IPM Living Lab Project Evaluation[1]

Introduction[2]

Increased interest among area farmers to adopt innovative pest management strategies led a team of county and state-wide Extension faculty to secure a three year IPM grant from USDA NIFA funding to transform the 330 acre farm at the Suwannee Valley Agricultural Extension Center in Live Oak into a "Living IPM Lab" to conduct trainings to a variety of clientele (Hochmuth, 2012). According to Bob Hochmuth, project co-director, this core grant, one time IPM funds, and an IFAS cost sharing grant (which was used to purchase a no-till drill for the project and conduct agent ISTs), and funds from a partnering with a UF/IFAS Beginning Farmer and Rancher grant together totaled over $250,000 in funding over the first three years of the project. The first year of funding for 2010-11 has resulted in the initiation of building the infrastructure for the Living IPM Lab and the development of a large multidisciplinary team of faculty and agency representatives. The overall goal of this project is to create a unique, hands-on, whole farm teaching approach to 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 of the IPM Living Lab Facility

The infrastructure has been developed for a novel Extension IPM Living Laboratory by transforming an existing traditional 330-acre research farm into a model Extension demonstration center that is being used to teach IPM principles and techniques beyond the classroom. A large multidisciplinary team of University of Florida county and state faculty and governmental agency personnel contribute to project planning and provide continuous training to stakeholders. The IMP Living Lab includes annual and permanent plantings that attract and support beneficial organisms, trap cropping systems, beneficial vertebrate habitats, banker plant systems, a 7-acre demonstration orchard, a 2-acre organic production field, greenhouse and protected agriculture structures, and support facilities and equipment (Leppla, Funderburk, & Hochmuth, 2014).

Hochmuth (2012) also detailed aspects of the Living Lab:

> "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 pollinators, and enhancing the ecological contribution of the lake and surrounding forest. The development of the teaching areas on the farm was completed in the spring of 2012 providing training opportunities held for several clientele groups including: farmers, Master Gardeners, USDA technical service providers, Extension agents, as well as 4-H and FFA youth".

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[2]The introduction is adapted from the 2012 Living IPM Field Lab Accomphisments report (Hochmuth, 2012).

Many of these features are illustrated in Figure 1 below. Site visits by the evaluator and photographic documentation (Davis, 2013) provide ample evidence that the facility was developed as intended, notwithstanding reasonable adaptations as the project evolved.

