Certification
Of New Jersey Annual
Report of Accomplishments and
Results (FY 2000)

Approval:

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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. The implementation of this plan has engaged New Jersey Agricultural Experiment Station researchers and Rutgers Cooperative Extension 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.

We have engaged the residents of the state in a Visioning and Planning process which has provided a framework for the future direction and focus of Cook College and the New Jersey Agricultural Experiment Station. Stakeholders have played a pivotal role in the process and will continue to be viewed as an equal partner 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.

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 U. S. 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
- Developing new products and commercial opportunities
- Increasing production efficiency and reducing costs

An example of adding value to an existing crop is a multidisciplinary initiative to discover new uses for one of New Jersey's major crops – blueberries. With the new knowledge about the antioxidant properties of blueberries, a team of food scientists and economists set out to capitalize these potential benefits to create several new products including a blueberry iced tea drink. In addition, the team assisted in the development of a new company with equity owned by blueberry producers to market these products. This effort will yield higher returns to blueberry producers, provide new income and employment opportunities, and at the same time new products with health benefits to consumers.

Rutgers has a long history in the breeding of new crops and varieties for agricultural producers. One of the most successful programs is the world-renown turfgrass program. Fifteen new varieties, many with enhanced disease resistance, were released in 2000. Approximately 195 varieties are currently licensed and being marketed commercially by 24 seed companies. Another successful program has been our oyster breeding program. The NJAES Haskins Shellfish Research Laboratory has developed a line of disease resistant oysters and has licensed these to a N.J. based company with the intent to revive this nearly defunct Delaware Bay fishery.

A novel, cost-effective, and environmentally safe technology developed by faculty in our Center for Agricultural and Environmental Biotechnology may provide local producers opportunities to market new products, including those with nutraceutical properties. This technology, which has captured the interest of New Jersey's Farm Bureau, removes biologically active compounds from plants. It has been patented and is licensed to a N.J. based spin-off company.

Rutgers research and Extension personnel have used both traditional and state of the art methodologies to assist New Jersey producers to increase efficiency and reduce costs. The *Garden State Agricultural Re-Engineering Initiative* provides agriculture the opportunity to (1) conduct in-depth financial analysis of farm operations; (2) take a deliberate and knowledgeable

approach to risk management; and (3) participate in regularly scheduled multidisciplinary team meetings. Forty-one businesses have participated to date. Our faculty have also developed a comprehensive multi-method Extension program for greenhouse operations. This program includes a greenhouse transplant program and a monthly newsletter, *Northeast IPM Notes,* jointly published with Cornell. Finally, using GIS and GPS methodologies, our staff have developed and deployed new site-specific precision management tools for N. J. agriculture. Specific applications of these tools have been field and forage crops, cranberries and vegetable crops.

Allocated Resources:

Research

Hatch Funds:	$1,373K
All Funds:	$16,060K
SY's:	42

Extension

Smith-Lever Funds:	$1,195K
All Funds:	$5,095
FTE's:	98

Goal 1

Key Theme: Adding Value to New and Old Agricultural Products

Activity: The blueberry industry is one of New Jersey's most important agricultural sectors. Blueberry sales, however, have peaked in recent years and growers are interested in expanding their markets. Given earlier indications of the potential health benefits of the blueberry, a nutraceutical-based value added blueberry product is an appropriate starting point for any exploration of market development opportunities for blueberries. To be effective, the development and marketing of a value added blueberry juice or other blueberry product requires multidisciplinary collaboration by food scientists, economists, and marketing/business development specialists.

Rutgers has designed a multidisciplinary program of research and technology transfer to develop value-added products to revitalize the blueberry industry. Project members, including food scientists, product development people, and economists tackled details ranging from identifying heretofore-unknown antioxidants in blueberries to figuring out what might be the best channels of distribution for new products. Researchers developed four potential products: iced tea, pomace, juice, and sports drink. A food science professor conducted taste tests. Rutgers has created a cooperative company, called Blueberry Health, Inc., to handle marketing of the products; several blueberry growers joined as owners of the company. Rutgers has worked with Blueberry Health, Inc., to plan for marketing the iced tea and pomace, the two most favored products. The next phase is to generate more interest in the product, develop a marketing plan. The program team members are working on convincing New Jersey supermarkets to carry the product as a way of entering the market, and at the national distributors of iced tea as a long-term marketing goal.

Impact: The University is developing products that blueberry growers do not have the resources to develop on their own. This summer, "Jersey Blues" iced tea was introduced for sale at approximately 50 farm stands and several county fairs in New Jersey. So far, approximately 1000 cases of the iced tea have been sold. Consumer surveys indicate a 90 to 95 percent acceptance rate of the product. The project team hopes that the success of this project will serve as a model for the University's role in economic development.

Source of Funding: State Funds, USDA Rural Business Cooperative Service, New Jersey Blueberry Council, and New Jersey Pinelands Commission

Scope of Impact: State Specific

Goal 1

Key Theme: Plant Germplasm

Activity: The New Jersey turfgrass breeding and evaluation program is world renown. During the past year we have made significant progress in finding new sources of resistance to a new serious disease of perennial ryegrass called gray leaf spot. In trials this past fall we identified nine different sources of resistance to this disease. This is the first report of any resistance to this disease in this species. This fall we increased these resistant populations for wider evaluation work and increase. We continue to make significant progress in population improvement work on tall fescue, three fine fescue species, crested hairgrass, tufted hairgrass, creeping, velvet and colonial bentgrass. All of these turfgrasses with improved disease resistance should require less pesticide usage and reduced overall maintenance costs. We are creating 2500 new hybrid Kentucky blue grasses per year in an effort to discover 10-20 new improved apomictic hybrids with improved persistence and seed yielding ability. We are also making a large effort each year to collect new germplasm sources to integrate into the breeding program. These collections are being made from those areas of the world where the cool-season turfgrasses originated. The new sources of gray leaf spot resistance were mainly from these collection efforts. We are making approximately 1000 collections per year in the 13 different turf species.

Impact: There are currently approximately 195 turfgrass varieties currently licensed to 24 different seed companies and being marketed commercially. These varieties generated approximately $3.1 million in royalties to Rutgers University during 2000. In the past year alone, we were involved in the development of over 40 agreements with private seed companies to develop improved turfgrass varieties. There were over 15 varieties that were named and released this past year from the program. In the National Turfgrass Evaluation Trials this past year varieties derived from the Rutgers breeding program represented over 90 percent of the top 20 performing varieties in perennial ryegrass, tall fescue, the three fine fescue species and the top Kentucky bluegrass variety.

Source of Funding: Hatch, State Funds, and Private

Scope of Impact: Integrated Research and Extension

Goal 1

Key Theme: Aquaculture

Activity: At the turn of the century, the Delaware Bay and Atlantic Coastal Bays of southern New Jersey contributed significant shellfish resources to the state's economy. Oysters produced locally supplied markets in New York, Philadelphia and Baltimore. Declines in coastal water quality and the outbreak of MSX disease in the 1950's destroyed this lucrative industry.

Rutgers has developed a multifaceted research and extension program to address the complex needs of this industry. Both traditional and biotechnical approaches have been used to develop and improve disease resistant oyster strains. Research in detection and control of shellfish diseases has complemented the breeding programs. Resource studies have provided critical information for management strategies. In addition, population dynamics modeling assists the development and evaluation of transplant strategies and aquaculture techniques. These and other production technologies and management and marketing strategies have been tested and demonstrated at a pilot oyster farm jointly developed by Rutgers and an industry cooperator.

Impact: Through the traditional breeding program, Rutgers has produced disease resistant strains of oysters currently being used by the industry. Rutgers researchers have also developed the first tetraploid oysters that are ideal for aquaculture due to their sterility, superior growth and improved meat quality. This technology has been patented and is licensed newly established NJ-based company which marketing the technology worldwide. Cultured Rutgers oysters from the pilot farm reach market size one year earlier than traditional harvests and with less disease mortality. These oysters were marketed to local restaurants at prices that were 10-15 cents per oyster more than other Delaware Bay oysters. These results have encouraged the industry cooperator to fund a ten-fold increase in the pilot farm. The demonstration projects have also identified appropriate culture methods for New Jersey, have evaluate disease resistant stocks and have generated production cost information for enterprise budgets.

Source of Funding: Hatch, State Funds, County, and Private Grant

Scope of Impact: Integrated Research and Extension

Goal 1

Key Themes: Biobased Products
Biotechnology
Nutraceuticals

Activity: Of 250,000 plant species living on Earth, only a small fraction have been fully analyzed for potential benefit to human health. Yet, until now, the methods for discovering novel, biologically active chemicals from plants have been based on crude extraction techniques and primitive hunter-gatherer approaches.

A plant science professor at Rutgers' Biotechnology Center for Agriculture and the Environment has developed a novel, cost-effective and environmentally safe technology for removing biologically active compounds from plants. This technology has led to an extensive collection of lead compounds against various therapeutic targets. A set of related technologies that allow efficient production and recovery of valuable recombinant proteins from plants has also been developed and patented. The promising compounds and technologies are first patented by Rutgers and then licensed to a spin-off company.

Impact: This drug and nutraceutical discovery program focuses on important diseases, including cancer and diabetes and various viral, bacterial and fungal infections. Compounds and technologies licensed by the spin-off company allow its corporate customer to skip the costly research phase and jump right into product development. As of January 2000, the company had signed four agreements with four companies, and was negotiating with 30 other companies and organizations. New Jersey agriculture is also in a good position to benefit from this activity. Many of the company's nutraceutical products are derived from plants that are or can be grown by local producers. The company is working directly with the New Jersey Farm Bureau to position greenhouse growers and other farmers to benefit from the emerging market. In some cases, even the extraction of a compound could be subcontracted. This company is one of 10 spin-off companies launched from Cook College and the New Jersey Agricultural Experiment Station in the past five years. These enterprises create jobs, contribute to economic development, and ensure that new knowledge is useful to society.

Source of Funds: Hatch, State Funds, New Jersey Commission on Science and Technology, and Private Grant

Scope of Impact: State Specific

Goal 1

Key Themes: Risk Management
Small Farm Viability

Activity: The New Jersey Farm Management Program addressed a clear and pressing need for superior management, marketing, financial and investment skills and served as a framework and support base to address the critical issue of farm viability. Agricultural Agents developed the ***Garden State Agricultural Re-Engineering Initiative*** program provides agricultural producers with the opportunity to (1) conduct in-depth financial analyses of their farming operations, (2) take a deliberate and knowledgeable approach to risk management, and (3) participate in regularly scheduled advisory team meetings.

The program offers:

- Training in the use of Finpack, the most comprehensive farm financial planning and analysis software available
- Crisis-intervention strategies for financially distressed farms
- Small group workshops and/or one on-on-one consultations on a continually scheduled basis
- Unlimited access to computers
- Flexibility to meet individual needs
- Complete confidentiality

Sixty-eight participants representing forty-one agricultural businesses operating in 10 New Jersey counties completed one of the nine 3 day workshops.

Impact: Program participants have developed roughly 300 individual commodity budgets in addition to their balance sheets and cash flow plans. Producers have conducted complete analyses of their farm's financial situation, which has enabled them to plan for the future. Databases have been developed that are used for benchmarks for costs of production, rates of return, and financial performance standards. Other positive outcomes or impacts of the program have been to increase understanding of financial terms, improve understanding of the interrelationships among financial statements, and also to decrease anxiety associated with computer usage.

Many participants expressed interest in purchasing the software utilized by the program, and several producers purchased computers for home-farm usage. A number of farm families utilized the program’s output (an organized set of financial statements) to successfully solicit loans. Several farms underwent expansion plans based on an analysis of alternatives provided during the workshops or during follow-up visits. Forty-one agricultural businesses have been involved representing the following commodities: dairy, vegetables, grain/hay, fruit, nursery, and livestock. Analyses of participant data have revealed significant improvements for local producers being more efficient and saving dollars.

Source of Funding: Smith-Lever 3(b) & (c) and State Funds

Scope of Impact: State Specific

Goal 1

Key Themes: Agricultural Competitiveness
Agricultural Profitability
Ornamental/Green Agriculture

Activity: There are approximately five hundred fifty greenhouse operations in New Jersey producing over 100 million dollars in ornamental crops annually. Despite New Jersey's small size, it ranks eleventh in the United States in floriculture production. A survey was conducted by RCE of Camden County in 1996 to assess grower needs. Results indicated that crop health issues were significant in limiting crop quality. To remain competitive, growers must reduce losses due to infectious diseases, arthropod pests and poor cultural practices.

A comprehensive multi-method Extension education program was implemented to address this issue. A Greenhouse Transplant program was conducted at the annual NJ Vegetable Growers Conference. Agents also organized the Central Jersey Bedding Plant Conference. In addition, abstracts and lectures on IPM and plant life were presented at professional meetings. A multistate monthly newsletter was published in cooperation with Cornell Cooperative Extension entitled, "Northeast IPM Notes". Twelve issues were sent to 30 greenhouse growers and Extension professionals in New Jersey, New York, and other states in the region.

