

Massachusetts Agricultural Experiment Station & UMASS Extension

FY 2003 Annual Report

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2003 Plan of Work Addendum

Certification:

Dr. Steve Goodwin, Associate Director
Massachusetts Agricultural Experiment Station

Date

Mr. Steve Demski, Director
UMass Extension

Date

Summary

The Massachusetts Agricultural Experiment Station at the University of Massachusetts in Amherst is currently administered through the College of Natural Resources and the Environment. Cleve Willis the dean of the College serves as director and Steve Goodwin the College's Associate Director oversees the day to day management of the station. The Massachusetts Agricultural Experiment Station is reporting on 16 Multistate Research Projects, which have an integrated component with Extension. Several other projects are not reported on in this annual report because they have not reached a degree of maturity and will be reported on in subsequent years. The stakeholder input on research derives from integration with Extension. Stakeholder issues in Massachusetts continue to include those elements such as land use, marketing and economic development, use of chemicals, production and management technologies, labor, child and elder care, food safety, food sanitation, regulations and good manufacturing practices, poverty, hunger, agrochemicals, public knowledge and education, global markets and the environment, land vs. population, and children youth and families at risk. While all of the projects presented have some impact on the needs of the under-served and under-represented populations of the Commonwealth, several projects MAS00834, MAS00807, NE-1012, MAS00882, MAS00893, MAS00797, MAS00870 and NC-1002 specifically targeted the under-served and under-represented populations of the State.

*Please note that goals were chosen for projects using the crosswalk designed for CRIS.

UMass Extension is currently administered through the Vice Provost for Outreach, John Mullen, with faculty and staff in the School of Public Health and Health Sciences, and the College of Natural Resources and the Environment.

UMass Extension is reporting on selected programs, as described by Program Area Directors, team and project leaders. UMass Extension university funding (state) was reduced 55% on July 1, 2003 as a result of a significant reduction in state funding for the university. This reduction significantly impacted the 4-H program.

The UMass Extension Board of Public Overseers continues to give leadership to overall program direction. Appointed by the Governor, this Board meets three times per year.

The renewed efforts to improve coordination between research and extension are reflected in a closer assimilation of the two areas in the FY2003 Annual. In addition, while we have worked hard to insure the Short Impact/Accomplishment Statements are indeed impact statements and not simply reports of accomplishments or activities, we recognize that this is an aspect of our reporting that will benefit from continued improvement. Both the Massachusetts Agricultural Experiment Station and UMass Extension are committed to our reporting of impacts over the coming year.

Planned Programs

Programs and Project Impacts Listed by Goal

Goal 1
**An agricultural system that is highly competitive
in the global economy**

- | | |
|---|------------------------------------|
| Key Themes: | Invasive Species |
| Adding Value to New and Old Agricultural Products | Managing Change in Agriculture |
| Agricultural Competitiveness | New Uses for Agricultural Products |
| Agricultural Profitability | Niche Market |
| Animal Genomics | Organic Agriculture |
| Animal Health | Ornamental/Green Agriculture |
| Animal Production Efficiency | Plant Genomics |
| Aquaculture | Plant Germplasm |
| Biobased Products | Plant Health |
| Biofuels | Plant Production Efficiency |
| Biotechnology | Precision Agriculture |
| Bioterrorism | Rangeland/Pasture Management |
| Diversified/Alternative Agriculture | Risk Management |
| Emerging Infectious Diseases | Small Farm Viability |
| GIS/GPS | Tropical Agriculture |
| Grazing | Urban Gardening |
| Home Lawn and Gardening | |
| Innovative Farming | |

Agency	Total Dollars	FTEs	MSR Projects/Programs	MSR Dollars
MAES	\$1,090,764	39.3	14	\$258,473
UMEXT	\$ 939,368	17	3	\$ 26,963
				-

Goal 1 Executive Summary

Much of the effort towards Goal 1 has gone into testing new cultivars and cultural practices for fruit trees. These efforts help to determine which cultivars will be the most precocious, high yielding, best tasting and disease resistant cultivars, allowing growers to select the best and most appropriate cultivars to plant in Massachusetts. The information was disseminated through twilight meetings, publications and individual visits with growers. Efforts to support aquaculture in Massachusetts are gaining momentum with the impact on shell fish reported this year. Impacts on finfish aquaculture will be report in future years.

Key Theme: Adding Value to New and Old Agricultural Products
Title of Program/Project: Evaluation of new peach varieties in a high-density peach orchard system
Contact Person: Clements, Jon M.
Brief Description of Program/Project: From 2000 through 2003 a high-density peach orchard of new, numbered and named peach varieties was established at the UMass Cold Spring Orchard in Belchertown, MA. The training system, called the ‘perpendicular-V,’ purportedly allows early

production of high quality fruit on easily managed trees; however, it is unproven in Massachusetts. Newer peach varieties have higher color and in some case preferable fruit quality to more commonly grown peaches, however, again their adaptability – particularly cold hardiness and disease-resistance – has yet to be evaluated in Massachusetts. These varieties, as well as some numbered sweet cherry varieties, are being evaluated under an agreement with the International Plant Management Testers Network.
Short Impact: This peach orchard has already been used for several pruning demonstrations. Data has been collected on harvest date and fruit quality of these peaches as the trees start cropping. Ongoing evaluation of fruit quality, yield, and pruning requirements will prove useful to Massachusetts growers wishing to invest in modern peach orchards and new varieties to capitalize on the high prices received for direct-market, local peaches. Evaluation of numbered variety selections as part of the International Plant Management Testers Network will prove valuable in making available to growers new peach varieties that are adapted to local growing conditions.
Source of Funding: Smith-Lever 3b & c; International Plant Management Testers Network (in-kind donation of trees)
FTE's: 0.1
Scope of Impact: State Specific

Key Theme: Adding Value to New and Old Agricultural Products
Title of Program/Project: NE-183 Multidisciplinary Evaluation of New Apple Cultivars
Contact Person: Greene, Duane W.
Brief Description of Program/Project: New and promising apple cultivars were propagated and distributed and planted in 28 different sites in 20 states and provinces. They are being evaluated for horticultural characteristics, taste, and susceptibility to insect and disease damage. Protocols were established by a subcommittee to insure that all data collected was done uniformly and over all sites.
Short Impact: Trees in this project are just coming into production. We are now getting a sense o of which cultivars will be the most precocious, high yielding, best tasting and disease resistant cultivars. It cost thousands of dollars to establish a new orchard. Information gathered here will allow growers to select the best and most appropriate cultivars to plant in a specific location, in our case, Massachusetts. Information gathered in this project will take the guess work of variety selection and potentially save growers many dollars by weeding out inappropriate cultivars that will not perform well in our environment.
Source of Funding: Hatch and grower funds
FTE's: 3
Scope of Impact: Multistate Research/Extension: MA, RI, NH, VT, ME, CT

Key Theme: Agricultural Competitiveness
Title of Program/Project: Education/outreach activities for commercial tree fruit growers in Massachusetts
Contact Person: Autio, Wesley R.; Clements, Jon M.
Brief Description of Program/Project: ‘Twilight’ meetings were held on a seasonal basis throughout Massachusetts to update tree fruit growers on current integrated (pest and horticulture) orchard management strategies. An annual ‘New England Fruit Meeting’ was held

<p>that included invited speakers with expertise in horticulture, pest management, and marketing. The ‘Healthy Fruit’ newsletter was published and distributed 20 times during the growing season with timely integrated orchard management information. The periodical ‘Fruit Notes’ were published with research results pertinent to Massachusetts and New England fruit growers. The ‘2003-2004 New England Pest Apple Pest Management Guide’ was published in collaboration with New England fruit specialists. The UMass ‘Fruit Advisor’ website was continuously updated with meeting notices, publications, articles, fact sheets, and video. At least 150 grower visits were made on an as-needed basis for problem diagnosis and horticulture/pest consulting or recommendations.</p>
<p>Short Impact: It is estimated that over 90% of the 200+ commercial fruit growers (Massachusetts and regional) were recipients of program/project information via education/outreach activities. Total meeting attendance was over 1,500. ‘Healthy Fruit’ and ‘Fruit Notes’ have subscriptions of 150 and 300 respectively. The ‘2003-2004 New England Apple Pest Management Guide’ was mailed to over (150) fruit growers in Massachusetts and an additional 700 regionally. Site/grower visits were important to analyze and advise on specific, local needs. No data are available on use of the UMass ‘Fruit Advisor’ website; however, increasing e-mail subscriptions to ‘Healthy Fruit’ suggests grower use of technology as an information resource is increasing. Altogether, as evidenced by strong meeting attendance and publication subscriptions, the importance of program/project information to Massachusetts fruit growers to make integrated orchard management decisions to protect the environment and human health while remaining profitable is clear. Tree fruit growers in Massachusetts have consistently cited extension as vital to the continued sustainability of the local industry.</p>
<p>Source of Funding: USDA CSREES; user fees</p>
<p>FTE’s: 4.2</p>
<p>Scope of Impact: Multistate Extension: MA, RI, NH, VT, ME, CT</p>

<p>Key Theme: Agricultural Profitability</p>
<p>Title of Program/Project: Evaluation of sweet cherry cultivars on dwarf rootstocks for Massachusetts direct-market and pick-your-own orchards</p>
<p>Contact Person: Clements, Jon M.</p>
<p>Brief Description of Program/Project: A sweet cherry orchard with twelve cultivars on two dwarf rootstocks was planted at the UMass Cold Spring Orchard in 2001. Objectives of the research are to evaluate the hardiness, productivity, fruit quality, and adaptability of these cherry varieties under Massachusetts conditions. New dwarf rootstocks are being evaluated because they have the potential to create easily harvested, pick-your-own orchards. Data on tree growth and ease of training have already been recorded, and, as the cherries start cropping in 2004, fruit quality and yield data will be collected. Results will be reported to fruit growers in extension publications and during grower meetings/field days.</p>
<p>Short Impact: The sweet cherry orchard has been a stop at one grower field day (2002). Several growers have toured the orchard and hence established dwarf sweet cherry orchards of their own. Already, some insight into which varieties may perform better under local conditions has been gleaned, and a clear difference in tree size between the two rootstocks has been observed. Information gained from this block will be vital in helping Massachusetts growers decide whether diversifying into sweet cherries is a good investment in their orchard business plan.</p>
<p>Source of Funding: Massachusetts Fruit Growers’ Association; Smith-Lever 3b & c</p>
<p>FTE’s: 0.1</p>

Scope of Impact: State Specific
Key Theme: Agricultural Profitability
Title of Program/Project: NC-140 – Evaluation of Pome- and Stone-fruit Rootstocks
Contact Person: Autio, Wesley R.
Brief Description of Program/Project: Research is conducted at the local, regional, national, and international level to assess apple and peach rootstock characteristics and determine best practices rootstock utilization. Massachusetts participates in 10 long-term rootstock experiments. Nine are located at the University of Massachusetts Cold Spring Orchard Research & Education Center in Belchertown, MA, and one is at Clarkdale Fruit Farm in Deerfield, MA.
Short Impact: Approximately 250 acres were planted with dwarfing rootstocks during the last year. These rootstocks, as defined and recommended by this project, will reduce pruning and harvest labor by 50%, increase fruit quality, increase size by 10-20%, and enhance the economic return on this acreage by as much as 50%. Further, smaller trees require 70% less pesticide because of reduced canopy volume. The net effect of the planting in 2003 is to reduce the amount of spray material in total by about 250,000 gallons per year in Massachusetts.
Source of Funding: Massachusetts Fruit Growers' Association, Inc., International Dwarf Fruit Tree Association, Hatch Multistate NC-140, Smith-Lever 3b & c
FTE's: .8
Scope of Impact: Multistate Extension/Research: MA, RI, NH, VT, ME, CT at other growing areas of Northeastern US, and Eastern Canada

