Certification
Of New Jersey Annual
Report of Accomplishments and
Results (FY 2005)

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Introduction:

New Jersey has been actively involved in the implementation of the integrated research/Extension 5-Year Plan of Work for fiscal years 2000 – 2004 and the supplemental update for fiscal year 2005-2006. The implementation of this plan has engaged New Jersey Agricultural Experiment Station (NJAES) researchers and Rutgers Cooperative Extension (RCE) specialists, agents and staff in the generation and transfer of knowledge and technologies related to agriculture, food systems, the environment and human and community development. The diversity of our state presents research and Extension with complex challenges, which are being effectively addressed through basic, applied, and policy-oriented research, education and outreach.

Early in the plan of work cycle, we engaged residents of the state in a Visioning and Planning process which resulted in a strategic plan for Cook College and the New Jersey Agricultural Experiment Station, which has provided a framework for the future direction and focus of the College and the Station. Programmatic focus areas are agricultural viability, environment and natural resource management, food, nutrition and health, and human and community development. Our goal is to be recognized nationally as the "Solutions State" where quality of life is heightened by the thriving agriculture, and sound environmental rural and urban communities. Stakeholders have played a pivotal role in the process and will continue to be viewed as partners in the planning and program development process for issues identification including those of the underserved and underrepresented.

Integrated research and Extension programs as well as multi-state, multi-institutional and multi-disciplinary research and Extension activities have addressed identified critical issues resulting in significant economic, environmental and social impacts which have proved beneficial to the state while at the same time achieving the goal of improved program efficiencies and effectiveness within Rutgers Cooperative Extension and NJAES.

A. Planned Programs

Goal 1

Overview: Operating within the most densely populated and urban state in the nation, New Jersey's agricultural producers face challenges unparalleled to their competitors in other regions of the United States. These challenges include high land prices, property taxes, and labor costs, stringent environmental regulations, severe wildlife damage, and urban neighbors who desire rural, rustic settings but do not appreciate the complexity of agricultural practices. However, proximity to the large consumer markets, sophisticated food manufacturing and delivery systems and center of the pharmaceutical industry also provides unique opportunities for our producers. In light of these challenges and opportunities, we have focused our resources to increase the profitability of New Jersey's agricultural producers by:

- Adding value to existing crops or products through enhancements or identification of new market opportunities
- Protecting crops from pests and disease
- Increasing production efficiency and reducing costs

New Jersey Agricultural Experiment Station (NJAES) created the Food Innovation Center (FIC) to provide solutions to the challenge of remaining viable in the future. Through educational seminars and its Food Business Incubator, this center provides farmers with an opportunity to create new businesses based on value added agricultural products, developing new products and commercial opportunities. The Center is driven by the underlying need to improve the outlet for agricultural products and move New Jersey agriculture into the new age of "value added". In one year, the Food Innovative Center has provided assistance to 223 clients, providing economic development and serving as a catalyst for creating new jobs in the region. It is the first service-based, food and agricultural industry incubator model to exist in the United States.

Switching growers from traditional commodity lower price crops to alternative, higher priced value added ethnic specialty crops has provided a competitive edge for New Jersey growers. Focused Extension education and research on organic high bush blueberry production has led to an increase in acreage and doubled gross revenue. New Jersey grape vineyard acreage has increased by 34% over 5 years with a 100% increase in the number of wineries.

The Rutgers University Equine Science Center at the New Jersey Agricultural Experiment Station is realizing its mission of "Better Horse Care through Research and Education". The Equine Management Short Course "New Research Information and Technologies on Equine Health Issues" resulted in increased knowledge and intended changes in management practices for horse owners, equine service providers and veterinarians.

The peach industry in a six-county area of southern New Jersey benefits from the nationally known research and Extension programs of Rutgers, NJAES. The focus of the work has been to stabilize the industry by developing peach production technology to reduce costs and reduce risks while continuing to sustain environmentally sound practices. Of note is the development and patent of the first flat or peento peach, Saturn. This donut peach is marketed internationally

in supermarkets and specialty shops. Two years of commercial study demonstrated that growers can effectively manage rusty spot in peaches using new integrated programs.

As the result of the multi-state integrated research and Extension work of the NC-140 project which as been in existence since 1992, over 99% of the new apple trees planted in New Jersey have been dwarfing rootstock. The financial benefit to U.S. fruit growers from earlier returns, greater yield, and higher fruit quality was $200,000,000 over the 5-year period. Overall, the work of NC-140 resulted in recommendations and educational programs which guided plantings of 170,000 acres of fruit trees in the United States during the same 5-year period.

Goal 1

Allocated Resources:

Research

Hatch Funds:	$1,421K
All Funds:	$17,966K
SY's:	36

Extension

Smith-Lever Funds:	$1,106K
All Funds:	$5,222K
FTE's:	75

Goal 1

Key Themes: Agricultural Competitiveness
Agricultural Profitability

Activity: The Food Innovation Center (FIC) provides research, education, outreach and business development services to New Jersey's agricultural and food industries. The Center is driven by the underlying need to improve the outlet for agricultural products and move New Jersey agriculture into a new age of "value added." Considering the high cost of doing business, New Jersey farmers cannot grow the same commodities as farmers in the Mid-West and still remain competitive. The proximity of New Jersey agriculture to the largest consumer market in the nation suggests that farmers can capture some of the values beyond the farm gate by producing high value prepared foods to be sold at specialty food stores, farm stands, supermarkets, and restaurants. The acceleration of value added activities will enhance the viability of agriculture and can turn the tide of declining profitability in agriculture.

The Center provides crucially needed expertise to New Jersey's agricultural and food industries which comprise one of the state's largest industries worth over $63 billion. The center has developed strategic partnerships with the City of Bridgeton, Cumberland Empowerment Zone, New Jersey Department of Agriculture, New Jersey Commerce, USDA Agricultural Research Service, USDA Rural Development, and numerous state and federal food and agricultural associations. It provides a direct link for business development and technology transfer from the vast resources of Rutgers to clients located throughout the state. The Center is a catalyst for creating new jobs in the region, and is the first service-based, food agricultural industry incubator model to exist in the United States. It has already become a template for similar programs throughout the United States.

Impact: In the past year, the Food Innovation Center has provided assistance to 223 clients throughout the state, providing economic development for the entire region. To date, with the guidance and support from the Food Innovation Center, 14 applicants have been successful in receiving funding from the program. The immediate effect on farmers can be summarized by the testimonial from Penni Heritage, of Heritage Station Vineyards & Winery: "We felt we had a very good idea to convert some of our orchards to vineyards; we learned how to make wine, produced our first bottle in 2000, and won awards from the beginning. I believe good wine begins with best practices in the field, we needed to hire a winemaker, expand facilities and boost our marketing to ensure our growth. The Food Innovation Center coached us every step of the way through a very complex application for a USDA value-added grant. As a result, we received a $50,000 grant. Without their help, I know we wouldn't have succeeded, and without our value-added products we would not be surviving in farming today."

Sources of Federal Funds: USDA Competitive Funds

Scope of Impact: State Specific

Goal 1

Key Themes: Agricultural Profitability

Activity: Many forms of agriculture are no longer economically viable in New Jersey. As a result, many farmers are dealing with the decision to either sell their farms to development or find a crop that will result in a good annual income. The wine industry nationwide is one of the fastest growing industries, in fact there are now wineries in every state in the USA and wine sales and consumption have steadily grown over the past few years. Wine consumption in New Jersey is the fourth highest in the country, however at present only 1% of that wine was produced in New Jersey. The New Jersey wine industry has a potential to make a major growth increase and growers in New Jersey need a viable crop to grow.

An annual grape/wine symposium called "Grape Expectations" is conducted to introduce new people to the industry, address current problems within the industry, and make recommendations for the future. In addition, twilight meetings, field visits, site evaluations, and individual office conference are conducted to educate prospective grape/wine growers on the realities of the industry. The target audience consists of two different backgrounds; the first being existing farmers looking for an alternative crop, and the second being people in industries other than farming and wishing to change their careers and lifestyles. A *Quality Wine Alliance* evaluation program has been instituted to improve wine quality in New Jersey and to foster consumer acceptance of New Jersey wines. Research evaluations of pesticides, organic alternatives, varieties, wine making techniques, and ground covers are all being conducted.

Impact: NJ grape vineyard acreage has increased by 34% over 5 years. There has also been a 100% increase in the number of wineries.

Sources of Federal Fund: Smith-Lever 3(b) & (c)

Scope of Impact: State Specific

Goal 1

Key Themes: Agricultural Profitability
Small Farm Viability
Agricultural Competitiveness

Activity: Growing ethnic populations of first and second generation immigrants in the Mid-Atlantic Region offer farmers opportunities to provide fresh produce native to these groups' homelands. United States Census data documents that Hispanic and Asian populations have increased approximately 70%; a total of 1,200,000 and 600,000 people in New Jersey respectively. New Jersey ranks third in the United States with an 18% ethnic community composition. To boost farm income and minimize competition among growers, a diversity of high value vegetable crops, specialty small fruits and consumer markets have provided a niche for New Jersey producers. Additionally value-added growing options like organic culture of specialty vegetables, herbs and fruits with a focus on Organic Blueberry production has continued to be stressed.

Agricultural Extension agents have conducted field tours, demonstrations, Extension events and disseminated information on specialty ethnic vegetables including: Asian, Hispanic, African/Caribbean, European and Indian. As a result, fact sheets on ethnic vegetables and organic blueberry production were published.

Impact: Switching growers from traditional commodity lower priced crops to alternative, higher priced value added ethnic specialty crops has provided a competitive edge for New Jersey growers. Attendance at grower meetings has steadily increased from 1999-2005. Ethnic crop production in New Jersey increased by over 400 acres and the number of new immigrant farmers is increasing. Both established and new fresh produce growers are taking advantage of marketing opportunities to provide fresh produce native to ethnic populations and the rapid demand of specialty grocers and restaurants for ethnic produce.

Focused Extension research and education on organic high bush blueberry production has led to an increase from 0 acres to over 200 acres among 13 farm sites. Growers have doubled gross revenue as their average price per flat of $11.00 increased to $23.00 - $30.00 per flat for New Jersey organic blueberries. Programmatic impact on organic specialty crops has helped increase organic farm certification by 21 new farms totaling 100 acres.

Source of Federal Funds: Smith-Lever 3(b) & (c)

Scope of Impact: State Specific

Goal 1

Key Theme: Animal Health

Activity: The Rutgers University Equine Science Center at the New Jersey Agricultural Experiment Station has combined the expertise of RCE specialists and research faculty in land use; water, pasture and waste management; endocrinology; equine nutrition; parasitology; exercise physiology; turf grass; entomology and many other disciplines to provide solutions to horse farmers, horse owners, traditional agricultural farmers with horse-related operations and the overall industry in New Jersey to ensure the viability of the industry and the vitality and well-being of the animal. The center's mission of "Better Horse Care through Research and Education" implemented by an integrated research and Extension focus which primarily provides solutions to problems facing the industry. A team of Extension specialists, agents and staff designed and conducted the Equine Management Short Course – "New Research Information and Technologies on Equine Health Issues." This two-day conference provided current, research-based information on horse health issues for horse owners, equine service providers and veterinarians. Workshops included: Parasite Life Cycles, Vaccine Development, and Disease Prevention, Lyme Disease, Diagnosing Lameness, Allergic Reactions in Horses, Manual Therapy and Acupuncture, Nutraceuticals, Stress and the Equine Athlete, Glucose Tolerance and Insulin resistance.

A special section offered exclusively for veterinarians covered the current status of equine vaccines, new technologies in vaccine preparation and allergic responses to vaccines.

Impact: An evaluation conducted at the conclusion of the equine short course revealed the following intended changes in management practices and knowledge of the participants:

- 54% planned to adjust their deworming schedules to reflect the impact that temperature and rainfall has on parasites.
- 45% planned to incorporate a tapeworm deworming product into their deworming program.
- 61% planned to evaluate their farm management practices to identify sources of stress.
- 100% did not plan to eliminate any vaccines in their health care program.
- 25% are planning to incorporate additional vaccines in the program.
- 88% reported that their knowledge of parasites and life cycles had improved or greatly improved.
- 94% reported that their ability to detect lameness had improved or greatly improved.
- 100% reported that their knowledge of acupuncture and manual therapy had improved or greatly improved.
- 55% reported that their knowledge of allergic reactions had improved or greatly improved.
- 59% reported that their ability to evaluate neutraceuticals had improved or greatly improved.
- 72% reported that their ability to recognize stress in the horse had improved or greatly improved.
- 63% reported that their knowledge of the effects of glucose intolerance and insulin resistance had improved or greatly improved.

Source of Federal Funds: Smith-Lever 3(b) & (c)

Scope of Impact: Multistate/State Specific

Goal 1

Key Theme: Agricultural Profitability
Plant Health

Activity: Increasing energy costs are beginning to seriously impact the economics of greenhouse crop production. To reduce energy costs, growers are reducing night air temperatures; however, this practice sometimes leads to deleterious effects on production time and crop quality. However, a faculty member at Rutgers University demonstrated that root zone heating technology can minimize the deleterious effects of lower night air temperatures for crops that prefer warmer production temperatures. To test this, a comparison of Poinsettia cultivars grown at a reduced air temperature with two different root zone temperatures was performed. Plant height and flowering date were compared between the two treatments and with the same cultivars grown in a greenhouse with standard benches and typical night air temperatures of 62-65F. No differences in final plant height or bract size were evident, and no increases in root disease commonly associated with growing Poinsettia at cool night temperatures was observed among the treatments.

