

2001 Annual Report PLAN OF WORK

State of Delaware

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University of Delaware
College of Agriculture and
Natural Resources

Delaware State University
College of Agriculture and
Related Sciences

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The annual report on the comprehensive
Plan of Work for the
1890 and 1862 Land Grant University
Research and Extension Programs
Serving the Citizens of the State of Delaware

INTRODUCTION

This is the annual report on the Plan of Work for Delaware's research and extension activities, as required by the Agricultural Research, Extension, and Education Reform Act of 1998 (AREERA), and follows the USDA "Guidelines for Land Grant Institution Plan of Work." This report includes the research and extension activities supported by USDA at Delaware State University and the University of Delaware.

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PLANNED PROGRAMS

NATIONAL GOAL 1. AN AGRICULTURAL SYSTEM THAT IS HIGHLY COMPETITIVE IN THE GLOBAL ECONOMY

UD researchers have prepared normalized cDNA libraries from tissues of economic importance to the poultry industry; namely, those involved in immunity, growth, and reproduction. Sequences from these libraries have been obtained and submitted to GenBank, and the sequence database can be viewed at www.chickest.udel.edu. Clones listed are distributed worldwide to poultry researchers. The database and clones are being used by laboratories worldwide to apply poultry genomics to improving production. The information from these studies will be useful to breeders trying to optimize vaccine efficacy and other desirable production characteristics. Culinary Herbs and Essential Oils continue to be one of the premier programs at Delaware State University. DSU level of engagement in this area is complimented by its progressive association with Herbs of Commerce (American Herbal Products Society, 2000, required by FDA for labeling) and the publishing of The Big Book of Herbs (interweave Press, November 2000). The Principal Investigator serve on the

editorial boards of Herbs for Health, Economic Botany, and Journal of Essential Oil Research, as well as advisor for ABC (American Botanical Council) and consultant for AHPA (American Herbal Products Association).

In 1997, the Food and Drug Administration (FDA), in implementing the Dietary Supplement Health and Education Act of 1994 (DSHEA), stated: " The common usual name of ingredients of dietary supplements that are botanicals...shall be consistent with the names standardized in Herbs of Commerce, 1992 edition...." (21CFR §101.4h). A Delaware State Researcher was the primary source of information for the 1992 edition of Herbs of Commerce and is one of the four co-authors of the Second Ed. of 2000. The Second ed. of Herbs of Commerce, published by American Herbal Products Association (AHPA), lists 2,048 separate species alphabetically (compared with nearly 600 names in the First Edition). This work establishes a single common name for each of the herbs in trade. Not only are the English and Latin names given, but also the Pinyin (China) and Ayurvedic (India) names. The intended audience is worldwide and includes the manufacturers of dietary supplements and other foods products, from research departments, quality control offices, product manager's desks, graphics departments, marketing departments, and Internet services departments, to the management of each and every herb company, pharmacists, healthcare practitioners, suppliers, writers, art directors, researchers, and professors. Within the first year, 800 copies were sold, and the FDA has started the process to list this as the mandated edition for labeling in the U.S.

The importation of herbs and spices rose from 393.5 g per capita in 1960 to 1146.5 g per capita in 2000 (a 291% increase). The increase in importation of essential oils likewise has increased from 24.7 g per capita in 1960-64 to 123.9 g per capita in 2000 (a 502% increase). In 2000, the value of imported condiments, seasonings, and flavoring materials totaled \$650 million while exports totaled \$172 million, the value of imported essential oils totaled \$300 million while exports totaled \$557 million, and the value of imported herbal teas totaled \$126 million while exports totaled \$29 million. It is estimated that the United States imports about two-thirds of its spice and seasoning requirements and increased demand for ethnic foods has contributed to the rising trend in imports over the past decade.

The economic damage caused by infecting organisms on animal health for Delaware's billion-dollar poultry industry has devastating potential. Using biotechnology techniques and animal genomics research to unravel the fundamental mechanisms of poultry diseases, UD researchers develop recombinant vaccines that combat current and emerging infectious diseases in poultry, thus preventing catastrophic losses. In addition, UD Poultry Diagnostic Laboratory yearly examines 700 disease cases and tests 20,000 blood samples for antibodies in order to monitor for diseases and to assess the effectiveness of vaccination programs.

Animal production efficiency for dairy farmers points to fly management as key, since these insects can contribute up to a 25 percent loss in milk production. Multiple IPM strategies were instituted when fly-breeding areas were identified in dairy operations by UD scientists, thus reducing fly populations by 60 percent and insecticide use by 30 percent.

At Delaware State University, research results indicate that more than 560 kg K₂O per hectare is required to sustain alfalfa production. Early results indicate that a 1:4 ratio of phosphorus to potassium is adequate to maintain alfalfa productivity, even though lower soil phosphorus levels had been noted when adequate potassium was available to maximize yields and maintain levels of soil phosphorus and potassium.

They have documented that a recently developed Bermuda grass variety will establish from seed. If sprigging can be eliminated, the use of Bermuda grass could increase on the Delmarva Peninsula since a local source of sprigs does not exist. The interseeding of rye into Bermuda grass plots increased total annual forage available for grazing 5.6 Mg ha⁻¹. Bermuda grass growth during the following summer growing season was not affected.

Agricultural profitability in today's environment means livestock producers must improve forage production and extend the grazing season through irrigation, one aspect of an ongoing study on Delaware pasture management.

As an alternative to current agricultural crops in the Mid-Atlantic region, aquaculture is being evaluated at Delaware State University within the given restrictions of seasonality and limited land and water access. Because of environmental concerns associated with the introduction of exotic species, the culture of the native white river crayfish, *Procambarus acutus acutus*, and two local baitfishes are being studied. The overall goal of this project is to develop intensive culture techniques for these local species given the cool water environment and to increase their economic potential by improving production efficiencies and yields. To date, research has included evaluation of 1) stocking density of crayfish broodstock on juvenile production; 2) intensive pond production of crayfish (effects of stocking density on production); 3) regional comparison of growth and production of crayfish (South Carolina and Delaware); and 4) control of aquatic nuisance weeds in crayfish ponds. The upcoming production season will focus on baitfish production. Results indicate that broodstock densities could be increased without negatively impacting juvenile production. Pond production of crayfish for food market production is limited when stocking newly hatched juveniles, regardless of density, locality or aquatic weed control methodology. Additional research is needed to evaluate nursing of juveniles to larger sizes prior to stocking to increase survival.

Soybean variety selection has an impact on the agricultural profitability, so UD researchers conduct cultivar performance trials yearly, and the results are widely

disseminated to growers. These trials are an important factor in estimating the potential impact of choosing a cultivar based on its performance.

The management of mushroom flies in commercial mushroom crops has become increasingly difficult, so researchers at UD are investigating a number of alternatives, including pesticides with novel chemistries as well as new modes of action: a growth regulator, nematode parasites, a botanical pesticide, and bacterium producing proteins toxic to fly larvae.