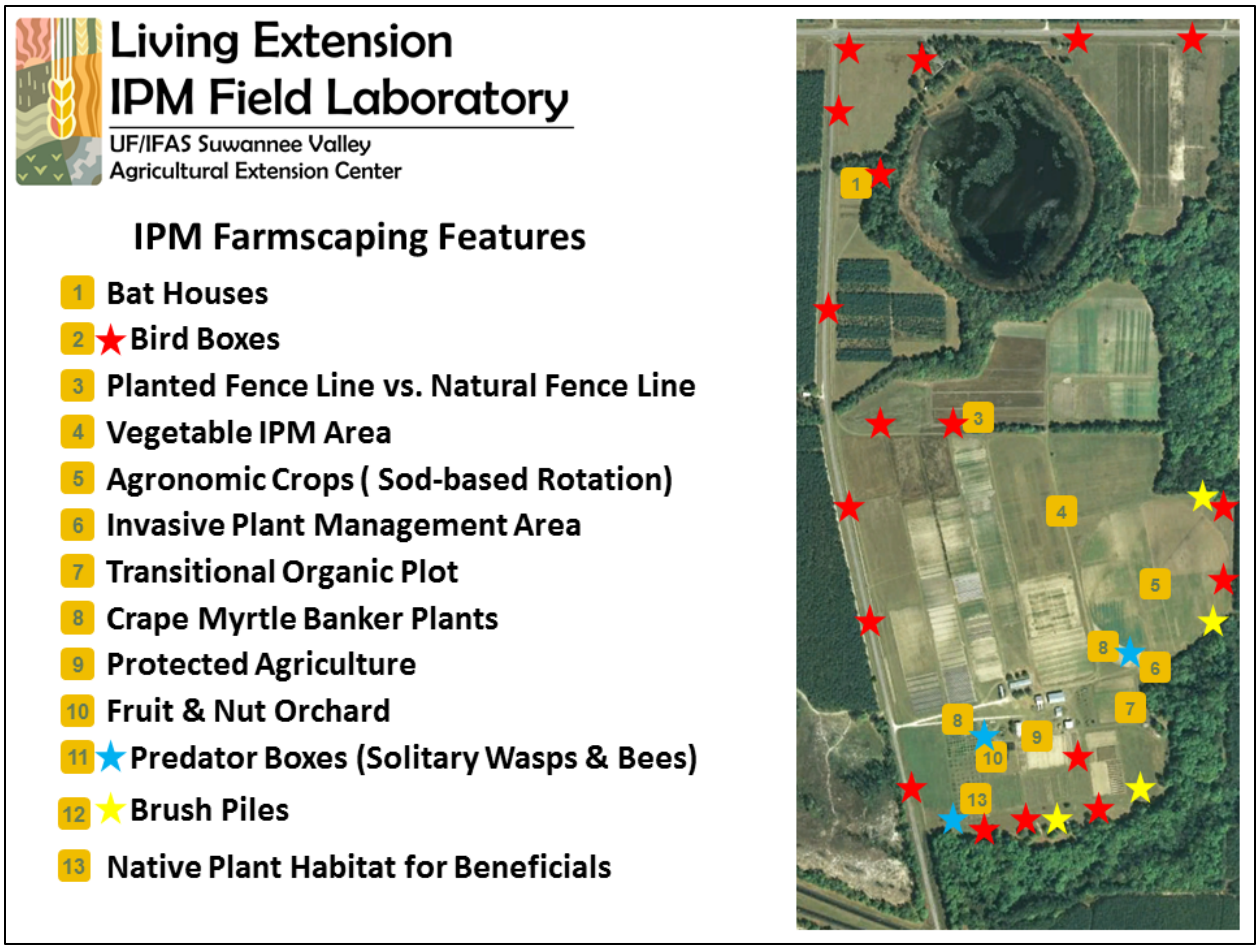

Figure 1. Farmscaping features of the IPM Living Lab (Source: Davis, 2013).

Supporting Resources, Publications and Presentations

A number of publications, presentations and other materials were developed for recruiting participants to the Lab's educational activities and informing professional peers about the project. A number of these reported by Leppla et al. (2014) are listed below.

- Leppla, N. C. 2014. What is Farmscaping and Whole Farm IPM? Farmscaping- A Whole Farm Approach for Integrated Pest Management. Extension Agent In-Service Training, Suwannee Valley Agricultural Extension Center, Live Oak, FL, May 21 & 22, 2014.
- Hochmuth, R. C., N. C. Leppla, M. C. Lollar, and C. Saft. 2014. University of Florida Living Extension IPM Field Laboratory. National Association of County Agricultural Agents (NACAA) poster.
- Hochmuth, R. C., N. C. Leppla, M. C. Lollar. 2014. University of Florida Living Extension IPM Field Laboratory. Southern Sustainable Agriculture Working Group (SSAWG) Poster.

- Hochmuth, R. C., L. Davis, N. Leppla, C. Saft, and M. C. Lollar. 2014. University of Florida Living Extension IPM Field Laboratory. Florida Small Farms and Alternative Enterprises Conference. Kissimmee, FL, August 1-2.
- Leppla, N. C. 2013. IPM Topics. 2013 IPM/NRCS Workshop. Suwannee Valley Agricultural Extension Center, Live Oak, FL, May 1-2.
- Hochmuth, R. C. and N. C. Leppla. 2013. University of Florida Living Extension IPM Field Laboratory, Suwannee Valley Agricultural Extension Center, Live Oak, FL (fact sheet & PowerPoint talk). Southern Region Small Farms Working Group, Kissimmee, FL, August 2.
- Hochmuth, R. C. and N. C. Leppla. 2013. University of Florida Living Extension IPM Field Laboratory Site, Suwannee Valley Agricultural Extension Center Live Oak, FL (6-module video series, introduction), August 15.
- Hochmuth, R. C. 2013. Whole Farm Approach to Trap Cropping Strategies for Stink Bugs, http://hos.ufl.edu/newsletters/vegetarian/issue-no-584.
- Hochmuth, R. C. 2014. Using Cover Crops for Integrated Pest Management Benefits, http://hos.ufl.edu/newsletters/vegetarian/issue-no-593.
- Hochmuth, R. C., L. L. Davis, and D. E. Toro. 2013. IPM for Small Farms- A series of pages on the UF Small Farms and Alternative Enterprises website, http://smallfarms.ifas.ufl.edu.
- Hochmuth, R., L. Davis, N. Leppla, C. Saft, and M. Lollar. 2014. University of Florida Living Extension IPM Field Laboratory. Poster and Abstract, Presented at 2014 Florida Small Farms and Alternative enterprises Conference and 2014 Southern Sustainable Agricultural Working Group Annual Conference.
- Hochmuth, R. C. and N. C. Leppla. 2014. Whole Farm IPM, A Ten-Module Video Series, http://vfd.ifas.ufl.edu/whole-farm-ipm.shtml.

Educational Programming

A series of educational workshops have been conducted, as well as presentations to both target audiences and professional peers from 2011-2014. During the project's lifespan, the following outreach opportunities were conducted: 28 on-Center programs, 32 presentations at various workshops throughout the state of Florida, and 5 educational posters at professional meetings (Leppla, et al., 2014). The trainings include groups of NRCS employees, county Extension faculty, farmers, university students, and youth. The materials developed or used in the training curriculum and notebook can be found at http://smallfarms.ifas.ufl.edu/IPM/index.html.

