

FINAL REPORT 2008

On-Farm Soybean IPM Education Programs: Cultivating Enhanced Soybean Management

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Soybean producers in ten counties in New York State

Abstract:

In 2008, 20 participants representing 16 farms in 3 counties in New York State participated in on-farm soybean Tactical Agriculture (TAg) team Integrated Pest Management (IPM) programs. Participants were actively engaged in a growing-season-long educational program discussing critical pest and crop management topics arising during the growing season. Multiple educational meetings were held in farmer fields enhancing opportunities to reinforce use of IPM concepts and techniques. Participating producers benefited from the timely collection of data from their fields throughout the growing season. The pest information gathered from scouting these soybean fields during the growing season was used in other extension educational efforts across New York State. In addition to the traditional soybean TAg efforts, one-time IPM and Integrated Crop Management (ICM) soybean meetings were held in Cayuga, Columbia, Jefferson, Oneida/Madison, Seneca and Tompkins counties. These field meetings extended the reach of soybean IPM and ICM on-farm education beyond the more intensive TAg groups to target soybean producers in areas where soybean acreage is expanding. Over one hundred producers attended these meetings.

Background and Justification:

Sound crop and pest management is a key component of economical and efficient field crop production in New York State. The diverse landscape of New York State provides a variety of environmental conditions that can present unique crop production and pest management challenges while providing opportunities for locally based and locally adapted Integrated Pest Management (IPM) and Integrated Crop Management (ICM) training. Many agricultural producers 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 field corn and alfalfa producers learn how to improve their crop and pest management. TAg is an intensive, on-farm,

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. An 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 new concepts will more likely retain the information and adopt the practice, especially when the information is reinforced throughout the growing season.

A soybean TAg team typically consists of 4 to 8 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 once a month to capitalize on the educational and management opportunities of the growing season. Participants are encouraged to be proactive and learn an IPM decision-making process. Many IPM options are presented, and participants are taught how to assess pest levels, and how to evaluate need, timing, and effectiveness of various management interventions. Thus, they can more effectively manage situations in real time during the growing season when the pest or crop issues are occurring. Producers are encouraged to consider and use non-pesticide options but to also include judicious use of chemical control tactics when appropriate. Each TAg participant brings his or her own experience and expertise, which enriches discussion and contribute to the groups' overall learning process. TAg participants each enroll 1 field of soybeans which serve as classrooms for TAg meetings.

On-farm education has been shown to increase participation and rates of adoption of new concepts and technologies (Wuest et al. 1995; Flora 1991). On-farm locations of TAg meetings provide ideal opportunities for direct observation of potential disease, insect, and weed pest outbreaks. The on-farm setting fulfills a producer's desire to see how an IPM and ICM method or new technology might work on his or her own farm. The small group educational design promotes learning and effective communication among 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. Trust is gained among farmer, extension, and agribusiness participants. In addition to a set of basic topics addressed, the flexible nature of TAg programs allows facilitators to address unique situations or local concerns. Adapting TAg programs to meet local needs has great potential to dramatically increase the rate of adoption of IPM and ICM practices. For more information on this approach, please visit the following section of the NYS IPM website: <http://nysipm.cornell.edu/fieldcrops/tag/default.asp>

Needs of agricultural producers constantly change. For many producers, soybeans fit well with their field crop rotations, provide a useful homegrown source of livestock feed, and offer a valuable cash crop option. In New York State, soybean acreage has increased 10-fold since 1986. The USDA National Agriculture Statistics Service estimated in November of 2008 that 226,000 acres of soybeans would be harvested in 2008 in NY, the largest acreage on record. From 2007 to 2008 there was an increase of 11% in the number of soybean acres harvested in New York State. The trend in soybean acreage expansion is expected to continue as local markets are enhanced by availability of commercial roasters and oil processing plants, favorable yield potential and commodity prices, and a continued increase in interest in production and

marketing of soy biodiesel. As soybean acreage has increased, so have producer questions regarding crop protection.

Until recently, soybean pest concerns have been minimal in the northeast, generally restricted to weeds, and minor insect, disease and vertebrate pests affecting emergence, vegetative and reproductive phases of crop development. Given our Northeastern pest spectrum, many pest impacts have largely been minimized or avoided through an integrated approach based on selecting varieties for maturity group, disease resistance, and commercial commodity attributes and the timely implementation of sound agronomic practices including crop rotation. Regular field monitoring for pests and crop condition is encouraged to alert producers of potential problems.