Plant health is critical to soybean growers, and two new potentially yield-reducing plant diseases have been identified in Delaware: sudden death syndrome in soybeans, caused by a soil-borne fungus, and wheat streak mosaic virus. Knowing that these diseases are present allows UD scientists and Extension to mount educational efforts and research to prevent these plant diseases from becoming serious problems for Delaware growers. In addition, a major effort was made in lima bean fields to control downy mildew that caused major losses in areas where control measures were implemented too late. Fungicide trials, grower meetings, and newsletters were used to provide control recommendations, and when controls were applied properly, yields were increased by 250 percent.

Current pickling-cucumber harvesting methods fail to remove much dirt and cause excessive product damage, so an innovative farming technique was needed. UD researchers constructed a pickling-cucumber harvester that reduces dirt on the final product by 12 percent, while the innovative redesign of the conveyer decreases product abrasion by 5 percent, saving growers \$24 per acre over 5,000 acres in Delaware, thus increasing plant production efficiency. These improvements increased grower income, on average, by \$24 per acre; over the 5,000 acres grown on Delmarva, this means an income of \$120,000 per season. In addition, the reduction in product dirt and damage reduced processor labor and equipment costs more than \$30,000 per season.

Many herbaceous perennials, both native to the temperate United States and garden-worthy, are wild-dug (which endangers wild gene pools) due to lack of quick, convenient propagation methods. UD developed micro propagation protocols make quick propagation possible, thus increasing availability. In vitro-generated “plugs” and/or plants of native varieties are now available for ornamental agriculture growers and for the home gardening market.

Seedless watermelons have become the choice of consumers, making the seedless varieties more commercially profitable for melon growers than the seeded ones. UD studies have demonstrated the advantages of commercial seedless watermelon production, which has grown from zero to 1,200 acres—44 percent of the watermelons grown in Delaware are seedless varieties.

Vegetable crop pests can cause an estimated yield loss of 10 to 20 percent because of improper pest sampling, timing of pesticide applications, and selection of inappropriate pest control strategies. New vegetable IPM strategies evaluated and implemented at UD resulted in the use of more than one IPM strategy on 75 percent of the State's processing vegetable acreage and 94 percent of the State's fresh market vegetable acreage.

To reduce the amount of active ingredients applied with herbicides for weed control programs in agronomic crops, UD researchers have focused on two areas: ALS-inhibitor herbicide combinations and the use of genetically engineered herbicide-resistant crops, both of which can lead to reduced resistant weed development and herbicide costs.

Yield losses from pest infestations can range from 10 to 20 percent because of improper sampling and timing of pesticide applications, improper selection of pest control strategies, and can lead to pesticide resistance. To improve agricultural profitability and agricultural competitiveness, timely information regarding pest outbreaks is disseminated with *Weekly Crop Update* during the production season. *Weekly Crop Update* is a commercial management tool that enhances agricultural profitability and benefits the environment.

More and more poultry growers are using tunnel-ventilated houses to achieve maximum production efficiency during moderate and hot weather. A twenty-five minute instructional video, produced jointly by UD Extension and Auburn University, has been distributed to every major U.S. broiler-producing state and 50 foreign countries. It is estimated that more than 20,000 people have viewed the tape. The project's economic impact from improved productivity in the poultry industry is estimated at \$25 million to date.

Heavily involved in Risk Management Education (RME) for more than three years, UD's Department of Food and Resource Economics (FRECE) and Extension have provided national leadership for RME since 1997. In the fall of 2001, the Northeast Center for Risk Management Education (serving New England states, New York, New Jersey, Pennsylvania, Maryland, West Virginia, and Delaware) was established at the University of Delaware to educate producers of agricultural products about the range of risk management opportunities available to them in order to maintain profitable businesses. To date, 10 grants totaling \$110,000 have been made to land-grant universities in the Northeast region.

Plant-disease-causing nematodes each year inflicts \$100 billion in damage to crops worldwide. Nematodes, specifically *Meloidogyne incognita*, cause major crop damage to soybeans and other livestock-feed crops by colonizing plants and invading root tissue. Using biotechnology tools such as genetic resistance to control plant-disease-causing roundworm, UD researchers are examining how infection occurs with the goal of identifying a specific gene to insert into crop plants. Arming a plant through genetic

resistance against the devastation cause by the nematode is the best choice for an economically feasible and environmentally sound means of managing this devastating agricultural pest.

The total expenditures by source of funds and FTE's for goal 1 are:

Hatch Act Funds	\$ 933,664
Smith-Lever Act Funds	\$ 95,607
State Matching Funds	\$ 1,029,271
Full-Time Equivalentents	37.7

NATIONAL GOAL 2. SAFE AND SECURE FOOD AND FIBER SYSTEM

At Delaware State University, the aquaculture specialist has collaborated with the University of Delaware Marine Advisory Service in providing ongoing public food safety education programs for Delaware and Mid-Atlantic consumers. Information on seafood quality, nutrition, handling, and safety has been provided via workshops and demonstrations. Annually, HACCP training has been provided to seafood processors and food safety, quality, and nutrition demonstrations have been conducted at Coast Day (Lewes, DE) and the Junior Watermen's show at the Mid-Atlantic Watermen's Show and Aquaculture Expo (Ocean City, MD).

UD research using high hydrostatic pressure processing for foods is ongoing in the pursuit for methods of food processing that offer food-borne pathogen protection, yet preserves food quality, ensures a greater variety of wholesome foods with intact nutrient content, and retains taste while minimizing changes to the product from the raw or fresh state.

UD Extension food safety training of teachers and volunteers who work with youth in 4-H and other youth development groups, has significantly increased youngsters' knowledge about food safety. Since many youngsters are responsible for preparing food for themselves and their families, their knowledge in handling food safely, and risk associated with microbial contamination of foods has resulted in fewer instances of foodborne illness.

Foodborne outbreaks are often traced to mistakes made by foodservice workers. To reduce these mistakes, foodservice personnel need to develop skills that prevent foodborne illness. In 2001, 511 foodservice workers participated in UD Extension's *Keep Food Safe* workshops designed to improve workers' hygiene practices and food handling skills, including proper temperature controls and prevention of cross contamination. Eighty-four percent of these quantity foodservice personnel planned to make at least one change in food handling practices as a result of the workshop. Participants (52%) mentioned better temperature control most frequently as the specific change they would make.

UD Extension has offered the ServSafe certification course for food service managers throughout Delaware. The risk associated with microbial contamination of foods can be reduced if food handlers use the recommended food handling procedures, thus giving managers of food service facilities the tools for preventing the wide spread of foodborne illness. Ninety-two percent of the 159 individuals taking the Educational Foundation of National Restaurant Association's ServSafe examination passed the test.

Poultry production and processing are of primary importance in Delaware. Because poultry can carry harmful bacterial pathogens, they present a food safety challenge.

Using genetic means, UD researchers analyzed the microbiota of the cecum of chickens. Changes in the microbiota with age were documented with probes reacting with specific groups of bacteria. Comparison of the bacteria composition of the cecal content and cecal mucosa indicated that a larger percentage of bacteria inhabiting the mucus layer of the cecum belong to the group of enteric bacteria. These bacteria might be important in protecting chickens from bacterial pathogens.

