

Project Title: Sustainable Greenhouse Management

Project Leader: Tina Smith

Project Overview

According to the USDA New England Agricultural Statistics, nursery and greenhouse production was ranked first among the state's agricultural commodities in 2012 with sales estimated at \$156 million. According to a 2009 survey, conducted by the New England Nursery Association there are more than 5,130 firms that are involved in production (nurseries, greenhouses, herbs, cut flowers, turfgrass) retail (garden centers, florists) and landscape services. Forty-six percent of these operations combined these different business elements. The industry consists of wholesale growers and grower retailers, including a rising number of diversified farms that have added greenhouse crops to their businesses strategies. Plant production is also the basis for many associated horticultural industries such as plant and seed propagators, product suppliers and service industries. These companies together have significant economic and environmental impacts for Massachusetts. Sustainable greenhouse management requires solutions to problems of energy, pest management, trained labor, water quality, production practices and plant nutrition for a diverse range of crops and complex agricultural and environmental issues.

As Massachusetts undergoes cultural, economic and climatic changes, both new and established growers will need to learn to use practices that are economically, environmentally and socially sustainable. The Sustainable Greenhouse Management program uses applied research and educational opportunities to address key problems and opportunities facing the industry and the public. Programs on greenhouse crop production, integrated pest management, water and nutrient management, waste management and energy are delivered through a variety of newsletters, websites and message board, publications, workshops, conferences, training programs, diagnostic services and applied research. Applied research is being conducted on organic growing media and fertilizers for ornamental greenhouse crops.

Situation & Priorities

Exotic pests, diseases and invasive species are important problems that face the greenhouse and floriculture industry and are a threat to the economic viability of the industry and to the environment. Crops that become infected with an exotic diseases or infested with exotic pest in most cases, become unmarketable and can be very costly to manage. Some pests and diseases on ornamentals may threaten food crops and some overwinter, becoming an on-going expensive problem. The globalized production and importation of crops and the distribution system for greenhouse crops increases the risk for introducing exotic pests, diseases and invasive species. There are a variety of pests that currently threaten specific crops and markets within the horticultural industry. In 2012, the destructive disease

Impatiens downy mildew killed garden impatiens in greenhouses, gardens and landscapes throughout MA and the region. Garden impatiens were an important economically significant plant in the ornamental industry. In 2009, the destructive disease, *phytophthora* was distributed to commercial farms throughout the northeast through plants grown for home gardeners and distributed through retail outlets. *Basil downy mildew*, a new disease in 2008, continues to be a problem. Other recent exotic pest include the quarantined disease, *Chrysanthemum White Rust* on garden mums, *Lily leaf beetle* on lilies, *Ralstonia* on geraniums, *Q-strain whitefly*, *Daylily rust*, *boxwood blight* and the list goes on. Invasive plant species are also creating problems in Massachusetts and the potential for future problems is significant. Invasive plant species typically are habitat generalists and aggressive colonizers and outbreaks are difficult to contain and almost impossible to eliminate unless discovered and addressed early in the invasion. Our established Greenhouse Crops and Floriculture Extension program with our strong network of Extension educators, web-based message board and email list direct to growers delivers research-based information to the industry that is used to educate their customers including home gardeners in MA. Extension staff also continue to expand and enhance a searchable, web-based photo library of pests and diseases. This helps growers to identify problems early and take action to avoid, detect and control exotic pests and invasive species.

Water Protection - Water resources must be protected through conservation and pollution prevention to provide clean drinking water, support viable terrestrial, wetland and aquatic ecosystems, serve as an essential resource for businesses, and provide recreational opportunities. Our Greenhouse Crops and Floriculture Program provides educational programs for growers to implement water conservation practices, proper plant nutrition and pest management to help protect our water resources.

Integrated Pest Management (IPM) - The use of IPM for greenhouse crops reduces management and production costs, reduces the risk of contamination, increases marketability, and improves the health of soil and water. Our Greenhouse Crops and Floriculture extension program provides educational opportunities for growers on advanced IPM practices through newsletters, our website, pest message and photo libraries, workshops, diagnostic services and web based APPs for smartphones and tablets.

Workforce Development - Employees of greenhouse crop production businesses need training opportunities to grow greenhouse crops that are economically viable and environmentally responsible for businesses to remain profitable. Employees of garden retailers need training to provide accurate, unbiased information to the public that is safe for people and the environment. The Greenhouse Crops and Floriculture Program provides educational training opportunities to growers and retailers.

Activity Summary - 2016

- Applied Research on organic growing media and fertilizers for ornamental greenhouse crops (1)
- Educational workshops and conferences on sustainable greenhouse crop production for growers, and garden retailers and agency staff (7)
- Educational Publications: Revised New England Greenhouse Floriculture Guide (2017-2018) and gardening fact sheets, 4 new and 4 revised. Educational workshops and conferences on sustainable greenhouse crop production for growers, and garden retailers and agency staff (7)
- Pesticide education training (1)
- Web-based educational materials for sustainable greenhouse crop production: photo library, message board and grower resources (31)
- Printed newsletters sent to subscription list for sustainable greenhouse crop production (6)

Total educational contacts

	Adult Contacts
Direct Contacts	814
Indirect Contacts (Print, Web, etc...)	380770

Narrative Summary and Impact

Sustainable greenhouse production addressed the following important issues: Maintaining economic viability for the floriculture and greenhouse industries and enhancing environmental sustainability, (greenhouse cultural practices, integrated pest management, organic production, water and energy conservation and exotic diseases, insects and invasives). Programs addressing these issues were delivered through a variety of educational opportunities including workshops and conferences, grower site visits, newsletters, electronic media including websites, Facebook and email lists and diagnostic services.

Activities included: Grower consultations; face to face educational workshops and conferences; articles, publications and newsletters (Extension Floral Notes - 300 subscribers); and websites (www.negreenhouseupdate.info - 44,960 users with 82.9% returning visitors this year), <http://ag.umass.edu/greenhouse-floriculture> (331,964 pageviews), facebook (371 likes) and email (850 on list by request only), two web-based apps on pest and disease management and YouTube videos on a variety of greenhouse production topics were viewed by 60,999.

Evaluations are distributed to attendees at face to face educational programs which are collected and tabulated. Based on tabulated evaluations for this year: 188 growers plan to use a new learned practice within the next year; 98 growers stated that they will benefit economically; 93 will use a new biological control practice such as using banker plants, using beneficial nematodes and better utilization of predatory mites; 11 growers plan to practice better greenhouse sanitation using tools they learned; 20 growers indicated that they will practice better disease and weed control. Over 100 growers collected information and talked one-on-one with Extension staff exhibiting information at an industry trade show. One hundred eight growers earned pesticide recertification credits this year at our face to face programs.

Collaborating Organizations

- **University of Connecticut Greenhouse IPM Program**
- **Massachusetts Flower Growers Association**