Key Theme: Animal Genomics
Title of Program/Project: Ovarian and Environmental Influences on Embryonic/Fetal Mortality in Ruminants
Contact Person: Fissore, Rafael
Brief Description of Program/Project: Several possible reasons exist for the low reproductive success & importantly among them are the environmental and metabolic stresses that these animals must bear to achieve high milk production yields. We will assess possible detrimental effects on oocyte maturation and developmental competence of the female gamete. We expect to find abnormalities & since we will evaluate the molecules involved in such effects, appropriate preventive measures can be taken.
Short Impact: Presently there is no manner to predict which oocytes give rise to offspring. In other words, there are no subjective or objective ways to determine oocyte quality. This is of significance because humans, instead of nature, are responsible for selecting oocytes to be used in invitro assisted reproductive techniques. Assisted reproduction is of importance in animals of agriculture species in terms of efficiency, but it acquires greater impact when it is done in humans, as offspring that result from poor quality oocytes may have severe defects. In this regard, it noteworthy that human zygotes generated in vitro appear to have abnormal methylation patterns and such patterns are known to alter gene expression.
Source of Funding: Hatch Multistate
FTE's: 1.7
Scope of Impact:** State, Multistate Research, MA, CT, NH, NY, OH, PA, WV

Key Theme: Animal Genomics
Title of Program/Project: Extending the lifespan of bovine fibroblasts for nuclear

transplantation
Contact Person: Jerry, D. J.
Brief Description of Program/Project: Recent success in cloning livestock from somatic cells has opened the possibility of producing animals with specific genetic characteristics. Although precise genetic alterations can be introduced into cultured cells by homologous recombination, cells derived from normal individuals undergo cellular senescence (stop dividing) before the selection process can be completed. Therefore, we have proposed methods to extend the in vitro lifespan of primary cell cultures. If successful, these methods will make it possible create animals with targeted insertions of transgenes and to transfer desirable alleles from one genetic background to another.
Short Impact: We have developed the essential tools to test the effects of immortalization on the success of nuclear transfer.
Source of Funding: Hatch, Grant
FTE's: .5
Scope of Impact:** State

Key Theme: Aquaculture, Animal Health, Diversified/Alternative Agriculture
Title of Program/Project: Southeastern Massachusetts Aquaculture Center (SEMAC)
Contact Person: Burt, William
Brief Description of Program/Project: The Marine Resources Office and SEMAC continue to support the sustainable development of aquaculture within the five counties of the southeast region of the state. The center coordinates the activities of various agencies, and partners to provide educational programs, research initiatives, demonstration projects, technical assistance, and financial support for the aquaculture industry. As in previous years, the center continues to expand its library resource network, hold informational and technical workshops, monitor marine water quality at pre-selected sites, and investigate disease and growth issues.
Short Impact: Risk Management Agency agents were able to visit actual hard clam culture sites, and hear from several growers about the problems with the pilot crop insurance program. These meetings led to significant changes in the crop insurance policy format. In the fourth year of the Barnstable County Bay Scallop Restoration efforts (designed in conjunction with local shellfish offices and the Division of Marine Fisheries), Cooperative Extension assisted six towns interested in stocking and deploying spawning sanctuaries with reproductive bay scallops; over 35,000 bay scallops were distributed in the summer of 2003. Fifty-seven people were trained in restoration of submerged aquatic vegetation as part of a scallop restoration program. Several pilot sites were chosen and planted with submerged aquatic vegetation. Cooperative Extension personnel, in cooperation with the Massachusetts Division of Marine Fisheries and the Marine Biological Laboratory, continued to monitor the status of diseases known to affect shellfish. These include QPX, MSX, and Dermo. Additionally, in the summer of 2003 Cooperative Extension initiated a test of treatments of QPX to improve juvenile shellfish survival. Mapping of Aquaculture sites with associated data layers began in FY 2003
FTE's: 2.0
Source of Funding: Smith-Lever 3b & c, County, Grant
Scope of Impact:** State Specific

Key Theme: Biotechnology
Title of Program/Project: The role of the NHLH2 transcription factor in female fertility
Contact Person: Good, Deborah
Brief Description of Program/Project: The Nhlh2 transcription factor is a member of the basic helix-loop-helix family of transcription factors. We have shown that Nhlh2 is expressed in areas of both the developing and adult hypothalamic-pituitary axis-areas long known to be important to successful reproduction and body weight maintenance. My laboratory has developed a line of mice containing a germline deletion of Nhlh2. Both male and female knockout mice are hypogonadal and become obese with increasing age. Thus, Nhlh2 knockout mice provide a model in which a single genetic change results in distinct effects on both the reproductive and metabolic systems. Unlike the male mice which are infertile, female Nhlh2 knockout mice can become pregnant and carry litters to full term. This seemingly paradoxical result can be explained by the ability of normal male pheromones to bypass the genetic lesion we have introduced, and positively influence the pubertal development of Nhlh2 knockout females (Cogliati, Good and Kirsch, in preparation). Although fertile, female Nhlh2 knockout mice are only able to support 3-4 pregnancies and exhibit abnormal estrus cycles throughout their lifetime. These phenotypes are characteristic of premature reproductive failure in humans and other animals. Our objective is to identify changes in the ovary and central nervous systems of the Nhlh2 knockout females that result in reduced fertility.
Short Impact: Successful reproduction in mammals requires the interaction of the reproductive and neuroendocrine systems. Our findings, which are both novel and timely in the field of sexual behavior and fertility show that female Nhlh2 neuronal transcription factor knockout mice have two distinct and fundamental problems that result in infertility. The first is a defect in ovulation, which occurs with aging, leading to a loss of fertility in mid-life. The second defect is a lack of female sexual behavior in response to normal males. Reduced lordosis quotients are found in both young and old female Nhlh2 knockout mice. These data along with our previous work in male reproduction, suggests that the Nhlh2 transcription factor is necessary for both male and female sexual behavior and fertility. We are using these results in mice to now analyze the expression and function of the Nhlh2 transcription factor in the bovine with the aim of identifying its role in the fertility and reproduction of larger mammals.
Source of Funding: Hatch, Grant
FTE's: 2.2
Scope of Impact:** State Specific

Key Theme: Niche Market
Title of Program/Project: New Apple Cultivars for New England (and the US in general)
Contact Person: Weis, Sarah
Brief Description of Program/Project: The goal of the project is to make recommendations to local apple growers as to the feasibility of growing and marketing these cultivars. We also make recommendations regarding estimates of proper harvest maturity, and any unusual handling requirements. Cultivars have included Ginger Gold, Arlet, Shizuka, Cameo, Golden Supreme, and Pink Lady.
Short Impact: New cultivars generate niche markets, especially for apple growers who retail their own fruit. Consumers benefit, too, from availability of high quality apples.
Source of Funding: Hatch, Smith-Lever 3b & c

FTE's: 2
Scope of Impact: Multistate Extension/Research: MA, RI, NH, VT, ME, CT

Key Theme: Organic Agriculture
Title of Program/Project: Application of research technology to improve best management practices in fresh market and processing
Contact Person: Carter, Ann
Brief Description of Program/Project: 1. Determine potential new specialty crops for Massachusetts. 2. Develop bio-intensive farm management practices for new and existing crops in Massachusetts.
Short Impact: Impact for organic growers is to increase marketability of sweet corn. Results indicate a higher percentage of marketable corn using these organic methods. Winter squash growers can increase yields about 40 percent using transplants
Source of Funding: Hatch
FTE's: .3
Scope of Impact:** State Specific

Key Theme: Plant Health
Title of Program/Project: Soil application of gypsum can reduce calcium deficiency symptoms in 'Cortland' apple.
Contact Person: Weis, Sarah
Brief Description of Program/Project: This is a long-term project whose goal is to determine the extent to which soil applied gypsum can alleviate calcium deficiency symptoms in apple fruit, specifically in Cortland, a cultivar which is especially prone to demonstration of calcium deficiency. Since 1992, various amounts of gypsum have been applied beneath 'Redcort' trees at the UMass research facility in Belchertown, MA, annually, biennially, triennially, or not at all. Since then, fruit have been stored each year, and, following cold storage, have been assessed for presence of bitter pit and senescent breakdown, two disorders associated with calcium deficiency. All of the gypsum treatments have consistently reduced development of bitter pit. Effect on breakdown has not been established because so many of the fruit have developed breakdown in conjunction with superficial scald, another disorder, which is not associated with calcium status of the fruit. We would also like to assess the long-term effect of gypsum application on soil magnesium and potassium, as there may be excessive (for tree and fruit health) exchange of Mg and K for Ca from the gypsum, and this might lead to magnesium deficiency (we have seen close-to-deficient Mg concentrations in leaves of gypsum-treated trees).
Short Impact: Application of gypsum to soil beneath apple trees could reduce calcium deficiency in fruit, and reduce need for postharvest calcium dips (with the accompanying fungicide in the dips).
Source of Funding: Hatch
FTE's: 1
Scope of Impact: Multistate Extension/Research: MA, RI, NH, VT, ME, CT

Key Theme: Precision Agriculture
Title of Program/Project: Nutrition, developmental physiology, and flood management in the culture of the American

Contact Person: Demoranville, Carolyn & Vandan Heuvel, Justine
Brief Description of Program/Project: 1. Determine the optimum range of rates for phosphorus and potassium fertilizer for cranberry production. Compare the use of an NPK combination fertilizer with applying the elements separately (different timing schedules). 2. Define the relationship among soil pH, cranberry yield, and bog weed populations. Evaluate yield and plant nutrient content in bog areas treated with several sulfur regimes. 3. Establish field trials to study the effects of chloride-containing fertilizers and high rates of potassium-magnesium soil amendments on cranberry productivity. 4. Examine the effect of flooding for pest management on cranberry productivity. Determine if pre-flood plant carbohydrate status is related to post-flood yield. 5. Investigate cranberry winter hardiness, chilling requirement, and breaking of dormancy. Compare by cultivar, nitrogen fertilization, and stand age.
Short Impact: Based on these findings the farmers of approximately 80+% of the MA cranberry acreage (14,500 acres) have adopted conservative fertility programs utilizing N-P-K materials and based on an N rate of 30 kg/ha or less. Supplemental use of P and K has become quite rare. Using the information from this project, growers have been able to sustainably reduce fertilizer input and frost management costs in a time when they are experiencing great financial stress.
Source of Funding: State
FTE's: .7
Scope of Impact:** Hatch, Grant

Key Theme: Plant Health
Title of Program/Project: Soil application of gypsum can reduce calcium deficiency symptoms in 'Cortland' apple.
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Short Impact: Application of gypsum to soil beneath apple trees could reduce calcium deficiency in fruit, and reduce need for postharvest calcium dips (with the accompanying fungicide in the dips).
Source of Funding: Hatch
FTE's: 1
Scope of Impact: Multistate Extension/Research: MA, RI, NH, VT, ME, CT

Goal 2
A safe and secure food and fiber system

Key Themes:

- Food Accessibility and Affordability
- Food Handling
- Food Quality
- Food Recovery/Gleaning
- Food Resource Management
- HACCP
- Food Safety
- Food Security
- Foodborne Illness
- Foodborne Pathogen Protection

Agency	Total Dollars	FTEs	MSR Projects/Programs	MSR Dollars
MAES	\$81,484	6.2	0	\$0
UMEXT	\$106,444	2	0	\$0

Goal 2 Executive Summary –

Food safety continues to be an important emphasis within Goal 2. These efforts range from analysis of the impact of food safety and nutritional attributes on consumer preferences to techniques for monitoring for the presence of pathogenic bacteria on specific food items. The impact of food policy on decision making in the areas of food safety, food quality and food security is expected to be a growing emphasis for the program over the next few years. Of particular importance are our educational efforts in the realm of food safety education. These efforts have been very successful with food producers, food processors and food service professionals.