Impact: Based on formal evaluation data, program activities resulted in adoption of recommended production practices for at least 14 million square feet or 25% of New Jersey's total production space. Attendees, at the Central New Jersey Bedding Plant meeting, who completed evaluations (56 of 75 attendees), represented impact on approximately 3,000,000 square feet with a production value of at least 30 million dollars. 100% indicated that information learned at the meeting was useful to very useful and 94% indicate information will improve pest management practices. More specifically 98% learned about new pesticides; 86% learned about pesticide alternatives; 91% improved pest identification skills; 93% learned how to improve pesticide application. Subscribers to the Northeast Greenhouse IPM Notes were surveyed and 25% or growers receiving the newsletter responded and indicated: Information resulted in adoption of IPM practices on 1,921,900 square feet of controlled environment greenhouse space and fifty six acres of outdoor flower crops representing a total crop value of approximately 20 million dollars. 100% indicated IPM Notes is useful and improved their pest management practices. Specifically growers learned about pesticide alternatives (96%), new pesticides (94%) and they improved pest identification skills (83%). Growers also reduced pesticide use (68%). Some reported reduced pest management costs (60%) and some increased profits (38%). Other impacts included improved pesticide applicator safety (68%) and helpful in training employees (40%). The Northeast Greenhouse IPM Notes was a National Finalist for the AT&T Communications Award (team newsletter category).

Direct assistance in recognition and management of growing media problem at an Atlantic County farm saved 150,000 tomato and pepper transplants worth $15,000 dollars.

Source of Funding: Smith-Lever 3(b) & (c), State Funds and Camden County Board of Chosen Freeholders

Scope of Impact: State Specific

Goal 1

Key Themes: GIS/GPS
Precision Agriculture

Activity: Extension agricultural agents and specialists have developed and implemented Rutgers site-specific precision management of agriculture and natural resources programs brings new technologies and time specific information to farmers and others by deploying Geographic Information System (GIS), Global Positioning System (GPS), and Remote Sensing (RS) precision agriculture tools. In addition, other high technology tools are used for field mapping, analysis crop stress, and watershed monitoring. The focus has been on Integrated Crop Management (ICM) and Integrated Pest Management (IPM) providing farmers with timely information to improve efficiently.

Impact: Field and forage crops ICM was practiced on over one hundred fifty fields with boundaries mapped and entered into GIS and sampled using the presidedress nitrogen quick test (PSNT). Recommendations for nitrogen fertilizer, based on the results of PSNT, saved producers approximately $45,000 compared to traditional fertilizer practices. An additional $10,000 was saved on decreased insecticide spraying through the use of site-specific scouting practices for alfalfa weevil.

Since 1997 cranberry growers have benefited from Color Infrared (CIR) aerial photography that has been used successfully to identify areas of beds with poor drainage and those that have extensive weed populations. The photography also documented areas with the presence of fungal diseases such as Fairy ring and Phytophthora root, which are not visible from the surface. Previous treatment recommendations for diseases required application of fungicides to areas larger than affected sites. For material alone, treatment usually costs $10,000 per acre of treated area. The use of remote sensing in detecting the specific location and extent of these diseases enables growers to target areas for treatment, thereby decreases the amount of fungicide applied and lowers costs.

By accessing maps at the RCE web site, farmers, researchers and others are able to receive critical pest information in as little as one day after the actual sampling period. This technology is used to control European corn borer (ECB) and corn earworm (CEW), highly destructive pests of New Jersey vegetable crops including sweet corn, lettuce, snap and lima beans, and peppers. New Jersey growers apply approximately $862,800 of insecticides annually for control of these pests. It is now as easy as glancing at a map to determine how to treat host crops and monitor pest in a fine geographical region. Mapping technology has also been used effectively on parasite control in the equine industry.

Source of Funding: Smith-Lever 3(b) & (c), State Funds, Private Grant, and USDA Special Grant

Scope of Impact: State Specific

Goal 2

Overview: New Jersey has one of the most culturally diverse populations in the U. S. At the same time, a significant proportion of our residents lives at or below the poverty line and do not attain even the most basic daily nutritional requirements. New Jersey farmers also have attempted to capture increased value by moving into small scale processing. Added to these are a large number of small food processors attempting to meet the needs of local consumer markets. In addition, 70 percent of the nation's major food manufacturing firms have headquarters or research facilities within a hundred mile radius of Rutgers campus. In total, there is a great need to design and deliver 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 and technological needs of the agricultural and food system within the State.

NJAES delivers a multi-faceted food security program to meet the diverse needs of N. J. consumers. This program includes activities to link N. J. growers with school lunch and summer feeding programs, youth farmstands which bring fresh produce to urban areas while at the same time providing workplace skills to urban youth, and the production of produce in community based gardens and greenhouse operations.

In cooperation with local WIC clinics, Extension personnel developed and offered a state-approved food safety curriculum targeted to low-income caregivers. They have developed and presented to 357 commercial and non-commercial food service workers a behavioral based program of safe food handling practices. A third program relating to food safety and quality involves researchers providing technical assistance to a quality audit of foods based on federal surplus commodities distributed in schools and other community programs.

Rutgers scientists have developed an intelligent microwave oven that can scan bar codes on food packages that include detailed cooking instructions. This innovation will improve food quality by more uniform heating food products thus enhancing nutrition, safety, taste, aroma, and texture. Several food manufacturing and appliance companies are evaluating the potential commercialization of this technology.

A series of food industry studies were conducted to assess recent food industry performance and identify major policy obstacles impeding performance in New Jersey. These studies have resulted in the creation of the N. J. Food Industry Alliance and a Kellogg funded regional Food Policy Institute at Rutgers.

Allocated Resources:

Research

Hatch Funds:	$239K
All Funds:	$2,857K
SY's:	10

Extension

Smith-Lever Funds:	$54K
All Funds:	$203K
FTE's:	3

Goal 2

Key Themes: Food Accessibility and Affordability
Food Security
Human Nutrition

Activity: Within this theme are a number of activities that have or will have impact on community food security in New Jersey. Included are the Farm to School program, Youth Farm Stand program, Cook Student Organic Farm, Sustainable Food Production project and Community Health and Environmental Coalition of New Brunswick. These programs are at various level of development. Some of these activities are linked to Multi-State Research Project NE-185, "Commodities, Consumers, and Communities: Local Food Systems in a Globalizing Environment."

Impact: The Farm to School program links New Jersey growers with schools to market local produce for school lunch and summer feeding programs. New Brunswick, Jersey City and Elizabeth, with an aggregate student population of 65,000 have agreed to serve as pilot sites. The Youth Farm Stand program, which is described in more detail under goal 5, involved seven sites and 80 youth last season. They sold approximately $12,000 worth of produce, 15% of it to WIC participants. Approximately 50 students were involved with the Cook Organic Farm project last season. Six students currently serve as Americorps volunteers to expand the programming year round and to develop greater collaboration with local emergency feeding services. The Sustainable Food Production project has established two 1,500 sq. ft. greenhouses to model year round production in an unheated space. Produce is being marketed in conjunction with Elijah's Promise to local restaurants. The Community Health and Environmental Coalition of New Brunswick was developed as part of an EPA Healthy Communities grant to support community gardens and nutrition education lessons for urban residents.

Source of Funding: Hatch, USDA, EPA, Americorps, State Funds, N. J. Department of Community Affairs, Bonner Foundation

Scope of Impact: Multistate Integrated Research and Extension (ME, NJ, NY, PA, WV, CA, IA, KS, LA, MI, MO, NC, PR, TX, WA, and WI)

Goal 2

Key Theme: Food Handling

Activity: Between 1988 and 1992, outbreaks of foodborne illness caused an annual average of more than 15,000 cases of illness in the United States, as reported to the Centers for Disease Control and Prevention. The actual illness rate may be higher because a count is taken only when the microorganism that caused the illness is identified by a laboratory and reported by a physician.

When unreported cases are taken into account, an estimated 76 million illnesses, 325,000 hospitalizations and 5,000 deaths each year may be associated with microorganisms in food. Hospitalization due to foodborne illnesses are estimated to cost over $3 billion each year. The cost of lost productivity is estimated at between $20 billion and $40 billion each year. In addition to acute illness, some microorganisms can cause delayed or chronic illnesses.

To address this critical issue, Extension educators surveyed NJ WIC clinics regarding the level and priority of food safety education with parents of infants and young children. Survey results revealed that few routinely provided this information to their clients because quality information and instructional materials were not available. Once hundred percent of surveyed NJ WIC clinics responded favorable to the suggestions that instructional materials on these topics should be made available to their clients.

Extension educators developed behaviorally focused food safety curriculum and supported instructional materials to educate caregivers of infants and young children on safe food handling practices. The project, which has resulted in a state-approved food safety curriculum, three RCE fact sheets, and support posters, targets low-income caregivers.

Impact: This program reached 21 women through six presentations in Gloucester County. All sessions were held in cooperation with local WIC clinics. All women involved have been informally surveyed on an individual basis to determine what improved practices have been adopted as result of the program. Those improved practices include:

- Inspecting formula packages and “use-by” dates prior to purchasing
- Sanitizing bottles and kitchen surfaces prior to preparing baby bottles
- Refrigerating infant formula immediately after preparing
- Discarding unused prepared formula after 48 hours
- Feeding warmed formula right away
- Thawing frozen breast milk in the refrigerator
- Using an insulated bag with ice or cold pack to keep infant formula cold

Source of Funding: Smith-Lever 3(b) & (c), USDA-CSREES Food Safety and Quality Initiative Grant, State FDA Grant.

Scope of Impact: State Specific

Goal 2

Key Theme: Food Safety

Activity: Research shows that there are gaps between the research, knowledge and practices that promote a safe food supply. Research also supports that food handlers who improve the way they prepare, thaw, and store food can reduce contamination and, likewise, risk of outbreak of foodborne illness.

It is vital that food handlers know the facts behind foodborne illness and safe food handling practices if we are to reduce the risk of foodborne illness. The **Food Safety for Food Servers** curriculum gives New Jersey FCS Educators a tool to teach commercial and/or noncommercial foodservice workers the safe food handling practices that will reduce the incidence of foodborne illness. Food Safety for Food Servers targets food handlers in both commercial and noncommercial settings, such as senior feeding programs, soup kitchens, youth groups and clubs, 4-H club members and volunteer leaders, fast food restaurants civic associations, or houses of worship that offer meals or feeding programs, etc.

Impact: This two-hour program was presented to 357 people in Monmouth, Mercer and Somerset Counties in New Jersey. Respondents to follow up evaluations reported at least one behavior change as a result of the session:

- 23% use a sanitizing cleaner on cutting boards, counters, and utensils
- 90% check the “use by” date on packages to be sure it hasn’t expired
- 92% place raw meat, fish, and poultry on plates before refrigerating so juices won’t drip
- 44% refrigerate or freeze leftovers immediately, not letting them cool on the counter first
- 89% date all leftovers before freezing or refrigerating

Food Safety for Food Servers has been well received by extension staff and program participants.

Source of Funding: Smith-Lever (b) & (c) & (d), State Funds

Scope of Impact: **State Specific**

Goal 2

Key Themes: Food Quality
Food Safety

Activity: The Quality Audit in the New Jersey Food Distribution Program was initiated in 1979 and has continued for the past 21 years with objectives and priorities adjusted annually to meet program requirements. This program includes school lunches served to hundreds of thousands of children daily and variety of other programs. Our responsibility is to provide technical assistance to ensure consistent high quality of distributed foods based on federal surplus commodities. Three major areas of our involvement are: 1) Review of products submitted for approval prior to contract; 2) Evaluation of complained samples; and 3) Technical assistance to the staff of the SNJDA Food Distribution Program. We evaluate eating quality, nutritional information, shelf life and other important food attributes. We frequently contact processors with suggestions for quality improvement.

Impact: We are proud to have an impact on quality of food products consumed on daily basis by children and adults throughout the State of New Jersey. Over the past year we evaluated quality of 60 pre-bid samples and 25 complained samples. We have helped to uncover potential sources of microbial contamination in a fruit product, which was pulled from the shelves prior to consumption by children. We also helped to determine the amount of fruit in a manufactured product, information that that the government can use to determine if the product meets the nutritional requirements. In evaluating a bakery item, we determined that ingredient interactions were the probable cause of unacceptable color change that produced a mold like appearance. We also make suggestions to the processors that in long-range lead to the improvement of both eating quality and nutritional value of the distributed products. We are in the process of developing a web page for school food service directors with basic information on selected products, processors, and other important information helping them to make choices in food selections and purchases. In addition, currently we are working on specific criteria and procedures for finished product monitoring program to be included in USDA "Food Distribution 2000 Business Process Re-engineering Project". The State of New Jersey was selected as one of the pilot programs in the nation with a specific responsibility for a part of the project assigned to the Rutgers Department of Food Science.

