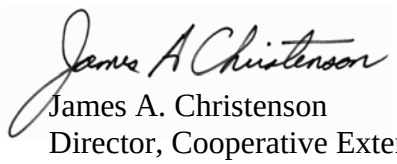
UNIVERSITY OF ARIZONA

COLLEGE OF AGRICULTURE AND LIFE SCIENCES

AGRICULTURAL EXPERIMENT STATION
&
COOPERATIVE EXTENSION

Annual Report of Accomplishments and Results

Submitted April 1, 2007



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PROGRAMS

Overview :

This report represents the final Annual Report for our previous plan of work. Partnerships, integration and collaboration continue to be the cornerstones of the College of Agriculture and Life Sciences programs at the University of Arizona. Research and Extension programs are integrated in the scholarship of discovery, integration and application. Extension specialists carry a joint research appointment and many research faculty carry a joint extension appointment. In addition, where appropriate in our distributed educational system, many of our joint extension/research faculty have a formal teaching appointment. Our approach is to provide an integrated and multi-functional approach as we address the diversity of needs across the State of Arizona. We provide the following selected impacts as they reflect unique benefits to a diversity of clientele and stakeholders. Finally we provide our own assessment of accomplishments based on the 5-year Plan of Work for the appropriate report period.

Goal 1: Competitive agricultural systems in a global economy

New Arid Land Crop Plants with Anticancer Activity

Impact Summary

Scientists at the University of Arizona's Southwest Center for Natural Products Research and Commercialization (SCNPRC) have discovered several compounds in desert plants that can significantly inhibit the growth of tumors and that are associated with Traditional Chinese Medicine and Indian Ayurvedic Medicine. The protein target of one of these compounds was determined and validated as a new target for anticancer drug discovery. They have also found a natural compound occurring in a plant-associated microorganism that has been shown to make the model plant, *Arabidopsis thaliana*, able to withstand high temperatures up to 45 degrees Celsius, or 113 degrees Fahrenheit, with significant implications for desert agriculture.

Issue

Scientists at the Office of Arid Lands Studies' Southwestern Center for Natural Products Research and Commercialization (SCNPRC) are working with universities in and outside the United States, with agrochemical and pharmaceutical companies, and with other commercial entities to develop new biological and industrial products. The SCNPRC is part of the University of Arizona College of Agriculture and Life Sciences. The goals are to discover 1) specialty chemicals in indigenous desert plants that can be grown as industrial cash crops; 2) plant-associated microorganisms that can be used to produce pharmaceuticals and natural products with agricultural implications and 3) manipulation of biosynthetic genes of microorganisms capable of producing biologically active natural products. Natural product-based anti-cancer and anti-infective drugs and agrochemicals are in particular demand.

What has been done?

The SCNPRC team selects plants and plant-associated microorganisms in collaboration with other scientists and evaluates them for useful biological activities. If active, the scientists

separate and characterize the natural compounds responsible for the activity, and determine how to cultivate and process these organisms on a commercial scale. In the case of anti-cancer agents, those showing promise will proceed into further testing for efficacy and toxicity. Scientists are currently pursuing several plant and microorganism-derived compounds for their *in vitro* and *in vivo* anticancer activity and also for their utility in improving agricultural production in arid lands. The drug discovery program includes anti-infective agents, especially those useful to treat HIV infections, and a program to study and manipulate microbial biosynthetic genes.

The SCNPRC group is collaborating with the UA Division of Plant Pathology, the Departments of Biochemistry and Biophysics, Immunology, Pediatric Oncology and Surgery, the Arizona Cancer Center, Arizona State University, Translational Genomics Institute, Josephine Ford Cancer Center, Harvard University, Whitehead Institute, China Pharmaceutical University, South Carolina Oncology Institute and DuPont Crop Protection Division.

Impact

A natural compound occurring in a plant-associated microorganism has been shown to make the model plant, *Arabidopsis thaliana*, thermotolerant—able to withstand high temperatures up to 45 degrees Celsius, or 113 degrees Fahrenheit. A patent application for this unusual activity of a natural product has been filed. Further work pursued in collaboration with Harvard University and the Whitehead Institute has shown that growing of *Arabidopsis* together with the fungus producing this compound also confers thermotolerance. Implications of these findings in arid land agriculture are currently being studied in collaboration with DuPont Crop Protection. If successful in creating drought and cold tolerant crop plants with this new approach, it will possibly serve as an alternative to genetic manipulation.

Animal studies of anti-cancer compounds isolated from two medicinal plants, one used in Traditional Chinese Medicine and the other in Indian Ayurvedic Medicine, have shown encouraging anti-angiogenic activity–the ability to halt cancerous growths by inhibiting the spread of blood vessels that nourish tumors and enable them to spread into vital organs of the body. The two compounds are also capable of 100 percent inhibition of cancer proliferation *in vitro* at low concentrations. A patent application has been filed for the discovery of a novel anti-cancer drug target. This is part of an ongoing effort to find natural products with unique applications from arid lands organisms, allowing conservation and maintenance of the delicate desert ecosystem.

Funding

Arizona Agricultural Experiment Station–Natural Products Center, Arizona Biomedical Research Commission, Prostate Cancer Foundation (CaP CURE), public health funding from NIH and NCI, Department of Defense Prostate Cancer Program, American Institute for Cancer Research

Arizona Meteorological Network (AZMET) Aids Crop Decisions

Impact Summary

The Arizona Meteorological Network (AZMET) is now widely accepted as an important (and often the only) source of meteorological information pertaining to the production of agricultural and horticultural crops in Arizona. Users accessed AZMET web pages more than 600,000 times in 2006, a two-fold increase from 2005. The turf web page was accessed more than 27,000 times. In conjunction with personnel affiliated with the Ft. Mohave Indian Reservation, AZMET evapotranspiration information is used to schedule irrigations on more than 20,000 acres of cotton and alfalfa in western Arizona.

Issue

Properly tailored weather information can assist with important management decisions related to variety selection, planting dates, crop assessment, pest control, irrigation and harvest. The Arizona Meteorological Network (AZMET) was developed in 1987 to provide weather data and information in near real time to the state's producers of agricultural and horticultural crops.

What has been done?

The AZMET network of 28 automated weather stations located across Arizona supplies meteorological data from important agricultural production areas and selected urban locations. Data obtained by the stations are transferred to a Tucson-based data processing center nightly, where computers process the data into a variety of informational formats to assist in decision making. AZMET data and reports are available to the public free of charge via three Web pages. AZMET data provide reliable information on heat unit accumulation, used to monitor general crop development, to time planting and harvest dates for melons, sweet corn and other horticultural crops, and to predict pest development. For example, the AZMET Southeast Arizona Crop Water Use Advisory provides corn, forage, chile and nut growers in Cochise and Graham Counties information on weather, water requirements and crop development. For cotton, AZMET generates weekly updates on heat unit accumulation, crop water use and current and projected weather conditions. The updates are distributed to nearly 500 growers each week as part of the Cotton Advisory Program. AZMET also provides daily updates on heat stress, which can significantly reduce cotton fruit retention and yield.

AZMET data on evapotranspiration (ET) are used to estimate the water use of vegetation, including field crops and turf. AZMET generates daily turf water use reports for the Phoenix area and distributes this information to the public via a turf water management web page, email and an automated fax transfer system. Twenty large turf facilities (with more than 10 acres in turf, mostly golf courses and parks) receive this information via email or fax daily. AZMET also generates a lawn watering guide published daily in major newspapers in the Phoenix metropolitan area. AZMET's turf water management program includes weather stations in the low desert, and also in Flagstaff, Prescott and Payson. A Web site offers information on landscape irrigation to residents of northern Arizona. AZMET provides reference ET data to the Bureau of Reclamation for use in the Lower Colorado River Accounting System (LCRAS). LCRAS represents a new and improved means of assessing water use along this portion of the Colorado River.