Key Theme: Food Safety
Title of Program/Project: Seafood Safety
Contact Person: Levin, Robert
Brief Description of Program/Project: The studies proposed will address the major problem with shellfish that arises from the fact that pathogenic vibrios such as <i>V. vulnificans</i> and <i>V. parahaemolyticus</i> occur naturally in shellfish before harvesting, are bound tightly the intestine of shellfish and therefore are not amenable to reduction by normal sanitary, HACCP, or depuration practices. We will therefore develop novel methodology for in vivo destruction of such pathogens in shellfish using phytochemical and GRAS chemical treatment of depuration water. We will also address the problem that certain pathogenic bacteria such as <i>Listeria monocytogenes</i> and <i>Aeromonas hydrophila</i> increase significantly in numbers on processing plant equipment resulting in contamination of fish during processing by examining factors that influence the development of biofilms containing such pathogens.
Short Impact:

The results of these studies will produce data that will allow the fisheries industry to make informed decisions about the reduction of pathogenic bacteria such as <i>Vibrio vulnificus</i> , <i>Vibrio parahaemolyticus</i> , and <i>Listeria monocytogenes</i> on fish. They will be able to assess various in-plant sanitizing methods on the recurrence of human pathogenic bacteria to identify optimum sanitizing methods. When applied to fish oregano and cranberry extracts have been found to decrease pathogenic bacteria by 99%.
FTE's: .3
Source of Funding: Special Grant
Scope of Impact: State

Key Theme: Food Safety
Title of Program/Project: Bacterial Adhesion and Growth at Phase Interfaces
Contact Person: McLandsborough, Lynne
Brief Description of Program/Project: Although most research is performed in liquid systems, microorganisms can be found in foods and processing environments at solid-liquid, gas-liquid, and solid-gas interfaces. The purpose of this project is to study bacterial growth at solid surfaces-liquid and liquid-liquid interfaces. Our efforts will be using <i>Listeria monocytogenes</i> and <i>Escherichia coli</i> O157:H7 in each of these interfacial systems, respectively.
Short Impact: In the Commonwealth of Massachusetts, there are approximately 1,530 dairy and cattle farms. It is estimated that <i>E. coli</i> O157:H7 is present in as many as 10% of cattle drinking troughs and is the major environmental reservoir of this organism. An understanding on how this pathogen can establish biofilms under low nutrient environments, such as found in water troughs on farms, is essential to finding ways to prevent the growth and dissemination of this pathogen.
FTE's: 1.3
Source of Funding: Hatch, State
Scope of Impact: State

Key Theme: Food Resource Management
Title of Program/Project: Competitiveness and Value-Added in the U.S. Grain and Oilseed Industry
Contact Person: Lavoie, Nathalie
Brief Description of Program/Project: My research examines various aspects of the impact of product differentiation in the wheat industry on international trade, market power, and on the validity of empirical tests of market power. It also examines the impact of state-trading enterprises and marketing boards on world wheat trade.
Short Impact: Exporting and importing state trading enterprises are a topic of negotiation during the current round of the WTO more specifically the United States hopes to eliminate those enterprises. These projects examine the impact of those enterprises on the domestic and international performance of the wheat markets, in particular their value to domestic producers, their impact on trade patterns and on the quality of wheat imported and therefore grown domestically. The results of this project are used to inform policy makers on the likely domestic impact of privatizing foreign wheat imports and exports. The US government's push to eliminate state trading agencies in the current round of WTO negotiation is likely to have minimal or deleterious impact on US wheat growers unless the USDA formulates regulations to

impose stricter variety standards like those that exist in Canada (which along with Australia are the major US competitors in the national wheat trade).
FTE's: .1
Source of Funding: Hatch Multistate, Grant
Scope of Impact: AK, ID, IL, GA, KS, LA, MA, MN, MS, NB, ND, OH, OK

Key Theme: HACCP, Food Safety
Title of Program/Project: Private strategies, public policies and food system performance
Contact Person: Caswell, Julie
Brief Description of Program/Project: Identify, describe, and analyze the factors shaping strategic decisions by food systems participants emphasizing firm decisions on product offerings, advertising, pricing, and scope of operations. Analyze the impacts of the safety and nutritional attributes of food products on consumer preference articulation, firm behavior, and the operation of the federal and state regulatory system. Assess how the private strategic decisions and public policies examined under the above objectives affect the performance of the food marketing system.
Short Impact: This project provided current analysis of the performance of the domestic and international food system. It analyzed how the system operated domestically, the prices and values it offered to consumers and producers, its competitiveness in international markets, and its ability to assure food quality, particularly food safety and nutrition. The results of this project were used in decision making by the private and public sectors.
FTE's: .7
Source of Funding: Grant, Hatch
Scope of Impact: State

<p>Goal 3 <i>A healthy, well-nourished population</i></p>
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- Key Themes:**
- | | |
|-----------------|------------------|
| Birth Weight | Infant Mortality |
| Health Care | Medicinal Plants |
| Human Health | Nutricueticals |
| Human Nutrition | |

Agency	Total Dollars	FTEs	MSR Projects/Programs	MSR Dollars
MAES	\$148,073	4.8	2	\$53,002
UMEXT	\$156,752	2.2	0	\$0

Goal 3 Executive Summary

Efforts toward Goal 3 include significant contributions to understanding how non-essential nutrients from foods improve health, in particular foods containing Omega-3 fatty acid. In addition, investigation of the role of dietary herbs as functional foods and nutraceuticals directly benefit human health. Finally, our nutrition and health education programs have been very successful in providing nutrition education and training to educators, caregivers, and agency staff.

Key Theme: Human Health
Title of Program/Project: Nutrient Bioavailability--Phytonutrients and Beyond
Contact Person: Decker, Eric
Brief Description of Program/Project: Many components in foods can have positive effects on health yet little is know about how they work. This project will investigate how non-essential nutrients from foods improve health.
Short Impact: Supplementation of two servings per week of foods containing Omega-3 fatty acid is equivalent to 1-2 servings of fish per week. This level of fish has been shown to decrease cardiovascular risk factors up to 40%.
FTE's: 1.3
Source of Funding: Hatch Multistate, Grant
Scope of Impact: Multistate Extension/Research: AZ, CA-Berkley, CA-Davis, CO, CT, IA, KS, MA, MI, NB, NM, OR

Key Theme: Human Nutrition
Title of Program/Project: Nutrition and Health Education Programs
Contact Person: Rita Brennan Olson
Brief Description of Program/Project: Nutrition and Health Programs provide nutrition education and training to educators, caregivers and agency staff. Through traditional workshops and distance learning opportunities such as home study courses, videoconferences and online courses and programs, participants increase knowledge and improve food practices relating to the U.S. Dietary Guidelines of target groups include child and elder care providers and other agency staff who work with children, youth and elderly. Extension collaborates with state education, public health and human service agencies for program promotion.
Short Impact: The ABC's of Good Nutrition for Young Children, a learn-at-home nutrition course for child care givers designed to help increase knowledge of the Dietary Guidelines for Americans 2000 and their impact on the feeding and caring of young children was offered as a traditional mail course and via the Internet. Each course provides 2 hours of training credits from the MA Department of Education to family day care providers.
<p>167 family day care providers participated in the ABC's of Good Nutrition for Young Children home study (online and in print). Evaluations of the course participants showed that:</p> <ul style="list-style-type: none"> 56% made changes in the type and/or amount of physical activity provided to children in their care 65% made changes in the meals and snacks they served 57% read food labels more often; changed meals to increase whole grains 46% increased use of vegetables

45% reduced fat -rich foods served to children.
 44% increased use of fruits

Two videoconferences on “Overweight Issues in Childhood: Role of the Environment and the community” and “Assessment and Behavioral Management of Childhood Overweight” was offered to over 80 allied professionals increasing their knowledge obesity issues relating to children and families. These conferences were sponsored in cooperation with the MA Dept. of Public Health, the MA Department of Education and the MA Dietetic Association.

Nutrition and Food Safety Education for Elder Care Givers (\$60,000 grant from the MA Department of Education) surveyed 110 Adult Day Health programs in Massachusetts to determine interests and education needs of staff and caregivers.

- 95% indicated interest in nutrition and food safety education for their staff on topics such as general nutrition and aging; health conditions such as diabetes and swallowing difficulties; and food safety
- 85% indicated interest in nutrition and food safety education for caregivers on topics such as general nutrition and aging, shopping, health conditions such as diabetes and osteoporosis.

One issue of the "Nutrition News and Reviews" newsletter provided easy-to-read articles on timely nutrition topics to agencies serving high risk groups. A reproducible fact sheet and information on nutrition resources were included on eating well as we age. Over 5000 agencies received the newsletter “Obesity Tips the Scale” and disseminated the nutrition information to approximately 100,000 elderly, children and adults.

87 child and elder care givers and consumers participated in 6 programs on the *Food Guide Pyramid* and *the US Dietary Guidelines and NIBBLE (Nutrition Information Bulletin Board and Learning Experience.)*

FTE's: .25

Source of Funding: Smith Lever 3b & c, County, Revenue based, Grants

Scope of Impact: State specific

Key Theme: Nutricueticals

Title of Program/Project: Production of Medicinal plants as alternative crops for New England

Contact Person: Craker, Lyle

Brief Description of Program/Project: 1. To determine effects of light, nutrition, and temperature on seed germination, growth, flowering, and synthesis of bioactive materials of selected medicinal plants. 2. To evaluate the growth and secondary metabolite synthesis of selected medicinal plants in the greenhouse and/or field under New England environmental conditions. 3. To develop cultural guidelines for the production of several medicinal plants within the New England region.

Short Impact: Understanding the environmental limits and needs and the available diversity within wild populations of black cohosh and goldenseal will enable development the cultivation procedures necessary for bringing these plants into cultivation. Earlier research efforts with lavender, echinacea, and basil have resulted in significant medicinal and aromatic crop

production in the New England area. Similar results are expected from cultivation studies on Chinese medicinal plants and plants currently wild-crafted. Several herbs are important as flavoring agents in the culture of minority, immigrant populations.

Source of Funding: Hatch
FTE's: .5
Scope of Impact:** State Specific

Key Theme: Nutraceuticals

Title of Program/Project: High Rosmarinic Acid Spearmint Clonal Lines for Nutraceutical and Food Preservative Applications

Contact Person: Shetty, Kalidas

Brief Description of Program/Project: Dietary herbs have uses as functional foods and nutraceuticals. The major limitation of using dietary herbs for nutraceutical, medicine and food preservation applications is the inconsistency of phenolic phytochemicals due to the heterogeneity resulting from the cross-pollinating nature of their breeding characteristics and especially species in the family Lamiaceae or the mint family. In this proposal non-transgenic tissue culture-based approach coupled with a non-transgenic chromosome doubling strategy using Colchicine will be used to select several elite clonal lines of spearmint (*Mentha spicata*). These elite clonal lines (each clonal line originating from a different seed), following large scale clonal propagation (micropropagation) and evaluation of functionality, will be targeted as dietary sources of phenolics for antioxidant function and to control chronic bacterial diseases linked to ulcer-causing *Helicobacter pylori* and urinary-infection causing *Escherichia coli*. Tissue culture-based methods offer strategies to develop clonal phenolic profiles that are consistent for antioxidant and antimicrobial functionality.

Short Impact: Our results indicate that phenolics from consistent clonal herbs can be beneficial to counter infections from ulcer-bacteria, *Helicobacter pylori*. The infections from *H.pylori* affect close to 50% of the world population and about 10% of this population may have severe infections leading to peptic ulcer and gastric cancer, if untreated. Current therapies for *H.pylori*, such as antibiotics and proton-pump inhibitors though effective, have side-effects and there is evidence of antibiotic resistance. Therefore, a dietary management of *H.pylori* using phenolic phytochemicals has potential both in terms of inhibiting the bacterial pathogen as well as enhancing host antioxidant response to counter the pathogen.