Impact: Applying heat directly to the root zone is less expensive than heating the entire greenhouse volume. The warmed floor can act as an energy flywheel which creates a stable warm root environment and warms air near the plant canopy even when the temperature of the much larger volume above is allowed to drop by 10°F. Being able to grow contemporary Poinsettia cultivars at night air temperatures 10°F cooler than normal without increases in root disease incidence or delays in production time could reasonably be expected to reduce fuel costs from 10-30 percent. For the many growers who have this technology today, this simple adjustment could save thousands of dollars per grower in fuel costs.

Sources of Federal Funds: Hatch

Scope of Impact: State Specific, National

Goal 1

Key Theme: Agricultural Profitability
Home Lawn and Gardening

Activity: Many farmers, landscapers, Master Gardeners, and professional horticulturalists depend on the expertise of Cooperative Extension for information and leadership. Many Cooperative Extension staff provide outstanding educational programs and consistently demonstrate a high level of effective teaching and communication skills. In order to provide accurate research based information on horticulture, agriculture, nutrition and environmental issues, our team developed an educational television series for New Jersey Network (NJN) Public Television. The television program showcases the expertise and programs of Cooperative Extension personnel. The television series also promotes New Jersey agriculture and showcases the expertise of New Jersey farmers. The program demonstrates how the latest University research from the New Jersey Agricultural Experiment Station helps to solve real world problems.

The quality and appeal of the program segments have kept viewers tuned in for six years. To date, twenty-one (21), 30-minute television episodes were created for the "If Plants Could Talk" (IPCT) television series, eighteen (18) episodes have aired on NJN to a potential audience of 8 million viewers. Filming of four (4) episodes for the 2005 series was done in 2004. The program is designed and produced by Cooperative Extension faculty and staff. The target audience is the general public and according to Nielsen ratings appeals to a wider audience range than other popular gardening shows such as Victory Garden.

Impact: Each airing of the "If Plants Could Talk" program attracts between 50,000 to over 150,000 viewers throughout the state of New Jersey as well as parts of Pennsylvania, Connecticut, Delaware and New York. NJN PBS airs the program once per month from April to December during Saturday afternoon and occasional evening slots on Saturdays and Sundays. As a result of the program, close to 9 million people have visited the "If Plants Could Talk" web site for more information on gardening, Extension programs, environmental issues, and New Jersey agriculture. Over 50,000 people have logged on to our Pick-Your-Own farms listed for New Jersey. If we estimate that only 10% or 5,000 of these people take our information and purchase from local farms, and if we assume that the average person spends $8 per visit and visits twice per week, then we can assume that approximately $80,000/week multiply by 10 weeks, or $800,000 during the production season is earned by New Jersey farmers as a result of the information provided on our television series and web site.

Public Service Announcements (PSA's) have been produced and aired on topics such as care of plants during a droughts and the Asian Longhorned Beetle (ALB). PSA's are shown before or after lottery drawings and/or NJN News which can attract as many as 200,000 viewers. Due to the airing of our ALB PSA's, a major find of ALB was reported in Middlesex County and as a result, a very conservative estimate of the detection and prevention of further damage to additional trees as well as damage to property and environment would be over $2 million. It is estimated that over $2 million worth of trees and property damage would be saved within two to three years due to the early detection of ALB encouraged by the PSA. This estimate is based on

the rate of spread of ALB over a six-year period within the two counties and an average tree value of only $3,000.

Sources of Federal Funds: Smith-Lever 3(b) & (c)

Scope of Impact: Multi-State (PA, CT, DE, NY)

Goal 1

Key Theme: Agricultural Competitiveness
Agricultural Profitability
Plant Genomics

Activity: A significant agriculture infrastructure of history, tradition and industry revolves around the activities of the peach industry in a six-county area in southern New Jersey producing 7,000 acres of peaches and nectarines with a production value of $35,000,000 and a tree value of $140,000,000. Approximately 80 commercial peach growers grow, pack and ship the product they grow in New Jersey as far west as Minnesota, Missouri and Texas and export to Quebec and Ontario and occasionally to Mexico and Central America. The peach industry in southern New Jersey ranks 4th in the United States behind California, Georgia, and South Carolina. The research and educational programs of RCE are known nationally and internationally. The focus of research and education has been to stabilize the industry by developing peach production technology to reduce costs and reduce risks while continuing to sustain environmentally sound practices.

Extension county agents and specialists have conducted twilight research meetings, educational conferences, written articles in the Plant and Pest Advisory newsletter, articles for trade journals and magazines, oral presentations at professional meetings as well as a poster presentation at the International Peach Symposium in Santiago, Chile. A Peach Science web site and electronic mail distribution list to share the latest technology in peach and other stone fruit science research was developed. Growers who participate in the RCE peach Integrated Pest Management (IPM) program have problems diagnosed and follow fertilizer recommendations based on leaf and soil samples.

Impact: The quality of peaches has improved and continues to improve through the downsizing of grower members and the increase in cooperation among shippers. The ultimate impact is an increase in average wholesale peach prices from 43 cents to 49 cents per pound and steady movement of peaches throughout the summer and fall.

RCE research evaluations and peach variety recommendations have resulted in the following: planting of the Flamin Fury varieties, Stellar varieties, and a series of white-fleshed peaches from Zaiger genetics of Modesto, California and many cultivars from public funded breeding programs. The most recent editions to planting are Klondoke, Flamin Fury PF 7 and Flamin Fury PF Lucky 13, Flamin Fury Lucky PF Lucky 24. Encore peach represents 9.1% of the trees planted in New Jersey with a value of $14,851,200. Encore is now the ninth most important variety in Washington State. The peach variety, Laurol, is the fifth most important variety in New Jersey having 5.4% of the trees with a total value of $8,812,800. Peach planting of Laurol have increased dramatically from 2000 to 2005 and is now believed to be the most important variety planted in New Jersey.

The patent on John Boy for a commercial nursery is the sixth most important variety in New Jersey with 4.7% of established trees and is one of the heaviest planted new varieties in Pennsylvania. The value of John Boy trees is $7,670,400 in New Jersey. Plantings of John Boy have and continue to increase through 2005 in New Jersey and the Middle Atlantic States. It is believed to be the second most important variety in New Jersey and one of the top ten varieties in Pennsylvania. The USDA varieties, Sentry and Bounty, researched by RCE in New Jersey are

now established varieties in the Middle Atlantic area. Sentry is the seventh most important variety (3.9% of the trees valued at $6,364,800 in New Jersey), and Bounty the eighth most important variety with 2% of the trees valued at $3,264,000. Both varieties have increased in importance in the period from 2000 to 2005. A purple-fleshed plum was released jointly with the USDA in 2004 and trees are all sold out for 2006. White-fleshed low acid peaches are now increasingly planted in New Jersey and the Mid-Atlantic States. The White Lady variety (1.8% of trees with a tree value of $2,937,600) is the most important white-fleshed peach in the Middle Atlantic area of the United States. Other low acid white-fleshed peaches planted are Spring Snow, Sugar May, Klondike, Snow Giant, Sugar Giant and Yukon.

The first flat or peento peach, Saturn, was developed by RCE and was patented for a commercial nursery. It is now marketed internationally as a donut peach in supermarkets and specialty produce stores. Grown mostly in California and Washington, it is a niche market item of untold value for growers and shippers and the only flat peach ever introduced. Approximately 180 acres have been planted in New Jersey and Pennsylvania. 4,000 packages were shipped from New Jersey in 2005 and 450,000 packages from California and Washington in 2005.

All of our 9,500 acres of fruit plantings in southern New Jersey have applications of chemical fertilizers to improve fruit tree growth and production. Nitrogen applications have been reduced through better timing, reduced rate recommendations and the development of organic matter supplemental sources. Of the 560 samples tested in the past three years for phosphorus only five needed phosphorous fertilization. By identifying these excesses, we have changed fertilizer practices. We have reduced phosphorous excesses in the soil and improved uptake of other elements including zinc.

A new program was developed to increase the uptake of zinc in peach trees. This was accomplished by applying foliar applications of zinc on acreage that has high soil levels of phosphorous. Nineteen growers used the program successfully in 2005. Zinc recommendations have been incorporated in our 2006 Commercial Tree Fruit Production for all peach growers.

Results of the two years of the commercial study demonstrated that growers can effectively manage rusty spot using the new integrated program. Specific impacts relate to improved disease control, increased grower profitability, environmental favorableness, and increased applicator and food safety included:

- Improved application timing enhances disease control, resulting in less yield loss
- Less fungicide introduced into the environment due to 50% to 75% fewer applications
- Reduced applicator exposure to toxic fungicides (fewer applications, use of biocontrols)
- Improved grower profitability resulting from a $40 to $80 per acre cost savings
- Estimated statewide savings of $200,000 to $400,000 per year (60% acreage susceptible)
- Reduced risk of fungicide residues on harvested fruit, thereby improving food safety for the public as a result of fewer sprays and use of less toxic biocontrols.

Sources of Federal Funds: Smith-Lever 3(b) & (c), Hatch

Scope of Impact: International, Mid-Atlantic Region

Goal 1

Key Themes: Agricultural Competitiveness
Agricultural Profitability
Innovation Farming Techniques
Biotechnology
Plant Genomics

Activity: Tree Fruit production is increasingly at odds with overproduction in the global world market. In the increasingly competitive international market, the growing demand for higher quality fruit by consumers, the consolidation of the United States chain store buyers, the strong pressure to reduce chemical use, and an ever increasing need to enhance the economic efficiency of production, tree-fruit growers must look to economically and environmentally sustainable management strategies for fruit production. Orchardists who want to stay profitable must establish high-density plantings with much smaller trees with new cultivars as rapidly as possible to maintain economic viability. These high-density plantings will cost several times more to establish than low-density plantings, thus greatly increasing the economic risk. A rapid return on investment is essential for growers to allow for changing cultivars in response to market. Modern high density orchards require 20,000 plus dollars per acre to establish. The central component of high-density systems is the rootstock. The root system imparts many characteristics to the mature tree such as size, precocity, productivity, fruit quality, pest resistance, stress tolerance, and thus profitability.

As the industry moves from low- to high-density plantings, several rootstock-related problems must be addressed. New pome- and stone-fruit rootstocks cannot be recommended to commercial growers without reservations until there is sustained research as to soil and climatic adaptability, root anchorage, size control, precocity, productivity, pest resistance, and propagation ability. In general, field-testing of rootstocks in an orchard setting requires a minimum of ten years to assess accurately the potential for improved profitability, reduction of inputs, and enhancement of production efficiency. With year-to-year variation in weather, this time span is necessary to obtain a true indication of rootstock performance. Through the uniform cooperative testing undertaken by NC-140, new rootstocks can be exposed quickly and systematically to widely varying soil and climatic conditions to shorten the time necessary for thorough evaluation.

New Jersey fruit growers directly benefit from the NC-140 research plots located in New Jersey. NC-140 trials are located at the Rutgers Snyder Research Farm and The Rutgers Agricultural Research and Extension Center (RAREC). 178 fruit growers toured and observed the NC-140 research plots at two twilight meetings at Snyder Farm in 2005 and one open house grower meeting at RAREC in 2005.

New Jersey results are published as recommendations in the New Jersey Commercial Tree Fruit Production Guide, NJ Plant and Pest Newsletters-Fruit Edition and New Jersey Horticultural. NC-140 cooperators oversee the development, acquisition, and evaluation of new rootstock material. Rapid evaluation of that material results in the ability of North American orchardists to benefit from its use with a better understanding of performance (productivity, precocity, efficiency, and pest susceptibility) and therefore less risk of failure.

The results of all NC-140 projects are presented in peer-reviewed, scientific journals, resulting in over 25 articles from the project as a whole and more than 120 from cooperative research in the past 5 years. In New Jersey and nation-wide, Cooperative Extension outreach is an integral part of the NC-140 project. Therefore, results are disseminated quickly and widely as soon as they are ready. As an example of the outreach effort, nearly 200 grower-oriented publications were developed, about 450 talks were given, nearly 150 field days were conducted, and more than 50,000 grower contacts were made in the last 5 years to disseminate information from NC-140 projects.

Impact: Because of the extensive output of NC-140 and the widespread participation, all modern North American recommendations regarding rootstocks for fruit crops have their basis in NC-140.

