# Tactical Agriculture (TAg) In Eastern New York State: Field Corn, Alfalfa, Soybeans and Organic Field Crops

## Project Leaders:

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## Cooperators:

Mike Hunter, Field Crops Extension Educator-Franklin County

## Type of Project:

Training Practitioners to use IPM techniques

## Project Location:

Lewis County, Oneida County, Essex County

## Abstract:

The Tactical Agriculture (TAg) program is an experiential, hands-on training program designed to teach integrated pest and crop management concepts to field crop producers and other agribusiness personnel. The TAg project has been active in New York State since 1990. The TAg program teaches field crop producers to better manage field crops, protect the environment and reduce health risks associated with production agriculture. Participants are actively engaged in a growing-season-long educational program, that discusses critical pest and crop management issues that arise during the growing season and reinforces the learning experience with the timely collection of data from their fields during the growing season.

## Background and Justification:

Sound crop and pest management is critical to economical and efficient field crop production in New York State. The diverse landscape of New York State provides a variety of environmental conditions which foster different crop production and pest management challenges and provide opportunities for locally based and adjusted IPM and ICM training. Many growers have indicated that they would like to learn more about Integrated Crop and Pest Management as a way to increase profits while protecting the environment. The Tactical Agriculture program (TAg) was initiated in the early 1990s to help growers learn how to improve their crop and pest management. TAg is an intensive, growing-season-long, educational program that brings together Cooperative Extension educators, field crop producers, and agribusiness personnel to teach, learn, and implement IPM and ICM practices. The experiential hands-on educational philosophy is the foundation of the TAg program approach. TAg builds on the philosophy that a participant learning a new IPM or ICM tactic by hearing, demonstrating, discussing, and practicing, will more likely retain the information and adopt the practice when the information is reinforced throughout the growing season.

Ideally a "TAg team" consists of 3 to 6 producers, and agribusiness personnel from a local area. TAg groups are comprised of farming neighbors who meet at a participant's farm to learn, discuss, demonstrate and practice the IPM and ICM methods**.** Meetings are scheduled approximately every two weeks to capitalize on the educational and management opportunities of the growing season. This schedule enables participants to observe, assess real field problems and discuss, select, and employ practical integrated solutions. Each TAg participant brings their own experience and expertise, which can enrich discussion and contribute to the groups' overall learning process. TAg participants enroll individual fields of corn, and alfalfa that serve as classrooms for TAg workshops. On-farm education has been shown to increase participation and rates of adoption (Wuest et al. 1995; Flora 1991). Producers want to see how an IPM and

ICM method or new technology might work on their own farm. The small group educational design promotes learning and effective communication among and between TAg participants and Extension facilitators. Participants learn from each other what agronomic methods might work on their farm given their unique crops, soils, equipment, management, and other individual farm strengths and constraints. Designing TAg programs to meet local needs has great potential to dramatically increase the rate of adoption of IPM and ICM practices.

The TAg program focuses on pest and crop issues over the entire growing season. The philosophy is to help participants understand and better anticipate potential pest and crop management needs, challenges, and opportunities. TAg programs help train participants to be proactive and more effectively manage those situations in real time during the growing season when the pest or crop issues are occurring.

In recent years we have developed 4 new TAg programs: Soybean, Wheat, Advanced Corn and Alfalfa, and Organic Field Crops. These new programs are in direct response to suggestions from producers and extension educators indicating interest in expanded TAg efforts.

## Objectives:

1. Design and implement the Tactical Agriculture programs (TAg team) in Lewis, Oneida, and Essex Counties.
2. Measure the level of knowledge and adoption of IPM and ICM practices by TAg participants.

## Procedures:

TAg teams were implemented in Lewis, Oneida and Essex Counties in 2005.
Lewis County conducted a traditional (field corn and alfalfa) TAg program, Oneida and Essex Counties initiated new pilot TAg projects. Oneida County implement a new soybean TAg project, while Essex County pioneered a new organic field crops TAg program. Table 1 indicates the number of farms, enrolled fields and acres of their faming operations.