Source of Funding: Hatch, Grant
FTE's: .2
Scope of Impact:** State

Goal 4
Greater harmony between agriculture and the environment

- Key Themes:**
- | | |
|-----------------------------------|-----------------------|
| Agricultural Waste Management | Pesticide Application |
| Air Quality | Recycling |
| Biodiversity | Riparian Management |
| Biological Control | Soil Erosion |
| Drought Prevention and Mitigation | Soil Quality |
| Endangered Species | |

Energy Conservation
 Forest Crops
 Forest Resource Management
 Global Change and Climate Change
 Hazardous Materials
 Integrated Pest Management
 Land Use
 Natural Resources Management
 Nutrient Management

Sustainable Agriculture
 Water Quality
 Weather and Climate
 Wetlands Restoration and Protection

Agency	Total Dollars	FTEs	MSR Projects/Programs	MSR Dollars
MAES	\$629,328	12.5	6	\$232,979
UMEXT	\$1,618,882	31	5	\$43,392

Goal 4 Executive Summary

Several of the programs that contribute to Goal 4 have begun to have dramatic impacts at the community level. Efforts on design of stream crossing have resulted in resolution of state and municipal disputes. Programs to increase consumer knowledge about household hazardous materials have resulted in improved participation in collection programs.

A significant amount of effort under Goal 4 continues to result in impacts that have benefited the cranberry industry, an industry that is under severe financial pressure. We have identified the key cranberry fruit rot pathogens and their over-wintering strategies, leading to improved timing of fungicide application. Improvements in the timing of fungicide applications are reducing the frequency of sprays. Control of swamp dodder through flooding is also reducing the application of herbicides. We are working to identify reduced-risk pesticides for cranberry fruitworm and have recommended to growers a new strategy for fall flooding to control this pest. Efforts have resulted in the side spread adoption of conservative fertility programs, raticonal weed management programs, and mitigation of the impact of road slat on cranberry production.

Key Theme: Biodiversity, Endangered Species, Wetlands Restoration and Protection, Wildlife Management
Title of Program/Project: Habitat and Biodiversity Conservation
Contact Person: Jackson, Scott
Brief Description of Program/Project: This initiative provides education, training and technical assistance covering a variety of topics, including: wildlife and wildlife habitat requirements, wildlife habitat evaluation, protection strategies for conservation of rare species, the importance of biodiversity, strategies and techniques for conserving biodiversity, landscape assessment, land conservation planning, and involving volunteers in wildlife inventory and monitoring. A particular focus of this program is assessing and mitigating highway impacts on wildlife.
Short Impact: A custom-designed stream crossings database has been developed for as part of

<p>an effort to assess the barrier effects of road crossings throughout Massachusetts. A draft technical guidance for the design and construction of river and stream crossings has been use by US EPA and other regulatory agencies in the review of permit applications.</p> <p>The Nature Conservancy and Westfield River Watershed Association have begun a project to assess all road crossing structures on rivers and streams in the Westfield River watershed.</p> <p>Mediated a disagreement involving the Opacum Land Trust, the Department of Environmental Management (now DCR), the Natural Heritage Program, a property owner, a developer of the property and the Sturbridge Planning Board and Conservation Commission that resulted in the permanent protection of a 266 acre parcel in Sturbridge; this included helping to draft a conservation restriction and assisting the town boards in fashioning their determinations on particular uses and prohibitions involving the property</p> <p>A town meeting vote to approve the purchase of a 100+ acre parcel with 1500 feet of frontage on the Quinebaug River was approved in response to the request of the Sturbridge Community Preservation Act Committee.</p> <p>Facilitated protection of a 23 acre parcel that abuts town forest in the town of Lancaster.</p> <p>Twenty volunteers covering 16 routes collected data on calling amphibians as part of the North American Amphibian Monitoring Program.</p>
FTE's: 1.5
Source of Funding: Smith-Lever 3b & c, Smith-Lever 3d, State, Grant/Contract
Scope of Impact:** State Specific, Integrated Research and Extension

Key Theme: Hazardous Materials, Water Quality
Title of Program/Project: Hazardous Material and Water Quality Education
Contact Person: Lopes, Marilyn
Brief Description of Program/Project: This program increases consumer knowledge and understanding of groundwater as a resource and the effects of solid and hazardous material disposal to water quality issues. The Barnstable County Hazardous Materials Program and Hazardous Hot Line offers technical assistance and educational support to town household hazardous waste coordinators for household hazardous waste collections and the implementation of permanent collection programs for recyclable hazardous materials. Staff specialists also provide the public easy access to up-to-date information on the proper disposal of household hazardous materials on Cape Cod. Questions answered include what is hazardous waste, how to package hazardous waste for disposal, where and when these items may be safely disposed and how to reduce the use of hazardous materials in homes and businesses.
Short Impact: Eight household hazardous waste collections were held between January and August for residents and small businesses of Barnstable and Yarmouth. Participation increased by 150% over 2002, and volume of materials collected increased by 67%. More than 46% participants were first-time users of any HHP collection, and 7% brought waste from small businesses.
In the second year of cooperative Household Hazardous Products Collections, six collections were held this year for residents and small businesses of Harwich, Brewster and Chatham. Participation increased by 16% over 2002; 36% were first time participants; volume of materials collected increased by 100%.
Three collections were held in 2002-2003 for residents and small businesses of Provincetown,

<p>Truro, and Wellfleet. Participation increased by 10% over 2002; 41% were first time participants and volume of materials collected increased by 17%.</p> <p>Six collections were held in Bourne, Falmouth, Mashpee, and Sandwich. Participation increased minimally over 2002 collections; 49% were first time participants. Costs were reduced by 22% through selection of a new licensed hazardous waste contractor.</p> <p>A mailing was sent to small businesses that generate hazardous materials to encourage them to participate in town-sponsored HHP collections at cost. This project focused on painters, paint and hardware stores, artist cooperatives and groups, and pesticide applicators. Information was sent to more than 500 individuals and groups. Outreach resulted in a 25% increase in participation in 2002-2003 of small businesses that generate hazardous materials.</p> <p>The Hazardous Materials Program sponsored mercury education programs and mercury thermometer, thermostat and switch collections in cooperation with SEMASS, Cape Cod towns, Elder Services' Senior Environment Corps and local hazardous waste coordinators. All Cape towns joined this effort to eliminate mercury from households and from the waste stream. More than 90 pounds of elemental mercury were collected at 46 locations this year and removed from the solid waste stream.</p> <p>41,000 gallons of household hazardous waste collected and diverted from the waste stream.</p>
FTE's: 1.0
Source of Funding: Smith-Lever 3b & c, County, USDA Sec. 406 funds
Scope of Impact:** State Specific

Key Theme: Integrated Pest Management, Sustainable Agriculture
Title of Program/Project: Infection biology of key cranberry fruit rot fungal pathogens
Contact Person: Caruso, Frank
Brief Description of Program/Project: The objectives of this project are to define inoculum sources of four fungi that cause field rot and storage rot of cranberries and to pinpoint the precise time that these fungi infect the flowers or developing berries. Little information is known on how <i>Coleophoma</i> , <i>Colletotrichum</i> , <i>Phyllosticta</i> , and <i>Physalospora</i> overwinter and initiate their infections at the beginning of the growing season and how often they are able to infect the plant during the season. Knowledge gained from this project will allow growers to utilize fungicides only when they are necessary, and save unnecessary sprays. Cultural methods should also be applicable, depending on where the inoculum resides. This has the potential of benefiting the environment and public safety, without sacrificing fruit quality for the farmer. Economic savings can also be realized by the farmer in a time when the price of cranberries does not even reach the break-even point for most growers.
Short Impact: We have determined during the first two years of the project that each of the four fungi has a different primary overwintering source; <i>Coleophoma</i> has been the most difficult of the pathogens to delineate so far. Timing studies employing different fungicide schedules indicated that sprays applied earlier in the bloom period and fruit development offer the best control (particularly for storage rot), indicating that this is the likely time of infection of the fungi.
Source of Funding: USDA/CSREES Northeast IPM Program, Cranberry Institute
FTE's: 0.6
Scope of Impact:** Multistate Integrated Research and Extension (MA, ME, MI, NJ, OR,

WA, WI)

Key Theme: Integrated Pest Management
Title of Program/Project: Flea Beetle Biology and Management in Brassicas
Contact Person: Hazzard, Ruth; Andersen, Caryn; Mangan, Frank
Brief Description of Program/Project: This is a long-term project to understand the biology and develop management strategies for flea beetles in brassica crops.
Short Impact: New knowledge about biology and control options was gained and was presented to approximately 150 growers and 60 researchers. As a result, approximately 20 growers tried new control methods and gained improved crop quality, or were able to produce brassicas during new parts of the season.
Source of Funding: State and Federal
FTE's: 0.1
Scope of Impact:** Multistate Integrated Research and Extension: MA, NY, RI

Key Theme: Sustainable Agriculture, Integrated Pest Management
Title of Program/Project: Use of short-term floods for control of dodder (<i>Cuscuta gronovii</i>).
Contact Person: Sandler, Hilary A.
Brief Description of Program/Project: One of the most problematic weeds in the MA cranberry industry is swamp dodder, an obligate shoot parasite capable of significantly reducing cranberry yields. Current recommendations include the use of cultural practices (e.g., sanding) along with herbicides to manage this pest. Anecdotal evidence from growers indicated that short floods may reduce dodder growth in the treatment year. To investigate the potential of integrating nonchemical alternatives into the management plan for dodder on commercial cranberry farms, a 2-year project was initiated to determine the efficacy of short-term floods (24 to 48 hr) for the control of dodder.
Short Impact: Flooding offers a viable option that can be integrated into the overall management plan for dodder. As cranberry growers continue to struggle for economic viability, this information provides immediate cost-saving benefits for growers opting to save money by reducing herbicide inputs. In addition, less herbicide is being applied to control dodder. For one large cranberry company, treated acres were reduced 67%-90% during 2001-2003 compared to 1999 (no floods held for dodder control). Information will be transmitted to cranberry growers through UMass Cranberry Station newsletters, UMass Extension fact sheets, and the UMass Cranberry Station Web Site.
Source of Funding: UMass IPM funds, Smith Lever 3b & c, Ocean Spray Cranberries, Inc.
FTE's: 0.2
Scope of Impact:** State Specific

Key Theme: Integrated Pest Management, Sustainable Agriculture
Title of Program/Project: Effects of repeat annual applications of dichlobenil on weed populations and yield components of cranberry.
Contact Person: Sandler, Hilary A.
Brief Description of Program/Project: Dichlobenil (Casoron or Norosac), has been used in the cranberry industry for decades to control annual and perennial grasses, sedges, and broadleaf weeds. Growers often have expressed concerns that annual repeat applications of

<p>Casoron caused direct vine injury or increased the susceptibility of the vines to environmental or pest stresses. Thus, to address grower concerns that repeated use of dichlobenil could negatively impact cranberry productivity, field studies were established at two commercial farms in either high-weed density or low-weed density areas. The objective of this study was to examine the effects of repeat annual applications of low (40 lb/acre) and maximum (100 lb/acre) rates of Casoron on yield components and upright characteristics.</p>
<p>Short Impact: Dichlobenil is an important component of weed management for cranberry growers. To remain economically competitive, growers must use all possible tools to their maximum effectiveness. Concerns of direct crop loss or chronic crop injury were not substantiated. Thus, this compound can be used to manage weeds within the context of a viable weed management program without compromising fruit production. Information will be transmitted to cranberry growers through UMass Cranberry Station newsletters, UMass Extension fact sheets, and the UMass Cranberry Station Web Site.</p>
<p>Source of Funding: Smith Lever 3b & c, Ocean Spray Cranberries, Inc.</p>
<p>FTE's: 0.4</p>
<p>Scope of Impact:** State Specific</p>