Source of Funding: State Funds

Scope of Impact: **State Specific**

Goal 2

Key Theme: Food Quality

Activity: Food consumers rely upon Land Grant Universities to develop technologies that will ensure food quality, convenience and safety. They also rely on Land Grant Universities for technologies that promote easy access to food-related information and that promote efficient use of energy. Researchers at the Rutgers University Food Science Department have developed a second-generation intelligent food-preparation appliance that goes beyond a microwave oven or a conventional oven. The appliance uses three different modes of energy to automatically cook the food to optimal prepared-food quality. The system begins with the food manufacturer, who develops the cooking instructions via (one or all of) the three heating modes to optimize the food product quality. These instructions are encoded in a symbol that the manufacturer imprints on the food package (e.g., a standard UPC code). The food-preparation appliance reads (scans) the code and automatically prepares the food per the manufacturer's recommended instructions. The instructions can be customized by the consumer. With this new technology, the cooking instructions can be extensive and much more precise since the consumer is no longer required to enter the cooking instructions manually. By simply scanning the barcode, the consumer provides the microprocessor in the oven with the precise information needed to identify the food manufacturer and the specific product. The microprocessor links the information coming from the barcode scanner to the microwave oven's database, which may contain the manufacturer's cooking instructions. If it finds the cooking instructions, it executes the instructions by controlling the appliance operations. If the microprocessor does not find the product in the database, it automatically links to the food manufacturer's home page or the new products' online database and downloads the new product's cooking instructions into the database. It then executes the new cooking instructions. Using the Web button, the consumer can also Web access other food information related to nutrition, allergens, product recall, new products, etc.

Impact: Improved food quality is achieved by controlling the operation of the microwave oven to produce a more uniformly heated food product while enhancing the food attributes of nutrition, taste, aroma and texture. Greater convenience is achieved by replacing the heating instructions with a fast and simple scanning of the standard UPC barcode on the package to automatically program the food–preparation appliance. Greater safety is achieved by using a highly reliable, fast and commercially proven method of transferring data by barcode scanning. More efficient use of energy is achieved by controlling the power levels of the different heating modes to bring the product to the desired final quality and temperature. Several appliance companies are currently evaluating the commercialization of this technology.

Source of Funding: State Funds, Private Grant

Scope of Impact: State Specific

Goal 2

Key Theme: Food Industry Performance

Activity: Food firms are typically well served by land grant universities in the areas of food science and engineering, nutritional science, and product development. However, in the area of food policy, land grant universities have usually lagged behind the needs of the industry. Issues pertaining to regulatory impact, labor quality and availability, image, and economic development needs are frequently overlooked by university researchers. In New Jersey, focus groups of food industry executives pointed to the need for greater university assistance in these critical areas.

A series of industry studies were conducted to (1) assess recent industry performance and (2) identify and prioritize the major policy obstacles impeding the performance of food firms in New Jersey. Studies were conducted for the food manufacturing, food wholesale, food retail, and food service sectors in New Jersey, both individually and within the context of the broader Northeast and U.S. industries. In additional to statistical analysis of economic performance (e.g., sales, value added, labor productivity, etc.), a series of industry executive focus groups were organized to specifically examine the critical state-level policy issues adversely affecting food firms. Reports were compiled on each of the four major industry segments identified above.

Impact: This research resulted in the mobilization of the industry trade associations and the creation of the New Jersey Food Industry Alliance (NJFIA). The mobilization of the industry was facilitated by the New Jersey Food Industry Summit, a major event attended by more than 200 industry executives and senior government officials that focused on addressing the policy needs of the food industry in the state. Another direct outcome of this project was the designation of the food industry as the NJ Department of Commerce's "target industry" for special economic development assistance.

This research also provided the underpinning for a major capacity generating exercise in the area of food policy research. A collaborative agreement proposal funded by the Kellogg Mid-Atlantic Consortium was drafted with input from a broad base of collaborators to convey the need for a food policy and outreach institute within the region that focuses on critical policy issues facing food firms and food consumers. This planning document was approved and resulted in the creation of the Food Policy Institute at Rutgers University.

Source of Funding: State Funds, New Jersey Department of Agriculture, Kellogg Mid-Atlantic Consortium, and Private Grant

Scope of Impact: 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, NJAES 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 Consumer Sciences, Agricultural, Food and Resource Economics Departments, in cooperation with other units within Rutgers and other institutions within the region, are working on this initiative.

Researchers at our Blueberry and Cranberry Research and Extension Center have identified and isolated compounds in cranberry juice that are linked to the prevention of urinary tract infections. This discovery may lead to increased value for cranberries by allowing them to be marketed as a nutraceutical product. Rutgers researchers have also developed a new test that uses a specifically prepared tissue culture to determine if specific foods have the ability to turn off specific cancer-causing genes, alternatively, turn on genes that fight cancer. A number of food items with these abilities have been identified. This technology has been licensed to a newly formed spin-off company. Finally, an extensive investigation into the market for nutraceuticals in the mid-Atlantic region was conducted and should serve as a basis for the development of this emerging industry in New Jersey.

Rutgers faculty have also focused on the relationship between nutrition and bone health. Researchers have studied the impact of weight reduction programs on the rate of bone turnover in women. Specific nutritional recommendations have been developed and are being used. Two educational programs relating to osteoporosis have also been developed. One program, *Strong Bones for a Lifetime,* provides extensive educational materials and counseling in four shopping malls throughout New Jersey. The second program, *Project Healthy Bones,* is offered in cooperation with the N. J. Department of Health and Senior Services and targets older women. Both programs have increased awareness and resulted in behavioral changes. In addition, a program focused on increasing the awareness of the value of soy foods in improving health and nutrition has targeted women's health issues.

A novel and creative educational program known as *Kids R Cooks*, relating nutrition and health is aimed at youth in a summer day camp and has reached more than 2,750 youth this past year.

In a relatively unrelated area, NJAES faculty and staff have been very influential in monitoring the spread of West Nile Virus and in developing strategies to control mosquitoes that spread this disease.

Allocated Resources:

Research

Hatch Funds:	$225K
All Funds:	$3,276K
SY's:	8

Extension

Smith-Lever Funds:	$140K
All Funds:	$531K
FTE's:	9

Goal 3

Key Themes: Human Health
Nutraceuticals – Adding Value to New and Old Agricultural Products

Activity: Urinary tract infections are a problem that accounts for more than 7 million doctor visits annually. An estimated 40 percent of women will experience this problem at least once in their lifetime and often recurrent infections pose a significant health concern for women. The annual health care costs associated with this common and painful condition exceed $1 billion. These infections are caused by bacteria adhering to the walls of the bladder and kidney. The bladder is routinely cleansed of bacteria through the elimination process, but an infection can develop if the bacteria adhere to the cell walls and multiply. While it had long been suspected that there was a connection between cranberry juice and urinary tract health, there was no clinical evidence to document the claim. Rutgers researchers set up a study to provide the clinical evidence that there was something specific to the cranberry that prevented bacteria from adhering to the lining of the bladder. The researchers isolated a compound in cranberries using a process called bioassay-directed fractionation.

Impact: The Rutgers researchers were successful in pinpointing why specific components in cranberry juice may be an effective strategy to help ward off or reduce symptoms of urinary tract infections. Their work helps confirm this anti-adherence theory and legitimizes the theory in the medical community. Their findings, which were published in the New England Journal of Medicine, could lead to the development of berries with a greater concentration of these compounds and eventually to medications that might prove useful as adjuncts to antibiotics. A patent application has been submitted for this work

Source of Funding: CSREES Special Grant, State Funds, and Private Grant

Scope of Impact: State Specific

Goal 3

Key Theme: Nutraceuticals

Activity: University research is discovering that some foods, or extracts of foods, can play a specific role in preventing a disease or reducing an adverse health effect. However, scientific research is needed to verify health benefits. And once the health benefits are verified, the intellectual property needs to be transferred to business enterprises that can develop and market functional foods, or nutraceuticals, based on these proven health benefits.

We have studied the chemical components of noni fruit (Morinda citrifolia), a fruit typically found in the Hawaiian and Tahitian islands. The fruits have been used traditionally as a folk remedy for many diseases including diabetes, hypertension, and cancer. In this research, several new glycosides and iridoids identified in noni fruits were found to suppress UVB-induced AP-1 activity in cell cultures. This discovery may lead to the use of noni juice as a chemopreventive agent for humans. We have also worked together with a New Jersey based nutraceutical company to identify the chemopreventive compounds in boswellin. Boswellin is a methanol extract of the gum resin exudates of Boswellia serrata. Using cell culture as well as animal model, we have established that the major constituents of boswellin have anti-carcinogenic, anti-tumor and anti-hyperlipidemic activities.

A multidisciplinary team of Rutgers researchers was formed in collaboration with faculty at the University of Medicine and Dentistry of New Jersey, the University of Hawaii and New York's Strang Cancer Center to investigate the scientific basis of health-promoting foods. The team has developed a test that uses a specially prepared tissue culture to determine if a specific food has the ability to turn off a cancer-causing gene or, alternatively, turn on a gene that fights cancer. Different foods can be tested on copies of the same gene, allowing researchers to easily sift through many compounds to identify those that produce the desired effect. In December 1998, a spin-off company was incorporated to develop and market functional foods that had been identified through the Rutgers-developed testing process. Rutgers licensed this patented process to a spin-off company and is a major shareholder in the company.

Impact: Our research has helped at least one nutraceuticals company to develop new products with enriched bioactive compounds. In addition, using the patented process, the spin-off company has developed an extract of orange peel that can help prevent colon cancer. A human supplement based on the orange extract, mostly likely in pill form, is expected to be available next year. The extract works by suppressing a gene that, when activated, promotes cancer cell growth. In addition to orange peel, the company has also found cancer-fighting properties in grapes, Mexican bamboo, Vietnamese mint, licorice and black tea. The company is currently focusing on identifying additional products to prevent colon, prostate and breast cancer.

Source of Funding: State Funds, N.J. Commission on Science and Technology, and Private Grant

Scope of Impact: State Specific

Goal 3

Key Theme: Nutraceuticals

Activity: Nutraceuticals may be defined as foods or food components that confer health or medicinal value (including disease treatment or prevention) and include products such as herbal remedies, dietary supplements, and functional foods. The U.S. market for nutraceutical products has been cited as a $92 billion entity that is growing at rates surpassing those observed in the traditional food and pharmaceutical industries. Opportunities exist for farmers to supply high-value plant materials to firms in this growing industry, however, given the recent emergence of the nutraceuticals industry, information on markets, cultivation practices, regulations, industry structure, and other critical areas is largely inaccessible. Consequently, current participation in the nutraceuticals industry among mid-Atlantic farmers is minimal. Similarly, post-harvest nutraceutical firms are in need of information on industry and market structure, regulatory issues, raw material sourcing, and other issues.

An extensive investigation of the market for nutraceuticals in the mid-Atlantic region has been completed. Primary data was collected to understand the current level of involvement in the industry (by both farmers and post-harvest firms), the challenges and opportunities facing the various segments of the industry (e.g., growers, manufacturers, distributors, retailers), and prospects for future industry growth. Case studies of selected large established West Coast growers were conducted to distill information applicable to the development of the mid-Atlantic industry. Finally, interviews with executives of selected food and pharmaceutical companies were conducted to assess current perceptions and strategies pertaining to nutraceuticals. The project concluded with a one-half day workshop of industry executives, government officials, and academics designed to develop recommendations for state and regional level nutraceutical industry development strategies and policies.

Impact: This research has provided a basis for nutraceuticals industry development in New Jersey and the rest of the mid-Atlantic region. As a result of this research, several companies and industry trade associations with interest in nutraceuticals have mobilized to collaborate with researchers to develop and advance policy recommendations for industry development.

Source of Funding: USDA Federal State Marketing Improvement Program and NJAES State Funds

Scope of Impact: State Specific

Goal 3

Key Theme: Human Health

Activity: It is no secret that many people in our society are overweight and that being seriously overweight can be detrimental to one's health and longevity. Not surprisingly, a giant reducing industry has developed, for profit as well as 'pro bono,' for the general good, as practiced by some hospitals, universities, and other public institutions. However, not enough is known at this time about the possible side effects of body weight reduction and specifically the impact on bone minerals.

Faculty in the nutritional sciences department have studied the effect of weight loss on the rate of bone turnover in overweight premenopausal (ages 21 - 45) and post menopausal (ages 55 - 75) women as a function of time, the rate of weight loss, and changes in body composition. This work is of special interest not only because of the scientific information it is disclosing, but also for the opportunity it provides to the participants--overweight women–to reduce their body weight under the supervision of registered dietitians, nutritionists and a medical doctor. Thus far, more than **180** women who typically lose 22 pounds during a six-month period have been studied.

