

## Planned Program 6 (Summary)

### 2. Brief summary about Planned Program

The overall emphasis in this planned program is low-impact, reduced-risk pest and nutrient management. This will include further refinements of IPM practices, development of biological control agents, new forays into organic production, and expansion of efforts within the green industry. One area of emphasis will be using molecular methods for identifying and detecting microbial plant pathogens and applying these methods to plant disease management. The focus will be on the population ecology of plant microbes. The research will utilize genetic analysis of microbes to study the evolution and function of microbial plant pathogens on plant hosts, and study applications of genetic probes to identify plant pathogens in situ. Similar analysis will be done on pathogens of arthropods, vectoring of pathogens by arthropods, and the ecology and evolution of parasitic microbes. Insect genomes will be explored to improve our knowledge of gene products and the molecular basis of all aspects of insect physiology and behavior. This knowledge will enable future breakthroughs and novel techniques for solving the various problems that insects create for human beings. Additional focus areas include horticultural products related to increased urbanization, the production of high value specialty crops, and value-added processing of food products. Integrated plant and animal production systems will be based on research in biological control of insects and weeds, integrated pest management, long term rotation effects, nutrient cycling and complex crop, pest, animal and environmental interactions.

3. Program existence : New (One year or less)

4. Program duration : Long-Term (More than five years)

5. Expending formula funds or state-matching funds : Yes

6. Expending other than formula funds or state-matching funds : Yes

### V(B). Program Knowledge Area(s)

#### 1. Program Knowledge Areas and Percentage

| KA Code | Knowledge Area  | %1862 Extension | %1890 Extension | %1862 Research | %1890 Research |
|---------|---|-----------------|-----------------|----------------|----------------|
| 201     | Plant Genome, Genetics, and Genetic Mechanisms                    |                 |                 | 1%             |                |
| 202     | Plant Genetic Resources   |                 |                 | 5%             |                |
| 203     | Plant Biological Efficiency and Abiotic Stresses Affecting Plants |                 |                 | 6%             |                |
| 204     | Plant Product Quality and Utility (Preharvest)                    |                 |                 | 7%             |                |
| 205     | Plant Management Systems  |                 |                 | 27%            |                |
| 206     | Basic Plant Biology   |                 |                 | 4%             |                |
| 211     | Insects, Mites, and Other Arthropods Affecting Plants             |                 |                 | 19%            |                |
| 212     | Pathogens and Nematodes Affecting Plants                          |                 |                 | 19%            |                |
| 215     | Biological Control of Pests Affecting Plants                      |                 |                 | 5%             |                |
| 216     | Integrated Pest Management Systems                                |                 |                 | 4%             |                |
| 312     | External Parasites and Pests of Animals                           |                 |                 | 1%             |                |
| 601     | Economics of Agricultural Production and Farm Management          |                 |                 | 1%             |                |
| 604     | Marketing and Distribution Practices                              |                 |                 | 1%             |                |
|         | <b>Total</b>  |                 |                 | 100%           |                |

### V(C). Planned Program (Situation and Scope)

#### 1. Situation and priorities

Massachusetts is the fourth most densely populated state in the U. S., and is bordered by states ranked two and three (Rhode

Island and Connecticut) in population density. And yet, the vitality of the economy and the quality of life in Massachusetts are heavily dependent on agriculture. Even though Massachusetts is a highly urbanized state, it produces 15% of its food and retains a significant amount of open land, much of it in farmland. Farms occupy nearly one-half million acres, 11% of the state's land. In many parts of the state, agriculture accounts for most of the remaining, privately held, undeveloped land, providing important habitat for wildlife, recharge zones for water supplies, and open vistas and recreational spaces for residents and tourists. On the other hand, Massachusetts currently imports 85% of its food. This can create problems from both an economic and ecological perspective. Direct marketing of agricultural products to a largely urban and suburban population is certain to become more important to the region. Identifying and developing specialty products and integrating production with agrotourism will play a role in farm viability. The proximity of farms to cities means that large numbers of people can directly see how food and ornamentals are grown. Massachusetts' agriculture has a heavy horticultural component, including fruits, vegetables, and ornamentals. Ornamental horticulture in particular has evolved rapidly to become a significant component of the state's economy. Beyond providing jobs in turf, nurseries, landscaping and greenhouses, these enterprises contribute to environmental protection and enhancement, effective use of municipal budgets, and improved quality of life. A large number of farms provide recreational activities such as cross-country skiing, bed-and-breakfast accommodations, farm tours, and harvest festivals. Such new business is strongly related to Massachusetts' mix of urban and rural environments. Finally, the development and re-use of land for residential, commercial and industrial purposes places tremendous stress on natural resources such as wetlands, groundwater, surface water, wildlife habitat, coastal resources and agricultural land.

