Plant Production

Plant Production

V(A). Planned Program (Summary)

1. Name of the Planned Program

Plant Production

V(B). Program Knowledge Area(s)

1. Program Knowledge Areas and Percentage

KA Code	Knowledge Area	%1862 Extension	%1890 Extension	%1862 Research	%1890 Research
201	Plant Genome, Genetics, and Genetic Mechanisms	0%		18%	
202	Plant Genetic Resources	0%		33%	
203	Plant Biological Efficiency and Abiotic Stresses Affecting Plant	12%		19%	
204	Plant Product Quality and Utility (Preharvest)	0%		8%	
205	Plant Management Systems	88%		22%	
	Total	100%		100%	

V(C). Planned Program (Inputs)

1. Actual amount of professional FTE/SYs expended this Program

Year: 2007	Extension		Research	
	1862	1890	1862	1890
Plan	7.5	0.0	11.6	0.0
Actual	5.4	0.0	18.2	0.0

2. Actual dollars expended in this Program (includes Carryover Funds from previous years)

Extension		Research	
Smith-Lever 3b & 3c 320965	1890 Extension 0	Hatch 837263	Evans-Allen 0
1862 Matching 320965	1890 Matching 0	1862 Matching 837263	1890 Matching 0
1862 All Other 474845	1890 All Other 0	1862 All Other 6589030	1890 All Other 0

V(D). Planned Program (Activity)

1. Brief description of the Activity

Plant Production

•In 2008 NMSU researchers will submit documentation to the NMSU Agricultural Experiment Station to release the NM0307 experimental alfalfa population as a cultivar with improved performance under both optimum and deficit levels of irrigation. This cultivar should benefit alfalfa growers in New Mexico, and perhaps adjacent regions, by providing a forage with enhanced yield potential across diverse production environments. Other more recently developed hybrid-based populations in the NMSU breeding program have been identified that tentatively outperform NM0307. Pending additional state-wide evaluations one of more of these will provide the bases for future cultivar releases. In other research, the integration of DNA marker linkage data with field performance of genetically defined alfalfa research population families under varying soil moisture conditions, has identified markers that can be used to select against alleles that reduce forage and root biomass yield under drought stress. Additional markers were identified that can be used to select for alleles that increase biomass production. Results suggest that selection for specific marker combinations can potentially improve yield performance by 3 to 14% under drought stress.

•The identification of NPGS plant introductions, that can perform well under limited and optimum irrigation management, will provide our program with additional parent populations to use in developing future alfalfa cultivars with greater yield stability/environmental adaptation over widely varying soil moisture conditions. Private industry has expressed concern that yield loss may accompany utilization of unimproved germplasms (e.g. many NPGS plant introductions). Our recent results, however, demonstrate that the forage yield of some hybrids derived from NPGS accessions can equal, or exceed, that of the best commercial cultivars. One private company has shown interest in our results, and we are collaborating on an alfalfa hybrid research project using some NPGS accessions as parents. This study will also provide information on the superiority or inferiority of using genetic male sterility to develop alfalfa hybrids. In other work, our diallel analyses indicate that measuring the general combining ability of a population, which is quite expensive, is not strictly necessary to identify useful parents. Rather, it is sufficient to measure the yield performance of each individual parent population only (not its' numerous hybrids), and the population's fall dormancy response. This later approach requires far fewer resources. Hence, significantly greater numbers of populations can be evaluated and breeding program efficiency can be improved.

•Subsurface drip technology in combination with saline water has been used to irrigate two multi-purpose fields (used for overflow parking during big events at the Aggie Memorial Stadium and for intramural soccer) on NMSU's campus. Master Gardeners have reported that homeowners across the state have expressed interest in applying this water conservation technology in their home lawn. Three athletic fields at the Rio Rancho high school are currently under construction and will receive subsurface irrigation technology.