<p>Key Theme: Integrated Pest Management</p>
<p>Title of Program/Project: Integrated Crop Management for Greenhouse Crops</p>
<p>Contact Person: Cox, Douglas</p>
<p>Brief Description of Program/Project: The University of Massachusetts Extension Floriculture Team provides an educational and applied research program in the area of Integrated Crop Management with emphasis on insect and disease management. Information on IPM techniques, biocontrol of insects (flower thrips and aphids), and emerging plant disease threats (southern bacterial wilt) is disseminated through statewide and regional educational meetings, newsletter articles, national trade publications and special publications.</p>
<p>Short Impact: A survey conducted in 2002-03 revealed significant growth in the use of IPM in Massachusetts greenhouses. About 500 growers were surveyed and 86% reported monitoring for insects and 80% reported weekly monitoring for plant diseases. About 70% use botanical insecticides and insect growth regulators and 50% use microbial insecticides for insect control instead of more toxic traditional chemical pesticides. Most growers (87%) take advantage of local educational programs and have insect and disease control guides appropriate to Massachusetts.</p> <p>Applied research on biocontrol conducted in Massachusetts commercial greenhouses has demonstrated the cultural and economic efficacy of parasitoids for whitefly control on poinsettias. Success has also been achieved in biocontrol of thrips with parasitic mites under Northeastern conditions and attention is now on biocontrol of aphids. Some growers have adopted these techniques but adoption rates are very low due to the current success of available chemical and "biological" pesticides.</p> <p>The Massachusetts Floriculture Team, in cooperation with University of Connecticut Cooperative Extension, published two major pest management guides for emerging floriculture crops during 2002-03. One focused on control of common diseases and insects of herb bedding plants and the other on IPM for herbaceous perennials. These two publications join an earlier one on vegetable bedding plants.</p>

Source of Funding: Smith-Lever 3b & c, Industry and State grants, Revenue-Based Trust funds
FTE's: 2.5
Scope of Impact:** State Specific, Multistate Extension (MA, CT, NY).

Key Theme: Integrated Pest Management
Title of Program/Project: New Multi-tactic Alternatives to Current Pesticides Against Key Apple Pests
Contact Person: Tuttle, Arthur
Brief Description of Program/Project: In this third year of the four year study, an experiment was performed in ten blocks of apple trees. All blocks had moderate-to-low risk for flyspeck disease according to border habitat surveys and flyspeck risk prediction evaluations. Five of the blocks received 2 full-block sprays of the environmentally benign fungicide, Flint, at three-week intervals after the mid-June spray. The other five blocks received one full-block Flint spray about four weeks after the mid-June spray and 2 sprays along a narrow strip of orchard border on July 1 and Aug. 1. The amount of infected fruit at harvest was the same in both sets of blocks (6 and 5 %), even though the second group of blocks received half the summer fungicide of the 1 st group. Each border spray depressed the amount of spore dispersal into the block.
Short Impact: The study demonstrated a successful strategy to reduce summer disease fungicides in apples to ten apple growers directly and to at least fifty others who have heard about it at grower meetings. Many other growers and industry professionals have been reached by publications.
Source of Funding: USDA CSREES Crops at Risk
FTE's: 0.25
Scope of Impact: Multistate Extension/Research: MA, RI, NH, VT, ME, CT, NY, NJ, PA

Key Theme: Natural Resources Management
Title of Program/Project: Ecosystem management in a landscape dominated by small private ownerships
Contact Person: Kittredge, David
Brief Description of Program/Project: Nationally, 57% of forestland is owned by non-industrial private individuals. In some regions of the country, such as the Northeast, as much as 85% of the forested landscape is in this ownership. Recent advances in forest ecosystem research have identified why an ecosystem-based approach to forest management is advantageous [e.g., forest health, protection of ecosystem functions, maintenance of biodiversity]. If an ecosystem-based approach is to be adopted in many parts of the nation, it must be embraced by non-industrial private owners. This proposed research will weave together landowner attitudes with new concepts of ecosystem management. The result will be an improved understanding of how this new paradigm might be successfully applied. We propose to follow-up on our pilot study of landowner attitudes that identified landowner agreement with certain ecosystem-based management principles. We will use a similar mail survey instrument with a broader population of landowners, to test the wider applicability of our results. In addition, we will use GIS technology in an interactive focus group setting to further test landowner attitudes towards cooperation across boundaries and management at a broader ecosystem scale. As the basis of the interactive GIS approach, we will use a model property tax

assessment program which affords tax relief to those landowners that take a more ecosystem-based approach to their land and its management and protection.
Short Impact: An estimated 235,000 non-industrial private families and individuals own 2,062,900 acres of forest throughout the commonwealth of Massachusetts. This represents 78% of all forest, and an average parcel size of 8.8 acres. Facilitated communication between owners is essential to ensure management decisions and actions made at scales larger than these small, individual and independent ownerships.
FTE's: .4
Source of Funding: Hatch
Scope of Impact:** State Specific

Key Theme: Natural Resources Management
Title of Program/Project: Mitigating Hypothetical Bias in Natural Resource and Environmental Decision Making
Contact Person: Stevens, Thomas
Brief Description of Program/Project: Recreational fees are being increased but little is known about the impact on low income users. Forest ecosystem management programs are being proposed but little is known about how landowners will respond.
Short Impact: Alternatives to traditional incentive based forest management programs may result in more effective forest ecosystem management. Alternatives to user fee based management of recreation on public lands may help to reduce impact on low income users.
Source of Funding: Hatch Multistate
FTE's: .9
Scope of Impact:** Hatch, Multistate Integrated Research & Extension CA, CO, IA, NE, ND, OR, SD, TX, UT, WA, WY

Key Theme: Pesticide Management
Title of Program/Project: Demonstration of proper technology for storage and mixing/loading of pesticides
Contact Person: Coli, William M.
Brief Description of Program/Project: After having designed and built a state-of-the-art pesticide facility at the UMASS Cold Spring Orchard, we used to site for a successful training session in 2003. The session, carried out in concert with the UMass Extension Pesticide Education team and USDA, NRCS, included a slide lecture detailing design considerations and construction details, and a tour of the site with discussion and question/answer session. NRCS staff in attendance informed growers of the availability of EQIP Program cost-sharing that can be used to partially fund facility construction.
Short Impact: At least one commercial grower has accessed bid specifications and plans and has indicated intent to build a similar facility on their fruit farm.
Source of Funding: Smith-Lever 3b & c, MDAR, User fees
FTE's: 0.5
Scope of Impact: Multi-state Extension: MA, RI, NH, CT, VT, ME

Key Theme: Sustainable Agriculture

Title of Program/Project: Nutritional and cultural impacts in cranberry cultivation.
Contact Person: DeMoranville, Carolyn
Brief Description of Program/Project: The objective of this project was to define nutritional and physiological factors that could be limiting to cranberry production. Primary goals were to reduce fertilizer inputs (environmental and cost savings) and to promote water conservation. MA is a highly urbanized State and any practice that reduces inputs into water and/or conserves water resources is to the public benefit. Reductions of input costs benefit the sustainability of cranberry farming, a defining land use for this region. With a farm-gate value of \$48.2 million in 2002, cranberries are the number one food crop in the State. However, in the past 5 years, the per unit return for cranberries has dropped precipitously, so that the price today is at least 50% less than in 1997. This study included research regarding P and K rates required to sustain cranberry production, interaction of N and K rates, suitable K forms, and interaction of N fertility with cold hardiness (need for spring frost protection).
Short Impact: We were able to determine that high-yield cranberry production is supported by moderate rates of P (22 kg/ha) and K (65-135 kg/ha). Previous research had shown that N rates of 20-55 kg/ha are adequate for most cultivars. However, anecdotes persisted that higher N rates could be used, and if vegetative growth became a problem, the effect of the excess N could be overcome by applications of high rates of K. We were able to show that this is not the case - the adverse effects of excess N were not overcome by high K applications. We demonstrated that in the short-term (3 years) lower-cost potassium in the chloride form could replace the previous, more expensive standard, potassium sulfate (although longer term use has not been researched). An additional impact of high N usage was studied - as N fertilizer rate increased, spring hardiness of flower buds in the cultivar Stevens decreased with increasing N dose. This implies that increasing N inputs (and costs) will also lead to increased costs for frost protection. Based on these findings the farmers of 80+% of the MA cranberry acreage (14,500 acres) have adopted conservative fertility programs utilizing N-P-K materials based on an N rate of 30 kg/ha or less. Supplemental use of P and K has become quite rare. Using the information from this project, growers have been able to sustainably reduce fertilizer input and frost management costs in a time when they are experiencing great financial stress. This research also has implications for other states such as WI, NJ, WA, OR, ME.
Source of Funding: Hatch, Grower Organizations
FTE's: 0.2
Scope of Impact:** State Specific

Key Theme: Sustainable Agriculture
Title of Program/Project: 2003 New England Vegetable and Berry Conference and Trade Show
Contact Person: Hazzard, Ruth
Brief Description of Program/Project The 2003 New England Vegetable and Berry Conference and Trade Show was held on December 16-18, 2003 in Manchester, NH. This was a new location for the event, and also the first time that conference was held in combination with the New England Fruit Meeting, adding tree fruits to the program for one of the days. There were 28 steering committee members from across New England and eastern NY, representing Cooperative Extension, CT Agricultural Experiment Station, grower associations, and industry. UMass Extension faculty and staff played key roles as Conference Chair, Registration Chair, Travel

Chair, Publicity Chair, and session organizers for several educational sessions.
Short Impact: The conference was attended by 1,348 people, including 285 people associated with the trade show, which had over 100 exhibits. Of the 231 people returning evaluations, 97% said the educational sessions were good or excellent, and 90% said the trade show was good or excellent. As a result of attending the conference, 92% of respondents said their pest management would be improved, 88% said their soil or nutrient management would be improved, and 82% said their farm profitability would be improved. A new source of information was found by 90% of respondents, and 79% said they planned to implement a new practice in the coming year as a result of the conference. A 375-page conference proceeding was published that contains summaries of 99 presentations. It is available for \$16 postpaid. Many of the articles are also available on line at: www.nevbc.org/proceedings.html Pesticide Recertification Credits were offered for 18 out of the 24 sessions for a total of nineteen and a half credits being offered. Ranges of one-half of a credit to two and a half credits were offered for those sessions. There were 238 growers that received Pesticide Recertification Credits, including 116 from Massachusetts.
Source of Funding: State & Federal Funds, User Fees
FTE's: 0.5
Scope of Impact:** Multistate Extension: MA, CT, RI, NH. VT, ME, NY

Key Theme: Water Quality
Title of Program/Project: Establishment of zebrafish bioassay technology for assessing the acute, developmental and reproductive toxicity of toxaphene & water samples
Contact Person: Arcaro, Kathleen
Brief Description of Program/Project: Protection of aquatic ecosystems and drinking water supplies is one of the great environmental challenges facing us and future generations. This project examines the usefulness of zebrafish bioassays for the detection of aquatic pollution.
Short Impact: The transgenic reporter fish developed in this project will benefit many small communities, both rural and inner city. The reporter fish will provide an inexpensive and easy method for monitoring water quality of local streams, ponds and reservoirs. Additionally, because little sophisticated equipment is needed and the fish are not killed, this method of monitoring pollutants has intrinsic appeal to grammar and high school students, and can be incorporated into an environmental studies curriculum.
Source of Funding: Grant, Hatch
FTE's: .5
Scope of Impact:** State

