy, ripening fruit where the larvae develop. As the larvae develop the berry degrades rapidly, becoming soft and brown. Current control methods include frequent spray applications of pesticides to control the adult fly. The purpose of this study was to determine the presence of SWD in the major blueberry growing regions in Florida.

Methods

Traps

Traps were made with 32 oz. clear plastic cups with lids with 8 to 10 -1/4 inch holes along the sides of the cup serving as adult fly entrances (Fig. 1). Each trap was baited with 150 ml of apple cider vinegar (ACV) (5% acetic acid) and 2 drops of odorless dish soap to help prevent fly escape. A yellow band was also added to the traps, thought to act as a visual lure for SWD. A recent trapping study indicated that the addition of the yellow visual cue did not increase SWD capture (Iglesias unpublished). Therefore in the 2013 survey the yellow band was removed. Traps were secured to the center of blueberry bushes (or tree along tree line) using twist-ties

Figure 2: Trap placement in blueberry bush

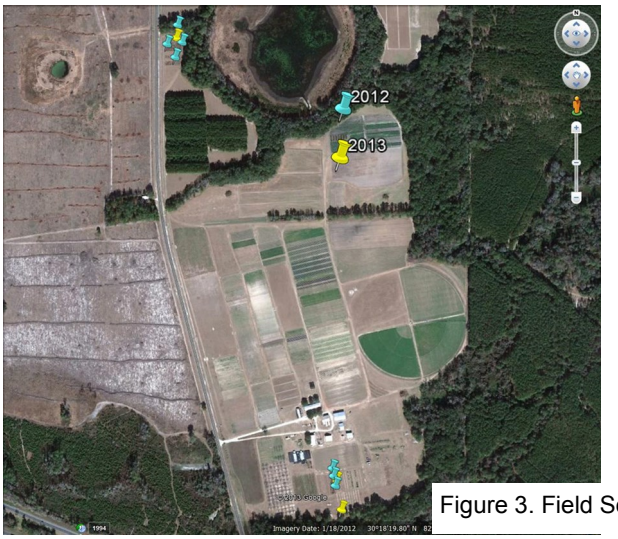


Figure 3. Field Setup

Trap Placement

Traps were serviced once per week by removing the used liquid bait mixture and replacing it with fresh mixture. Flies were brought back to the Small Fruit and Vegetable IPM Lab in Gainesville for identification.

See figure 3.

Field Setup

Traps were set early in the fruiting period when berries were changing from green to pink on April 11, 2012 and April 17, 2013. Traps were removed May 16, 2012 and May 29, 2013. In 2012, four traps were set along the perimeter of the blueberries by the office and three traps were set in in the blueberries on the farm. In 2013, we decided that since the area of bushes is small we would only place three traps total. One trap was placed in the blueberries by the office, one in the blueberries on the farm, and one trap in in the wood line on the southern edge of the farm. A trap was placed in the wood line because we believe this fly is migrating from the wooded areas to the blueberry fields.
See figure 3.

