NEW MEXICO STATE UNIVERSITY
COLLEGE OF AGRICULTURE AND HOME ECONOMICS
ANNUAL REPORT OF ACCOMPLISHMENTS AND RESULTS

New Mexico Agricultural Experiment Station
and
New Mexico Cooperative Extension Service

For the Period Covering
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LeRoy A. Daugherty
Associate Dean and Associate Director
Agricultural Experiment Station

Paul H. Gutierrez
Associate Dean and Associate Director
Cooperative Extension Service

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A1. Planned Programs—Agricultural Experiment Station

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

Overview

New Mexico agriculture must remain competitive in U.S. and world markets. This requires a continuous flow of appropriate technology addressing local needs within New Mexico. It is critical that the College maintains and strengthens programs that address these needs. The College recognizes that agricultural competitiveness and efficiency should take into account social and environmental costs. Determining these factors requires a coordinated, team approach within the College.

The New Mexico Agricultural Experiment Station believes that it is meeting the short-term goals outlined under Goal 1 in the 5-year Plan of Work submitted in July 1999.

Outputs, outcomes, and impacts: Highlights of research at New Mexico State University:

① 'NuMex Nematador,'a southern root-knot nematode resistant cayenne cultivar, was released. The majority of cayennes are processed in the area, so the impact value of the addition of a new cayenne cultivar is multiplied by the increased value of the processed product.

② Scientists have identified tree species and clones suitable for wastewater reutilization as well as for economic return to the subsistence land owner along the US/Mexico border region. The ultimate economic impact of this research is apparent when considering the low-inputs of land application (<$50,000 per year in operation and maintenance) versus the multi-million dollar option of an engineered wastewater treatment plant plus its associated annual maintenance, operational, and depreciation costs.

③ Genetic transformation techniques have been developed for peanuts, tomato and alfalfa.and *Agrobacterium* mediated transformation techniques for efficient transfer of reporter genes for enhanced expression in chile pepper (*Capsicum annuum*) and onion are in progress. Protocols for regeneration of transgenic plants are being developed. Seed setting in putative chile transformants in green house for progeny analysis. Genes conferring disease or pest resistance or controlling product quality are being targeted for transfer into chile pepper, onion, alfalfa, peanut, and tomato. All are high value crops important in New Mexico agriculture.

④ A genetic transformation approach is being developed for bunching onion (*Allium fistulosum*) and bulb onion (*Allium cepa*). Transformation systems are being developed for chile peppers (*Capsicum annuum* and *Capsicum baccatum*), using various explant-regeneration systems and co-cultivation with *Agrobacterium tumefaciens* and *A. rhizogenes*. Improved drought and/or heat tolerance in crops should result in lower water costs, reduced production losses, and possibly increased production. Improved disease and pest resistance should result in lower production costs in fungicide and pesticide

applications, and reduced production losses. Improved vegetable quality should result in a higher value of products.

⑤ Results indicate that NMSU researchers will be able to convert a majority of identified drought responsive genes into DNA markers. Development of drought-responsive root markers will complement research supported by other funds to develop drought responsive markers in alfalfa leaves.

⑥ Research has demonstrated that alfalfa as a rotation crop with chile pepper can provide simultaneous suppression of the root-knot nematode/yellow nutsedge/purple nutsedge pest complex that results in subsequent chile yields greater than those attainable following conventional pesticide applications.

⑦ The first Organically Certified research acres at New Mexico State University were established at the Alcalde Sustainable Agriculture Science Center to assist fruit, medicinal herb, and specialty crop growers interested in producing and marketing organically. Based on this research, several local growers have begun to grow and sell organic strawberries grossing the equivalent of up to $40,000 per acre.

⑧ Evaluation of about 30 medicinal herbs in observational plots continued. Information from these studies will permit small farmers and stakeholders in northern New Mexico to supplement their income with niche products. Research on medicinal herbs as alternative high value crops is based on traditions, culture, and expansion of markets. Results indicate that, depending on current prices, returns per acre can be quite substantial.

⑨ Researchers also have made significant progress in identifying locations to select bigtooth maples suited to dry environments. Bigtooth maple is the only Southwestern maple that can rival the foliage color of the eastern sugar maples. The selection of bigtooth maple that can survive dry conditions of New Mexico will be a great addition to the ornamental plant industry of New Mexico.

⑩ Studies at the Agricultural Science Center at Farmington continue to show that well-managed drip irrigation has the capability to deliver exact amounts of water and nutrients to meet crop demands. The results of these studies can be transferred to other semi-arid areas that are experiencing water shortages and groundwater contamination due to over applications of water and nutrients.

❶ Projected 2003 crop cost and return estimates were developed and released prior to the planting season. The set of cost and return estimates includes 49 representative farms and 4 nontraditional crop situations. The set covers 39 geographical production areas, 22 different crops, several size classes, and 3 major irrigation types as well as dryland. Impacts include improving decision-making by farmers and ranchers and providing needed input data to the decisions made by lenders.

Total expenditures for Goal 1 were $320,099 from Hatch Act and Animal Health appropriated funds. The number of full-time equivalents engaged in research for this goal was 20.49

Key Theme – Agricultural Competitiveness

a. Description of Activity

This program develops chile and onion cultivars for growers in New Mexico. The chile industry is a large employer in New Mexico. Keeping it competitive keeps the industry here instead of it moving out of state or offshore. Elucidation of taxonomic relationships among wild *Capsicum* species will open new genetic avenues for plant breeders to use. Very few commercial onion cultivars are adapted to the growing conditions found in New Mexico. In addition, the onion acreage in New Mexico is too small to warrant specific cultivar development by commercial seed companies. Our program develops high yielding, high quality, disease resistant, and bolting resistant cultivars that allow growers in New Mexico to be competitive with other onion markets in the United States.

b. Impacts/accomplishments

Short-term:

- During 1996-2003 NMSU researchers evaluated approximately 1361 *Capsicum* accessions for one or more of the following characteristics: *Verticillium* wilt resistance, beet curly-top geminivirus resistance, capsaicinoid content, DNA marker diversity, morphological diversity, leaf/fruit variegation, and the genetic potential of accessions to serve as parents in developing improved crop varieties. Selections were made in segregating breeding material of green chile, cayenne, and jalapeño. A replicated trial of cayenne and jalapeño breeding materials was accomplished.

- A southern root knot nematode resistant cayenne cultivar, NuMex Nematador was released.

- Two, mild habanero cultivars, NuMex Suave Orange and NuMex Suave Red were released.

- From this work, three novel capsaicinoid compounds influencing the pungency of chile were identified.

- Plant Variety Protection (PVP) applications were submitted for the "NuMex Crimson" and "NuMex Solano" onion cultivars.

Long-term:

- These research findings will impact the industry by providing a new southern root knot resistant cultivar to the industry. The majority of cayennes are processed in the area, so the impact value of the addition of a new cayenne cultivar is multiplied by the increased value of the processed product. If male-sterility can help in providing an inexpensive hybrid seed production system, then the direct seeding of the chile pepper crop can be done with hybrid seed.

- Open-pollinated, male-sterile, maintainer, and pollinator breeding lines of onions were screened for disease resistance, bolting resistance, bulb yield, bulb quality, maturity dates, and bulb color. 'NuMex' cultivars and other germplasm were screened for resistance to Fusarium basal rot using a seedling screening procedure and a mature bulb screening. Promising breeding lines and released cultivars were compared to commercial cultivars and experimental lines using variety trials at off-campus agricultural science centers. Hybrid lines were evaluated for disease resistance, bolting resistance, bulb yield, and bulb quality. These trials offered stakeholders the opportunity to observe cultivars under local conditions at two field days or other visits. Results serve as the basis for state recommended cultivar lists.

- Studies to determine narrow-sense heritability of bolting resistance, pink root resistance, Fusarium basal rot resistance, soluble solids, and percentage of single centers were conducted using several open-pollinated onion populations. Pink root-resistant cultivars reduce the need for pesticide use. Higher marketable-onion yields with less bolting means fewer "cull" onions will be left in the field. Improved productivity on the same acreage reduces development of new land. Disease resistant onion varieties reduce the need for crop rotation and production on disease-free land.

c. Source of federal funds — Hatch

d. Scope of Impact — State Specific

Key Theme – Animal Production Efficiency

l. Description of activity

This research area focuses on increasing efficiencies of producing food from animals. Key areas of research are to improve understanding of physiological mechanisms affecting reproduction, growth, and performance.

m. Impacts/accomplishments

- Pregnancy losses due to inadequate progesterone from the corpus luteum are estimated to approach 30% in ruminant females. Increasing calving rate 5% (to 92%) would result in an additional 27,000 head weaned or an additional 13.6 million lbs of calves weaned in New Mexico. Based on these figures the increase of 5% in calving rate would increase economic return approximately 10 million dollars to NM ranchers.

- Progesterone-impregnated intravaginal inserts (CIDR) can be used to induce estrus in seasonally anestrus ewes as well as synchronize estrus in cycling ewes. Realization of two lamb crops per year could have tremendous impacts on either increasing the number of lambs born each year or producing the same number of lambs with fewer ewes. Approval of progesterone-impregnated inserts by FDA for use in anestrous ewes will allow producers to breed ewes when they would normally not be cycling.

- Data suggest that Brangus heifers from a sire with balanced expected progeny differences (EPD) for growth and scrotal circumference achieve reproductive competency earlier than heifers from a sire with EPDs for either large growth—moderate scrotal circumference or moderate growth—large scrotal circumference. This relationship may be related to differences in mechanisms which influence feed intake, but appears to be independent of serum concentrations of leptin among the sires groups. The beef cattle industry is a multi-million dollar industry in NM. These data will contribute to the knowledge of needed to improve sire selection for improved growth and carcass characteristics of cattle. Efforts will also lead to improved reproductive efficiency of NM beef herds.

- Preliminary data suggest that crossbred lambs weighed about 14% heavier at marking than fine wool lambs. To date our progesterone treatments have not improved implantation rates.

- Research indicates that E. coli 0157:h57 is not transferred from lamb wool to the carcass during slaughter/processing.

c. Source of Federal Funds — Hatch

d. Scope of Impact — Multistate Research
- with states AK, AR, AZ, CA, CO, HI, IA, ID, IL, IN, KS, KY, ME, MI, MN, MO,MT, NC, ND, NE, NV, NV, OH, OK, OR, SD, TX, UT, WA, WI, WY

Key Theme – Managing Change in Agricultural Systems

a. Description of activity

The aim of this project is to develop and evaluate strategies for managing change in agriculture by determining the technical feasibility and profitability of new and modified systems of agricultural production, and by evaluating strategies for improving the efficiency of irrigation delivery.

b. Impacts/accomplishments

Short-term

- Scientists have demonstrated that residual forage can be comparable to and cattle gains and pasture productivity can be higher from light stocking density, as compared with higher densities. The project has demonstrated it is economically viable to add value to cull cows; not all methods of supplementation, however, are equally profitable. Corn and sorghum variety trials have sown differences in variety yields. If proper variety selection results in a 1 bu/acre increase in crop yield, the economic impact on eastern New Mexico could exceed $2 million annually.

Long-term

- Warm- and cool-season turfgrass screening trials are being evaluated at the Agricultural Science Center at Tucumcari to determine those grasses that are best adapted to New Mexico growing conditions. Some of the turfgrasses are new to the market and have not

previously been evaluated in New Mexico. Screening of selected turfgrasses will identify adapted turfgrasses that contribute to aesthetic home sites and recreation areas.

- Because of its relative low water use requirements, cotton acreage is increasing in eastern New Mexico. Cotton varieties/cultivars and harvest management processes are being evaluated in an attempt to improve the profitability of cotton production in eastern New Mexico.

- Irrigated pastures are grown on approximately 160,000 acres in New Mexico, and are the second most prevalent irrigated crop in the state. Because pastures have traditionally produced low or negative returns, studies are underway to evaluate irrigated pasture production alternatives in an effort to increase potential profitability.

c. Source of Federal Funds — Hatch

d. Scope of Impact — State Specific

Key Theme – Ornamental/Green Agriculture

a. Description of activity

The objectives of the ornamental horticulture research program are to bio-rationally increase the post-production life of harvested products, particularly cut flowers, to improve nutrient management and protect surface and groundwater resources, and to alleviate salinity stress of plants growing in salt-affected environments and at sites of low soil and water quality.

b. Impacts/accomplishments

- Bermudagrass findings suggest that it may be possible to avoid a late season N application, provided that a slow-release N source is applied at an adequate rate, and preceding the autumnal decline in N demand of the grass. By avoiding a late-season N application, as much as $30 to $50 per acre per year in slow-release N fertilizer cost plus labor could be saved. For an average regulation-sized golf course, approximately $2000 to $4000 could be saved per year per operator, not counting fuel and depreciation-on-equipment costs. This rough estimate would increase in proportion to the numerous bermudagrass golf courses in the expanding desert municipalities in western Texas, southern New Mexico, and southern Arizona.

- Scientists have identified tree species and clones suitable for wastewater reutilization as well as for economic return to the subsistence land owner along the US/Mexico border region. They are nearing the end of a 7-year study and anticipate that the results will demonstrate economic incentives for using trees as a low-input solution to help solve environmental and economic problems on the border. The ultimate economic impact of this research is apparent when considering the low-inputs of land application (<$50,000 per year in operation and maintenance) versus the multi-million dollar option of an engineered wastewater treatment plant plus its associated annual maintenance, operational, and depreciation costs.

- The *Asimina triloba* study showed that even at quite low salinity (< 0.6 dS/m in the soil saturation extract), high SAR (5 to 9 in the saturation extract) limits trunk and root growth, net macroelement uptake per tree, and tree establishment during two years of field observation. At 1,300 trees per acre planting density, the differential survival rate accounts for a difference of 156 living trees per acre, times an average cost per tree at ~$10, or ~$1,560 per acre lost to high SAR conditions. This is a significant economic value for small growers seeking high-value alternative crops such as *A. triloba*, and is magnified for larger operators.

- *Lupinus. havardii* (Big Bend bluebonnet) has demonstrated good potential for positively affecting the rural agricultural sector of New Mexico. According to a recent floral industry survey, this product is in high demand nationwide. Over 60% of New Mexico farms earn less than $10,000 per year, and this value typically represents the household's chief source of annualized income (National Small Farm Conference, Albuquerque, NM, 2002). Only a small greenhouse facility would be needed to make a large economic impact for the small grower. One *L. havardii* plant can produce as many as 30 blooms that sell for $1 each in the wholesale trade. Therefore, slightly over 300 plants could return about $9,000 in supplemental gross annual income needing less than 1,000 square feet of greenhouse space. A moderately-constructed greenhouse of this size would cost $5,000 to $10,000 to build, which is within range of an SBA loan.

- Another important aspect of the *L. havardii* research comes from the preliminary functional vaselife duration comparisons between White Select (8 to 10 days functional vaselife) and the established cultivar, 'Texas Sapphire' (about 6 days functional vaselife). The 2 to 4 day extension of vaselife exhibited by White Select can have a significant impact on greenhouse production and market chain water use efficiency. Effectively, the water use efficiency of production and distribution is increased by 33%. That is, an equivalent amount of water in the field, greenhouse, and processing/handling environments would be required to produce and distribute greater amounts of functional, longer-lasting product to a larger number of florist end-users. An additional but unquantified impact could include forced market share expansion for the small grower, thus opening up new sales opportunities.

c. Source of federal funds—Hatch

d. Scope of Impact—State Specific

Key Theme – Plant Genomics

a. Description of activities

This research area focuses on elucidating fundamental biochemical processes of crop plants. The research also seeks to develop methods to manipulate biochemical processes within living plants to increase crop productivity and drought tolerance, and to provide alternative crops for new markets.

b. Impacts/accomplishments

Short-term

- *Lotus japonicus* plants transformed with the alfalfa GS_1 gene, driven by the CaMV 35S promoter, showed accumulation of the transcript and polypeptide corresponding to the transgene in all the organs. The transformants also exhibited phenotypic changes in the form of increased growth, chlorophyll content and protein content.

- GS_1 genes from alfalfa and soybean (Gm*gln*β1) engineered behind the CaMV 35S promoter when introduced into alfalfa showed that the transgene mRNA accumulated in the leaves but not in the nodules. Understanding the regulatory mechanism underlying the expression of GS_1 in alfalfa will allow us to design genetic engineering approaches to increase GS activity in the appropriate cell types. Increased GS activity in alfalfa will result in increased growth and biomass production under low nitrogen conditions thus improving its nitrogen use efficiency.

- Genetic transformation techniques have been developed for peanuts, tomato and alfalfa.and *Agrobacterium* mediated transformation techniques for efficient transfer of reporter genes for enhanced expression in chile pepper (*Capsicum annuum*) and onion are in progress. Protocols for regeneration of transgenic plants are being developed. Seed setting in putative chile transformants in green house for progeny analysis. Genes conferring disease or pest resistance or controlling product quality are being targeted for transfer into chile pepper, onion, alfalfa, peanut, and tomato. All are high value crops important in New Mexico agriculture.

- New Mexico Agricultural Experiment Station scientists have constructed a total of eight cDNA libraries. Five libraries contain transcripts expressed in drought-stressed leaf: *Capsicum chinense*, *Phaseolus acutifolius*, *Trifolium purpureum*, *Dactylis glomerata*, *Medicago sativa*. Two libraries contain transcripts expressed in drought-stressed roots: *Phaseolus acutifolius*, and *Medicago sativa*. One library contains transcripts expressed in drought-stressed stems: *Medicago sativa*. DNA sequences on approximately 2,500 clones have been obtained to date and these DNA sequences are under analysis. An analysis of the genetic diversity of drought-responsive genes in desert populations of *Trifolium purpureum* and *Dactylis glomerata* has been completed. Peripheral populations of these species, i.e., groups collected in the Negev desert have a much greater diversity for drought-responsive genes than do groups collected in the temperate Mediterranean region. The reverse is observed for genes that are not drought-responsive. Towards the goal of characterizing the capsaicinoid biosynthetic genes they have mapped the chromosomal location of eight structural genes. This information will be useful for future engineering of plant metabolism or marker-assisted selection to develop drought resistant crops.