Table 1: Farm Acres and Enrollment

| County | Number of Farms | Acres Enrolled | Number of fields Enrolled | Total Acreage of Farming Operations |
|---|---|---|---|---|
| Lewis – Traditional TAg | 4 | 200 | 8 | 1400 |
| Oneida-Soybean TAg | 5 | 300 | 10 | 5000 |
| Essex-Organic TAg | 4 | 100 | 8 | 2500 |

### Educational Design:

Each County identified key IPM and ICM educational needs of potential producer participants and organized and held timely meetings to address their topics. Meetings were scheduled relative to the needs and opportunities identified. Meetings were held to provide relevant teaching in critical educational moments during the growing season. Tables 2, 3, and 4 present the list of topics offered this summer in Lewis, Oneida, and Essex counties, respectively.

Table 2: Subjects Taught in Traditional TAg-Lewis County

| **Meeting Time** | **Topics Taught** |
|---|---|
| April | Manure Spreader Calibration |
| June | Alfalfa Weevil Management<br>Alfalfa Disease Management<br>Stand counts |
| June | Early Season Corn Pests<br>Corn Planter calibration (fertilizer and seed drop)<br>Soil Sampling Issues |
| July | Potato Leafhopper Management<br>Alfalfa Harvest Issues |
| August | Corn Rootworm Management<br>Alfalfa Harvest Issues |
| August | Weed Identification and Management |
| September | Soil Fertility Issues |
| September | Corn Harvest Issues |

Table 3: Subjects Taught in Soybean TAg-Oneida County

| **Meeting Time** | **Topics Taught** |
|---|---|
| May | Early season insect pests<br>Soybean Rust update |
| June | Soybean stages of growth<br>Plant population assessment - stand counts<br>Seed corn Maggot, Slugs<br>Early Season disease pests: seedling rots and blights<br>Soybean Aphids<br>Weed identification and management |
| July | Soybean Aphid identification and management<br>Spider mite identification and management<br>Soybean Rust and other foliar diseases<br>White mold |
| August | Defoliating insects<br>Soybean rust update<br>Weed Identification and Management<br>Soybean rust update<br>Farm-by-farm season-long pest management review |
| September | Management of pests of stored soybeans<br>Soybean Harvest Issues<br>Planning for next year's crop: Crop rotation, variety selection |

Table 4: Subjects Taught in Organic TAg-Essex County

| **Meeting Time** | **Topics Taught** |
|---|---|
| May, | **Wheat:**<br>Wheat Growth Stages<br>Wheat Stand Counts<br>Early Season Wheat Diseases and Management<br>Seedling rots and blights<br>Yellow Dwarf Virus and Management<br>Cereal Leaf Beetle Management<br><br>**Alfalfa:**<br>Alfalfa Weevil Management<br>Alfalfa Disease Management<br>Stand counts |

| | |
|---|---|
| June | **Wheat:**<br>Wheat Growth Stages<br>Wheat Stand Counts<br>Early Season Wheat Diseases and Management<br>Wheat Scab (Fusarium head blight) Identification and Management<br>Cereal Leaf Beetle Management<br><br>**Soybeans**<br>Soybean stages of growth<br>Plant population assessment - stand counts<br>Seedcorn Maggot, Slugs<br>Early Season disease pests: seedling rots and blights<br>Soybean Aphids<br>Weed identification and management<br><br>**Alfalfa**<br>Alfalfa Weevil Management<br>Alfalfa Disease Management<br>Stand counts |
| July | **Wheat**<br>Wheat Growth Stages<br>Stored Grain Pest Issues<br>Wheat Scab (Fusarium head blight) Identification and Management<br><br>**Soybeans**<br>Soybean Aphid identification and management<br>Spider mite identification and management<br>Soybean Rust and other foliar diseases<br>White mold<br><br>**Alfalfa**<br>Potato Leafhopper Management<br>Summer Foliar and Root Diseases<br>Alfalfa Harvest Issues |
| August | **Wheat**<br>Aphid Management<br>Hessian Fly Management<br><br>**Soybeans**<br>Defoliating insects<br>Soybean rust update<br>Weed Identification and Management<br>Soybean rust update<br><br>**Alfalfa**<br>Potato Leafhopper Management<br>Summer Foliar and Root Diseases<br>Alfalfa Harvest Issues |
| September | **Wheat**<br>Hessian Fly Management<br>Aphid Management |

| | |
|---|---|
| | **Soybeans**<br>Management of pests of stored soybeans<br>Stored Pest Issues<br>Planning for next year's crop: Crop rotation, variety selection |