The total expenditures by source of funds and FTE's for goal 2 are:

Hatch Act Funds	\$ 15,513
Smith-Lever Act Funds	\$ 27,788
State Matching Funds	\$ 43,301
Full-Time Equivalents	2.8

NATIONAL GOAL 3. A HEALTHY, WELL-NOURISHED POPULATION

Information from the American Obesity Association states that obesity plays a significant role in causing poor health in women, negatively affecting quality of life and shortening quantity of life. More than half of adult US women are overweight, and nearly one quarter are obese. Persons with obesity are at risk of developing one or more serious medical conditions, which can cause poor health and premature death. DSU Extension's Intelligent Eaters Club instructs women between the ages of 17 years and 65 who are overweight, obese and interested in improving their health by changing their diets, as well as engaging in various forms of regular exercise.

UD research is investigating the potential of flaxseed as an antistaling agent in chemically leavened baked products. Adding flaxseed flour to muffins up to a 5 percent (w/w) basis has little effect on their physicochemical properties, other than an increase in hardness and color. Muffins are darker after the addition of 5 percent flaxseed flour. No significant change in water activity or total moisture content for each flaxseed level was observed. Batter viscosity was significantly increased by the addition of flaxseed flour, which may affect the commercial processing of products with added flax

Proper nutrition and eating habits are important problems in our society today, especially for youth. UD 4-H Extension staff, along with committee volunteers from the County Leaders Association and County Junior Council, plan and coordinate a Favorite Foods Contest and County Foods Judging Contest on an annual basis in each county. On average, 202 4-H members participate in both the Favorite Foods Contest and the County Foods Judging Contest statewide.

For the Favorite Foods Contest, 4-H members prepare a food dish in their age division in one of five categories: 1) Appetizers, Hors d'oeuvres, and Soup, 2) Bread, 3) Meat and Main Dish, 4) Fruits and Vegetables and 5) Desserts. Youth work with Extension

staff, 4-H Leaders and parents to learn to prepare food, to create a table setting to assist them in presenting their food dish, to properly write a recipe, and to use their food dish in a menu. They are interviewed and scored by a judge who is trained in the nutrition field. This interview and exchange of conversation has proven to be most helpful in teaching these youth to develop and increase their culinary and nutritional skills.

4-H members also participate in the County Foods Judging Contests. They are trained and gain knowledge in such areas as food safety, nutritive value of food, comparing prices, proper serving sizes, and food and cooking terminology.

Human health depends on nutrition. Individuals with limited funds must get the most nutrition for their food dollars. UD Extension's Lifeskills, a program conducted in cooperation with the Food Bank of Delaware, Inc. and its member agencies, teaches low-income individuals how to plan and prepare nutritious meals on a limited budget.

Improving diets for low-resource families with young children makes getting the most nutrition for the food dollar a critical concern. UD EFNEP program instructs low-income homemakers with children in how to improve their diets, encourage good lifelong eating habits, and employ smart shopping and budgeting practices so that monthly food allotments last all month.

University of Delaware Cooperative Extension adopted the "Dining with Diabetes" program from West Virginia Cooperative Extensions to help diabetics and their families better understand the disease and develop meal planning and food preparation skills to control blood sugar levels. This year's 117 participants reported making changes in their eating habits, becoming more aware of what they ate, and being selective in the purchase and preparation of food.

Team Nutrition for youths was designed to give educators the resources they need to expand and improve current nutritional and health programs creative and collaborative approaches to nutrition and health education. UD Extension, in conjunction with the Delaware Department of Education, trained 53 teachers, school nurses, dietitians, and foodservice managers; and parents on the Dietary Guidelines for Americans 2000. A total of 2,737 students participated in activities and educational programs in 11 schools.

The total expenditures by source of funds and FTE's for goal 3 are:

Hatch Act Funds	---
Smith-Lever Act Funds	\$ 368,492
State Matching Funds	\$ 368,492
Full-Time Equivalents	7.7

NATIONAL GOAL 4. AN AGRICULTURAL SYSTEM WHICH PROTECTS NATURAL RESOURCES AND THE ENVIRONMENT

The Institute of Soil and Environmental Quality at the University of Delaware was launched to assist in solving, through basic and applied research, a vast array of soil and environmental quality issues facing Delaware. Research on non-point source pollution of surface water and groundwater by nutrients is a primary focus. Another project undertaken by the Institute will integrate the efforts of animal scientists, soil scientists, hydrologists, and environmental engineers to develop the best management practices for phosphorous. The Institute also will serve as an unbiased scientific advisory body to state, regional and national advisory and regulatory agencies and conduct public education and outreach programs designed to further the public's understanding of soil and environmental issues, thus encouraging active citizen involvement in environmental policy decisions.

Delaware's Nutrient Management Act requires that agricultural waste management practices in poultry-producing areas be developed for soils that are "high" in phosphorus and a potential threat to surface and shallow ground waters. UD researchers have conducted studies that provide scientific justification for these regulations, specifically rapid, accurate soil test methods that can predict when soils are sufficiently saturated with phosphorus (P) to be of environmental concern.

UD Extension has developed and is carrying out an education/certification program on water quality issues in Delaware, so that livestock producers will know how to comply with the new stricter Nutrient Management regulations. An anticipated long-term impact will be an increase in the knowledge base of affected producers and a corresponding improvement in both the economic efficiency of nutrient management and in water quality conditions in Delaware.

UD researchers conducted field trials on farms throughout Delaware to demonstrate the value of "starter" fertilizer on corn across soils with a wide range of initial soil test phosphorus (P) levels, to show the value of poultry litter applied at various rates, and to demonstrate the value of diagnostic tools for better nutrient management during crop production. A long-term impact will be to increase farmer awareness of the economic value of poultry litter as a source of nutrients in crop production, thus minimizing the environmental problems associated with over-application of poultry litter to cropland.

Nutrient management is an important issue on the sandy soils of the state, especially since the regulation of Total Maximum Daily Load and the realization that many of Delaware's waterways are environmentally degraded. Because poor nitrogen efficiency increases production costs and decreases profitability, farmers are concerned about nitrogen loss. Based on the acreage involved in the recommendations (about 6,000

acres), the farmers estimate that they have reduced nitrogen applications by 18,000 pounds and increased their net income by \$45,000.

Using state-of-the-art microfocused x-ray absorption and x-ray fluorescence spectroscopies at Lawrence Berkeley and Argonne National Laboratories, the speciation and distribution of zinc and arsenic was determined in contaminated soils and in soils in which various remediation strategies were employed. Additionally, the effect of chemical treatment of poultry litter with alum (aluminum sulfate) on phosphorus mobility was evaluated. With zinc, it was found that discrete zinc mineral phases formed in topsoil samples while the zinc was sorbed to iron and manganese oxides in the subsoil samples. In soils that had been limed to pH 7 or above, zinc precipitated as a zinc-aluminum hydroxide. The formation of this phase had earlier been found in the laboratory with soil minerals and uncontaminated Delaware soils. However, it had never been identified before in field-contaminated soils. The use of direct spectroscopic techniques enables the direct determination of what species and phases of contaminants exist in soils, which will provide critical information concerning fate, transport, and bioavailability of toxic metal and metalloid contaminants. It also will assist in initiating scientifically sound and cost-effective soil remediation strategies.