Long-term

- A genetic transformation approach is being developed for bunching onion (*Allium fistulosum*) and bulb onion (*Allium cepa*). Transformation systems are being developed for chile peppers (*Capsicum annuum* and *Capsicum baccatum*), using various explant-regeneration systems and co-cultivation with *Agrobacterium tumefaciens* and *A. rhizogenes*. Improved drought and/or heat tolerance in crops should result in lower water costs, reduced production losses, and possibly increased production. Improved disease and pest resistance should result in lower production costs in fungicide and pesticide applications, and reduced production losses. Improved vegetable quality should result in a higher value of products.

c. Source of Federal Funds — Hatch

d. Scope of Impact — State Specific

Key Theme – Plant Germplasm

a. Description of activity

This research area focuses on germplasm, the basic resource for plant improvement. Major objectives are to: 1) increase the genetic diversity available for basic and applied plant science research, 2) increase the germplasm base of New Mexico's major crop species to reduce the chances of devastating crop losses due to either biotic or abiotic stresses, 3) develop and enhance unique germplasm resources to provide private and public breeding programs a greater array of elite germplasm for cultivar development, 4) improve germplasm to ensure systematic genetic advances of newly developed cultivars, 5) enhance specific plant and seed traits to permit alternative uses of the major crop species, and 6) provide unbiased data to New Mexico producers.

b. Impacts/accomplishments

- Approximately 569 M*edicago* accessions were also evaluated for one or more of the following: forage yield over 3 to 4 years under normal and suboptimum irrigation, diallel analyses to determine quantitative inheritance of forage yield, and DNA marker diversity. Data have been/are being summarized for peer-reviewed publication and to be submitted to GRIN.

- Fifty-three *Vicia* and 99 *Trifolium* accessions were evaluated for forage yield potential and persistence under dryland, irrigated, and high salt field conditions. In addition, some accessions were evaluated for DNA marker profiles to determine if successful somatic hybrids had been generated between cell cultures of *Trifolium medium* and *Trifolium sarosiense*.

- Approximately 325 *Arachis* accessions were evaluated for acceptable seed color, peanut yield, plant morphology and disease resistance.

- Forty-nine accessions of *Sorghum* and *Zea* were evaluated by members of private seed companies to identify parents useful for improving specific traits within elite commercial breeding populations. Approximately 192 accessions representing numerous genera (*Abelmoschus, Ageratum, Alcea, Allium, Amaranthus, Antirrhinum, Avena, Brassica, Brunfelsia, Callistephus, Camphanula, Capsicum, Citrullus, Cucumis, Dahlia, Datura, Dianthus, Ficus, Gossypium, Iberis, Limonium, Lobelia, Lotus, Luffa, Lycopersicon, Malus, Matthiola, Nicotianana, Papaver, Penstemon, Petunia, Phlox, Physalis, Pimpinella, Ricus, Rudbeckia, Scabiosa, Solanum, Tagetes, Verbena, Violam, Vitis, Zea, and Zinnia*) were distributed to other individuals for evaluation of general growth habit, yield, and/or adaptability to New Mexico environments. Forty-four of these accessions were used for elementary school teaching tools in a demonstration garden, and as demonstration plots for the Master Gardner's Landscape Program.

- Results indicate that NMSU researchers will be able to convert a majority of identified drought responsive genes into DNA markers. In future work, segregation of these markers will be monitored in two first backcross generation alfalfa linkage mapping populations grown under water deficit irrigation. These populations are known to be segregating for a wide variety of traits including drought tolerance. This work will allow testing an important hypothesis: Drought responsive genes are candidate genes for the quantitative trait loci influencing drought tolerance in alfalfa. Since screening for environmentally induced phenotypes is difficult at the whole plant level, these markers may provide powerful tools to improve selection efficiencies for drought tolerance in plant breeding programs. Development of these drought-responsive root markers will complement research supported by other funds to develop drought responsive markers in alfalfa leaves.

c. Source of Federal Funds — Hatch

d. Scope of Impact — State Specific

Key Theme – Plant Health

a. Descriptions of activities

Research in this area addresses the long-term goal of preventing soil-borne disease in irrigated agriculture.

b. Impacts/accomplishments

- Alfalfa provided simultaneous suppression of southern root-knot nematode (*Meloidogyne incognita*), yellow nutsedge, and purple nutsedge, resulting in greater chile yields than were attainable using 1,3-D in conjunction with rotation crops that did not adequately suppress nutsedges. Suppression of *M. incognita* population resurgence was enhanced by the use of root-knot nematode-resistant alfalfa. Lower alfalfa plant densities lessened nutsedge suppression. This research has demonstrated that alfalfa as a rotation crop with chile pepper can provide simultaneous suppression of the root-knot nematode/yellow nutsedge/purple nutsedge pest complex that results in subsequent chile yields greater than those attainable following conventional pesticide applications.

- Agricultural Experiment Station researchers are working to to determine the influence of climate on a mustard weed (London rocket) that leafhopper vectors of beet curly top virus in New Mexico can overwinter on. They found that seed of the plants will germinate

between 5 and 30 C. Leafhoppers were trapped from the margins of 10 chile fields in southern New Mexico during the past year on a biweekly basis. Vector leafhoppers first were trapped in the fields in mid April; numbers peaked in August, and vectors were no longer trapped in December. Curly top causes losses to chile. This research will develop a model based on rainfall and temperature to predict how much disease will likely occur during a season and when the leafhopper vector will first show up during a season.

c. Source of Federal Funds — Hatch

d. Scope of Impact — Multistate research
- With states AK, CA, HI, ID, MI, NE, NC, OR, WA, WY

Key Theme – Rangeland/Pasture Management

a. Description of activity

The purpose of this research program is to better assess economic and vegetation outcomes from different recommended grazing intensity levels on New Mexico rangelands.

b. Impacts/accomplishments

- Models developed and preliminary results from this research indicate that net returns are about 50 dollars per animal unit higher under conservative than moderate stocking. There are about 550,000 beef cows in New Mexico. On this basis this research has the potential to improve income to New Mexico ranchers by 15 to 30 million dollars per year. This research has the potential to reduce rancher/environmentalist conflicts by providing better technology to maintain and improve vegetation and wildlife habitat. Increased rancher income could reduce rangeland losses to subdivisions and other development.

c. Source of Federal Funds — Hatch

d. Scope of Impact — State Specific

Key Theme – Small Farm Viability

a. Description of activity

This research program seeks to assist farmers and ranchers of north-central New Mexico to use their land in a more efficient, productive, and profitable manner by developing new research-based information to assist them in improving their current cropping and crop-livestock systems. Overall objectives are: 1) To develop and evaluate cropping methods and crop-livestock systems which increase the efficiency of resource use in order to increase agricultural productivity and profitability on a per unit area basis while maintaining or enhancing the natural resource base, and 2) To evaluate crop varieties and alternative crops for their adaptation and productivity in north-central New Mexico.

b. Impacts/accomplishments

Short-term

- The first Organically Certified research acres at New Mexico State University were established at the Alcalde Sustainable Agriculture Science Center to assist fruit, medicinal herb, and specialty crop growers interested in producing and marketing organically. Based on this research, several local growers have begun to grow and sell organic strawberries grossing the equivalent of up to $40,000 per acre.

- Research plots using under-tree sprinkler systems in tree fruit and drip systems in berries and medicinal herbs, have resulted in several growers adopting these methods and thus irrigating more efficiently on their farms. Several growers are also using the under-tree sprinklers for protection against late spring frosts—a serious challenge for local fruit growers.

Long-term

- A new alfalfa variety × winter-grazing trial was planted in fall 2001; the first two harvests were taken in 2002 and three harvests in 2003. Preliminary results indicate that winter-grazing reduced summer harvest yields.

- Data collection began in 2003 for lavender variety and planting time (fall vs. spring) evaluation studies. First-year yields were highest for "Grosso" and "Super" in the standard variety trial. In the planting time trial, only fall planting (vs. planting the following spring) gave marketable yields.

- Evaluation of about 30 medicinal herbs in observational plots continued. Information from these studies will permit small farmers and stakeholders in northern New Mexico to supplement their income with niche products. Research on medicinal herbs as alternative high value crops is based on traditions, culture, and expansion of markets. Results indicate that, depending on current prices, returns per acre can be quite substantial.

- A new study began evaluating the productivity of three local medicinal herbs – cota (Thelesperma gracile), manso (Anemopsis californica), and oshá (Ligusticum porteri) -- under various irrigation x weed-management regimes. Irrigation treatments were drip vs. surface as well as amount of water applied. Weed treatments were woven black plastic mulch vs. hand weeding. Oshá didn't survive. Cota yielded highest in the hand-weeded plots regardless of irrigation treatment. Manso grew well in all plots and there were no significant differences between treatments.

c. Source of Federal Funds — Hatch

d. Scope of Impact — Multistate research
- With states: AS, CO, GU, ID, MT, NV, OR, UT, WA, WY

Key Theme – Urban Gardening

a. Description of activities

This research program focuses on the drought tolerance, water use, and requirements of ornamental plants in managed landscapes and the human factors that influence water conservation in an arid environment.

b. Impacts/accomplishments

- Researchers developed a base of knowledge that will help to explain why Mexican elder has unpredictable performance in managed landscapes. Also, the crop coefficients developed can be used to develop irrigation schedules for Mexican elder. Researchers also have made significant progress in identifying locations to select bigtooth maples suited to dry environments. Bigtooth maple is the only Southwestern maple that can rival the foliage color of the eastern sugar maples. The selection of bigtooth maple that can survive dry conditions of New Mexico will be a great addition to the ornamental plant industry of New Mexico.

c. Source of Federal Funds — Hatch

d. Scope of Impact — State Specific

Key Theme – Irrigation Technology

a. Description of activity

The objectives of this research program are: 1) to assess and develop decision criteria for adoption of microirrigation technologies; and 2) to promote appropriate microirrigation technologies through formal and informal educational activities.

b. Impacts/accomplishments

Short-term

- A crop coefficient was developed from literature data and an experiment started to measure the crop coefficient. See http://weather.nmsu.edu/nmcrops/Trees/Poplars/poplar-coef.html. Navajo Agricultural Products Industry (NAPI) is planting 100 acres of poplar trees with plans to expand and the development of the crop coefficient is needed to schedule irrigations. The crop coefficient has to be adjusted for percent cover as the trees grow.

Long-term

- Studies at the Agricultural Science Center at Farmington continue to show that well-managed drip irrigation has the capability to deliver exact amounts of water and

nutrients to meet crop demands. Deep percolation is reduced or eliminated, preventing environmental contamination. The results of these studies can be transferred to other semi-arid areas that are experiencing water shortages and groundwater contamination due to over applications of water and nutrients.

c. Source of Federal Funds — Hatch

d. Scope of Impact — Multistate research
   - With states: AL, AZ, CA, FL, GU, HI, ID, IN, IA, KS, MN, NY, OR, PR, TX, VI, VA, WY

Key Theme – Range Livestock Enterprises

e. Description of activity

   - Information regarding costs and returns for crop and livestock enterprises are necessary for decisions regarding input use and output mix. Most farmers and ranchers do not have sufficient records, adequate time or the analytical skills necessary to develop such cost and return information. The focus of this program is 1.) to develop cost and return estimates on historical and projected bases for crop and selected livestock enterprises and farms in New Mexico; 2.) to provide cost and return data for use in other research projects when needed; and 3.) to develop accurate data on the cost of ownership and use of farm machinery and equipment in New Mexico.

f. Impacts/accomplishments

   - Projected 2003 crop cost and return estimates were developed and released prior to the planting season. The set of cost and return estimates includes 49 representative farms and 4 nontraditional crop situations. The set covers 39 geographical production areas, 22 different crops, several size classes, and 3 major irrigation types as well as dryland. A spinoff of this effort is the use of the work in publishing extension circulars and in thesis research carried out on the applications of modern portfolio theory.

   - Demographic, social and economic characteristics of New Mexico ranchers were studied using Census of Agriculture and National Agricultural Statistics (NASS) data to define the location, size of operation and apparent type of livestock operation for each New Mexico livestock producer. GIS procedures were used to visualize the location of each ranch relative to the National Resource Conservation Service (NRCS) definitions of major land resource areas in New Mexico. With this visualization, the population of livestock producers in New Mexico was categorized as to size, type of production, and production area. Formulation of an additional mail survey to gather social and economic data from ranchers statewide was finalized.

g. Source of Federal Funds — Hatch

h. Scope of Impact — State Specific

Key Theme – Insecticidal Control of Insects

a. Description of activity

- This research program refine economic threshold levels for arthropod pests of western irrigated crops with principal interests in aphids and thrips in minor crops; determines relationships between frequency of insecticide applications and insecticide classes on the potential increase of secondary pests; and determines the impacts that environmental conditions and plant characteristics have on newer biorational insecticides' uptake, efficacy, and residual activity.

b. Impacts/accomplishments

- Research and the resulting Section 18 state registration of SpinTor for thrips control in New Mexico onions provided growers with the first new insecticide class that has been registered for thrips control in over 10 years. Currently, at least two other western states have used the data to request Section 18 labels for the use of SpinTor for thrips management in onions. The addition of the new class of insecticide will reduce: pyrethroid resistance in thrips populations; frequency of insecticide applications; and increase yield in regional onions.

- Approximately 30% of New Mexico pecan acreage used imidacloprid under the 24C state label to control blackmargined aphid. The single application resulted in season long control of aphids. As research continues to define the economic status of blackmargined aphid and control methods are refined, nut quality and yields will increase significantly in orchards implementing aphid management strategies. Previous to research investigating the economic status of blackmargined aphid, few pecan growers in the western region controlled the insect.

- Baselines for currently used insecticides in green beans for bollworm control have been established. Findings will help determine future causes of bollworm control problems and provide insight into potential insecticide resistance issues.

c. Source of Federal Funds — Hatch

d. Scope of Impact — State Specific

Goal 2: A safe and secure food and fiber system.

Overview

The New Mexico Agricultural Experiment Station believes that it is meeting the short-term goals outlined under Goal in the 5-year Plan of Work submitted in July 1999. Research outputs take a number of forms:

- 2 refereed journal articles
- 3 non-refereed publications, reports, technical papers
- 2 proceedings, published abstracts

Total expenditures for Goal 2 were $43,170 from Hatch Act funds. The number of full-time equivalents engaged in research for this goal was 0.67.

Key Theme – Food Quality and Safety

a. Description of activity

This research area focuses on the quality and safety of foods by developing improved processing technologies and packaging environments.

b. Impacts/accomplishments

Trials were conducted to investigate the survival and recovery of pathogenic bacteria (specifically E Coli and Salmonella spp.) in and around livestock. Bacteria demonstrated remarkable ability to survive in all trials. Continuing research is needed to realize the impact of decreased bacteria occurrence in food products harvested from livestock.

c. Source of Federal Funds — Hatch

d. Scope of Impact — State Specific

Goal 3: A healthy, well-nourished population.

Overview

The New Mexico Agricultural Experiment Station believes that it is meeting the short-term goals outlined under Goal 3 in the 5-year Plan of Work submitted in July 1999.

Total expenditures for Goal 3 were $108,273 from Hatch Act funds. The number of full-time equivalents engaged in research for this goal was 1.6.

Key Theme – Human Nutrition

a. The aim of this research program is to improve human food consumption patterns to provide for a healthy, well-nourished population.

b. Impacts/accomplishments

The instrument that was developed to assess calcium intake among adolescents of different ethnic groups has been validated and tested for reliability. This instrument has been digitized and is being used in an IFAFS research project related to health education and calcium intake. The results will impact how and what information is presented.

Data indicate that fresh chile is very low in sodium but a rich source of potassium. Both sodium and calcium level of the chile increase when the chile is commercially canned. Knowing nutrient content, as in chile, is key to issues such as marketing, nutrition education and research, and food labeling.

Preliminary data collected on chile mash indicate insoluble solids may have a bigger impact on final product quality than soluble solids such as pectin. The microbial profile of this product is complex and will take time to fully characterize.

c. Source of Federal Funds — Hatch

d. Scope of Impact — Multistate research
With states AZ, CA, CO, HI, ID, IN, KS, MA, MI, MT, NE, NV, OR, UT, WA, WY

Goal 4: Greater harmony between agriculture and the environment.

Overview

New Mexico has a rich and diverse land and natural resource base that is arid and semiarid and, in many respects, extremely fragile. This natural resource base is a major contributor to the economic well-being of the state's residents. Its economic uses result in demands for various resources. In addition to direct demands for land and water, there is increasing pressure for recreation-related activities that represent a growing economic opportunity. Activities related to the state's natural beauty and its wildlife make a major contribution to the economy. The potential to develop, manage, and protect natural resources needs to be encouraged.

The New Mexico Agricultural Experiment Station believes that it is meeting the short-term goals outlined under Goal 4 in the 5-year Plan of Work submitted in July 1999.

Outputs, outcomes, and impacts: Highlights of research at New Mexico State University:

① The distribution of manure and the potential impact on cropped land from a nitrogen loading standpoint has been reassessed. Additionally, salinity impacts have been evaluated from continuous application sites. The effects of irrigation system and cropping patter have also been assessed with regards to nitrogen leaching. Data collected from this project helps direct best management practices for minimizing environmental impacts while optimizing crop yield. Many costs have been avoided by dairies that may have otherwise been fined due to mismanagement of nutrients from manure and effluent water.

② Greenhouse studies have shown that increased ammonium nitrate fertilizers can exacerbate soil salinity and reduce chile pepper yield. Continued greenhouse studies are comparing organic and inorganic fertilizers and their effects on chile growth and yield. Dairy manure application to arid rangeland resulted in reduced runoff and soil erosion, but increased soil salinity, and possibly decreased vegetation diversity. The application of manure to depleted uranium-contaminated soils apparently immobilizes the metal and makes it less available for phytoremediation and plant uptake.

③ Prairie dogs are important components of desert grassland biodiversity. In a study on the Armendaris Ranch in New Mexico, adult female prairie dogs were overall less vigilant and spent more time foraging then males. Adult females engaged in fewer territorial behaviors and more amicable behaviors than males. Juveniles allocated about 75% of their time to foraging, and were less vigilant than adults. The research has resulted in advances in our understanding of the ecology and ecosystem roles of several important species in the Chihuahuan Desert, thereby improving natural resource management.

④ A leaf beetle, *Diorhabda elongata*, that feeds on saltcedar was tested in cages and released into the open field at a single site near Artesia, NM, on the Pecos River. The beetles completely defoliated caged trees in one month. The vegetation near the release has been characterized as baseline data so that subsequent damage can be quantified.

⑤ Progress has been made on developing effective propagation protocols for many woody plant species which can be used in disturbed land restoration/rehabilitation. Work also has been conducted on identifying those species which are inherently adapted to various disturbance conditions including extreme alpine conditions and sites with low-productive soils.

⑥ Preliminary trials have been completed which examine the carbon distribution in pinon-juniper ecosystems. This information will be used to parameterize and assess carbon cycling models developed for other, related ecosystems.

⑦ Researchers have finished mapping and digitizing the landforms and soil parent materials of the Jornada Experimental Range and Chihuahuan Desert Rangeland Research Center located in southern New Mexico. In addition to providing information about the geomorphic nature of the Chihuahuan Desert in southern New Mexico, these maps are being used to correlate soil-vegetation relationships at the landscape scale, compare historic and prehistoric erosion, and identify ecologically fragile regions. This information will allow land managers and policy makers to more fully understand and predict the consequences of human interactions with the environment at global and regional scales.