- Since 1992 over 99% of the new apple trees planted in New Jersey have been on dwarfing rootstock.
- The financial benefit to United States fruit growers from earlier returns, greater yield, and higher fruit quality was $200,000,000 over the 5-year period.
- Overall, the work of NC-140 resulted in recommendations and educational programs which guided planting of 170,000 acres of fruit trees over the last five years in the United States.
- Cumulative state and federal investment in NC-140 for the last 5 years was approximately $5,000,000. Cumulative, measurable benefits to the United States temperate tree-fruit industries were more than $300,000,000. Less easily measured benefits, such as averted losses and enhanced environmental quality, certainly increase the financial value of NC-140 to well beyond $300,000,000 in the last 5 years.
- NC-140, Rootstock and Interstem Effects on Pome and Stone Fruit Tree projects have had significant positive impacts on the tree fruit industry in New Jersey and nationwide.
- Utilization of NC-140 recommendations resulted in significantly earlier returns on investments related to tree establishment.
- Mature yields increased by 20% per acre, fruit size was 10% greater, and the percent meeting the highest grade category increased by 20%.
- Because new apple plantings being primarily in the dwarf category (with substantially reduced canopy, leaves and branches, volume per acre), pesticide usage on the new acreage was reduced by nearly 40%, with the associated environmental benefit plus $100,000,000 saved over the 5-year period in pesticide cost and application across the United States.
- Because of the use of disease-resistant rootstocks and better selection of susceptible rootstocks, tree losses decline by 10% over the 5-year period.
- NC-140 output guided propagation of fruit trees in nurseries, allowing them to tailor better their output to grower demands and to avoid problematic rootstocks. As an example, a series of cherry rootstocks from Russia were gaining a great deal of interest, but NC-140 work found them to be hypersensitive to Prunus Necrotic Ringspot virus, reducing their suitability for United States production.
- NC-140 continues to develop advanced experimental design approaches to reduce the costs of rootstock research.

Source of Federal Funds – Hatch, Smith-Lever 3(b) & (c)
Scope of Impact – State Specific, Multi-State Integrated Research and Extension (NY, MA, NJ, IA, CA, CO, MN, WI, VA, MI, TN, PA, KY, NC, MD, AR, UT, GA, MO, WA, IN, SC) Canada, and Mexico

Goal 2

Overview: Approximately 70 percent of the nation's major food manufacturing firms have headquarters or research facilities within a hundred mile radius of the Rutgers University campus. New Jersey based food manufacturers are under a variety of regulatory, economic and environmental pressures. Retaining a strong manufacturing base is an essential component for the state's economic growth. NJAES designs and delivers innovative programs that address both the diverse food security, safety, and quality needs of consumers, and at the same time the food safety and handling technological needs of the agricultural and food system within the State.

The research and educational program conducted by the Extension food safety specialist targets small to medium-sized companies with technical assistance to ensure the safety of the food supply. Economically benefits have been realized through the prevention of product losses and recalls.

Foodborne illness is a critical issue costing billions of dollars in lost productivity, hospitalization and in many cases resulting in death. Focused research at NJAES examined the effectiveness of a new antimicrobial substance, found in fish against food-borne pathogens in perishable foods, such as apple cider and shellfish. It was discovered that pleurocidin was active against E. coli 0157:H7 isolated from rotting apples, and was active against the shellfish bacteria even at a low pH (pH4) and is heat resistant even at high temperatures. Work done on the shelf-life studies in apple cider and shellfish using pleurocidin highlights its usefulness as an antimicrobial.

Goal 2

Allocated Resources:

Research

Hatch Funds:	$92K
All Funds:	$2,098K
SY's:	4

Extension

Smith-Lever Funds:	$105K
All Funds:	$449K
FTE's:	6.3

Goal 2

Key Theme: Foodborne Pathogen Protection
Food Safety
Foodborne Illness

Activity: Foodborne illness is a critical issue nation-wide costing billions of dollars in lost productivity, hospitalization and in many cases resulting in death. Food contamination, caused by pathogens in various raw or cooked foods, affects millions of people annually. Children are particularly vulnerable to foodborne illness such as those caused by the pathogen E. coli. NJAES researchers have examined the effectiveness of a new antimicrobial substance, found in fish, against food-borne pathogens in perishable foods, such as apple cider and shellfish. Apple cider and shellfish were chosen as the test food material for pleurocidin because there is wide-spread concern regarding the survival of E. coli 0157:H7 in apple cider and halophilic (salt-tolerant) bacteria in shellfish. E. coli 0157:H7 has been shown to survive for over 21 days in apple cider stored at refrigeration temperature.

Ensuring the safety of the food supply of New Jersey based food manufacturers is the goal of the Extension food safety specialist. Technical assistance is provided to ensure the safety of the food supply through short courses and telephone assistance. Research and Extension programs targeted to small and medium sized companies helps them to navigate a variety of regulatory, economic and environmental pressures while at the same time maintain a strong manufacturing base.

Impact: It was discovered that pleurocidin was active against E. coli 0157:H7 isolated from rotting applies, and was active against the shellfish bacterial even at low pH (pH4) and is heat resistant even at high temperatures. Pleurocidin is ideal as a preservative for apple cider which is acidic in nature and in addition to being susceptible to E. coli 0157:H7, might be also infected by yeasts and molds, both of which have been shown to be sensitive to pleurocidin. The effectiveness of pleurocidin against shellfish pathogens in salty and high heat conditions underscores its usefulness in normal food processing procedures. The work done on the shelf-life studies in apple cider and shellfish using pleurocidin highlights its usefulness as an antimicrobial. Its effectiveness in apple cider is very significant for improving the safety of the food supply for children, since the majority of apple cider consumers are young children, and every year several children die or are seriously injured by drinking E. coli contaminated apple cider. Also, for communities in which shellfish is a significant part of the diet, pleurocidin can prevent the number of cases of foodborne illnesses due to shellfish contamination or improper shellfish processing.

New Jersey, home of many food manufacturers measures a part of its economic growth by the success and failure of New Jersey based food manufacturers. Economic impact to New Jersey based companies resulted in a savings of more than $170,000 in product losses and recalls. Assisted New Jersey-based meat processor facing recall of 67 different batches of product and a New Jersey-based meat processor facing USDA hold or recall of 8 batches of product.

Saved companies outside of New Jersey more than $1,026,000 in product losses and recalls.

Sources of Federal Funds: Hatch, Smith-Lever 3(b) & (c)

Scope of Impact: International, State Specific

Goal 3

Overview: New Jersey's culturally and economically diverse population includes those residents that can barely afford the most basic nutritional requirements and those who are willing and able to pay for high value health-promoting foods and dietary supplements. Across this entire spectrum, consumers are confused and concerned about nutrition-related information available through the media. New Jersey's agricultural and food system must serve these diverse needs. In response, the New Jersey Agricultural Experiment Station has mounted a major multi-disciplinary *Food, Nutrition and Health Initiative*. Research and Extension faculty from our Food Science, Nutritional Sciences, Plant Sciences, Family and Community Health Sciences, Agricultural, Food and Resource Economics Departments, in cooperation with other units within Rutgers University and other institutions within the region, are working on this initiative.

Obesity has become a national epidemic. This trend has a negative effect on disease and life expectancy for many New Jersey residents including our children. The New Jersey Agricultural Experiment Station funded the New Jersey Obesity Group (NJOG), a collaborative program that coordinates obesity research and outreach with faculty from Cook/NJAES-Rutgers University departments and the University of Medicine & Dentistry of New Jersey to address the serious health issues related to obesity.

Extension educators in the Family and Community Health Sciences department have planned and conducted nutrition and health educational programs to address the obesity epidemic. Of note are the "Children's Health Summit – Fighting Back Against Childhood Obesity" which resulted in the formation of Building Healthy Kids Coalitions to address children's health issues across the state.

The West Nile virus has underscored the need for mosquito research and control. Researchers are analyzing the scope of the threat to human health. This program, originally designed to monitor mosquito vectors has expanded to new invasive mosquito-borne pathogen and collection surveillance data.

New Jersey's Expanded Food and Nutrition Education Program is making a difference for those families who participated; diets have improved and families are managing food resources more efficiently.

Scientists continue their work on health promoting properties of food and have discovered that regular consumption of cranberry juice cocktail may offer protection against certain antibiotic resistant bacteria that cause urinary tract infections (UTIs). This research has laid the foundation for a number of new studies to better understand the benefits of cranberry. Health benefits are a major factor driving increased consumption. Laboratory research has shown that cranberry's anti-stick properties were effective against 80% of the antibiotic-resistant bacteria that cause UTI.

Goal 3

Allocated Resources:

Research

Hatch Funds:	$179K
All Funds:	$4,127K
SY's:	8

Extension

Smith-Lever Funds:	$82K
All Funds:	$726K
FTE's:	11

Goal 3

Key Theme: Human Health
Human Nutrition

Activity: Obesity has become a national epidemic. This trend has a negative effect on the incidence of disease and life expectancy for Americans, including our children. According to the USDA Food Guide Pyramid and the Dietary Guidelines for Americans, individuals need to choose a diet low in fat, saturated fat, and cholesterol and high in whole grains, fruits and vegetables. American diets normally consist of too much fat and too little grains, fruits and vegetables. America has become a sedentary nation with modern conveniences and technology being responsible in part. Childhood obesity is on the increase and overweight children are showing the same risk factors as overweight adults. Families need reliable information. Professionals need access to quality continuing education. As a result, Rutgers Cooperative Extension Family and Community Health Sciences educators have developed and implemented Children's Health Summits, full-day conferences for professionals, school officials, government human services professionals, and health care professionals, who work with and care about children and parents to help them to understand and ultimately take action against the obesity epidemic impacting children. To date, five regional summits have been held in Cape May, Atlantic, Union, Passaic and Cumberland Counties. Workshops included: Staying healthy in a super-size world (strategies for successful weight management), Helping kids cope (finding workable family solutions for addressing the emotional issues of overweight children), Health and student achievement (understanding the mind/body connection for children,) along with Active kids/healthy kids (exploring the physical, cognitive and emotional benefits of exercise). These six hour intensive conferences have engaged over 350 participants in the fight against childhood obesity building sustainable collaborative partnerships which have resulted in Building Healthy Kids Coalitions (BHKC) to address children's health issues.

In addition to the Children's Health Summits, Family and Community Health Sciences educators have developed and delivered a variety of nutrition programs targeted to adult audiences, some of which include "Supersize America: Beating, the Obesity Epidemic" with a focus on portion control and exercise; "Walking: Steps to Better Health" program targeting school food service workers; "Dash Diet and Lower Your Blood Pressure" presenting the findings from the "Dietary Approaches to Stop Hypertension" clinical study that showed how elevated blood pressure levels can be reduced with an eating plan low in total fat, saturated fat and cholesterol, while being rich in fruits, vegetables and low fat dairy products.

The "From Our Farms" program targets 3 to 8 year old children, their parents and teachers with fun educational activities that use exploration and adventure to teach children about food, nutrition and the farm. Since 2000, more than 5,500 children

Researchers at New Jersey Agricultural Experiment Station are actively engaged in diabetes obesity research.

Impact: Evaluation results and feedback from participants in 3 of the 5 Children's Health Summits indicate that more than 80% of the participants reported that they had a better understanding of the causes, consequences and solutions surrounding the childhood obesity problem. In addition, 58% were willing to stay involved in RCE's Building Healthy Kids Coalitions.

Outcomes reported as a result of participating in the Children's Health Summits include:

- Food is no longer used as a reward for good behavior in one elementary school district
- An area gym started a program for kids called "Busy Bodies" in an effort to involve youth in physical activities
- Two teachers coordinated Family Fitness nights for parents and students; another arranged for an outside walking trail to be built for the students to use at lunch time and recess time was moved from after lunch to before lunch
- Teachers and administrators from several school districts shared conference literature with colleagues at work
- A school nurse started a walking club with staff and next year they plan to open the walking club to students
- A parent questioned the use of vending machines in child's school and was able to get school administration to review its policies
- A school food service director now serves all sandwiches on whole wheat bread instead of white bread, chocolate milk is no longer available, and additional fruits and vegetables, along with a salad bar, have been added to the daily lunch menu

Communities have been empowered to implement changes resulting in positive impacts on childhood nutrition Building Healthy Kids Coalitions have been established at the county level bring together key partners to address childhood obesity.

Evaluation results from adult participants in nutrition education programming revealed that:

- 96% admit they eat larger portion sizes than they should
- 75% said they diet yearly to lose weight
- 25% will add 30 minutes of exercise daily
- 67% of food service workers were willing to walk
- 81% of food service workers eat 5 fruits and vegetables daily

A total of 25 school food service workers lost weight and achieved 10,000 walking steps per day for more than 8 weeks of time.

Survey responses of parents whose children participated in "From Our Farms" reported these behavior changes:

- 75% child tried a new fruit or vegetable
- 35% prepared locally grown foods with their children
- 97-99% visited a farm stand or farm market and purchased "Jersey Fresh" produce

Rutgers researchers have discovered that as the number of people who undergo surgery for weight loss increases, the need for studies discovering the effects of weight loss increases. Research studies have determined that there is less decrease in calcium absorption after Roux-en Y Gastric Bypass surgery, which is the most common and most studied surgery of its type, in comparison with other bariatric surgeries, and data about how calorie restriction and diabetes

affects the rate of bone turnover in overweight women is showing that premenopausal women (unlike postmenopausal women) do not lose bone mass due to moderate weight loss and that calcium supplementation is beneficial in both groups of women. In addition, new insights are helping scientists understand how early nutrition is related to later risk for obesity and diabetes, and may lead to new methods for treating children who have suffered undernutrition in early childhood. Explorations into how diabetes affects sweet taste, food cravings and dietary compliance is improving the treatment for gestational diabetes, which creates greater risk for poor fetal outcome and for developing Type 2 diabetes later in life

Sources of Federal Funds: Hatch, Smith-Lever 3(b) & (c)

Scope of Impact: State-Specific, National

Goal 3

Key Theme: Human Health

Activity: The threat of West Nile Virus has spread to most of the country, jeopardizing human health as well as the nation's equine industry. In New Jersey, mosquito populations directly impact the public health and welfare of the residents and visitors in addition to influencing the economy of the state. Diseases transmitted by mosquitoes in New Jersey include Eastern Equine Encephalitis (EEE) and West Nile Virus (WNV). EEE poses a serious economic threat to New Jersey's $650 million annual equine industry revenue. The New Jersey Agricultural Experiment Station, in cooperation with the New Jersey Department of Health laboratories, has been studying EEE at five study sites for more than a decade. The researchers monitor the seasonal progression of virus activity in the bird feeding mosquito, Culiseta melanura. This research enable New Jersey to target the most important mammal-biting species that transmit EEE from birds to humans and horses. When WNV first appeared in New York metropolitan area in 1999, researches applied a similar approach to the method used to combat EEE.