### Field Scouting:

Field monitoring helps document timely data on current crop condition and pest status. This information is highly relevant to producers, perks their interest and participation in TAg meetings and helps to more fully engage them in a fruitful learning and decision making process with direct application to their farm's net profitability. In short, real data on pest and crop management issues from a producer's own farm is ultimately more convincing and effective at promoting behavioral changes than hypothetical examples. Both Lewis and Oneida County had summer assistants to scout two fields per farm. The producers in Essex County scouted all their fields at least once every two weeks. Field data was shared with the producers in Oneida and Lewis Counties once a week and was used during the educational meetings to reinforce the information being delivered. Each producer in Oneida and Lewis Counties were encouraged to scout other fields on their farms during the growing season. This data was also used in other extension educational efforts like newsletters and pest alerts that were shared throughout New York State.

### Evaluation of the Program:

Participants were asked to complete a pre-test and a post-test to document a baseline of participant's IPM / ICM knowledge and skill level prior to program participation and assess changes resulting from involvement with the TAg program. A post-season survey was also conducted to determine how many IPM or ICM practices participants planned to continue doing, on how many acres, and participants' suggestions for improving TAg efforts in their county.

## Results and Discussion:

TAg programs have been a model for IPM and ICM information transfer for over 15 years. In 2005 new TAg programs were launched in Essex (Organic TAg), Oneida (Soybean TAg) counties, while Lewis County conducted a traditional (field corn and alfalfa) TAg program.

This was the second year for the Lewis County Traditional TAg Program. Jennifer Beckman, a new Extension Educator in Lewis County, leads the project. Beckman has found TAg program involvement very complementary to her outreach responsibilities because of the pre-made educational curriculum and ability to document and measure her impacts. Her producers have encouraged her to expand the program each of the 2 years she has conducted it. This year she had 4 producers and 2 agriculture consultants in her program. Beckman plans to offer the Traditional TAg program again in 2006.

New York soybean acreage had increased dramatically in the last decade. Jeff Miller, Field Crop Extension Educator reports Oneida County has had a 4000+ acre increase in soybean production during this time. Oneida County agribusinesses have recently constructed 2 soybean roasting facilities. The value of local soybean production this past growing season is estimated to have exceeded $1 million. To enhance their knowledge and production competitiveness, Oneida county producers asked Miller for an educational program to address soybean pest and crop management issues. The NYS livestock and field crop IPM program team worked with Miller to pilot a new TAg program targeting soybean pest and crop management. This program was modeled after the traditional TAg Program. Five producers, growing close to 1000 acres of soybeans, participated in this pilot effort.

The NYS livestock and field crop IPM program team also worked with Anita Deming, Field Crop Extension Educator in Essex County, to address needs of another emerging stakeholder group, organic field crop producers. Organic field crop production is starting to increase in

acreage in small pockets around the state. Several Essex county producers are trying to grow organic winter and spring wheat, soybeans, and alfalfa. Deming assessed many of her organic producers needed training in organic pest management issues. Having much of the educational curriculum for "conventionally produced" wheat, soybeans and alfalfa already completed; we were able to adapt the lessons to an organic system. These producers enthusiastically embraced the TAg program and actively participated in the once a month meetings looking at problems in their fields throughout the season. We have been asked to continue this program a second year in Essex County. Interest in organic field crop TAg has also been expressed growers in Herkimer, Otsego and Montgomery Counties for the 2006 season.

Much of the information gathered from TAg fields during the growing season was summarized and shared with field crop extension personnel via the NYS Weekly Field Crops Pest Report.

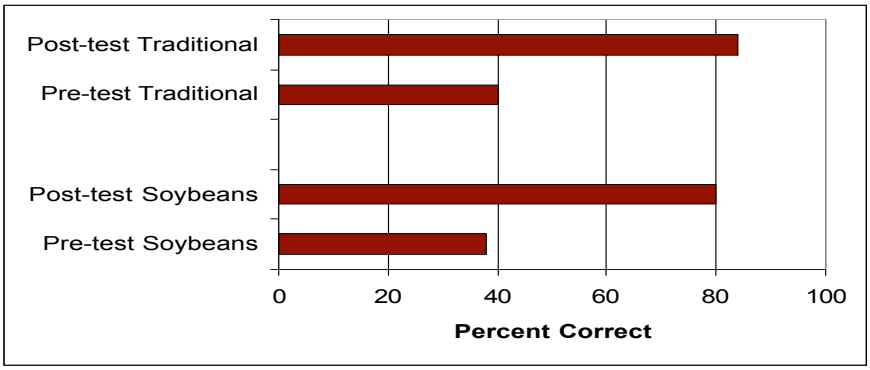
## General Perception of the TAg Program by Producers:

TAg participants provided very positive feedback regarding their TAg training experience. One hundred percent of the TAg participants agreed the program helped them better understand pest and crop management issues. Growers all indicated that they would recommend the program to other farmers in their area.

## Knowledge and Adoption of IPM and ICM:

Results of the pre and post-testing indicated that TAg participant's dramatically increased their knowledge of IPM and ICM. Participants' test scores increased by at least 40 percent from the pre-test to the post-test (Figure 1). *Note*: that we did not pre and post test participants in the new organic TAg program.

Figure 1. Pre-test and post-test averages (9 respondents)




While knowledge of IPM and ICM is important, the long-term implementation of these practices is even more critical. After the completion of the TAg program participants completed an exit survey to indicate what IPM and ICM practices they would implement.

## Impacts:

### Soybean TAg-Oneida County

A pilot soybean Tactical Agriculture (TAg) Team project was conducted Oneida County in 2005 to help growers learn and apply IPM practices to this commodity. The soybean TAg effort was conducted in cooperation with Julie Stavisky, Western NYS Field Crop and Livestock IPM Area Educator and a $7,800 grant from the NE Soybean Board.

Our pre-season test indicated that producers lacked knowledge in soybean pest issues but had a good grasp of crop management issues. A test of current knowledge was administered prior to the program, and producers answered on average fewer than half of the questions correctly. At the completion of the program, producers answered 80% of the same questions correctly. Results from post-evaluation materials indicate that IPM practices will be implemented on 900+ acres of soybeans which is about 23% of the total soybean production in Oneida County.

Interest is strong among county educators and agribusiness professionals for further development of this program. The following is specific information growers provided on their adoption of IPM and ICM soybean practices survey:

Table 5: Percent of responses and number of acres specific IPM practices were implemented on Oneida County TAg farms (4 respondents).

| IPM Practice | Will Do | Will Try | Will Not Do | Acres |
|---|---|---|---|---|
| Keep records of scouting visits, management decisions and actions | 50 | 50 | 0 | |
| Use threshold tables and guidelines | 25 | 25 | 0 | |
| Prepare IPM scouting plan before the growing season begins | 0 | 75 | 25 | |
| Collect reference material to help plan your IPM program | 0 | 100 | 0 | |
| Consult you extension educator or IPM educator for new information | 75 | 25 | 0 | |
| Perform stand counts | 0 | 100 | 0 | 750 |
| Conduct spring and fall weed identification and surveys | 75 | 25 | 0 | 925 |
| Monitor for weed escapes from herbicides | 75 | 25 | 0 | 925 |
| Scout for diseases: Septoria brown spot, Asian soybean rust, downy mildew, white mold | 75 | 25 | 0 | 908 |
| Scout for soybean aphid and spider mites | 100 | 0 | 0 | 908 |
| Monitor for beneficial insects | 100 | 0 | 0 | 908 |
| Time herbicide treatments carefully based on plant growth stage | 25 | 75 | 0 | 925 |
| Time fungicide treatments carefully based on plant growth stages and presence of diseases | 50 | 50 | 0 | 908 |
| Use economic thresholds to guide insect and disease management decisions | 75 | 25 | 0 | 925 |
| Make pest management decisions based on stand health, growth stage, and yield potential | 75 | 25 | 0 | 925 |
| Conduct soil testing to determine proper fertilization needs | 100 | 0 | 0 | 925 |
| Use crop rotation to control weeds and diseases | 66 | 33 | 0 | 725 |
| Review the soil test results with your CCE educator | 33 | 66 | 0 | 550 |

Only 100 of the 900+ acres enrolled in the Oneida county soybean TAg program warranted treatment for soybean aphid using recommended guidelines (aphid populations in excess of 250 aphids per plant, low natural enemy populations present and a vulnerable crop growth stage). One TAg participant remarked that participating in this program kept him from spraying his soybeans when it wasn't necessary. Soybean aphid populations were below threshold for the majority of the 900 soybean acres enrolled. The information generated by the TAg effort had a multiplier effect when shared with other clientele. Many other producers who received extension emails or newsletters may also have saved $10 – 15/ac by not applying an unwarranted insecticide. Producers participating in the soybean TAg program potentially saved $8,000 to $12,000 in reduced insecticide applications due to improved soybean aphid management decisions enhanced by crop monitoring.