With the detection of soybean rust in the southeastern US in November of 2004, many experts speculated that rust could have a substantial impact on soybean pest management in the future. In response, producers anticipated a need to be proactive in learning how to manage the problem should rust appear in New York. A season-long on-farm soybean education program is playing a major role in effectively communicating with farmers about Asian soybean rust identification and management, and the associated surge in interest and awareness of other foliar diseases. In addition, soybean aphid, a pest that was first documented in New York in 2001, has also dramatically increased the need for sound IPM education for soybean producers.

Weed management in soybeans will continue to be an important area for educating producers. While initially intended to be used occasionally to clean up weeds from problem fields, estimates from field crop extension educators indicate that at least 90 % of soybeans planted are Roundup Ready (glyphosate resistant) varieties. This management technique appears to work adequately in most cases, but it is essential for IPM educators to be proactive in keeping soybean farmers alert about the potential risk of developing herbicide resistance, shifts in the time of occurrence of weed species, and the role that other glyphosate resistant crops (field corn and alfalfa) play in the use of this technology in the near future. Lambsquarter that appears to tolerate normal rates of round-up are becoming a larger concern to soybean farmers across NY. With two new exotic pests, numerous other occasionally severe pests, as well as increasing weed management challenges, it is crucial to use an educational delivery method that Cooperative Extension and other personnel can easily use in IPM outreach in soybean production systems. Soybean producers in Yates Niagara and Oneida counties were targeted for participation in intensive Soybean TAg training programs this season. In addition to these traditional TAg efforts, one-time IPM and Integrated Crop Management (ICM) soybean grower meetings were held in Cayuga, Columbia, Jefferson, Oneida/Madison, Seneca and Tompkins counties.

Objectives:

- 1) Conduct on-farm “traditional” TAg season-long integrated pest management (IPM) and integrated crop management (ICM) education programs for soybean producers across New York State. Discuss all agronomic and economic aspects of soybean production in New York State, with an emphasis on the identification, biology, and management of critical pests, including Asian soybean rust and soybean aphid.

- 2) Extend the reach of soybean IPM and ICM on-farm education beyond the season-long groups to more effectively target farmers in areas to which soybean production is expanding, by offering soybean producer “one time” meetings group field meetings.
- 3) Evaluate the impact of the education programs by measuring the level of adoption of IPM and ICM practices by participating soybean farmers.

Procedures:

Traditional TAg Educational Design:

Soybean on-farm TAg education programs were implemented in 3 Counties in 2008. Each county identified key IPM and ICM educational needs based on initial meetings with the farmers who chose to participate. Local educators organized and held timely meetings to address the identified topics. Meetings were scheduled relative to the pest-related needs and opportunities identified. Meetings were held to provide relevant teaching in critical educational moments during the growing season. Mike Stanyard established two soybean TAg teams in Yates and Niagara Counties. The soybean producers involved included full time field crop producers, dairy farmers, and producers with vegetables in their rotations. Jeff Miller coordinated a soybean TAg team in Oneida County. Table 1 summarizes the number of farms, coordinating Cornell Cooperative Extension Educators, and acres targeted. Table 2 presents the range of topics offered during 2008 for the traditional locally-adapted soybean TAg meetings.

Field Scouting: Extension summer assistants monitored the enrolled soybean field on each participating farm on a weekly schedule. Obtaining field observations at regular intervals helped reinforce the value of timely scouting and the application of this approach to all soybean acreage in production. Field scouting documented crop growth and condition and pest status. Scouting reports were shared with producers weekly, and collected field data was used as a basis for discussion at each TAg team meeting. Experience has the “educational moment” value presented when producers analyze *real* pest and crop management data collected on their *own* farm. The analysis of timely field information more fully engages participants in the learning and decision making process. This approach is ultimately more convincing and effective at promoting behavioral changes than using hypothetical examples. As a result producers learn more and are more likely to adopt IPM and ICM practices.

Soybean producer “one time” group field meetings.

A new component of this season’s educational effort was to provide soybean IPM training opportunities for growers in new soybean production areas. Local extension educators coordinated several one-time field meetings to educate soybean producers in IPM and ICM concepts. Although these meetings did not have the advantage of a full season TAg training, the format was very similar to a typical TAg team agenda.

Each meeting was held in the field and featured training in how to identify, monitor and evaluate common pest and crop problems. Fields were evaluated for crop growth and development and examined for presence of diseases, weeds, and insects. Suggested field monitoring and record keeping forms and other resources were shared with participants. These trainings prepared soybean producers with information and enhanced skills to conduct their own scouting. The meetings were offered in Cayuga, Columbia, Jefferson, Seneca, Oneida/Madison and Tompkins

counties. One hundred and ten growers participated. See table 2 for an overview of topics taught at particular times during the growing season.