The project is supported by the National Institute of Aging at the National Institute of Health, and is carried out in cooperation with the New York Obesity Research Center and Body Composition Unit at St. Luke's-Roosevelt Hospital, Columbia University and the Radiology Department of the Robert Wood Johnson University Hospital. In the study, the volunteers are randomly assigned to receive a calcium supplement or a placebo and follow a well-balanced individualized low-calorie, moderate exercise regimen. Various measurements are taken to determine bone mineral density and turnover by X-ray absortiometry and by determination of certain blood constituents, respectively.

Impact: Results have shown that calcium supplementation can diminish the accelerated bone turnover that accompanies moderate weight loss. On the strength of the findings to date it is recommended that post menopausal women who adhere to a weight loss program should, in addition to the calcium in their diet, consume a calcium supplement that will provide 1 gram (1000 mg) of calcium per day.

Source of Funding: Hatch, NIH, and State Funds

Scope of Impact: State Specific

Goal 3

Key Theme: Human Health

Activity: Osteoporosis is a serious condition in which bones become thin, brittle and easily broken. American women over age sixty-five have a 50% chance of suffering from osteoporosis; men a 20% chance. Broken bones can easily debilitate older women. In the United States, more than 250,000 hip fractures occur each year in persons age 65 and older. This disability can place heavy demands on the person with osteoporosis, his or her family and the health care system. Osteoporosis can be prevented or slowed by exercise, diet and frequently, by hormone replacement therapy. The Education Subcommittee of the Interagency Council on Sciences Education of which RCE is a member, planned an educational intervention to reach residents of New Jersey and increase awareness of osteoporosis prevention from adolescence to older adults. The subcommittee planned and implemented a mall-walk campaign called ***Strong Bones for a Lifetime***. This campaign targeted four malls across the state. There was a mass media event that preceded the campaign, several people received media training and participated in a media campaign to kick-off the event during the month of May, which is National Osteoporosis Month. Several of these trained professionals were interviewed by News-12 New Jersey and each of the interviews aired at least twelve times on Channel 12. Those who took part in the event at each mall had the opportunity to take advantage of several educational interventions: height and risk assessments, bone density video, osteoporosis video, educational literature, and samples of various types of milk and cookies. A medical expert and nutrition expert spoke at each mall event to provide current information to the participants. The highlight was a milk mustache contest, where the winner had their picture posted on a billboard on the NJ Turnpike for a month.

Project Healthy Bones a grant-funded forty four week program sponsored by the New Jersey Department of Health and Senior Services and delivered by Extension educators taught older women the importance of exercise, nutrition, and other lifestyle factors related to osteoporosis.

Impact: A follow-up survey was done for the Strong Bones for a Lifetime program. 462 surveys were sent out and 117 were returned. Participants stated that before the event they were familiar with:

- Osteoporosis as a disease (84%)
- Risk factors (62%)
- Prevention strategies (56%)
- Many were not familiar with diagnosis (46%) and treatment options (46%)

Participants also responded they plan to respond to the training session by:

- Changing my daily diet (72%)
- Beginning a weight bearing program (76%)
- Checking the home to make a safe environment (64%)
- Almost half stated that they would discuss osteoporosis with their doctors (49%)

An analysis of the Project Healthy Bones program revealed that all women began at Level I. After 28 weeks: 65% of the women have advanced to Level 3 (last level) of the “Balance Exercise.” Seventy-eight percent (78%) of the women have advanced from using no ankle

weights in the first week to using nine-pound or more ankle weights for the leg exercises. Seventy-two percent (72%) have increased their hand weights from one pound in the first week to five pounds. As a result of their nutrition education, 100% of the women have increased their calcium and vitamin D consumption by the 28th week.

Source of Funding: Smith-Lever 3(b) & (c), State, County, and Private Funds

Scope of Impact: State Specific

Goal 3

Key Themes: Human Health
Human Nutrition

Activity: Soyfoods are becoming a popular nutrition choice for health-conscious consumers. The research is mounting that soy is protective against heart disease, some cancers, osteoporosis, and helpful in relieving the symptoms of menopause.

As soy continues to receive media attention and grows in popularity, Family and Consumer Science Educators responded to consumers' needs through a variety of program delivery methods: workshops, exhibits, taste-testing demonstrations, small group presentations, and consumer inquiries.

Impact: Workshop participants increased their knowledge, purchased more soy products, and used soy in family meals. After-class surveys of 271 participants documented a 91% increase in knowledge of the nutritional value of soyfoods and 95% learned how to use soyfoods in their daily diets. Of the 112 surveys returned (41% responding), 96% had purchased soyfoods; 76% had prepared soyfood dishes; and 76% now include soyfoods in their diets on a regular basis (daily or weekly).

Source of Funding: Smith-Lever 3(b) & (c), NJ Department of Agriculture, and Private Funds

Scope of Impact: State Specific

Goal 3

Key Themes: Human Health
Human Nutrition

Activity: Extension Family and Consumer Sciences Educators recognized the need youth have to experience positive, supportive relationships and opportunities to reduce the chances of at-risk behaviors such as alcohol, drug use and violence and as a result developed **Kids R Cooks** summer day camp program that is centered on building developmental assets that lead to positive productive lives. The camp program focused on building the external assets of youth through a variety of youth development activities. Four nutrition and health-related lessons were designed and implemented. Asset-building strategies, including building, supporting and nurturing, were incorporated into the program design. The youth went to "Camp College" and learned about the body "factory" and the role that food plays in helping the human body function.

Impact: More than 2,750 youth learned one or more nutrition and health concepts. Specifically, youth learned:

- different parts of the body and how it functions (Anatomy 101)
- how the muscles, bones, and joints work and how proper foods improve the performance of athletes (Sports Nutrition 101)
- proper care and maintenance of the teeth (Dental Anatomy 101)
- gained knowledge about how the body digests foods (Physiology 101)
- nutrition basics and why the body needs a variety of foods to stay healthy (Art 101)

Source of Funding: Atlantic City Housing Authority and Urban Redevelopment Agency, State and County Funds

Scope of Impact: State Specific

Goal 3

Key Theme: Human Health

Activity: The appearance of West Nile virus (WNV) in the New York – New Jersey metropolitan area underscored the need for mosquito research and control that is based on science. This program, which was originally designed to monitor mosquito vectors for eastern equine encephalitis virus, was able to expand its activities toward this new invasive mosquito-borne pathogen and collect surveillance data to define the extent of the health threat and identify areas that required immediate investigation. Funds were obtained to conduct a statewide surveillance effort to monitor the virus in mosquitoes and wild birds.

Impact: Though only in the first year of this program, there are significant findings which impact the effective and environmentally sound control of mosquitoes: (1) *Culex* mosquitoes, thought to be the primary vectors for this disease, play a major role in the amplification of WNV in local bird populations but their role as vectors to humans is questionable; (2) floodwater *Aedes* mosquitoes appear to pose the highest risk to humans and equines; (3) mosquito surveillance should focus more fully on meteorological events such as floods; (4) sentinel chicken flocks have limited value as indicators of WNV in any geographic area; and (5) WNV is exceptionally lethal to wild crows. These findings have and will be critical to the development of strategies to control mosquitoes and the spread of this threat to human health.

Source of Funds: Hatch, State Funds, and N.J. Department of Environmental Protection

Scope of Impact: State Specific

Goal 4

Overview: As the most densely populated state in the U. S., New Jersey is experiencing environmental problems sooner and more severely than other states. We are challenged with land, water and air issues and to 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 recognized this potential very early in their history and thus created an environmental sciences department nearly 80 years ago. The College of Agriculture was also renamed the College of Agriculture and Environmental Sciences in 1965. As a result, we have very broad and extensive research and Extension programming in this general area.

A major focus in New Jersey has been in biological and integrated pest management. The recent development of a hypervirulant strain of the pathogen that is the causal agent of Chestnut Blight disease may serve as a biological control agent for this factor that is responsible for the destruction of chestnut trees in eastern hardwood forests. Another program has developed insecticidal nematodes that serve as biological control agents. These nematodes have been patented and licensed to biotechnology firms. Rutgers staff have also facilitated cooperation between New Jersey and Pennsylvania to control blackfly populations in the Delaware River. We have GIS and GPS technologies to identify site-specific targets for the use of biological pesticides guided by IPM practices. In addition to extensive IPM programs in traditional crops such as fruits, vegetables and field crops, we have planned and implemented IPM programs for landscape plantings including turfgrass. Participating commercial landscapers report using 40 percent less pesticides. Finally, Rutgers hosts the national headquarters for IR-4. During 2000, IR-4 facilitated 511 clearances for pesticides and 56 clearances for biopesticides for minor and specialty crops crucial to agriculture in N.J. and other states.

One of the most serious problems facing N. J. farmers has been crop losses due to white tail deer. In response, Rutgers has created a Center for Wildlife Damage Control. The Center uses traditional and GIS survey techniques to identify and quantify deer densities and resulting crop losses. It also provides extensive educational programs on damage control technologies and has funded research in the area of non-lethal fertility control in deer.

Rutgers also has a long history in waste management and recycling. A recent program has facilitated the diversion of food wastes to animal feeds. This program has served as a national model and has led to significant industry and regulatory changes. New guidelines for the application of sewage sludge to agricultural lands has been published and is forming the basis of new right-to-farm rules.

Rutgers has developed considerable expertise in the area of ecological restoration resulting in the creation of the Center for Urban Restoration Ecology. The Center has supported research and demonstration projects restoring native vegetation to disturbed sites such as strip mines and landfills. The results of these have led to new policy and regulatory procedures for government agencies.

Another area of focus has been the development of biological remediation technologies. Two environmental technologies that have created and have serious potential for commercialization

are (1) phytoremediation for the clean-up of toxic metals in soils and (2) a sequential treatment process for remediation of soils impacted by hydrophobic hydrocarbon contaminants.

NJAES research faculty have been leaders in the emerging area of prediction models for climate change. Highly sophisticated models developed in our Center for Environmental Prediction are of interest in power companies, farmers, insurance companies and municipal and state highway and road authorities.

In the area of indoor air quality, a Rutgers Extension specialist, has implemented the national *Healthy Indoor Air for America's Homes* program through a train-the-trainer approach. Another activity, the *Get the Lead Out* program, targets limited resource urban audiences with the message of the dangers of lead poisoning.

Finally, New Jersey 4-H youth development faculty have capitalized on Rutgers environmental science capacity and have planned and implemented extensive environmental programs for youth. These programs have received local and national recognition.

Resources Allocated:

Research

Hatch Funds:	$915K
All Funds:	$10,225K
SY's:	24

Extension

Smith-Lever Funds:	$204K
All Funds:	$746K
FTE's:	14

Goal 4

Key Themes: Biological Control
Forest Resource Management
Plant Health

Activity: The American Chestnuts once occupied 25 percent of our eastern hardwood forests. However, the pathogen *Cryphonectria parasitica*, the causal agent of Chestnut Blight disease, resulted in the destruction of chestnut trees in the forests of Northeast America. Rutgers scientists, along with others in the Northeast, have been investigating viruses that may reduce virulence of the fungus and cause it to be less of a problem in forest settings, and to investigate the response of the fungal pathogen to these viruses. Biological control of this fungus is an ecologically and environmentally desirable goal of the research. An indirect goal is to use this system to help assess whether biological control of plant pathogenic fungi with viruses is a realistic goal in more traditional agronomic settings.

Impact: Two transposable elements have been identified which will assist in tracking the early geographic movements of the fungus, and provide markers to assess the effect of the biocontrol viruses on the fungal population in the forests of North America. Furthermore, these elements may be of great value for developing gene-tagging vectors for plant pathogenic fungi. Being able to monitor the dynamics of virulence of this pathogen will assist in planning strategies for biologically based control practices. A hypervirulant strain of the pathogen has also been created through biotechnology that may serve as a biological control agent.

Source of Funding: Hatch, McIntire-Stennis, NRI, and State Funds

Scope of Impact: Multistate Research (CT, MA, MD, NJ, NY, WV)

Goal 4

Key Theme: Biological Control

Activity: The thrust of this program, which is linked to a multistate effort, is to investigate the use of entomopathogens into pest management systems. A recent project focused on assessing the quality of the commercially produced entomopathogenic nematodes used as biological insecticides. In addition, a strain of the insecticidal nematode Heterorhabditis bacteriophora was genetically engineered by the addition of a heat-shock protein from a free-living nematode. Risk assessment studies, which included mammalian pathogenicity, insect host range, and other experiments, demonstrated that the transgenic strain differed from controls (wildtype strain) only in having increased heat tolerance. We concluded that genetic engineering had provided a precise method to alter heat tolerance without affecting other important life history characteristics, and that the transgenic nematode is unlikely to pose any threat to the environment if released on a wide scale.

Impact: The first project demonstrated that (1) the entomopathogenic nematode cottage industry lacks rigorous quality control, (2) self-regulation is problematic without feedback on quality, and (3) consumers are rarely able to provide this feedback. This study, exposing quality problems in the insecticidal nematode industry, led to a producer-driven meeting at Rutgers University to establish international industry-wide standards.