Impact: Because science has been applied to mosquito control, human cases of WNV and EEE in New Jersey have been minimal and equine cases are much lower than other states that do not have a viable surveillance program in place. In addition to successfully guarding humans and horses against these two diseases, New Jersey's monitoring programs are successfully protecting humans from the health risks associated with the excess use of pesticides. Fewer pesticides are needed because County Mosquito Control Commissions are able to focus on the control of larval mosquitoes using source reduction and biorational mosquito control products. Decisions to spray pesticides to reduce adult mosquito populations are made on the basis of sound scientific research.

Based on the work done at New Jersey Agricultural Experiment Station, key management publications, such as "Best Management Practices for Mosquito Control and Freshwater Wetlands Management" have provided the state government with science-based information and management practices to help legislators and organizations put into place those practices that will provide the public with the best level of protections.

Sources of Federal Funds: Hatch

Scope of Impact: State

Goal 3

Key Theme: Human Nutrition
Human Health

Activity: Many limited-resource families in New Jersey experience food insecurity, poor dietary quality, substandard food safety and shopping/resource management practices. As a result, their health and well-being is at stake, and undue stress is placed on the medical community to meet their needs. To that end, our program provides nutrition education to adults and youth throughout the community aimed at achieving the following desired outcomes: improved diets and nutritional welfare; increased knowledge of the essentials of human nutrition; increased ability to select and buy food that satisfies nutritional needs; improved practices in food production, preparation, storage, safety and sanitation; and, increased ability to manage food budgets and related resources such as food stamps.

The New Jersey Expanded Food & Nutrition and Education Program (EFNEP) delivered behaviorally focused, outcome-based nutrition education classes to 4,663 adults, 2,494 of whom attended 6 or more classes, and 7,787 youth.

Impact: Program evaluation documented via the ERS federal reporting system document the following behavioral changes:

- 40% more often planned meals in advance
- 37% more often compared prices when shopping
- 36% less often ran out of food at the end of the month
- 41% more often thought about healthy food choices when deciding what to feed their families
- 38% more often prepared food without adding salt
- 50% more often used the "Nutrition Facts" on food labels to make healthy choices
- 34% reported that their children ate breakfast more often

EFNEP educational outreach is making a difference for those families who participated, their diets improved. National data indicates that each dollar invested in EFNEP leads to $10.64 savings in future health care costs.

Sources of Federal Funds: Smith-Lever 3(d)

Scope of Impact: State Specific

Goal 3

Key Theme: Human Health
Functional Foods
Nutraceuticals

Activity: Scientists have discovered that regular consumption of cranberry juice cocktail may offer protection against certain antibiotic resistant bacteria that cause urinary tract infections (UTIs). When subjects consumed cranberry juice cocktail, their urine was capable of preventing not only susceptible, but antibiotic-resistant bacteria from attaching to the urinary tract. This study is also the first to look at the duration of the effect from cranberry juice on the urinary tract. This research found that cranberry juice cocktail's beneficial effect may start within two hours and can last for up to 10 hours in the urine, which suggests that consuming a serving in the morning and one in the evening may provide more effective anti-adhesion protection than consuming one serving a day. This latest research, conducted jointly between Rutgers and the University of Michigan, suggests that regular consumption of cranberry juice cocktail could reduce the potential for development of urinary tract infections caused by either antibiotic resistant or susceptible bacteria, thus decreasing the need for antibiotics and potentially reducing the rate of resistance development.

Impact: This research has laid the foundation for a number of new studies to better understand the benefits of cranberry. As a result of Rutgers research and publicity more women and health professionals are aware of the benefits of consuming cranberry juice to combat UTIs. International cranberry sales are increasing, and in the United States, cranberry juice consumption per capita has increased, from 1.54 to 1.90 pounds. Also, cranberry production across the nation was reported to have increased in 2005. Health benefits are the major factor driving increased consumption. Among the total population, 63 percent have consumed cranberries for their health benefits. Among those increasing their frequency of consumption, 74 percent do so for health benefits.

Laboratory research has shown that cranberry's anti-stick properties were effective against 80% of the antibiotic-resistant bacteria that cause UTI, and this gives people, and effective way to prevent this infection and reduce the need for antibiotic use. This could have global implications, especially in Third World countries where resistance to first-line antibiotics used to treat UTIs is close to 100%

Sources of Federal Funds: Hatch

Scope of Impact: State-specific, National, International

Goal 4

Overview: As the most densely populated state in the United States, New Jersey is experiencing environmental problems sooner and more severely than other states. We are challenged with land, water and air issues and attaining an efficient balance between production activities, the environment, and human health. New Jersey is a microcosm of both the challenges faced at the agricultural/environmental interface and the mutually beneficial solutions that are possible. As such, it has the potential to serve as a model of how to achieve greater harmony between agriculture and the environment. The NJAES and Rutgers University recognized this potential very early in their history and thus created an environmental sciences department nearly 80 years ago.

Integrated Pest Management (IPM) practices have been adopted on 66,662 acres. Benefits have been seen in the areas of field crops, fruit, greenhouse, nursery and vegetable production systems. Overall, impacts of the ICM/IPM program serve to decrease non point source pollution, decrease pesticide use, farm worker and consumer exposure to pesticides, while at the same time maintain crop quality and yield. Additionally, significant outcomes are resulting from the school IPM program as the result of trainings provided to school IPM coordinators. Implementation of cultural, genetic and chemical disease control practices discovered by the Rutgers team by turfgrass managers has resulted in significant economic savings.

Manure management on livestock farms is a growing concern that is being addressed through educational programs and changed production practices.

Rutgers research to develop an effective point-non point source pollutant trading program for phosphorus that is scientifically and economically feasible is underway.

The Extension Specialist has provided leadership in the development of public outreach and education programs that bring progressive stormwater management directly to communities of the state through an integration of research, education and Extension to address water resources problems with a focus on stormwater management.

Goal 4

Allocated Resources

Research

Hatch Funds:	$889K
All Funds:	$9,884 K
SY's:	13

Extension

Smith-Lever Funds:	$408K
All Funds:	$2,336K
FTE's:	34

Goal 4

Key Theme: Integrated Pest Management

Activity: The state's nursery and greenhouse agricultural sector is significant economically, representing approximately 16 million square feet of greenhouse space producing crops worth $121 million dollars annually. Pest control has become an economic and environmental issue for growers and the public alike and there is a demand for Rutgers Cooperative Extension (RCE) resources in the areas of integrated crop management (ICM) and integrated pest management (IPM) for practices that minimize plant losses, pest infestations in landscapes, gardens, and environmental and health risks associated with misapplication of pesticides by consumers.

RCE faculty and staff have developed and implemented mating disruption systems for Oriental fruit moth (peaches) and Oriental beetle (nursery crops, turf and blueberries) and the use of non-broadleaf ground covers to prevent damage caused by cat-facing insects (peaches). In addition, the vegetable IPM program was able to impact more acreage through the use of web-based technology that tracks weekly European corn borer and corn earworm population changes in the state. This program is linked to a similar network maintained for Mid-Atlantic States by Pennsylvania State University.

Primary participants in the state's IPM program are growers who participate in a field scouting program that forms the program core and data source for newsletter articles and basis for pest management recommendations. The scouting program concentrates on insect and diseases, nutrition and nematode management. An IPM database is utilized to record pests and pesticide use data. The Plant and Pest Advisory Newsletter and Northeast IPM notes were published and distributed to provide growers with critical information and timely IPM practices.

Impact: IPM practices have been adopted on 66,662 acres. Benefits were seen in the areas of field crops, fruit, greenhouse, nursery and vegetable production systems. In southern New Jersey, $1,200 to $4,050 in application costs was saved by field crop growers through reduction of pesticide use by 26 to 80% compared to standard calendar spray schedules. Pesticide use in tree fruit was reduced between 50-80% for Oriental fruit moth control. Weekly pest management recommendations from Rutgers Cooperative Extension led to pest free fruit valued at approximately $34 million. Laboratory tests were completed in 2005 as part of a fertility component. Over 75% of areas sampled were shown to have sufficient to excessive phosphorous levels which led to decreased phosphorous use on those sites. Growers in the Vegetable IPM program received more timely information that resulted in less pesticide use (approximately $50/acre savings). Nursery growers were better able to predict pest outbreaks and greenhouse growers were able to manage pests and reduce insecticide and fungicide use as a result of the scouting program. Overall impacts of the ICM/IPM program serve to decrease non point source pollution, decrease pesticide use, farm worker and consumer exposure to pesticides while at the same time maintain crop quality and yield.

Sources of Federal Funds: Hatch Act, Smith-Lever 3(b) & (c), NJAES

Scope of Impact: State Specific, Northeast Region

Goal 4

Key Theme: Integrated Pest Management

Activity: The New Jersey School Integrated Pest Management (IPM) Act of 2002 established a public policy requiring New Jersey public and private schools to implement integrated pest management practices and notify employees, parents and guardians of pesticide use in schools. 500 school IPM coordinators with the responsibility for implementing school IPM policy and notification of pesticide use on school property participated in required training conducted by Rutgers Cooperative Extension in cooperation with the NJ Environmental Federation. Prior to the training sessions, a survey revealed that coordinators assessed their knowledge of IPM was well below average.

Impact: A sample of school IPM coordinators attending the training programs in Union, Mercer, Middlesex and Monmouth Counties participated in a pre/post test evaluation. The coordinators (133) answered true/false questions regarding the law, notification requirements, IPM techniques for indoor insect pests and turf management. The average pre-test score was 79% and the average post-test score was 94%. Participants improved their scores by an average of 15 points. Thirty-one percent of the school IPM coordinators bettered their scores on specific questions regarding advance notification and posting on non-low impact pesticide applications; and the use of endophyte infected grass seed and entomopathogenic nematodes to reduce the need for turf insecticide use on school property. Twenty percent of the participants improved their score on a question about the use of baits for indoor pest management and 18 percent could better identify the best time to seed a turf area. Proper grass establishment reduces the risk of insect, disease and weed problems.

The school IPM coordinators requested additional training on hiring/firing contractors, risk communication, wildlife/rodent control and athletic field maintenance and educational materials for parents, staff and students.

Sources of Federal Funds: Smith-Lever 3(b) & (c)

Scope of Impact: State Specific

Goal 4

Key Theme: Integrated Pest Management
Natural Resource Management

Activity: Turfgrass is a valuable and rapidly expanding component of our urban and rural landscape. Turfgrass covers 12 million homes in the United States including over 60 million lawns and more than 16,000 golf courses. Golf courses are an important component of the turfgrass industry. They are a source of green space in the urban environment and offer recreation and enjoyment for approximately 36 million Americans. Golf courses also generate jobs, commerce, economic development, and tax revenues for communities throughout the country. A recent report by the World Golf Foundation stated that golf contributes $62.2 billion worth of goods and services each year to the national economy (www.golf2020.com). Since 1992, gray leaf spot disease, caused by the fungus Pyricularia grisea, has emerged as one of the most destructive diseases of perennial ryegrass turf in North America. Before the initiation of this project, little was known about the distribution and control of gray leaf spot disease. Due to its severity on golf and landscape turf, studies were initiated at Rutgers University, Penn State University, the University of Kentucky, and Purdue University to evaluate cultural management practices and fungicide chemistries that could be used to suppress gray leaf spot in the field. At the time, fungicides were providing only moderate control but cost turf managers an average of $9,800 per golf course per year to protect susceptible turf. Moreover, isolates of the pathogen resistant to several fungicide chemistries had been reported resulting in significant turf loss (e.g., 15 to 90% turf on affected golf course fairways and lawns). Since the early 1990s when the disease first reached epidemic proportions on golf course fairways and new landscape seedings in the northeastern and central United States, it became apparent that a more comprehensive and environmentally sound approach was required to improve disease control, reduce fungicide usage, and maintain adequate turfgrass quality. A collaborative research effort was undertaken among Rutgers Cooperative Extension faculty (i.e., a management specialist, pathologist, breeder, and two county agents), two graduate students, and three scientists from other universities (Penn State University, University of Kentucky, and Purdue University) to determine the relationship between cultural, genetic, and chemical control strategies and the development of gray leaf spot on perennial ryegrass. This team planned, conducted and evaluated numerous field and laboratory studies and extended the results of an integrated disease control research program to turfgrass managers at the state, regional and national level. Results have been published in professional journals, trade magazines, newsletters, proceedings, abstracts, and Extension publications. Findings were also disseminated at county, state, regional, and national meetings in 23 states over the past 10 years. County agents and turfgrass managers were informed of results via on-site research visits, field days, and frequent updates in the Rutgers Pest Advisory Newsletter which has a circulation of over 800 turfgrass professional in the Mid-Atlantic and northeast regions.