⑧ NMSU scientists have developed a pest management program for suppressing cotton boll weevil populations both before and during eradication programs. They reduced boll weevil damage and insecticide applications to save over $300,000 in just one year just in the Pecos Valley.

⑨ An autoradiography technique was developed to detect very small concentrations of depleted uranium in small root samples (much smaller than needed for chemical analysis). The technique should allow several experiments to be conducted to test the interaction of roots and fungus on Uranium uptake in roots.

⑩ Streamside research measured groundwater flow and water quality. Irrigation ditch flows and Rio Grande flows were also measured at both sites and hydrology and water quality interactions between surface water and groundwater were characterized over the 2003 irrigation season. This research has yielded immediate benefits to irrigation ditch associations, who have identified benefits of ditch seepage and postponed plans to line their ditches (thus stopping seepage) until further site assessments can be completed. Benefits of ditch seepage include providing return flow to the river that is available for downstream users later in the irrigation season, maintaining quantity and quality of shallow groundwater, and supporting riparian vegetation with its aesthetic, grazing, and wildlife values. The improvements in understanding of hydrologic budgets along streamside corridors will be useful water resources planning by irrigators, water managers, and entities charged with water quality protection.

❶ Research projects on fire history effects in shortgrass prairie and on grassland restoration in mesquite-dominated lands will provide data to support predictions about impacts of

management actions. The research on African rue ecology and control will give insight into the conditions that facilitate recruitment of this class B weed, and inform strategies to limit further invasion and spread.

❷ Scientists are measuring the reflectance signature of plants under different growth stages and stress conditions. These reflectance signature data are being used to interpret the satellite and aircraft data and to develop models for monitoring plant development and conditions.

Total expenditures for Goal 4 were $294,845 from Hatch and McIntire-Stennis Act appropriated funds. The number of full-time equivalents engaged in research for this goal was 25.93.

Key Theme – Agricultural Waste Management

a. Description of activity

This program continues to evaluate the long-term effects of organic amendment misuse that would increase the likelihood groundwater and surface water contamination.

b. Impacts/accomplishments

- The distribution of manure and the potential impact on cropped land from a nitrogen loading standpoint has been reassessed. Additionally, salinity impacts have been evaluated from continuous application sites. The effects of irrigation system and cropping patter have also been assessed with regards to nitrogen leaching. Data collected from this project helps direct best management practices for minimizing environmental impacts while optimizing crop yield. Over 60 people have been trained in comprehensive nutrient management training programs as a result of much of this work. These individuals then work with individual dairies and farmers to make recommendations for optimum production and meet environment department requirements. Many costs have been avoided by dairies that may have otherwise been fined due to mismanagement of nutrients from manure and effluent water. Furthermore, violations of Water Quality Control Commission directives can lead to fines of up to $15,000 per day.

- Greenhouse studies have shown that increased ammonium nitrate fertilizers can exacerbate soil salinity and reduce chile pepper yield. Continued greenhouse studies are comparing organic and inorganic fertilizers and their effects on chile growth and yield. Dairy manure application to arid rangeland resulted in reduced runoff and soil erosion, but increased soil salinity, and possibly decreased vegetation diversity. The application of manure to depleted uranium-contaminated soils apparently immobilizes the metal and makes it less available for phytoremediation and plant uptake.

c. Source of Federal Funds — Hatch

d. Scope of Federal Impact — State Specific

Key Theme – Biodiversity

a. Description of activity

This research program deals with various methods for characterizing the ecological and environmental risks posed by invasive species. The focus of the project is on quantitative methods, usually implemented as computer simulation models. These models typically include some description of the spatial dynamics of the population(s) involved, as well as the temporal dynamics.

b. Impacts/accomplishments

- Prairie dogs are important components of desert grassland biodiversity. In a study on the Armendaris Ranch in New Mexico, adult female prairie dogs were overall less vigilant and spent more time foraging then males. Adult females engaged in fewer territorial behaviors and more amicable behaviors than males. Juveniles allocated about 75% of their time to foraging, and were less vigilant than adults. Five adult Kit foxes have been radio-collared on the Armendaris Ranch; five more will be collared soon. Their movements and foraging behavior will be studied. Northern pintail ducks have declined in abundance over the past two decades. Studies of radio-collared pintails confirm that overwintering ducks spend time in wetlands in Northern Mexico. The behavior of ducks in Mexico differs significantly from that of ducks in the Middle Rio Grande Valley of New Mexico. The research has resulted in advances in our understanding of the ecology and ecosystem roles of several important species in the Chihuahuan Desert, and thereby in improved natural resource management.

c. Source of Federal Funds — Hatch

d. Scope of Impact — State Specific

Key Theme – Biological Control

a. Description of activity

Exotic invasive weeds continue to degrade New Mexico rangelands and riparian areas. Integrating biological control with more traditional control measures such as mechanical and chemical control can provide significantly more stability to a weed control program. This research program assesses the effectiveness of biological control agents in New Mexico environments.

b. Impacts/accomplishments

Short-term

- The success of the leafy spurge project has resulted in a renewed interest in control of the exotic invasive weed around Angelfire, NM. The county is now actively moving beetles to any new leafy spurge populations and the community is aware of the problems and very supportive of the non-herbicidal management efforts.

Long-term

- The first release of saltcedar biological control agents on the Pecos was met with optimism and hope. It took 5 years to get approval for these releases from the USFWS; the data collected on the Pecos should pave the way for releases on the Rio Grande and Gila drainages.

- The African rue feeding insect, *Thamnurgis pegani,* was brought from Turkmenistan into the New Mexico State University High Containment facility in the fall of 2002. Basic biological information including host range, fecundity, longevity, biotic potential etc. is being collected. Preliminary data suggests that this beetle will kill individual stems of rue plants, which will reduce reproduction.

- A leaf beetle, *Diorhabda elongata*, that feeds on saltcedar was tested in cages and released into the open field at a single site near Artesia, NM, on the Pecos River. The beetles completely defoliated caged trees in one month. Beetles were from an ecotype collected from Crete, Greece and were active well into November. The vegetation near the release has been characterized as baseline data so that subsequent damage can be quantified.

c. Source of Federal Funds — Hatch

d. Scope of Impact — Multistate Research
   - AS, AZ, CA, CO, GU, HI, ID, KS, MT, NJ, NY, ND, OR, UT, WA

Key Theme – Forest Resource Management

a. Description of activity

This McIntire-Stennis research program addresses the issues and problems associated with forestation and plant restoration ecology in New Mexico. Along with this effort, the program attempts to quantify underlying variability of individual species to cultural treatments so as to develop more robust propagation strategies for these species. Species selection for research is usually associated with need for the species for specific forestation or restoration projects. Another project explores the response of woodland areas to different types of management to enable grass production and woodland products to be maximized over time.

b. Impacts/accomplishments

- Progress has been made on developing effective propagation protocols for many woody plant species which can be used in disturbed land restoration/rehabilitation. Further, work has been conducted on identifying those species which are inherently adapted to various disturbance conditions including extreme alpine conditions and sites with low-productive soils. Specifically, work focused on regulating germination during stratification for shrubs species with long stratification requirements via the use of polyethylene glycol solutions.

- Preliminary trials have been completed which examine the carbon distribution in pinon-juniper ecosystems. This information will be used to parameterize and assess carbon cycling models developed for other, related ecosystems.

- The environmental impacts of this research include developing more efficient reclamation/restoration/ revegetation practices and providing the necessary tools (plants) and techniques to improve reclamation success. The increasing occurrence of stand replacing fires in southwestern forests, further emphasizes the need to have both the plant material and technologies to mitigates fire effects and rehabilitate these sites. In terms of the pinon-juniper ecology research, the work performed here will assist land managers in their land management activities by reduce any environmental impacts. In terms of the horticultural nursery industry, the use of native plants is a well known aspect of a water conserving landscape.

- Data derived from past and current research on these sites has been incorporated into a number of projects. Currently under design is a sustainable rural development project in with South Central Mountain RC&D Council to develop a large scale juniper thinning operation to rehabilitate watersheds in Central New Mexico to improve water quality and yield, increase forage, and improve wildlife habitat. Pine beetle invasion in New Mexico has occurred during the last four years as woodlands are stressed by long-term protracted drought. The plots treatments offer an excellent opportunity to evaluate the effects of intensive thinning on resistance to natural outbreaks of decimating insect invasion (see attachment). The baseline data provided by the research plots in critical for ascertaining the effectiveness of thinning pinion trees as a recommended 'Best Management Practice' in pinion-juniper woodland areas. Impacts from lightly thinned treatments are minimal and shortlived. The increased growth occurring to remaining pinions may not be sufficient to protect the trees from invasion population levels of beetles, this will be determined in last five years of monitoring for Mesic or Xeric sites.

c. Source of Federal Funds — McIntire-Stennis

d. Scope of Impact — State Specific

Key Theme – Global Climate Change

a. Description of activity

The goals of this program are to understand prehistoric vegetation changes and natural cycles of desertification, and to determine if CO_2 is released into the atmosphere from soil carbonate in an arid region of southern New Mexico. These goals are accomplished by measuring rates of erosion recorded by sedimentary deposits, and vegetation change based on soil isotopes. Subsequent studies will focus on rangeland management that can curtail CO_2 losses from carbonate and promote carbon sequestration in vast areas used for grazing in the United States and similar dryland regions of the world.

b. Impacts/accomplishments

- Researchers have finished mapping and digitizing the landforms and soil parent materials of the Jornada Experimental Range and Chihuahuan Desert Rangeland Research Center located in southern New Mexico. These maps will be published in an Oxford University Press book on the Jornada Long-Term Ecological Research site, and also will be made available to the public via the Jornada Experimental Range web site. In addition to providing information about the geomorphic nature of the Chihuahuan Desert in southern New Mexico, these maps are being used to (1) correlate soil-vegetation relationships at the landscape scale, (2) compare historic and prehistoric erosion, and (3) identify ecologically fragile regions. This information will allow land managers and policy makers to more fully understand and predict the consequences of human interactions with the environment at global and regional scales.

- Scientists completed a study of carbon isotopes in termite galleries and determined that termites do not modify $\delta\ ^{13}C$ signatures in soils used to reconstruct prehistoric vegetation patterns. Combined with the isotopic data, they used x-ray diffraction and electron microscopy to test the hypothesis that termites are precipitating calcite crystals for the construction of their above-ground galleries. They concluded that calcite crystals in their galleries were translocated from underlying soil calcic horizons rather than having been biomineralized by the termites. The data exclude termites from being directly involved in carbon sequestration by the use of atmospheric CO_2 to generate soil inorganic carbon.

- Researchers have completed carbon inventories above- and below-ground. These results reveal that soil inorganic carbon is 10-times more abundant than soil organic carbon which is 4-times more abundant than above-ground biomass carbon.

c. Source of Federal Funds — Hatch

d. Scope of Impact — State Specific

Key Theme – Integrated Pest Management

a. Description of activity

Integrated Pest Management (IPM) promotes minimized pesticide use, enhanced environmental stewardship, and sustainable systems. This is achieved by protection of commodities, homes, and communities with environmentally and economically sound practices that result in abundant, high quality supplies of food and fiber products and improved quality of life. Research at New Mexico State University was conducted in various areas of IPM.

b. Impacts/accomplishments

Short-term

- NMSU scientists have developed a pest management program for suppressing cotton boll weevil populations both before and during eradication programs. They reduced boll weevil damage and insecticide applications to save over $300,000 in just one year just in the Pecos Valley. They also made progress with USDA/APHIS in developing a microencapsulated formulation of malathion that would have saved boll weevil eradication programs approximately $3 Million per year. Although the success of the boll weevil eradication program has left researchers without locations for field trials, the technology may be transferable for use with other insect pests, e.g., grasshoppers. The data collected over the last five years on yield partitioning indicates late-season insecticide applications are rarely economic. Eliminating for example just one application on 70,000 acres could save NM cotton farmers over $1.4 Million per year.

- Results of a study examining the effects of the insecticide Lorsban, used for pink bollworm control on non-target cotton arthropods, indicate that repeated applications of Lorsban have very little impact on non-target pests and beneficials in southern New Mexico. This impact is particularly interesting for beneficial arthropods, as the majority of their populations appeared unaffected. This is likely due to the numerous alfalfa fields in and around Mesilla valley. Alfalfa harbors many of these beneficial insects, and the close proximity of many of these fields to cotton appears to allow quick repopulation. Two beneficial arthropod species were significantly reduced with repeated insecticide application, and populations of these insects should be closely monitored. One field season was completed examining the efficacy of cotton lines that express host-plant resistance to insects. Large field plots of conventional, transgenic Bt, and okra-leaf cotton varieties were evaluated to determine their impact on pest and beneficial arthropod populations, particular attention was given to potential differences in plant microclimate to determine if that affects arthropod abundance.

Long-term

- Studies continue monitoring the seasonal activity, dispersal, and management of stable flies in New Mexico dairies. Arthropod pest of livestock pose a threat to the health, well-being and productivity of animals. Direct losses to the livestock industry due to arthropod pests are estimated to be more than $3.5 billion annually. These losses include reduced milk production, weight gains, feed efficiency, hide and wool quality, increased transmission of diseases and death.

- Pheromone disruption is a novel insect control method that may prove to be valuable in integrated pest management of Pecan Nut Caseborer, particularly in small orchards and home owner settings. These growers presently have no way to control pecan nut casebearer because expensive spray equipment cannot be justified for small plantings. Small pecan growers make up a significant part of the pecan producers and it is felt the use pheromone paintballs will be and inexpensive and useful tool for them. Continued research need to be conducted to increase longevity.

- A decision support system is being developed with the University of Texas at El Paso Department of Computer Science that will accept data from a variety of sources and advise producers on the best course of action to take with respect to maximizing cotton yields while minimizing costs. The data management and support systems will run on a laptop computer that can be carried into the fields.

c. Source of Federal Funds — Hatch

d. Scope of Impact — Multistate Research
   - with States AL, AR, AS, AZ, CA, CO, FL, GA, GU, HI, IA, ID, KS, KY, LA, MN, MT, ND, NE, NJ, NY, OR, TN, TX

Key Theme – Nutrient Management

a. Description of activity

The purpose of this research program is to follow the fate of nitrogen fertilizer applied to pecan trees during the kernel fill period.

b. Impacts/accomplishments

- A special, non-radioactive isotope of nitrogen fertilizer was applied to a commercial pecan orchard and the nitrogen followed in the tree, soil, and nuts. After 1 year in the field, considerable decomposition of the woody material had occurred. Little or no nitrogen mineralization occurred with the application of high rates of pecan trimmings. The addition these high rates of organic matter had little or no influence on the soil moisture holding capacity or bulk density. With more efficient use of nitrogen fertilizer, farmers may save money and reduce the fluctuation in yield between on and off years. Nitrogen fertilizer added during the kernel fill stage helps

to prepare the tree for the next season's production. An economical disposal method for the woody trimmings of pecans is needed because burning causes air pollution problems. Shredding of woody trimmings and incorporation into the orchard is an alternative method of disposal that appears to have no negative impact on soil properties.

c. Source of Federal Funds — Hatch

d. Scope of Impact — State Specific

Key Theme – Riparian Vegetation Management

a. Description of activity

This project examines how a range of grazing intensities and seasons of use affect vegetation, soil properties, and runoff in riparian areas of multiple-use in southwestern forests.

b. Impacts/accomplishments

- Data summarized for 2001 revealed that stream morphology was not negatively impacted by any treatment – stream width/depth ratios, Gini coefficients and change in cross-sectional area were unaffected by level of grazing intensity or season of use. Effects of season of use appeared to be significant on herbaceous species richness (i.e., number of different species) and Simpson's diversity index. Enclosures grazed during the cool season had the greatest species richness and diversity. Data from grazing treatments continued throughout 2002 and 2003 are currently being analyzed for presentation at professional meetings as well as Cooperative Extension workshops. Grazing treatments and data collection for 2004 is scheduled to begin this month.

c. Source of Federal Funds — Hatch

d. Scope of Impact — State specific

Key Theme – Soil Quality

a. Description of activity

This program is focused on remediation of lands contaminated with depleted uranium, mostly from military use of depleted uranium munition.

b. Impacts/accomplishments

- An autoradiography technique was developed to detect very small concentrations of depleted uranium in small root samples (much smaller than needed for chemical

analysis). The technique should allow several experiments to be conducted to test the interaction of roots and fungus on Uranium uptake in roots.

c. Source of Federal Funds — Hatch

d. Scope of Impact — State Specific

Key Theme – Water Quality

a. Description of activity

This research program focuses on the following areas of watershed management: 1.) vegetation management effects on runoff and water quality; 2.) irrigation ditch management effects on shallow groundwater quantity and quality; 3.) development of watershed optimization models that examine the economic tradeoffs between alternative water uses, various institutional structures, and infrastructure changes; and 4.) description and characterization of water supply reliability.

b. Impacts/accomplishments

- Researchers have had several varied and measurable impacts during the past year, including numerous presentations, publications, research proposals, and funding opportunities for students. A principal objective and measurable impact is the improvement of the water management capability of the Nation, State, and local community.

- Research continued on two main watershed areas: uplands and streamside corridors. In the upland research, six experimental watersheds were established at the Santa Fe Ranch and instrumented for measurements of precipitation, air and soil temperature, soil moisture, runoff, and sediment yield. In the Mora River watershed, five 10-acre experimental plots have been established and federal paperwork largely completed to allow runoff plot tests in summer 2004 of tree clearing effects on runoff and sediment yield. The upland component of this research will provide rangeland and water managers with strategies to clear vegetation and provide increased forage along with improved water quality. Many of these impacts will be realized as the direct effects of tree clearing are illuminated by the research in 2004 and beyond.