A technology license was issued for a novel pathogen strain developed at Rutgers University to a biotechnology company in Japan as a biological insecticide that will be commercialized as BIOTOPIATM. Patents have been submitted for two insecticidal nematode mass production methods.

Source of Funding: Hatch, State Funds and Private Grant

Scope of Impact: Multistate Research (AL, AR, CA, CT, FL, GA, ID, IL, KY, LA, ME, MN, MS, NJ, NY, NC, PR, SC, TN, ARS)

Goal 4

Key Themes: Integrated Pest Management
Biological Control

Activity: All immature black fly stages (eggs, larvae, and pupae) require moving water for development since water movement provides their oxygen and food. Large populations of black flies were found in many of the rivers and streams in northwestern New Jersey. In the early 1990s thousands of New Jersey residents became severely impacted by swarming black flies. These biting nuisance insects curtailed enjoyment of recreational outdoor activities during the summer months. This species was always present, but increased dramatically in numbers as New Jersey's waterways improved in quality.

A black fly geographic and demographic survey was initiated in which survey responses were solicited from citizens randomly via ads and at northwest New Jersey county fairs. Geographic information such as presence or absence of nuisance biting black flies, zip code, and nearest cross road intersection were collected. The Rutgers Grant F. Walton Center for Remote Sensing and Spatial Analysis produced color-coded maps from survey data depicting the extent and range of black fly annoyance to New Jersey residents. Using Geographic Information Systems and Global Positioning Systems tools, survey data was "layered" over river and stream geographic data providing powerful insight on the relationship between biting annoyance and breeding places. This also provided powerful visual communication to responsible agencies such as the New Jersey Department of Environmental Protection-Pesticide control Program and Division of Fish, Game, and Wildlife; the Pennsylvania Department of Environmental Protection; elected local and state officials; county health officers; mosquito commissions; and citizen activist groups all interested in site-specific targeting of IPM control relief efforts.

Impact: Based on this work a new and continuing New Jersey State appropriation enables joint NJ-PA agreement to treat sections of the Delaware River with the biological pesticide Bti, *Bacillus thuringiensis israelensis.* With the permit came the need to monitor black fly populations, using IPM recommendations for treatment. There is now a grant of more than $100,000 annually to provide an IPM basis for control efforts.

Source of Funds: State Funds, N.J. Department of Environmental Protection

Scope of Impact: Integrated Research and Extension

Goal 4

Key Themes: Integrated Pest Management
Plant Germplasm
Home Lawn and Gardening

Activity: The purpose of this multidisciplinary research and extension program, which contributes to Multistate Research Project NE-187, “Best Management Practices for Turf Systems in the East,” is to aid golf course superintendents in the selection of improved bentgrass cultivars that will require reduced fungicide inputs. It focuses on the disease response of several new bentgrass cultivars maintained under different nitrogen fertility, mowing height, and fungicide regimes. Three common foliar diseases were evaluated – dollar spot, brown patch, and copper spot.

Impact: The total number of fungicide applications used on this study in 2000 was reduced 75 to 88% for improved bentgrass cultivars compared to the most susceptible cultivar to dollar spot. From this research, it is apparent that many of the new bentgrass cultivars can be used to reduce fungicide inputs while maintaining acceptable turf quality. For most cultivars, dollar spot was most severe on turf receiving the low rate of nitrogen and the lower height of cut. Brown patch was most severe on turf maintained at greens height and high nitrogen, while a high incidence of copper spot was only seen on one pf the new cultivars.

Source of Funding: Hatch, State Funds and Private Grant

Scope of Impact: Multistate Integrated Research and Extension (CT, FL, ME, MD, MA,

Goal 4

Key Themes: Integrated Pest Management
Water Quality

Activity: An Extension program was planned and executed to address environmental issues of significant concern to residents of the Delaware Valley where ornamental landscape plantings including turfgrass are a dominant ecological feature. Landscape managers, including professionals and homeowners, rely heavily on chemicals for maintenance. As a result, pesticides and fertilizers are sometimes misused presenting risks to humans and to the environment. Water use is also a priority concern. Liberal water use threatens limited groundwater aquifers. Many believe that increasing water use is depleting groundwater aquifers at a rate that exceeds natural replenishment. This program addresses these and related environmental and health concerns by increasing awareness and adoption of sustainable landscape management practices by commercial and consumer horticulturists.

Twenty-eight educational lectures were presented to approximately 650 professionals, homeowners and Master Gardeners at 18 educational meetings offered locally. Thirteen articles were published in statewide newsletters. Additionally, approximately 5,000 consumers and professionals requested assistance with lawn and ornamental plant problems.

In another county, a mentoring program was established by RCE to educate professional landscape contractors about adopting a complete IPM program. Each month during the growing season, an extension program associate met one-on-one with the landscapers on their customers' properties. Mentoring sessions assisted with diagnosing landscape problems, demonstrating monitoring skills and record keeping, answering questions, encouraging appropriate pest control decisions, and reinforcing IPM concepts.

Impact: Overall, educational outreach (including meetings, newsletters, publications and individual publications) reached 21,000 plus contacts. An additional 150,000 Camden County residents were reached through a mass mailing, in collaboration with the Camden County Municipal Utilities Authority. Evaluation results confirmed that program efforts achieved the objectives to increase IPM understanding, improve diagnostic skills and adoption of IPM practices on at least 7,500 acres of residential, commercial and public landscapes. Evaluation data revealed adoption of environmentally sensitive lawn and landscape practices on 10,200 acres of residential, public and commercial landscapes.

Commercial landscapers in the IPM Mentoring program reduced their pesticide use by 42 percent, and increased their use of natural, biological pesticides. Sixty percent of program participants now use some IPM practice in their business, and 100 percent plan to incorporate IPM into their customer marketing. Thirty percent of participants have adopted a total IPM approach and 100 percent of those who were mentored are using IPM methods. Cooperating commercial landscapers sprayed 92 percent fewer plants after completing the IPM mentoring program. By the season's end, pesticide use had decreased 40 percent (from 240,000 gallons before the program to 144,000 gallons using IPM)

Source of Funding: Smith-Lever 3(b) & (c), State Funds, Camden County Board of Freeholders

Scope of Impact: State Specific

Goal 4

Key Themes: Biological Control
Pesticide Application

Activity: Domestic production of fruit, vegetable, herb, turf, ornamental, and other specialty crops are estimated to be worth over $40 billion dollars annually (1997 Census of Agriculture). In New Jersey, 89% of the farm gate value of crops are from high value, low acreage horticultural crops. Producers of these crops (collectively called minor crops) have numerous problems with insect, disease, and weed pests that can cause a significant reduction in farm gate value. Due to high costs of research and development, the basic producers of crop protection chemicals often do not extend legal registrations of their products into these high value, low acreage specialty crops.

USDA has established Interregional Research Project Number Four (IR-4) as the national program to support the registration of chemical and biological pest control tools for minor or specialty crops. This program is a partnership between USDA and the State Agriculture Experiment Stations. The IR-4 Project is administered from its National Headquarters at Cook College/New Jersey Agricultural Experiment Station, Rutgers-The State University of New Jersey.

IR-4 relies on commodity producers, state and federal research scientists and extension personnel to identify pest control needs and potential solutions to the problem pest on the minor crops. These needs are evaluated by the potential registrant of the chemical and/or biological pesticide, by the U.S. Environmental Protection Agency (US-EPA), and by committees of minor crop pest control experts. Once priority research projects are identified, IR-4 will provide coordination, funding and scientific guidance for both field and laboratory research to develop the appropriate data to support the registration by US-EPA. Without the assistance of IR-04, few safe and effective chemical and biological pesticides would be available for use on minor crops.

For the past five years IR-4 has focused it's research efforts to pest control tools, which are considered reduced risk. These new pest control tools, when used properly, often have very low toxicity and hazard to humans and the environment, and have the potential to serve as suitable substitutes to chemicals that are vulnerable to cancellation from US-EPA implementing the Food Quality Protection Act of 1996. In 2000, IR-4 funded 175 research projects consisting of 138 reduced risk chemicals and 37 biological pest control agents. In addition, IR-4 performed over 600 field trials.

Impact: In calendar year 2000, IR-4's efforts facilitated the regulatory clearance of 511 clearances on food crops and 56 biopesticide clearances. Since 1963, IR-4's research efforts have developed data that supports over 5,500 used on food crops, over 8,800 on ornamental crops and over 200 biopesticide clearances.

Source of Funding: Hatch, CSREES, Special Grant, Private Grant

Scope of Impact: Multistate Integrated Research and Extension all 50 states

Goal 4

Key Themes: Wildlife Management
GIS/GPS

Activity: A survey of New Jersey farmers regarding crop losses to deer was conducted by the Rutgers ***Center for Wildlife Damage Control***. The survey sampled 4,403 New Jersey farm operators whose reported annual farm sales were greater than $10,000. A total of 51% of the farmers responded. Respondents indicated that deer were responsible for 70% of the crop damage associated with wildlife on the land that they farmed. Of those farmers reporting damage, 39% reported it to be intolerable to the point of taking additional action to resolve the problem. Total annual crop losses estimated by the respondents were between $5 and $10 million. Responding farmers spent over $620,000 on deer control with 25% reporting abandonment of tillable ground, and 36% ceasing to grow certain crops due to deer damage. Survey results were mapped using a GIS and distributed to growers and legislators.

In spring of 2000, the Center for Wildlife Damage Control collaborated with Hunterdon County, Sussex County, New Jersey Farm Bureau, and the New Jersey Division of Fish and Wildlife for an aerial helicopter deer survey using FLIR – forward looking infrared aerial photography. The results of the helicopter survey covering 40,000 acres were mapped. On 5,000 acres of Delaware Township, Hunterdon County deer densities of approximately 212 deer per square mile were measured. Economic damage to crops affected by deer (corn, wheat, soybean, alfalfa, and hay) at populations of 20-25 per square mile becomes intolerable. Results shared with Division of Fish & Wildlife were submitted to the Hunterdon and Sussex County Boards of Agriculture and other policy makers, providing them with estimates of deer densities in their counties.

Impact: Maps that include FLIR deer count imagery overlaid on municipal land parcel maps served as the basis for developing New Jersey's first community-based deer management plan. Selected farmers within the highest deer density areas are working with NJAES to quantify deer density using on-farm fenced "enclosures" and yield monitoring. In September 2000, a satellite image of Hunterdon County was purchased to evaluate whether deer damage can be observed and estimated over large areas using remote sensing. These interactions will lead to improve deer management programs that are more responsive to the needs of farmers and others seeking solutions to landscape, or environmental damage.

Source of Funding: Smith Lever 3(b) & (c), State and County Funds, NJ Department of Environmental Protection, and New Jersey Farm Bureau

Scope of Impact: State Specific

Goal 4

Key Theme: Recycling

Activity: The food waste to animal feed research and education program at Rutgers University as shown potential to greatly alter the means by which food waste is managed in this country. Solid waste managers nationwide are considering the possibilities of diverting food residuals to animal feed instead of landfilling or incinerating. There are several plants (Florida, Wisconsin, New Jersey, Hawaii, Alabama, etc.) using food residuals to produce animal feed nationally. One of those, located in central New Jersey makes a product using restaurant and/or supermarket waste. This company, Enviro-Feed Corp., has been in operation for nearly two years. They market their product to beef and swine, but increasingly to dairy farms; and have shown slow growth in market development. We have been involved with Enviro-Feed in conducting research projects with Enviro-Feed pellets and in giving advice relative to both product and market development and regulatory requirements. Second, we have done the most contemporary review of the feeding of food waste that has been completed. This has helped to provide baseline data about the use of food waste cooked by traditional means (wet-cooking) and the use of processed food waste as animal feed. We have also conducted numerous research projects, which have resulted in the publication of many articles, both refereed and non-refereed, and given many presentations on the use of food waste as a feed for pigs. These have all served to support the food waste industry. Third, the Food Waste Symposia, which were initiated in 1996, have provided a forum for those interested in the feeding of food waste to animals. These have been well attended, with a national audience, since their inception, and have allowed the group to have a voice not just in solid waste management, but also in animal health policy at both the USDA and FDA.

Impact: The USDA is in the process of making changes in how the food waste feeders (we feeders) may process food waste prior to cooking. This will change both cooking and inspection requirements. Of greater note is the role that those involved with the symposia had on the Bovine Spongiform Encephalopathy (BSE) regulations in 1997. In response to input from many individuals within the organization, the FDA exempted plate waste from these requirements. Finally, the recent publication of the book, “Food Waste to Animal Feed,” and its positive reception by the industry indicate the influence that Rutgers University has had upon the food waste feeding industry, as well as the solid waste disposal industry, and the regulatory climate of both.

The food waste to animal feed research and education program at Rutgers has shown significant impact on all influence by it through national symposia and invited presentations, publication in both peer reviewed and non-peer reviewed press, undergraduate student development and organization of a trade group for those with an interest in the topic.