Summary of 2012 Trainings, Presentations, and other Activities

1. Tri-county Pesticide School, Lake Butler, (Feb 16) 50 attendees, Presentation on IPM Farmscaping program
2. Starting a Successful Hydroponic Business, SVAEC, (March 12-13 and 16-17) 65 attendees, hands-on training including pest exclusion, banker plants, insect scouting, etc.
3. Master Gardener Hydroponics training, SVAEC, (March 23) 90 attendees, IPM principles, scouting, using hand lens, etc.

4. Bradford High School FFA demonstration greenhouse, Starke, (Fall 2011 and Spring 2012) classes total of 130 students, Teach students greenhouse IPM principles, biological control, scouting, etc
5. Living Extension Field IPM Field Lab, Memphis, TN (March 27-29), 25 attendees, Innovative Extension programming in IPM
6. NRCS Field Staff training, SVAEC (April 30- May1), 24 attendees, Overall IPM Living Field Lab program
7. Florida Extension Agent IST, SVAEC (May 14-15), 21 attendees, Overall IPM Living Field Lab program
8. IPM for Small Farms, SVAEC (May 23), 30 attendees, Overall IPM Living Field Lab program
9. Attracting Pollinators and Beneficials (Master Gardeners), SVAEC (May 30), 20 attendees, Overall IPM Living Field Lab program with emphasis on attracting pollinators and other beneficials
10. Attracting Pollinators and Beneficials, UF/IFAS You Tube videotaped as a result of training of Master Gardeners on May 30, http://www.youtube.com/watch?v=t6G-OkoN69A&feature=youtu.be
11. 4-H Bug Out Day Camp, SVAEC (June 19-22), 15 youth attendees, Basic entomology, collecting and preserving insects
12. 4-H Bug Out Day Camp, SVAEC (June 19-22) You Tube video developed at Bug Out Day Camp http://www.youtube.com/watch?v=B833ExTsEQs
13. Good Bug, Bad Bug ID, Florida Small Farms and Alternative Enterprises Conference, Kissimmee (July 29) 60 attendees, Hands-on ID training supported with resources of IPM grant
14. IPM Table top Display, EPAF, Orlando (Aug 27-29), approximately 200 Extension agents attended conference, Display showed the overview of the Living IPM Lab
15. “Blacklighting” Insect Collecting event for UF DPM students and families, SVAEC (Sept 29) 35 attendees, Tour of Living IPM Lab and insect collecting activity
16. UF DPM Capstone course, SVAEC (Oct 5) 8 attendees, Tour of Living IPM Lab
17. IPM training for Suwannee County Master Gardeners, SVAEC (Oct 10) 15 attendees Included overview of Living IPM Lab
18. FAMU Small Farmer training and tour, SVAEC (Oct 12) Tour of Living IPM Lab and Hydroponic demonstrations
19. Sunbelt Ag Expo UF/IFAS Exhibition Building, Moultrie, GA (Oct 16-18) Over 15,000 individuals visited the Exhibition Building with at least 500 quality contacts at the IPM booth
20. IPM training for Bradford County Master Gardeners, SVAEC (Oct 24) 12 attendees Included overview of Living IPM Lab

NRCS Integrated Pest Management (IPM) Workshop

There were 24 participants in the April 30 – May 1, 2012, workshop, including instructors and facilitators, 16 from NRCS, seven from UF/IFAS Extension, and one from the Florida Department of Agriculture. In addition to attending presentations and touring the lab, each participant received a comprehensive notebook, containing selected references on farmscaping, NRCS IPM policies, trap cropping, cover crops, cropping systems, and weed management. A copy of the first PowerPoint lecture also was provided to each participant, along with a copy of the UF/IFAS EDIS publication, "Guidelines for Purchasing and Using Commercial Natural Enemies and Biopesticides in Florida and Other States," and a hand lens for viewing insects. Funding for the training was provided by a set of partners, including the UF/IFAS Extension program, Suwannee Valley Agricultural Extension Center, USDA/NIFA Extension IPM program, USDA/NIFA Southern IPM Center, and Glades Crop Care.

Figure 2. NRCS personnel touring the Living IPM Lab (upper left), Agent Mace Bauer (upper right) and Specialist Jason Ferrell (lower left) conducting training during the workshop (Source: Hochmuth et al, 2012).

Figure 3. Agents Elena Toro (upper left, lower left) and Bob Hochmuth (lower right) teaching NRCS personnel during the workshop (Source: Hochmuth et al, 2012).

IPM Living Lab IST Program

The IPM Living Lab In-service Training Program was on conducted at Suwanee Valley Agricultural and Extension Center on May, 2012, and again in 2014. The IST was designed to increase county faculty's knowledge and skills of farmscaping practices and enhance confidence about teaching clientele on these same topics. A total of 21 agents attended the two-day training and 20 completed the pre- and post-test evaluation in 2012, while another 17 agents attended and completed the evaluation in 2014.

