Plant and Animal Protection

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V(A). Planned Program (Summary)

1. Name of the Planned Program

Plant and Animal Protection

V(B). Program Knowledge Area(s)

1. Program Knowledge Areas and Percentage

KA Code	Knowledge Area	%1862 Extension	%1890 Extension	%1862 Research	%1890 Research
211	Insects, Mites, and Other Arthropods Affecting Plants	0%		5%	
212	Pathogens and Nematodes Affecting Plants	20%		24%	
213	Weeds Affecting Plants	0%		27%	
215	Biological Control of Pests Affecting Plants	0%		11%	
216	Integrated Pest Management Systems	60%		17%	
311	Animal Diseases	20%		0%	
312	External Parasites and Pests of Animals	0%		13%	
315	Animal Welfare/Well-Being and Protection	0%		3%	
	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	1.8	0.0	11.2	0.0
Actual	5.0	0.0	13.4	0.0

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

Extension		Research	
Smith-Lever 3b & 3c 265993	1890 Extension 0	Hatch 641318	Evans-Allen 0
1862 Matching 265993	1890 Matching 0	1862 Matching 641318	1890 Matching 0
1862 All Other 3910489	1890 All Other 0	1862 All Other 4998575	1890 All Other 0

V(D). Planned Program (Activity)

1. Brief description of the Activity

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•Nutsedge counts in fields infested with the M. incognita-nutsedge pest complex can be used as a visual predictor of J2 populations, unless the number of nutsedge plants is very low. Certain locally-adapted plants within the Asteraceae were found to be poor hosts of the southern root-knot nematode, and may be of use to small-scale organic vegetable producers and residential dwellers as tools for suppressing this ubiquitous nematode pest. The improved technique developed to provide more reliable recovery of DNA from individual nematodes may be of use to others involved in the use of molecular identification or the study of nematode phylogeny.

•With lower use rates and still obtaining effective season long weed control, potential impacts from leaching and runoff from target application has been virtually non-existent. NMSU researchers have shown for example that weed control in field corn with preemergence herbicides, with irrigation being controlled properly without inducing leaching, that postemergence herbicides do not need to be applied. This scenario also applies to most crops researched at the ASC for broadleaf and grass weed control.

•Our understanding of the distribution and biology of alfalfa weevil strains in the state is a critical component in developing an integrated pest management system specific to the unique conditions of New Mexico. The impact of Lygus on cotton production in New Mexico remains poorly understood. NMSU research will give us a better picture of that impact as well as the proper timing and implementation of management for its control. These data will be presented to growers and consultants and an economic threshold will be released that reflects our new understanding of the impact of this pest on NM cotton. Efficient management of alfalfa and cotton pests can result in a reduction in unnecessary control costs and potentially increase crop yields. This can translate into a significant increase in productivity and profit to New Mexico's growers. Also, fewer insecticide applications can result in reduced exposure of the chemicals to the environment.

•Thee successful completion of a livestock pest project has provided a better understanding of the interactions between livestock and associated pests. Quantitative data allows for economically feasible technology for controlling stable flies on confined and pastured livestock. Such strategies will reduce the impact of these flies on livestock production and the resulting impact on neighboring residential areas. Accurate models of fly population dynamics permit livestock producers to economically implement appropriate control strategies before populations reach levels necessitating insecticide treatments.

•Understanding more about the ecology, genetics, transmission, and weed hosts of beet curly top virus in New Mexico will aid in developing management options for chile growers. A predictive model developed by NMSU scientists for curly top in southern New Mexico has given growers information on the disease so that they can make informed choices on which management methods they will need to use to handle the disease pressure.

•A better understanding of the role that the fungal endophytes of locoweed play in locoism, the genetics of the fungi, and the factors that influence toxin production will lead to new options to mitigate the disease locoism and its impact. The information generated by NMSU researchers thus far changed knowledge significantly, in that fungal endophytes had not previously been known to be involved in locoism, much less responsible for the problem.

- The impact of NMSU Phytophthera and Verticillium research is that it provides New Mexico chile producers and industry with information on outbreaks of Phytophthora blight in virgin soils, and on synergism leading to increased wilt levels when both P. capsici and V. dahliae are present in production fields. Additional impact of this research is that it provides information to New Mexico peanut producers on emerging diseases such as Sclerotinia blight and the urgency to foster preparedness for managing these diseases.

- NMSU researchers have determined that plant genotype is a key factor in swainsonine toxicity, which is crucial for informing locoweed control management decisions.

•The knowledge that resistance to both picloram and clopyralid is conferred by a single recessive nuclear gene in yellow starthistle, helps explain the observation that resistance has not spread from where it was first observed. Due to its recessive nature, the resistance allele is less likely to increase in frequency in yellow starthistle populations that are not under strong selection pressure. Therefore, development of picloram resistance in this biotype does not appear to impose a large threat to successful yellow starthistle management as long as auxinic-herbicide management is carried out prudently. Additionally, results from these experiments show that the temperature and nitrogen conditions under which yellow starthistle grew did not alter picloram response suggesting that management of susceptible yellow starthistle with these inexpensive tools, will not be compromised under variable environmental conditions.