UD soil scientists are studying the inactivation and transport mechanisms of viruses in porous media under relevant environmental conditions, which provides an important scientific basis for developing regulations to protect water resources from contamination by microbial pollutants.

The UD Agroforestry/Tree Planting for Poultry Houses project resulted in a publication and effort on wind break establishment around poultry houses that landowners can implement to reduce soil erosion by wind, reduce snow velocity, maintain energy efficiency for heating in winter months and cooling in summer months, and water and air quality improvements.

Research is under way to study the relationship between legume plants, namely alfalfa, and naturally-occurring soil bacteria called rhizobia explore how the interactions between this bacteria and the roots of legumes help the plant to produce its own supply of nitrogen from the atmosphere. When scientists understand the way in which legumes harness nitrogen, plants that maximize this trait can be developed. By selecting for this trait, farmers can ensure a plentiful harvest without the tons of nitrogen they typically apply to their fields, sometimes with enough extra nitrogen left in the soil to supply the next season's crop.

Wetlands restoration and protection will be enhanced by a current UD project to identify and delineate freshwater wetlands on the Atlantic Coastal Plain, even when wetland hydrology is not present because of the season. Three UD research projects on seasonally saturated wetlands will help to identify indicators of historic hydric soils and

wildlife species important to determining wetlands. These projects have the potential to improve our ability to identify and delineate seasonally saturated wetlands.

The University of Delaware has been conducting a collaborative research project with the Delaware Center for Horticulture and the Delaware Department of Transportation. The research team has planted 34 pilot sites along Delaware roadside to study methods of establishment, species evaluation, maintenance strategies and economics. The pilot plots have provided information for a design and concept manual to be used by DelDOT for including roadside vegetation in any new or renovation road project. Now funded entirely by DelDOT, the team is beginning to implement concepts learned through the pilot studies on a larger scale throughout Delaware. Acres of land currently mowed 6 to 10 times per year will be allowed to re-grow with native vegetation and managed with yearly mowing and selective herbicides, thus saving time and money.

A DSU project in sustainable agriculture was designed to address the needs of farmers and Extension agents interested in developing an environmentally friendly nutrient use system and growing free-range broilers in a sustainable system. Four methods of poultry manure, fertilizer and manure/fertilizer blends were imposed on corn, soybeans, and winter wheat in a three-year rotation. The only significant difference was commercial fertilizer, which produced significantly more corn. In two separate broiler growth trials using alfalfa, orchard grass and conventional methods of rearing, no significant differences in growth rate, feed consumed and feed efficiency were found between the broilers grown on forages compared to the conventionally reared birds.

Approval of genetically engineered Bt corn depends on sound management of resistance in target pests. Non-Bt corn refuges are required to generate pests that remain susceptible to Bt. Information still needed to model the optimal size and location of refuge plantings is the distance male and female pests move before they mate. University of Delaware scientists have bred a red genotype of the Western corn rootworm, making it easier to quantify beetle movement in the field. Quantifying pre-mating dispersal patterns in the western corn rootworm will assist modelers in determining how large and how close refuge plantings must be for effective resistance management.

UD programs, aimed at ecosystem balance, focus on maintenance of biodiversity in natural ecosystems in ways that are compatible with agriculture and with urban/suburban population growth and development. Program components include developing and delivering integrated pest management programs, a systems approach using chemical, cultural, mechanical, and biological control to increase net profits to producers while protecting the environment. The expansion of integrated pest management into processing vegetables, melons, potatoes, and ornamentals has led to the refinement of disease and mite management programs in watermelons, and in other crops, the use of alternative controls including fly tapes, insecticidal baits and biological control.

UD Extension participated in a regional training for leaders in agricultural preservation throughout Delmarva (DE, MD, VA). Workshops provided participants with information on farmland protection and land use issues relating to their communities. Training topics included determining land use, economic, and demographic changes on the Delmarva Peninsula, gauging public attitudes about land use to facilitate community discussion, and analyzing effective land use and farmland protection strategies.

The total expenditures by source of funds and FTE's for goal 4 are:

Hatch Act Funds	\$ 266,466
Smith-Lever Act Funds	\$ 315,309
State Matching Funds	\$ 581,775
Full-Time Equivalents	16.9

NATIONAL GOAL 5. ENHANCED ECONOMIC OPPORTUNITY AND QUALITY OF LIFE FOR AMERICANS

According to the president of the National Fatherhood Initiative, there is an increasing receptiveness to the idea that fathers matter and more need to be done to support and encourage responsible father hood. DSU Extension addresses this need with Fatherhood: Old Dads Mentoring New Dads. This program provides opportunities for the adult male to learn effective parenting skills to support and promote positive growth and development in the lives of children. Knowledge of physical, mental, intellectual and emotional growth across the lifespan is taught with emphasis on nutrition, diet and health, and parent-child relationship building.

In collaboration with the public school system, DSU extension formed the Ladies and Gentleman's clubs for the purpose of making a positive impact on the lives of students who are at risk for negative behaviors associated with functional-dysfunctional home life. Participants engage in activities that improve their written and oral communication skills. They set goals and work towards them learning to make better choices as well as participating in community service projects.

If children and youth at risk in limited-resource communities are to grow up to become productive citizens, they need to experience and accumulate more resilience factors than risk factors. UD Extension has been working with community residents in three low-resource communities throughout Delaware to assess needs and strengths, develop resources, and implement customized programs to reduce developmental risks and enhance resiliency factors for children and youth.

High school students who are behind academically need positive experiences in the work world to prepare themselves to be productive adult citizens. Through the Workforce Preparation Program, overseen by Delaware 4-H, youths are placed in part-time jobs at non-profit organizations during vacation from school. Students also participate in enrichment classes to ensure academic continuity over the summer months. The program provides students with real-work experience on a daily basis, reinforcing the importance of reporting to work as scheduled and the teamwork involved in doing a good job.

University of Delaware Cooperative Extension has developed a Web-based approach to deliver financial education resources to schools throughout the state. The Jump\$tart Coalition for Personal Financial Literacy encourages curriculum enrichment to ensure the teaching of personal finance management in grades K through 12. The curriculum encompasses basic survival principles of money management, consumer rights, an individual's responsibility regarding money, and investing in stocks and bonds are among the lessons. In addition, 25 financial literacy resources have been correlated

with state educational standards and competencies, and have been brought together under the name DelaWISE as a resource teachers can access to search for curricula by grade level, specific standards, or topic. In addition, a Financial Literacy Task force has convened to determine best approaches to be used within the schools to ensure the all teens complete school with basic financial literacy skills.

One way in which the DSU youth development program and 4-H promoted leadership and decision-making skills with high school students was to prevent after-prom alcohol and drug use by forming the After Prom Promise Committee, which sponsored an event with structured activities to give prom-goers an alternative in a safe drug-free and alcohol-free environment.