Traditional TAg-Lewis County

In 2005, we implemented a Traditional TAg program (Alfalfa and Field Corn) in Lewis County. This TAg team consisted of 4 field crop producers and 3 crop consultants. A test of current knowledge was administered prior to the program, and producers answered on average fewer

than half of the questions correctly. At the completion of the program, producers answered 85% of the same questions correctly. Collectively, this year's grower participants are expected to utilize their IPM and ICM training on the approximately 450 acres of field corn, 300 acres of alfalfa, and 300 acres of forage grass for a total of 1050 acres of field crops they manage. There was no post-survey to determine specifically what practices growers would use in the future. Because of the TAg program over the last 2 years in Lewis County Jennifer Beckman has taken graduates of the program and has been able to provide advanced training in IPM and ICM practices.

Organic Grains and Forage TAg-Essex County
In cooperation with Anita Deming in Essex County we started a pilot organic IPM grains and forage educational program this last year. We met with 4 organic producers that grew soybeans, winter and spring wheat, alfalfa and grass hay. Organic field crop producers have fewer management options for pests than do their conventional counterparts. The organic producers learned how to plan their pest management program carefully. They learned how to identify insect pests, diseases, and weeds. They also learned how monitor specific pests, what were at economic thresholds and what organic management options they had available. Much of the educational curriculum that was used was the soybean, wheat and alfalfa IPM teaching modules that we have developed. At the completion of the program we conducted a survey and determined that the organic producers were going to implement organic IPM practices on close to 1500 acres of wheat, soybeans, and alfalfa. We are planning to expand the organic program to other counties in Eastern NYS in 2006.

**Summary:**
The TAg program in Lewis, Oneida and Essex Counties has proven to be an excellent educational model for producers to learn and implement IPM and ICM philosophy and practices in their farming operation. When the education is personalized to a producer's specific farming environment and is combined with good, interactive, and participatory learning, farmers will learn to adopt and implement IPM and ICM practices. Overwhelmingly, producers involved indicated receptiveness to the TAg approach and have shown a willingness to implement many of the IPM and ICM practices highlighted in the course.

Because of developing new soybean, wheat and organic TAg programs we have also been in the process of developing educational curriculum to enhance the teaching and learning. Teaching modules on IPM for soybean and wheat pests are in development. Along with the new teaching modules we have also developed supporting handouts and pest flash cards have been prepared to enhance producers' cognitive retention. These teaching modules and curriculum will provide a ready-made package for field crop extension educators to use as in field lesson plans. Since the lesson and activities are already prepared an educator can pick up the materials and in a short period of time be able to teach an IPM in-field meeting of the subject of choice. Since organic field crop production is increasing we or including organic options in this curriculum.

## References:

Flora, B. F. 1991. Research Priorities for Sustainable Agriculture. Conference proceedings: Setting Priorities: Research, Practice and Policy for a More Sustainable Agriculture. Leopold Center for Sustainable Agriculture.

Wuest , S. B., Guy, S. O., Smith L. J. and Miller, B. C. 1995. On-Farm Tests as a Tool for Extension Programming. Journal of Extension 33: 4.

## Comments by Participants:

-What I like most about TAg is the hands-on approach to teaching.
-By looking at other farmers and different situations of planting and pest management opens your eye to other ways of doing things,
-The hands on experience means a lot
-Seeing and identifying diseases and insect pests is nice

-TAg has helped me better understand soils and the importance of rotating crops.
-TAg was very beneficial to individual farmers for improving economic viability.
-Hands on experience means a lot
-Seeing and identifying diseases and insects on plants was nice
-Kept us from spraying for soybean aphids
-Looking at other farmers and different situations of planting and spraying opens your eyes to other ways of doing things