- The Fast Agricultural Response Monitoring (FARM) System has the potential of dramatically impacting crop production in the United States and beyond. This initiative will determine the optimum water and nitrogen use strategy to maintain yield and quality, discourage pest insects, reduce environmental contamination, and increase profits. The FARM

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System's innovative approach to field crop management results in a five-fold effect: (1) optimal agrochemical use, (2) reduced input costs to growers, (3) increased profits, (4) reduced environmental contaminants, and (5) reduced pest densities and crop damage from pest insects.

- The scope of impacts from an alternatives to pesticides research program range from local to international since crops affected by pests are grown in every state of the US and throughout the world. In particular, development of effective controls for nematodes that can fill the void left by the withdrawal of fumigants like methyl bromide will have a tremendous impact for producers of most crops in the US and throughout the world. Additional peripheral impacts include development of technology that will keep the US at the forefront applying biotechnology to develop effective "green" solutions to food production problems that affect the entire world. Maintaining our position as world leaders in this area will also contribute to economic growth in the high tech / biotech sector of the national economy.

- Yellow and purple nutsedge and root-knot nematodes simultaneously reduce yields of many crops grown throughout the southern and western regions. Management that targets the individual pests has not been successful or sustainable due to the beneficial interactions among these pest species. The purpose of our work is to develop ways to manage this pest complex, reduce the use of fumigant nematicides, and increase the profitability of crops affected by these pests. A four-year field study is assessing the effectiveness of nematode-resistant alfalfa for providing economical suppression of all three pests in succeeding chile pepper and cotton crops. These results lead us to conclude that nutsedge counts in a field infested with the M. incognita-nutsedge pest complex can be used as a visual predictor of M. incognita J2 populations, unless the number of nutsedge plants is very low. Nematode population assessment is very difficult and requires that growers take and process soil samples; the results of this modeling indicate that growers may be able to use above-ground plant counts to estimate nematode populations in soil.

•Producers have few options for managing perennial nutsedge in minor crops. Research supporting the use of halosulfuron for purple nutsedge management in chile pepper provided industry with data in support of registration and information to growers on use of this tool. Modeling Yellow Nutsedge (YNS) and Purple Nutsedge (PNS) early season growth and early season root-knot nematode (RKN) reproduction is the first attempt by any group to understand and develop tools to predict the population development of an important pest complex. The data suggest that pre- nutsedge emergence heat units drive early season reproduction from RKN overwintering in the nutsedge tubers. The data also suggest that winter moisture affects numbers of tubers that sprout and that heat unit accumulation prior to emergence interacts with heat unit accumulation after emergence to affect plant growth and development, particularly under stressed conditions. Urban landscapes and crop production land in arid New Mexico are dependent on irrigation water supplied by compacted earthen canals and laterals either continuously or intermittently throughout the nine month irrigation season. Weeds growing along the network of canals reduce the amount of available water for irrigation, obstruct the flow of water, and produce seeds that are deposited and germinate in irrigated lands and surrounding riparian areas. The data obtained over three years of sampling provide for the first time a baseline of information regarding species found on this canal system and models that can be used to predict species location relative to canal capacity and some soil characteristics.

•NMSU entomologists working with Aphthonia beetles have convinced the Angel Fire City Council to modify their new construction laws to limit the movement of soil from any sites infested with leafy spurge.

•Data suggests that insecticide applications for square injury by bollworm could be almost eliminated in southern New Mexico. However realistically many applications are made for insurance against risk, fear of loss and under pressure from sales representatives. A 50% reduction of insecticide applications on non transgenic cotton is ambitious but achievable. Reducing inputs will help in retention of cotton as a rotation crop in the Pecos Valley, and would be the most important impact. Pecan: Our primary impact on pecan will be to avoid losses in yield from insect pests particularly as the landscape changes to a more monoculture environment favoring more insect pest outbreaks. Our strategy is to determine how to use smaller acreage of alfalfa to maintain populations of beneficial arthropods in pecan.

2. Brief description of the target audience
Attention will be given to commodity organizations in or serving New Mexico producers as well as pesticide applicators, Master Gardeners and garden clubs, youth (4H, Future Farmers of America and other groups and conferences) and the general public.

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

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

	Extension	Research	Total
Plan			
2007	6	31	37

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	% producers adopting NMSU recommendations to protect plants and animsl
5	Successful agricultural enterprises

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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
Public Policy changes
Government Regulations
Competing Public priorities

Brief Explanation

New Mexico continues in a serious drought. Land use disputes exacerbate tensions between industry, agriculture, urban and domestic users.

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

1. Evaluation Studies Planned

During (during program)
Time series (multiple points before and after program)
Case Study
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}