Delaware State University and University of Delaware extension educators have participated in the CHILD CARE SATELLITE CONFERENCES. This is an educational training program for childcare providers and is offered eight times a year. The satellite program curriculum is supplied by Pennsylvania State University. Child Care Licensing with the State of Delaware approves satellite workshop credits. As a result of participating in these trainings, providers have reported a greater creativity with program development, improved child-teacher relationships, increased understanding of children's developmental stages, and improved director-teacher relationships.

Responding to community input and President Bush's call to action, the New Castle County 4-H Program launched a year-long service campaign—"Our Hands for Larger Service"—to provide volunteer opportunities on National Days of Service. These volunteer activities address community issues, and children and adults across New Castle County have been encouraged to take part regardless of whether or not they are connected to the 4-H program. More than 100 volunteers (ages 5 to adult) from local communities and collaborating organizations (AmeriCorp, Boys & Girls Clubs, Vista Volunteers) targeted their efforts at 4 sites in New Castle County on MLK Day. In the 400 volunteer hours donated on the first service day, an estimated value of work at one site alone was \$15,000.

Because keeping teens in youth programs is difficult, UD 4-H has addressed this problem in part with its Counselor-in-Training Program. Teens remain active in the 4-H camping program by serving as camp counselors, which allow staff to provide quality programs for this difficult-to-reach audience.

Smoking and tobacco use continue to be a huge problem among the youth of Delaware, contributing to the state's high cancer death rate. 4-H has implemented the youth tobacco prevention curriculum--Health Rocks. This 10-12 hour curriculum emphasizes life skills, which serve to raise the level of tobacco awareness among adolescents. In addition, six tobacco prevention advisory groups have been established statewide. These advisory groups not only offer program support, they conduct tobacco prevention

projects all over the state. More than 600 youths were reached, and an additional 1,100 people participated in activities conducted by the advisory boards.

UD Extension workshops in financial management for low-resource adults helps foster greater financial literacy in topics such as, basic money management, debt reduction, educated consuming, and saving for the future.

The total expenditures by source of funds and FTE for goal 5 are:

Hatch Act Funds	\$ 2,814
Smith-Lever Act Funds	\$ 550,041
State Matching Funds	\$ 552,855
Full-Time Equivalents	21.0

B. STAKEHOLDER INPUT PROCESS

In the State of Delaware, the University of Delaware and Delaware State University used a multi-faceted approach to securing stakeholder input for the original Plan of Work. We believe in direct contact with people and attempt to solicit input from a wide variety of clientele, users, and stakeholders. Opportunities for input include, but are not limited to, the following: extension overall advisory committees, extension issue-based advisory committees, strengthening families statewide advisory committee, 4-H volunteers, 4-H Foundation, LINKS, agriculture commodity groups, environmental interests, the green industry, agri-businesses, agriculture associations (i.e., Farm Bureau, Grange, Pork Producers Association, Delmarva Poultry Industry, Soybean Board, Sheep Producers Association, etc.), Master Gardeners, Master Food Educators, and Master Financial Planners. We hold a variety of regular meetings across the state, which include a diverse mix of clientele, users, and stakeholders. These meetings include such things as: Delaware Herb Growers Association (DHGA), American Herbal Products Association (AHPA) and American Botanical Council (ABC), Agriculture Visiting Committee, State Chamber of Commerce, Kids County Advisory Council, Delaware Public Policy Institute Task Force, Friends of Agriculture Breakfast series, Council of Farm Organizations, USDA Food and Agricultural Council, State Agriculture Technical Committee, and user groups like 4-H regular and day camp parents. Students enrolled in our colleges, faculty, professionals, and salaried staff, are all encouraged to provide input on program priorities. We have conducted random surveys of users and non-users of the programs and activities on a variety of issues including land use and economic development. Other tools that we use to get input include visioning processes and focus groups.

These efforts have been focused on both building commitment and getting input from stakeholders such as, government agencies, industry partners, and regulatory

agencies. Our programs have expanded, and input continues to increase. We are recognized as a source of not only useful but also reliable information. We will continue to seek input in a variety of ways. These methods will change as the issues themselves change.

A survey on our programs related to National Goal 5 was used to evaluate our Plan of Work related to ENHANCED ECONOMIC OPPORTUNITY AND QUALITY OF LIFE FOR AMERICANS. The results of that survey indicate that our programs are on target, but many people are unaware of the breadth of our programs to improve the quality of life and enhance economic opportunities.

Focus groups for other four national goals area were held to gather input directly from extension agents, faculty, and staff that conduct programming and research were included in our combined plan of work. To simply and efficiently collect input from stakeholders, it was determined that a simple form survey would be used. To keep the survey from becoming too long, or asking too many questions that respondents would have no experience with which to answer, it was determined that a series of specialized one-page surveys would be the best approach.

Input gathered from focus groups of extension agents, faculty, and staff was used to design the content of the survey forms as well as to identify potential stakeholders and stakeholder groups for each goal area. By subdividing the plan of work in this way, it was possible to “tailor” each survey to the stakeholders and potential stakeholders in a particular goal area. This helped to improve response rate and to reduce non-response errors in the data.

The surveys are all designed in similar fashion. The first question determines an individual’s familiarity with/participation in current programming being conducted under the current combined plan of work. The next three questions are designed to specifically address the levels of input included in Volume 65, Issue Number 26 of the Federal Register:

“Stakeholder input should be sought on a variety of different levels, including but not limited to: advice on priority setting and program development; input on both immediate needs and long term goals; participation in relevancy and portfolio reviews; guidance on monitoring, evaluation, and oversight systems employed to track performance and results; and counsel on emerging technologies and recommendations for public education and discussion about the mission and directions of the institution.”

To provide respondents with the opportunity to take a “comprehensive and meaningful role,” space is provided for free responses, in addition to the yes/no responses given for each of the following questions: “Do you feel these programs and publications address the right issues?”, “Do you feel that programs and newsletters in this area can have a positive impact on your household?”, and “Do you feel there are any issues in this area

that we're missing?" These three questions follow the list of current programs, and are specific and direct to facilitate a meaningful response.

The last few questions cover gender, county of residence, and age. This is very basic demographic information that does not compromise the confidentiality of respondents. A question is also included that is specific to the goal area in question. For example, in the survey "Improving Quality of Life in Delaware," respondents are asked how many children under the age of 18 are in their household. In the survey "Supporting Agriculture and Protecting the Environment in Delaware," respondents are asked what their primary source of income is (full-time farming, part-time farming, pension, etc.). The demographic data helps in the evaluation of the surveys' success, and can be compared to known demographics of the state to help ensure that representation is balanced.

The survey on Goal 5 was presented to stakeholder groups, as well as mailed out to recipients of newsletters published and distributed by the CANR and its affiliates.

The survey on Goal 5 was used as a test of the value of this approach to obtaining stakeholder input. The use of a survey to evaluate our programs related to Goal 1-4 is being evaluated and discussed with traditional stakeholder groups. As we develop the next Plan of Work in 2004 we will use this tool to obtain additional stakeholder input. Reasonable efforts will be made to ensure balanced representation among respondents, with special efforts to include the under-represented and under-served communities.