•Sophisticated irrigation scheduling using computer based climate data can improve pecan crop yield while optimizing water use. However, growers are uncomfortable using computers. Consequently, a hand-held device was created and distributed to growers in New Mexico, Texas, and Mexico in 2007.

•NMSU researchers have found that land application of partially treated wastewater can reduce contamination of surface waterways, while providing alternative crops for small landowners.

•Scientists identified tall fescue turfgrass cultivars and mowing practices amenable to southern New Mexico. These findings will aid desert turf managers in selection of wear-tolerant cool-season turfgrasses.

•A new climate database management system has recently been developed to replace the old one and this new system has the capabilities to intake any type of climate data. The webpage is currently run both the old system and the new system because the old tools are still being transferred to the new system. CoCorahas, the community based rainfall monitoring system, has expanded throughout the state and has over 600 participants. Continuing effort is underway to improve the QC of the system. Researchers and state agencies along with the public are using the data made available on the system to make management decisions. 5000 request per day are being served by the climate server at http://weather.nmsu.edu.

•NMSU scientists developed and released the first public transgenic Bt (insect resistant) cotton cultivar (1517-99W) in the United States in 2005. It was grown in more than 13% (8,417 acres) and 6.8% (3400 acres) of cotton acreage in New Mexico in 2006 and 2007, respectively, according to the "2006-2007 Variety Planted" and "2007-2008 Variety Planted" reported by USDA-AMS. The new cultivar 1517-99W increased cotton production by 70-140 pounds per acre, totaling >600,000-1,200,000 pounds ($300,000-600,000) and 238,000-476,000 pounds ($150,000-300,000) of cotton in increase for New Mexico in 2006 and 2007, respectively. This new insect resistant Acala 1517 cultivar with insect resistance also is expected to reduce production cost and chemical contamination by reducing the use of pesticides.

•Researchers have developed a number of elite germplasm lines with desired fiber quality and high yield potential from interspecific breeding. This represents one of the first successful examples in cotton breeding in an attempt to significantly increase crop yield from interspecific hybridizations by introducing genes from one species to another.

•NMSU scientists constructed a high density linkage map with more than 1000 DNA markers, which can be used for identifying desirable genes for cotton yield and fiber quality.

•The first Organically Certified research acres at New Mexico State University continue to be used at the Center to assist

fruit, medicinal herb, and specialty crop growers interested in producing and marketing organically. Numerous groups of interested clientele visited the Center where they were instructed on organic growing techniques. 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 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. Interest in fruit and medicinal herb production has grown substantially. Fruit research results were presented at the New Mexico Alternative Crops Workshop, Santa Fe, NM, December, 2007. In 2007 we had an excellent turnout at a multi-topic field day that covered our fruit, medicinal herb, forage, and irrigation/hydrology research (292 plus attended).

•An alternative cropping strategies project, recently completing its third year, has demonstrated that forage sorghums can be grown more efficiently than corn; however nutritive value of the sorghums and corn under limited irrigation is still questionable as quality results indicate that reducing irrigation did not reduce nutritive value of corn to the degree expected. The potential impacts from this project are great, considering the steadily increasing dairy numbers in this region of the U.S. and the amounts of water that can be saved if water use efficient sorghums are broadly accepted by the industry. Evaluation of various sorghums for biofuel potential will begin in 2008 and project is still in the planning phase. The variety testing program is used to evaluate variety and hybrid adaptation to both irrigated and dryland growing scenarios in eastern New Mexico. Use of better-adapted varieties allows growers to utilize their resources more efficiently and leads to economic savings. Particularly, more efficient water and nitrogen utilization contributes to conservation efforts and sustainable agricultural production.

•Composted biosolids may provide a beneficial use of what may otherwise have been waste. In an NMSU study, biosolids appeared to improve tree nutrition and growth, at least during the initial years. This may be an important source of fertility as the price of manufactured inputs continues to rise.