Impact

AZMET is now widely accepted as an important (and often the only) source of meteorological information pertaining to the production of agricultural and horticultural crops in Arizona. Use of AZMET information continues at a high rate; users accessed AZMET web pages in excess of

600,000 times in 2006, which is close to double the number accessed in 2005. In conjunction with personnel affiliated with the Ft. Mohave Indian Reservation, AZMET ET information is now used to schedule irrigations on more than 20,000 acres of cotton and alfalfa in western Arizona. The turf web page was accessed in excess of 27,000 times in 2006.

Funding

Arizona Cotton Research and Protection Council, Arizona Grain Research & Promotion Council, Arizona Department of Water Resources, City of Phoenix, United States Bureau of Reclamation, Golf and Environmental Foundation of Arizona, irrigation districts, NRCDs, power districts, commodity organizations, Experiment Station and Cooperative Extension.

Functional Genomics of Maize Chromatin Proteins

Impact Summary

Researchers at The University of Arizona and other collaborating universities have identified more than 300 chromatin-related genes in maize that are responsible for certain types of gene expression. Seventy lines were already available and in use in labs around the world by January 2006. To date there have been 19 requests from 16 different labs; in response, 272 packets of this material were sent to scientists for study. For example, these lines were used by two different laboratories to advance the understanding of UV response in maize (Casati et al., Plant Journal 2006).

Issue

Gene regulation is critical to plant growth and development. One important regulator of gene expression is chromatin structure, which refers to the manner in which the DNA is packaged in the nucleus of the cell. Little is known about the genes responsible for creating and maintaining chromatin structure in maize, or how alterations to this structure can alter gene expression and other biological phenomena.

What has been done?

In 2005 plant scientists from the UA and five other universities won a 4-year, multi-million dollar grant from the NSF to identify and study the function of all chromatin related proteins in corn, the nation's most important economic crop. The scientists are developing and characterizing mutants which will allow them to analyze features of plants that lack the proteins involved in chromatin structure and modification. The mutants are then studied to determine how chromatin structure, gene expression, and important genetically regulated processes are altered. More than 300 chromatin related genes have been identified in maize, and information about each gene has been made available to the public in a Web-based database. This information is readily accessible and has the potential to be utilized by thousands of researchers.

This project is expected to provide researchers with a deeper understanding of an important crop plant, and also to increase the understanding of chromatin level regulation of gene expression, which is a critical component of disease, growth, development, and silencing of introduced transgenes in plants, humans and other organisms.

Impact

In collaboration with scientists at other universities, researchers at the University of Arizona are generating 300 mutant lines for scientists around the world to use in their own research. Seventy lines were already available and in use in labs around the world by January 2006. To date there have been 19 requests from 16 different labs; in response, 272 packets of this material were sent

to scientists for study. For example, these lines were used by two different laboratories to advance the understanding of UV response in maize (Casati et al., Plant Journal 2006).

Funding

National Science Foundation (NSF), Experiment Station, Experiment Station

Maize Microarray Project: A Tool for Crop Research and Improvement

Impact Summary

A maize expression array containing 57,452 genes has been developed and is being distributed to the worldwide maize research community. In the 30 months that maize expression arrays have been available, users have accessed the array data in the Zeamage relational database 71,915 times. Also during this time, 3,400 arrays have been sent to 105 research groups around the world, where they are currently used in researching nitrogen utilization; root growth under drought, water and phosphate stress; seed development; photosynthesis; pathogen response; aluminum stress in roots, maize ear, pollen and tassel development; and hybrid vigor.

Issue

Maize is one of the most economically important cereal crops and is grown worldwide with cultivars that are adapted to a wide variety of growing conditions and climates. Considerable interest exists in developing optimal tools and technologies for global analysis of gene expression in maize. These measurements can provide the basis not only for understanding the ways in which regulation of gene expression controls plant development, and responses of the plant to biotic and abiotic stimuli, but also for the rational design of strategies to improve crop yield and quality.

What has been done?

Plant scientists from the University of Arizona and two other research institutions won a three-year, $3.6 million grant in 2003 to develop a gene expression microarray for maize and develop an online relational database (Zeamage) for curation and dissemination of all gene expression data associated with the gene expression microarray. A maize expression array was developed and is being distributed to the worldwide maize research community using a cost-recovery model. As of December 2006 the array contained 57,452 genes. A project website (www.maizearray.org) has been developed that contains all associated project information and web-based tools for data submission. The website also houses the Zeamage relational database, which allows access to array data that has been deposited by array users. Additional tools have been developed that assist array users in experimental design and data analysis. Five workshops to train array users have been held and additional workshops are planned.

Impact

In the 30 months that maize expression arrays have been available to the research community, users have accessed the array data in the Zeamage relational database 71,915 times. A total of 3,400 arrays (in the form of slide sets) have been sent to over 100 research groups in the United States, Canada, England, Mexico, Italy, Germany, Belgium, China, Australia, Venezuela and Switzerland. These maize expression arrays are being used to study gene expression in a diverse group of research areas including nitrogen utilization; root growth under drought, water and phosphate stress; seed and pollen development; photosynthesis; aluminum stress in roots, maize ear, pollen and tassel development; and hybrid vigor.

Data generated from these expression profiling experiments is available to all interested researchers immediately upon deposit into the Zeamage database which currently contains 11.2

GB of expression profiling data. Insights gained from this approach to understanding gene expression will provide deeper insights to understanding maize growth and development and may eventually lead to improvements in crop productivity.

Funding

National Science Foundation Plant Genome Research Program, Experiment Station

Better Nitrogen Management in Irrigated Cotton

Impact Summary

UA demonstration projects have shown that nitrogen fertilizer applications can be reduced with no loss in yield and benefits to the environment from reduced nitrates in the soil; if adopted statewide, the annual savings, at March 2007 nitrogen prices, would be conservatively estimated at about $28 per acre. If 200,000 acres of the total cotton acreage in Arizona were affected, this would equate to $5.6 million in savings to the growers, who would be using approximately 150 pounds per acre, compared to a more common rate of about 200 pounds per acre, a 25 percent reduction.

Issue

The traditional approach to nitrogen management in irrigated cotton has been to push for maximum high yields by applying large amounts of nitrogen fertilizer. Historically, in many parts of Arizona, nitrogen application rates have exceeded 200 pounds per acre per season. Although yields may increase, there are serious drawbacks to this practice. Over the last 10-20 years the luxuriant vegetative growth resulting from these high nitrogen applications has harbored damaging insect populations and diseases in Arizona's cotton fields. Studies during the same period have shown that aggressive nitrogen fertilizer application can actually increase the loss of nitrogen from the soil. In the past, nitrogen fertilizer has been relatively inexpensive for Southwest desert growers, but in 2001 those costs rose approximately 30 percent they have been increasing again recently.

What has been done?

To help Arizona cotton growers establish efficient nitrogen applications in their fields, University of Arizona researchers studied and documented nitrogen uptake patterns and requirements in the crop at three UA agricultural centers. At each location, treatments varied from a conservative to a more aggressive approach to nitrogen management. Results at each location revealed a strong relationship between the crop fruit retention levels and nitrogen needs for the crop. Results showed that the higher, more aggressive N application regimes did not consistently benefit yields at any location. Generally, a more conservative, feedback approach to N management provided optimum yields at all locations.