Poa annua (annual bluegrass) and *Poa trivialis* (roughstalk bluegrass) are two of the most problematic and difficult to control weeds on golf courses, athletic fields and sod farms. Infestations of these weeds reduce playability of athletic fields because they will thin and die out under heavy traffic. The value of cultivated sod infested with these weeds is greatly reduced and may not even be able to be sold. Most importantly, golf course fairways, tees and putting greens

infested with these weeds require greater fungicide and water inputs to maintain an acceptable playing surface during summer months. The identification and evaluation of potential new herbicides for selective control of *Poa annua* and *Poa trivialis* in cool-season turfgrass would be beneficial when integrated into an overall weed management plan.

Research has been conducted over the past 4 years to evaluate the potential of ALS –inhibiting herbicides, currently labeled for use in agronomic crops, for postemergence control of *Poa annua* and *Poa trivialis* in cool season turfgrasses. This work has led to the identification of three experimental herbicides; bispyribac-sodium, primisulfuron and sulfosulfuron as having potential for selective use in cool-season turfgrass tolerance. In addition, we have conducted basic physiological studies and determined that bispyribac-sodium is foliar and root absorbed suggesting that irrigation management to increase soil moisture levels may enhance herbicidal activity.

The results of these studies have been presented at scientific meetings and to the golf course industry at the New Jersey Turfgrass Expo and regional turfgrass meetings including the Maryland Turfgrass Conference, the Metropolitan Golf Course Superintendents Association Winter Seminar and the New York State Turfgrass Association Empire State Green Industry Show.

Impact: The team that collaborated on the integrated disease control project discovered that gray leaf spot disease could be effectively controlled on golf courses and home lawns by reducing nitrogen applications, raising the mowing height, collecting infested leaf clippings, planting new disease resistant cultivars of perennial ryegrass developed at Rutgers University, and alternating fungicide chemistries to reduce the occurrence of resistant isolates of the fungal pathogen (*Pyricularia grisea*). Implementation of the cultural, genetic, and chemical disease control practices by turfgrass managers has resulted in significant economic savings attributed to an average 25 to 30% reduction in fungicide use. Based on surveys of participants at national golf management conferences and reports from golf industry representatives, it has been estimated that the program developed by this team has resulted in a total savings of $2,700,000 per year on golf courses in the United States when gray leaf spot epidemics were most severe (e.g., 1998, 2001 and 2005). In addition to economic savings, the environmental benefits (e.g., reduced non-target effects on other organisms) from reduced fungicide applications were also apparent. Moreover, the reduced frequency of fungicide applications resulting from this program has decreased the potential for fungicide resistance.

As a result of the turfgrass herbicide work, a letter of support was written for a 24-c (special local needs) label for New Jersey for use of bispyribac (Velocity) in 2004. Based upon recommendations the Extension Specialist provided to golf course superintendents 90 to 100% control of *Poa annua* and 70 to 80% control of *Poa trivialis* was achieved in 2004 and 2005.

Research has also determined that primisulfuron has the potential to control *Poa annua* and *Poa trivialis* in Kentucky bluegrass. However, additional research needs to be conducted to further refine rates and number of applications. A letter of support was written for a 24-c (special local needs) label for Colorado. If successful in Colorado a 24-c label will be requested for New Jersey.

Sulfosulfuron (Certainty) has been labeled for use in both warm and cool-season turfgrass species and can be safely and effectively used in Kentucky bluegrass and perennial ryegrass for control of *Poa trivialis*. Bispyribac (Velocity) received full federal registration from the EPA in the fall of 2004 and can be safely and effectively used for control of both weed species on all cool-season turfgrass species (including creeping bentgrass) except Kentucky bluegrass. Control of these weeds on golf courses will lead to reduced fungicide and water use, improve the quality of cultivated sod, and the playing of surfaces of athletic fields.

It is estimated that there is approximately 250,000 to 300,000 acres of highly maintained fairways, tees and putting greens in the cool-season turfgrass growing region in the United States and at least 50% of these acres have significant infestations of *Poa annua* and/or *Poa trivialis*. It is estimated that golf course could reduce fungicide use on these acres by approximately 30% if these two weeds were controlled resulting in an annual reduction of 700,000 pounds active ingredient of fungicide and saving approximately 8.0 million dollars annually. It is estimated that water use could be reduced by approximately 25% resulting in a reduction of 8.0 million gallons of water per golf course per year. Total water saved on an annual basis would be approximately 4.3 billion gallons of water per year.

Sources of Federal Funds: Hatch, Smith-Lever 3(b) & (c)

Scope of Impact: Multi-State (PA, KY, IN)

Goal 4

Key Theme: Animal Waste Management

Activity: Manure management on livestock farms is a growing concern in New Jersey. Recent changes in federal and state legislation have mandated that livestock producers dispose of animal manure in such a way as to minimize environmental impact. Manure has traditionally been land-applied and utilized as a crop nutrient. With increased development in rural areas, combined with decreased tillable land dedicated to agricultural production, many growers have elected to participate in federal cost share programs to dispose of manure. Requirements for these programs mandate that growers develop and implement a balanced plan designed to properly dispose of manure with limited environmental impact. State agencies have also realized the potential environmental impacts from animal feeding operations and have implemented state rules to govern the disposal of manure. The development of a state rule for animal waste has left many producers with questions regarding their operation. As a result, certified members of Rutgers Cooperative Extension provided on-site visits to evaluate farms for manure management and developed certified nutrient management plans for nine New Jersey farmers selected for federal program funds. A crop nutrient management program was implemented and farms were assessed for potential environmental impacts. In addition, RCE faculty and staff conducted a nutrient management training for equine operators.

Impact:

- 77% of producers changed production practices based upon the recommendations made in their nutrient management plan.
- Manure generated on-farm provided nearly $1,500 in fertilizer savings for each farming operation. Utilizing the manure generated on-farm reduced the potential for environmental impact while maintaining crop production.
- 700 acres of farmland utilized best management practices.
- 80% of the equine producers reported that their production practices did not meet recommended practices for manure management. 100% of these producers reported that they would change their manure management practices based on the information they obtained from the Extension programs.

Sources of Federal Funds: Smith-Lever 3(b) & (c)

Scope of Impact: State Specific

Goal 4

Key Theme: Water Quality

Activity: If New Jersey plans to successfully meet its goals to improve and preserve water quality, nutrient trading will have to play a significant role in obtaining cost-effective reductions. Many municipalities can not afford the costs associated with reducing their total daily maximum load (TDML) requirements. Nutrient trading is one solution to this problem. Research at Rutgers New Jersey Agricultural Experiment Station is being done to develop an effective point-nonpoint source pollutant trading program for total phosphorus in New Jersey that is both scientifically and economically feasible. The program will focus on both point-point and point-nonpoint trading opportunities. Watershed studies have been completed for the Passaic River Basin and a TMDL is near completion for waters impaired due to exceeding the 0.1 mg/1 phosphorus standard. This project will provide a cost-effective way to implement the TMDL once it is completed. An active coalition of point sources, the New Jersey Department of Environmental Protection, and a team of experts from Rutgers and Cornell Universities are working to complete this program.

Impact: These feasibility studies have provided the data needed to solicit funding from the State to develop a water quality trading program in several sub-watersheds of the Raritan Basin. Additionally, the United States Environmental Protection Agency has funded a project to develop and implement of a water quality trading project in the Passaic River Basin for total phosphorus. Approximately 25% of New Jersey's population lives in this watershed, and the improved water quality that is created by the trading program will directly impact the drinking water supply of these people. Also, this provides a cost-effective solution to municipalities struggling with the cost of water quality requirements from the state.

Sources of Federal Funds: Hatch

Scope of Impact: State Specific

Goal 4

Key Theme: Natural Resources Management

Activity: New Jersey is facing serious water resource problems that can only get worse as development continues at such a rapid pace throughout the State. New Jersey Department of Environmental Protection (NJDEP) has released new stormwater management and permitting regulations. These new rules focus not only on managing water quantity but also on water quality and groundwater recharge. Although these new rules will significantly change the way New Jersey manages its stormwater runoff, the rules only apply to new development. This leaves the stormwater runoff impacts from existing developments to only be addressed through the new municipal stormwater permit rules and the implementation plans for the Total Maximum Daily Loads (TMDLs). The result will more than likely be voluntary programs that have little hope for success.

Rutgers Cooperative Extension has taken the leadership in the development of public outreach and education programs that bring progressive stormwater management directly to the communities of the State through an integration of research, education and Extension to address water resources problems. The public education and outreach program for stormwater management was developed to improve the water quality of New Jersey's waterways and recharge the State's groundwater supplies through progressive stormwater management. The targeted audiences for this program were the residents in New Jersey that typically participate in the RCE Master Gardener Program, watershed organizations, and other environmentally oriented non-profit groups. For years, these groups have wanted to make a difference but lacked the training and leadership to have their efforts make a significant impact on addressing environmental concerns. The RCE Water Resources Program has moved forward with this stormwater management initiative and has completed the following objectives:

- An educational curriculum on stormwater management was developed that focused on empowering the stakeholders to implement best management practices at home and throughout their community.
- The technique of disconnecting impervious surfaces (e.g., roofs and paved driveways) from running off directly into waterways and storm sewer systems was incorporated into the curriculum. This promotes groundwater recharge and reduces stormwater runoff peak flows, while removing pollutants from stormwater.
- The program was incorporated into existing Extension programs, namely the Master Gardener Program and Master Environmental Stewards Program. This conserved resources by marketing the program to these volunteers that are already being engaged by RCE.
- The program was delivered in various audiences including the Rutgers Environmental Stewards of Essex County and Gloucester County, the Master Gardeners of Union County and Middlesex County, and middle school students in South Brunswick and Berkeley Heights. Furthermore, presentations were made to six environmental commissions in Union County to further disseminate the educational information.
- Funding from a NJDEP 319h grant was used to construct four demonstration rain gardens within Union County. The newly trained Union County Master Gardeners participated in the design and construction, along with the Rahway River Association, a nonprofit watershed management organization.

- Undergraduate students were incorporated into the program. In addition to assisting with the design and construction of the demonstration rain gardens, undergraduate bioenvironmental engineering students worked with the South Brunswick Middle School to incorporate stormwater management into the 7th and 8th grade ecology unit.

Impacts: Over one hundred volunteers were trained across four New Jersey counties including Union, Middlesex, Gloucester, and Essex. Presentations were given to six environmental commissions in Union County on the issue of stormwater management. Four demonstration rain gardens were constructed in Union County. These rain gardens disconnect and treat stormwater runoff from approximately 5,000 square feet of impervious surfaces, thereby promoting groundwater recharge and decreasing stormwater runoff peaks. All of these rain gardens were constructed in highly visible areas and will be used in future educational programming. The use of trained volunteers to construct the demonstration rain gardens resulted in saving in labor costs exceeding $10,000. More importantly than these cost savings, the municipalities in Union County now have real examples of this very important stormwater management practice so that they can encourage industry, businesses, and homeowners to implement this practice, while referring to these examples. Also, the municipal officials themselves can also now better understand how this best management practice looks and works.

A rain garden was constructed at the South Brunswick Middle School to disconnect and treat stormwater runoff from 5,000 square feet of impervious surface. In a little under ten weeks, we were able to educate 125 middle school students on stormwater management and the benefits of rain gardens. In addition to the middle school students, we also trained several teachers and school administrators on the same issues. Although the middle school project was intended as a one-time pilot program, there is interest in building a more extensive program to continue the efforts. Discussions are underway to secure private foundation monies to build a hands-on inquiry based science education program for middle schools that carries forward the efforts already piloted at the South Brunswick Middle School.

Sources of Federal Funds: Smith-Lever 3(b) & (c)

Scope of Impact: State Specific

Goal 5

Overview: As noted previously, New Jersey has a culturally and economically diverse population. Demographic and socioeconomic factors such as poverty, indebtedness, changing employment conditions, and family structure create uncertain futures for individuals, families, communities, agricultural and food producers, and small business owners. Human and community development issues are the focus of many of our family and community health sciences and youth development programs which address problems associated with urbanization and economic development. To improve the quality of life and enhance economic opportunity educational programs have been planned and implemented resulting in the development of leadership skills, and workforce preparation.

New Jersey has nurtured its most valuable resource through the 4-H Youth Development Program. Providing youth with opportunities to develop knowledge, attitudes and skills which are needed to become competent, caring and contributing members of society. Volunteers who are the backbone of this program have contributed an investment in time and efforts which translate to over $11 million dollars in return.

The $62.5 billion agricultural and food systems industries comprise the third largest industry in New Jersey in economic benefits. Agriculture and food systems industries in New Jersey provide a hook for encouraging youth to think about short and long-term employment and career opportunities. Rutgers Cooperative Extension faculty and staff have developed and implemented innovative programs to engage at-risk-youth in positive life altering educational experiences, many providing them with workforce development skills.