- In streamside research, two sites at NMSU facilities in northern New Mexico (at the Alcalde Sustainable Agriculture Science Center) and in southern New Mexico (as the Chihuahuan Desert Rangeland Research Center) were instrumented with wells to measure groundwater flow and water quality. Irrigation ditch flows and Rio Grande flows were also measured at both sites and hydrology and water quality interactions between surface water and groundwater were characterized over the 2003 irrigation season. Future work will measure additional components of the hydrologic budget in these streamside areas, particularly seepage from flood irrigation and evapotranspiration from riparian vegetation. The streamside component of this

research has yielded immediate benefits to irrigation ditch associations, who have identified benefits of ditch seepage and postponed plans to line their ditches (thus stopping seepage) until further site assessments can be completed. Benefits of ditch seepage include providing return flow to the river that is available for downstream users later in the irrigation season, maintaining quantity and quality of shallow groundwater, and supporting riparian vegetation with its aesthetic, grazing, and wildlife values. The improvements in understanding of hydrologic budgets along streamside corridors will be useful water resources planning by irrigators, water managers, and entities charged with water quality protection.

c. Source of Federal Funds — Hatch

d. Scope of Impact — Multistate Research
- AZ, CA, CO, GA, HI, IN, KS, NC, ND, NE, OR, TX, UT, WA

Key Theme – Weather and Climate

a. Description of activity

This program focuses on providing climate information, including historical, real-time and prognostic, for the optimal management of agriculture and natural resources.

b. Impacts/accomplishments

- In the last year the climate center expanded the climate network to include 130 climate stations. The new reference evapotranspiration equation was published on the web, along with information on drought and forage production. End user numbers have remained steady at 600 per day but email requests for information have increase by 5%.

c. Source of Federal Funds — Hatch

d. Scope of Impact — State Specific

Key Theme – Wildlife Management

a. Description of activity

This program focuses on sustainable management practices for wildlife in the Chihuahuan Desert ecosystem.

b. Impacts/accomplishments

- Several research projects were continued: These projects include (1) “Burrowing owl nest-site selection in relation to prairie dog colony characteristics and surrounding

land-use practices in Janos, Chihuahua, Mexico" (2) "Effects of three different forest thinning practices on Sacramento Mountain Salamander populations" and (3) "Influence of grassland patch size and shrub-encroachment on grassland birds in Chihuahuan Desert grasslands". These studies will provide better understanding of the distribution and ecology of vertebrate fauna of this region, including permanent resident species and seasonal migrants. As a result, we will be better able to sustainably manage our native vertebrate fauna. Data collected for this project can also help alleviate future entanglements related to the management needs and status of specific species. It will also contribute to enhanced wildlife viewing and sustainable populations for fee hunting.

c. Source of Federal Funds — Hatch

d. Scope of Impact — State Specific

Key Theme – Invasive Weeds

Starthistle Program

a. Description of activity

This research program focuses on understanding the mechanisms of herbicide action and tolerance or resistance in weeds and crops as well as characterizing plant/insect interactions as they relate to the success of biological control. Greenhouse and field investigations are used to determine the effects of disturbance on vegetation and soil dynamics, including recovery from drought, fire, grazing, and invasive species.

b. Impacts/accomplishments

- Broom and threadleaf snakeweed are major rangeland weeds in the western United States, and picloram is the major herbicide used for their management. Previous work showed that these species are most susceptible to picloram applied in autumn or when precipitation is high and that differences in herbicide absorption and tissue sensitivity as measured by picloram-induced ethylene production do not fully explain variation in seasonal response. Therefore, the role of picloram metabolism in seasonal susceptibility to picloram was examined. Researchers concluded that variation in picloram metabolism is not involved in differential susceptibility across season or population.

- African rue has become established in several western states, where it poses a threat of further spread because of its capability of reproduction by seed and vegetative lateral roots, as well as its apparent success under water-stressed conditions. In previous studies, applications of hexazinone, imazapyr, and metsulfuron have provided effective control of African rue. In this study, plant-herbicide-water stress interactions were investigated. This initial screening suggests that water status plays a role in altering African rue's sensitivity to herbicides.

- Scientists have characterized vegetative and reproductive development of African rue throughout the growing season, and have investigated the influence of soil moisture and temperature on African rue seed germination. Investigations of seedling response to water stress have shown that this species is capable of continued photosynthesis under moderate levels of water stress, and that individuals recover quickly from water stress. Herbicide efficacy is affected by water stress, with moderate water stress facilitating herbicide effectiveness. Investigation and verification of African rue physiology and response to herbicide using mature plants in extant, field conditions are ongoing.

- Abiotic (soil erosion, water infiltation rate, soil compaction, and soil chemistry) and biotic (species composition, total plant cover) response variables are being evaluated in response to 3 treatments: chemical control of mesquite, soil manipulations designed to reduce overland water flow and sediment yield, and reseeding at different times in the growing season. This experiment is long-term in nature, and will likely require 10 years or more to discern long-term effects of the treatments.

- Research projects on fire history effects in shortgrass prairie and on grassland restoration in mesquite-dominated lands will provide data to support predictions about impacts of management actions. The research on African rue ecology and control will give insight into the conditions that facilitate recruitment of this class B weed, and inform strategies to limit further invasion and spread.

c. Source of Federal Funds — Hatch

d. Scope of Impact — Multistate Research
   - with states CA, FL, HI, IN, KS, NV, NY, OR, UT, WA

Key Theme – Remote Sensing

a. Description of activity

The goal of this project is to develop procedures for using data from infrared photography and satellite images as modeling inputs and early warning tools for making timely and environmentally sound management decisions, such as planting date, irrigation scheduling, chemical application, and pest control.

b. Impacts/accomplishments

Short-term

- NMSU researchers are receiving daily satellite images of the Mesilla valley and are using aircraft to take aerial infrared photographs of selected areas.

- Scientists are using a spectroradiometer to measure the reflectance signature of plants under different growth stages and stress conditions. These reflectance signature data

are being used to interpret the satellite and aircraft data and to develop models for monitoring plant development and conditions.

c. Source of Federal Funds — Hatch

d. Scope of Impact — State Specific

Goal 5: Enhanced economic opportunity and quality of life for Americans.

Overview

New Mexico's future is increasingly tied to regional environments and a global economy. Clearly defined regional and international perspectives are essential for the programs of the College. The University's traditional programs can be enriched by regional and international components and thereby better achieve their full potential. International activities enhance global understanding by incorporating international dimensions into the ongoing instruction, research, and extension efforts of the College. Graduates of the College need an education that will allow them to achieve success in a global economy. They must have the skills necessary to keep New Mexico a supplier of food and fiber throughout the world and keep New Mexico a destination for tourists from around the world.

The New Mexico Agricultural Experiment Station believes that it is meeting the short-term goals outlined under Goal 5 in the 5-year Plan of Work submitted in July 1999. Research outputs take a number of forms:

- 7 non-refereed publications, reports, articles
- 13 invited presentations
- 1 online forum

Total expenditures for Goal 5 were $144,341 from Hatch Act funds. The number of full-time equivalents engaged in research for this goal was 1.94.

Key Theme — Children, Youth, and Families at Risk

a. Description of activity

The focus of this program is on the providing support for New Mexico School-age Child Care Program Directors. Collaborations occur with other agencies to provide workshops and seminars as needed.

b. Impacts/accomplishments

A library was maintained of resources that New Mexico School age Child Care Program Directors can borrow. Mailings were made to alert them of available materials. In addition, a newsletter was published. The economic impacts of this project are evidenced when parents are able to work due to the availability of school-age child care. These programs allow for continuous, uninterrupted transitions for the children from the school to child care, thus allowing parents to remain on the job with a sense of security. In some cases, school-age child care allows the parents to further their educations, thus increasing their employability.
Over the 5 years of this project, many resources were accessed by

educators across the state, with 2096 requests in 02-03.

c. Source of Federal Funds —— Hatch

d. Scope of Impact —— State Specific

Key Theme – Parenting

Overview

The short-term goal of this program is to decrease negative parenting practices and increase positive parenting practices among high-risk families of young children. The long-term goal is to decrease adolescent substance abuse and other risky behaviors.

1a. Description of activities

Six-month parenting classes were offered to divorced and unmarried parents of young children in Dona Ana County. The goal of the classes was to improve parenting skills so as to help parent and child develop resiliency and achieve positive outcomes.

1b. Impacts/accomplishments

Pre/post test data showed significant improvement for parents in 5 areas: 1. increased empathy for children's needs; 2.decreased belief in the value and use of corporal punishment; 3.fewer inappropriate expectations of children; 4.fewer reversals of parent-child roles; 5.greater knowledge of positive discipline techniques. Understanding how personal characteristics of parents and children interact with environmental risk and protective factors can help policymakers and program planners support single-parent families. State only

2a. Description of activities

A study was designed and data collected to explore the impact of transition in the family on work. Specifically addressed were the effects of family transition on identity and well being. By understanding some of the psychological aspects associated with work productivity, employers will enjoy greater productivity

2b. Impacts/accomplishments

Data analyzed to date has been disseminated through CES and the CYFAR network improving mental and physical health of New Mexico families by diminishing stress within families and among workers is the expected impact.
CA, ID, MT, OR, UT, WY, AZ, MS

c. Source of Federal Funds — Hatch

d. Scope of Impact — State Specific

Key Theme - Community Development

I. Tourism

a. Description of activities

Tourism is the second largest business in New Mexico and quality restaurants are essential components of tourism. Through collecting a variety of date and information, publications about the independent restaurants of New Mexico were made available in extension publications. Areas such as why restaurants fail, added value restaurant products, history and use of technology systems in culinary labs, food allergy trainings, and driver dining preferences have been explored.

b. Impacts/accomplishments

A food allergy component has been implemented by the National Restaurant Association into their training. An average of 24 e-mails is received weekly requesting advice on restaurant operation.

II. Spanish language website

a. Description of Activities

New Mexico has the highest percentage of Hispanics of all states, and Spanish-speaking populations have grown immensely nationwide since the early 1990s. This explosive growth has created an urgent need for Spanish-language Extension services in many states where the Extension system has little or no Spanish-language resources.

A team of bilingual communicators from NMSU, Texas A&M, and the Universities of California and Illinois have jointly created an online, national clearinghouse of Extension-related materials in Spanish for free and immediate use by Extension personnel nationwide.

The *Extension en Espanol* (EEE) clearinghouse provides educational print and audio materials, links to related Web sites, resource guides, glossaries, style guides, educational materials about Hispanic communities, an online discussion forum and translation services.

b. Impacts/accomplishments

--Over 300 participants viewed a national online Internet forum to inform potential users about EEE. Three separate workshops were presented to accommodate various time zones. 137 sites from 36 states logged on to the workshops.

--Initial data indicated 13,391 downloads of documents. In addition, visitors accessed EEE articles on culture and Spanish-speaking communities 42,071 times and used EEE links to other online resources 6,567 times.

Key theme: Agricultural Education and Research

I. Secondary Agricultural Education

a. Description of activity

Using a survey and working with a committee, the goal of this project was to improve secondary agricultural education in New Mexico by assessing the status and safety of agricultural mechanics facilities and creating a statewide agricultural education office.

b. Impacts/accomplishments

The survey developed to assess facilities has been implemented.
Funding has been secured to establish a statewide office.

II. Improving the Quality of Research

a. Description of activities

Even poorly designed studies and experiments can be expensive to implement. This project connects statisticians to researchers to enhance the research from conception to conclusion. Statisticians work directly with researchers to provide guidance and expert advice on the appropriateness and correctness of the research design, appropriate analyses, and correct and appropriate interpretation of results.

b. Impacts/accomplishments

More than 65 projects in AES and CES received the services of a statistician, thereby increasing the likelihood of more efficient use of research dollars.

c. Source of Federal Funds — Hatch

d. Scope of Impact — State Specific

A1. Planned Programs—Cooperative Extension Service

Goal 1: An agricultural system that is highly competitive in a global economy.

Overview

New Mexico Cooperative Extension has a tremendous role in helping to keep New Mexico's agricultural economy strong particularly in light of because of international border competition issues. Drought and water fights, use of expansive range lands, invading diseases and pests, and national economic down turns, all play a role in maintaining, retaining and building anew Mexico's agriculture infrastructure. Extension specialists and agents are working toward resolving conflicts through researched solutions, mediation through involvement of clientele in problem solving, incorporation of technology applications whenever feasible, and continuous reintroduction of tried and true practices.

These efforts require a continuous flow of appropriate information and technology to address local needs. It is critical that the College maintains and strengthens programs that address these needs. The College recognizes that agricultural competitiveness and efficiency should take into account social, economic and environmental costs. Determining these factors requires a coordinated, team approach within the College and among researchers and Extension faculty.

The New Mexico Cooperative Extension Service believes that it is meeting the short-term goals outlined under Goal 1 in the 5-year Plan of Work submitted in July 1999.

Total expenditures for Goal 1 were $368,612 from Smith-Lever Act 3(b)(c) appropriated funds. The number of state-level full-time equivalents engaged for this goal was 11.79 FTE.

Key Theme – Crop Management

a. Description of activity

Curriculum development for new alfalfa, cotton, corn and other agronomic crop programs was established based on a need from clientele throughout New Mexico where these crops are grown or grown in rotation. The programs are based on farmer, consultant and other agricultural professional training, information and current needs in these crops.

b. Impacts/accomplishments

c.

Modules over the different crops and production practices were developed and used at group training meetings; publications on growth/development and production practices on the crops were developed. Training using either Horizon Live or Centra transmission was implemented and distributed in Powerpoints in meetings or on

compact disk. As a result of this program, farmers will have a resource with which to evaluate and expand their agronomic forage acres while obtaining a sustainable farming operation. This baseline of programming will again activate the statewide forage and agronomy crop Extension efforts in the state and allow the program to be rebuilt with new information and an expanded educational effort on production practices and crop scouting needs. The program will allow liaisons with other production associations, agencies and businesses so that they become active partners with the Extension educational effort in New Mexico.

c. Source of federal funds -Smith Lever 3(b)(c)

d. Scope of impact -State Specific

Key Theme – Chile Pepper Task Force

d. Description of activity

The New Mexico Chile Pepper Task Force is an inter-disciplinary partnership facilitated by New Mexico State University's College of Agriculture and Home Economics. It was developed to promote and enhance the interaction between researchers, Extension specialists, and industry leaders to maximize the efficiency and profitability of the New Mexico chile pepper industry.

e. Impacts/accomplishments

The "Best Management Practices" being developed as a major work objective of this project will emphasis the importance of IMP; soil and plant tissue testing; green manure; and other sustainable and environmentally sound crop production practices. The direct impact of this project will reverse the significant losses that have already occurred to the chile industry as a result of high labor costs and failure to fully implement existing best management practices. Emphasis on profitable yields will ensure the use of appropriate technology and encourage efficient management of resources. The potential contribution of these efforts is in excess of $400 million.

A mechanical thinner is slated for commercial production for the 2004 growing season, offering labor-cost savings of $75-$100 per acre.

Prototype mechanical cleaning equipment that combines mechanical and electronic technologies has been developed and is being tested. In initial trials this equipment separated approximately 90% of harvest trash from chile pods. Further testing is underway, as are preliminary talks with commercial manufacturers. This new equipment, combined with existing mechanical harvesting machines, will make widespread mechanical harvest viable and will open even greater opportunities for reducing the cost of harvest.

The task force has identified key management practices to streamline chile production

and has disseminated them to growers through publications and the task force Web site.

Task force plant breeders have released 'NuMex Garnet', a new paprika cultivar with characteristics that are beneficial for early season mechanical harvest.

f. Source of federal funds - Smith Lever 3(b)(c)

g. Scope of impact - State Specific

Key Theme -- Animal Production Efficiency

a. Description of activity

Livestock specialists and county agricultural extension faculty work together to provide assistance and education to livestock producers across the state. Livestock producers range from those who have been on farms and ranches for several generations to absentee owners who have little knowledge of livestock production practices. A number of methods are employed to reach producers, including one-on-one contacts, educational meetings and seminars, mass media efforts, and interaction through state livestock associations and service agencies. Livestock and non-dairy livestock products account for approximately 50 percent of all New Mexico farm and ranch receipts. Total farm and ranch receipts from livestock and non-dairy livestock products were approximately $856 million in 2001. Small increases in efficiency of production leading to increased profit can have a substantial impact on the sustainability and economic viability of New Mexico's rural and urban communities. An increase of as little as five pounds of calf weaned per beef cow in New Mexico could add an estimated $3 million to annual ranch receipts. An increase in the pounds of lamb weaned per ewe of 10 percent could contribute an additional 1.1 million pounds of lamb to market for an increase in ranch receipts of over $750,000. An annual increase of five pounds of calf weaned per cow accrued over five years will total over $8 million. An annual increase of 10 in pounds of lamb weaned per ewe over five years will total over $3.7 million.

b. Impacts/accomplishments

New Mexico State University and Texas A&M University have been cooperating in the New Mexico Ranch to Rail program conducted Double A Feeders in Union County, New Mexico. The 2002-2003 New Mexico Ranch to Rail program totaled 555 steers entered from New Mexico (316 head from 20 ranches) and Texas (239 head from 20 ranches.

The New Mexico BQA Program is patterned after national guidelines developed and adopted by the National Cattlemen's Beef Association. The New Mexico BQA program is conducted by the New Mexico Cooperative Extension Service, with the New Mexico Livestock Board serving as a third party certifying agency. In developing the certification program, livestock specialists have been instrumental in the cooperative effort between the New Mexico Cattle Growers Association and New

Mexico State University to create a Beef Quality Assurance Task Force (BQATF). The BQATF was established to serve as an advisory board to NMSU regarding future BQA efforts. Specialists annually attend the National Cattlemen's Beef Association Beef Quality Assurance State Coordinators' Meetings. Specialists developed a PowerPoint presentation that is being used to train and certify beef producers in BQA. Five BQA producer-training meetings were held in 2003.

Standardized Performance Analysis (SPA) is a financial and economic software package designed to aid cow-calf producers in evaluating ranch finances and cattle performance relative to other ranching operations. Livestock specialists have coordinated the New Mexico SPA program. The 2003 workshop had 7 participants representing more than 1,500 cows. The estimated improvement in net return during the following year, based on the recommendations provided to producers, was $52,240 ($35/head). Over 10 years, this level of improvement would yield more than half a million dollars to these producers, plus any impact the participating producers may have on neighboring beef enterprises.

Beef cattle specialists and county extension agents continue to coordinate the Tucumcari Bull Test and Sale and the Northern New Mexico Bull Test and Sale. These sales provide are a valuable tool for educating producers in principles of cattle selection, providing an opportunity for purebred producers to evaluate the genetic makeup of their produce, and providing a source of performance tested bulls for commercial producers.

