

## Climate Change and IPM

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*Abstract:* IPM staff have participated in several climate change projects in order to provide data, pest management expertise, and summaries of scientific information to farmers, extension staff, and policy makers. A fact sheet and powerpoint presentation were prepared and are available on the internet. A scientific paper containing IPM monitoring data trends was published. Presentations of the information were given to extension professionals in the northeastern US.

### *Background and Justification:*

Several institutions in New York State, including Cornell, have demonstrated interest in examining the potential effects of climate change on New York infrastructure including agriculture. The IPM Program continues to be active in these studies, contributing information on the potential impact of insect and disease pests in agriculture and providing field data collected during routine pest monitoring activities that may shed light on whether any pest changes are occurring. IPM roles in the projects have involved extension and research activities ranging from evaluating pest monitoring data, compiling and reviewing information based on the research of plant pathologists and entomologists specializing in climate change effects, preparing a resource fact sheet, preparing a powerpoint presentation to be used by extension staff, making presentations at northeast regional extension meetings and participating in the preparation of climate change impact documents for agriculture.

There have been three major climate change projects in which NYS IPM staff have participated:

1) Grubinger, V., B. Burtis, D. Wolfe. 2005-2007. Climate change and agriculture: Preparing educators to promote practical and profitable responses. Funded by Northeast Sustainable Agriculture Research and Education Program.

2) Spanger-Siegfried, E. et al. 2006-continuing. Northeast Climate Impacts Assessment. <http://www.northeastclimateimpacts.org/>

3) Roswnzweig, C. A. DeGaetano, and W. Solecki. 2008-continuing. Integrated Assessment for Effective Climate Change Adaptation Strategies in New York State. NYS Energy Research and Development Authority.

### *Objectives:*

1) Participate as a resource for information about the potential impacts of climate change on insect and disease pests. (Projects 1,2,3).

2) Contribute data from monitoring networks to climate change research initiatives. (Projects 1,2,3).

3) Prepare a fact sheet and powerpoint presentation on the impact of climate change on insects and diseases for use by extension professionals. (Project 2).

- 4) Make presentations at extension meetings in the northeast regarding potential climate change impacts on insect and disease pests of agriculture. (Project 2).
- 5) Contribute to organized discussion sessions and preparation of a report on the impact of climate change on agriculture in New York. (Project 3).

*Procedures:*

- 1) Petzoldt participated in all three climate change projects listed above. Meetings sponsored by the various projects and held in 2006, 2007, and 2008 have outlined some of the information and resource needs that the NYS IPM Program can contribute to the discussion of climate change. Examples of potential pest insect and disease concerns that could arise as a result of climate change were provided.
- 2) Various types of data collected annually in IPM projects over a long period can be valuable to those studying climate change. Western NY Pheromone Trap Network data (Seaman) has been used in several of these studies to illustrate possible trends in insect populations that could be occurring in the present. Although tracking this type of data for many years will be necessary to determine whether any of the trends in observations are significant, corn earworm trap catches in western New York have been occurring earlier in the growing season since the mid 1990's. Since corn earworm is not known as an overwintering pest in New York, it is unclear if the earlier arrival of this pest is an indication of overwintering in areas closer to New York or in New York itself. The data was contained in a scientific paper published in 2008.
- 3) Following an extensive search of the entomology and plant pathology literature, Petzoldt and Seaman prepared a fact sheet titled "Climate Change Effects on Insects and Pathogens" along with a documented power point presentation of the same title. These documents illustrate the potential changes and challenges that could be faced by northeast US farmers in the event of relatively small changes in climate temperature and moisture situation. Insects and disease organisms can be impacted in several ways by the changes that climate scientists anticipate happening in the next 50 years – some of the impacts could decrease pest pressure in certain situations, others could increase pest pressure resulting in negative economic consequences for growers of some crops. These materials are part of a series on the impacts of climate change on agriculture in the northeast and can be utilized by extension staff and others to speak to the issue in the course of their educational programming. The materials are available for download from the website: <http://www.climateandfarming.org/index.php>.
- 4) The powerpoint was presented (Petzoldt and Seaman) at training sessions in Maryland and Connecticut in 2007 to about 100 extension agents from the northeast who had registered for a one-day course in climate change.
- 5) The New York State Energy Research and Development Authority has funded a project to assess the potential for climate change impact across many sectors of New York State. Petzoldt is participating in this ongoing project as a resource for the agricultural section. Presentations have been made at an agricultural climate change assessment meeting and input from agricultural scientists has been received. A final report will be prepared and released for this project in 2009 outlining the major potential challenges for New York State and offering some general assessments of solutions. Policymakers will be the target recipients of the report.

### *Results and Discussion:*

The idea that climate change is or has occurred in the recent past and is accelerating is a topic that has received much high profile debate in the recent past. Climate scientists predict increases in temperature, changes in precipitation patterns, changes CO<sub>2</sub> levels and other impacts from the observations they have made. Changes of this type, if they occur will clearly have the potential for major impact on the occurrence and distribution of pest species, including insect, fungi, bacteria, and viruses. Various entomologists and plant pathologists have studied these potential impacts in detail over the past two decades and have made predictions of impacts at both the level of the individual organism and the level of populations. Small changes in average temperature, moisture and CO<sub>2</sub> are predicted to result in substantial differences in pest populations and the range of pests observed in New York.

While this information has been published in the scientific literature, these projects are some of the first that have attempted to summarize the information and make it available to extension staff, farmers, and policy makers to help them interpret the scientific literature. Participation of the IPM Program in these projects is important to ensure that any analyses, policy decisions etc. that result from climate change information contains accurate pest management information and impacts. In addition, data that we routinely collect for IPM decision-making purposes in real time for the NYS IPM Program can be valuable in a historical sense to the larger climate change discussion. We are providing data and the pest management resource information to the larger New York and northeast US communities as part of this process.

### *Samples of Resources Produced (see attached)*

- 1) Petzoldt, C. and A. Seaman. 2007. Climate Change Effects on Insects and Pathogens. Fact Sheet. <http://www.climateandfarming.org/clr-cc.php>
- 2) Petzoldt, C. and A. Seaman. 2007. Climate Change Effects on Insects and Pathogens. Powerpoint file. <http://www.climateandfarming.org/clr-cc.php>
- 3) Wolfe DW, L Ziska, C Petzoldt, A Seaman, L Chase, K Hayhoe. 2008. Projected change in climate thresholds in the Northeastern U.S.: implications for crops, pests, livestock, and farmers. *Mitigation and Adaptation Strategies for Global Change*. 13:555-575.