Software was developed and released in 2007 to aid alfalfa growers in estimating yield before harvest using fall dormancy category, cutting, growing degree days, and natural plant height. Forage Brassicas may be particularly useful in the irrigated high-desert regions of the southwestern USA and climatically similar environments. Delaying planting in the southern Rocky Mountains until the 30-d forecast temperature is less than 20°C will likely give highest first harvest yield and may give an opportunity for considerable regrowth for a second grazing or even a third grazing if temperatures remain mild and precipitation or irrigation is adequate. Rape is best for single grazing systems while turnip had greater regrowth potential and kale yield was too low in multiple cut systems to be of much value. Cotton growers can recover input costs when cotton is destroyed by wind or hail by planting cowpeas for edible dry beans as late as mid-June and using deficit irrigation until approximately 30 dap and reduced irrigation every 7 to 14 days during bloom and pod-filling. Harvesting Valencia peanut forage 2 to 3 weeks before pod digging provided the best compromise between forage yield and quality and pod yield and quality. Results from the statewide alfalfa variety testing program in 2006 were summarized indicating that, by selecting higher yielding varieties, growers can increase productivity by as much as 2.92 tons/acre and return per acre by $490.

2. Brief description of the target audience

The target audience is both small as well as medium and large scale agricultural operations, businesses, associations, cooperatives, consulting firms and collectives that may or may not be defined as a farm under the USDA economic return criteria, but rather are land owners, managers, consultants, or students that wish to improve agronomic production and efficiency as do and are other audience participants such as Extension agents, farmers, ranchers, other agricultural specialists, private-tribal-state-federal and even nonprofit organizations.

V(E). Planned Program (Outputs)

1. Standard output measures

Target for the number of persons (contacts) reached through direct and indirect contact methods

	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Year	**Target**	**Target**	**Target**	**Target**
Plan	0	0	0	0
2007	0	0	0	0

2. Number of Patent Applications Submitted (Standard Research Output)

Patent Applications Submitted

Year	**Target**
Plan:	0
2007:	0

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Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

	Extension	Research	Total
Plan			
2007	1	72	73

V(F). State Defined Outputs

Output Target
Output #1

Output Measure

The specific output measures will vary according to the specific project being monitored. The development of research procedures and technology, training of students, publishing research papers, and disseminating research results via educational workshops, conferences, and Extension media are important outputs for the various projects falling under this planned program.

Year	Target	Actual
2007	0	0

V(G). State Defined Outcomes

O No.	Outcome Name
1	# of trained professionals
2	# of research publications
3	# of Extension publications
4	% of producers, growers, homeowners adopting NMSU recommendations
5	# of improved plant varieties released
6	Successful plant agricultural enterprises

Plant Production
Outcome #1

1. Outcome Measures

Not reporting on this Outcome for this Annual Report

2. Associated Institution Types

3a. Outcome Type:

3b. Quantitative Outcome

Year	Quantitative Target	Actual

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

What has been done

Results

4. Associated Knowledge Areas

KA Code	Knowledge Area

V(H). Planned Program (External Factors)

External factors which affected outcomes

Natural Disasters (drought,weather extremes,etc.)
Economy
Appropriations changes
Public Policy changes
Government Regulations
Competing Public priorities
Competing Programmatic Challenges

Brief Explanation

New Mexico continues in a serious drought, which affects the amount of water available to farmers. Water availability also exacerbates tensions between industry, agriculture, urban and domestic users. Until all water rights have been adjudicated, users remain in a "use or lose" situation regarding their water amounts.

V(I). Planned Program (Evaluation Studies and Data Collection)

1. Evaluation Studies Planned

During (during program)
Case Study
Comparisons between program participants (individuals,group,organizations) and non-participants
Comparisons between different groups of individuals or program participants experiencing different levels of program intensity.
Comparison between locales where the program operates and sites without program intervention

Evaluation Results

{No Data Entered}

Key Items of Evaluation

{No Data Entered}