## **2. Scope of the Program**

- In-State Research
- Multistate Research
- Integrated Research and Extension

## **V(D). Planned Program (Assumptions and Goals)**

### **1. Assumptions made for the Program**

Agriculture in Massachusetts will become increasing more oriented to direct marketing and value-added products. Local production and utilization of food crops provides important benefits to the economy, the environment, and the citizens of Massachusetts. Massachusetts has land and soil resources that would allow the state to produce 35% of its food needs. Plants resistant to pests and diseases, weeds and stresses will increase productivity and improve the quality of our environment by decreasing the use of agricultural chemicals. Efficient production of food, fiber and polymers will be increased by adoption of new techniques in biotechnology. Genomics will vastly increase our understanding of the myriad ways in which plants defend themselves against insects and insects overcome plant defenses.

### **2. Ultimate goal(s) of this Program**

To exploit natural products to create desirable biorational insecticides, modify plant growth and develop new foods and food ingredients, to present local farmers with techniques that results in reduced toxic exposure to agricultural workers and consumers while maintaining high product quality, to increase the economic viability of small farms in New England, to increase the nutritional value of produce, to develop plants that are less susceptible to pests because of changes in their defensive array of natural products, to develop more conservative nutrient management strategies that make production more competitive while reducing impacts on the environment

## **V(E). Planned Program (Inputs)**

### **1. Estimated Number of professional FTE/SYs to be budgeted for this Program**

| Year | Extension |      | Research |      |
|------|-----------|------|----------|------|
|      | 1862      | 1890 | 1862     | 1890 |
| 2009 | 0.0       | 0.0  | 5.5      | 0.0  |
| 2010 | 0.0       | 0.0  | 6.0      | 0.0  |
| 2011 | 0.0       | 0.0  | 6.0      | 0.0  |
| 2012 | 0.0       | 0.0  | 6.0      | 0.0  |
| 2013 | 0.0       | 0.0  | 6.0      | 0.0  |

**V(F). Planned Program (Activity)**

**1. Activity for the Program**

Conduct research and produce refereed publications in the scientific literature. Present on-site research meetings.

**2. Type(s) of methods to be used to reach direct and indirect contacts**

| Extension           |                     |
|---------------------|---------------------|
| Direct Methods      | Indirect Methods    |
| ● {NO DATA ENTERED} | ● {NO DATA ENTERED} |

**3. Description of targeted audience**

Agriculturists, growers, viticulturists, pasture managers, tree fruit orchardists, cranberry growers, medicinal plant growers, Grape growers, ethnic vegetable growers, organic farmers, Golf course managers, Arborists, IPM

**V(G). Planned Program (Outputs)**

**1. Standard output measures**

**Target for the number of persons(contacts) to be reached through direct and indirect contact methods**

|      | Direct Contacts Adults | Indirect Contacts Adults | Direct Contacts Youth | Indirect Contacts Youth |
|------|------------------------|--------------------------|-----------------------|-------------------------|
| Year | Target                 | Target                   | Target                | Target                  |
| 2009 | 0                      | 0                        | 0                     | 0                       |
| 2010 | 0                      | 0                        | 0                     | 0                       |
| 2011 | 0                      | 0                        | 0                     | 0                       |
| 2012 | 0                      | 0                        | 0                     | 0                       |
| 2013 | 0                      | 0                        | 0                     | 0                       |

**2. (Standard Research Target) Number of Patent Applications Submitted**

**Expected Patent Applications**

2009 :0

2010 :0

2011 :0

2012 :0

2013 :0

**3. Expected Peer Review Publications**

| Year | Research Target | Extension Target | Total |
|------|-----------------|------------------|-------|
| 2009 | 50              | 0                | 0     |
| 2010 | 50              | 0                | 0     |
| 2011 | 50              | 0                | 0     |
| 2012 | 50              | 0                | 0     |
| 2013 | 50              | 0                | 0     |

**V(H). State Defined Outputs****1. Output Target**

- # of refereed manuscripts

**2009 :15                      2010 :15                      2011 : 15                      2012 :15                      2013 :15**

- # of on-site research meetings per year

**2009 :9                      2010 :9                      2011 : 9                      2012 :9                      2013 :9**

**V(I). State Defined Outcome****1. Outcome Target**

Accurate research on low impact pest and nutrient management made available and shared

**2. Outcome Type :** Change in Knowledge Outcome Measure

**2009 :0                      2010 : 0                      2011 : 0                      2012 :0                      2013 : 0**

**3. Associated Institute Type(s)**

- 1862 Research

**4. Associated Knowledge Area(s)**

- 201 - Plant Genome, Genetics, and Genetic Mechanisms
- 202 - Plant Genetic Resources
- 203 - Plant Biological Efficiency and Abiotic Stresses Affecting Plants
- 204 - Plant Product Quality and Utility (Preharvest)
- 205 - Plant Management Systems
- 211 - Insects, Mites, and Other Arthropods Affecting Plants
- 212 - Pathogens and Nematodes Affecting Plants
- 215 - Biological Control of Pests Affecting Plants
- 216 - Integrated Pest Management Systems
- 312 - External Parasites and Pests of Animals
- 601 - Economics of Agricultural Production and Farm Management