Key Theme: Water quality, Sustainable agriculture, Off-site impacts on agriculture
Title of Program/Project: Salt effects on cranberry soils, plant growth, and productivity
Contact Person: DeMoranville, Carolyn
Brief Description of Program/Project: The objective of this project is to define both chronic and acute salt levels that can lead to adverse growth and yield impacts on cranberries. These levels will become the analysis standard for samples from water bodies used for cranberry production. Effects of salt loading on cranberry soil chemistry will also be investigated and mitigation options studied and field tested. Since cranberry has been assumed to have poor salt tolerance based on studies of similar species, the use of deicing salt (NaCl) on highways

adjacent to bogs has come under scrutiny and in some cases been curtailed. However, deicing substitutes are expensive and less effective, posing a safety hazard. By defining critical levels, highways can be treated to maintain public safety while cranberry waters can be monitored to ensure no harm to agriculture.
Short Impact: At the end of the project will be a mechanism in place to allow use of de-icing salts near at-risk cranberry operations if there is a monitoring program in place calling for action if salt levels reach some fraction of the critical level, we recommend a 10x safety factor. The outcome should satisfy the need of the Highway Department to maintain safe roads in a cost-effective way that does not threaten the livelihood of cranberry farmers. We have determined to date, that the damaging level of salt on cranberry is less than 100 ppm in water - actual critical point remains under investigation. We have identified a mitigation treatment that desalinates cranberry soil in the laboratory.
Source of Funding: State Highway Department Grant (Federal Highway funds)
FTE's: 0.3
Scope of Impact:** State (researchers from WA and WI are participating)

Key Theme: Water Quality, Natural Resources Management, Biodiversity, Land Use, Wildlife Management, Riparian Management, Endangered Species
Title of Program/Project: Mill River Watershed Project
Contact Person: Jackson, Scott
Brief Description of Program/Project: This project is piloting an approach to community-based watershed protection in the Mill River watershed, a sub-basin of the Connecticut River watershed. The Mill River Watershed Project is an effort to identify and address environmental issues within five communities (Hatfield, Whately, Deerfield, Conway, and Northampton). The project involves working with municipal boards, conducting a variety of watershed assessments, targeted outreach, involving teachers from local schools in environmental education, and convening stream teams and a watershed council to facilitate public participation.
Short Impact: With technical assistance from UMass Extension, the Greater Mill River Coalition completed digitizing all of the parcel data for the watershed. This will help them prioritize and protect large blocks of land that span town boundaries in the watershed and connect existing protected parcels. Grants from the Massachusetts Environmental Trust and the National Oceanic and Atmospheric Agency were received to study the feasibility of dam removal, repair or modification to promote fish passage. Commitments have been made by the USFWS and Town of Hatfield for funding and construction of culvert upgrade project on the Mill River. A hydrological and instream habitat study was completed. Areas of suitable habitat for fish and federally endangered dwarf wedgemussels were mapped. Changes in habitat quality in response to changes in instream flow were modeled and recommendations made for the long-term conservation of aquatic ecology and endangered species. In cooperation with state and federal wildlife agencies these recommendations will be incorporated into a conservation plan for the Mill River.
FTE's: 0.8

Source of Funding: Smith-Lever 3b & c, Smith-Lever 3d, State, Grant/Contract
Scope of Impact:** State Specific, Integrated Research and Extension

Goal 5
*Enhanced economic opportunity and quality of life
for Americans*

Key Themes:

- | | |
|---------------------------------------|---|
| Aging | Home-based Business Education |
| Agricultural Financial Management | Impact of Change on Rural Communities |
| Character/Ethics Education | Jobs/Employment |
| Child Care/Dependent Care | Leadership Training and Development |
| Children, Youth, and Families at Risk | Literacy |
| Communications Skills | Parenting |
| Community Development | Promoting Business Programs |
| Conflict Management | Promoting Housing Programs |
| Consumer Management | Retirement Planning |
| Estate Planning | Supplemental Income Strategies |
| Family Resource Management | Tourism |
| Farm Safety | Workforce Preparation - Youth and Adult |
| Fire Safety | Workforce Safety |
| Home Safety | Youth Development/4-H |
| | Youth Farm Safety |

Agency	Total Dollars	FTEs	MSR Projects/Programs	MSR Dollars
MAES	\$72,685	2.3	1	\$12,713
UMEXT	\$1,496,160	28.5	0	0

Goal 5 Executive Summary

Goal five primarily reflects efforts of the 4-H Youth and Family Development Program. Efforts focused on expanding outreach to underserved communities, in particular in the area of strengthening science education. In addition the volunteer management system was significantly redesigned and strengthened to ensure the safety of participating youth. Significant subject area vehicles for learning have included In Touch Science Program, Embryology, Teen Leadership Series, State Teen Leadership Conference, Teen Leadership Institute, and the Visual Presentation Event. We have attempted to document not only participation rates, but also impacts in changes in knowledge, changes in attitudes and changes in action. We will continue to endeavor to improve this documentation over time. It should also be noted that UMass funding for 4-H was significantly reduced on July 1, 2003. This reduction effected FY03 programs and has challenged 4-H to evolve towards a self funded organization.

Key Theme: Child Care/Dependent Care

Title of Program/Project: 4-H Babysitter's Program
Contact Person: Guyott, Sherrie & May, Gretchen
Brief Description of Program/Project: The Massachusetts 4-H Babysitter's Program is a volunteer-led educational opportunity recommended for youth ages 12 and up. There are 2 manuals – one for the volunteer outlining a series of necessary topics to cover and one for the youth detailing first aid and safety, nutrition, child growth & development, and play. By September 2003, 736 participants (85% female, 15% male) had completed an assessment of their knowledge and skills learned as a result of the course. Volunteers had led 223 sessions totaling 389.25 course hours. Volunteers who conducted the courses set their own requirements for successful completion. Some items included were attendance at all sessions, demonstrating first aid and safety techniques, and preparing a babysitter's bag of items to bring to the job; 99% (734) successfully completed the local requirements. Volunteers who had conducted the program locally were also used as sources for revisions of the curricula. In addition, the US Army purchased our curricula and implemented trainings at 16 installations.
Short Impact: 98% of participants could identify safety of the children as the number one responsibility of a babysitter. 96% could demonstrate/explain what to do in a health emergency. 97% could demonstrate/explain what to do in a safety emergency. 95% could demonstrate/explain how to deal effectively with discipline problems for children of varying ages. 97% gained confidence in their ability to solve a variety of problems related to babysitting. 95% have sufficient knowledge and skills to be competent babysitters. 98% made a "babysitter's magic bag".
Source of Funding: state, Smith-Lever 3b & c, County, USDA Army Project, MA 4-H Foundation
FTE's: .4
Scope of Impact:** State Specific

Key Theme: Leadership Training & Development
Title of Program/Project: Teen Leadership Program
Contact Person: Waskiewicz, Tom
Brief Description of Program/Project: The 4-H program is committed to providing learning experiences for teens at the local, regional and state level, which will increase their leadership capacity and build their confidence in taking on leadership roles. Three specific events were designed to meet this goal.
Short Impact: State 4-H Teen Conference-138 high school youth from across the state attended this four-day conference on the UMass campus. 54% identified hands-on leadership skills, 34% wrote "making new friends", and 43% highlighted learning about college and college living as key experiences. Delegates met with UMass faculty, staff and graduate students, attended workshops on lifeskills and completed a community service project. State 4-H Teen Leadership Institute-67 teens attended this intensive, 2-day leadership conference at the Barton Conference Center in Oxford. The conference was led by State 4-H Teen Advisory Council members in partnership with adult advisors. Key programming areas included appreciation of diversity, conflict management, decision-making and leadership styles. Delegates rated "learning about leadership" (64%) and "community leadership" (47%) as

highlights while indicating a desire for more offerings on how to work “with adults” and “how to impact decisions that adults make that affect teens”.

Youth Conference East/West-38 pre-teens attended YCE and 42, YCW to learn about 4-H opportunities in the areas of leadership, citizenship and community service. Led by the State 4-H Teen Advisory Council, one of YCE/YCW’s main purposes is to have older teens serve as role models for younger 4-Hers and to encourage them to stay active in 4-H. Many YCE/YCW delegates continue on in 4-H and attend State 4-H Teen Conference, State 4-H Teen Leadership Institute, National 4-H Conference and National .

Source of Funding: State and revenue based, Smith-Lever 3b & c

FTE’s: 1.4

Scope of Impact:** State Specific

Key Theme: Leadership Training and Development

Title of Program/Project: Volunteer Management and Development Program

Contact Person: Kathleen Chatwood

Brief Description of Program/Project The Volunteer Management Educator and Development Educator chaired the Volunteer Management Team (VM). The following initiatives were undertaken by the Educator, or in conjunction with 4-H staff, Extension staff, University officials, state agency leaders or (VM) team members.

Mediation Trainings: When legal negotiations reached an impasse, Educator conducted three half-day mediation sessions between Essex County 4-H Foundation, 4-H Youth and Family Program (YFDP) and Extension regarding 4-H Charter revocation. Managed collaborative authoring process for new MOU.

Volunteer Screening: Educator researched, developed and implemented a state-wide 4-H/Extension Criminal Record History Investigation (CORI) system for new Massachusetts child protection laws in consultation with Criminal History Systems Board, University Legal Counsel and with staff/management input.

Volunteer Fiscal Management : Worked with State Advisory Council and staff to set up pilot program of 4-H treasurers to review and recommend additions to the Massachusetts 4-H Treasurer’s Book. Researched Massachusetts tax laws to develop Massachusetts tax guidance and treasurer’s resources listing.

Advisory By-laws: Incorporated feedback from all state and county 4-H Advisories into new standardized, state-wide governance system of by-laws.

Volunteer Dispute Resolution and Dismissal: Educator, in consultation with University legal counsel and risk, managed numerous volunteer incidents with potential legal, risk or negative publicity consequences as reported by state staff.

Volunteer Recruitment and Orientation: In concert with VM team, researched best practices in country, including review of written programs and web-based materials. Wrote grant to Massachusetts 4-H Foundation for recruitment PR.

Short Impact:

Mediation Trainings: 15 people trained for 1.5 days total; New MOU collaboration and mediation process resulted in improved relations, re-issuance of Charter, avoidance of legal suit and state-wide negative publicity for all parties.

Volunteer Screening: 25 staff trained in UMass Extension/4-H YFDP CORI policies and procedures. 25 staff and 500 direct volunteers (out of estimated 1500 direct volunteers)

successfully CORI'd by 9/03. Resulted in first statewide listing of screened volunteers, revised Martech categories to enable accurate counting and tracking of volunteers.

Volunteer Fiscal Management : 20 staff and 75 pilot participants trained in new fiscal Treasurer's Book accountability standards. 20 staff and 60 pilot participants trained in 4-H Name and Emblem and Tax Exempt Status of 4-H groups. 14 Essex County Treasurers trained at special session.

Advisory By-laws: New standardized by-laws adopted state-wide by 100% (9) Advisories including State Advisory Council; adopted by 75% (3) State Animal Science Councils. Ongoing revision and standardization for remaining animal councils and fair boards still in process.

Volunteer Dispute Resolution and Dismissal: 100% (30) of reported cases successfully contained. 3 highly serious volunteer incidents where legal suit was threatened resulted in 3 volunteer dismissals, 8 probations or verbal warnings of volunteers, collaborating organizations or staff, 2 mediation sessions and 1 DSS investigation involving three counties and three families. Extremely successful avoidance of potentially very high and negative legal, risk and publicity impact on 4-H and Extension.

Volunteer Recruitment and Orientation: Received \$5000 grant for publicity recruitment materials from MA. 4-H Foundation; coordinated University departmental assistance for web-based volunteer recruitment and orientation.