Producer surveys were sent to north-central NM and southern Colorado producers supplying information on the Valles Caldera Interim Grazing Program. Thirty-nine producers, who received information on the Interim Grazing Program, were selected to participate in the 2003 grazing program. These producers grazed 1009 head of replacement heifers and cow/calf pairs for four months. Thirty-eight of the 39 producers participating in the program normally grazed on public land grazing allotments in north-central NM. This grazing opportunity was an opportunity for all 39 producers to retain a portion of their herd that otherwise might have been dispersed due to the ongoing drought and poor pasture conditions on their home place.

c. Source of Federal Funding -Smith Lever 3(b)(c)

d. Scope of Impact - Multistate Extension (AZ, CO, TX)

Key Theme - Agriculture Marketing

a. Description of activity

From 2000 to 2001, cash receipts for all vegetable crops in New Mexico increased 18.8 percent. Although most of the increase was associated with chile and onion production, other minor vegetable crop cash receipts increased 25.0 percent. As many of these crops are marketed through alternative marketing techniques, more

information is needed on the characteristics of these marketing channels. Most minor vegetable crops and other specialty crops are produced on small farms under sprinkler, furrow or flood irrigation, all of which are relatively inefficient. These growers are concerned about the potential shortages of water for irrigation. The time of unlimited water is rapidly passing and more efficient methods of irrigation must be implemented and evaluated. More information is also needed on what varieties of herbs and other high value crops are adapted to northern New Mexico.

b. Impacts/accomplishments

The public was made aware of the benefits of growing specialty crops and using drip irrigation and mulch techniques to conserve water (as much as 22.7%) in the production of herbs and other specialty crops through workshops, conferences, tours, field days, newspaper releases, and newsletters.

c. Source of federal funds -Smith Lever 3(b)(c)

d. Scope of impact -State Specific

Key Theme - Plant Pathology

a. Description of activity

The plant pathology program supports agricultural producers and urban clientele by providing educational programs and diagnostic services for identification of plant disorders. Educational programs are conducted at Master Gardener Classes, Pesticide Applicator Training Workshop, Crop Conferences (vegetables, specialty crops, field crops, and turf and ornamentals), and various public workshops on plant health. Diagnostic services are provided on a formal basis in the Plant Disease Laboratory at New Mexico State University. Plant specimens submitted by county agents, extension specialists, agricultural producers or the general public are evaluated for disease by use of modern laboratory procedures. A diagnosis of the plant problem is made and a formal report is provided to the individual who submitted and to the owner of the plant (if different). Disease diagnosis is also made on an informal basis at plant clinics held throughout the state. At plant clinics, specimens are generally evaluated on site and a diagnosis is made without laboratory analysis and recommendations are provided to the plant owner (if laboratory analysis is required, the specimen is taken to the lab for a formal diagnosis).

b. Impacts/accomplishments

The Extension Plant Pathologist conducted a seed germination experiment in soil amended with broccoli residue. This is preliminary work as part of an overall research project to determine the efficacy of broccoli residue in controlling soil-borne fungal diseases of chile peppers.

Specialists participated in State Survey Committee Meetings, which are designed to evaluate pest problems and potential pest problems in New Mexico and establish a plan for pest surveys in New Mexico, including prioritizing pest problems and funding requests. Specialists also worked with the State Homeland Security officials to develop an agr-security plan for plant pathogens.

c. Source of federal funds -Smith Lever 3(b)(c)

d. Scope of impact – Integrated Research and Extension; Multistate Research/Extension (with states AZ, CO, GA, IN, KS, MN, MO, ND, OK, TX, WY)

Key Theme - Risk Management and Farm/Ranch Management

a. Description of activity

The risk that prices can move enough to cause major economic damage to agricultural producers has long been a significant problem. Likewise in the new era of deregulation, other industries such as finance, utilities, and energy face the same risks that agriculture faces. Tools exist, such as futures, options, and swaps, that can help manage the risks of price changes and thus be helpful to industries. This project looks at each industry and the tools that can help provide economic benefits to those that choose to use them.

b. Impacts/accomplishments

Extension specialists responded to many requests for tax, economic, accounting, lease or custom rate information from producers, lenders, and business people (in addition to cost of production requests). Projected 2003 crop cost and return estimates were developed and released prior to the planting season. The set of cost and return estimates includes 49 representative farms and 4 nontraditional crop situations. The set covers 39 geographical production areas, 22 different crops, several size classes, and 3 major irrigation types as well as dryland. An historical cost and return estimates manuscript for 2002 was accepted for publication. A spinoff of this effort is the use of the work in publishing extension circulars and in thesis research carried out on the applications of modern portfolio theory. The primary economic impact involves improving the decision-making of farmers and ranchers and providing needed input data to the decisions made by lenders, and the analyses of appraisers and economic researchers.

A scan of articles associated with price risk management tools was completed. Case studies are in development stage for training and publication. Basis tables are under construction for cattle and wheat. Price risk reduction improves business stability and profitability. Currently, no more than 5% of N.M. farms and ranches use price risk tools. If the number doubled to 10%, an additional $7 million dollars of net farm income would be generated and at least 70 farms and ranches would be saved from bankruptcy.

c. Source of Federal Funding -Smith Lever 3(b)(c)

d. Scope of Impact -State Specific

Key Theme - Small Farm Viability/Specialty Crops

a. Description of activity

A majority of fruit growers in the State produce on small acreages (less than 10 acres), and find it necessary to obtain off-farm employment to make ends meet economically. Ureliable production of crops currently grown and marketing problems were listed as major reasons for this lack of profitability according to stakeholders (advisory board). Growers have expressed a desire to remain tied to the land, but need help in production and marketing in order to do so. Remaining on the land will help with social problems (family togetherness) and also with food security, preservation of water rights, and preservation of an agricultural heritage.

b. Impacts/accomplishments

Specialists and researchers had excellent harvests of strawberries, raspberries, blackberries and grapes from the 2.5 acre certified organic plantings made in 2002. They are aware of 5 major growers who are reporting excellent results using our recommended “soft” pest control techniques. Specialists are aware of 8 new grape growers in the Northern part of the state (this will result in at least 150 tons of grapes that will be available to local wineries), 3 new tree fruit orchards, and six new berry growers. One strawberry grower increased his income by $15,000.00 with his 6000 plants. Specialists were major players in the collection and establishment of 23 “old heritage” apple varieties in the new Heritage orchard, Dixon, NM.

c. Source of Federal Funding -Smith Lever 3(b)(c)

d. Scope of Impact -Integrated Research and Extension

Key Theme - Small Farm Task Force

a. Description of activity

The Small Farm Task Force/RAIPAP is a project of the New Mexico State University Cooperative Extension Service. This project presents a holistic approach through its intended goals, to provide the essential resources required for empowerment that would sustain rural family life. This is accomplished by training the local residents to carry out rural development that will improve the quality of life and increase economic opportunities in their communities.

b. Impacts/accomplishments

Specialists continue to assist La Jicarita Enterprise Community in their agriculture and natural resource programs, advising on funding projects and assisting in developing for-profit and non-profit business opportunities.

Specialists continue to gather up-to-date policy issues from the spectrum of the news media, federal and state agencies, community based organizations and others to keep community, county and state leaders informed on these emerging issues. More than 50 community leaders are informed with these bi-monthly mail outs.

c. Source of Federal Funding -Smith Lever 3(b)(c)

d. Scope of Impact -Integrated Research and Extension

Key Theme - Urban Horticulture

a. Description of activity

Although New Mexico's population is almost 3/4 urban, most home garden and landscape problems for rural citizens are identical to those of urban residents. Other than home gardening, urban residents have little contact with agriculture or NMSU and get their horticultural information through local nurseries. Gardening is a major means of relaxation and important fresh food supplement for citizens. Questionnaires have shown that though the primary source of information is the nursery, the most reliable source is perceived by the public to be the Extension Service and Extension Service volunteers such as Master Gardeners. In New Mexico, concerns over water conservation linked to a desire to maintain attractive landscapes, has increased the need and desire for reliable, research based, water conserving gardening information. Commercial and institutional landscapes and professional landscape managers are aspects of New Mexico's agriculture.

b. Impacts/accomplishments

The Extension Urban Horticulturalist coordinated State Master Gardener Program, authored chapters in and provided content oversight for the New Mexico Master Gardener Manual, taught Master Gardener classes during initial training period and provided update and advanced training to Master Gardeners throughout the year.

The Extension Urban Horticulturalist hosted State and Regional Southwest Yard and Garden Television shows to teach gardeners proper and effective gardening methods for the unique environment of the American Southwest and conducted monthly radio garden question call-in programs on KFLQ radio (coverage from S. Colorado to Alamogordo, Tucumcari to Grants). These shows reached thousands of people, informing them of appropriate plants and gardening techniques for this region.

The Horticulturalist assisted and advised County Extension Agents regarding problems diagnosis and program development/presentation regarding landscape horticulture in their counties.

c. Source of Federal Funding -Smith Lever 3(b)(c)

d. Scope of Impact - Multistate (CO)

Goal 2: A safe and secure food and fiber system.

Overview

New Mexico's Food Technology Program addresses promotion of regulatory compliance, food product development, food safety and nutrition education, and marketing of specialty food products. Specific audience targets include clientele in twenty-six of thirty-three counties consisting primarily of Anglo, Hispanic and Native American populations. A challenge in programming is to deliver education at several different levels of complexity, culture and language comprehension. Audiences range from youth and other non-technical audiences to multilingual populations to scientists, and members of the food industry.

The New Mexico Cooperative Extension Service believes that it is meeting the short-term goals outlined in the 5-year Plan of Work submitted in July 1999. Research outputs include 25 web-based outreach tools.

Total expenditures for Goal 2 were $13,792.20 from Smith-Lever Act 3(b)(c) appropriated funds. The number of state-level full-time equivalents engaged in research for this goal was 0.25.

Key Theme – Food Accessibility & Affordability

Multilingual Food/Nutrition Education

a. Description of activity

A majority of people need access to good quality, affordable foods. They can receive this information through educational programs on nutrition and healthy living through Extension programs. However, up until the last four years, 81% of Extension nutrition education programs were delivered in English. But research tells us that English-only programs do not always fill the needs of our growing minority-majority multicultural population. Therefore, multilingual (Spanish-English, Spanish only, and Navajo-English) videotapes, computer-based software, and print material nutrition education programs have been prepared and used by Extension and loaned to other agencies. The videotapes are particularly popular because of their 'telenova' format, realistic script writing and use of clientele as actors and actresses.

b. Impacts/accomplishments

The currently existing catalogue of resources was added to this year. Of note in this theme is a training module in Navajo and English about Sheep and Beef Meat Handling. Demand is very high with all but 2 counties having high speed internet access

c. Source of Federal Funding -Smith Lever 3(b) (c)

d. Scope of Impact – Integrated Research and Extension

Key Theme – Food Handling

Food Technology Program

a. .... Description of activity

The value of New Mexico's agricultural food products are being significantly increased through food processing business development. Small farmers, which comprise a majority of NM farmers, are raising more and more specialty crops that can lend themselves to unique food products and income producing commodities. Value-added food processing is beginning to generate a significant number of jobs and a return on economic investment. Food technology program objectives are to 1) provide food processors programs on producing safe food products, 2) teach state and federal regulations pertaining to food product development, 3) assist in developing and maintaining compliance with all food regulations, 4) teach food handling and safety, with particular emphasis on restaurants and tourism facilities. The Food Technology Specialist, three Home Economists and seven nutrition assistants have been directly involved with knowledge transfer of food technology research, teaching workshops and responding to clientele questions.

b. Impacts/accomplishments

The Better Process Control School was developed and presented twice over the year in NM involving people from the southwest as well as northern Mexico. It is scheduled again this Spring and will be taught in Spanish.

The program 'Food Industry Seminar' was established. This program brought prominent Food scientists to present new and innovative food science concepts to the region, as well as providing an opportunity for students and food processors to interact with the scientists.

c. Source of Federal Funding -Smith Lever 3(b)(c)

d. Scope of impact – Integrated Research and Extension

Key Theme - Food Safety

Family/Consumer Food Safety

a. Description of activity

Those most susceptible to serious consequences or even death due to food borne illness are infants, young children and the elderly. Yet, these individuals often have the least control over the food they eat. Extension food safety education is targeted at consumers, infant care givers, young children and the elderly, food service and restaurants workers and managers. Educational programs focus on safe handling, processing and storage of food. Programs are designed to create awareness of practices that increase the risk of food borne illness and to change behavior of participants.

The Food and Nutrition Specialist serves as a resource to and provides training for the Extension Home Economists in subject matter and serves as a state liaison between the Cooperative Extension Service, other agencies and organizations, and Extension's nutrition educators. Collaborating with several agencies has been a key in reaching targeted audiences. In addition, 4-H focuses on youth projects and activities related to food safety and food preservation. An Agricultural Communications Specialist (NMSU Agricultural Communications Department) has developed food safety video and web games (http://www.fooddetectives.org/). Special attention is placed on cultural and language needs, low income needs, the elderly and infants and children.

b. Impacts/accomplishments

-Food Safety Education Multimedia kits (videos, CD-ROMs, print materials) were distributed statewide. These are produced in 3 languages: English, Spanish and Navajo
-each county office now posses a canner tester and a black-light box (for use in hand-washing demonstrations)
-4,500 food safety contacts were made both in person and by phone
-Food Safety Booths were featured at the New Mexico State Fair (Albuquerque) and the Southern New Mexico State Fair (Las Cruces)
OK, AR, TX, LA

c. Source of Federal Funding -Smith Lever 3(b)(c)

d... Scope of Impact-Integrated research and extension, multistate-CO

Goal 3: A healthy, well-nourished population.

Overview

A healthy, well-nourished population is an important goal for modern society because if health issues are address, populations can turn their attention to increased productive social, economic and environmental concerns. Three health areas are still very prevalent in New Mexico. They are addressed in this section.

The New Mexico Cooperative Extension Service believes that it is meeting the short-term goals outlined in the 5-year Plan of Work submitted in July 1999. Research outputs take a number of forms:

- 34 non-refereed publications, reports, articles, columns, 19 bilingual
- 15 newspaper, radio and TV releases
- 15 public trainings, workshops

Total expenditures for Goal 3 were $14,373.59 from Smith-Lever Act 3(b)(c) appropriated funds. The number of state-level full-time equivalents engaged in research for this goal was 0.20.

Key Theme – Health Care

Diabetes Education

a. Description of activities

In New Mexico, an estimated 105,000 people have diabetes. Approximately 35,000 of them do not even know they have it. Many of the state's citizens are at particular risk, because the disease is more prevalent in minority populations. Hispanics in the state are almost one and one-half times more likely than Anglos to die of diabetes, and Native Americans are more than five times as likely to do so, according to the Centers for Disease Control and Prevention.

Education is the key to helping New Mexicans prevent or control diabetes with regular physical activity and a balanced, nutritious diet. Twenty-five NM counties have provided diabetes education over the past three years. Diabetes education in New Mexico is accomplished using a variety of teaching/awareness methods.

The Extension Diabetes Coordinator is Certified Diabetes Educator and a Registered Dietitian. The Extension Diabetes Coordinator and the Food and Nutrition Specialist serve as resources to and provide training for Extension Home Economists in subject matter and serve as liaisons between Cooperative Extension Service and other agencies and organizations.

I. Kitchen Creations

Description of activities

A Cooking School for People with Diabetes and Their Families was conducted in 25 New Mexico counties with 998 participants.

Impacts/accomplishments

Results from evaluating practices of participants before and after Kitchen Creations show a dramatic impact on increasing participants' use of basic meal planning tools recommended for people with diabetes; improved consumption of non-starchy vegetables, beans, whole grains; and increased use of healthful food preparation techniques such as using oils instead of solid fats, preparing desserts with less sugar, and using herbs and spices instead of salt and fat.
Sample comments: 'I had no idea how food affected your blood sugar until today;' 'I learned to compare products and then choose what is better for me;' 'to read the total carbs, not just sugar.'

II. On the Road to Living Well with Diabetes

Description of activities

A single class that targets people with diabetes, who are not being seen by a health care provider. 300 people participated in 3 counties.

b. Impacts/accomplishments

Participants' understanding of the five tests determining risk of diabetes complications improved and 75% of these participants returned to clinical care after participating in the program.

c. Source of Federal Funding -Smith Lever 3(b)(c)

d. Scope of Impact – Integrated research and extension, Multistate (AZ)

Key Theme - Human Nutrition

I. Childhood Obesity

2. Description of activities

Obesity now affects over one half of all Americans. Over weight in children has tripled in the last twenty years. Two pilot projects have been initiated regarding childhood obesity: 1. Planning and procurement of resources for a family based pediatric weight management program. This program was initiated in October 2003.

2. Extension collaborated with Dairy Max to provide training about nutrition, physical activity and nutrition environment to 11 teams from schools across the state. These teams are implementing changes in their schools.

II. ICAN (Ideas for Cooking and Nutrition)

1. Description of Activities

Provides hands-on needs-based education in the areas of healthy food choices, food preparation, food safety and food resource management. The purpose of the series of classes (some for adults, some for youth) is to teach limited resource participants skills that will help them make food choices that are more nutritious, cheaper and safer.

b. Impacts/Accomplishments

Total contacts of 67,116 for the ICAN/EFNEP program include recruitment, onetime classes, series classes and newsletter contacts. 6,490 total participants attended scheduled classes. Graduates of the classes include 2,585 adult and 2,744 youth.

84% of homemakers showed improvement in one or more food resource management practices (i.e. plans meals, compares prices, does not run out of food or uses grocery list).
84% of homemakers showed improvement in one or more nutrition packages (i.e. palns meals, makes healthy food choices, prepares food without adding salt, reads nutrition labels or has children eat breakfast).
66% of homemakers showed improvement in one or more of the food safety practices (i.e. thawing and storing foods properly).

c. Source of federal funds – Smith-Lever 3b & c

d. Scope of impact - Statewide

Goal 4: An agricultural system that protects natural resources and the environment.

Overview

Both rural and urban human activities can pollute land, water, air, and food. Through teaching, research, and extension programs, the College is committed to furthering our understanding of human impact on the environment, and to supporting environmentally-sound agricultural and natural resource practices. The College will continue its efforts to understand the interaction between the environment and production agriculture.

New Mexico has a rich and diverse land and natural resource base that is arid and semiarid and, in many respects, extremely fragile. This natural resource base is a major contributor to the economic well-being of the state's residents. Its economic uses result in demands for various resources. In addition to direct demands for land and water, there is increasing pressure for recreation-related activities that represent a growing economic opportunity. Activities related to the state's natural beauty and its wildlife make a major contribution to the economy. The potential to develop, manage, and protect natural resources needs to be encouraged.

The New Mexico Cooperative Extension Service believes that it is meeting the short-term goals outlined in the 5-year Plan of Work submitted in July 1999.

Total expenditures for Goal 4 were $265,633 from Smith-Lever Act 3(b)(c) appropriated funds. The number of state-level full-time equivalents engaged in research for this goal was 12.36.

Key Theme - Pest Management

a. Description of activity

In New Mexico, range lands, forests, and virtually every crop (for example, alfalfa, chile, pecan nuts, various fruit and greenhouse/nursery crops, cotton, corn, and small grains) can be considered as candidates for IPM. In the course of this state program, the investigators use various educational methods, materials, and all appropriate media to aid growers, crop consultants, and industry groups in identification of and management techniques for the various plants and animals in and around their fields and pastures. In recent years, urban IPM has come into its own; some of the investigators on this program have extended their educational efforts to urban/suburban clientele.

b. Impacts/accomplishments

Specialists identified a number of practices that could be used to keep boll weevil populations low until a boll weevil eradication program could be implemented. These efforts, done in conjuntion with the Pecos Valley Farmers Association, saved just one county over $300,000 in one year.

Specialists prepared or updated multi-media training materials and guides of IPM principles and practices. Clientele were trained in sampling/survey work for the commodity or situation of interest plus pest identification and appropriate IPM measures through individual contacts, group meetings, workshops, and plant clinics. Master Gardeners were trained and involved in horticultural workshops and plant clinics.