The pre-test and post-test evaluation instrument was used to measure the change in agents knowledge as a result of the training. As shown in Table 1, the number and percent of items answered correctly increased from pre- to post-test. When using the 20 matched pre-/post-tests, a net increase of 11.6 percentage points was observed (which was statistically significant with a T-test value of 10.71 with 19 degrees of freedom and a p-value of <.001. In short, there was evidence that county faculty increased their knowledge on the topics taught during the IST.

Table 1. IST pre-test and post-test knowledge scores for county faculty, 2012.

Variable	*N*	*Mean*	*Std. Dev.*	*Min.*	*Max.*
Total number of correct items on pre-test	21	63.7	5.7	51.0	71.0
Total number of correct items on post-test	20	74.9	4.6	66.0	83.0
Percent of correct items on pre-test	21	70.0	6.3	56.0	78.0
Percent of correct items on post-test	20	82.3	5.0	72.5	91.2
Percent change in matched pre- and post-tests	20	11.6	4.8	2.2	23.1

Further, the consistent pattern of the upward trajectory from pre-test score to post-test score can be seen for each of the 20 agents in Figure 4 (the agents are represented by the gray lines and the dashed line indicates the average score).

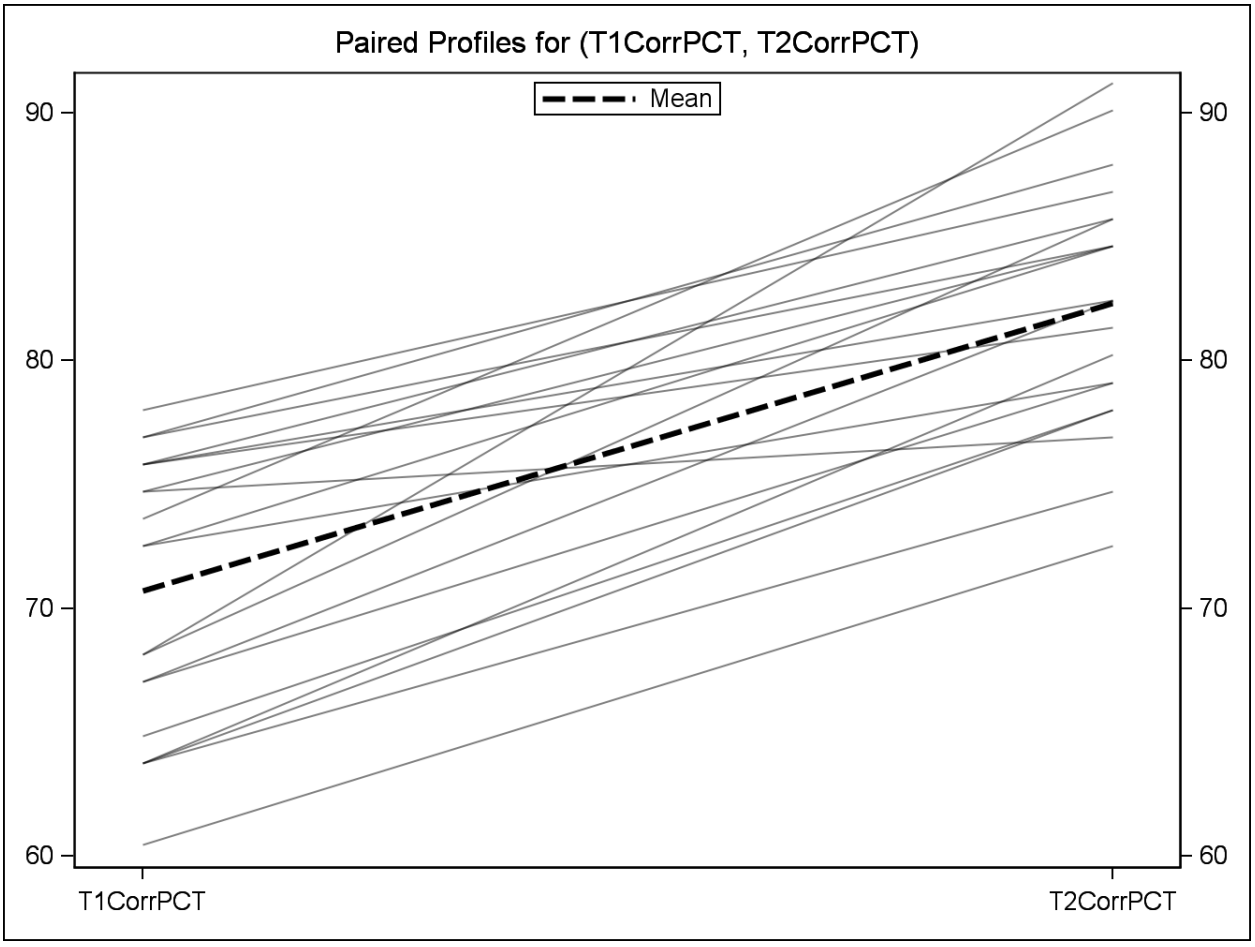

Figure 4. Percent correct items on the IST pre-test and post-test.