Evaluation of the Program:

TAg 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, to assess changes resulting from involvement with the TAg program, and to identify subject areas requiring special attention. 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 IPM and ICM education efforts in their county.

Results and Discussion:

Two types of soybean educational programs were conducted this season in NY: the traditional soybean TAg program and one-time soybean producer field meetings. Location of counties participating in these efforts is shown in figure 1.

Traditional Soybean Tactical Agriculture teams (TAg).

The Tactical Agriculture (TAg) program has been a model for IPM and ICM information transfer in New York State for over 15 years. Three soybean TAg team programs were successfully implemented in 2008. Participants learned how to correctly identify, sample, assess, and apply different management tools on potential soybean pests including insects, weeds and diseases. They also gained the self-confidence needed to make environmentally and economically sound pest management decisions on their own.

2008 season overview. Initial TAg meetings addressed variety selection, soil pH, seeding rate, and fertility. During the mid June meetings, we conducted stand counts, provided an update on soybean rust development in the Southeast, practiced soybean aphid scouting (including monitoring for natural enemies), and conducted a weed assessment. Spring time planting conditions were excellent for soybeans this season. Soil conditions and temperatures were favorable and early planted beans came up quickly. Stand establishment was typically good with no significant emergence disease or insect problems noted. Soybean aphid populations (SBA) remained well below threshold all growing season in 2008 unlike many regions in 2007. Growers learned how to evaluate SBA infestation levels and thus, avoid needless use of insecticides. An emphasis continued to be placed on understanding plant growth stages at every meeting to help participants understand vulnerable stages in plant growth and development, and to correctly time management actions, if management was necessary. During July and August meetings, we discussed and observed foliar diseases of soybean, giving special attention to distinguishing each disease from soybean rust. White mold (*Sclerotinia sclerotiorum*) presented problems in many soybean fields across New York this season. TAg participants learned to identify this disease, discussed conditions that favor its development and learned how to manage this disease in the future. September meetings focused on pests of soybeans in on-farm storage, as well as crop rotation, variety selection, and seed treatment decisions for 2009.

New York State participated in the 2008 national Soybean IPM PIPE Sentinel plot network under the guidance of Gary Bergstrom (Cornell Department of Plant Pathology), Mary McKellar (Northeast Plant Diagnostic Center), and Keith Waldron (NYS IPM Program). The sentinel plot network, designed to provide an early warning to the arrival of soybean rust, has had the added

benefit of providing field information that has greatly improving our understanding of the occurrence of other important diseases including several diseases which were never before detected in NY. The network also documents the status of soybean aphid populations. Three of the 16 sentinel plots in NY were located on the farms of soybean TAg team participants (one in each of Oneida, Yates and Niagara counties). If soybean rust had been present in NY in 2008, TAg team members and other soybean farmers would have been kept informed of status and management options through Cornell Cooperative Extension and the Cornell Plant Pathology Soybean Rust information site (<http://www.ppath.cornell.edu/soybeanrustny/>). See the website <http://sbrusa.net/> for more information on the national soybean rust efforts.

Recent pest and crop observations gathered from monitoring one field of each participant were shared at every meeting. The weekly scouting visits encouraged members to begin their own sampling programs and become more familiar with their crops. The pest information gathered from scouting the soybean TAg fields during the growing season was also used in other extension educational efforts across New York State, including the NYS IPM Weekly Field Crops Pest Report (<http://nysipm.cornell.edu/fieldcrops/tag/pestrpt/>). This report was distributed to field crop educators, crop consultants, and other agri-business personnel throughout NY. Information was also posted on county and regional program websites and included in Extension newsletters. TAg updates were also discussed with statewide field crop extension personnel during Cooperative Extension weekly conference calls. The resulting “multiplier effect” greatly increased the reach of the on-farm education programs beyond the 19 participants on TAg teams.

Knowledge and Adoption of IPM and ICM:

Results of the pre and post-testing indicated that TAg participants all increased their knowledge of IPM and ICM. Scores on pre-tests averaged 57%. At the completion of the program, participants’ scores greatly increased to an average of 76%. Mean scores on pre and post tests are presented by team in Table 3.