A special IPM course developed earlier by an Extension Entomologist was updated to provide pest control professionals around the state to adopt and apply IPM principles in their businesses.

c. Source of federal funds -Smith Lever 3(b)(c)

d. Scope of impact -State Specific

Key Theme - Water Conservation

a. Description of activity

This program 1) educates county agents, master gardeners, golf course and other ground maintenance personnel about effective, economical, and environmentally-sound turfgrass establishment and maintenance; and 2) selects turfgrass species and cultivars that are best suited for the different climatic regions of New Mexico, and disseminates the results to stakeholders.

b. Impacts/accomplishments

The Turfgrass Specialist installed and established sub-irrigated, low maintenance turfgrass plots at the Agricultural Science Centers at Tucumcari and Alcalde.

A 40,000 ft^2 demonstration and research area at the NMSU golf course was built and turfgrass research and demonstration area at the Fabian Garcia Research Center was installed to investigate irrigation efficiency of alternative irrigation systems. The Turfgrass Specialist will examine different irrigation methods and root zone materials that affect water use efficiency, turf performance and water movemen, and will test suitability of high saline ground water for turfgrass irrigation. These areas will provide NMSU with an example of cutting-edge turf irrigation technology and will serve as a real world demonstration to be used during field days and for extension training.

c. Source of Federal Funding -Smith Lever 3(b)(c)

d. Scope of Impact -State Specific

Key Theme - Natural Resources and Wildlife Management

a. Description of activity

Many New Mexicans exhibit an interest in wildlife for varied reasons and illustrate a need for life history information as well as management information. Up-to-date information is needed to guide these individuals in their management endeavors to ensure the long-term sustainability of our natural resources. Technical information outlining the methods of control for wildlife damages is greatly needed. Natural resource management agencies also need accurate, unbiased information and research oriented data to help resolve conflicts that arise over the management of the natural resources occurring in the state. The youth of New Mexico also are keenly interested in the wildlife that occurs across the state and require accurate information to further their knowledge about the wildlife resource.

b. Impacts/accomplishments

An expanding elk herd in New Mexico results in increased utilization of the grazing resource and conflicts with cattle ranching. The wildlife specialist and the range management specialist coordinated a conference in 1999 on "Livestock/Elk Habitat Management in the Southwest." Monitoring elk utilization on upland and riparian areas began in 1996 and continues in cooperation with the Gila Permittee Association. This project was initiated through a "Farmer-Rancher Grant" program in the U.S. Department of Agriculture (USDA). It is being continued with Cooperative Extension Service support. The data collected are being provided to the U.S. Forest Service, the New Mexico Department of Game and Fish, and the Gila Permittee Association. These data will provide information on which sound management decisions can be carried out. Data were collected from cattle free areas such as the Gila Wilderness and from adjoining allotments where cattle are grazing with elk. This information was presented to the 13th Great Plains Wildlife Damage Control Workshop in Nebraska and the Range Improvement Task Force Advisory Board. Another project in the Lincoln National Forest is focusing on cattle, deer and elk utilization of the native forage base and any competition which may exist for forage species.

Range management decisions should be based on good information. Unfortunately, federal land management agencies do not have the budget or personnel to conduct a range monitoring program that can help them make management decisions. This presents a problem but also an opportunity for ranchers to take control of their future. The Range Management specialist, in cooperation with county Extension faculty, the Riparian Management specialist and the Wildlife specialist has conducted workshops that illustrate how to implement monitoring programs on individual ranches. This program is a program with three advancement levels: basic, intermediate, and advanced range monitoring. Schools are set up to teach the basics of range monitoring with participants establishing monitoring sites on their own ranches the second day of the workshop. The Cooperative Extension Service takes the lead in these workshops with Forest Service, Bureau of Land Management, State Land Office, and Department of Game and Fish supporting this effort. In addition, a 3 day workshop was conducted that included land management agency administration and land owner organizations. The purpose of the workshop was to obtain a level of understanding and endorsement

for a rancher initiated range resource monitoring program. During the summer and fall of 2002, the range management specialist designed a "Rapid Assessment Methodology" (RAM) for use in determining grazing suitability of Forest Service allotments on the Santa Fe national forest. This methodology was used to evaluate allotments in the Lincoln and Gila National Forests during 2003. The Extension Range Management Program through its range monitoring programs strives to educate producers to make range management decisions based on sound information. These decisions will reduce resource damage and improve range conditions on public and private rangelands.

Poisonous plants inflict about a $2 million dollar loss on the state's livestock industry annually. Direct losses are the most obvious, but indirect losses such as the loss of grazing land, lowered weaning weights, and lowered reproductive performance may be of a greater economic drain than death loss. Locoweed is the single most prevalent poisonous plant in New Mexico. Since 1992, the range management specialist and the Union County Extension agent have been working toward assembling the latest research information to develop management strategies to reduce incidence of locoism. These recommendations are listed in the publication: *1998 NMSU Locoweed Research: Updates and Highlights.* Reducing direct and indirect losses from locoweed and other poisonous plants by ½ of 1998 levels would save more than $5 million over the next 5 years.

c. Source of Federal Funding -Smith Lever 3(b)(c)

d. Scope of Impact – Integrated Research and Extension

Key Theme - Riparian Management

a. Description of activity

The Riparian Management Program at New Mexico State University is designed to work with producers, natural resource managers, state and federal agencies, and other interest groups to promote and teach sustainable riparian area management while simultaneously maintaining their value to producers. The Extension Riparian Management Specialist is responsible for teaching and promoting state-of-the-art techniques for riparian area management. Where the current scientific literature fails to provide adequate guidance for riparian area management, research is conducted to develop the knowledge-base necessary to make informed management decisions.

b. Impacts/accomplishments

Data summarized from 2001 revealed that stream morphology was not negatively impacted by any treatment – stream width/depth ratios, Gini coefficients and change in cross-sectional area were unaffected by level of grazing intensity or season of use. Cottonwoods received significantly less use on lightly grazed plots (18%) compared to moderately grazed plots (33%), and these were significantly greater than use

observed on ungrazed plots (0.2%), which was presumably from wild ungulates. Moderately grazed plots in the dormant season had the greatest use of 53%. Effects of season of use appeared to be significant on herbaceous species richness (i.e., number of different species) and Simpson's diversity index. Enclosures grazed during the cool season had the greatest species richness and diversity. Evenness was significantly lower in ungrazed plots compared to moderately grazed plots. Infiltration rate was not significantly affected by grazing intensity treatments or by season of use. Sediment production was significantly greater in enclosures grazed during the cool season than in enclosures grazed during the warm season.

Data from grazing treatments continued throughout 2002 and 2003 are currently being analyzed for presentation at professional meetings as well as Cooperative Extension workshops.

c. Source of Federal Funding -Smith Lever 3(b)(c)

d. Scope of Impact – Multistate (CO)

Key Theme - Soil and Water Quality/Quantity

a. Description of activity

Population growth along New Mexico's river valleys is among the fastest in the nation, resulting in a greater demand for domestic use of surface and groundwater supplies. The hydrologic impacts from drought, federal claims to water, growing population demands, invasive species, and institutional barriers to conservation have begun to seriously threaten the economic, social, and cultural future of the state. In an effort to provide practical solutions to problems relating to agricultural and urban water conservation, programs address irrigation efficiency, drought mitigation, water policy, state and regional water planning, and hydrologic watershed modeling.

b. Impacts/accomplishments

A USDA grant of nearly one million dollars for research, Extension and education of irrigation efficiency for water conservation has been maintained. Twenty research/Extension and nine county Extension projects are on-going. The NMSU College of Agriculture and Home Economics Water Task Force facilitated policy education activities including lecture series, state water planning programs, adjudication education, review of water quality proposed revisions and hydrolgic modeling of the Rio Grande Basin.

c. Source of Federal Funding -Smith Lever 3(b)(c)

d. Scope of Impact – Multistate (TX)

Goal 5: Enhanced economic opportunity and quality of life for Americans.

Overview

Economic opportunity and quality of life vary greatly for New Mexicans. New Mexico still suffers from some of the highest statistics nationally relative to families with children-poverty levels, per capita retirement incomes, numbers of high school graduates, illiteracy, crime, unemployment in rural communities, teen-pregnancy and uninsured motorists among many other unsatisfactory figures. Addressing the quality of life issues is a core piece in New Mexico Extension's educational efforts.

The New Mexico Cooperative Extension Service believes that it is meeting the short-term goals outlined in the 5-year Plan of Work submitted in July 1999. Research outputs take a number of forms:

1~ 55 non-refereed publications, reports, articles, columns; 18 bilingual

1~ 4 newspaper, radio and TV releases

1~ 4 presentations

1~ 6 sets of teaching materials

Total expenditures for Goal 5 were $61,874.14 from Smith-Lever Act 3(b)(c) appropriated funds. The number of state-level full-time equivalents engaged in research for this goal was 0.95.

Key Theme - Financial Management Education

A variety of presentations, programs, and workshops were offered across the state with the objectives being to discover ways to save money, learn financial strategies for retirement planning, and learn to better utilize current resources

1a. Description of activities

Basic Budgeting was incorporated into the STEPS program, the Parenting Programs and presented to participants in more than six counties.

1b. Impacts/accomplishments

Evaluations indicated increased skills in money management and an interest in starting a retirement plan.

2a. Description of activities

America Saves was introduced to the Home Economists as a group during the 2002 in-service and subsequently was presented to over 180 participants in 4 counties.

2b. Impacts/accomplishments

Participants set savings goals as part of the program.

3a. Description of activities

Who Gets Grandma's Yellow Pie Plate was attended by 20 participants in Santa Fe County.

3b. Impacts/accomplishments

Evaluations indicated a better understanding of the transfer of untitled property and the adoption of the transfer property inventory sheet.

4a. Description of activities

Consumer Decision-making was provided to 4H youth in a contest format and over 320 other individuals across the state.

4b. Impacts/Accomplishments

Grants County participants reported increased knowledge of consumerism and actually practicing skills maximizing family financial stability and well being.

5a. Description of activities

The High School Financial Planning Program was offered this year.

5b. Impacts/accomplishments

The program was presented in 42 New Mexico high schools and reached 5870 students.

6a. Description of activities

Mini-Society, a youth entrepreneurship program was offered to over 300 students, grades 4-6.

6b. Impacts/accomplishments

Teachers reported hearing comments such as 'let's vote on it,' and 'we need a town council meeting.'

7a. Description of activities

Investing for your Future- an on-line investing course for which NMSU is responsible. Unit Seven--Tax-deferred

7b. Impacts/accomplishments

Participants have enrolled from most states and several countries.

Land grant institutions from 6 states developed the curriculum: NJ, SC, VA, ID, MI, NM.

Key Theme – Children & Families at Risk

a. Description of activity

New Mexico Cooperative Extension administers the Children, Youth & Families at Risk Grant Project from CSREES and has increased these activities with state funds (OJJDP).There are many activities being conducted under these grant goals. They vary from county to county, depending on specific needs. For this report, activities are listed, followed by impacts.

I. CYFAR

1. Colfax County:
a-1. Three child care provider capacity building workshops were held..
b-1. 45 participants showed an increase of knowledge, in particular in discipline and behavior management. Follow up interviews with 14 of the participants indicated that the training was relevant and affected their childcare practices in practical and philosophical ways.
a-2. The Safe Room completed its first full year of operation.
b-2. 54 children were interviews and 7 professionals were trained to conduct the interviews. Individual interviews with community members showed that the Safe Room Facility is considered one of the most rewarding projects.
a-3. The Community Resource Directory for Colfax County was created.
b-3. Over 400 copies were distributed and it is available on a website. Community members now have a complete list of services available and how to contact them.

2. Dona Ana County:
a. Can We Talk Parenting Program was conducted. This 6 class series addresses the communication of issues such as sexuality, drugs and violence.
b. The evaluation materials indicate a significant increase in the number of times parents talked to their children about sensitive topics.

3. Grant County:
a-1. County Home Economist conducted a birth defects prevention program
b-1. 79 individuals received the training with pre/post tests indicating a significant increase in knowledge and an increase in the number of participants who will take a multivitamin with folic acid.
a-2. All 3rd graders in the district received training on sanitation and hand washing (The Germ Detective Program)
b-2. 391 youth and 23 adults/teachers attended. Evaluations were excellent and also led to the discovery that hand washing was not occurring due to lack of time, hot water and soap Changes are expected.

4. Lea County:

a-1. County Home Economist conducted a day long Holistic Care for the Caregiver conference.

b-1. Evaluation forms indicated an increase in knowledge level among participants.

a-2. The Home Visitation Program provided participants with education on child care and development, as well as offering support.

b-2. The participants (10) reported increased knowledge in all areas: prenatal care, postpartum care, infant care, parenting skills, life skills and child abuse prevention. Participants especially appreciated having their baby weighed on the scales that were brought to their homes. 100% said they would recommend the program to a friend.

5. Rio Arriba County:

a. County Home Economist implemented the Passport to Success Parent Training Program, designed to help parents help their children with study skills, homework and test taking.

b. 6 parent volunteers completed 14 hours of training; 2 of the volunteers graduated 3 parents from the program. Results showed that parents gained in knowledge.

6. Santa Fe County:

a. distributed healthy snacks to children of homeless and low income families via a drive through system.

b. 278 families of 400 served, rated milk as their first snack choice and changes were made accordingly. The success of the program in providing nutrition snacks resulted in additional funds from a local organization.

Youth at Risk-4H

a. Description of activities

With the investment of Juvenile Justice monies, New Mexico's youth at risk program has provided programming in counties in the form of after school, summer or in school 4-H Share/Care programs. Program goals are designed to provide substance abuse education and emphasize self0development for youth ages 5-19 years. The number of counties and Extension agent involvement has increased from 6 to 11 counties.

__8__ Impacts/accomplishments

Over the past year, 3089 children participated in one or more programs.
Evaluation efforts generally include a pre and post test. Some notable impacts include: Increased skills in problem-solving and decision-making, self-esteem, making healthy food choices, choosing activities that promote physical health, and food safety procedures.

c. Source of federal funds – Smith-Lever 3b & c

d. Scope of impact - Statewide

Key Theme –Community Development

I. Teleliteracy Assistance

a. Description of Activities

The initial activity included workshops for business and community leaders in rural New Mexico communities to learn how to harness the Internet for local prosperity. Workshops provided detailed instruction for local businesses, government officials and individuals to begin tapping the Internet as part of their day-to-day operations. Using the knowledge gained in these workshops, the next step is to expand the offerings. The project's goal continues to be to provide rural communities with tools that enhance the quality of life for their citizens and increase local prosperity.

b. Impacts/accomplishments

-Additional workshops were offered through the Albuquerque Hispano Chamber of Commerce, the Native American community and small communities. Follow-up contacts found business owners making progress with establishing websites. Evaluation comments included 'I feel more comfortable and confident with the technology,' 'I am now taking a more active role in my website, learning to do it myself.'

-funding and support was secured to offer a workshop which is scheduled for April, 2004. Attendees are registered from 6 states, faculty presenters from 7 states and business leaders from 5 states are scheduled so far.

-additional funding was secured for marketing e-commerce
Business and community leaders in rural New Mexico communities are learning how to harness the Internet for local prosperity through workshops from New Mexico State University's Cooperative Extension Service.

c. Source of federal funds – Smith-Lever 3b & c

d. Scope of impact - Statewide

II. Wildlife Enterprises

__8__ Description of activities

Wildlife enterprise on private land has been pursued through publications, workshops, presentations and individual communication. The objective was to provide ranchers, farmers and the ecotourism industry with the needed to utilize wildlife and fisheries resources as a means for primary or supplemental income

b. Impacts/accomplishments

One new wildlife enterprise was started, an existing wildlife enterprise was expanded, and about 500 square miles of rangeland was improved.

c. Source of federal funds – Smith-Lever 3b & c

d. Scope of impact - Statewide

Key Theme - Parenting

I. Baby's First Wish Newsletter Program

a. Description of activity

Baby's First Wish is an age-paced, developmental newsletter for parents of young children. It is mailed to parents of children aged 1 month to 3 years in New Mexico on a monthly basis. The newsletter is free and a subscription form is included with each birth certificate. In combination with the Agricultural Communication Department, 24 issues of Baby's First Wish were revised for print copies and web posting at www.nmcyfar.org. A national web site on all states newsletters, with a link to New Mexico's newsletters, was designed for Extension Specialists in conjunction with the USDA-CSREES Age Paced Newsletter Committee at www.parentinginfo.org

b. Impact/ accomplishment

Baby's First Wish was mailed to 7,600 families in all 33 New Mexico counties every month to equal 91,200 newsletters mailed annually. Based on previous evaluations done nationally and statewide, it is expected that parents will increase their knowledge regarding child development and guidance each time they read each newsletter, treat their baby more positively and reduce the likelihood of child abuse and neglect.
MI, CO, PA

II. STEPS

__8__ Description of activities

Steps to Employment and Personal Success (STEPS) provides instruction in life skills with a focus mainly on job search; parenting and nurturing skills; and nutrition education.

b. Impacts/accomplishments

The program ended in July of 2003. Of the 430 referrals, 99 graduated from the program. 47 of the referrals found employment before program completion. 23 of the graduates are now enrolled at the local community college, other graduates have completed computer training programs, truck driving school, and customized trainings.

III. Strengthening Families Initiative (SFI)

__8__ Description of activities

Offer classes in self-nurturing skills, parenting skills, nutrition and youth development. The program addresses parents' need to balance self-care and caring for children.

b. Impacts/accomplishments
Twenty courses were attended by 243 parents and 272 children, for a total of 4,830 hours of education delivery. Pre and post tests analysis is not yet available, however, sample comments on evaluations include:

“I am very happy, I learned to value myself as a mother and to value my children."
33-year old mother of four children

“It has changed me and my family a great deal for the better.”
26-year old mother of two children, ages four and three months

"I've learned not to be so hard on myself, and not to expect so much from my children."
24-year old mother of five children ranging in age from newborn to seven years

"I think a lot more, I don't just scold. Cause I thought scolding and spanking was the right thing to do…[I learned] to redirect my children and give them choices, not just what I say."
22-year old father of three preschool boys

" I'm more centered, I feel better seeing that what I do is not in vain. It is giving me results."
38-year old mother of three children ranging in age from four to eleven years

c. Source of federal funds – Smith-Lever 3b & c

d. Scope of impact - Multistate

Key Theme - Homes

1. Description of activities
Two programs are underway in this area: Indoor Air Quality and Healthy Homes. Indoor Air Quality educates consumers about sources, health risks and control measures related to common residential indoor air problems, helping to reduce health risks. Healthy homes intends to protect children and their families from housing-related health and safety hazards.

b. Impacts/accomplishments

-150 Home Economics Agents attended a presentation on Healthy Indoor Air at a statewide conference.
-In support of the National Radon Poster Contest, a direct mail of information was sent to 150 middle schools.
-Asthma was the highest priority issue for counties, and a workshop was developed in response to this need. One county held 3 workshops for city employees attended by 24 people, and one workshop for child care providers attended by 13. Thirty five participants rated the program 'very useful.' Comments included: 'easy to understand, promoted prevention,' and 'it helped to isolate my asthma triggers.'

c. Source of Fderal Funding-Smith Lever 3 (b) (c)

d. Scope of impact—state specific

Key theme: Youth Development

Through Statewide 4 H programming, New Mexico youth have had a variety of opportunities to involve themselves in workshops, conferences, traditional livestock schools, and ongoing clubs. The results include measurable growth in leadership and citizenship

I. Leadership

a. Description of activities

Over 400 youth participated in one or more of the statewide events: Teen Get Away, State 4-H Conference, and Senior Leadership Retreat. Each event included a variety of workshops on leadership topics, contests on 4H topics, and social events.

b. Impacts/accomplishments

Evaluations were very positive for all events. Participants reported increased knowledge in many areas. Leadership skills where most indicated increased knowledge included teamwork, communication, trust, and listening. Other areas where increased knowledge was reported included: farm and ranch heritage, digital camera use, welding, and making friends. Participants reported they would use their new found knowledge and skills in a variety of ways, such as: run for office, apply it to my life, teach others, and help my county.