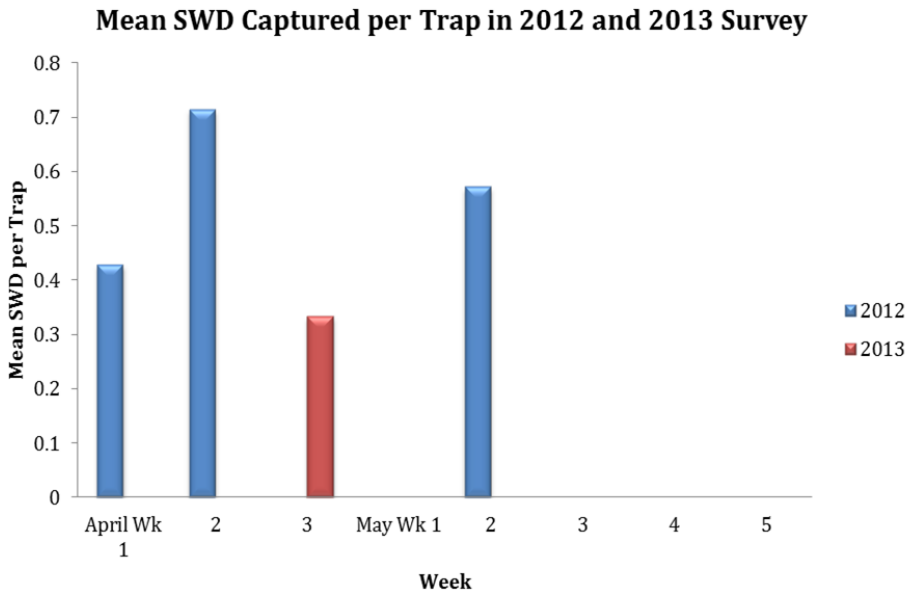


Figure 4: Average SWD captured per week at UF/IFAS Suwannee Agricultural Extension Center for 2012 (blue) and 2013 (red) blueberry seasons.

Conclusion

Overall, the SWD numbers at UF/IFAS Suwannee Agricultural Extension Center are low, remaining at less than 1 per trap on average. Additionally, this location has late-season blueberries (rabbiteye) and grapes, both of which are potential hosts to SWD. Therefore, we recommend that monitoring for SWD continue throughout the summer months. One trap should be placed in all susceptible crops during their summer fruiting period and may be changed biweekly unless numbers begin to increase.

4-H Bug Out

Summer Camp

Fallon & Cameron Kerr Success Story

Two Boys that attended the Bug Out Day Camp in 2012 continued collecting insects for their insect collection. They became very engaged with the process and with the help of their father, they built their own professional insect boxes out of cedar and Plexiglas. The two boys entered their insect collections in 4-H County Events and in the 4-H State Insect Collection Contest. Both boys earned first place ribbons in the state contest in their respective age categories. Because of their success, the boys gained confidence and gave a demonstrative talk to their 4-H club and in 2013 staffed booths at festivals and libraries sharing their knowledge with other youth. The boys showed comprehension of their topic and confidence in their presentation which helps them become more comfortable with public speaking.

Fallon during the field portion of the Bug Out Day Camp 2013

Cameron with his pinned specimens During Bug Out Day Camp 2013

Community Service – Exhibits/Presentations:

Date	Event	Community Service Hours	Attendance
2/15/2013	Surrey Place Nursing Home	½ hour	22
3/14/2013	Azalea Festival – downtown White Springs	2 hours	56
5/4/2013	Wild Florida Event at Stephen Foster State Park (SFSP)	2 hours	8
5/7/2013	Ag Day at Westwood Christian School	1 ½ hours	62
8/6/2013	Set up display at club mtg	1 hour	33
9/25/2013	Literacy Day event at SFSP	3 hours	112
10/19/2013	Big Shoals State Park – Fall Festival	3 hours	53
3/4/2014	D.E.V.O.T.E.D 4-H club presentation	1 ½ hours	17
3/24/2014	Suwannee Elementary School – After school program	2 ½ hours	85
3/25/2014	Suwannee Intermediate School – After school program	2 ½ hours	75
4/26/2014	SFSP Campground program: Wildflowers & pollinators	1 ½ hours	23
7/11/2014	Suwannee Regional Library – LO – children's program	1 hour	37

Fallon and Cameron Kerr displaying their insect collections outside one of the Craft Square cabins at Wild Florida. -Photo: Gabrielle Stevenson

The two boys chose to enter the contest again in 2013 and 2014. The boys both moved in classes based on age requirements and again both brought home blue ribbons, both years. The boys agreed to gather insects and make an insect display for the local extension office. The boys also helped teach and council their peers at the 2013 Bug out day camp giving them a leadership opportunity. One of the boys continues to collect insects and had stated," I would like to be an entomologist because there are so many different jobs available." The day camps continue to provide youth with experiential activities and view the many career opportunities available to them.

University of Florida Entomology & Nematology Club black light insect collecting field trip

The Club contacted the Center believing that with the IPM program it would make it a good place to schedule a Family Night for students and their families.

Diverse habitat areas were established for collecting and black lights were set up in these areas for attracting bugs.
It was an excellent way to see the diversity of bugs that come out at night.