C. PROGRAM REVIEW PROCESS

Peer Review of Research Programs

We adopt by reference the [National Standards for Peer Review](#).

Merit Review of Extension Programs

Merit review for Delaware Cooperative Extension consists of five levels of peer and stakeholder review. Extension professionals submit county plans that have been reviewed by their peers within the county and by county stakeholder advisory groups. These stakeholder groups provide input on critical needs and issues within their communities, which is used to develop the county plans. After county plans are complete, stakeholders review them for inclusion of the previously identified needs and issues as well as program delivery and evaluation methodologies. Each of these plans includes specific objectives that are examined for relevance, usefulness, and potential impact of the programs. This feedback is used to refine county plans and develop future plans.

The second level of review is by college-wide issue teams that are cross-functional and multi-disciplinary. From this review, county plans are combined into a college-wide five-year plan.

The third level of review is both within and outside the university community. Copies of the plan are submitted to university administrators and related agency personnel who function as both present and future partners. These individuals are invited to comment on the objectives identified, areas of collaboration, and potential impacts. University administrators are also asked to comment on ways in which we might work across colleges and schools to increase our outreach efforts.

A fourth level is with statewide stakeholder groups, including advisory groups, commodity organizations, volunteers, research partners, state and local funders, etc. These groups are asked to provide feedback regarding objectives, potential impacts, and how it meets their specific needs.

The final level is the Northeast Extension directors, who have agreed to share all state plans among each other. This peer review helps the states advise each other on opportunities to strengthen individual state plans and ways that we can collaborate across state lines.

D. EVALUATION OF THE SUCCESS OF MULTI AND JOINT ACTIVITIES

Delaware State University and the University of Delaware have participated in numerous programs and projects that are multi-state, multi-institutional, multi-disciplinary, and joint research and extension programs. Sections E and F highlight some of the successful programs. All twelve program areas in the Delaware Plan of Work involve some multi and joint activities.

The planned programs were identified through the stakeholder input process as described in sections B. Program evaluations and surveys are being used annually to ensure that the planned programs are still on track and relevant to the needs of the state and region.

Attracting underserved and underrepresented populations is a continuing challenge. During the civil rights audit of the Extension programs in Delaware, several suggestions were made on how to attract more underrepresented groups. The response to the civil rights audit has been submitted to CSREES and the report emphasizes the steps being taken to ensure that we exercise “all reasonable efforts.”

In sections E and F the outcomes and impacts of joint and multi programs are described. These outcomes and impacts are consistent with the description in the Plan of Work.

Delaware State University and the University of Delaware have a tradition of multi and joint activities. These programs have been effective and efficient in the past and continue to accomplish their goals. We share faculty with the University of Maryland, combined the dairy herds of Rutgers and Delaware, and participate in region-wide crisis management programs for beekeepers and stone fruit growers.

Further evaluation of planned programs including outcomes and impacts are presented in Section E and F.

E. INTEGRATED EXTENSION AND RESEARCH

At Delaware State University, the complementary aquaculture extension program collaborates closely with the Delaware Sea Grant program at the University of Delaware to provide expertise and resource information on aquaculture production to persons interested in either production, processing or marketing and to those individuals and agencies involved in either policy-making or regulation of the industry. This collaborative effort has recently led to the development of an aquaculture industry-based set of regulations, which is currently in the approval process for implementation. In addition to the annually produced DSU Aquaculture: Leading the Wave newsletter, which is distributed at the Delaware State Fair and elsewhere, the aquaculture extension program works closely with twelve vocational agriculture programs within the public school system to teach aquaculture.

At UD, research and Extension are so closely aligned in their efforts to provide Delaware producers with information they can put to use. The following examples are highlights, also contained in other goal sections of this report.

The economic damage caused by infecting organisms on animal health for Delaware's billion-dollar poultry industry could be devastating. Using biotechnology techniques and animal genomics research to unravel the fundamental mechanisms of poultry diseases, UD researchers develop recombinant vaccines that combat current and emerging infectious diseases in poultry, thus preventing catastrophic losses. In an outreach effort, UD Poultry Diagnostic Laboratory monitors for diseases in poultry and assesses the effectiveness of vaccination programs.

Plant health is critical to soybean growers, and two new potentially yield-reducing plant diseases have been identified in Delaware: sudden death syndrome in soybeans, caused by a soil-borne fungus, and wheat streak mosaic virus. Knowing that these diseases are present allows UD scientists and Extension to mount research and educational efforts to prevent these plant diseases from becoming serious problems for Delaware growers.

Current pickling-cucumber harvesting methods fail to remove much dirt and cause excessive product damage so an innovative farming technique was needed. UD

researchers, working closely with Extension, have constructed a pickling-cucumber harvester that reduces dirt on the final product by 12 percent, while the innovative redesign of the conveyer decreases product abrasion by 5 percent, thus economically benefiting both grower and vegetable processor.

UD researchers have evaluated the effect of chemical treatment of poultry litter with alum (aluminum sulfate) on phosphorus mobility. Their findings supply critical information for this important broiler-growing region concerning fate, transport, and bioavailability of toxic metals and contaminants, enabling Extension to offer growers scientifically sound and cost-effective strategies.

UD researchers conducted field trials on farms throughout Delaware to demonstrate the value of “starter” fertilizer on corn across soils with a wide range of initial soil test phosphorus (P) levels, to show the value of poultry litter applied at various rates, and to demonstrate the value of diagnostic tools for better nutrient management during crop production. UD Extension’s long-term goal is to increase Delaware farmers’ awareness of the economic value of poultry litter as a source of nutrients in crop production, thus minimizing the environmental problems associated with over-application of poultry litter to cropland.

F. MULTI-STATE EXTENSION ACTIVITIES

UD Extension often reaches over state lines to Extension staff at other universities for a wider distribution of information. These states include all those on Delmarva (DE, MD, VA) as well as PA and NJ. The following examples of multi-state Extension activities touch on some of these programs, which also may be contained in other goal sections of this report.

In the fall of 2001, the Northeast Center for Risk Management Education (serving New England states, New York, New Jersey, Pennsylvania, Maryland, West Virginia, and Delaware) was established at the University of Delaware to educate producers of agricultural products about the range of risk management opportunities available to them in order to maintain profitable businesses. An advisory committee will review grant proposals from the public and private sectors and the northeastern land-grant universities, then distribute project funds for agricultural education programs. Educational outreach programs will include the variables that go into running any well-managed business, such as estate planning, federal standards, retirement, workers’ compensation, hiring employees, futures and options, and computer training.

University of Delaware Cooperative Extension began offering classes for nutrient management certification in January 2001. The certification program is a series of classes for individuals that are affected by the Nutrient Management Law and are required to attend a maximum of 12 hours of training. The Nutrient Management

Program estimates approximately 5,000 individuals will attend the certification classes. The classes attracted people who have been certified in other states, including Maryland and Virginia.

More and more poultry growers are using tunnel-ventilated houses to achieve maximum production efficiency during moderate and hot weather. A twenty-five minute instructional video, produced jointly by UD Extension and Auburn University, has been distributed to every major U.S. broiler-producing state and 50 foreign countries. It is estimated that more than 20,000 people have viewed the tape. The project's economic impact from improved productivity in the poultry industry is estimated at \$25 million to date.