County faculty also generally reported high levels of satisfaction with the in-service training program (Table X). There was one attendee whose training needs were not met and that person expressed dissatisfaction on every aspect of the training. Overall, the large majority reported being satisfied or very satisfied with almost every aspect of the training.

Table X. Agents satisfaction with aspect of the Living Lab IST, 2012.

	N	Very Satisfied	Satisfied	Neither	Dissatisfied	Very Dissatisfied
Organization of the training	19	78.9%	15.8%			5.3%
Length of the training	20	70.0%	25.0%			5.0%
Relevance of topics	20	60.0%	35.0%			5.0%
Clarity of workshop objectives	20	65.0%	30.0%			5.0%
Instructors' expertise	19	78.9%	15.8%			5.3%
Educational materials quality		89.5%	5.3%			5.3%
Workshop location	20	75.0%	5.0%	15.0%		5.0%
Time spent on hands-on activities	20	65.0%	20.0%	5.0%	5.0%	5.0%
Opportunities for sharing information with other attendees	20	75.0%	15.0%	5.0%		5.0%
Opportunities for asking questions	18	83.3%	5.6%	5.6%		5.6%
Answers to my questions	20	70.0%	20.0%	5.0%		5.0%
Activities to get me involved	20	80.0%	10.0%	5.0%		5.0%
Being able to understand the information	20	55.0%	30.0%	5.0%	5.0%	5.0%
Examples for using information in educational events	19	57.9%	36.8%			5.3%

County faculty also were asked about their confidence for conducting elements of the farmscaping program and how likely they were to conduct educational programming in the future. Between half and two-thirds of the participating county faculty were mostly confident about conducting elements of the farmscaping IPM program in their county. Although many of the agents indicated that they were very likely or certain to conduct educational activities, there also were lower levels of confidence in leading a training (which is understandable given the novelty of the topic).

Table X. Agents' confidence in and likelihood of conducting farmscaping IPM activities, 2012.

	N	Not at all confident	Slightly confident	Moderately confident	Mostly confident	Completely confident
Working with a client to design a farmscaping plan	18		5.6%	33.3%	61.1%	
Teaching clients about farmscaping	18		5.6%	22.2%	66.7%	5.6%

IPM						
Using workshop activities in agent's program	17		5.9%	23.5%	58.8%	11.8%
Designing and leading a training on this topic in their county	18	5.6%	22.2%	22.2%	50.0%	
	N	Not at all likely	Slightly likely	Somewhat likely	Very likely	Certain
Work with clients to design farmscaping plans	16		18.8%	18.8%	37.5%	25.0%
Teach clients about farmscaping IPM	18			27.8%	44.4%	27.8%
Design and lead a training on farmscaping in my county	18		22.2%	33.3%	38.9%	5.6%

As was the case for the 2012 IPM IST, attendees at the 2014 IPM IST showed a statistically significant increase in knowledge (Table X). Of the 17 who attended, 16 increased their knowledge score on the post-test while one individual who scored below average on the pre-test had no gain.

Table X. IPM IST pre-test and post-test knowledge scores for county faculty, 2014.

Variable	*N*	*Mean*	*Std. Dev.*	*Min.*	*Max.*
Total number of correct items on pre-test	17	34.1	8.4	15.0	45.0
Total number of correct items on post-test	17	45.6	8.4	29.0	59.0
Percent of correct items on pre-test	17	57.7	14.2	25.4	76.3
Percent of correct items on post-test	17	77.4	14.2	49.2	100.0
Percent change in matched pre- and post-tests	17	11.6	6.4	0	24.0

Paired T-test = 7.46 with 16 degrees of freedom, p-value = <.001

In addition to demonstrating a significant increase in knowledge during the IPM IST, county faculty generally reported very high levels of satisfaction with the training. It is notable, however, that one area that more agents reported being only satisfied was on aspects involving time spent on hands-on activities, activities to get them involved, and to a lesser extent, providing examples that they can use. This suggests that some instructors might need to incorporate more active learning strategies into their presentation. Overall, participant assessment of the training was very positive.

Table X. Agents satisfaction with aspect of the Living Lab IST, 2014.