IMPACTS:

The program provided valuable information and served as a forum of discussion for a wide range of soybean producers. Emphasis was placed on educating producers about two new invasive pests of soybeans. Soybean aphids have been present in NY for several years, and occasional severe infestations have caused yield losses. However, many producers in New York do not make management decisions based on field observations and economic thresholds. Soybean aphid identification, scouting, and management were major topics covered during soybean TAg meetings. Although Asian soybean rust has fortunately still not yet been detected in NY, producers were concerned about the possible occurrence of this disease and the occurrence of diseases that have similar symptoms. In our TAg program evaluation, we emphasized these two pest problems with the following questions: Because of TAg, 1) Do you feel more knowledgeable about Asian soybean rust?; 2) Do you have an improved ability to scout for soybean diseases and to distinguish common diseases from rust?; 3) Are you more knowledgeable about whom to contact in case of the appearance of rust?; and 4) Are you more knowledgeable about soybean aphid life cycle, damage, and thresholds? All participants answered yes to all four questions.

While knowledge of IPM and ICM is important, the long-term implementation of these practices is a more critical measure of program impact. After the completion of the TAg program, participants completed an exit survey or participated in interviews to indicate what IPM and ICM practices that they plan to implement.

Impacts of the one-time soybean pest and crop management meetings

Participants in the one-time soybean meetings were asked to complete an evaluation providing feedback on meeting content and suggestions for future topics. Information from these educational events have proven positive. When participants were asked to assess their pre- and post-meeting knowledge (1 = low, 5 = high) on various soybean topics their responses indicated noticeable improvement (See table 4).

One-time meetings had an additional benefit of stimulating local interest in more in depth soybean IPM training. As a result, a Soybean TAg education program is being planned for implementation in Jefferson County in 2009.

Summary: The TAg programs in Oneida, Niagara and Yates Counties in 2008 were successful at helping 19 participants representing 16 farms to learn and to implement IPM and ICM philosophy and practices on the 4,110 acres of soybeans that they manage in their farming operations. A key aspect of the success of this method is educational opportunities personalized to a producer's specific farming environment combined with interactive and participatory learning. The TAg programs could not succeed without the dedicated efforts of local educators and scouts. Overwhelmingly, producers involved indicated receptiveness to the on-farm season-long TAg approach to soybean IPM education, and have shown a willingness and desire to implement many of the IPM and ICM practices highlighted in the TAg programs. As a result of education and increased awareness, including our efforts through soybean TAg team participation, producers are more vigilant than ever toward pests in their soybeans. Many more producers in NY have expressed their interest in participating in an on-farm soybean IPM education team in the future, and educators continue to identify areas in need of soybean pest and crop education. Continuation of the soybean on-farm education programs will enhance soybean IPM implementation efforts in NY and will improve the exchange of information between producers and extension personnel.

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Table 1. Description of TAG Teams in 2008. Number of farms and soybean acreage impacted by participating county programs

County	Local CCE TAG Team Coordinator	Number of Farms	Number of Team Members	Approximate number of Soybean Acres Targeted
Yates	Michael Stanyard	5	5	110
Niagara	Michael Stanyard	6	9	3680
Oneida	Jeff Miller	5	5	320
Totals:		16	19	4110

Table 2. Soybean TAG Topics. Overview of topics covered at Soybean TAG meetings.

Meeting Time	Topics Taught
June	Soybean stages of growth, plant population assessment - stand counts, seed corn maggot, slugs, early season disease pests: seedling rots and blights, soybean aphids, weed identification and management
July	Soybean stages of growth, soybean aphid identification and management, progress of on-farm demonstrations, soybean rust and other foliar diseases (Septoria brown spot, downy mildew), white mold, results of NY on-farm soybean fungicide trials conducted in 2006
August	Soybean stages of growth, defoliating insects, soybean rust update, weed identification and management, white mold, farm-by-farm season-long pest management review, progress of on-farm demonstrations
September	Management of pests of stored soybeans, soybean harvest issues, planning for next year's crop: crop rotation, variety selection and seed treatment options; summary of on-farm demonstration observations so far

Table 3. Pre and Post Test Scores. Mean scores on pre and post tests by county program

County	Mean Pre-test Score (%)	Mean Post-test Score (%)	Percent Improvement
Oneida	50	80	20
Niagara	63	80	17
Yates	47	77	30
Overall	53	79	22

Table 4: Pre/Post survey feedback from soybean educational event.

Topic	BEFORE: Mean Response	After: Mean Response
Soybean aphid	2.8	3.9
Diseases of Soybean	2.4	3.75
Fungicide use decision-making	2.6	3.4
Soybean growth stages	3.2	3.8
Use of economic thresholds	2.4	3.8

Figure 1. Location of Soybean IPM Educational Programs 2008