UA College of Agriculture and Life Sciences researchers have designed nitrogen management guidelines and recommendations that pinpointed the best times to apply nitrogen in the proper amounts. Over the last 20 years this comprehensive nitrogen management strategy has been implemented in a statewide extension education plan for cotton growers that includes bulletins, reports, articles and grower meetings.

Impact

The cost of cotton production has been high during the last several years, but the market price has been low. UA demonstration projects on cooperating cotton farms have realized yields equivalent to commercial yields, using less nitrogen input, which has saved approximately $30

per acre in nitrogen application costs. If adopted statewide, the annual savings, at March 2007 nitrogen prices, would be conservatively estimated at about $28 per acre. If 200,000 acres of the total cotton acreage in Arizona were affected, this would equate to $5 .6 million in savings to the growers. Growers would be using approximately 150 pounds per acre, compared to a more common rate of about 200 pounds per acre, a 25 percent reduction.
In 200,000 acres of cotton, this means 5,000,000 pounds of nitrogen fertilizer would be withheld, resulting in less rampant vegetative growth, fewer insect problems and improved plant use of residual nitrogen in the soil. It would also protect groundwater from excess leaching of nitrogen compounds, thereby protecting the environment.
Difficult market conditions, which are the worst they've been since the Great Depression, have no doubt served as a stimulus in encouraging growers to make these changes. Approximately 60 percent of the cotton growers in Arizona are using more conservative nitrogen management strategies than they were five to ten years ago. Fortunately, the information in the educational program associated with these management decisions was already in place.

Funding
Water Quality Program, national Cooperative Extension, Hatch Act, Smith-Lever,
Arizona Cotton Growers Association, Cotton Incorporated

Low input barley

Impact Summary

Grain yield of low input barley is about half that of high input barley, but it requires only a third of the irrigation water and a quarter of the fertilizer. The potential savings by growing low input barley is about 2 acre-ft per acre of water and 150 pounds of nitrogen fertilizer per acre grown. When grown under low input conditions, “Solar,” a new variety introduced by the UA in 2006, yielded an average of 320 pounds more than “Solum,” an earlier low input variety, and 682 pounds per acre more than “Barcott,” a high input barley crop sometimes grown in Arizona using reduced water.

Issue

Barley is an important component of the crop mixture in Arizona. It improves the soil and breaks pest cycles, and thus benefits subsequent crops such as cotton and vegetables. Growers wish to recover their production costs when growing barley. This has become more difficult with the rising costs of inputs such as irrigation water and fertilizer. In 2005, about 30,000 acres of barley were harvested in Arizona, valued at $8 million.

What has been done?

University of Arizona researchers have evaluated low input barley varieties at the Maricopa Agricultural Center for the past 15 years, and released a new variety, Solar. The new variety was selected out of a group of 142 lines of barley in the breeding program.

Impact

The University of Arizona released a low input barley cultivar named Solar in 2006. Compared with Solum, a low input barley released in 1991, Solar has 10 percent higher grain yield, 11percent higher grain test weight, and 24 percent less tendency to lodge (tip over) than Barcott, a high input barley sometimes grown in Arizona under reduced water use conditions. When grown under low input conditions at the Maricopa Agricultural Center, Solar yielded an average of 320 pounds more per acre than Solum and a surprising 682 pounds per acre more than Barcott. Grain yield of low input barley is about half that of high input barley, but it requires only a third of the irrigation water and a quarter of the fertilizer. Therefore, if water and fertilizer costs are

high, growing low input barley can be more economical. The potential savings by growing low input barley is about 2 acre-ft per acre of water and 150 pounds of nitrogen fertilizer per acre grown.

Funding

Arizona Grain Research and Promotion Council
Experiment Station, Cooperative Extension

Goal 2: *Safe and secure food and fiber systems*

First Cell Culture System for Growth of Human Norovirus

Issue

Noroviruses are the leading cause of human adult diarrhea in the world. In the United States, they are the major cause of foodborne illness. More than 20 outbreaks of norovirus are reported each year in the Arizona alone. No method has been available for the growth of this virus in the laboratory, which is needed for the development of vaccines and methods to prevent outbreaks. The largest number of norovirus infections ever documented occurred in 2006. A new strain has recently evolved which causes a more serious illness with more reported deaths than previous strains. As with all viruses, noroviruses cannot be treated with antibiotics.

What has been done?

A team of investigators at Battelle Laboratories Northwest, Arizona State University and the University of Arizona have developed the first cell system for the growth of the human norovirus in cell culture. Scientists have attempted to accomplish this for decades; this is the first successful attempt reported.

Impact

The growth of norovirus in cell culture is a major breakthrough to understanding the pathogen's disease processes, and developing vaccines and methods for the assessment of antimicrobials to prevent outbreaks of this virus. This single development can potentially lead to the control of disease agents responsible for millions of cases of gastroenteritis worldwide, saving billions of dollars in related health costs and lost work hours, and potentially saving thousands of lives.

Funding

American Waterworks Research Foundation, Experiment Station

Aquaculture Pathology Laboratory Assists Shrimp Industry

Impact Summary

The UA's Aquaculture Pathology Laboratory has served the domestic and international shrimp farming industry for 30 years by developing diagnostic methods for control and prevention of

shrimp diseases; by being part of the team that produced the first domestic pathogen-free stocks of the Pacific white shrimp that has become the dominant shrimp variety cultivated worldwide; by training more than 1,000 national and international shrimp disease specialists; and by identifying new shrimp pathogens and diseases. The APL has helped form the basis of the commercial shrimp industry, from its experimental beginnings in the 1970s to the multi-billion dollar business that it is today and has helped the shrimp industry save billions of dollars in lost harvests by identifying and isolating or destroying affected shrimp crops early.

Issue

Large-scale commercial farming of shrimp began about 35 years ago, and now more than half of the world supply comes from farms. Most of the farmed shrimp production is imported by the United States, Japan and Western Europe. Some very significant shrimp diseases have emerged and spread rapidly in the industry, often resulting in severe epizootics in some shrimp growing countries. Global crop losses in pandemics since 1992 from two shrimp virus pandemics now exceed several billion dollars.

What has been done?

Established in 1984, the Aquaculture Pathology Laboratory (APL) in the University of Arizona College of Agriculture and Life Sciences describes and studies the biology of diseases of farm-raised shrimp and develops diagnostic methods and control or prevention strategies for these diseases using traditional and modern molecular techniques. These include methods for improving on-farm, regional or national biosecurity, as well as developing domesticated specific pathogen-free or specific pathogen-resistant shrimp stocks. In addition, the APL transfers these technologies through an annual summer session shrimp pathology short course and through special shrimp disease workshops in host countries.

The program includes a laboratory and a primary quarantine facility that acquires wild or farmed shrimp and assesses the disease status of these stocks prior to their being introduced into domestic shrimp breeding programs. The laboratory was designated by the OIE (World Organization of Animal Health) in 1993, as one of the two reference laboratories in the world for penaeid shrimp disease. It is also a USDA APHIS Approved Laboratory for shrimp diseases. The ideal geographic location of the UA, isolated from coastal waters, reduces to near zero the risk of accidental introduction of shrimp pathogens into the aquatic environment.