	N	Very Satisfied	Satisfied	Neither	Dissatisfied	Very Dissatisfied
Organization of the training	17	94.1%	5.9%			
Length of the training	17	58.8%	41.2%			
Relevance of topics	17	64.7%	35.3%			
Clarity of workshop objectives	17	88.2%	11.8%			
Instructors' expertise	17	76.5%	23.5%			
Educational materials quality	17	100.0%				
Workshop location	17	94.1%	5.9%			
Time spent on hands-on activities	17	47.1%	52.9%			
Opportunities for sharing information with other attendees	17	76.5%	23.5%			
Opportunities for asking questions	17	82.4%	17.7%			
Answers to my questions	17	76.5%	23.5%			
Activities to get me involved	17	64.7%	35.3%			
Being able to understand the information	17	82.4%	11.8%	5.9%		
Examples for using information in educational events	17	64.7%	29.4%	5.9%		

As seen in the agents' reports for the 2012 IPM IST, agents attending the 2014 IPM IST also expressed high confidence for conducting farmscaping activities and reported being likely to implement some of these activities (Table X). Again, county faculty were less confident and less likely to design and lead a farmscaping training than was the case for other activities. Moreover, the 2014 attendees were somewhat less confident and likely than peers who attended the 2012 IST.

Table X. Agents' confidence in and likelihood of conducting farmscaping IPM activities, 2014.

	N	Not at all confident	Slightly confident	Moderately confident	Mostly confident	Completely confident
Working with a client to design a farmscaping plan	17		11.7%	35.3%	35.3%	17.7%
Teaching clients about farmscaping IPM	17			17.7%	58.8%	23.5%

Using workshop activities in agent's program	17			23.5%	47.1%	29.4%
Designing and leading a training on this topic in their county	17	5.9%	11.8%	29.4%	35.3%	17.7%

	N	Not at all likely	Slightly likely	Somewhat likely	Very likely	Certain
Work with clients to design farmscaping plans	17	5.9%	17.7%	29.4%	29.4%	17.7%
Teach clients about farmscaping IPM	17	5.9%	5.9%	35.3%	29.4%	23.5%
Design and lead a training on farmscaping in my county	17	11.8%	5.9%	35.3%	35.3%	11.8%

IPM Living Lab IST Program Follow-up Survey

The IPM Living Lab In-service Training Program was held in May, 2012 and the follow-up survey was conducted in October-November, 2014. Eighteen county faculty were contacted for the follow-up survey and fourteen (78%) responded. The faculty were asked to think about the interval since the in-service training and then report whether they had been involved in selected activities that related to that training. Overall, twelve of the fourteen county faculty who responded to the survey reported doing at least one activity since he or she attended the training (Table X).

Table X. Agents' involvement in farmscaping IPM activities after the IST.

	Number doing the activity	Percent doing the acvity
Worked to design a farmscaping plan (demonstration area at your office or on a cooperating farm) in your county	8	57.1%
Conducted any workshops or other training activities about farmscaping IPM	10	71.4%
Used any of the farmscaping in-service training workshop hands-on or other activities in your own programming	12	85.7%
Applied for grants related to IPM farmscaping to extend your ability to conduct this training	4	28.6%

Of the county faculty who reported conducting one or more activities as a result of the IPM Living Lab In-service Training, they provided the following descriptions

- Knowing the bugs on your farmscape (presented to at least 45 people via 3 workshops). Knowing the bugs on your garden (presented to at least 65 people through 3 workshops, one of them in Spanish)
- 2013 Small Farm Field Day - at WFREC / 2013 Vegetable Producers Round up
- Banker Plant Utilization in the Greenhouse and Field, a UF/IFAS Extension 2013/14 Central District Extension Program Enhancement Mini Grant
- I taught a class to a garden club entitled, "FARMSCAPING: Managing Pests With Integrated Pest Management". I used information learned at the in-service training in gardening training for Master Gardeners and consumers regularly.
- Most of the activities have been one on one with producers and were discussions about various IPM strategies they could use
- Encouraged the use of trap crops, used trap crops in demonstrations
- Banker Plant Utilization in the Greenhouse and Field
- Gave information to high school as they worked on activity
- Trap Crops and Cover Crops
- Pollinators and Wildflowers / Creating Pollinator Habitat
- After attending the farmscaping IST, I have been part of a team that has applied to two different grants to try to study sesame and how it enhances pollinator habitat and can potentially be added to farmscaping.

Among the responding county faculty, five were aware of clients adopting farmscaping practices in their county or region as a result of their training efforts while eight were not. County faculty who were aware of client's adoption of farmscaping practices briefly quantified or described these:

- Clients have reported that they have planted plants that attract beneficial insects, left parts of their space un-mowed to create habitat for ground nesting pollinators, can identify beneficial and harmful insects. One client noted that they will not give up on their bat house just yet after learning it normally takes a few years before bats populate them.
- I have been working with vegetable producers to use trap crops in order to reduce pesticide use. Also, many producers are becoming more aware of pollinators and ways to increase them.
- Work with community vegetable gardens, a couple made a point of planting trap crops to help monitor pests and to encourage beneficials.
- Eighty-five people have planted native plants or wildflowers to provide pollinator habitat. Forty-two individuals have made and installed pollinator nesting boxes. Fifty-eight people have left a portion of their yard free of mulch and undisturbed for ground nesting bees. Seventy-seven participants have indicated they have seen more solitary bees, butterflies and bees in their yards since taking the classes and implementing the practices.