RCE give attention to addressing the needs of the diverse workforce in the agricultural and agribusiness industries with special emphasis on training Hispanics in their native language.

Goal 5

Allocated Resources:

Research

Hatch Funds:	$16K
All Funds:	$1951K
SY's:	4

Extension

Smith-Lever Funds:	$284K
All Funds:	$1878K
FTE's:	30

Goal 5

Key Theme: Youth Development/4-H
Children, Youth and Families at Risk

Activity: The youth of New Jersey are our most valuable resource. They are challenged in today's environment with making choices and withstanding peer pressure to deviate from the mass. Our future depends on providing opportunities for youth to develop knowledge attitudes and skills which they need to become competent, caring and contributing members of society. The 4-H Youth Development Program uses experimental learning methods to engage youth grades K-13 in educational programs focused on science literacy and environmental stewardship, character development, community youth development and healthy lifestyles. 4-H educators and caring adult volunteers and teen volunteers share their skills to make a difference in the lives of 45,436 youth who participate in the program.

Impact: The major programmatic focus for their participation has been in the areas of science literacy and environmental stewardship, character development, healthy lifestyles and children, youth and families at-risk initiative.

New Jersey 4-H youth were engaged in positive youth development which enabled them to acquire life skills necessary to meet the challenges of adolescence and adulthood in the following ways:

- 13,744 youth were members of 951 4-H organized clubs
- 13,559 youth were members of 587 4-H special interest/short-term programs
- 2,129 youth participated in 74 camping programs
- 25,684 youth were involved in 960 4-H school enrichment programs
- 4 youth participated in 4-H individual study programs
- 625 youth participated in 37 School Aged Child Care (SACC) education programs

Volunteers are the backbone of the 4-H program. In 2005, 2,283 adult leaders and 217 teens successfully delivered the program. The average adult volunteer donates 220 hours per year. This volunteer investment of time and efforts translates to over $11 million dollars in return. 4-H educators work collaboratively with other youth serving agencies and organizations to extend the outreach of 4-H to a population of more diverse and underserved youth, while at the same time increasing resources available to the 4-H program. The youth of New Jersey are engaged in meaningful experiences and are gaining invaluable skills which will benefit society in the future.

Source of Federal Funds: Smith-Lever 3(b) & (c)

Scope of Impact: State Specific

Goal 5

Key Theme: Workforce Preparation – Youth and Adult

Activity: In 1990 the United States Secretary of Labor organized the Secretary's Commission on Achieving Necessary Skills (SCANS). The SCANS Report for America 2000 identified the knowledge, skills, and attitudes that youth must have in order to compete successfully in the workplace, and charged the education system with the responsibility of integrating those skills into students' academic preparation. The Workforce Investment Act of 1998 (WIA) also supports the fact that youth are not being properly prepared for employment, and CSREES has identified Workforce Preparation as a national concern for youth.

The agriculture and food systems industries in New Jersey provide a hook for encouraging youth to think about their short and long-term employment and career opportunities. The $62.5 billion agriculture and food systems industries comprise the third largest industry in New Jersey in economic benefits. The New Jersey Department of Agriculture's *Reinventing Agricultural Education for the Year 2020* initiative emphasized repeatedly the need for "preparing young people for productive careers" in agriculture and the need for educated skilled workers at all levels to support this multi-billion dollar industry. A key goal of the initiative is to "ensure a constant supply of young people selecting agriculture as their career" especially in view of the fact that "10% of professional jobs in agriculture go unfilled each year."

Rutgers Cooperative Extension (RCE) faculty and staff have developed and implemented innovative programs to engage at-risk-youth in positive life altering educational experiences many providing them with workforce development skills.

The Rutgers Cooperative Extension Youth Farmstand Program is a statewide, interdisciplinary program designed to increase workforce readiness skills in at-risk youth, support local farmers, the New Jersey agriculture industry, and build healthier, stronger communities. The primary delivery mode for the program consists of youth-operated farmstands that provide at-risk and special needs youth in grades 9-12 the opportunity to develop and practice workforce readiness skills defined in the SCANS Report. The farmstands use an entrepreneurial approach; youth make most decisions related to stand operations and receive a share of the profits at the end of the selling season. The youth farmstands are located in economically depressed communities in order to provide local residents with fresh, quality produce that may otherwise be inaccessible. Several youth farmstands accept WIC and Senior Nutrition program vouchers. Nutrition information is available on-site to customers, as are cooking methods and recipes. The youth farmstands support the New Jersey Department of Agriculture's *Jersey Fresh* program by purchasing only locally grown produce for resale. Youth participants educate customers about the importance of buying *Jersey Fresh* produce to farmers and the community residents.

In 2005, eight RCE Youth Farmstand projects were implemented across the state. The youth farmstands provided a hands-on work and entrepreneurship experience to youth in the mechanics of owning and operating a small business. There were three (3) major educational components: pre-farmstand training, farmstand operations and ongoing educational activities and experiences during the selling season. Curriculum topics included workforce readiness skills, farmstand operations, marketing, *Jersey Fresh*, agricultural careers, the food system, character education, and job search skills.

The New Jersey Bureau of Forestry's assessment of the state's tree health and maintenance problems pointed out the need for qualified managers and an infusion of labor to preserve, maintain and enhance our natural tree resources. In addition, local tree care and landscape firms are continually searching for seasonal and full-time employees to better service their clientele. Additionally, New Jersey Youth Corps (NJYC) sought vocational and experiential training to develop job skills, improve personal decision-making, and increased employability for their clientele throughout the state. In building upon the past four years programming efforts and evaluation, work was done to streamline the program within the constraints of a restructured NJYC to provide this program to youth clientele already enrolled in their Brownfields Technician Training program. This program was initiated in 2000 as a pilot program. All 12 New Jersey Youth Corps offices (Asbury Park, Camden, East Orange, Jersey City, Newark, Paterson, Phillipsburg, New Brunswick, Trenton, and Vineland, New Jersey) were included in the training. This effort affords the youth training and employment opportunities while also building on the New Jersey Youth Corps' models of leadership and citizen development.

The Hispanic population in the United States is increasing at a much faster rate than any other demographic group. Approximately one eighth of the state population is Hispanic and by the year 2020 it is estimated that more than 22% of the population will be Hispanic. It is estimated that 43% of this population has difficulty with the English language and pursues jobs in the green industry because of the lower demand for English proficiency. Current data indicates that greater than 60% of the green industry workers are not proficient in English. Several short courses and 1 day workshops have been developed to educate Hispanics in their native language. Courses have focused on personal safety, basic lawn care, plant identification, and tree maintenance. Such classes have targeted Spanish speaking landscapers working in New Jersey. In Atlantic County, Extension professionals conducted an educational job and career fair. Applicants and employers were invited to educational sessions such as "Native Plants of New Jersey", "Spanish for Landscapers" and "Employee Motivation and Retention".

Opportunities exist for job training and development in the area of Horticultural Therapy (HT). Only a handful of college and universities offer this training. HT has been shown to be an effective intervention for people with a wide range of mental, physical, emotional and social disabilities and challenges. Yet there is great and growing need for trained individuals to facilitate therapeutic horticulture programs in hospitals, nursing homes, rehabilitation centers and prisons. Many jobs are becoming available in this area, and it represents a new career path for undergraduates. HT is considered a new and emerging aspect of both horticulture and health care. At Rutgers Cook College two new curricular in HT were developed as part of the Plant Biology and Pathology Department. In 2005 the HT Certificate program received full accreditation by the American Horticultural Therapy Association. This means that Rutgers students completing the certificate are already well on their way toward professional registration, automatically earning 1.5 points toward HTR (Registered Horticultural Therapist) or HTM (Master of Horticultural Therapy) status.

Impact: A total of 73 at-risk/special needs youth participated in the RCE Youth Farmstand Program. Over 300 total hours of educational activities were provided by Mercer, Gloucester and Atlantic faculty and staff. All youth demonstrated increased workforce readiness skills and attitudes at the close of the selling season. Just over $3,000 in profits were distributed among the

youth participants, based upon total stand sales and hours worked. More than $22,000 in combined wages were earned by youth participants in Mercer and Gloucester Counties. Approximately $14,000 in produce was purchased from local farmers. Suppliers indicated they were satisfied with the program, eager to learn how to access local niche markets and looked forward to broadening relationships. A combined total of over 3,300 customers in economically disadvantaged areas purchased $22,000 in *Jersey Fresh* produce from the Youth Farmstands. Individual sites reported that up to 80% of their customers were low income and/or elderly, and the farmstands redeemed 370 WIC or Senior FMNP vouchers. Community residents reported increased access to fresh, quality produce, and that they understood (and felt good about) their contribution towards supporting local farmers *and* youth workforce readiness training. The majority of customers who redeemed WIC or Senior Farmers Market vouchers reported using vouches exclusively at the farmstands, and over one-third indicated they had no other accessible outlet for voucher redemption.

The workforce development program for youth seeking employment opportunities within the New Jersey's tree care industry revealed:

- 66% are considering a career in the green industry
- 100% would recommend the training to other potential participants
- 92% would use or share their new knowledge even when following another career choice
- 78% rated the overall program as "Very Good" or "Excellent"

Average skill evaluations for the 2005 program revealed:

- 30% displayed the proper safety techniques in ascending a tree utilizing rope and saddle, working from the top of a ladder, or aerial life, a 70% increase from pre-test results
- 36% exhibited a working knowledge of tying-in and other fall-prevention measures when working in and around trees, a 300% increase from pre-test results
- 40% identified potential electrical hazards and detailed necessary safety measures and precautions when working near electrical lines, a 95% increase from pre-test results
- 80% identified the causes of chainsaw kickback and how to prevent it, a 30% increase from pretest results
- 90% exhibited a working knowledge of proper pruning methods, a 100% increase from pre-test results

Educational seminars and training sessions targeting Spanish speaking landscapers and agribusiness workers have received attention regionally as well as nationally. Participants who completed pre and post testing found approximately 30 to 40% increased proficiency in various areas. Conversations with owners/supervisors have found that at least 75% have noticed an increase in job skills of their employees. Fifty percent indicated an interest in sending employees to future programs.

Those who participated in the Atlantic County educational job and career fair reported the following:

- 100% of applicants indicated the job fair was a valuable experience and that they would attend again if not employed.
- 83% of businesses reported a valuable experience and that they would attend again.
- 75% of applicants interviewed with a potential employer.
- 70% of businesses interviewed potential employees.
- 63% of businesses planned to hire candidates from the job fair.

The Cook College Horticultural Therapy classes are some of the most popular in the department. HT has also demonstrated more rapid growth than any other Plant Biology program. Hundreds of undergraduates have taken HT courses and many are already in the workforce as HT facilitators. A number are going on for professional registration. It is not known how many hundred and thousands of clients these newly trained professionals will serve, but the impacts will be sustained and significant. HT has been shown to help reduce hospital stays and accelerate the healing and rehabilitation processes. It also helps prepare youth-at-risk and incarcerated individuals for employment in New Jersey's vast Green Industry. Research shows that HT helps reduce the recidivism rate among adult prisoners. This translates into significant economic savings for individuals, for the health care system, and for society at large. Further, the value of helping reclaim lost lives is immeasurable.

Source of Federal Funds: Smith-Lever 3(b) & (c)

Scope of Impact: State Specific, Multi-State Extension (PA, MA, MD, IL, GA)

B. Stakeholder Input Process

As reported in previous years, Cook College and the New Jersey Agricultural Experiment Station (NJAES) engaged stakeholders in a strategic planning process. As we move forward with the implementation of the strategic plan, stakeholders continued to be actively engaged. The Cook College/NJAES leadership team engaged stakeholders in sessions throughout the state sharing the vision for the future.

Annual county budget sessions were conducted in conjunction with stakeholder input meetings in counties throughout the state engaging a diverse cross section of residents, organizations, and collaborative partners encouraging their input into the budget, program planning, and development process for Cooperative Extension. In addition, Rutgers Cooperative Extension actively engages stakeholders throughout the year through service on Extension advisory boards. Extension faculty and staff also work collaboratively with community leaders and agency and organization representatives to ensure that the diverse needs of county residents are addressed through appropriate Extension educational programs.

The state mandated NJAES Board of Managers is an advisory group appointed by the Rutgers University Board of Governors based on nomination by each county Board of Agriculture as well as representatives from six other major constituencies related to the Cook/NJAES mission: environment, biotechnology, marine science, food science community resources and public policy. The Board of Managers has research, Extension and teaching committees that provide valuable input directly to respective deans, faculty and staff relative to defining initiatives, identifying resources, establishing linkages and proactively addressing critical issues essential to the successful development of NJAES/Cook College programs.

Faculty members at Cook College and the NJAES are eligible to apply for competitive funding for the McIntire-Stennis program. It is expected that these proposals will meet the goals of the McIntire-Stennis Cooperative Research Act of 1962, as well as abide by the mission of the NJAES. Proposals for McIntire-Stennis funding are evaluated by two separate reviewer groups to ensure selection of only those proposals which will provide the most impact to the field of forestry and that will result in the most benefit to the relevant stakeholder groups. These two groups are the Environmental and Natural Resources Council and the Forestry Advisory Council. To this end, proposals are evaluated by the Forestry Advisory Council, whose members consist of industry, government and faculty leaders in forestry, reviews and evaluates the proposals. Also, they are reviewed by the Environmental and Natural Resources council, a group of faculty and staff dedicated to identifying and promoting the best scientific and outreach programs in New Jersey Agricultural Experiment Station and Cook College.