The APL remains a leader in shrimp disease research, having recently identified, characterized and named three new diseases from penaeid shrimp. Infectious Myonecrosis, IMNV, has caused more than $20 million in lost production to Brazilian shrimp farmers since the disease emerged in 2002. Because IMNV has recently appeared in southeast Asian shrimp farms, it poses a significant threat to shrimp famring worldwide, and IMN is a likely candidate for disease listing by the OIE in 2007. The second new disease was spiroplasmosis, a presumably new and very interesting disease of farmed shrimp that broke out first in shrimp farms in Colombia. APL has named the causative agent *Spiroplasma penaei*. The third new disease is another virus limited to Central America. APL characterized the virus and named it Penaeus vannamei nodavirus (PvNV).

Impact

The APL has served the domestic and international shrimp farming industries for more than 35 years. Much of what is known about shrimp diseases and the methods to diagnose and manage them was developed at the APL. Of the many hundreds of shrimp disease specialists working with the shrimp farming industry today, many have completed much of their training directly or indirectly from the APL. So far, the APL has held 18 regular summer session short courses on

the UA campus; some 476 students from 53 countries or territories have been trained in diagnostic shrimp pathology in these courses. Combined with the number of students attending more than 20 special workshops held abroad, 1,051 students had received formal training in shrimp pathology and diagnostic methods from the APL as of December 2005.
The APL also conducted, in Tucson, the primary quarantine on stocks of Pacific white shrimp, producing the founder populations of specific-pathogen-free stocks that were later propagated and distributed by the Oceanic Institute in Hawaii to domestic broodstock producers and eventually to commercial shrimp farmers throughout the world. The Pacific white shrimp variety has since become the dominant shrimp variety farmed worldwide.
By identifying three prominent new shrimp diseases the APL has provided a diagnostic tool that will help shrimp farmers detect these pathogens in their stocks. By destroying or harvesting the shrimp early, before the disease spreads to the rest of their crop or to other shrimp farms nationally and internationally, shrimp growers worldwide are collectively saving billions of dollars.

Funding

U.S. and international shrimp farming industry, USDA Marine Shrimp Farming Consortium, Experiment Station

Goal 3: *Healthy, well-nourished population*

EFNEP Knowledge is Power–Nutrition Education for Healthier Families

Impact Summary

EFNEP nutrition educators in Maricopa County (including the Phoenix metropolitan area) taught 2,202 families in 2006; of these, reports show that 83 percent of the participants exited the program showing improvements in planning meals, comparing prices and using grocery lists. Seventy-four percent ate two or more servings of fruit daily, ran out of food less often before the end of the month, and stopped thawing food at room temperature—a major preventive measure in reducing foodborne illness.

Issue

Hunger and poor health contributes to debilitating factors such as increased chronic disease, homelessness, family stress and deterioration, and child health related diseases due to inadequate nutrition. The Native American reservations are combating diabetes at an alarming rate and the African American and Hispanic communities are struggling with diabetes and high blood pressure. Americans as a whole are faced with the same nutrition related problems. Proper nutrition plays a major role in combating food related diseases. EFNEP, the Extension Food and Nutrition Education Program strengthens low-income families through education. EFNEP Families learn about making sound nutritional choices based on dietary guidelines, by improving their overall nutrition and health, and learning skills to manage their money through optimum grocery purchasing and applying safe food practices.

What has been done?

EFNEP paraprofessionals provide education to low-income families through a series of classes

presented weekly, biweekly or in some cases daily, in one or two-hour sessions. Handouts, nutrition games, quizzes, dietary guideline curriculum and “Eating Right is Basic—Enhanced” are used to teach the classes. Participants receive a certificate upon completion, and a pre-and post-test, 24-hour food recall and a behavioral survey are administered at the beginning and end of each class lesson series.

EFNEP nutrition educators in Maricopa County (including the Phoenix metropolitan area) taught 2,202 participants six lessons each for a total of 13,212 contacts in 2006. Of these, 1,714 participants were low-income parents between the ages of 21-29. The number of households enrolled in one or more food assistance programs as a result of EFNEP assistance was more 1,400. Simple money-management techniques taught in EFNEP classes empowered families to use food dollars more wisely and make healthier food decisions. EFNEP has more than 120 registered volunteers who provide class set-up, transportation of families to sites, and babysitting.

Impact

In 2006, 83% percent of the 2,132 EFNEP participants who completed classes showed improvement in planning meals, comparing prices and using grocery lists. They also showed improvement in one or more nutrition practices, such as preparing food without added salt. Seventy-four percent of EFNEP participants ate two or more servings of fruit daily, ran out of food less often before the end of the month, and stopped thawing food at room temperature—a major preventive measure in reducing foodborne illness. Sixty-two percent were eating three or more servings of vegetables upon exiting the program. EFNEP volunteers contributed 1500 hours of service in 2006.

Funding

Smith-Lever 3 (d): EFNEP

EFNEP Knowledge is Power–Nutrition Education for Healthier Families

Impact Summary

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Issue

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What has been done?
EFNEP paraprofessionals provide education to low-income families through a series of classes presented weekly, biweekly or in some cases daily, in one or two-hour sessions. Handouts, nutrition games, quizzes, dietary guideline curriculum and “Eating Right is Basic—Enhanced” are used to teach the classes. Participants receive a certificate upon completion, and a pre-and post-test, 24-hour food recall and a behavioral survey are administered at the beginning and end of each class lesson series.
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Funding
Smith-Lever 3 (d): EFNEP
In-kind from agencies

Better Nutrition Through EFNEP

Impact Nugget
In 2006 more than 3,313 low-income families that included 12,569 family members and 3, 711 youth attended EFNEP classes in Arizona; As a result of the program, nearly 60 percent of the children ate breakfast more often, 56 percent of the adult participants now use a shopping list, and about 70 percent followed recommended food safety practices.
Issue
EFNEP, the Extension Food and Nutrition Education Program, addresses the needs of low-income, minority families and youth nationwide. The goal is to teach families with children to stretch their limited food dollars, plan and prepare nutritious foods and make informed choices about food and other lifestyle issues that support family health and well-being. Funded nationally by the USDA, EFNEP is staffed locally in each state and the U.S. territories by Extension-trained nutrition educators.
What has been done?
Arizona's EFNEP program is offered in 5 of the state's 15 counties—Cochise, Maricopa, Santa

Cruz, Pima and Pinal. The EFNEP curriculum includes methods of meal planning, food shopping and budget management skills, handling food properly, food storage and sanitation as well as improving family nutrition and health. By the time parents graduate from the program, participants have learned how to use government-issued commodity foods, compare food labels, and choose a healthy diet while still cutting expenses.

Impact

In 2006 more than 3,313 low-income families that included 12,569 family members and 3,711 youth attended EFNEP classes in Arizona; 382 volunteers assisted with family nutrition education. The Arizona EFNEP program included 80 percent minorities (Hispanic, African-American, Asian and American Indian). As a result of the program, nearly 60 percent of the children ate breakfast more often, 56 percent of the adult participants now use a shopping list, and about 70 percent followed recommended food safety practices.

Funding

Smith-Lever3(d),EFNEP

Goal 4: *Greater harmony between agriculture and the environment*

Cotton IPM: A Decade of Reduced Insecticide Use in Arizona

Impact Summary

A comprehensive integrated pest management (IPM) program implemented in Arizona cotton for the past 11 years resulted in a 60% reduction in pesticide sprays for all insects combined, including whiteflies, pink bollworm and Lygus bug and others, reducing insecticide usage by more than 1.6 million pounds. Growers saved over $142 million in pesticide costs and reduced damage by over 11%. Last year (2006) represented the lowest annual insecticide usage in Arizona cotton in 28 years.

