Pathogens and Nematodes Affecting Plants (Molecular and Field Programs)

Pathogens and Nematodes Affecting Plants (Molecular and Field Programs)

V(A). Planned Program (Summary)

1. Name of the Planned Program

Pathogens and Nematodes Affecting Plants (Molecular and Field Programs)

V(B). Program Knowledge Area(s)

1. Program Knowledge Areas and Percentage

KA Code	Knowledge Area	%1862 Extension	%1890 Extension	%1862 Research	%1890 Research
212	Pathogens and Nematodes Affecting Plants	100%		100%	
	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	0.2	0.0	6.4	0.0
Actual	0.2	0.0	3.0	0.0

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

Extension		Research	
Smith-Lever 3b & 3c 0	1890 Extension 0	Hatch 63992	Evans-Allen 0
1862 Matching 0	1890 Matching 0	1862 Matching 984523	1890 Matching 0
1862 All Other 0	1890 All Other 0	1862 All Other 1316998	1890 All Other 0

V(D). Planned Program (Activity)

1. Brief description of the Activity

This program utilizes molecular and field activities to control pathogens and nematodes affecting commercial crops. Investigators in the molecular subprogram use tools to develop risk prediction models and to identify and characterize genes involved in pathogenicity and host-specificity, disease susceptibility and resistance, and virus-host interactions and their coevolution. Specifically, investigators analyzed pathogenicity factors and their involvement in disease development in wheat; and conducted experiments to discern the mechanisms of closteroviral movement and the role of virion in this process. Results were presented at regional, national and international meetings, published in leading professional and broad-impact journals and other periodicals, and taught to graduate students. The field subprogram seeks to discover better chemical and cultural management strategies and to design programs to maintain or improve management while reducing use of pesticides and improving grower profitability. Investigators examined the effect of 1-MCP on stem end decay caused by Botrytis cinerea, a fungus affecting the d'Anjou pear (Pyrus communis L.) fruit, and prestorage treatment in long-term cold storage. Post-harvest management techniques were also evaluated and those deemed promising were integrated into a multi-faceted program. Nematode field trials seek to evaluate metam sodium treatment regimes on suppression of potato tuber damage from Columbia root-knot nematode (Medloidogyne chitwoodi, CRKN). Results have been shared at seminars, experiment station field days and national conferences, and published in peer-reviewed journals and conference proceedings.

2. Brief description of the target audience

The target audiences include growers, packers, crop consultants, extension faculty and researchers in the potato and pear industries and in the wheat, grape, and cereal industries.

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	500	450	50	0
2007	100	500	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	1	8	9

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

SCHOLARLY excellence in referred articles, book chapters, and books; participation on professional boards and panels, as well as science panels.

Year	Target	Actual
2007	0	20

Output #2

Output Measure

PROVIDE ADDITIONAL UNDERSTANDING FOR PLANT AND ANIMAL PROTECTION FROM DISEASES AND PESTS Research experiments and tests to:

- understand virus reproduction and transport in plants.
- technologies for efficient application of viral vectors in grapevine.
- decay risk prediction models for use in orchards and packinghouses
- better understand species complex and fungicide sensitivity
- Understand physiological basis of plant disease resistance and susceptivility
- Knowledge that fumigants used at reduced rates in combination with other nematicides are likely to be the optimum management strategies for control of CRKN.
- Learn that applications would need to be made earlier at higher population levels. It also indicates the importance of sampling to determine population levels before management begins and emphasizes the need for early season application times at high population levels.
- Design crop management systems for suppression of CRKN using suppressive rotation crops, green manure crops and reduced nematicide use
- Quantify the efficacy of individual treatments for control of postharvest decay of pear fruit, and quantify and compare the efficacy of treatment programs composed of diverse, multiple control tactics.
- Identify decay management programs appropriate to various producer objectives.

Year	Target	Actual
2007	4	6

V(G). State Defined Outcomes

O No.	Outcome Name
1	Genes and genetic mechanisms: • Elucidate the underlying molecular mechanisms of pathogenicity (virulence) and disease susceptibility (compatibility) and disease development. • Knowledge gained will facilitate future planned activities in functional genomics and provide a more robust sampling of the Pleosporales for comparative genomic studies by the fungal research community. • Information for the development of resistant wheat germplasm to tan spot. • Determined functions of the GLRaV-2 proteases in virus reproduction and spread, as well as characterize mechanisms of BYV Hsp70h interactions with actin cytoskeleton and targeting to plasmodesmata. We will also design approaches to engineering GLRaV-2 gene expression vectors. • Contribute to understanding molecular mechanisms responsible for closterovirus reproduction and transport in plants and develop model to predict risk • Develop technologies for efficient application of viral vectors in grapevine. • Characterize genes involved in Victoria Blight Disease susceptibility, and uncover relationships between disease susceptibility and disease resistance.
2	Management tactics • Fumigants used at reduced rates in combination with other nematicides are likely to be the optimum management strategies for control of CRKN. • Efficacy of various orchard, postharvest, and storage methods for control of postharvest decay of pear
3	Disease and pest control control of a wide-ranging and serious disease on wheat. apply knowledge to generation of the viral vectors for grapevine disease control and functional genomics vectors have a potential for replacing current strategies of using chemical fungicides and bactericides with viral biocontrol strategies. Growers, packers and extension faculty incorporate practices to lower decay risk, including reduced fungicide usage, and identify high risk fruit lots and to market these before decay has time to develop in storage. Determine packinghouse water system contamination by fungal pathogens. Commercial service lab can apply PCR technology to maintain sanitation determine most effective fungicides for each species. develop a customized decay control program for each unique pathogen complex. District-specific control programs will reduce usage of fungicides with low efficacy and emphasize integrated control practices. use of green manure crops in combination with reduced nematicide use is likely to be successful, particularly for short season potato crops. CRKN may be managed with crop rotation sequences, including green manure crops, which suppress nematode populations so that no or minimal nematicides are necessary. Establish that the interaction of program components and the overall efficacy of various combinations of orchard, postharvest, and storage factors will be the guides to the description of programs for implementation in the pear industry.
4	Scientific advancement using generated knowledge for furthering our understanding of the fundamental processes of virus-host interactions and coevolution.
5	In the long term: • enhance economic opportunities for agricultural producers, and enhance the nation's natural resource base and environment by revealing cost-effective means to control this and other plant diseases and reduce the need for pesticides. • general progress of grapevine industry in US. • biocontrols will reduce environmental damage and costs of grape growing and facilitate the development of the table and wine grapes with improved quality and nutritional value and therefore to increase competitiveness of the US grape growers and wine makers at the world markets. • control of disease • A better understanding of CRKN population cycle and the process of tuber infection will permit nematicides to be applied at more strategic times in the growing season to increase the level of control with less nematicide. • producers maximize the control of postharvest decay within the various production and marketing objectives of producers.

Pathogens and Nematodes Affecting Plants (Molecular and Field Programs)
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
Other (personnel)

Brief Explanation

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

1. Evaluation Studies Planned

Evaluation Results

{No Data Entered}

Key Items of Evaluation

{No Data Entered}