IPM Living Laboratory display

A display board and various items
Were used at conferences, workshops and expos
Throughout the region

Moultrie Ga. Sunbelt Expo 2012

Small Farms Conference IPM display

2012

2013

2014

IPM in Protected Culture

Some examples of IPM strategies for protected culture

IPM training at the Hydroponic Greenhouse Short Course

Ground cover assists in controlling weeds.

Monitoring using sticky cards

When and what to use when considering chemical options.

Learning identification and life cycles.

Airlock on entrance to keep forced air system from pulling insects in through entrance

Which are the good guys and which are the bad guys.

Reflective mulch at the back of the greenhouse helps deter insects from that area. The insect screen keeps out the small insects that tend to be pulled through the pad system .

Utilizing scopes for identification during hands on workshops

Learning the proper way to use hand lens

Learning how to utilize banker plants in protected culture.

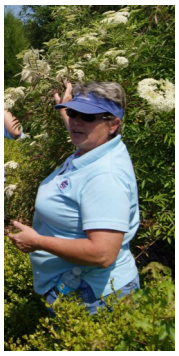
Virtual Field Day Videos

Whole Farm IPM Overview
Bob Hochmuth and Dr. Norm Leppla

The Role of Birds, Bats and Owls
Holly Ober

Habitats for and Other Predators
Dr. Kathryn Sieving

Developing Habitat Areas
Native Plants and Other Habitats
Carolyn Saft



Plants That Attract Beneficial Insects
Lei Lani Davis

Insect Traps and Trap Crops
Insect Traps
Dr. Oscar Liburd

Insect Trap Crops
Dr. Russ Mizell

Managing the Pest Population
Dr. Susan Webb

Whole Farm IPM Pollinators
Dr. Jaret Daniels

Videos can be seen on

http://vfd.ifas.ufl.edu/whole-farm-ipm.shtml

Scope Lab

The use of stereo scopes have been very useful in identifying and clarifying what is being viewed.

Libby Johnson
IPM IST training 2012

Carolyn Saft
assisting student during
4H summer camp 2012

Master Gardener Training 2012

Scopes used in greenhouse for IPM
hands on portion during
Hydroponic Short Course in 2014

During the Small Farm & Alternative Enterprise Conference in 2014 a learning lab was set up for various training s using the scopes.

Attracting Pollinators 2013

IPM IST training 2014

Opportunities

This project provided opportunities for graduate students to conduct their research at the center and also to gain practical field experience with IPM.

Dr. Oscar Liburd with Lindsy checking trap

Lindsy Iglesias

While a Research Assistant, M.S. for University of Florida, Dept. of Entomology & Nematology her M.S. thesis focused on developing an IPM program for the control of the spotted wing drosophila (Drosophila suzukii) in Florida blueberries (see pages 26, 27).

Lindsy is currently a Research Assistant,

PhD at University of Florida

Bonnie scouting squash for pests

Bonnie Wells when she was a DPM student .
Now a St. Johns County Extension Agent

MS student Mandy Bailey here with a PhD student from UF and two biologists with FWC conducting bat research.

Holly Ober an Associate Professor and Extension Specialist in the Department of Wildlife Ecology and Conservation has worked with Mandy Bailey and Elizabeth Braun de Torrez on various bat monitoring projects at Suwannee Valley Agricultural Extension Centers Living Laboratory. The bat houses have offered excellent conditions for field training.

Elizabeth Braun de Torrez

Living Extension
IPM Field Laboratory
UF/IFAS Suwannee Valley
Agricultural Extension Center

Farmscaping — Hedgerow Creation

Hedgerows may be established by direct planting or by installing horizontal perching wires to encourage natural re-seeding by birds.

Hedgerows containing a mixture of native shrubs, small trees, wildflowers, and native grasses will provide the greatest environmental benefits including:

- providing food, cover and corridors for wildlife
- reduction of chemical drift and odor movement
- increasing carbon storage and biomass in soils
- improving farm aesthetics
- intercepting undesirable airborne particulates
- providing living fences

UF UNIVERSITY of FLORIDA
IFAS Extension

The placement of predator insect nesting boxes on your farm will provide housing for solitary bees and wasps. These predators feed on a wide variety of insect pests.