Issue

At one time, insecticide applications in cotton typically accounted for about half of all insecticide use in the United States. New materials on the market are now enabling cotton growers to reduce their spray applications while maintaining competitive yields. These technologies also help growers implement more ecologically-based IPM programs and become less dependent on broadly toxic insecticides.

What has been done?

An integrated pest management program in Arizona has implemented two new tools for the last 11 years (in 1996 and continued their use through 2006): insect growth regulators (IGRs, effective against whiteflies) and transgenic cotton (containing Bt effective against pink bollworms). The University of Arizona College of Agriculture and Life Sciences collaborated with growers, the USDA, the Arizona Department of Agriculture, the Arizona Cotton Growers' Association, Cotton Incorporated, industry and others. Both of these tools are highly effective against pests, but safe to humans and the environment. Based on insect hormones, growth regulators disrupt the growth and development of insects. Transgenic cotton is genetically engineered to carry its own biological insecticide, targeting lepidopterous pests, within the plant

tissues. Both technologies kill their target pests while allowing natural processes to play a larger role in the control of all other insects.

Impact

Nearly 100 percent of the cotton acreage in Arizona was sprayed multiple times for pink bollworm and silverleaf whitefly in 1995. By 2006, more than a decade of comprehensive integrated pest management in the state decreased the total pesticide applications for whiteflies, pink bollworm and Lygus bug by 60%, a reduction of more than 1.6 million pounds of pesticide. Large-scale adoption of IPM programs by cotton growers has reduced insecticide usage and lowered exposure risks to farm workers, growers and the public.

In 1995, cotton growers sprayed on average 12.5 times with broadly toxic insecticides totaling1,709,000 pounds By 2006, cotton growers sprayed just 1.3 times with safer compounds totaling less than 80,000 pounds, a 20-fold reduction in insecticide use. Growers saved over $140 million in pesticide costs and reduced damage by over 11%. The year 2006 represented the lowest annual insecticide usage and lowest yield losses to insects in Arizona cotton in 28 years. Almost half of the state's cotton acreage was never sprayed for insect pests, less than 25% for Lygus bugs and less than 5% for pink bollworm. Growers relied more on selective control technologies that are compatible with natural controls. When insecticides were used, growers chose reduced risk products that are safer for applicators and for the environment.

Along with resistance management, these IPM efforts reduced insecticide use, conserved biological control agents, and enhanced sustainability and profitability. The availability of these selected technologies, which are harmless to predaceous insects, has provided growers the opportunity to employ IPM practices that enhance the population levels of beneficial insects in the field and created area-wide benefits for all producers. Furthermore, these plans have been exported for use in California, Texas, northern Mexico and Latin America.

Funding

Hatch Act, Smith-Lever 3(b) & (c), Special Research Grants, Smith-Lever 3(d) (e.g., IPM), Western Region IPM; Pest Management Alternatives Program, Cotton Incorporated, Arizona Cotton Growers Association, Agrochemical industry
Western IPM Center (CSREES), Arizona Pest Management Center, Crop Insect Loss and Impact Assessment Working Group (UA)

School IPM: Children's Environmental Health Program

Impact Summary

For the coalition of 22 school districts in Arizona that are implementing the school IPM program, there was a 71 percent reduction in pesticide applications, and a 78 percent reduction in pest complaints from 2000-2006. The number of students enrolled in these schools represent more than 31 percent of all state-registered students in 216 school districts—roughly 304,000 youth. The Arizona state program for IPM in schools has become a model for developing children’s environmental health programs in schools across the United States.

Issue

Many schools in Phoenix and elsewhere in Arizona routinely spray their facilities with pesticides to control an assortment of fire ants, cockroaches, mosquitoes and bark scorpions. Each month the treatments are repeated as part of an outdated pest prevention program that often fails to

work. Unacceptable pest populations remain a problem in these schools. At the same time, while the pesticides are applied and reapplied, parents pull their children out of school for a day or two each month to avoid pesticide exposure.

What has been done?

An integrated pest management program (IPM) for schools began in Arizona in 2000 and has continued to expand over the past five years. The goal is to control pests effectively while avoiding reliance on chemical pesticides. The program is now part of a national and international environmental health effort connecting school districts in Arizona, Florida, Alabama, Ohio, Indiana, Utah, Nevada, California, Oregon, Colorado, Washington, and Sonora, Mexico. The goal is to control pests while avoiding reliance on chemical pesticides. Each school develops a plan to identify pests, find out where they are coming from, and prevent their entry into buildings. Custodial and kitchen staff are involved in training. Openings around pipes and conduits are sealed, closing off crawl spaces, and drains and building slabs are repaired to inhibit entry of cockroaches and other pests. Trees may be trimmed back, and bird roosting areas limited to places where their droppings won't contaminate walkways and other high-traffic areas.

The program spread from the pilot schools in metropolitan Phoenix to the Gila River Indian Reservation and Hopi Reservation in fall 2002. One school had spent nearly $7,000 in pest control annually until the school IPM program brought the cost down to a few hundred dollars instead. During 2006, the entire Hopi school district (elementary through high school), along with all tribal government buildings, achieved very high standards of IPM implementation. Pesticide applications were completely stopped, and pests were controlled though improved pest-proofing of buildings, alternate sanitation practices, and use of reduced-risk controlled products.

The School IPM program continues to expand: UA faculty have partnered with the Arizona Department of Environmental Quality, the Arizona Department of Health Services, Arizona Structural Pest Control Commission, Arizona/Sonora Commission, Arizona Asthma Coalition, EPA Region 9, National IPM Institute, International Urban IPM Association, Environmental Strategic Alliance entities, ASU, the Navajo Housing Authority, and Phoenix Children's Hospital. The ultimate goal is statewide implementation of school IPM practices.

A Valley Metro School Coalition formed by UA faculty in 2003 to implement IPM in member schools had expanded 2006 to include 22 school districts in the Phoenix metropolitan area, plus the Hopi Reservation schools. A program was established in Tucson Unified School District and in the Nogales Arizona/Sonora border area. The Arizona/Sonora Commission plans to expand IPM to all schools in Sonora, Mexico, showcasing the model process along the border regions.

Impact

For the coalition of 22 school districts in Arizona that are implementing the school IPM program, there was a 71 percent reduction in pesticide applications, and a 78 percent reduction in pest complaints from 2000-2006. The number of students enrolled in these schools represent more than 31 percent of all state-registered students in 216 school districts—roughly 304,000 youth.

The IPM final evaluation for the pilot program in the Kyrene School District in 2000 showed that the three Phoenix schools reduced their pesticide applications by 90 percent and kept pest populations below 85 percent of their original levels. The costs associated with IPM were no more than a traditional program. The Arizona state program for IPM in schools has become a model for developing children's environmental health programs in schools across the United States.

Indoor Air Quality technologies are now introduced to all participants involved in the IPM Coalition, making this a broader Children's Environmental Health Program. Child care facilities

and support entities are now also joining the coalition, including certain UA faculty, Arizona Department of Health Services Breath Mobile participants and pediatric asthma specialists from the Phoenix Children's Hospital. The latter are conducting studies on the prospective health benefits of school IPM programs by monitoring students with asthma. The study involves a school district with the highest frequency of asthma attacks resulting in emergency room visits in the state. Asthma triggers include certain pest allergens, such as cockroaches, and types of pesticides. Schools that are on IPM programs not only have fewer cockroaches, but also less pesticide in the environment.

