Progress Report for aWater Resources Institute, Federally Funded Ornamentals Project, through the Department of the Interior and the Department of Environmental Conservation

Title: Greenhouse BMP's: Transforming Principles into Practice Years One and Two

Project ID: 2002NY8B

Congressional District: NY 26

Research Category: Water Quality

Focus Categories: Agriculture, Non Point Pollution

Keywords: greenhouses, nurseries, nonpoint source management, nutrients, pesticides

Project Type: Information Transfer

Federal Funds Received through the Cornell Water Resources Institute: $11,000

Principal Investigators: Jana Lamboy, Thomas Weiler and Mary-Lynn Cummings, Cornell University

Summary Description: This is a long-term project designed to raise awareness of water quality issues facing ornamental horticulture, produce resources to help in education and assessment, and to increase the implementation of Best Management Practices without enlisting new legislation.

Problem & Research and Extension Objectives: The 2001 Directory of New York State Certified Nurseries, Greenhouses, and Plant Dealers lists 1,967 operations. Many of these businesses discharge wastewater directly to the ground surface or through drains to surface water. Greenhouse and nursery wastewaters are likely to contain some contamination from the legal and appropriate use of pesticides and fertilizers. New York growers need simple and direct resources explaining how to construct safe storage facilities for pesticides, and why and how they should monitor their nutrient solutions.

The goal of this project is to increase awareness and implementation of best management practices for minimizing the discharge of nutrient- and pesticide-contaminated wastewaters from commercial greenhouses and nurseries in New York State. The target audience includes commercial greenhouse owner/operators, extension educators, and horticultural students. The first year the project satisfied three primary objectives:

· Develop an Agricultural Environmental Management (AEM) program for commercial greenhouses.

· Teach horticulture students and CCE educators how to evaluate current practices.

· Reach industry leaders to enlist their support to increase adoption of BMP principles.

The second year's goals were to create an introductory brochure and begin revising the worksheets designed for research greenhouses to meet the needs of commercial operations.

Methodology: The current Cornell Research Greenhouse BMP Plan addresses several areas of greenhouse environmental stewardship in depth but it was not written for commercial establishments. In 2001 we learned about grower concerns and prepared introductory materials for the industry. Programming took place in several counties and SUNY Cobleskill to explain what Greenhouse BMP's include. After the seven worksheets were revised, they were submitted to AEM for review.

Comments from the AEM committee received in 2003 were very thorough and very helpful. The worksheets were reorganized in response to their suggestions. A proposal was submitted to WRI in December '03, Greenhouse BMP's: Transforming Principles into Practice Year Three, to support Cornell Cooperative Extension Educators in voluntary assessments of greenhouse operation BMP's.

Principal Findings & Significance: Most greenhouse operations agree that efficient use of inputs is the best way to run a business. The stakeholders we engaged (Karen Hall's and Walter Nelson's clients) try to practice IPM, and they are willing to look for additional ways in which they can improve environmental stewardship.

References: The seven greenhouse BMP worksheets written for Cornell research greenhouses are available online at http://oeh.cals.cornell.edu/BMPplan.htm/

Student Support:

Three Cornell Horticulture students participated in the first year's project. In 2003, a student intern from the University of Adelaide assisted in the Poinsettia crop nutrient monitoring project funded by the NYS IPM Program.

Notable Achievements: (if any)

Production of the six AEM worksheets for commercial operations

Publications:

The second year we produced the brochure, Protecting your business and the environment with Best Management Practices. A poster, funded by the Cornell College of Agriculture and Life Sciences was created from the same information.

A fact sheet on improving pesticide storage facilities was prepared by Karen Hall, and on greenhouse fertilization by Tom Weiler. A third fact sheet on back flow prevention is currently being written collaboratively, with Chris Logue as senior author.

Documents included:

-Summary of Six AEM Worksheets for Greenhouse Best Management Practices

-Article for Cornell's Focus on Floriculture, a Cooperative Extension Newsletter

Summary of AEM Worksheets for Greenhouse Best Management Practices

6 program areas, each with multiple elements

Category	Fertilizer Storage and Handling	Pest Management	Pesticide Storage	Weed Management	Greenhouse Maintenance	Greenhouse Construction
Components	Location of storage area Lighting Signage and security Ventilation and temperature control Fire prevention and suppression Containment and spill preparedness Contents of area: chemical compatibility and segregation Containers: type, labeling, arrangement, partially-used, damaged Inventory Emergency preparedness Fertilizer Injection systems Backflow prevention Equipment selection and maintenance Calibration monitoring Application: frequency, automation Crop nutrient status pH and electrical conductivity Employee training Record keeping Precipitate disposal Leaching	Communication Sanitation Plant care Monitoring and record keeping Pest exclusion Pest containment Pruning and rogueing Pesticide choice Biological control Pesticide application technique and training Pesticide application safety	Location of storage area Location of mixing area Building materials used Signage and security Ventilation and temperature control Lighting Fire prevention and suppression Containment Spill preparedness Emergency preparedness Contents of storage area and chemical compatibility Containers: type, labeling, arrangement, partially-used, damaged Personal safety Storage of small quantities Inventory PPE worn in storage area Application equipment storage Storage of PPE PPE worn in mixing area	Physical & mechanical controls Applicator qualification Chemical selection Application equipment Application frequency Application timing Application notification Record keeping and reporting	Routine inspection Drainage Good housekeeping Irrigation systems Spill cleanup Concrete repairs Disposal of plastic coverings Glazing repairs Shading – application Shading – removal Evaporative cooling Communication	Floor construction Chemical storage Mixing/loading area Application equipment storage PPE storage Laundry facilities Worker safety area Building controls Water supply Secondary containment systems Worker safety needs Spill control Disposal systems

Each component of each category has four levels, low risk to high risk

Article included in Focus, the Floriculture Extension Newsletter, Fall of 2002

The Benefits of Best Management Practices

Jana S. Lamboy, New York State Integrated Pest Management Program
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Walter N. Nelson, Cornell Cooperative Extension, South Central New York
Thomas C. Weiler, Department of Horticulture, Cornell University

In an urban state like New York, many citizens are concerned about environmental conservation, employee safety, and public safety aspects of agricultural practices. Regulations related to many of these concerns are developed and monitored by the NYS Department of Environmental Conservation (DEC), as well as by a number of counties where the protection of groundwater from agricultural pollution is a key issue. Greenhouse wastewater (effluent) is likely to contain contaminants from the legal and appropriate use of agricultural chemicals. Many of the 1100+ commercial greenhouse operations in New York discharge wastewater directly to aquifers through leaching and/or to surface water by runoff. Attention paid now to greenhouse crop management practices that are potentially detrimental to the watershed minimizes risk to business growth in the future and improves community, employee, and customer relations.

During site visits in the past couple of years we have heard growers regularly comment on the importance of good neighbor relations. The concerns might relate to pesticide application and storage or how operations handle fertilizers. When you invest in BMPs, you are protecting your own groundwater as well as your neighbor's. Secondary containment (placing a container or piece of equipment inside another container to capture spills) will minimize the potential for ground water contamination. One grower is retrofitting the injector area for improved performance. While doing that, a pool liner is being installed beneath the area to catch any spills that may occur. By adding a sump pump, the liner could be easily emptied if necessary. Construction of a pesticide storage facility away from retail traffic is also a priority being addressed. Features of the new storage room include an exhaust fan providing negative pressure, a floor that was sealed to capture possible spills, and appropriate placards on the door that identify contents. Personal protection equipment is stored outside of this area. A good pesticide storage facility is not in the pump house or near the wellhead!

An important aspect of Best Management Practices is monitoring water quality and fertilizing accurately. If chemicals need to be used, they should be applied in an efficient way. Deborah Kwasniewski from Taylor Greenhouses in Portland, New York has been monitoring soils and water quality for over 10 years. Initially, she was using the Myron Meter and sending samples to diagnostic labs. In 1998, she purchased an Anderson injector that she now uses to inject acid and fertilizer. This investment of approximately $1200.00 was necessary because of the poor well water that was available- 375 ppm alkalinity and pH 7.28. Deb now injects sulfuric acid through the proportioner, bringing the water alkalinity down to 67.9 ppm and pH to 5.7-6.0. Deb has been very pleased with the system and said that it has been extremely useful because "you are now giving what you think you are." Prior to installing the system she used three times as much fertilizer.

Crops such as bacopa and vinca vine, that require more iron, show dramatic improvement. The estimated payback period, taking into account savings on fertilizer and increased plant quality, was "easily within a year" said Deb.

Installing a backflow assembly on your incoming waterline and having it inspected annually leads to great peace of mind. An appropriate backflow valve eliminates the possibility of fertilizer or pesticide going back into the public water supply or your well. Ned Periwinkle installed his new assembly when he updated his water supply. It was both a Town and New York State requirement, and he understood that he would face unlimited liability if there were an incident in which his materials polluted the public potable water system. A sudden demand on the water supply such as when the fire department draws water could pull water back out of your line. Ned said that the installation cost and annual inspection by a licensed inspector is a small price to pay. Those folks who have been "Grandfathered" into the system and therefore not inspected should in any case install backflow valves, begin the annual inspection cycle, and reduce their liability!

BMP's help to establish priorities for improvements in your facilities or changes in practices that will reduce impacts on the environment and improve worker safety. Monitoring inputs can improve efficiency and crop quality, and accident prevention reduces grower risks. Today, these are activities of a good business.