II. Life Skills Through Involvement

a. Description of activities

Youth involvement in Livestock schools and events topped 1000 participants.
Events run the gamut from the State 4-H Horse School to shooting sports contests, to rodeo to the 4-H Livestock Schools (beef, sheep, swine, goats, and dairy heifers). In all activities, participants learn subject matter through hands-on experiences developing skills through project work, competitive events, and real-life situations. They need to keep accurate records, make informed decisions, and speak in public.

b. Impacts/accomplishments

Overall evaluations fell in the Excellent-Very Good range. Participants reported improved knowledge about their animal and its care, along with improved skill in showmanship and in riding (horse school).

III. Volunteer Development

__8__ Description of activities

The goal of increased adult volunteers in the 4H program was pursued through a deliberate, coordinated plan of recruitment, orientation and training. The adult leaders provide a significant amount of direct contact with the 4H youth and are essential partners in the youth development program.

b. Impacts/accomplishments

Counties report volunteers being involved with conducting horseshows, county rodeos and county fairs. One county reported 15 new leaders (minority backgrounds) took leadership in expanding programming to new youth. Another county reports leaders being instrumental in providing leadership and support to members aspiring to a state youth leadership position. There was a statewide increase in adult leader enrollment of 562.

c. Source of Federal Funding--Smith Lever (b) (c)

d. Scope of Impact--Statewide

B. Stakeholder Input

The New Mexico Agricultural Experiment Station received input regarding research priorities from the following stakeholder groups: agricultural science center advisory boards during their regularly scheduled quarterly meetings, interim state legislative committees, general public during field days at the off-campus agricultural science centers, and various commodity commissions listed in the New Mexico State University 5-Year Plan of Work (1999). The Agricultural Experiment Station also received guidance from the New Mexico Extension Support Council, which represents the county constituency from across the state, during their annual meeting as well as during the College of Agriculture and Home Economics All-College Conference.

In addition to the New Mexico Extension Support Council, a large and diverse group of stakeholders are regularly involved in helping the Cooperative Extension Service plan for the future. Across the state, more than 1,500 people serve on local county advisory committees, over fifty people serve on the statewide Extension Support Council and over five hundred producers, commodity group members, and community organizations contribute directly to the Cooperative Extension Service's planned program directions.

Last year, the Extension Support Council compiled a broad set of initiatives covering a variety of program efforts from working with local governments to computer learning centers in every county, to marketing Extension (a total of 60 initiatives). Most of the efforts have been "added in" to existing program efforts as additions or perceived program "holes". The initiatives came from county advisory groups through Support Council representation. The Extension Service has taken these initiatives seriously and has reported on these accomplishments as they have impacted programs.

C. Program Review Process

There have been no significant changes in the program review process for either the New Mexico Agricultural Experiment Station or the New Mexico Cooperative Extension Service.

D. Evaluation of the Success of Multi and Joint Activities

The multistate, multi-institutional, and multidisciplinary activities, joint research and extension activities carried out by the New Mexico Agricultural Experiment Station and the New Mexico Cooperative Extension Service addressed the critical issues of strategic importance as listed in the 5-Year Plan of Work submitted July 1999, including issues identified by our stakeholders. The planned programs addressed the needs of under-served and under-represented populations in New Mexico. Although we believe that the programs will result in improved program effectiveness or efficiency, we do not yet have sufficient program data to determine the degree of effectiveness/efficiency being achieved.

E. Multistate Extension Activities

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

Institution **New Mexico State University**
State **New Mexico**

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

	Actual Expenditures				
Title of Planned Program/Activity	**FY 2000**	**FY 2001**	**FY 2002**	**FY 2003**	**FY 2004**
Profitable Livestock Production		18,000	26,317	25,252	
Invasive Noxious Weeds		19,260	11,783	7,239	
Development of Culturally Sensitive Materials		20,000	8,659	9,205	
Life Skills Through Knowledge		13,210	11,421	12,669	
Range Management Education		6,500	26,064	13,990	
Pecan Nut Management		6,500	12,541	0	
Dairy		12,150	12,177	11,620	
Volunteer Development		7,610	7,614	11,478	
Water Education		18,625	0	0	
Wildlife Management		7,500	12,948	13,005	
Plant Pathology		0	11,832	11,890	
Total		129,355			

Director 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
Multistate Extension Activities and Integrated Activities
(Attach Brief Summaries)

Institution **New Mexico State University**
State **New Mexico**

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

	Actual Expenditures				
Title of Planned Program/Activity	**FY 2000**	**FY 2001**	**FY 2002**	**FY 2003**	**FY 2004**
Urban Horticulture		0	11,110	0	
Food Safety	0	10,287	0		
Integrated Pest Management		0	2,110	0	
Infant Nutrition and Welfare		0	11,490	0	
Environmental Manure Management		0	0	9,923	
Profitable I E-Commerce	0	0	17,390		
Financial Management Education		0	0	14,833	
Rural Leadership		0	0	10,415	
Total		129,355	176,353	193,167	

_____ _____
Director Date

Form CSREES-REPT (2/00)

Descriptions of Multistate Research and Extension Activities

Invasive Weed and Brush Control Management Programs

The New Mexico State University Invasive Weed and Brush Control Management programs are coordinated with management efforts in Arizona, Colorado, Idaho, Montana and Texas. The passage of the Noxious Weed Law in the 1998 legislative session signaled an increased awareness to this issue. Recently, data has shown that lands in the west are being taken over by these species at the rate of 200 acres/hour. Awareness, education, and management are the key components in addressing this problem. State-of-the-art management information and recommendations are provided to weed management groups, state and federal land management agencies and private producers in public meetings, training sessions and field trips.

Invasive brush and weeds are found in every county of the state and they are a serious problem on New Mexico rangeland. The purpose of this program is to demonstrate the most efficacious methods of controlling end managing noxious brush and weeds on rangeland. Historically, 135 demonstration-research trials have been in place throughout New Mexico. These trials are installed at the request of county Extension faculty, producers, governmental agencies or agri- business. Each trial demonstrates control of a specific species of brush or weed. Control measures are usually mechanical, chemical, biological or a combination of methods. Annually, all trials in place less than four years are evaluated to determine target species control and subsequent forage response. Data are then used as the basis for recommendations in educational programs.

These non-native plant species are impacting the southwest through increased production costs, reduced land values, elimination of biodiversity, reduced recreational opportunities, and a general reduction in state revenue. This issue impacts all citizens in the southwest, not just the agricultural producer.

Pecan Nut Management

Commercial nut production is a large industry in many of the southern and southwestern states including New Mexico. Growers need to keep abreast of new, or improved techniques in order to manage their orchards and make a profit. Coordinating and maximizing use of orchard inputs helps growers to be selective in their orchard practices, choosing those that can help them to obtain optimum yields with less cost.

The major educational forum is the annual western pecan conference held in New Mexico for growers from Texas, Arizona, California, and New Mexico. Around 700 people participate in conference events. Other educational sessions throughout the year include field days, short courses, workshops and distribution of timely publications including a monthly column for a California magazine. Even though Texas and New Mexico share frequently on nut management efforts scheduled activities benefit everyone growing pecans/nuts in the southwestern region (West Texas, Arizona, California, and New Mexico).

Improving Dairy Practices

The New Mexico State University Dairy Program has collaborated with several College of Agriculture and Home Economic departments and science centers including the Department of Animal and Range Sciences, Extension Home Economics Department, Artesia Agricultural Science Center, and Tucumcari Agricultural Science Center. The dairy program covers a wide range of aspects related to dairy farming and production. Information dissemination takes place through extension demonstration projects, experimental research projects and college courses pertaining to dairy science. Multistate collaboration was established between the NMSU Dairy Program and Arizona, Oklahoma, Texas, and California. These Multistate ventures included production management workshops, extension fact sheets and monthly newsletters.

Western Region Volunteer Development

Adult volunteers provide a significant amount of direct contact with 4-H youth and are essential partners in the 4-H Youth Development Program for maintaining and expanding the New Mexico 4-H program. Four-H volunteer leaders must be recruited, selected, oriented, trained, supervised, evaluated and recognized for a sustaining volunteer program to exist. An increasing number of adult 4-H volunteers are being empowered to assume roles that, in the past, have been filled by Extension 4-H faculty and staff: This allows for more outreach to under-served youth audiences, the addition of new 4-H projects or activities and the on-going development of unpaid and paid 4-H staff.

Increased retention of volunteers is a challenge. Adult leaders need options of how and when to be involved, as their priorities regarding volunteer, personal and work commitments change over time. Volunteer leaders need orientation and education about the organizational structure of 4-H, 4-H delivery modes, affirmative action requirements, risk management efforts, enrollment procedures, youth protection standards, youth friendly attitudes, leadership styles, leadership roles, 4-H projects, and local, state, national and international 4-H opportunities. Adult 4-H leader enrollment in New Mexico declined by over 500 in the 1998-1999 program year. The 4-H Volunteer Specialist is focusing on bringing volunteer development resources to counties. A 4-H volunteer recruitment video has been provided to each county office along with printed volunteer resources. New Mexico is a member of the western region marketing committee which studies the issue of volunteer recruitment and is currently collaborating with western states serving on that committee.

Profitable Livestock Production

Livestock operations and the sale of cattle and calves is the single highest revenue generating agricultural enterprise in New Mexico, with nearly 1 billion dollars in cash receipts annually. However, many independent operations are challenged with maintaining profitability due to acute or chronic production problems that result in inefficient output. The basis of this major program is to address the variety of needs of livestock producers to increase the likelihood of profitability and to therefore maintain stability in this important contributor to the state economy. In cooperation with Texas A&M University, and USDA-NRCS offices in Texas,

Oklahoma, Colorado, and Kansas, educational camps and Ranch-to-Rail programs are conducted.

Development of Culturally Sensitive Materials

The NMSU Agricultural Communications Department does a number of media projects annually that integrate AES and CES functions. Recent projects include: a series of 22 web based games for outreach into remote and minority communities where youth might not experience a traditional 4-H club; Cybercamp educational songs and games; on-line resources for the Southwest Rangeland Invasive Plants initiative; national distribution of 'Fight Bac!' on CD-Rom. .A number of additions have been made to our multilingual video and computer-based educational programs, including Sheep and Beef Meat Handling (Navajo) and Spanish Home Child Care.

Life Skills through Knowledge

In order to prepare New Mexico youth to become knowledgeable, productive citizens, they must possess basic life skills. Four-H is a proven informal, hands-on youth development program that can help youth gain knowledge in job skills, consumer skills, money management, nutrition and health, life skills, personal and family development, and communication skills. Youth development takes place in many different formats, such as livestock and horse schools, novice camps and workshops. The Life Skills through Knowledge program works to provide opportunities statewide for 4-H members to develop skills that can be used for a lifetime. Society as a whole, the state of New Mexico, multistate program opportunities (especially with neighboring Arizona and Colorado) and individual communities benefit greatly when young people learn life skills that enrich their lives, now and in the future. Major program focuses include communication skills, resistance to peer pressure, community service, time management; drug prevention programs, problem solving, conflict resolution, and decision making. Many of New Mexico's current business and community leaders have recently emerged from the 4-H youth development program.

Range Management Education

Monitoring elk utilization on upland and riparian areas began in 1996 and continues in cooperation with the Gila Permittee Association. This project was initiated through a "Farmer- Rancher Grant" program in the U.S. Department of Agriculture (USDA). It is being continued with Cooperative Extension Service support. The data collected are being provided to the U.S. Forest Service, the New Mexico Department of Game and Fish and the Gila Permittee Association (including residents of Arizona). These data provide information on which sound management decisions can be carried out.

Financial Management Education

Wise financial management practices enhance the economic stability of families. How families use their money—whether they spend it or save it—affects the total economic picture of the nation. Educational programs that provide basic family resource management and financial planning are important to the well-being of New Mexicans. The Cooperative Extension Service seeks to provide research-based programs that will assist New Mexicans, both youth and adults, in developing effective money management skills and sound consumer habits. Programs offered include America Saves, 4-H Mini-Society, High School Financial Planning Program, and Investing for your Future.

Plant Pathology

The plant pathology program provides training for county agricultural agents, growers, and the general public on (a) the basic concepts of plant pathology, (b) the information required from the grower for accurate diagnosis, (c) pathogen and abiotic affects on plants and the subsequent
response of the plant to attack by disease agents (recognition of plant disease symptoms and signs), and (d) specific plant diseases (recognition and management). In 2002, the Karnal bunt laboratory screened five samples from regulated counties and three samples for the National Survey. Timely reports of the Karnal bunt lab activity were sent to USDA and NMDA. Reports also were sent to county agents and wheat growers/elevator operators. New Mexico Karnal bunt testing results were provided for the National Agriculture Pest Information Survey (NAPIS).

Urban Horticulture

In New Mexico, concerns over water conservation linked to a desire to maintain attractive landscapes, has increased the need and desire for reliable, research based, water conserving gardening information. Commercial and institutional landscapes and professional landscape managers are aspects of New Mexico's agriculture. Extension specialists hosted State and Regional Southwest Yard and Garden Television shows to teach gardeners proper and effective gardening methods for the unique environment of the American Southwest and conducted monthly radio garden question call-in programs (coverage from S. Colorado to Alamogordo, Tucumcari to Grants). These shows reached thousands of people, informing them of appropriate plants and gardening techniques for this region.

Integrated Pest Management

Extension is helping in this area by reducing insect damage and insect control costs, particularly for cotton, chiles, alfalfa, and pecans. This program is addressing control in a number of ways including developing techniques that will dramatically reduce the cost of eradication. Extension specialists are also developing low-no cost techniques to reduce pests through modification of habitats and growing conditions to increase desiccation in this desert environment. In conjunction with the Chile Task Force and concurrence by cotton producers in south central New Mexico, a “Cotton and Chile Scouting School” was held for producers, processors and others interested in these two commodities. It was assigned Continuing

Education Credits from pesticide license holders in New Mexico and Texas along with CEUs for Certified Crop Advisors in New Mexico and Texas.

Healthy Homes/Indoor Air Quality

Through workshops, presentations and demonstrations, participants are educated about sources, health risks and control measures related to common residential indoor air problems.(IAQ) and how to protect their family from housing-related health and safety hazards (HH). The results include fewer health problems, including those caused by mold, fewer accidents, and an overall improvement in the quality of life at home.

E-Commerce Project

Business people and aspiring business people are acquainted with the how-tos of business on the internet. Focus for outreach are the small communities, rural communities and underserved populations. Workshops are held to present the basic information and individual contacts established for follow up and continued training. Training trainers is another piece of this effort, with established business leaders, CES agents, and faculty learning how to train others in the art of e-commerce. The increase in the number of businesses as well as the increased revenue for existing businesses contributes to the economical well being and improved quality of life for New Mexicans.

Wildlife Enterprises

An under-tapped possibility for economic development in New Mexico rests with the landowners who could pursue a variety of wildlife enterprises. Through publications, workshops, presentations and individual contact, ranchers, farmers and the ecotourism industry have been provided with the information needed to utilize wildlife and fisheries as a means for primary or supplemental income. Improvement in the land is a possible additional advantage to wildlife enterprise.

Food Safety and Nutrition

The nutritional needs of the residents of New Mexico are being met through a number of programs. To address food safety and nutrition programs are presented to homemakers, day care providers and school children, the Food Safety mobile visits the state fairs, brochures and publications are disseminated throughout the state. The high number of New Mexicans with diabetes and at risk for diabetes are offered classes on diet, cooking, and nutrition, as well as an opportunity to identify medical tests through On the Road to Living Well with Diabetes. At risk families are introduced to nutrition, and healthy eating through classes coordinated with other federal programs, along with healthy snacks provided directly to participants.