Adult bees collect nectar from flowers as their main source of food and collect pollen to feed their young. They are essential pollinators of plants, including many crops. Wasps are beneficial parasites or predators of insect pests, using them for food for their young.

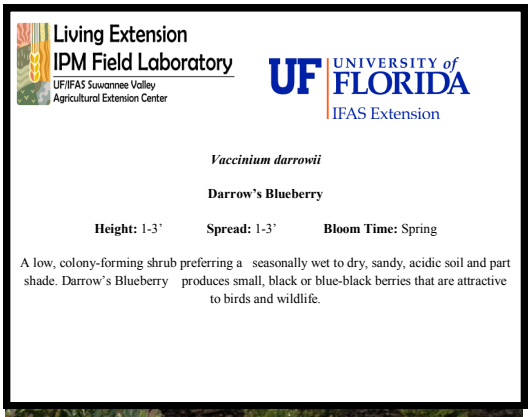
The solitary bees and wasps that occupy these nests are docile. They rarely sting humans, and almost only if they are handled. The wasps use their stings to immobilize prey.

Social wasps, such as yellow jackets and paper wasps, are more defensive around their nests, which they build in trees and bushes, underground, or under the eaves of buildings. They do not occupy the burrows of these nests, although occasionally a paper wasp may build a nest hanging underneath.

Signage

Throughout the farm signage was placed in areas in kiosks, movable signs and smaller identifying signs.

This proved to be very helpful during tours and when a knowledgeable person was not available.



On-line and printed educational resources developed as a result of project.

All resource material is available on the Small Farms & Alternative Enterprises web site.

http://smallfarms.ifas.ufl.edu/

Farmscaping IST

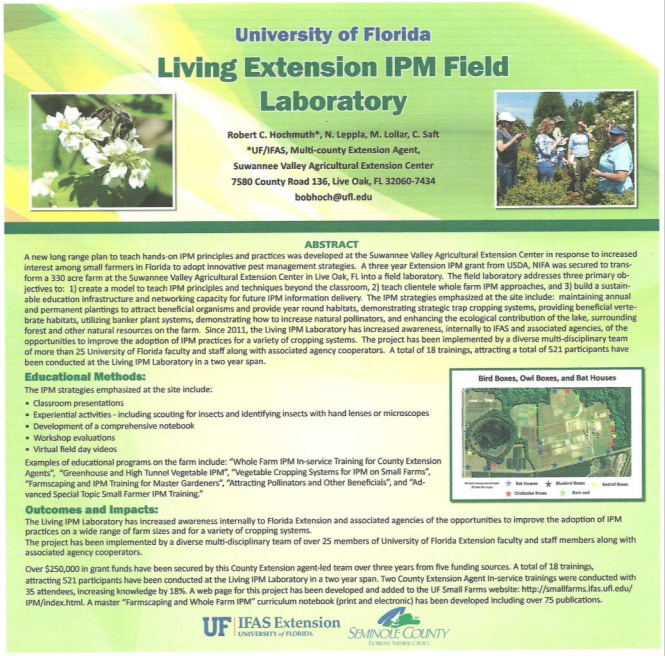
Resources and value of hands on activities

- Field scouting to make visual counts or assessment of damage
- Insect life stages
- Good bugs/Bad Bugs
- Specimen collection

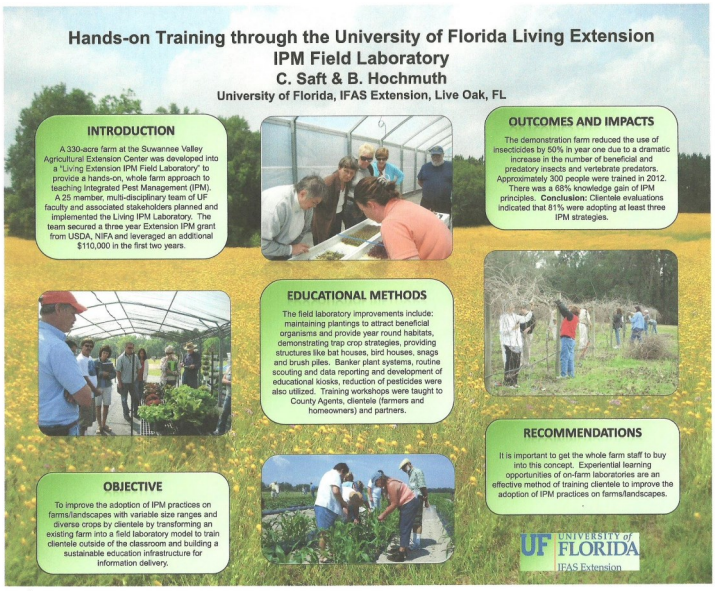
Notebooks were made for the various workshops and given to attendees.