Source of Funding: Smith-Lever (b) & (c), Hatch, and State Funds

Scope of Impact: State Specific

Goal 4

Key Themes: Biodiversity
Forest Resource Management

Activity: Rutgers faculty, through the Center for Urban Restoration Ecology (CURE), have undertaken a series of research and demonstration projects involving the restoration of native vegetation to disturbed sites. One set of projects conducted for the U.S. EPA related to the re-vegetation of mountain top strip mines in West Virginia. These studies determined the patterns of terrestrial vegetation in affected sites with the intent to better understand the potential for re-establishment of native species. A second program developed recommendations for the ecological restoration of native vegetation on the Fresh Kills Landfill located on Staten Island. A third project involved the development of a database of all the native plant species found in the 33 county region (NJ, NY, and CT) that makes up the New York City metropolitan area.

Impact: As a result of the West Virginia study, the State has revised its protocols for reforesting lands that were the subject to this type of strip mining, and these rules have been passed by the State legislature. The new rules are now being considered for adoption by states throughout the mining region. In addition, the study has produced much detailed knowledge of the ecological process of plant species invasion onto disturbed lands, critical for wildlife habitat; this helps us to understand the ecological process of succession and biodiversity enhancement, towards improve our environments. This is of immediate use to EPA Regions 2 and 3, covering much of the eastern area of the United States.

The Fresh Kills project, on the largest landfill in North America, will yield results applicable to many other sites in New Jersey and throughout the east coast. For example, our protocols have been approved for use in a Massachusetts landfill, adjacent to state park land. There are potential policy and regulatory implications to this work. Our recommendations for landfill closure can be made into public policy, and as previously stated, other landfill management people within the tri-state area have already consulted with the team about our recommendations.

Source of Funding: U.S. EPA, NSF, State of West Virginia, New York City, State Funds

Scope of Impact: State Specific

Goal 4

Key Themes: Soil Quality
Biotechnology
Hazardous Materials

Activity: Rutgers faculty have developed several promising biological remediation technologies for soils. Phytoremediation uses certain varieties of plants to accumulate toxic metals such as chromium, lead, and cadmium from contaminated soils. A related technology uses hydroponic plant cultures to remove toxic metals from water. This technology was developed through an integration of talents involving plant physiologists, biochemists, plant breeding experts, soil scientists, ecologists, agronomists, and molecular biologists.

A second environmental technology uses a sequential treatment process for remediation of soils impacted by hydrophobic hydrocarbon contaminants. This technology will be of immediate relevance and applicability to the gas and electric utility industries as owners of former manufactured gas plant sites with soils contaminated with coal tar residues. The technology will also be applicable to wood treatment sites contaminated with creosotes, to coke plant sites, to gas works sites contaminated with gas condensate residues, and to petroleum refineries and petroleum storage facilities (such as tank farms) that have been contaminated with heavy oil fractions. In addition, this technology could be used for treatment of media contaminated by other highly hydrophobic compounds, such as sediments contaminated with PCBs, chlorinated dioxins and dibenzofurans, or soils contaminated with DNAPLs such as chlorinated solvents.

Impact: Phytoremediation technology is being used to clean up the site of the former Magic Marker plant in Trenton. It has also been used to help redress severe contamination near the site of the Chernobyl nuclear disaster. Development of phytoremediation led to a spin-off company. In addition to its obvious value to the environment and “green industries,” phytoremediation has potential to provide New Jersey farmers with new, value-added crops to cultivate, thereby increasing productivity and profits for an industry with extremely narrow profit margins, and makes previously-contaminated land available for development or agriculture.

Because of the tremendous need for more effective approaches to remediate soils contaminated with highly hydrophobic organic contaminants, the sequential treatment process has attracted a great deal of industrial interest, particularly among the electric and gas utilities. In addition, two environmental technology companies have expressed interest in licensing the technology. A patent application is currently being developed for this technology.

Source of Funds: Hatch, State Funds, N.J. DEP and Private Grant

Scope of Impact: State Specific

Goal 4

Key Themes: Weather and Climate
Global Change and Climate Change

Activity: In 1989, the first edition of *Our Changing Planet,* a report by the U.S. Global Change Research Program, concluded that, "in the coming decades, a global change may well represent the most significant societal, environmental, and economic challenges facing this nation and the world. The report supported the National goal of developing a predictive understanding of global climate change. However, existing global models are limited in the amount of information they can generate about a specific region, such as New Jersey. Such models allow for no differentiation between climate conditions in diverse, but nearby, geographic areas. Existing regional models produce more specific information, but need to be driven by global atmospheric and oceanic conditions.

Rutgers' Center for Environmental Prediction was formed to produce the Ocean-Land-Atmosphere Model (OLAM), the world's most sophisticated predictive model of climate change. By combining global and regional atmospheric and oceanic models, scientists will be able to better understand the climate system and to make increasingly realistic climate scenarios.

Impact: The OLAM model will surpass the accuracy of current models. For instance, OLAM is expected to be particularly useful to better estimate the local and regional effects of global weather events such as El Nino. Some of the other implications for this work are likely to felt in New Jersey in some very practical ways. For example, with the improved predictive capabilities of OLAM, electricity companies will be able to better plan electricity production and pricing; municipalities will be able to purchase salt and snow removal equipment based on early predictions of snowfall; insurers will know how much to charge for flood insurance; and farmers will know far in advance which crops would thrive in New Jersey during decades to come. In addition to helping us cope with consequences of climate change, the work has important implications for science. By merging the information from various models and studying the processes, scientists are gaining new knowledge about the interactions between the physics, the biology and the chemistry.

Source of Funds: NOAA, State Funds, and Private Grant

Scope of Impact: State Specific

Goal 4

Key Theme: Air Quality

Activity: Health Indoor Air for America's Homes is a national program that the New Jersey Housing and Energy specialist has implemented through train-the-trainer programs and collaborative partnerships with organizations and agencies concerned about the quality of indoor air. Seventy-eight train-the-trainer sessions have been conducted to increase awareness of common indoor air quality problems such as radon, molds, excessive moisture, second-hand smoke, lead dust, carbon monoxide and others. A series of fact-sheets were authored and has been used to support educational programs. The "Get the Lead Out" program, targeted to reach limited resource urban audiences with the message of the dangers associated with lead poisoning has been taught to school audiences. Many of the educational programs were presented in both English and Spanish. Asthma programs were also presented at schools and targeted to underserved audiences.

Training sessions were also conducted for Home Depot Home Center employees, community health workers, day care providers, welfare workers, health departments and parents, over 650 individuals were trained.

Impact: One thousand eighty eight homeowners adopted remodeling practices to avoid indoor air quality hazards. Nine hundred eight also reported that they passed along newly learned safer remodeling ideas to others. One hundred occupants detected and removed mold mildew and other biological hazards. Fifty occupants improved or corrected moisture levels in the home.

Pre-post evaluations of the lead poisoning and asthma programs revealed that there was a significant increase in knowledge and that participants would adopt improved practices such as insistence on hand washing before eating and sleeping, cook with cold water, and flush the tap before using it; and damp dust and frequently wash woodwork in window areas.

Source of Funding: Smith-Lever (b) & (c), State Funds

Scope of Impact: NJ for the report: however there is a national report of impact for the following territories and states AL, AK, AS, AR, CA, CO, CT, DE, DC, FL, GA, ID, IL, IN, IA, KS, KY, LA, MD, MI, MN, MS, MO, NE, NV, NM, NY, NC, ND, OH, OK, OR, PA, PR, RI, SC, SD, TN, TX, UT, VA, WA, WI, WY.

Goal 4

Key Theme: Natural Resources Management

Activity: 4-H Youth Development Agents planned and implemented an in-depth environmental program for Youth in grades 5-7 from a three-county area in southern New Jersey participated in a 3-day/2-night conference on waste management and environmental issues and learned to become better stewards of our resources and environmental ambassadors in their schools and communities. The program brought waste management alternatives and environmental issues to life through activities that used experiential, inquiry-based interactive and cooperative learning techniques. Youth built a mini-incinerator and landfill; constructed a compost bin; took a "trip through trash", and investigated habitats. Participants toured various facilities: a materials separation/recycling facility, landfill, composting facility, waste water treatment plant and waste-to-energy plant. Workforce preparation and career exploration were also woven into the program's curriculum.

Impact: Youth in grades 5 to 7, teachers, aids, and parents representing 10 school districts participated in the program. Pre- and post-test as well as end of program evaluations revealed that:

- 99% indicated they would recommend the program to other students in their school
- 98% increased their post-test scores from the pre-test outcomes by an average of 31%
- 73% indicated they learned "a lot" about waste management and environmental conservation
- 71% rated the program as "great" and 28% rated the program "good"
- 69% reported an increase in knowledge of waste management alternative
- 58% reported an increase in knowledge of items that can be recycled

The cooperation between all the organizations involved in this program helped to provide a well-rounded and broad-based learning experience. There was a significant amount of radio and newspaper coverage and the program has received state and national exposure and recognition. This 4-H Environmental Ambassador Program was recognized by the NJ Department of Environmental Protection for the "Outstanding Achievement in Recycling" award. This program was awarded the National Association of Extension 4-H Agents "Environmental Stewardship" award and was recently selected as a 2000 National Natural Resources and Environmental Management Flagship Program.

Source of Funding: Smith-Lever 3(b) & (c), State, County, and Private Sector Funds

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. These needs are the focus of many of our family and consumer science and youth development programs. We have selected just several to highlight in this report.

One of the most successful and comprehensive programs ever developed to assist families living on the financial "edge" with little or no savings and high debt loads is *Money 2000.* Over eighteen hundred residents enrolled in the program in New Jersey report nearly $4.5 million in increased savings and $2.6 million of reduced debt. The program has been replicated in over 40 states. A cost-benefit analysis shows that for every $1.00 invested by RCE in the program, participants save and/or reduce debt by $36.75.

Rutgers Extension personnel have planned and implemented numerous youth- and family-at-risk programs. One such program is the Sussex County *4-H Teen Mentoring* project in which members of the 4-H Teen Council serve as mentors for at-risk youth. A second program, the Middlesex County *4-H Holiday Shopping Day for the Needy,* provides a free day of holiday shopping for needy families. Approximately 175 youth were served by this program in 2000. In Monmouth County, the Kids for Kids 4-H Club has demonstrated along standing appreciation for diversity through its work with special needs youth and young adults.

Three workforce preparation programs for youth offered in New Jersey are *Kids in Biz, Careers in Science Education,* and *School to Work.* The first program exposes middle school youth to career options in the food industry, while the second provides the same age group hands-on training and practical experience in various science fields. In the *School to Work* program, federal work-study students served as tutors for reading and math to over 2000 K to 8 students in New Brunswick, N.J.

Allocated Resources:

Research

Hatch Funds:	$51K
All Funds:	$893K
SY's:	2

Extension

Smith-Lever Funds:	$902K
All Funds:	$3,536K
FTE's:	68

Goal 5

Key Theme: Family Resource Management

Activity: Family and Consumer Sciences Educators developed a comprehensive program to assist families living on the financial “edge” with little or no savings and high debt loads. The statewide ***Money 2000*** program encouraged participants to save and/or reduce debt by $2,000 before the end of the year 2000. The program provided participants with a free quarterly newsletter between 1996 and 2000; optional classes, a statewide home study course, and "PowerPay" a computerized debt reduction analysis and computer software program to track participants progress. In addition, program coordinators have distributed Money 2000 press releases weekly to NJ newspapers.

Money 2000 participants are surveyed six months following enrollment and every six months thereafter to track their financial progress (*i.e.*, increased savings, reduced debt, *etc.*) Statewide Money 2000 impact numbers and the potential impact of completed PowerPay computer analyses are summarized twice a year in June and December.

Impact: 1,832 NJ residents enrolled in the Money 2000 program. To date, participants have reported a total impact of over $7 million dollars: $4,453,138 in increased savings and $2,602,195 of reduced debt. The Money 2000 program is being replicated by Cooperative Extension in over 40 states and was featured in the January 1998 issue of MONEY magazine. More than 13,000 participants from 29 states have reported savings or debt reduction totaling nearly $20 million. A grant-funded Money 2000 promotional video has been viewed by thousands of people nationwide and duplicated for use in over a dozen states. PowerPay debt reduction computer analyses is provided statewide. Eighteen cable television shows have been produced with estimated outreach of 300,000 households statewide. A cost-benefit analysis for NJ participants showed that for every one dollar Rutgers Cooperative Extension devoted to Money 2000 programming, participants increased savings and/or reduced debt by $36.75.

Source of Funding: Smith-Lever 3(b) & (c), State, County, and Private Funds

Scope of Impact: Multistate Extension, NJ, AZ, ND, CT, KY, ARK, NV, Ha, Co, OK, NM, IN, SC, PA, NY, IA, IL, VT, VA, OH, CA, SD, MI, OR, UT, WA, MD, NB, WI, WY, LA, DE.