Source of Funding: State, Smith-Lever 3b & c, MA 4-H Foundation

FTE's: 7.95

Scope of Impact:** State Specific

Key Theme: Youth Development/4-H

Title of Program/Project: Science and Technology-In touch Science

Contact Person: Field, Jay & Mietlicki, Shirley

Brief Description of Program/Project: As an effort to increase the comfort and competency level of adults teaching science in formal and non-formal settings, the 4-H Science and Technology Action team continued to provide trainings in the Cornell designed 'In-touch Science' curricula. These trainings occurred at the MA Association of Science Teachers Conference, at local out-of-school provider trainings and at other 4-H sponsored events for volunteers.

Short Impact: Over 100 adults were trained in three components of the In Touch Science curricula that included Chemistry and the Environment, Fiber and Animals and Plants and Engineering. 23% of the adults who participated in these trainings incorporated these new activities into their youth programs, reaching approximately 200 youth, ages 7 to 14. Based on observation, the adults rated the children's level of interest at 4.3 (rating scale of 1 as low, 5 as high) and the level of the children's conversation with each other and with the adults during the activities at 4.2. Using a similar rating scale, the adults rated their prior knowledge of the subject at 4.0 and their comfort level in using the teaching approaches presented at 4.4. 83% of the adults indicated that they would use the activities again. One adult commented that the activity "ties in wonderfully with our land and water unit. We create stream tables in groups of four students and perform various activities such as stimulating rainfall." Another adult commented that "it was really interesting to watch the different strategies that students used to do the activity. It tied in very well with the activity we were doing in class with washers and magnets called breaking the force."

23 teachers and youth providers participated in In Touch trainings sessions conducted by 4-H Educators, the potential multiplier effect of this endeavor is estimated at 1,429 children. As a result of the training, 48% of the participants strongly agreed that they knew how to engage the children with the In-Touch Science curricula; 42% strongly agreed that they knew how to engage adults in the In-Touch Science curricula; and 60% strongly agreed that they knew how to get the materials needed to engage the children with the In-Touch Science curricula. 82% of the adults also indicated that they would engage children or adults with the In-Touch Science curricula within the next year. Some comments from the adults were: “Great new hands-on activities”; “A unit on salinity perhaps could be added to bring this up to high school level; great way to teach polymer chains.”

Source of Funding: State, Massachusetts 4-H Foundation

FTE's: .5

Scope of Impact:** State Specific

Key Theme: Youth Development/4-H

Title of Program/Project: Community Development and Engagement through the Environment

Contact Person: Mietlicki, Shirley

Brief Description of Program/Project: It has been shown that residents living in “greener” surroundings report lower levels of aggression, better attention, and relief in dealing with the everyday pressures of living in poverty. At the same time, people in these communities are often not aware of the value of trees and green spaces to their environment and often, are uninvolved in the decision making and public policies related to these areas. It will be shown that exposing young people to their environment through innovative educational approaches will assist these youth in becoming enthusiastic participants in green space preservation programs and possible future careers.

Short Impact: 100 youth of color from 4 urban cities in MA attended a one day Learn About Forests program; 80% of the participants increased their knowledge of forest ecology, learning more about the interaction of water, fish, soil and trees in a forested site, while 50% gained knowledge about the value of insects to the environment; 75% increased their capacity to be better stewards of the land by cleaning ponds, clearing trails, and assessing tree health; all participants were exposed to a forest for the first time and interacted with professionals in the natural resources and environmental area.

Twelve youth of color with 2 adults participated in a year long training on urban forestry as part of the Boston Urban Stewards Program supported by funding through the state Department of Environmental Management. 80% of the participants were able to identify five species of trees in their neighborhood, assess the health of trees, and demonstrated the technique of pruning trees. 100% indicated a better understanding of the value of trees to their lives and the environment and were exposed to professionals in the forestry and green industry professions. Additionally, these urban stewards, in collaboration with the Boston Parks Department, assisted in the removal of dead trees and the planting of new trees on selected streets in Boston, and recruited 100 volunteers to participate in the department’s Keep it Clean, Keep it Green event celebrating Arbor Week. Through funding provided by an external Foundation, this program will be expanded to three other groups in the Boston area in the upcoming year.

Source of Funding: Federal Smith-Lever 3b & c, MA Department of Environmental Management, MA 4-H Foundation
FTE's: 1 FTE
Scope of Impact:** State Specific

Key Theme: Youth Development/4-H
Title of Program/Project: Reaching Diverse Populations
Contact Person: Mietlicki, Shirley A.
Brief Description of Program/Project: During this program year, the 4-H Extension Educators continued to reach underserved and under-represented youth populations by integrating the youth of color recruited through the State Strengthening Grant and through several environmental initiatives. The environmental initiative included the Boston Urban Stewards Program and the Learn About Forest Program. Youth of color from these programs participated in the 4-H sponsored Teen Leadership Weekend and Peer Leadership Institute. A diverse group of youth, adult and teen volunteers, collaborators and public officials were also acknowledged at the 4-H Day on the Hill, culminating Centennial Celebration event.
Short Impact: This past year, a total of 65,750 youth were reached through the 4-H program. 35% of these youth were reached through our Family Nutrition Program and through our camping program. The remaining 65% represented participants in our club, after school and school enrichment programs. 67% of our youth were White, 19% Hispanic, 11% Black with 5% comprising Asians and Native American youth. These figures are similar to what was reported last year. Of the 3,226 adult and teen volunteers in the program, 95% were White, 3% Black and 2% Hispanic. Although the volunteer numbers are down from the year before, we did see a slight increase in the number of Black youth and adult volunteers. 34 youth of color recruited through the Boston Urban Stewards program and Learn About Forest initiative participated in the 4-H Teen Leadership and Peer Leadership weekends and had an opportunity to meet other 4-H youth. Evaluations indicated that 75% of the youth identified their leadership style, practiced leadership skills and felt more confident in demonstrating their leadership abilities within their school and community.
Source of Funding: State, Smith-Lever 3b & c, MA 4-H Foundation, County Funds
FTE's: 16.8
Scope of Impact:** State Specific

Stakeholder Input Process

The Stakeholder Input Process remains the same as in the past year. We have included the overview for your reference.

Overview:

Nearly 1000 individuals function as stakeholders involved in providing input and advice on extension and research programs in Massachusetts. Since the majority of college faculty and staff are involved in both research and extension, input from stakeholders is considered for both

research and extension work. While some individuals provide input on a one-by-one basis, such as through surveys, interviews and unsolicited material, the large majority of stakeholder input is through organized groups. These are generally:

- a. groups organized by Extension, either on an on-going basis, or convened for a one-time interaction.
- b. existing groups, such as neighborhood councils, commodity associations, professional societies and foundations
- c. groups formed by legislative mandate

The Agriculture Program reports input from 147 individuals and 12 organized groups. Several comprehensive grower associations, such as the Massachusetts Flower Growers Association, through their elected board of directors, also serve as stakeholder groups. In other commodity areas, individuals are invited to participate in advisory committees to provide input. Finally, one time focus groups used at times to provide input of specific themes.

The Agriculture program also planned and invited a cross-section of agricultural stakeholders to two focus meetings held during November of 2003. The invitee list was developed to include 185 people from agricultural producer and agricultural service provider groups. The sessions were facilitated by a professional consultant, and designed to get advice and feedback on how the Agriculture Program can adapt its activities to better meet stakeholder needs. The results of these meetings were incorporated into the program planning process.

The 4-H YFD program area involves approximately 400 individuals in county-wide, program, event-specific or other topical advisory groups. As a part of the celebration of the 100th Anniversary of 4-H, nine Conversations were conducted across the Commonwealth to gain input from over 400 youth, volunteers, parents, youth serving professionals and teachers, on issues facing today's youth. 4-H. Staff have also participated on various local coalitions and youth serving boards to gain input on concerns facing today's youth, families and communities.

Within the Natural Resources and Environmental Conservation Program, the NREC Advisory Committee serves a primary advisory function. It is made up of 24 educators, scientists, planners, local officials, and natural resource professionals from a variety of federal, state, town, and private organizations involved in conservation. Members of this committee represent a wide variety of viewpoints yet have broad perspectives on conservation issues. All have distinguished themselves as leaders in the fields of conservation and conservation/environmental education. Within NREC there are Boards of Directors for two program-supported Centers (20 members, total). Specific projects within the NREC program are guided by advisory committees, technical advisory committees, or steering committees (45 members). Additionally, the Natural Resources Conservation Advisory Board has been active in identifying our areas of emphasis, and identifying outreach needs and approaches. The board has 3 charges: 1. to provide us with advice in structuring our teaching, research, and outreach programs, 2. be an advocate for our programs as new initiatives are developed to advance natural resources management, education and research within the UMass system and regionally, 3. to assist us in raising funds which provide a 'margin of excellence' that funds beyond the state/federal allocations. The following

organizations are represented on the Board: Mass Dep. of Environmental Management; Mass Watersheds Commission; US Fish and Wildlife Service; National Marine Fisheries Service; US Environmental Protection Agency; Mass. Department of Fisheries and Wildlife; US Forest Service; Forest Management and Arboriculture Industry; Forest Products Industry; National Park Service; Natural Resources NGO and Public Utilities Industry. Both of these departmental advisory groups provide stakeholder input on all aspects our “program of research” (McIntire-Stennis, Hatch, and contracts with agencies) as well.

The Nutrition program uses two primary advisory groups with 30 stakeholders. For food safety, the Partnership for Food Safety Education provides input from state and federal state food regulatory and educational agencies in order to provide maximum impact of our efforts at all stages in the food system from farm to table. An advisory group for the Adult Day Health project, including MA DOE, MA Executive Office of Elder Affairs and practitioners from ADH programs also provide an advisory function.

For Extension as a whole, the UMass Extension Board of Public Overseers, created by the legislature and comprised of representatives of agriculture commodity groups, state agencies, natural resources groups, the state nutrition board and several state-wide 4-H advisory groups, meets regularly with Program Directors, the Director and Assistant Director. The legislation mandates the composition of the Board. Over the past five years, this group has addressed funding in general, as well as specifically how resources are allocated by program to meet the needs of the Commonwealth. The Board also provides input for overall program direction.

Actions taken to seek stakeholder input that encourages their participation:

As described in the overview, stakeholder input is encouraged through regular meetings, existing organizations, one-time focus groups and other strategies. Surveys, feedback forms, e-mail and the Web are also used to elicit input, as is personal contact.

A brief statement of the process used by the institution to identify individuals and groups who are stakeholders and to collect input from them:

Each program area seeks and identifies stakeholders appropriate to their program area. The process includes asking for volunteers; using criteria such as geographic representation, diversity and length of participation (long term participants as well as stakeholders less involved). Environmental scanning as part of strategic planning is also used to identify potential stakeholders. We also continue to stress the importance of listening to stakeholders at meetings of commodity groups, trade shows, twilight meetings and on-site visits.

A statement of how input was considered.

Input from the stakeholder group, is considered, in conjunction with the faculty and staff who are responsible for the program. Results of surveys, focus groups, discussion about

reports and proposals are part of the information mix, along with the goals of the University, the mission of Extension and research, and the five USDA goals.

Program Review Process

No significant changes have been made to the review process since the 5-Year Plan of Work was written.

Evaluation of the success of Multi and Joint Activities

The Massachusetts Agricultural Experiment Station is combining the brief statement of progress with the response to the four evaluation criteria for each activity described.

Infection Biology of Key Cranberry Fruit Rot Fungal Pathogens (Multistate Integrated Research and Extension (MA, ME, MI, NJ, OR, WA, WI))

The objectives of this project are to define inoculum sources of four fungi that cause field rot and storage rot of cranberries and to pinpoint the precise time that these fungi infect the flowers or developing berries. We have determined during the first year of the project that each of the four fungi has a different primary over-wintering source. Timing studies employing different fungicide schedules indicated that sprays applied earlier in the bloom period and fruit development offer the best control, indicating that this is the likely time of infection of the fungi.