Educational posters at professional meetings

Posters have been developed for various meetings and conferences in an effort to introduce the sustainable strategies developed during this project.

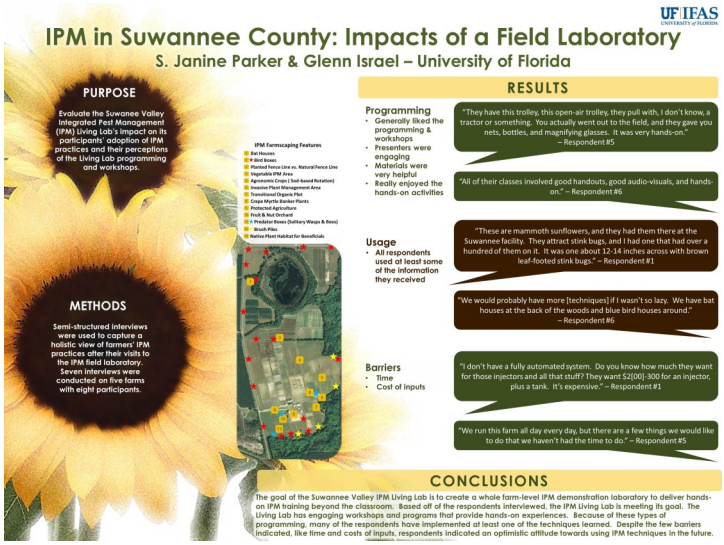


Southern SWAG 2014



National Association of County Agricultural Agents 2014, Mobile AL.

Small Farms & Alternative Enterprise Conference 2014



Rural Sociology Society Annual Conference, 2014

The Impact of the Living IPM Lab on Insecticide Use Over Six Years

The mixed vegetable crop area in the spring of each year at the Center was used as a case study to determine the impact of implementing IPM strategies on the insecticide usage from the initiation of the project in 2009 to 2014.

Insecticide applications were made with the following guiding principles:

Applications were based on weekly scouting data.

Broad spectrum insecticides were not to be used unless an emergency with no other alternatives arose.

Based on the mode of action classification scheme, those groups of “broad spectrum” insecticides prohibited in this project included: Group 1A (Carbonate's), 1B (Organophosphates, 2A (Organochlorides), and 3A (Pyrethroids and Pyrethrins).

Trap cropping systems requiring insecticide applications for stink bugs and leaf-footed plant bugs were allowed to use Group 3A (Pyrethroids) as a targeted application on the trap crop (sunflower) only since no “softer” alternative was available.

Table 1. Impact on insecticide use patterns from 2009 to 2014.

Year	# of “softer” chemical applications	# of broad spectrum chemical applications	Total #
2009	3	9	12
2010	7	12	19
2011	9	3	12
2012	7	2	9
2013	8	0	8
2014	3	0	3

Note: broad spectrum insecticides were those in Groups 1A, 1B, 2A, and 3A according to IRAC Mode of Action categories. The IPM program began to be built in 2010 but was fully implemented in 2011.

Results:

Overall number of average insecticide applications per year was reduced from 15.5 for 2009-10 to an average of 8 from 2011-14, a 51.6% reduction as a result of implementing the IPM Living Lab project.

Reduction in total insecticide costs per season was approximately 40%, not the full 51.6% due to the average higher cost for “softer” insecticide choices.

Broad spectrum insecticide applications were reduced from an average of 10.5 during 2009-10, to 2.5 during 2011-12, to 0 in 2013-14.