NJAES/Cook College has various constituents and industry advisory boards to academic departments and centers. These advisory groups meet between one and four times a year, depending on the department or center. They provide valuable technical input and links with constituents.

C. Program Review Process

There have been no significant changes in the merit review or scientific peer review processes since the inception of the Plan of Work. Plans are underway to more actively engage the Research Committee of the New Jersey Agricultural Experiment Station Board of Managers in the merit review process.

D. Evaluation of the Success of Multi and Joint Activities

At Rutgers our process for the generation and transfer of knowledge and technologies is best viewed as a continuum in an integrated system. This dynamic research, education and outreach system anticipates and responds to issues and challenges in agriculture, food systems, environment and natural resources, and human and community health and development in order to empower people to improve their lives, the lives of others, and the environment on which they depend. Needs assessments occur at the grassroots level, through industry organizations, advisory boards, professional associations and the student body to identify critical issues of strategic importance. Multistate, multi-institutional, and multidisciplinary activities and joint research and Extension activities have been implemented to address these identified issues that are representative of the concerns of the diverse population of our state including agricultural, environmental, industry, youth, underserved, underrepresented, at-risk, urban and geographically isolated residents. Planned programs also address identified critical issues within the region where formal memoranda of understanding and collaboration agreements have been developed between states. The resulting agreements have resulted in both improved program effectiveness and efficiencies as documented in the reports of the Extension multistate and integrated research and extension activities, states involved in these joint efforts have benefited greatly from the shared faculty, researchers and Extension specialists who have addressed critical programmatic needs that expand beyond the state.

E. Multistate Extension Activities

Penn Jersey Livestock/Crops Program

Agents from Pennsylvania and New Jersey on the northern borders of the Delaware River planned and conducted the Northeast Regional Small Farm and Rural Living Expo and Trade Show. The expo was geared to small farm operations which provide a significant impact on the economics, aesthetics and rural character of communities in the Northeast. During this two day event, over eighty workshops and demonstrations were presented to assist new farmers, farm managers and rural residents to make strategic linkages with support agencies, supplies and sound research based information. This event provided participants the opportunity to develop skills to assist in the management and marketing of their agricultural endeavors. Over 2,600 participants attended the event from nine states.

The Penn Jersey Extension Partnership delivered for the third year a Regional Crop Master Program for area crop producers. The two day intensive training session featured “weed management” as a focus for over thirty producers. The series improved grower concepts for weed identification, treatment, and control using cultural and chemical practices. The three year

"Crop Master" Series was recognized at the 2001 National Association of County Agricultural Agents meeting as the award winning entry in the Search for Excellence in Crop Production. The entry won the Northeast division and then was one of four national finalists and was selected as the national winning entry.

Coinciding with the Crop Masters Series, the Penn Jersey Extension Partnership designed and developed a user friendly crop web page entitled www.cropmaster-icm.org. The website to date has had over 50,000 hits and has received wide acceptance from growers and other colleagues. Penn State University has linked the website for their forage informational website. Additionally, the fact sheets developed for the web page, were awarded the northeast team fact sheet award for the 2001 NACAA entries. Weekly Crop Alerts/Reports are also hosted on the web page and feature current topics and happenings as reported by agents, specialists, farmers, and crop agencies.

Due to staffing changes, the Penn Jersey Livestock/Crops Program was disbanded as an official Multistate Extension Activity during FY03.

In 2004, The Penn Jersey collaborative programming resumed with educational programs on equine forage needs and forage quality. A series of twenty-two educational programs were offered.

In 2005, a survey of 1200 horse owners documented hay buying practices and prices.

Mid-Atlantic Consortium (MAC), Pathways to a Better Trained Workforce

This regional project in New Jersey, New York, Maryland and Delaware continues its focus on systemic change in the educational systems of the region building extensive public and private partnerships, documenting multiple pathways which enable youth to enter productive careers in the food industry. Two of the five demonstration programs were developed in Burlington County, New Jersey. These are the Supermarket Experience, which is a fifth grade curriculum delivered by Junior Achievement of South Jersey and the Factory Floor Classroom which is a course on food processing offered on site at Ocean Spray Incorporated. This multi-state Extension activity came to closure.

MAC – Food Policy Institute

The Food Policy Institute (FPI) is a unique partnership created to focus on policy issues and challenges facing the food industry and food consumers in the mid-Atlantic region. The Institute's mission is to develop timely and relevant research programs that address pressing food policy issues and to engage in outreach and education to industry, consumers, and policy makers. The objective is to maximize the quality of decision-making for industry executives and government regarding food production, distribution, quality, consumption and the nutritional and health implications.

Higher education partners participating in this regional program include: Rutgers University, Cornell University, University of Delaware, Delaware State University, Sussex County College,

Mercer County College, University of Maryland – College Park, and University of Maryland – Eastern Shore. In addition, there are numerous industry and trade associations, government agencies, and other public entities participating in FPI.

The FPI's supports research and outreach projects relating to the following food policy issues: 1) Consumer perceptions of food biotechnology, 2) Usage of alternative food delivery systems, 3) Nutraceutical industry development, 4) Blueberry industry development, 5) Food waste diversion, 6) receiving numerous grants including a "Consumer Acceptance of Food Biotechnology in the US" funded by USDA's IFAFS program and 7) BSE consumer survey.

MAC – Food Systems Web

The Mid-Atlantic Food Systems Web Site Project launched its initial product in March 2001 as "agri-culturehealth.com". It is a comprehensive, interactive source providing information to farmers on how-to direct market product to consumers, to consumers looking for nutrition information relating to the health benefits of local fresh produce, general information on food safety and the interaction of agriculture and the environment, specifically in the area of watershed management. Consumers and farmers are aided in finding each other by a local produce directory system that allows farmers to list their farms and products, and consumers to search for farms by area and product.

Mid-Atlantic Fruit, Vegetable, Crop Manuals and Conferences

In FY 2002 Rutgers Cooperative Extension specialists and agents again worked with colleagues in one or more of the neighboring states (Pennsylvania, Delaware, Maryland, West Virginia, Virginia) to produce "Commercial Vegetable Production Recommendations for New Jersey", "Tree Fruit Production Guide for New Jersey" and "Pest Management Recommendations for Field Crops". These are the leading handbooks for commercial agricultural producers and even small part time farmers in these states. More than 3500 copies are sold each year. Recommended practices address economics, environment (IPM) and practical tools for everyday agricultural activities. The use of the recommendations enables growers to maintain their competitive efficiency and helps them to minimize pesticide use and adhere to pesticide use regulations.

In FY 02 the 32nd Annual Mid-Atlantic Vegetable Workers Conference was held. At this conference results from numerous field experiments were presented to share performance of the latest pest control measures, varieties, cultural practices and marketing strategies. In FY 2002 the multistate team also gave leadership to the Mid-Atlantic Crop Management School and Mid-Atlantic Pumpkin School.

Research at Rutgers Agricultural Research and Extension Center conducted in vegetable weed control in the early 1990's resulted in the first reports of safety in cucurbit crops treated with halosulfuron. Continued work to date has contributed significantly to the labels obtained in 2001 and 2002. The control of these tough weeds, especially yellow nutsedge, is perhaps the most significant contribution to vegetable production in the past decade. Continued research is under

way to extend the label to watermelons and between the rows of summer squash grown on plastic mulch.

In 2005 Rutgers continues to provide leadership to the production and distribution of the "Commercial Vegetable Production Recommendation for New Jersey", "Tree Fruit Production Guide for New Jersey" and the "Pest Management Recommendations for Field Crops".

NJ/Delaware Weed Science Cooperative Agreement

New Jersey and Delaware work collaboratively to share specialist expertise in weed control. Delaware provides field and forage crop weed management expertise and New Jersey nursery/turf expertise to Delaware. In FY 2001, soybean herbicide demonstration plots were established in NJ. The plots were used to educate over 60 growers at an Extension twilight meeting about newly developed herbicide resistant soybeans and weed control management strategies. Specialists continued to deliver a strong multistate outreach program to a diverse clientele in weed management in turfgrass and ornamentals. The information was also presented at field crop growers meeting. Presentations in the form of seminars and workshops to commercials and public clientele (landscape contractors, golf course superintendents, parks and recreation) on integrated weed management in turfgrass and ornamentals were conducted in Delaware. There is also year round interaction with the Delaware Cooperative Extension in the form of published fact sheets, email and phone calls.

Northeast and Mid-Atlantic Direct Marketing

This collaborative effort with states throughout the region (New Jersey, New York, Pennsylvania, Maryland, Virginia) and direct marketing organizations is co-coordinated by New Jersey. The major event is an annual conference in which educational programs and exhibits are a major component. The FY 01 conference was held in Virginia. The 3-day conference attracted 325 attendees.

Farmer to consumer marketing continues to be a major issue in the region. Farmers are looking for state-of-the-art resources during a time of declining resources devoted to marketing. Agri-culturehealth.org a web-based multi-institutional collaborative educational system interlinking direct marketing resources, food systems and health was launched. This tool links consumers looking for fresh local product to the farmers that produce them.

During 2004, the Mid-Atlantic (Farmer's) Direct Marketing Conference & Trade Show attracted 350 farmers and direct marketers.

In 2005 farmer-to-consumer direct marketing enterprises continue to offer economic opportunity for farmers. With limited and declining resources devoted to marketing in the region, farmers looking for state-of-the-art resources have fewer options for finding the information they need. Cooperatively with five state specialists and agents, a resource base and educational system was being developed for the industry.

Of note this period was the launching of agri-culturehealth.com, a web-based multi-institutional, collaborative educational system interlinking direct marketing resources, food systems and

health funded by a Kellogg/Mid-Atlantic Consortium (MAC) Collaborative Agreement Proposal grant. This electronic format provided easily accessible information to the direct marketing community, and provided a link between consumers looking for fresh local product and the farmers that produce them.

This year's Mid-Atlantic (Farmers') Direct Marketing Conference & Trade Show attracted 350 farmers and direct marketers who gained direct marketing knowledge in classroom and tour settings and made critical support industry contacts.

4-H Juried Curriculum and Related Educational Product Development

The National 4-H Experimental Learning Design Team oversees the efforts of the 4-H juried curriculum. The affiliate Extension Specialist in Educational Design serves on this national team and provides guidance to youth curriculum for the state. Guidance is provided for the development of all youth curriculum to ensure that they conform to the 4-H experimental learning criteria and standards. Over 50% of the materials used to support the New Jersey 4-H Youth Development program are national juried pieces. In addition to serving on the jury the New Jersey specialist is a member of the Experimental Learning Design Team which coordinates experimental learning curriculum development and other supporting activities.

The Somerset County 4-H Agent serves the liaison to NASA Education and Public Outreach Forum. In this role she assisted in the development of national educational materials for youth who participate in Project ASTRO a national network designed to join astronomers and teachers as partners in astronomy education.

Mid-Atlantic Equine Pasture Initiative

The Mid-Atlantic Equine Pasture Initiative is a 3-year equine pasture management professional development program that is being offered as part of a Northeast Sustainable Agriculture Research and Education (NE SARE) grant to equine and agricultural service providers in New Jersey, Delaware, Maryland, northern Virginia, eastern and southern Pennsylvania, and southern New York.

The goal of the Mid-Atlantic Equine Pasture Initiative is to provide equine and agricultural service providers with the knowledge and skills necessary to develop sustainable equine pasture management programs and to assist clients in the development of environmentally sound farm management plans.

The program has been designed for all equine and agricultural service providers, including agricultural Extension agents, representatives of the Natural Resource Conservation Service, soil conservation districts and state departments of agriculture, veterinarians, feed, seed and fertilizer dealers, and crop management consultants.

Participants attended a full day equine pasture management workshop. The workshop was held at two locations (December 8, 2005 in Flemington, New Jersey; December 15, 2005 in Lancaster, Pennsylvania) to ensure regional accessibility. Demonstration farms will be recruited for the

program and additional trainings will be offered on the site of the demonstration farms in the spring and summer 2006.

The pasture management workshops featured presentations provided by equine and forage specialists from the region and will include; nutritional advantages of pasture forages, health issues involved with grazing horses, establishing realistic pasture management goals, soil fertility planning, forage species identification and selection, weed identification and management, and pasture rotation and renovation.

On-farm training sessions are scheduled for spring, summer and fall of 2006 will reinforce concepts offered during the workshop and will afford ample time for discussion and hands-on activities. Additional topics to be covered on individual demonstration farms include: manure management and water quality, toxic plant identification and control, pest management, and fencing options. A 2-day pasture management short course held during Horses 2007 (end of March, 2007) to target horse owners, managers and enthusiasts on pasture management issues. The short course will be taught by the agents, educators, and professionals that attend the December 2005 training session.