1. This planned program addressed the number one issue identified by cranberry growers.
2. This planned program did not address the needs of under-served and under-represented populations in the Commonwealth.
3. Description of outcomes and impacts from planned programs included understanding of the biology of pest organisms and their interactions with environmental factors and the agricultural systems.
4. The planned programs did improve the responsiveness of the activity to an industry under financial stress with limited state resources.

Commodities, Consumers and Communities: Local Food Systems in a Globalizing Environment (Multistate Integrated Research and Extension (MA, RI, NY, VT, NH, ME, CA, KS, WI, MS,))

Research and Extension activities benefited farmers who are interested in producing new crops for the growing immigrant communities in the Northeast. A focus of this work has been with growers who sell at farmers' markets. There are over 100 farmers' markets in the state and many are located in urban areas where large immigrant communities live. Research identified cultivars of crops that can be successfully grown and marketed in New England. Much of this information was made available in languages other than English. At least five new crops were grown and marketed by at least 40 farmers that they had not grown in the past, thus increasing their profitability.

1. This planned program addressed an important issue of a newly identified stakeholder group
2. This planned program directly addresses the needs of rapidly growing ethnic minorities, which are both under-served and under-represented populations in the Commonwealth.
3. Description of outcomes and impacts from planned programs included identify new cultivars that enhance profitability.
4. The planned programs did benefit from information exchange provided by both multi and joint activities.

Nutrient Bioavailability – A Key to Human Nutrition
(Multistate Integrated Research & Extension
(AZ, CA-B, CA-D, CO, CTS, IN, KS, MA, MI, NE, NM, OR, WA))

We will examine *in vitro* techniques to maximize potential mineral bioavailability and other physiological effects through processing with other added food components, such as ligands to develop methods for determining bioavailability of dietary factors including calcium, iron and other food components. Foods contain many nonessential nutrients that could have health benefits. This research shows that wheat contains antioxidants that can protect biological lipids from damage. These antioxidants are primarily found in wheat products made from bran or whole grains. During the digestion process, the health protecting activity of wheat antioxidants increases. Muscle foods also contain an antioxidant known as carnosine. Consumption of beef results in carnosine being absorbed into our blood. This dietary carnosine can protect our blood lipids and thus could be beneficial to health.

1. This planned program is targeted for increased input from stakeholder groups.
2. This planned program did not address the needs of under-served and under-represented populations in the Commonwealth.
3. Description of outcomes and impacts from planned programs included bioavailability of vitamins and minerals. This planned program expands on that impact.
4. The planned programs did benefit from information exchange provided by both multi and joint activities

Environmental and Economic Impacts of Nutrient Flows in Dairy Forage Systems
(Multistate Research and Extension
IL, IN, MA, MD, MI, NJ, NYC, OR, PA, UT, WA, WI, WVA, U of Penn, USDA-
ARS/Pennsylvania, USDA-ARS/Wisconsin)

Our objective has been to develop and implement the use of a decision aid (FarmSoft) for use in "comprehensive" nutrient management planning. This has been done to meet outreach needs of University of Massachusetts Extension and Massachusetts USDA Agencies with concerns and obligations regarding nonpoint source pollution control from animal feeding operations. The decision aid FarmSoft has proven to be comprehensive in terms of meeting most if not all of the needs of comprehensive nutrient management planning. The introduction of the corn stalk nitrate test provides farmers with an evaluation method to determine whether they are applying sufficient or too much N fertilizer. The amino-sugar nitrogen soil test if found suitable for corn would eliminate the need for a separate soil sampling operation to test for N as is required in the pre-sidedress N test.

1. This planned program addresses concerns and obligations regarding nonpoint source pollution.
2. This planned program did not address the needs of under-served and under-represented populations in the Commonwealth.

3. Description of outcomes and impacts from planned programs included determining the effect of crop management on nutrient, pesticide and sediment pollution.
4. The planned programs did benefit from information exchange provided by both multi and joint activities

Nutritional Risk and Antioxidant Status in the Elderly

Researchers at the University of Massachusetts (MA) have been collaborating with the food banks in both the western and the central regions of the state to quantify food insecurity, food choice, and health indicators particularly of older clients receiving food assistance through these sites. Results not previously reported show a low frequency of consumption of fruits and vegetables (F&V) by these same participants, 1.39 times per day for fruit and 2.06 times per day for vegetables. Improving fruit and vegetable availability at food pantries can increase fruit and vegetable and concomitant antioxidant intake in at risk populations such as the low-income elderly.

1. This planned program addressed an issue that has been of paramount importance to multiple stakeholder groups.
2. This planned program did address the needs of low-income elderly, an under-served and under-represented population in the Commonwealth.
3. Description of outcomes and impacts from planned programs included assessing nutritional risk on the elderly.
4. The planned programs provided resources that would not have been available in the absence of the multi and joint activities.

Enhancing Adoption of New Rootstock Cultivars for Fruit Trees in Massachusetts (Multistate Integrated Research and Extension (RI, CT, MA, ME, NJ, NH, NY, VT))

A number of apple and peach rootstocks have been under trial at the University of Massachusetts Cold Spring Orchard Research & Education Center and at a few commercial orchards for several years. Particular attention has been paid to rootstocks that provide a reduction in tree size, thus reducing labor required to prune and harvest and reducing the amount of pesticide needed per acre. Also, rootstocks have been selected that are well adapted to our weather conditions and are resistant to normal pest pressures. Approximately 150 acres of new dwarfing apple rootstocks were planted by commercial orchardists. Current year's planting, and planting during the previous four years resulted in overall pesticide-use reduction of approximately 10%. Current year's planting and planting during the previous four years resulted in approximately a 10% increase in profitability.

1. This planned program addressed an issue that has been identified by interactions with stakeholders over a number of years.
2. This planned program did not address the needs of under-served and under-represented populations in the Commonwealth.
3. Description of outcomes and impacts from planned programs included understanding of the biology of pest organisms and their interactions with environmental factors and the agricultural systems and bio-intensive strategies.
4. The planned programs did benefit from information exchange provided by both multi and joint activities.

**U.S. Department of Agriculture
Cooperative State Research, Education and Extension Service
Request for Waiver from Target Percentage
For Multistate Extension Activities and Integrated Activities**

Institution: University of Massachusetts Amherst
State: Massachusetts
Waiver for (circle one)

Multistate Extension Activities

**Integrated Activities (Hatch Act Funds)
Integrated Activities (Smith Lever Funds)**

Fiscal Year (circle one)

**FY2000
FY2001
FY2003**

FY2003

FY2004

Type of Waiver

Pre-waiver (must be submitted prior to October 1)

Post-waiver

(must be submitted with Annual Report of Accomplishment and Results)

Justification: The FY03 goal for Massachusetts Extension is \$82,500. UMass Extension requests a waiver for FY2003 for the following reasons:

UMass Extension faculty and staff are engaged in eight multi-state Extension Activities over a range of projects and with states, primarily in New England and the Northeast. Examples include the Extension Fruit program involved in three New England projects and the Floriculture and Vegetable Programs each involved in two New England and northeast regional projects. Our Natural Resources and Environmental Conservation Program has one New England multi-state project. We estimate our investment of state and Smith Lever b/c funds to be approximately \$590,000.

Massachusetts law requires fringe benefits (costing approximately 22%) to be paid for personnel funded by non state funds. UMass Extension thus uses state funds primarily for faculty and professional positions. Smith Lever monies fund primarily clerical support and non personnel costs. This use of Smith Lever b/c funds has created difficulty in appropriately tracking Smith Lever project expenditures.

Stephen Demski
Director

Date

Note: all reports must be submitted regardless of request for waiver
Form CSREES-WAIVER (2/00)

**U.S. Department of Agriculture
Cooperative State Research, Education and Extension Service
Request for Waiver from Target Percentage
For Multistate Extension Activities and Integrated Activities**

Institution: University of Massachusetts Amherst
State: Massachusetts
Waiver for (circle one)

**Integrated Activities
(Smith Lever)**

Integrated Activities (Hatch Act Funds)

Fiscal Year (circle one)

**FY2000
FY2001
FY2003**

**FY2003

FY2004**

Type of Waiver

Pre-waiver (must be submitted prior to October 1)

Post-waiver

(must be submitted with Annual Report of Accomplishment and Results)

Justification: The FY03 goal for Massachusetts Extension is \$53,500. UMass Extension requests a waiver for FY2003 for the following reasons:

UMass Extension faculty and staff are engaged in five multi-state Extension Activities, primarily in New England and the Northeast. The Extension Fruit program and Natural Resources and Environmental Conservation program are each involved in two New England projects and the Vegetable Programs is involved in one northeast regional project. We estimate our investment of state and Smith Lever b/c funds to be approximately \$313,000.

Massachusetts law requires fringe benefits (costing approximately 22%) to be paid for personnel funded by non state funds. UMass Extension thus uses state funds primarily for faculty and professional positions. Smith Lever monies fund primarily clerical support and non personnel costs. This use of Smith Lever b/c funds has created difficulty in appropriately tracking Smith Lever project expenditures.

Stephen Demski
Director

Date

Note: all reports must be submitted regardless of request for waiver
Form CSREES-WAIVER (2/00)



Integrated Activities for the MA Agricultural Experiment Station



Revised March 6, 2004 by PDC

*U.S. Department of Agriculture
Cooperative State Research, Education and Extension Service
Supplement to the Annual Report of Accomplishments and Results
Multi-State Extension Activities and Integrated Activities*

Summaries of Integrated Activities can be found at
<http://www.umass.edu/nre/contentpages/expst-integrated.html>

Institution: University of Massachusetts

State: Massachusetts Check one:

Multi-State Extension Activities

Integrated Activities (Hatch Act Funds)

Integrated Activities (Smith-Lever Act Funds)

Research Project Number <small>(Click Number for Link)</small>	Title	Affiliated Goal/s	2003 Expenditures/FTE's
MAS00815	Plant Parasitic Nematodes	Goal 1	\$50,718/.1
MAS00826	Best Management Practices for Turf Systems in the East	Goal 1	\$42,621/.7
MAS00517	Postharvest Physiology of Fruits	Goal 1	\$23,867/.4
MAS00539	Rootstock and Interstem effects on Pome and Stone Fruit Trees	Goal 1	\$3,786/.3
MAS00763	Environmental and Economic Impacts of Nutrient Flows in Dairy Forage	Goal 1	\$46,591/.4
MAS00647	Conservation and Utilization of plant	Goal 1	\$4196/.2

	genetic		
MAS00747	Multidisciplinary Evaluation of New Apple Cultivars	Goal 1	\$18,418/.7
MAS00878	Association of Fertility with Temporal Changes in Ovarian Function of Domestic Ruminants	Goal 1	\$60,376/1.7
MAS00881	Nutrient Bioavailability -- Phytonutrients and Beyond	Goal 3	\$19,489/.3
MAS00663	Nutritional Risk and Antioxidant Status in the Elderly	Goal 3	\$32,616/1.1
MAS00762	Nutrient Bioavailability -- Phytonutrients and Beyond	Goal 3	\$35,562/04
MAS00880	Characterization and Mechanisms of Plant Responses to Ozone in the Northeastern U.S.	Goal 1&4	\$12,085/.3
MAS00066A	Biological Improvement of Chestnut	Goal 4	\$177,759/.3
MAS00496	The National Atmospheric Deposition Program	Goal 4	\$9,056/.1
MAS00877	Benefits and Costs of Resource Policies Affecting Public and Private Land	Goal 4	\$38,905/.9
MAS00797	Rural Low-Income Families: Monitoring Their Well-being & Functioning in the Context of Welfare Reform	Goal 5	\$13,738/.4