F. Integrated Research and Extension Activities

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

Institution **New Mexico State University**
State **New Mexico**

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

Title of Planned Program/Activity	Actual Expenditures FY 2000	FY 2001	FY 2002	FY 2003	FY 2004
Agricultural Economics	7,392	7,909	2,544	0	
Nutrient Management	3,454	3,696	0	1,262	
Pest Management of Cotton	3,454	3,696	0	8,791	
Pecan Nut Development	1,796	1,922	3,135	0	
Forage Fiber Tradeoff -- Piñon-Juniper Woodlands	6,908	7,392	18,624	9,809	
Integrated Weed Management for NM Rangeland	6,217	6,652	8,095	4,925	
Costs & Returns for Crops & Livestock	4,836	5,175	22,215	939	
Risk Management in Ag. & Natural Resources	6,217	6,652	2,709	4,775	
Vegetable Production	1,589	1,700	2,694	0	
Turfgrass, Soil, Water	1,658	1,774	1,856	1,866	
Dairy Production	1,243	1,330	1,705	1,544	
Total	44,764	47,898			

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Director 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
Multistate Extension Activities and Integrated Activities
(Attach Brief Summaries)

Institution **New Mexico State University**
State **New Mexico**

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

	Actual Expenditures				
Title of Planned Program/Activity	**FY 2000**	**FY 2001**	**FY 2002**	**FY 2003**	**FY 2004**
Riparian Management	2,556	2,735	3,235	3,250	
Systematic & Floristic Studies of SW Plants	6,217	6,652	7,473	0	
Cattle IPM	7,599	8,131	0	0	
Biological Control of Rangeland Weeds	6,908	7,392	6,752	0	
Food Safety	1,036	1,109	1,372	2,069	
Integrated Media Projects	0	0	7,608	3,038	
Water Quality	0	0	3,845	1,595	
Brush & Weed Management	0	0	1,571	2,368	
Peanut Research	0	0	7,359	0	
Fruit & Nut Orchard Managment	0	0	0	2,932	
Total	69,080	73,917	102,792	57,470	

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Director Date

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Multistate Extension Activities and Integrated Activities
(Attach Brief Summaries)

Institution **New Mexico State University**
State **New Mexico**

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

	Actual Expenditures				
Title of Planned Program/Activity	**FY 2000**	**FY 2001**	**FY 2002**	**FY 2003**	**FY 2004**
Range Improvement Task Force	20,450	24,724	6,854	13,219	
Systematic & Floristic Studies of SW Plants	2,727	3,000	1,319	0	
Peanut Research	10,452	18,000	12,766	0	
Riparian Management	9,089	20,000	9,705	9,751	
Vegetable Production	11,361	15,000	13,469	17,562	
Soil, Water Pesticide Issues	5,908	10,000	3,113	5,126	
Integrated Media Projects	58,623	50,000	15,447	6,167	
Economics Risk Management	5,226	7,500	1,982	0	
Brush and Weed Management	12,951	15,000	6,284	9,472	
Integrated Pest Management	9,089	15,000	7,028	15,865	
Food Safety	9,089	0	5,486	21,998	
Total	154,965	178,224			

Director Date

Form CSREES-REPT (2/00)

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Multistate Extension Activities and Integrated Activities
(Attach Brief Summaries)

Institution **New Mexico State University**
State **New Mexico**

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

	Actual Expenditures				
Title of Planned Program/Activity	**FY 2000**	**FY 2001**	**FY 2002**	**FY 2003**	**FY 2004**
Water Quality	6,817	8,000	10,005	11,963	
Pecans Nut Development (discontinued)	12,724	14,000	15,677	0	
Turfgrass, Soil, Water	11,361	15,000	13,921	5,597	
Costs & Returns for Crops & Livestock	8,180	10,000	3,940	15,574	
Excess Property	6,817	7,500	18,414	7,394	
Dairy	11,361	13,000	6,413	5,919	
Soil, Water, and Ag. Productivity	3,636	25,000	24,137	6,624	
Agricultural Economics (discontinued)	8,407	0	0	0	
Food Safety and Nutrition (discontinued)	2,954	0	0	0	
Fruit & Nut Orchard Management	0	0	0	8,437	
Total	227,222	270,724	175,960	180,819	

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Director Date

Form CSREES-REPT (2/00)

Descriptions of Integrated Research and Extension Activities

Costs and Returns of Crop and Selected Livestock Enterprises in New Mexico

There is a definite need to examine the effect of costs and returns of crop and livestock enterprises on the structure of New Mexico farms and ranches and the resulting response to conservation policies, commodity programs, chemical restrictions (such as EPA Section 18 applications), water quality, and quantity problems, and other national and state policy concerns. This project draws on the combined expertise of all County Extension Agents, many state Cooperative Extension Service specialists, and many Agricultural Experiment Station researchers. We have successfully drawn on this combined expertise of the College each year over the last 15 years to publish a projected set of cost and return estimates as a Cooperative Extension Service release and an actual (after actual yields and prices have been established) set as an Agricultural Experiment Station research report.

Research–Extension Continuum for Soil, Water and Agricultural Productivity

The Agricultural Science Center at Farmington is located in the driest portion of New Mexico. Demand on water resources is great and increasing. Diverse groups, including rural, urban, municipal, industrial, Native American, and agricultural, have vested interests in water use. Approximately 60% of the surface water exiting New Mexico is within this system and downstream groups are also demanding their allotment of the river. For agriculture to continue in the Four Corners region and the rest of the State, management strategies and crop species must be found that more efficiently use this valuable resource. To address the conservation of soil and water in this semi-arid environment, a research project has been established to investigate subsurface drip irrigation (SDI) for several economically viable crops. The increased efficiency of SDI has translated into increased crop productivity. The Navajo Agricultural Products Industry has requested the Center to use the research results of this project to develop plans for the transition of abandoned rectangular side roll fields into productive SDI fields for high value crops. A Diné College (1994 Land-Grant Institution) demonstration farm is being developed in Shiprock, NM. The Center has been requested to provide input into the design of the proposed irrigation system, a sizable component of which is drip. Orchard managers and urban horticultural enthusiasts have requested the Center for advice on low water application technologies. These technologies will be included in an irrigation workshop for farmers, ranchers, and other interested parties from the Four Corners region. The workshop is the second in a series of collaborative irrigation workshops being organized by Colorado State University, Utah State University, the University of Arizona, and New Mexico State University. Such activities are the deliberate streaming of information along the research – extension continuum. This Soil, Water and Agricultural Productivity project is designed to facilitate this sort of information exchange.

Food Safety

Our Food Safety program offers information, resources, and training in a number of important areas. Food processors are provided programs on producing safe food products. Food handling and safety workshops are offered with particular emphasis on restaurants and

tourism facilities. In all arenas, state and federal regulations are emphasized and assistance in developing and maintaining compliance with these regulations. The testing facility, established earlier, serves as an important resource in this effort.

Biological Control of Rangeland Weeds

This is an AES/CES project to demonstrate that inundative biological control with *Aphthona* flea beetles can be used as a tool for eliminating small isolated populations of a noxious weed: leafy spurge (*Euphorbia esula* L.). By using early intervention techniques we hope to prevent the spread of leafy spurge, which could potentially become a serious problem impacting at least 50,000 ha in New Mexico alone. Knowledge gained from this project will be shared with the scientific community, the extension community, and private landowners. The primary beneficiaries of our efforts are landowners. Tours were conducted at each location throughout the lifetime of the project. Landowner involvement ensures there is producer-to-producer information exchange. Information on the projects outcome was disseminated through radio interviews, the popular farm press, scientific journal articles, and other means. The Extension State Weed Scientist organizes an annual noxious weed short course and provides talks to interested producers and land managers from New Mexico and surrounding states (Colorado, Arizona, Utah). The PIs gave presentations at many different venues, including the New Mexico Vegetation Management Association annual meetings, Native Plants Society meetings, garden clubs, county agent training sessions, and New Mexico Soil and Water Conservation Districts annual meetings.

Brush and Weed Management

Noxious brush and weeds are found in every county of the state and are a serious problem on New Mexico rangeland. data has shown that lands in the West are being taken over by these species at the rate of 200 acres/hour. The purpose of this program is to demonstrate the most efficacious methods of controlling end managing noxious brush and weeds on rangeland. Historically, 135 demonstration/research trials have been in place throughout New Mexico. These trials are installed at the request of county Extension faculty, producers, governmental agencies, or agribusiness. Each trial demonstrates control of a specific species of brush. Control measures are usually mechanical, chemical, biological, or a combination of methods. Annually, all trials in place less than four years are evaluated to determine target species control and subsequent forage response. Data are then used as the basis for recommendations in educational programs. Awareness, education, and management are the key components in addressing this problem. These non-native plant species are impacting our state through increased production costs, reduced land values, elimination of biodiversity, reduced recreational opportunities, and a general reduction in state revenue. This issue impacts all citizens of the state, not just the agricultural producer.

Orchard & Nut Management

Commercial nut production involves pecans and pistachios. Growers need to keep abreast of new or improved techniques to manage their orchards better. Coordinating and maximizing use of orchard inputs helps growers to be more selective in their orchard practices, choosing those that could help them to obtain optimum yields with less cost.

Improving Dairy Practices

The Improving Dairy Practices program focuses on increasing efficiency of both human and animal production. Information is offered to producers through constant update of the website, newsletter, publications, and one-on-one communication. Workshops pertaining to employee management, reproduction efficiency, heat stress, milk quality issues, fitting/showing for 4-H heifer projects, and other pertinent topics are conducted in four general locations throughout the state: south of Albuquerque, Las Cruces area, and two sites in eastern New Mexico. Opportunities for interested students to acquire further knowledge of the dairy industry through distance education and internship programs exist through the extension dairy program.

Vegetable Production

The vegetable production program at NMSU integrates AES and CES functions. The target clientele is commercial vegetable producers. The focus is on drip irrigation, fertilizer use, pest management, and varieties. Some of the recent AES activities have been a field experiment on the effect of planting date and fungicide treatment on stand establishment of chile pepper at Leyendecker Agricultural Science Center and Pumpkin cultivar trials at Leyendecker and Artesia Agricultural Science Centers. Examples of recent extension activities include an on-farm demonstration of drip irrigation at the Rincon Farm of Marty Franzoy and a short course on drip irrigation on November 9, 2000, that attracted 130 participants.

Pest Management of Cotton

The needs of extension clientele drive this research program. Over the past five years we have had research/extension programs that have addressed one of our most immediate problems-boll weevil establishment in New Mexico. We have operated monitoring programs in conjunction with, and funded by grower organizations, to detect early infestations as well as migration lines to determine the source of infestation. At the same time we conducted research trials that would develop pest management tools to suppress and help eradicate boll weevil. Boll weevil establishment and control in New Mexico is different than in other areas of the cotton belt that are more humid. We found, for example, from both our extension monitoring program and our research program that overwintering habitat particularly in urban areas had a major influence on the success of boll weevil establishment and subsequent yield losses. Implementing the resulting recommendations for weed control and delayed planting saved farmers in south Eddy County over $50/acre in 1998 alone.

A number of cultural techniques were tested that proved to be effective in boll weevil control that have also been recommended. We are also supporting eradication efforts by developing techniques that will save programs Beltwide money, for example in developing better boll weevil traps and in testing experimental microencapulated formulations that may reduce application intervals in half potentially saving cotton farmers in eradication zones over $30 million per year.

Systematic and Floristic Studies of Southwestern Plants

This project continued plant identification services, as well as providing information about range plants and plant toxicity upon request. The PI edited the "The New Mexico Botanist" newsletter; four issues appearing, compiled and maintained "A Working Index of New Mexico Vascular Plant Names" on the web, maintained links to information sites about poisonous plants, copies of "The New Mexico Botanist" newsletter, and a list of identification sources for New Mexico plants, and presented plant identification workshops.

Integrated Media Projects

The NMSU Agricultural Communications Department does a number of media projects annually that integrate AES and CES functions. Recent projects include: a series of 22 web based games for outreach into remote and minority communities where youth might not experience a traditional 4-H club; Cybercamp educational songs and games; on-line resources for the Southwest Rangeland Invasive Plants initiative; national distribution of 'Fight Bac!' on CD-Rom. .A number of additions have been made to our multilingual video and computer-based educational programs, including Sheep and Beef Meat Handling (Navajo) and Spanish Home Child Care.

Turfgrass, Water Quality, and Soil and Water Conservation

There are numerous places throughout the state that are covered by Turfgrass and require management strategies to achieve and maintain optimum quality. There are approximately 90 golf courses in New Mexico, numerous athletic fields (baseball, soccer, football fields), and parks and home lawns. Water is the biggest concern in turf management as quantity and quality can rarely be maximized for optimum growth and maintenance. Especially for athletic fields, such as high school football fields, the resources are not readily available to provide adequate turfgrass maintenance. Therefore, the conditions on these fields range from very poor to average. Homeowners spend a great deal of time and resources to achieve the perfect looking lawn and are often prevented from reaching their goals because of water quality, quantity, and species selection. Golf courses range in quality from the top fifteen nationwide for public golf courses to poor quality due to water restrictions.

Nutrient Management

Plant nutrients are found in both synthetic and organic materials such as farmyard manure and composts. Animal feeding operations in New Mexico have increased since 1982 resulting in a 56,000 head increase in dairy cows alone. Commensurate with this increase is

increased manure production that can be utilized for crop production. However, repeated and excessive applications of manure to cropland can cause nutrients to buildup and cause negative environmental and livestock health implications. Unique soil properties found in New Mexico offer some degree of protection against many of problems found in the eastern U.S. However, permits issued to animal feeding operations require some form of tracking and accounting for the nutrients applied to cropland. Nutrient management is a best management practice suitable to all persons utilizing the land for economic plant production. Managing nutrients for sufficient plant growth, animal nutrition, and environmental compatibility will assure a safe and reliable source of food and fiber in New Mexico. Additionally, proper nutrient management practices will maintain economic viability of New Mexico's cropland and livestock producers.

Riparian Management

During FY 1999–2000, the New Mexico State University Riparian Management Program participated in state- and regional-level activities incorporating both AES and CES missions. At the state level, the NMSU Riparian Management Program conducted AES-sponsored research and transferred information via CES programs regarding sustainable management of livestock in southwestern riparian ecosystems. Audiences included state and federal management agencies, State and County Faculty in the Cooperative Extension Service, and private producers through public meetings, training workshops, and field trips. At a regional level, the NMSU Riparian Management Program collaborated with faculty, specialists, and administration representatives to explore cooperative research and outreach funding in Arizona, Montana, and Utah, among others. Research and outreach topics focused on landscape-level watershed, riparian, and wetland management.

Integrated Pest Management

Ranked by annual cash receipts, alfalfa, chile, pecan nuts, various fruit (apple, cherry, grape) greenhouse/nursery crops, cotton, corn and small grains are the leading plant crops for New Mexico producers. The boll weevil, pink bollworm, cotton bollworm and cotton aphids resistant to various insecticides have become key pests for the state's cotton crop; while genetically engineered cotton cultivars are now available to the state's producers, the added *Bacillus thuringiensis* genes protect the developing bolls only to a point from caterpillar problems. Alfalfa weevil, three species of aphids, and occasional caterpillars continue to plague the alfalfa crop; cyclic populations of grasshoppers and blister beetles cause occasional crop losses and, in the case of blister beetles, subject growers to legal liabilities and additional economic losses. Several species of aphids plus additional arthropods, diseases and weed pests are annual problems for corn, small grain, nut and fruit crop producers. In the last five years, European corn borer has been detected infesting corn in two additional counties (total now of seven infested New Mexico counties), karnal bunt-infested wheat seed has brought new regulations to the south-central part of the state, sorghum ergot has invaded the milo fields of eastern New Mexico, and pecan nut casebearer has become well established in pecan groves and yard trees throughout Dona Ana County. Pepper weevils, various caterpillars and whiteflies are major threats to both the fresh and processed chile markets in

the state. Chile and other vegetables generated over $163 million in New Mexico farm income during 1997; over 1 million acres of these crops are irrigated.

Approximately 70 million acres in the state are devoted to livestock grazing; nearly 10 million acres of non-federal land are forested. Range caterpillars, grasshoppers, and various forest pests (bark beetles, tussock moths, mistletoes, etc.) are periodic pests in these rangeland or forested areas; in addition, invasive, exotic weeds (musk thistle, various knapweeds, yellow star thistle, etc.) are continuing to spread in various parts of the state, out-competing native plants and replacing them with less desirable, less palatable and even toxic species for livestock and wildlife.

Of the approximately 1.5 million people in the state, nearly 75% live in urban centers with 2500 or more people. Consequently, pests of urban ornamentals affect the greater percentage of clientele. Surveys continue to indicate severe over-reliance on commercial pesticides by homeowners and pest control operators to control major and nuisance pests in the state. Urban ornamentals and turf have been attacked by ash whitefly, ash bark beetle, tomato spotted wilt virus and other pests; on-going drought has further weakened landscape plants, making them more susceptible to an assortment of arthropods borers and defoliators. The nursery and greenhouse industries have been shaken by invasive red imported fire ants and Japanese beetles in Dona Ana and Bernalillo Counties, respectively.

An advisory group exists for the urban landscapes IPM program; various crop commodity groups for cotton, alfalfa and chile make suggestions for IPM programs in those commodities. New Mexico also participates in the USDA-APHIS-PPQ Cooperative Agricultural Pest Survey Program. Data from agricultural, rangeland and forest pest surveys are gathered and entered into the National Agricultural Pest Information System data base. The program documents the occurrence and movement of various pests within and between states and tracks exotic pests introduced from other countries.

Risk Management in Agriculture and Natural Resources

The risk that prices can move enough to cause major economic damage to agricultural producers has long been a significant problem. Likewise in the new era of deregulation, other industries such as finance, utilities and energy face the same risks that agriculture faces. Tools exist, such as futures, options, and swaps, that can help manage the risks of price changes and thus be helpful to industries. This project looks at each industry and the tools that can help provide economic benefits to those that choose to use them.

Range Improvement Task Force

The Range Improvement Task Force (RITF) seeks to extend the Agricultural Experiment Station and Cooperative Extension Service's efforts by investigating impacts to federal lands, focusing at the ranch-unit level. It provides objective information to ranchers and governmental policy makers, and offers solutions to rangeland issues/disputes based on science. The RITF's only concern is the long-term health of rangeland.

Integrated Weed Management for New Mexico Rangelands

This project studies weed establishment, persistence, and interference within rangeland ecosystems by evaluating fire and herbicides in different seasons and application procedures to produce desired vegetation mosaic. The scientists are developing low-input, sustainable approaches utilizing integrated control methods to achieve desired vegetation response. This results are disseminated via Extension workshops.

Peanut Research Program

Peanuts are a mainstay cash income commodity for Eastern New Mexico. With approximately 18,000 acres and income of approximately $15 million, peanuts average more than $800 per acre. This is the single largest income-producing crop for producers. As peanuts are sold primarily in shell, quality is a major factor related to price received. Maintaining this quality through control of diseases such as Web Blotch, Southern Blight, *Rizoctonia*, Pod Rot, Blackhull, and *Fussarium* becomes extremely important. The breeding program is also designed to maintain quality through development of disease resistant varieties. Other production variables include fertility management programs and irrigation. Drip irrigation studies relate to water consumption and lowering input costs. Four other projects for the year included herbicide studies for weed control. Other minor projects are conducted to evaluate control of early season insects such as thrips and worms. Late season insects include beet armyworm and grasshoppers. All of these programs focus on research-based information transferable to producers through publications, news media, field days, and quarterly meetings with the Peanut Research Board and annual meetings with the New Mexico Peanut Growers Association.

Water Quality

Population growth along New Mexico's river valleys is among the fastest in the nation, resulting in a greater demand for domestic use of surface and groundwater supplies. Conflicts between urban use and irrigated agriculture are becoming critical issues. Population concentrations along the rivers also threaten water quality by increasing pollutants from septic tanks, household hazardous waste, and lawn and garden practices. There is a general lack of knowledge about the impacts to water supplies from land use and waste disposal practices. Educational programs designed for Extension agents, the general public, municipal water and wastewater managers, and garden hobbyists will increase awareness of the need to conserve and protect water resources.

Forage Fiber Tradeoff — Piñon-Juniper Woodlands

The purpose of this project is to analyze the impacts of dispersed recreation on public lands to test whether income from recreation can offset losses of extractive industries (livestock grazing, timber, and mining). This project shows where and how industry (ranches) expenditure patterns affect the New Mexico economy by sectors.

Integrated Weed Management for NM Rangeland

This project's goal is to determine the relationship between changes in mesquite densities and soil textures and depths. Because of the native plant and animal changes occurring in the desert regions due to increasing human populations, natural reserves will be established to protect this fragile ecosystem from further development.

Excess Property

Excess federal property is identified and procured on behalf of both research and extension programs at New Mexico State University.