Funding

Cooperative Extension, Experiment Station
Environmental Protection Agency

Saving Energy Costs with Operation Cool Shade

Impact Summary

By planting shade trees around their homes, 396 homeowners in Pima County, Arizona collectively saved a projected $55,245 in electrical costs during the peak summer months in 2005. The Operation Cool Shade program distributed more than 1,150 trees to these electric cooperative customers. Since 2000, a total of 10,408 trees have been distributed to 3,627 customers in Pima County.

Issue

Studies show that proper shading of the home can reduce energy consumption by as much as 20 percent. "Operation Cool Shade" began in 2000 when the University of Arizona Cooperative Extension in Pima County joined with Tri-Co Electric Cooperative to distribute shade trees to residents for energy conservation.

What has been done?

Tri-Co Electric Cooperative and Pima County Extension provided trees and training, respectively, to interested residents. A requirement of the program was that trees be planted in locations around the house to ensure maximum shading. Master Gardeners completed "train the trainer" programs and in turn trained residents regarding the correct selection, placement, planting and care of shade trees.

In 2006, ten Master Gardener volunteers conducted four annual programs, two in Green Valley and two in Marana, for 181 participants. An additional four Master Gardeners staffed an answer booth on tree planting and care at the tree distribution day conducted by TriCo Electric Cooperative's headquarters in Marana, Arizona. Tri-Co employees conducted follow-up inspections to ensure that trees were planted in the pre-determined locations and that the trees remained in good health. (Follow-up information and assistance with tree care is provided by the Pima County Cooperative Extension).

Impact

During the 2006 Operation Cool Shade program, 1,150 trees were distributed to 396 electric cooperative customers. Since 2000, a total of 10,408 trees have been distributed to 3,627 customers in Pima County, Arizona.

Given the average peak household consumption (July, August and September) of 7,263 kilowatt hours and the current rate of $0.09602 per KWh, the average projected savings for individual households participating in Operation Cool Shade for the three-month period is 20% of 7,263 KwH or 1,453 kWh, with a dollar savings of $139.51 during that time. In terms of all 396

participating households for 2006, the projected savings is 575,388 kWh or $55,245 for the peak three-month summer period.

Funding

TriCo Electric Cooperative, Cooperative Extension

The Master Naturalist/Watershed Steward Program

Impact Summary

Overall, master naturalist/watershed steward class members donated 4,015 hours to area agencies and organizations in 2005, with a dollar contribution to the community, county, area agencies and organizations in excess of $70,714, using the federal volunteer compensation rate of $17.61/hour. By December 2006, the volunteers in the Master Naturalist/Watershed Steward program had doubled their volunteer hours to 8,000, with a dollar contribution (using the same compensation rate) of $140,880.

Issue

Many communities, agencies and organizations rely on citizen volunteers for implementing youth education programs, operating parks, nature centers and natural areas, and for providing leadership in local natural resource conservation efforts. The Master Naturalist/Watershed Steward program in Coconino County is directed at creating a corps of well-informed volunteers to deliver quality environmental education programs and to assist in the stewardship of Arizona's watersheds and natural environment.

What has been done?

Coconino County Cooperative Extension initiated a program called Arizona Master Naturalists in fall, 2003. In 2005 this program partnered with the University of Arizona Master Watershed Steward program and modified the name of the program to reflect this change. Volunteers undergo 12 weeks of training focusing on plants (invasive weeds and ethnobotany), wildlife habitat, water and drought issues, stream processes, geology, soils, climatology, forest health and fire ecology, geospatial mapping, interpretation and education, and the natural and cultural history of the region. At the end of the training, class participants give back a minimum of 40 hours in service to organizations and agencies of northern Arizona, including The Arboretum at Flagstaff, The Museum of Northern Arizona, Arizona Game and Fish, the National Park Service, Grand Canyon Trust, The Nature Conservancy and many other organizations.

Arizona Master Naturalists/Watershed Stewards continue to maintain the Web log site http://azmasternaturalist.arizona.edu, initiated by a Master Naturalist in 2004 and used as an information and communication tool to class members and the general public. In addition, a video library of classes has been established due to the efforts of another Master Naturalist.

Impact

Overall, master naturalist/watershed steward class members donated 4,015 hours to area agencies and organizations in 2005, with a dollar contribution to the community, county, area agencies and organizations in excess of $70,714, using the federal volunteer compensation rate of $17.61/hour. By December 2006, the volunteers in the Master Naturalist/Watershed Steward program had doubled their volunteer hours to 8,000, with a dollar contribution (using the same compensation rate) of $140,880. The program Web log site was accessed 3,900 times.

Funding

Arizona Dept. of Environmental Quality's Water Quality Division
Flagstaff Community Foundation Arizona
Cooperative Extension

Goal 5: *Economic development and quality of life for people and communities*

Arizona 4-H Character Counts: Educating Cochise County Youth

Impact Summary

Thanks to effective teacher and leader training for Character Counts programs, more than 10,000 youth in Cochise County were involved in Character Counts education in 2006.

Issue

4-H Agents have identified character issues as critical in many 4-H activities. Also, schools report that disruptions in the classroom due to behavior problems reduce the number of effective teaching hours in a school day. The needs identified were to improve behaviors in some youth, and to train agents, teachers and community leaders using Character Education materials and resources.

What has been done?

Through the Character Counts program, school children are learning to become leaders instead of displaying negative behavior. Character Counts Curriculum is now offered in the Sierra Vista, Palominas, McNeal, Douglas and Fort Huachuca school districts in southeastern Arizona. Cooperative Extension personnel in Cochise County provided Character Counts training to care providers who serve all five of the before-and-after-school sites at the Sierra Vista elementary schools. Character Counts training was also provided to the Boys and Girls Clubs of America in Sierra Vista and Bisbee. Sierra Vista continues as a "Community of Character" and has extended and endorsed Character Counts throughout the community. At Apache Middle School the six “pillars” of Character Counts—trustworthiness, respect, responsibility, fairness, caring, citizenship—were painted on the locker ramada as a daily reminder for all students.
Bisbee's homeless shelter for women and their children use the curriculum and have started a 4-H club at their site. In 2005, 17 juvenile detention staff were trained in Character Counts for comprehensive implementation at the Sierra Vista facility. Twenty-five teachers at Chancellor charter school were also trained, and In addition, to five school districts, the program is fully implemented at a child development center, and 12 providers from the Sierra Vista Parks and Leisure KIDS world program who completed Character Counts training for full implementation serve more than 300 youth five days a week.

Impact

Thanks to effective teacher and leader training for Character Counts programs, more than 10,000 youth in Cochise County were involved in Character Counts education in 2006. One trainer at the Sierra Vista Boys & Girls Club of America stated, “We couldn't imagine NOT having the six pillars of character be the foundation of our program. It is fun, easy, and just makes sense.”

Funding

Cooperative Extension

Project LEAP: A 4-H Leadership Education Adventure for Pre-Teens

Impact Summary

A 4-H program for pre-teens aged 11-13 involved 56 youth in activities designed to give them a sense of belonging and build their leadership and decision making skills: more than 84 percent showed gains in these areas according to pre-program and post-program surveys.

Issue

Because adolescents are often testing boundaries and their role in the adult world, they may leave behind the groups in which they were previously involved. If they don't find a suitable replacement niche, they may succumb to the temptations of gangs and drug and alcohol abuse. Arizona 4-H camping activities have typically been limited to teens over the age of 14. Providing alternative opportunities not only give pre-teens a sense of belonging (thus promoting 4-H youth development and helping to ensure membership as an older teen) but also offers valuable life skills development.

What has been done?