Regional Research Projects

As a part of regional projects NE-183 and NC-140 a New Jersey County Ag Agent contributes to the demonstration and outreach of results from apple, semi-dwarf apple, apricot, sweet cherry, varietals and rootstock trials. This is done through several field days to various clientele each year and via websites. This team continues to make significant progress in meeting the needs of apple growers. Cumulative state and federal investment in NC-140 for the last 5 years was approximately $5 million. Cumulative, measurable benefits to the US temperate tree-fruit industries were more than $300 million. Less easily measured benefits, such as averted losses and enhanced environmental quality, certainly increase the financial value of NC-140 to well beyond $300 million in the last 6 years. NC-140 output guided propagation of fruit trees in nurseries, allowing them to better tailor their output to grower demands and to avoid problematic rootstocks. As an example, a series of cherry rootstocks from Russia were gaining a great deal of interest, but NC-140 work found them to be hypersensitive to Prunus Necrotic Ringspot virus, reducing their suitability for United States production. NC-140 continues to develop advanced experimental design approaches to reduce the costs of rootstock research.

NE-9 is a regional research project with a long history of investigating the best ways to preserve the useful genetic diversity of economically important plant species. To remain competitive in national and international markets, breeding programs must constantly provide the growers with new and improved cultivars that are adapted to local growing conditions and markets. This project will lead to the identification of new sources of genetic diversity to develop peach, apricot, and apple cultivars which will be better adapted to northeastern growing conditions. Several varieties of native fruit trees are being crossed with Central Asian varieties' germplasm to improve disease resistance and environmental tolerance to northeastern weather conditions. Individual trees within each accession will be scored for tree health and vigor, and data will be collected on fruit characters and factors affecting winter hardiness. The results are being made available to the National Plant Germplasm System (NPGS) for incorporation into the Germplasm Resources Information Network (GRIN) database. Over the course of this project, many peach,

apricot, and apple selections have been distributed to researchers, growers, and nurseryman for further testing. Several of the best selections have been propagated for commercial/residential release and will be available in 2006.

F. Integrated Research and Extension Activities

Animal Production Efficiency

Proper management of livestock and forage systems can reduce nutrient losses and improve water quality. New Jersey Agricultural Experiment Station research on livestock production and nutrient management will help local livestock farmers to better monitor and manage their farms and result in reduced nutrient losses and improved environmental stewardship. New studies on recycled paper as bedding offer alternatives for farmers to save on costs on bedding. In addition, New Jersey Agricultural Experiment Station reported on projects investigating strategies for detecting, maintaining and improving immune function in exercising aged horses, and preventing insulin/glucose-related metabolic diseases of younger horses. There are continued integrative studies on the reproductive efficiency of goats and sheep, and also the effect of exercise on immune health in horses. This work demonstrates how research on the hormone profiles in these domestic species can provide models for human health concerns.

Field and Forage Crops

Current studies are integrating cultural weed control techniques into orchard weed management programs to improve orchard weed control, reduce the need for herbicide inputs, improve tree growth and yield, reduce soil erosion, and improve soil tilth. Phytotoxicity data and efficacy data has been collected on new and more effective post-emergence herbicides for perennial control and residual herbicides for annual weed control in orchards. An experimental design has been developed, and orchards established in 2004 and repeated in 2005 to evaluate mulches, to integrate mulch treatments into an orchard weed control program. For crop growers, recommendations were given to pumpkin growers on silicon fertilization and the use of municipal leaves as mulch. Asparagus growers were provided with recommendations for use of rock salt to improve asparagus production. Landscapers were provided with soil fertility recommendations for suppressing turfgrass diseases. Growers with manganese deficient crops were provided with best management practices for correction of this nutrient deficiency. Overall impact of these recommendations will be a reduction in use of chemical pesticides and the most effective fertilization practices for correction of manganese deficiency.

Turfgrass Breeding and Management

Several turfgrass specialists work together to address the issues of new methods for pest control, new disease-resistant cultivars, and to explore and communicate best management practices. Currently, there are few herbicide options available for post-emergence control of grassy weeds in bentgrass. Two herbicides, sulfosulfuron and bispyribac, have been identified that have substantial post-emergence activity on problem weed species such as Poa annua and Poa trivialis. The results of these studies indicate that sulfosulfuron may potentially control Poa trivialis at use rates that are safe on creeping bentgrass. Bispyribac is safer to use on creeping bentgrass and related bentgrass species and can potentially provide control of both Poa annua and Poa trivialis. Other bentgrass studies developed (and now commercially available) synthetic selections of creeping bentgrass cultivars that maintained excellent turfgrass quality with 80-90% fewer fungicide applications than the standard dollar spot susceptible cultivars. These cultivars exhibited improved disease resistance and turf performance as published by the National Turfgrass Evaluation Program (NTEP) (www.ntep.org). The use of entomopathonogenic nematodes for turf pests, such as white grubs, has proven useful for biological control of these pests. Due to its exceptionally high pathogenicity against a wide range of white grubs, the nematode S. scarabaei will allow the development an effective and much needed biological control agent. S. scarabaei has also good potential for long term white grub management. Meanwhile, the complementary combination of imidacloprid and the commercially available nematode H. bacteriophora can broaden the use of nematodes against white grubs.

Plant Pest Management

Several projects have been focused on developing and testing integrated pest management for economically important plants, including vegetable crops and fruit trees. For New Jersey, developing a new potato variety with heat stress tolerance is an important factor and new potato cultivars with heat tolerance and disease resistance will soon be available to consumers. Phytophthora (Plant Destroyer) which causes late blight infection, is a very destructive plant pathogen in New Jersey, throughout the nation and the world, and causes destructive blights of ornamentals, trees, vegetables and fruits. New Jersey Agricultural Experiment Station faculty are working to record specific locations of fungicide resistance within the state, and are finding new control measures including blight-resistant varietals, biological control agents, and new fungicides. Not only are faculty working on pests that are currently a problem in the state, they are also keeping growers aware of potential disease problems. Though the Plum Pox Virus has not yet been detected in New Jersey, growers have been updated of survey and research progress in other states during New Jersey Agricultural Experiment Station meetings and discussions**.** Other work focuses on developing a better understanding of the use of flowering plants as a means to attract natural enemies of important landscape pests in order to reduce their impact. This information can be used to design landscape pest management programs that reduce reliance on pesticides and therefore reduce the potential for environmental contamination.

Plant Production Systems

Research and outreach efforts have been conducted in support of the New Jersey greenhouse industry, especially related to design, construction, and operation of controlled environment plant production facilities. The knowledge gained from designing and operating an entirely closed plant production system, as needed for example for NASA's long duration manned space missions, can be directly applied to the commercial greenhouse industry. Work on environmental control strategies and systems to facilitate mass production of tropical orchids under Northeast conditions will lead to development of a new commercial greenhouse sector in the region. Agricultural Management Practices for Permanent Greenhouse Production can help resolve disputes between commercial growers, their neighbors and zoning and city officials in New Jersey. Economic pressures require greenhouses to be productive and reduce costs. By reducing labor intensive practices, researchers can help greenhouses achieve this goal. Using growth regulators to inhibit lateral shoot growths on tomato plants decreases the need to manually remove these fruit-limiting growths, and may actually increase the yield. Another faculty member tested heating methods and reports that for ornamental plants, applying heat directly to the root zone is less expensive than heating the entire greenhouse volume.

Food Safety

New Jersey Agricultural Experiment Station faculty remedied the problem that no user-friendly computer models were currently available to assist meat processors or retail operators in cooling foods properly to control risks from Clostridium perfringens and C. botulinum. By offering workshops, lectures, computer programs and educational websites, processors can now easily use a computer program that predicts the risk of foodborne illness during changing temperature conditions has been used in a variety of situations to assist food processors. The technical expertise developed as a result of this project has saved meat processors product recalls costs in excess of $1,000,000. Other research is focused on finding new, naturally occurring antimicrobials and preservatives might be used to stop the growth and/or kill pathogens in food. By investigating the effectiveness in using bacteriocins or pleurocidin as natural food antimicrobials and preservatives, the food processing industry will have additional tools to decrease the incidence of illness and recalls due to food pathogens.

Nutrient Management and Recycling

Research and extension teams are working on developing methods and management practices for economically and ecologically sound use of nutrients for agriculture. Projects include the investigating, the effect of land application of municipal collected shade tree leave on soil quality and crop production, and the environmental and economic impacts of nutrient management on dairy forage systems (as a contribution to a multi-state research project), and demonstrated that better monitoring and management of animal diets leads to less nutrient excretion and greater profitability. An additional research and education program focuses on diverting food wastes to animal feed instead of landfilling or incinerating. Recently, this program has resulted in the publishing of a handbook, numerous scientific and popular articles, national symposia, numerous invited presentations, and the creation of the Food Recovery and Recycling Association of North America. Partnerships between agents and specialists reported that for sewage biosolids, there are plant-available nutrients and organic matter useful in improving soil structure, recycling these materials through land application is increasingly being viewed as desirable. Best

management practices for non-traditional organic wastes provide agricultural extension agents, the Natural Resources Conservation Service, and farmers with the information they need to effectively use non-traditional wastes without contributing to non-point source pollution.

Agricultural Financial Management

This is multifaceted program with the New Jersey Farm Management Program as its centerpiece. The latter program funded through a multi-year grant from the New Jersey Department of Agriculture provided formal training to over 4000 producers in the areas of management, marketing, finance and investment. Another component of this overall program is participation in Northeast Farm Management Working Group focusing on risk management. As part of a Northeast Sustainable Agriculture Research and Extension project, 80 budgets were developed for conventional, IPM and organic production systems. A series of budgets for conventional, ICM, and organic production methods were made available on line for crop and livestock budgets in New Jersey. Related activities include participation in two additional multi-state research projects focusing on the marketing and production of (1) fruits and vegetables and (2) environmental plants. The Risk Management Education Grant funded two hands-own workshops targeted at greenhouse owners. Greenhouse Cost Accounting software program allows greenhouse managers to allocate costs to specific crops. It enables users to easily make decisions about pricing, reducing unprofitable production, controlling costs, and increasing sales of profitable crops.

U.S. Department of Agriculture
Cooperative State Research, Education, and Extension Service
Supplement to the Annual Report of Accomplishments and Results
Multistate Extension Activities and Integrated Activities
(Attach Brief Summaries)

Institution Rutgers University
State New Jersey

Check one: X **Multistate Extension Activities**
____ **Integrated Activities (Hatch Act Funds)**
____ **Integrated Activities (Smith-Lever Act Funds)**

Actual Expenditures

Title of Planned Program/Activity	FY 2001	FY 2002	FY 2003	FY 2004	FY 2005
PENN-JERSEY Livestock/Crops	4,000	17,770	-	15,222	63,323
MAC-PATHWAYS/Food Policy & Food Systems Web	25,000	27,448	18,450	9,281	32,305
Mid-Atlantic Fruit, Veg., Crop Manuals/Conference	4,000	7,511	5,300	9,180	72,321
Weed Science – NJ/Delaware	2,500	2,912	2,980	6,976	20,817
Northeast Direct Marketing	1,000	752	780	5,774	2,809
EPA-2/Cornell & Rutgers	13,000	8,000	-	-	-
4-H Jury Curriculum & Related	1,000	1,166	1,475	5,541	19,697
Regional Research Projects	1,500	1,850	2,140	4,041	19,534
Other	-	-	-	-	-
Total	52,000	67,409	31,125	56,015	230,806

Karyn Malinowski — Director of Extension
May 2006 — Date

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	Actual Expenditures				
Title of Planned Program/Activity	**FY 2001**	**FY 2002**	**FY 2003**	**FY 2004**	**FY 2005**
Animal Production Efficiency	20,858	52,228	49,863	54,320	30,212
Field and Forage Crops	17,465	35,173	-	-	9,835
Turfgrass Breeding and Management	73,470	58,809	45,827	57,888	90,261
Plant Pest Management	-	-	40,714	25,829	58,726
Plant Production Systems	126,517	127,809	92,261	97,563	78,378
Food Safety	8,354	9,577	73	9,682	3,507
Food Security	-	-	-	-	-
Human Nutrition	-	-	-	23,525	8,825
Nutrient Management/Recycling	33,365	39,078	40,085	13,783	11,986
Agricultural Financial Management	17,440	9,650	24,125	46,067	44,436
Total	297,469	332,324	292,948	328,837	336,166

_____ May 2006
Dean of Research **Date**

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__X__ **Integrated Activities (Smith-Lever Act Funds)**

Title of Planned Program/Activity	Actual Expenditures FY 2001	FY 2002	FY 2003	FY 2004	FY 2005
Field and Forage Crops Management	9,556	-	-	-	-
Turfgrass Breeding and Management	60,516	96,598	88,617	92,505	184,712
Plant Pest Management	-	-	-	-	-
Plant Production Systems	81,937	47,066	45,990	27,961	69,862
Food Safety	-	9,415	9,806	9,758	48,025
Environmental Quality (now part of Nutr. Mgt/Recycling)	-	-	-	-	-
Nutrient Management/Recycling	13,246	23,000	23,627	48,264	98,919
Agricultural Financial Management	8,895	9,030	12,944	9,612	39,060
Animal Production Efficiency	4,990	-	-	-	-
Total	179,140	185,109	180,984	188,100	440,578

Karyn Malinowski — Director of Extension
May 2006 — Date

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