MAAREC (Mid-Atlantic Apiculture Research & Extension Consortium) is a five-state consortium (DE, MD, NJ, PA, and WV) of university research/Extension, state regulatory and beekeeper associations, charged with keeping bee colonies healthy, thus meeting regional pollination demands, ensuring agricultural profitability.

To reduce loss from crop insects, weeds and diseases, Extension and researchers from the University of Delaware, the University of Maryland/College Park, Rutgers University, and Virginia Tech collaborate on compiling comprehensive Pest Management Recommendation Guides for regional field crops and for vegetable crops. The information is specific to local climate, soils, and conditions, comparing the effectiveness of treatments for specific weed, insect, and crop diseases based on data derived from university trials.

G. MULTI-STATE RESEARCH

In 1977, Norman H. Dill and Arthur O. Tucker established a herbarium at Delaware State University (then College). In 1980, the University of Delaware's Department of Plant Science formally transferred the herbarium of the Society of Natural History of Delaware to Delaware State University. On June 12, 1982, the Delaware State University herbarium was formally dedicated to Claude E. Phillips (1900-1981). Claude was the most active and best known field botanist on the Delmarva Peninsula for much of the latter half of the twentieth century. He authored 8 books on plant identification and conservation, including *Wildflowers of Delaware and the Eastern Shore* (1978).

In 1996-1997, Kenneth Bell, Dean of the School of Agriculture and Related Sciences of Delaware State University, and William DeLauder, President of DSU, obtained funding from the U.S.D.A. and the Longwood Foundation to construct a new herbarium building and equip it with many new cabinets. The new herbarium was dedicated on May 11, 2000. On May 13, 2000, a formal symposium was held with speakers, musical presentations, gourmet herb luncheon, and exhibits. With its bright, pleasing, and inviting interior, the new herbarium building successfully achieves budgetary, aesthetic,

and utilitarian balance. It is a place where both the public and research scientists feel welcome.

Funding for personnel and equipment awaited the encouragement and expertise of Dean Bell, who procured support from the Natural Resources Conservation Service of U.S.D.A. This funding allowed the search and hiring of a curator and educator (who began work in mid-June 2001 and mid-February 2001, respectively), as well as the employment of students and contractual workers. Funding also provided for the ordering of essential equipment, supplies, and books.

The Claude E. Phillips Herbarium contains specimens of vascular plants, mosses, lichens, fungi, algae, and fossil plants. The vascular plant collection is the most extensive, with about 110,000 specimens from around the world that date back to 1799. The collection of books (about 2500 volumes dating back to 1737), periodicals (numerous issues of 73 different serials), and photographic slides covers a diversity of botanical subjects. Not only is it the only public herbarium on the Delmarva Peninsula, it is the largest herbarium at a Historically Black College or University by at least 10-fold. It is the only cooperative herbarium with signed memoranda of understanding with various federal, state, and private institutions (Natural Resources Conservation Service of U.S.D.A., Delaware Dept. of Natural Resources & Environmental Control, Delaware Dept. of Agriculture, Delaware Nature Society, Mt. Cuba Center for the Study of Piedmont Flora, University of Delaware, and Wesley College). Formal and informal links also exist with The Society of Natural History of Delaware, The Herb Society of America, International Herb Association, and Delaware Herb Growers & Marketers Association. The staff of the Claude E. Phillips herbarium consists of Co-director Arthur O. Tucker, Co-director Thompson D. Pizzolato (University of Delaware), Curator Robert F. C. Naczi, and Educator Susan E. Yost.

The mission of the Claude E. Phillips Herbarium is documentation, research, and education on wild and cultivated flora, particularly of the Delmarva Peninsula. The herbarium seeks to maintain, provide access to, and augment its extensive collection of vascular plants, mosses, lichens, fungi, algae, and fossil plants. In addition, the herbarium supports research, teaching, and extension activities in such fields as systematics, economic botany, conservation, and biodiversity studies.

The staff of the herbarium has served the public, DSU community, and scientific community in many ways. In 2001 alone, 27 groups and 466 individuals learned about our facilities and programs by participating in tours of the Claude E. Phillips Herbarium. Six students received in-herbarium employment and training in herbarium practices and techniques (over 2,000 hours worked in 2001). Herbarium staff taught 5 classes or workshops using herbarium resources. Fifteen scientists and members of the public from near (e.g. Natural Resources Conservation Service office in Dover, Delaware Geologic Survey office in Newark) and far (e.g. U. S. Geologic Survey office in Florida, editorial office of Australian Wild Herb Bulletin) visited to consult herbarium specimens

and literature. Botanical identification, through the Claude E. Phillips Herbarium and The Herb Research Center, and essential oil analyses by gas-chromatography/mass-spectroscopy are provided as support for the public, herb farmers, and members of the scientific community. In 2000, herbarium staff received and answered 23 requests from the public, personnel at state agencies (e.g. Delaware Dept. of Agriculture, Delaware Dept. of Transportation), and members of the larger scientific community for identification of 27 specimens of plants. In 2001, herbarium staff received and answered 21 requests for identification of 69 specimens. Seven individuals ranging from members of the public to U.S.D.A. personnel requested and received information from labels of herbarium specimens during 2000-2001. During 2000-2001, botanists from 5 different universities requested and received loans of 44 specimens from the herbarium for use in various research projects.

The University of Delaware participates in numerous multi-state research projects in support of our State Plan of Work. We will highlight the impact of two of these projects: NE 138, Epidemiology and Control of Emerging Strains of Poultry Respiratory Disease Agents; and NE501, Eradication, Containment and/or Management of Plum Pox (Sharka) Disease.

NE 138 addresses respiratory diseases that have historically caused major economic losses in the poultry industry. Recent restrictions on the poultry industry limiting the use of antibiotics to control these diseases has led to increased pressure on producers to rely more heavily on other methods of disease control, such as the use of vaccines and the emerging technology of antivirals. To support this transition, molecular and conventional research is needed to develop technologies to help identify, diagnose, and control emerging respiratory pathogens.

This multi-state research project has perfected molecular techniques (PCR) for "real-time" (i.e., immediate) identification and quantification for six respiratory disease agents in poultry. They have sorted out the strain relationships for the Infectious Bursal Disease virus, and in the process, identified hitherto unknown reservoirs of infection that are perpetuating epidemics in flocks. The project has also constructed a recombinant DNA vaccine for the fowl poxvirus, giving mild symptoms and protection from other strains of this virus. Finally, through the project's research activities, the poultry industry benefits directly from the monitoring of respiratory pathogen outbreaks. For example, in mid-May 2000, scientists at the University of Delaware used project-developed methods to rapidly screen an egg-layer operation of over 1 million birds, discovering scientific explanations for their egg production decreases approaching 10%. The operator then implemented corrective control measures.

The bottom line impact of this NE-138 includes:

Diminished production losses from poultry respiratory diseases, and increased profits for the poultry industry.

Reduced consumer risks through poultry products free of otherwise necessary antibiotics.