Project LEAP (Leadership Education Adventure for Pre-teens) was created for southeastern Arizona youth aged 11-13 to give them the chance to take part in activities that enhance leadership skills, boost self-esteem and improve their decision-making skills. Workshops, activities and demonstrations that were held for this age group in 2004-2006 included horse care, GPS training, entomology, ham radio operations, rappelling, archery, hiking, and arts and crafts. Outside demonstrations included experiences with Army dogs, challenge games, and an Army simulated "boot camp." In addition, more than 40 4-H youth have performed community service projects, including preparing holiday baskets for needy families; rebuilding an archery site and refurbishing trash cans at a local facility rented for LEAP activities.

As a service project for Cochise County, Teen/Pre-Teen Council members collaboratively wrote two grants to the county health department for projects that would encourage physical activity and include mini-lessons on diabetes and asthma. The council sponsored three community service events fostering health and fitness for Cochise County 4-H members and leaders. A "Plan & Play" was held for teens and pre-teens from Cochise, Fort Huachuca and Santa Cruz counties, allowing youth ages 11-18 to identify needs, plan programs and events, and practice leadership skills. Overall, youth participants were taught numerous physical activities to encourage productive, healthy lifestyles, and were trained to identify current activities and skills needed to avoid risky behaviors. They had opportunities to interact with people of diverse cultures, to make new friends, and to learn safe camping practices in preparation for the time when they are old enough to attend 4-H teen and leadership camps.

Impact

Middle schooler (pre-teen) involvement in 4-H activities has expanded to include nearly 50 percent of all Cochise County Teen/Pre-Teen Council events. In 2004, 50 percent of youth involved were pre-teens. In 2005, evaluation data revealed that pre-teen involvement increased from half to roughly two-thirds of the Teen/Pre-Teen Council and their activities. By 2006, nearly three-fourths of youth involved were pre-teens—their enrollment had more than doubled, from 44 youth in 2004 to 86 in 2006. Surveys conducted using the online Arizona Life Skills Evaluation tool focused on wise use of resources, communication, accepting differences, useful/marketable skills, and self-responsibility. Specifically, youth were evaluated in areas such as "assisting a group in meeting its goals by showing or directing along the way; using personal influence to guide a group in reaching its goal, organizing a group to reach its goal, and

contributing as a member of the team." According to evaluations for 86 participants, the percent of participants who made gains from pre-program to post-program was 66 percent.
"We've never had anything for us [pre-teens] before. You have always had to be 13 to do anything fun in 4-H. LEAP Camp was the greatest weekend of my life. Now I get to do all the stuff the teens get to!" –pre-teen participant
"The best part of LEAP Camp was that I made friends with younger kids. I'm a better role model, now!" –11-year-old participant
"This program is very [much] needed for this age of children. The kids were willing to help, participate and enjoy each other. There were no cliques, no 'problem children', and great enthusiasm. Counselors were educated in every way. LEAP was planned out great. Hope to see you next year and many years to come!" –adult chaperone for LEAP program

Funding

Cooperative Extension

Life and Job Skills Training: "The Extension Connection"

Impact Summary

Over the past seven years more than 550 high-risk adults from a low-income Phoenix community (more than 85 percent of those enrolled) have graduated from "The Extension Connection" workforce development program; more than 235 have been employed for more than a year, and many of the participants have overcome drug addictions and gang affiliations.

Issue

There is a need in the Phoenix metropolitan area for "welfare-to-work" type programs. Extension Connection was developed when a local Cooperative Extension agent recognized a dire need for the addition of life management skills along with nutrition education in programs for families. The Extension Connection components added a special touch to an already existing program called Successful Training Resource Individual Development or otherwise known as Project S.T.R.I.D.E. at Keys Community Center. This program promotes workforce development in a South Phoenix high-crime, at-risk area.

What has been done?

The Extension Connection program enhances life skills and promotes workforce development of low-income families by providing a series of educational experiences that promote self-sufficiency. Families learn job development skills, nutrition, and money management. The program uses a variety of Cooperative Extension programs such as Money Management, Life Skills and Nutrition and a series of educational experiences called Challenge to enhance the skills and abilities of families towards self-sufficiency.
The program reaches people who are at risk: unemployed, underemployed, unskilled, young dropouts, ex-prisoners, drug and alcohol addicts, and young mothers. Participants in the program have ranged from former gang members to newly arrived immigrants to the United States whose lack of English and American job skills caused significant barriers to employment. Ninety-five percent of the program graduates are members of racial or ethnic minorities, 60 percent have had less than a high school education; many have criminal records. Many of the participants have returned to help as volunteers and mentors, and three are now employed as staff.
In 2005, the KEYS Community Center spent a large amount of time revamping the center and programs, as well as applying for grants for Extension Connection (STRIDE). The result of this long term (1997) collaboration of Keys and Extension Connection was to have monies awarded: $50,000 from various groups; the private sector; DES through Creative Innovations and New

Century Collaborations; also $60,000 additional monies waiting approval from Latino Coalition for 2006.

Impact

During the past seven years more than 550 high-risk adults from a low-income community, including 95 percent of those enrolled in 2005-06, have graduated from the Extension Connection program. More than 325 have been employed for over a year. Many participants have returned to the site to help as volunteers and mentors, and some are now employed at the site as staff. For some participants, this was the first time they were free of drugs, free of gang affiliations and showed up daily for classes. Due to changes in administration at Keys Community Center, just 50 people participated in 2005-2006, compared to previous years. Of these, 100 percent showed improvement in working with others positively; more than 95 percent learned at least two skills that boosted their self-esteem and completed the goals they set at the beginning of the session. All participants set goals at the beginning of the program, and 85 percent had completed these goals by the end of the program. Chase Bank, US Bank, and City of Phoenix, are all on board to help with jobs. Regarding dietary changes, upon graduation, 85 percent of participants in 2006 learned to plan meals.

One STRIDE/Extension Connection graduate became a counselor at a drug rehab home helping other women get off the street. “STRIDE put pride in my eyes,” she says. Another graduate credits the Connection program with helping her focus on goals, setting reachable steps and believing she could succeed. She connected with a local small business development center after her training, and now owns and operates her own neighborhood beauty salon. One former drug addict is now a leader in the community and director of a company.

“The Extension Connection helped me to bridge the gap in society for me, to make the transition to a new life smoother.” –former prison inmate who wanted to improve his life with skills for living and get a decent job.

Funding

EFNEP, Southwest Leadership Foundation, DES: Creative Innovations and New Century Collaborations, Big O Tires

STAKEHOLDER INPUT PROCESS

1) Advisory Boards

a) *Cooperative Extension.*

The Legislature of the State of Arizona accepted the provisions of the Smith-Lever Act in 1915. It authorized the Board of Regents of the University of Arizona, the Land Grant University in Arizona, to “organize and conduct agricultural Extension work which shall be carried on in connection with the College of Agriculture and Life Sciences of the UA in accordance with the terms and conditions expressed in the Act of Congress aforesaid”. This State legislation also empowered county governments to appropriate funds for the county Extension program.

Currently, according to Arizona State Law *ARS 3-124-127*, each County Extension Board consists of seven persons, who are residents of the county, four of whom have as their principal

business the production of agricultural commodities, and the other three of whom are representative of organizations or persons who utilize the county Cooperative Extension offices. Extension faculty are sensitive to including membership representative of their county regardless of racial or ethnic background. Names of Advisory Boards for each Arizona county are available at the Cooperative Extension web site (http://ag.arizona.edu/extension/). The County Extension Boards have three responsibilities. First, in order to build educational program priorities that are based on needs of local people, the Extension Board must approve the Annual County Plan of Work. The county Extension faculty present a prioritized list of potential programs and the Board may suggest others. In setting priorities, Cooperative Extension is interested in involving a broad-based, representative county group that may include commodity groups, 4-H councils, family consumer groups and community development groups.