- The Roonie farm added buckwheat and sunflowers to their blueberry operation. The Hoover farm has done limited work adding pollinator habitat to their organic vegetable operation. And, the Shenandoah dairy had an exploratory phase of adding sunflowers to corn silage production system to reduce stinkbug damage.

One county faculty also had a success story to share from a recent training that had been conducted:

- The training occurred October 2, 2014 and many attendees left the workshop excited about the possibilities. We have already heard from an attendee about them finding a SARE grant to get money to do a farmscape program at their nursery.

Interpretation of the Follow-up Survey Results

Based on the self-reported evidence, the adoption rate by county faculty of IPM Living Lab content into their programming appears to be high and, in the opinion of this evaluator, impressive. In addition, six faculty reported adoption or potential adoption by clients with one reporting substantial numbers adopting specific practices. On the other hand, there is not evidence of clients adopting farmscaping across the entire farm operation but this might occur as a more distal outcome in the future.

2012 4-H Bug Out Day Camp[3]

Participating in 4-H activities help youth develop an interest in learning that will equip them to succeed in a rapid changing society. Agent Carolyn Saft developed an annual wildlife series day camp to engage youth in educational activities in the summer. Objectives for the camps include developing stewardship behaviors, visiting higher education campuses and learning about potential careers. Ms. Saft partnered with Brian Estevez, Suwannee County 4-H Agent, and Bob Hochmuth, Multi county Vegetable Agent, and entomologist to provide the 2012 Bug Out day camp. Funding for equipment and supplies came from a USDA grant. Each Agent led a variety of interactive activities.

Exit surveys indicated a 32% knowledge gain about insects and a 45% increase about helping pollinating and beneficial insects. Campers also reported what they learned about insects with comments like; “Some are good for crops” and “Insects use pheromones to help them work together”. They also indicated the skills they learned would help them; “identify good bugs” and “know about insects when we grow our garden”. When asked about plans for college campers stated, “It’s important to go and it is not scary to go”. Thoughts about careers included, “you can play with bugs to earn money” and “there are all kinds of jobs involving bugs”.

Two boys from the camp continued collecting insects. They became very engaged with the process and looked online to purchase professional insect boxes. The boys realized that their budget would not allow for them to purchase “store bought” boxes. So, with the help of their father, they built their own professional insect boxes out of cedar and plexiglass. This activity provided an opportunity to gain life skills in critical thinking, decision making and solving math problems. The building of the boxes also taught them how to use power tools safely. Spending

[3]This section uses information from Hochmuth (2012) with minor modification.

time working on the project provided bonding time with their father. The two boys entered their insect collections in county events and in a new event they weren't previously aware of 4-H Congress. Both boys earned first place ribbons at Congress in their respective age categories. Because of their success, the boys gained confidence and gave a demonstrative talk to their 4-H club and did such a good job, that they were encouraged by Ms. Saft and Mr. Estevez to enter their demonstration at the 2013 County events contest. As a result of their demonstration at the club level, more youth learned about collecting insects and some of the activities available at the Bug Out camp planned for 2013. The youth showed comprehension of their topic and confidence in their presentation which helps them become more comfortable with public speaking.

Similarly, another 4-Her continued to bring insects she collected to the office to "show off" and get help with identification. She stated, "My sister thinks I'm weird, but I don't care because I like bugs". Ms. Saft has continued encouragement to this girl to pursue additional science related topics with the hopes she will earn a science degree. The camp provided many new learning experiences for the campers and inspired some the campers to more about insects and life sciences.

NRCS Workshop

Attendees at the 2013 NRCS workshop showed a statistically significant increase in knowledge, with every individual showing a gain on the post-test score (Table X).

Table X. NRCS workshop pre-test and post-test knowledge scores for participants, 2013.

Variable	*N*	*Mean*	*Std. Dev.*	*Min.*	*Max.*
Total number of correct items on pre-test	24	6.7	1.2	4.0	9.0
Total number of correct items on post-test	24	11.0	1.4	7.0	12.0
Percent of correct items on pre-test	24	55.9	10.3	33.3	75.0
Percent of correct items on post-test	24	91.3	11.7	58.3	100.0
Percent change in matched pre- and post-tests	24	4.3	1.8	1.0	8.0

T-test = 11.57 with 23 degrees of freedom, p-value = <.001.

Encouraging Pollinators and Other Good Guys Workshop

Attendees at the 2013 Pollinators workshop showed a statistically significant increase in knowledge, with every individual showing a gain on the post-test score (Table X).

Table X. Pollinators workshop pre-test and post-test knowledge scores for participants, 2013.