Participants in NE-138 represent experiment stations in CT-S, DE, MD, NY-C, AL, GA, IL, NC, OH, and TX, as well as scientist from USDA-ARS, St. Jude Children's Research Hospital, and Department of Virology and Molecular Biology, TN.

In existence for only two years, the plum pox NE-501 group has done a great deal to blunt the impact of a very damaging disease of stone fruits, and the group still holds strong prospects of eliminating the disease from the U.S. Their strategy began early (November, '99) with an inclusive team-building effort uniting LGUs (research and extension), State Depts. of Agriculture, APHIS, ARS, and Industry. By December of 1999, this group had brought together experts from Europe (sources of the virus were earlier identified to be Europe, Chile or Canada), with representatives of all of the above-mentioned organizations to develop an eradication strategy for the Plum Pox virus. They shared all available information, and planned a strategy for future efforts. That meeting had more than 100 attendees. The meeting was filmed, and tapes were made available on VHS and web-based video. By January, PSU and APHIS had both published informative brochures on the subject, and web pages were on line (<http://sharka.cas.psu.edu/>). In April, 2000 a workshop was held that brought together the key regulatory, research, and extension personnel that were being deployed to manage the disease. Agricultural economists met with government regulators and OMB staff and the Pennsylvania Department of Agriculture to begin the development of what was to become the first-ever indemnification plan that included comprehensive reimbursement for current and future losses (It could be a model for future invasive pests).

During the summer, they monitored for spread, perfected sampling and detection techniques, and monitored for presence in indigenous species other than *Prunus*. The education programs conducted in December and April and continuing through the present, enlightened the Canadians to the possibility of plum pox (sharka) and they (the Canadians) found extensive infestations on the Niagara peninsula.

In October, the NE-501 group held a Plum Pox forum attended by about 120 registrants. This group included registrants from 18 states and Canada. These people represented all of the U.S. participants defined earlier, plus at least three Canadian organizations. Since the fall meeting, the group has continued to augment the above-mentioned web page with new publications, film clips, Canadian information, indemnification information, etc. The page averages a little less than 1,000 page views per month since it has been up. An additional on-line tool has been developed for diagnosis of plum pox and other diseases of stone fruits. It is available (pre release) by visiting: <http://www.cas.psu.edu/docs/Publications/ppvbooklet/default.htm>. Plum pox information has also been incorporated into the tree fruit production guide: <http://tfpg.cas.psu.edu/>. The continuing education through print media as well as web-based information is a lynchpin in the protection and early recognition of new entries of

this virus into the U.S. from Europe, Chile, or Canada. Further, NE-501 is an example for combating other viruses that may enter our perennial crops.

NE-501 is a multi-functional group that is exemplary in its scope, encompassing governmental, industry, and international organizations, as well as both research and extension. It is accomplishing a strong educational role as well. Even though it is destined for replacement at the end of this fiscal year to a multi-state project, and has only been in existence for 14 months, it has had a huge impact, and demonstrates what can be done in a rapid response mode, to bring together multiple organizations to solve a problem.

The Bottom Line Impacts of NE-501 include:

Meetings and information sharing with international scientists have helped develop a strategy to eradicate PPV in the affected areas. GIS mapping techniques helped track the exact locations of infected trees and gave insight to researches on how the virus spread through the orchard.

Fruit growers all over the country are becoming educated about and trained on identification and control of PPV in orchards and nurseries.

850 acres of infected peaches, plums, and nectarines were eradicated. The project has effectively contained the PPV from spreading into other counties and neighboring states.

The USDA has created the first indemnification program for reimbursing fruit growers of their losses, current and future, due to PPV eradication program. The project gathered the information that USDA accountants reviewed and presented to the Office of Budget and Management.

NE-501 set a good example on how a rapid response project could be an effective vehicle in addressing an emergency. This project also serves as a lesson on how to deal with invasive pests in the future.

Participants in NE-501 represent experiment stations in DE, MA, MD, NJ, NYC, NYG, PA, AL, AR, CA, FL, GA, MI, MO, NC, OH, SC, TN, and WA, and scientists from USDA-ARS/Maryland and USDA-ARS/West Virginia.

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

Institution: University of Delaware
State: Delaware

Check one: x Multi-state Extension Activities
Integrated Activities (Hatch Act Funds)
Integrated Activities (Smith-Lever Act Funds)

Title of Planned Program/Activity	Actual Expenditures		Projected Budget		
	FY 2000	FY 2001	FY2002	FY2003	FY 2004
<i>Goal 1: An agricultural system that is highly competitive in a global environment</i>	152,097	149,977	152,097	152,097	152,097
<i>Goal 2: A safe and secure food and fiber system</i>	11,200	11,044	11,200	11,200	11,200
<i>Goal 3: A healthy, well-nourished population</i>					
<i>Goal 4: Greater harmony between agriculture and the environment</i>	86,815	85,605	86,815	86,815	86,815
<i>Goal 5: Enhance economic opportunity and quality of life for Americans</i>	69,433	68,465	69,433	69,433	69,433
Total	319,545	315,091	319,545	319,545	319,545

John C. Nye
Director

March 1, 2002
Date

Form CSREES-REPT (2/00)

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

Institution: University of Delaware

State: Delaware

Check one: Multi-state Extension Activities
 Integrated Activities (Hatch Act Funds)
 Integrated Activities (Smith-Lever Act Funds)

Title of Planned Program/Activity	Actual Expenditures		Projected Budget		
	FY 2000	FY 2001	FY2002	FY2003	FY 2004
<i>Goal 1: An agricultural system that is highly competitive in a global environment</i>	309,870	305,551	309,870	309,870	309,870
<i>Goal 2: A safe and secure food and fiber system</i>					
<i>Goal 3: A healthy, well-nourished population</i>					
<i>Goal 4: Greater harmony between agriculture and the environment</i>	19,433	19,162	19,433	19,433	19,433
<i>Goal 5: Enhance economic opportunity and quality of life for Americans</i>					
Total	329,303	324,713	329,303	329,303	329,303

Robin W. Morgan
Director

March 1, 2002
Date

Form CSREES-REPT (2/00)

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

Institution: University of Delaware

State: Delaware

Check one: Multi-state Extension Activities
 Integrated Activities (Hatch Act Funds)
 Integrated Activities (Smith-Lever Act Funds)

Title of Planned Program/Activity	Actual Expenditures		Projected Budget		
	FY 2000	FY 2001	FY2002	FY2003	FY 2004
<i>Goal 1: An agricultural system that is highly competitive in a global environment</i>	150,479	141,684	150,479	150,479	150,479
<i>Goal 2: A safe and secure food and fiber system</i>	10,962	10,321	10,962	10,962	10,962
<i>Goal 3: A healthy, well-nourished population</i>					
<i>Goal 4: Greater harmony between agriculture and the environment</i>	84,968	80,002	84,968	84,968	84,968
<i>Goal 5: Enhance economic opportunity and quality of life for Americans</i>	76,913	72,417	76,913	76,913	76,913
Total	323,322	304,424	323,322	323,322	323,322

John C. Nye
Director

March 1, 2002
Date

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