Another role of the County Extension Board is to annually approve the county Extension budget, submitted to the Extension Board by the County Director. This budget covers all funds expended for Extension work in the county. According to the legislation, the Board of Supervisors of each county must provide reasonable rent-free office space for the conduct of extension work in that county. Third, the Extension Board approves the Annual Report of Extension work in the county. County reports are available at the Cooperative Extension web site.

b) *Experiment Station*

Individual advisory boards have been established for each of the following Agricultural Centers: Maricopa and Citrus, Safford, Yuma, Oracle, Santa Rita Experimental Range and the V-V Ranch. The boards have representatives from the agricultural community, the agri-business community and include consumer representatives who are appointed on a rotational basis. These boards meet from two to four times per year to review ongoing programs and make recommendations for change. In addition, the State 4-H Youth Development program, the Departments of Agricultural and Biosystems Engineering and Animal Science and the Schools of Natural Resources and Family and Consumer Sciences have separate advisory committees that provide input to the programs of these units.

2) State Program Evaluation

Accountability is increasingly important to secure new resources, maintain visibility, and market effectiveness. Every faculty member in the College of Agriculture and Life Sciences provides an Annual Performance Report (APR) of accomplishments and impacts for the previous year, and a plan of major commitments for the coming year. This information is entered into a searchable database of programs and their impacts. Key components of the database are: (1) college-wide reporting, linking extension, research and teaching; (2) agricultural experiment station reporting of federal project data; (3) Cooperative Extension reporting of federal clientele contact data and outreach activities. This data base is accessible at http://ag.arizona.edu/APROL. Public impact statements are available under the “Arizona Delivers” label, a new attempt at branding for CALS.

Statewide program priorities have been identified for the next three to five years. Cooperative Extension sponsored a program retreat for family, consumer and health sciences. New and innovative programs are targeting new audiences, such as outreach to "exurban clientele." Initiatives on community vitality, climate change, rangeland health, youth development and healthy lifestyles were identified; support in program development and evaluation are provided. In order to assess whether our programs are meeting stakeholder needs, a survey of "program priorities" was developed from input from all Extension faculty. We are in the process of collecting stakeholders/clients input statewide. Extension faculty are committed to an on-going process of self-evaluation and improvement.

3) Public Input for College of Agriculture and Life Sciences Programs

Public input is extremely important to the College of Agriculture and Life Sciences. Because we are a Land Grant College committed to serving the needs of the State of Arizona, the College regularly seeks stakeholder input, programmatic feedback, and advice on future directions from citizens. As noted above, Extension Advisory Boards provide stakeholder input to Extension faculty on a yearly basis. Other efforts are also employed. During 2005 we participated in an extensive multi-state stakeholder survey of small farms in conjunction with the Western Region Sustainable Agriculture Research and Education Professional Development Program. We also completed a revision of our 5-year Strategic Plan which involved significant public and stakeholder input. In Spring, 2006 we asked people across Arizona to help us prioritize our programs: 496 stakeholders statewide provided input. We believe that our partners including growers, ranchers, researchers, volunteers, advisory boards and industry representatives, are essential to include in the discussion and priority-setting process.

Rural area issues that could best be addressed through the long-term goals of the UA College of Agriculture and Life Science programs were identified. In order to respond to these needs, we requested and received funding in the FY 2006 legislative budget for additional faculty positions to address these priorities. The hiring plan for FY 2007 was based on this stakeholder input.

PROGRAM REVIEW PROCESS

There have been no significant changes in the program review processes submitted in the original 5-Year Plan of Work.

RESOURCE ALLOCATION

Allocation of resources across the five goals was based on available dollars, State and College

priorities and available faculty with interests and expertise in the various areas.

EVALUATION OF THE SUCCESS OF MULTI AND JOINT ACTIVITIES

Continued progress has been made on nearly all of the goals and outcomes outlined in the revised 7-Year Plan of Work. Much of this can be attributed to our multi-state and integrated programs. We are currently involved in 56 separate multi-state projects and coordinating committees which, coincidentally, allowed us to have direct interaction with scientists from more than 46 separate agricultural experiment stations from the various states and territories. This interaction also involves an increasing number of individuals who have their primary appointment with Cooperative Extension. The relatively small amount of federal dollars that are committed to this process leverages a very significant number of resources in terms of personnel and operations to solve many of our regional and national problems. The Western Region has fully implemented an integrated multi-state research and extension review, accountability and reporting process through the Regional Coordination and Implementation Committee (RCIC). Arizona is fully committed to this process and is a strong player in the formalized multi-state effort.

As noted before, Arizona has a fully integrated research and extension program. This is evidenced by the fact that nearly all of our extension specialists have split appointments as do many of the research faculty. The split responsibility model is carried up through the department heads, center directors and at the dean/director level where resource decisions are made jointly by research, extension and academic program leadership. Therefore, we have minimized distinctly separate extension and research programs. Rather we have a situation in which some activities are largely "extension" oriented, some that are largely "research" oriented and a very large body of activity in the middle that represents a combination of efforts. Much of our day to day progress can be attributed to the joint and collaborative efforts that emerge from this working model.

As noted above, most of the multi-state "research" activities are conducted through the formalized multi-state programming effort. In the Plan of Work we also outlined a formalized effort with New Mexico and Utah, involving mostly county extension personnel and designed largely to meet the needs of the Native American community. For example, the Navajo Extension Partnership (NEP) brings together Extension from six counties, the three 1862 state universities, Diné, a 1994 College, Navajo Nation Division of Agriculture and Natural Resources and others including the Tohono O'odham Community College the nation's newest 1994 Institution to address new or emerging issues in the State of Arizona.

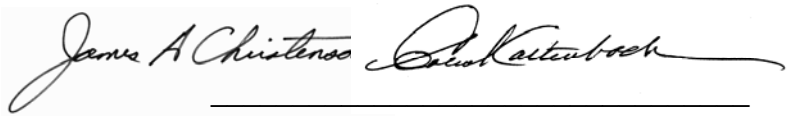
U.S. Department of Agriculture
Cooperative State Research, Education, and Extension Service
Supplement to the Annual Report of Accomplishments and Results
Actual Expenditures of Federal Funding for Multistate Extension and Integrated Activities
(Attach Brief Summaries)

Fiscal Year: 2006

Select One: ☐ **Interim** ☐**X Final**
Institution: University of Arizona
State: AZ

	Integrated Activities (Hatch)		**Multistate Extension Activities (Smith-Lever)**		**Integrated Activities (Smith-Lever)**	
Established Target %	3.42%	**%**	8.62%	**%**	7.94%	**%**
This FY Allocation (from 1088)	$1,816,301		$1,944,053	#	$1,944,053	
This FY Target Amount	$62,117		$167,577		$154,358	
Title of Planned Program Activity						
Agricultural production system competitive in global economy	41,812		82,905		83,330	
Safe, secure food and fiber system			10,320		13,133	
Healthy, well-nourished population	2,362		5,403			
Greater harmony between agriculture and environment	3,565		21,350		38,816	
Enhanced economic opportunity and quality of life	14,378		47,599		19,079	
Total	62,117		167,577		154,358	
Carryover						

Certification: I certify to the best of my knowledge and belief that this report is correct and complete and that all outlays represented here accurately reflect allowable expenditures of Federal funds only in satisfying AREERA requirements.



Director

1-Apr-07
Date