Variable	*N*	*Mean*	*Std. Dev.*	*Min.*	*Max.*
Total number of correct items on pre-test	10	8.9	2.3	6.0	14.0
Total number of correct items on post-test	10	13.0	1.8	10.0	15.0
Percent of correct items on pre-test	10	55.6	14.6	37.5	87.5
Percent of correct items on post-test	10	81.3	11.0	62.5	93.8
Percent change in matched pre- and post-tests	10	4.1	2.3	1.0	8.0

T-test = 5.56 with 9 degrees of freedom, p-value = <.001.

Discussion and Recommendations

This section provides a critical assessment of project accomplishments, strengths, weaknesses, and make recommendations for future work in a number of areas.

Project Planning and Fidelity

The project directors included a number of county faculty and state specialists, as well as representatives from collaborating organizations. This provided a broad based of input for project planning and facilitated adaptive management. One problem identified with implementation involved limited buy-in to the project by a few of the Suwannee Valley Agricultural Extension Center's farm workers (Hochmuth, 2013). This problem was reduced as a result of employee turnover.

> *Recommendation:* Directors of similar projects should devote time to build commitment to the IPM Living Lab process among all personnel.

Target audience identification and coverage

The IPM Living Lab project description (Leppla et al., 2014) identified a wide array of target audiences. Given the novelty of the project, the set of audiences appears reasonable. Administrative records list the participation of specific target audiences but participant counts are incomplete. Consequently, there is insufficient data to assess the extent to which each audience was reached and, in turn, whether opportunities for educational outreach were maximized.

> *Recommendation:* During project planning, target audiences should be defined with a level of specificity that allows for participation to be tracked and coverage to be measured.

Learning outcomes

A clear strength of the project was the conduct of educational activities and measurement of knowledge gain. Every educational activity evaluated showed statistically significant increases in knowledge. Likewise, anecdotal evidence from the But Out Workshop told a compelling story about youths' learning outcomes.

Recommendation: Continue conducting periodic measurement of knowledge gain. In particular, assessments should be conducted for new workshops in order to demonstrate their efficacy.

Participant satisfaction and confidence

Another strength of the project involves creating high levels of satisfaction among program participants. This was clearly documented for participants in the IPM IST. Interviews with participating farmers also reflected considerable satisfaction with the educational activities and a number of farmers reported sharing information with others (Parker & Israel, 2014). On the other hand, there are some aspects that can be improved to enhance satisfaction. There was evidence that some instructors rely too much on the lecture format or try to pack too much content into the allotted time.

Building participant confidence is important from the perspective of increasing the network to trainers (which further expand outreach to targeted audiences), as well as facilitating the adoption of farmscaping practices. Responses from the IPM IST participants indicated reasonable levels of confidence for conducting educational activities, although some had less confidence for designing and leading workshops on the topic.

Recommendation: Because of the novelty of the IPM Living Lab approach, it is important to actively engage participants in learning through hands-on activities. Such experiential learning addresses trialibility and observability aspects of adoption (Rogers, 2003). Thus, project directors should emphasize the need to include hands-on activities to all instructors. One benefit of this approach is the likely enhancement of confidence in implementing recommended practices by clients or teaching the content by trainees.

Adoption of specific practices

Evidence of adoption was documented at two levels. First, the follow-up survey of the 2012 IPM IST participants provided self-reports of agents using information from the training in their educational programming. Second, these same agents reported examples of adoption of farmscaping practices by client farmers. These reports are corroborated by interviews of farmers who participated in the IPM Living Lab activities (Parker & Israel, 2014). Although there is good evidence of adoption, there is insufficient data to estimate the extent of adoption among specific target audiences (with the exception of agents targeted for the IPM IST). It should be noted that the personal interviews such as those conducted by Parker and Israel (2014) can provide very detailed information to understand the adoption process and uncover barriers to adoption, the methodology is not suited to estimating the extent of adoption.

Recommendation: Directors of future project might consider developing a protocol for conducting a follow-up survey with a sample of target audience participants in order to obtain an estimate of adoption. This could be done alone or in conjunction with a set of interviews.

Whole-farm plan development

These was not data available to assess whether and to what extent any farmers had developed a farmscaping plan for the entire farm operation. Although this is an important outcome, the team evaluator failed to include it.

> *Recommendation:* Fire the evaluator and get a better one. In addition, add the measurement of farmscaping plans to the list of metrics for future projects.

Overall assessment

It is the opinion of this evaluator that there is evidence of a high level of productivity and significant outcomes. High productivity by project personnel is well documented and observable – both in the physical facilities at the Suwannee Valley Agricultural Extension Center and the large number of educational activities conducted and materials developed over the project period. Significant outcomes in participant learning, satisfaction, confidence, and adoption are documented through evaluation pre-tests and post-tests, as well as follow-up interviews with farmers.

With this being said, there is also room for improvement as demonstrated by the list of recommendations provided above. Given the demonstrated productivity and outcomes, as well as opportunities for enhancing the educational program, it is reasonable, however, to conclude that the project should be continued. Furthermore, the results appear promising enough such that Extension faculty in other states should consider implementing similar programs.

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