Goal 5

Key Theme: Children, Youth and Families at Risk

Activity: In today's society far too many youth are involved in negative behavior. 4-H community service projects provide youth an opportunity to become active participants in their community. Through community service learning youth practice citizenship by developing a sense of caring for the welfare of their communities in positive activities which have benefited others.

Impact: In Sussex County the 4-H Teen Mentoring project has enriched the lives of at-risk-youth who live in an apartment complex with limited exposure to positive peer role models. The 4-H Teen council worked to establish "buddy partner" with youth in this environment. Teens who worked as mentors with at-risk youth participated in classes on mentoring skills. Partnerships were then formed between Teen Council members and youth from the apartment complex. Meeting of buddy partners included opportunities for teens and youth to bond and become familiar with each other. Teens and youth took part in activities including hiking, swim parties, and campouts. Teen mentors contacted their buddies frequently. As a result of the mentoring process, friendships were made, self-esteem of the youth was strengthened and the teens felt good knowing that they had made a difference in the lives of other youth.

The Middlesex County 4-H Holiday Shopping Day for the Needy is an event that has been held annually since 1997. It is a community service learning project that is planned and implemented by the 4-H Teen Council to provide a free day of holiday shopping for needy families in the county.

Donations of new clothing, toys, games and books, were requested from businesses, community organizations, 4-H clubs and 4-H families. Teen Council also received monetary donations from county organizations, clubs and through Teen Council fund-raising efforts. Teen Council members used these funds to purchase toys and clothing appropriate for the ages of the children being served

The 2000 4-H Holiday Shopping Day reached approximately 175 youth from nine different Middlesex County agencies. Parents who attended the event were thrilled with the opportunity to provide holiday gifts for their children, and many of them said that this was the "only way they had to give gifts to their children this year."

Teens involved in the Shopping Day project indicated that they felt a sense of satisfaction from being involved in the event, and believed that they were making a positive contribution to the community. Their comments included the following: "It makes me realize how fortunate I am, and makes me feel good to help those less fortunate," "Most people don't realize that many families, not just the homeless, need assistance."

Teens received a 1999/2000 Colgate Youth for America Honorable Mention Award for this community service project.

Source of Funding: Smith-Lever (b) & (c), Private and State Funds

Scope of Impact: State Specific

Goal 5

Theme: Character/Ethics Education

Activity: Character education is designed to introduce youth to the six pillars of character, trust-worthiness, respect, responsibility, fairness, caring and citizenship. In Monmouth County the Kids for Kids 4-H Club has fostered diversity, caring, respect and responsibility for over 18 years.

The club is engaged in a unique activity whereby club members fundraise for and conduct an annual social for clients of the Association for Retarded Citizens (ARC) in Monmouth County. The purpose of this activity is to promote in youth increased acceptance of those with disabilities. This is achieved through social interaction to bring club youth and ARC members together. The social is also designed to provide a recreational opportunity not often afforded to ARC clients. In addition to the social, 4-H club members have conducted a variety of recreational/educational activities for ARC clients throughout the year such as Knights of Columbus dance and an exercise program. They also conduct community service activities such as collecting for the All Saint's Church Navesink Food Pantry and the Lunch Break in Red Bank.

Impact: Over 500 youth have been involved in this activity since the club's inception. The club members, club leaders and volunteers demonstrate a great commitment to this project conducting extensive fundraising including the 24 hour dance marathon at Keyport High School. The club generates a great deal of community support for this effort, involving local merchants and government officials.

The annual social for ARC clients was a featured segment on NBC's "48 Hours" television program. Club leaders indicate that the 4-H members have demonstrated increased sensitivity to those with disabilities. The community service activities of the club have also fostered youth's appreciation of diverse groups. This 4-H club has earned recognition due to its longstanding commitment to diversity appreciation.

Source of Funding: Smith-Lever (b) & (c), State Funds and Private Sector

Scope of Impact: State Specific

Goal 5

Key Theme: Workforce Preparation – Youth

Activity: Extension Family and Consumer Sciences education developed ***Kids in Biz*** (KIB), a 10-lesson workforce preparation program exposed 25 middle school aged youth to job/career options in the food industry. Youth from two Atlantic City Housing Authority communities participated in KIB after school. Kids were taught business basics, promotion and sales using the KIB curriculum guide. "Classes-on-the-move" heightened their awareness about the business of catering, fast food, and job options in the supermarket industry. A casino visit exposed them to the many jobs required to move food from the "platform to the plate".

Impact: Three components of the Secretary of Labor, Secretary's Commission on Achieving Necessary Skills (SCANS) Workforce Preparation Model were achieved including Early Development (exposure to a variety of job and career opportunities); Awareness (structured exposure to community work environments); and Guided Exploration (extended visit and supervised experience in work environments). Additional impacts include:

- 100% of the youth developed two or more workplace competencies and skills
- 100% learned preparation skills and how to work in teams
- 100% developed their first resume
- 100% developed a business plan in addition to using marketing and sales basics
- 24 of 25 youth graduated (96%) – a significant accomplishment for adolescents who volunteered to attend an after school program
- Youth learned two or more nutrition and food safety concepts

Source of Funding: County and Private Funds, and Atlantic City Housing Authority

Scope of Impact: State Specific

Goal 5

Key Theme: Workforce Preparation Youth

Activity: *Careers in Science Education… 4-H Junior Intern Program* was designed to meet a need for developing knowledge, skills, and behaviors essential to success in the workplace, while increasing youth interest and expertise in various science fields. This program was designed as part of a partnership between New Jersey Audubon's Nature Center of Cape May and the Cape May County 4-H Youth Development Program.

Careers in Science Education is an 8-week summer program for 7^{th} – 9^{th} grade youth, which combines hands-on training and practical experiences. Junior interns were matched with the Nature Center's teachers and naturalists who served as mentors. The interns receive 16 hours of training and mentors received 4 hours of orientation/training. Two days per week, the interns worked directly with their mentors for a minimum of two hours, assisting with the implementation of the center's Summer Day Camp Program. During this time, the job shadowed naturalist teachers, helped to present activities to younger youth, conducted guided tours and participated in community service projects. This model program provided youth the opportunity to develop essential workplace skills, sample a variety of career options, increase their knowledge and skills in the area of science, and become contributing members of the workforce.

Impact: All participants, both interns and mentors, successfully fulfilled their responsibilities and spent over 1000 hours. Junior interns reported that the program provided valuable experiences impacting their career choices, increased their knowledge of environmental and marine science, and developed their interest in working in science education as an intern, volunteer, or in the future as a teacher/naturalist. Youth indicated that it helped them understand basic techniques of teaching science, increased their public speaking ability, helped develop their management and organizational skills, and provided an opportunity for self-evaluation and personal development. Nature Center staff observed a marked improvement in the skills, sense of responsibility, and performance of the interns from the beginning to the end of the program.

A stream restoration project was undertaken by the participants on a county-owned park. Under the direction of the Natural Resources Conservation Services biologist, the participants planted bushes at the edge of the stream to stop erosion. This stream was one of a few natural trout-bearing streams left in the county. When the group studied the effects of their work the following summer, improvements were seen in the stream flow and less sediment had been deposited in that section of the stream.

Source of Funding: Smith-Lever 3(b) & (c), County, State and Private Funds

Scope of Impact: State Specific

Goal 5

Key Theme: Workforce Preparation – Youth Literacy

Activity: A county 4-H Agent worked collaboratively with the Federal work-study program to implement ***Workforce Preparation – School to Work***, one of the National Initiatives for 4-H Youth Development. The America Reads Challenge is a national bi-partisan effort to help every child read independently by third grade. The America Reads/4-H program addresses the Workforce Preparation initiative in at least two ways: (1) college students are getting work experience and in some cases may actually make career goal changes because of their tutoring experiences, and (2) children must be able to read and do math to be prepared for the world of work.

The 4-H agent recruited and trained Federal work-study students who were placed as tutors of reading and math. The training consisted of 3 hours in a group session where tutors receive instruction on how to plan lessons and techniques for tutoring the students. An additional 2 to 3 hours is required of the tutors to view tapes of actual tutoring sessions and instructions on how to use "The Phonics Game" to teach phonics. After training is completed, tutors are assigned students. The goal is to meet with same students at least one-half hour two times a week. Over 2,000 students (grades K-8) at Paul Robeson and Livingston Elementary Schools in New Brunswick were tutored in reading and math by federal work study students.

Impact: Teachers returned evaluations of the tutoring program. Thirty-two of the children receiving tutoring were in these teachers' classes. Eighty-four percent increased their interest in reading; 72% increased their enjoyment of reading, and 66% showed improvement in their reading skills.

Source of Funding: Smith Lever 3(b) & (c), Federal Work Study, and Local Board of Education

Scope of Impact: **State Specific**

Goal 5

Key Theme: Character/Ethics Education

Activity: Character Counts is one of the most widely used and recognized character education and ethical decision-making models. Training using this model was conducted on the Cook Campus. This 4-day session was an interactive session designed to introduce participants to the Six Pillars of Character (Trust-worthiness, Respect, Responsibility, Fairness, Caring and Citizenship). Thirty five participants who received the training have continued to provide a minimum of three additional sessions within two years of the initial training.

Impacts: This train-the-trainer model has resulted in some of the following impacts:

- Character Counts! Was presented to 160 4-H members as part of the 1999 SJTC Conference. One elementary school has mandated that the six pillars be taught as part of the curriculum for the entire school.
- Character Counts! Was taught as a workshop to a group of Counseling Graduates of St. Elizabeth's College. Plans are in the works to do the same workshop for student teachers.
- Mercer County Family and Consumer Sciences program has been using Character Counts! With families making the transition from welfare to work.
- Character Counts! Has been used in 4-H clubs throughout the state and RCE 4-H youth development staff meetings.
- Fifteen teens became Character Counts! Facilitators and are working with juvenile offenders.
- Character Education Institute was conducted for the past 2 years by the NJ Department of Education bringing together over 300 educators and administrators to network and discuss Character Education issues.
- Two networking meetings have been held for workshop participants to share ideas and to plan upcoming Character Counts! Events.
- Most significant is the fact that the Governor has included $4.65 million dollars in the FY 2001 budget to be used for Character Education.

Source of Funding: Smith Lever (b) & (c) and State Funds

Scope of Impact: State Specific

B. Stakeholder Input Process

In December 1999, the Executive Dean appointed the Cook Steering Committee composed of faculty, students, administrators, and stakeholders to manage and coordinate a transparent process of visioning and planning to engage all stakeholders of Cook College New Jersey Agricultural Experiment Station (NJAES) in the development of a new mission and vision statement and strategic plan.

Stakeholders were actively engaged in this process that included ten visioning and listening workshops held on campus, county dialogue sessions held throughout the state that engaged residents and provided an opportunity to involve under-represented and under-served populations. At the county level, individual letters of invitation followed by phone calls were sent to invite agency heads, master and teaching volunteers, county decision makers, program participants and other key county leaders representing the unique diversity of each county. In addition, a diverse group of stakeholders were contacted via telephone interviews for input into the process. Stakeholders played a key role in identifying critical issues and mapping future direction through their service on "strategy teams" formed to explore 3-5 year strategies and goals for Cook College NJAES. A website was also established to provide an opportunity to insure inclusiveness in engaging stakeholders and others in the process. This process has involved academic program, research and Extension clientele in a process where their input was valued and given equal consideration as that of all others involved in the visioning and planning effort.

Information gathered through the open process and listening sessions was used for a Visioning Conference that involved internal and external participants in a working meeting to examine core values, mission and 3-5 year goals as framework for future direction.

Beyond the strategic planning efforts to engage stakeholders, NJAES has formal mechanisms established to receive input from stakeholders. 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.

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 diverse needs of county residents are addressed through appropriate Extension educational program.

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 and provide significant input and links.

C. Program Review Process

There have been no significant changes in the merit review or scientific peer review processes since the 5-year Plan of Work.

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

Mid-Atlantic Fruit, Vegetable, Crop Manuals and Conferences

Each year New Jersey Extension specialists and agents work with colleagues in one or more of the neighboring states (PA, DE, MD, WVA, VA) 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 1500 copies are sold each year. Recommended practices address economics, environment (IPM) and practical tools for everyday agricultural activities. In addition, several conferences, the Mid-Atlantic Vegetable Workers Conference, the Tri-State Horticultural meetings and the Shenandoah Valley Fruit Workers Conference, bring together over 500 scientists and/or growers to discuss the latest problems and practices affecting their respective industries. No direct impacts on production efficiency or environment aspects can be measured on the farm, but the number of purchased copies of manuals and attendance at meetings remains strong and indicative of growers in the area.

EPA Region-2/Cornell/Rutgers Extension Environmental Liaison

Through collaborative funding by EPA, Cornell and Rutgers Cooperative Extensions and USDA-CSREES, a liaison was hired and placed in EPA-2 offices in New York City to facilitate a cooperative educational partnership among the sponsoring agencies. The partnership has recently expanded to include the University of Puerto Rico and the University of the Virgin Islands. Initial efforts of the liaison are focussed on water quality and watershed management issues. Specific programs have related to the following:

1. Regulatory and assistance programs associated with animal feeding operations and confined animal feeding (CAFO/AFO).

2. Initiatives to educate municipal officials and the general public about the management of nonpoint source water pollution (including NEMO, LEAPE, Home-A-Syst and related Cooperative Extension programs).

3. The Clean Water Action Plan, the Section 319 nonpoint source grant program and the Stormwater II regulations.

4. New York City Watershed Protection Program.

5. New Jersey Watershed Planning Program.

6. EPA National Estuary Program, including the three NEP estuaries in Region 2.

7. Initiatives to assist communities to effectively manage growth.

To date, efforts have concentrated on building partnerships not only within the sponsoring groups, but also with external partners. The liaison has been named to five external groups

demonstrating the value of this liaison role. The liaison has additionally trained Extension educators and facilitated the development of a major grant proposal.

Penn-Jersey Livestock/Crop Partnership

Agents from Pennsylvania and New Jersey on the northern borders of the Delaware River plan and conduct winter meetings, field days and demonstrations with support of specialists in both states. The Penn Jersey Extension Partnership has provided formal educational programs for participants from a regional area with attendees coming from five states. The programs delivered covered field crops, pastures and forages, West Nile Virus, equine management, on-farm nutrient management, Integrated Pest Management, Integrated Crop Management, and the economics related to more profitable crop and animal production strategies.

Many of the programs developed by the Penn Jersey Group key into specific clientele needs through our post program evaluations, which are used to implement future program themes and topics. Based on the program evaluations clients attending the sessions have indicated changes in practices. Items changed range from reducing fertilizer applications, improved IPM and ICM practices, increased forage and pasture management with resulting improvements in conservation and nonpoint source pollution, and an overall improvement in management that ultimately made them more efficient.

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

This regional project in NJ, NY, MD and DE focuses 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 are being developed in Burlington County, NJ. 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.

To date the following significant accomplishments have been achieved:

- A comprehensive regional governance team of 12 and an advisory group of 45 public and private partners representing the food industry as well as educational institutions regularly meet to promote consistent regional programming and shared decision making. This provides the basic structure for institutionalization and sustainability of the developing system.

- Two hundred fifty partners representing secondary and post secondary schools, government, organized labor, trade and industry groups, private business, community groups, and Cooperative Extension are working on a regional level to design, implement, and replicate programs.

- Ten model programs have been implemented addressing a broad range of ages from K-college and on to adulthood.

- The project has reached out to disadvantaged out of school youth (aged 16-24) by networking regional resources from public and private entities throughout the Mid-Atlantic Region to reconnect youth to school and the workplace. To date, 23 youths (mostly Spanish speaking) have returned to GED programs, received workplace skill training, and are in paid internships en route to higher paying management jobs in the food retailing industry.

- In New York City (for the first time) a study has been completed and published on the workforce development needs of the City's food industry.

- A 35-credit certificate course has been developed in partnership with Ocean Spray Cranberries, Inc., and Burlington County College. The certificate is for a "Food Processing and Packaging Technician". Thirteen Ocean Spray employees are currently enrolled in the course. A marketing campaign is underway to enroll county college students in the fall semester 2000.

- Articulation agreements between colleges in New Jersey allow students to articulate between high school, community colleges, and 4-year institutions in Food Retailing Management.

- Over 200 Food System Careers have been documented and printed in a binder to better inform young people and prospective workers of potential careers, skills, and education required and where to obtain skill training in the region.

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. To date, the New Jersey 4-H Science Discovery Kids, Volume 1, have been accepted as part of the national 4-H Juried Curriculum Collection.

Northeast and Mid-Atlantic Direct Marketing

This collaborative effort with states throughout the region (NJ, NY, PA, MD, VA) and direct marketing organizations is coordinated by New Jersey. The major event is an annual conference in which educational programs and exhibits are a major component. In FY 2000, the Direct Marketing Conference focused on Agro Tourism. Over 200 participants came from the five coordinating states and Canada. For many farmers, agro tourism has resulted in community-wide efforts to increase farm visitation. The program adopted most widely has been the development of corn maizes to attract visitors to the farm market. Farmers have reported that they can expect anywhere from 300-3000 visitors in a two-month period. Depending on the baseline, some have seen as much as a 10-fold increase.

The group is also working with farmers and teachers to explore matching agrimarketing and agribusiness to core curriculum standards for elementary and secondary schools.

Food Systems Web Development, Mid-Atlantic Consortium (MAC)

The MAC project is a collaborative effort between Rutgers, University of Delaware, Maryland, Cornell and Sussex County Community College to develop and launch a website to educate consumers about local agriculture, its health benefits, environmental impacts of agriculture, food systems and provide a link to the USDA Ag Library for food safety information. Stakeholders have been actively involved in the development and review of the website with special efforts made to reach out to underserved and underrepresented audiences. The site has not yet been launched.

Weed Science Cooperative Agreement with Delaware

New Jersey and Delaware work collaboratively to share specialist expertise. Delaware provides field and forage crop weed management. Expertise and New Jersey provides nursery and turf weed management expertise. In FY 2000 a New Jersey specialist made a presentation on turfgrass weed management at the Delaware Landscape and Nursery Association annual meetings for over 150 participants. The clientele reached by these presentations represented under represented clientele groups. Three articles have been requested for the Delaware Ornamentals and Turf Hotline newsletter. In addition, requests have been made for short courses and workshops in weed management in turf and ornamentals for summer/fall of 2001. Ten to fifteen requests for specific information on weed control via email and phone since the agreement started in 2000.

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 and consumption.

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

FPI's annual and long-term research and outreach agenda are determined by its industry, government, academic, and public partners. It is overseen by a Board of Directors comprised of prominent members from each of the stakeholder segments. Informing the Board are Issue Are Advisory Committees focusing on nine critical policy areas including: food quality and safety; business climate and long-term sustainability; environmental impact and regulations;

food pricing and consumer welfare; health, food, and nutrition; food security; labor quality and education; food service, retail, and distribution; and international trade. Committees are made up of stakeholders representing the four segments.

FPI is currently supporting research and outreach projects relating to the following food policy issues:

- Consumer perceptions of food biotechnology
- Usage of alternative food delivery systems
- Nutraceutical industry development
- Blueberry industry development
- Food waste diversion

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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 2000**	**FY 2001**	**FY 2002**	**FY 2003**	**FY 2004**
03 PENN-JERSEY Livestock/Crops	4,000				
02 MAC-PATHWAYS/Food Policy & Food Systems Web	21,500				
05 Mid-Atlantic Fruit, Veg., Crop Manuals/Conference	4,000				
06 Weed Science – NJ/Delaware	2,500				
07 Northeast Direct Marketing	1,000				
08 EPA-2/Cornell & Rutgers	13,000				
09 4-H Jury Curriculum & Related	1,000				
10 Regional Research Projects	1,423				
Other	0				
Total	48,423				

Zane R. Helsel
Director

March 30, 2001
Date

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F. Integrated Research and Extension Activities

Animal Production Efficiency

Projects are aimed at increasing the reproductive efficiency in small sheep and goats, development of non-lethal population control of white-tail deer, more effective nutrient use in dairy and beef cattle, and nutritional control and/or prevention of heritable disorders in equine. The latter project has resulted in a patent (Diagnosing a predisposition for equine osteochondritis dissecans) and the testing and production of new feeds and feeding practices for growing horses.

Field and Forage Crops

New management systems are being investigated for hay production and pasture productivity that enhance profitability and minimize the potential for nitrate leaching. Preliminary findings demonstrate that hay producers can increase profitability by using smooth bromegrass and orchardgrass. Best management practices for NJ horse pastures are being developed and will be disseminated through a new web page. A proactive campaign is being developed to increase the awareness of new federal regulations relating to nutrient management. Wheat, soybean and corn trials were conducted at three locations across the state and results have been made available to producers. Participation continues in a multi-state project to develop new potato clones for reduced pesticide use and increased profitability.

Turfgrass Breeding and Management

A team of turfgrass specialists including breeding, biotechnology, management, pathology, entomology, and weed science are focusing on the development of new varieties and management practices for production and maintenance of turfgrass in New Jersey. New varieties and practices have been developed that require the use of less chemical pesticides and more efficient use of water and nutrients. As noted previously, approximately 195 turfgrass varieties from this program are currently licensed to and are being marketed by commercial seed companies. These specialists also participated in a multi-state effort to develop best management practices for turf systems in the eastern US.

Plant Pest Management Systems

One project that is associated with a multi-state effort focuses on the incidence and control of Plum Pox disease. An ongoing surveillance program has been developed in cooperation with the NJ Department of Agriculture and educational programs have been developed to increase awareness of NJ growers. A second project is investigating biological control of insect predators on vegetables through the intercropping with flowers.

Plant Production Systems

A multidisciplinary team of engineers, horticulturalists and an economist has participated in a multi-state effort to support the design, construction and operation of controlled environment

plant production facilities. The NJ program supports the NJ commercial greenhouse industry and is contributing to a NASA funded NSCORT project to develop closed plant production systems for long duration space missions. Another program is investigating the profitability and adaptation of plasticulture strawberry productions systems for NJ. Vegetable and fruit breeding and evaluation are providing new cultivars of important horticultural commodities for use by NJ growers. Evaluations of flower production systems assist the floriculture industry in improved practices.

Food Safety

A food science specialist is developing microbial quantitative risk assessments for predicting safety and quality of foods. He has developed a good agricultural practice training program to improve the safety of produce grown in NJ. Also a fact sheet on the new FDA regulations for fresh juice was developed for producers. In partnership with the NJ Department of Labor, a training program has been developed to teach food safety, good manufacturing practices and HAACP to food companies.

Food Security

A number of activities are underway which impact on community food security in NJ and also contribute towards a multi-state research and outreach project on local food systems. A Farm to School program has been initiated to link NJ growers with schools to provide local produce to school lunch and summer feeding programs in three pilot cities. The Youth Farm Stand provides city youth an opportunity to develop workforce skills and at the same time make fresh produce available to city residents. The Sustainable Food Production project has established two 1,500 square foot greenhouses to model year round food production in an unheated space with the resulting produce be marketed, in conjunction with Elijah's Promise, to local restaurants. A coalition was created with an EPA Healthy Communities grant to develop community gardens and nutrition education lessons for urban residents.

Human Nutrition

A marketing specialist conducted a survey of consumers visiting organic food markets. Information was collected on purchasing decisions, attitudes about organic and non-organic produce, and demographic characteristics. This project contributes to a multi-state effort on food demand, nutrition and consumer behavior.

Nutrient Management and Recycling

Projects include the investigating: the effect of land application of municipal collected shade tree leave on soil quality and crop production; the effect of leaving clippings during mowing on lawn and soil fertility; and the environmental and economic impacts of nutrient management on dairy forage systems (as a contribution to a multi-state research project). An additional research and education program focuses on diverting food wastes to animal feed instead of landfilling or incinerating. This program has resulted in the publishing of a book (Food Waste to Animal Feed) and numerous scientific and popular articles, development of six national

symposia, numerous invited presentations, and the creation of the Food Recovery and Recycling Association of North America.

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 NJ 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. 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.

Environmental Quality

Work in the area atmospheric particulate matter (aerosols) which has resulted characterization of personal exposure which will be helpful in developing a NJ air quality management plan to meet the EPA's National Ambient Air Quality standards. Numerous training programs throughout the year provide certification education to agency personnel.

Solid waste management (sewage, food, animal) presents numerous problems in our densely populated state. Agents and specialists have developed an extensive set of guidelines on the use of sewage sludge on agricultural land which is forming the basis of an "agricultural management practice" promulgated right-to-farm rule for NJ. Guidelines on food wastes and horse manure are based on applied research are forthcoming.

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State New Jersey

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

	Actual Expenditures				
Title of Planned Program/Activity	**FY 2000**	**FY 2001**	**FY 2002**	**FY 2003**	**FY 2004**
Animal Production Efficiency	39755				
Field and Forage Crops	35821				
Turfgrass Breeding and Management	54413				
Plant Pest Management	32588				
Plant Production Systems	42578				
Food Safety	16425				
Food Security	19941				
Human Nutrition	8732				
Nutrient Management/Recycling	23365				
Agricultural Financial Mangement	16491				
Total	294109				

Adesoji Adelaja — Director
March 30, 2001 — Date

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_X_ Integrated Activities (Smith-Lever Act Funds)

Title of Planned Program/Activity	Actual Expenditures FY 2000	FY 2001	FY 2002	FY 2003	FY 2004
Field and Forage Crops Management	7880				
Turfgrass Breeding and Management	37293				
Plant Pest Management	13122				
Plant Production Systems	58715				
Food Safety	11666				
Environmental Quality	19997				
Nutrient Management/Recycling	13087				
Agricultural Financial Management	7720				
Total	169480				

Zane R. Helsel
Director

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