V(A). Planned Program (Summary)

Program #5

1. Name of the Planned Program

Plant Production Systems

2. Brief summary about Planned Program

Plant biology linking basic science with applied science is important to bring the results of basic plant science toward a usable form for applied agricultural sciences. Molecular biology and genomics are opening many new pathways for crop plant improvement and pest management, which will enhance the economic development of agricultural regions, enhance human health through more nutritious and safer food products, and find fundamental solutions to societal issues through renewable and sustainable crop production and pest management. Successful applied crop science, environmental science, and pest management only occur through collaboration with scientists actively involved in fundamental plant and pest sciences.Cooperative Extension has active work teams in:

- •Pest Management, with a sub-team on Diagnostics and Pest Management
- •Plant Introduction and Invasive Species

3. Program existence : Mature (More then five years)

4. Program duration : Long-Term (More than five years)

5. Expending formula funds or state-matching funds : Yes

6. Expending other than formula funds or state-matching funds : Yes

V(B). Program Knowledge Area(s)

1. Program Knowledge Areas and Percentage

201	10%	Plant Genome, Genetics, and Genetic Mechanisms
203	10%	Plant Biological Efficiency and Abiotic Stresses Affecting Plants
205	20%	Plant Management Systems
206	10%	Basic Plant Biology
211	10%	Insects, Mites, and Other Arthropods Affecting Plants
212	10%	Pathogens and Nematodes Affecting Plants
213	10%	Weeds Affecting Plants
215	10%	Biological Control of Pests Affecting Plants
216	10%	Integrated Pest Management Systems

V(C). Planned Program (Situation and Scope)

1. Situation and priorities

Colorado State has a history of providing crop selection and testing in other agronomic crops and fruits and vegetables to support the development of these agricultural industries in Colorado. In 2004, wheat generated $161 million in commodity sales, dry beans $38 million, potatoes $192 million, and other agronomic crops and vegetable and fruit crops generated $776 million, in Colorado. The value of these industries to the Colorado economy through other related economic activity is at least double these combined

amounts. Colorado expenditures on garden-related products, landscape and lawn service, and other related green industries (irrigation, botanical gardens, and outdoor equipment) have averaged 10 percent annual growth since 1993, resulting in $1.67 billion in direct sales, in 2002. (This generates an economic impact of $2.1 to $5.0 billion depending on the economic multiplier used.) The value of the Colorado golf industry alone is $1.2 billion. The landscape-related industries of Colorado employ nearly 34,000 positions (6 percent average annual growth) with a payroll of $825 million annually (18 percent average annual growth). Thirty percent of industry revenues are generated from out of state (domestic and international) sales. A diverse and expanding pest complex requires enhanced management skills that often increase production costs. A conservative loss estimate of 5 to 10% due to plant pests could cost Colorado producers in urban and rural settings $50 to $100 million annually. There is a long-term need for a comprehensive, high quality, integrated pest management system encompassing the disciplines of entomology, plant pathology and weed science.

•Fundamental plant biology linking basic science with applied science is important to bring the results of basic plant science toward a usable form for applied agricultural sciences. Molecular biology and genomics are opening many new pathways for crop plant improvement and pest management, which will enhance the economic development of agricultural regions, enhance human health through more nutritious and safer food products, and find fundamental solutions to societal issues through renewable and sustainable crop production and pest management.

•Non-hybrid crop plants require public investment in genetic improvement to provide varieties of cultivars which improve yield, resist environmental and pest stresses, and serve the consuming public. Colorado State has a history of providing cultivar breeding for wheat, dry beans, and potatoes to serve the industries in climatic zones represented in Colorado.

•Colorado is an urban and urbanizing state in which demographic evolution is changing the scope of “agriculture.” The landscape (green) industry of Colorado, and the nation, is large and growing and comprises a significant part of Colorado agriculture.

•Management of weeds, insect pests and plant pathogens is one of the most costly inputs that clientele in agriculture, the green industry, and consuming households must finance every year in Colorado. A diverse and expanding pest complex requires enhanced management skills that often increase production costs.

•The Colorado ecosystem is shared by agricultural producers, a rapidly growing human population, and wildlife. As competition grows for finite water, land, and air resources, and as agricultural and natural resource policies and international markets change, opportunities to maximize the economic value of agriculture in Colorado will change continuously. The complex relationships of ecosystem variables must be well understood to predict these opportunities.

2. Scope of the Program

- Multistate Extension
- In-State Extension
- Integrated Research and Extension
- In-State Research
- Multistate Research
- Multistate Integrated Research and Extension

V(D). Planned Program (Assumptions and Goals)

1. Assumptions made for the Program

•Successful applied crop science, environmental science, and pest management do not occur in the absence of scientists actively involved in fundamental plant and pest sciences.

•Colorado State has created the Cancer Prevention Laboratory (CPL) imbedded among strong programs of plant breeding and crop production research to address interactions between crop composition and human health.

•Professional agriculturalists and agribusiness people will require much more education in the relationships of ecosystem variables.

2. Ultimate goal(s) of this Program

PCProgram goals will emphasize the following areas:

•Molecular biology and genomics of crop plants and their pests, mechanisms of biological resistance to pests, mechanisms of invasion of weed species, and understand the molecular and cellular foundations for crop improvement and crop pest management.

•Combine the knowledge of human nutrition and plant genetics to extend crop selection, germplasm screening, and crop improvement with the objective to build greater amounts of compounds relevant to improved human health and disease prevention into these crops.

•Research in plant selection and improvement, limited-irrigation landscape plant cultivation, and landscape policies, and outreach in landscape industry plant selection, cultivation management, and Master Gardener education and volunteer

development.

•Research in genetic determinants of host plant resistance, fundamental mechanisms of biological invasions, and ecology, bioinformatics, genomics, and population genetics of pests. Extension will include applied research and education relevant to emerging issues of Colorado's agricultural industries, including biosecurity, safe and effective pesticide use, and implementation of effective pest management strategies that do not rely on pesticides.

•Evaluate new crop, range, and livestock systems in semi-arid environments including disciplinary and interdisciplinary work in crop and soil sciences, animal sciences, pest sciences, range science, wildlife biology and ecology, forest science, water sciences, economics, and landscape design and policy applicable to the state and region.

•Disseminate findings through extension educational programs aimed at changing practices to control pests.

•Proper diagnosis of plant problems, entomology related to plants and structures, weed control and recommendations of integrated pest management strategies.

V(E). Planned Program (Inputs)

1. Estimated Number of professional FTE/SYs to be budgeted for this Program

Year	Extension		Research	
	1862	1890	1862	1890
2008	21.0	0.0	36.0	0.0
2009	21.0	0.0	36.0	0.0
2010	21.0	0.0	36.0	0.0
2011	21.0	0.0	36.0	0.0
2012	21.0	0.0	36.0	0.0

V(F). Planned Program (Activity)

1. Activity for the Program

•Conduct basic and applied research in plant productions systems.
• Workshops and educational classes for producers.
•Utilize demonstration plots and field days to communicate program results.
•Use individual counseling with producers and clientele on specific plant production problems

2. Type(s) of methods to be used to reach direct and indirect contacts

Extension	
Direct Methods	Indirect Methods
● Workshop ● Other 1 (Field Days) ● Education Class ● Demonstrations ● One-on-One Intervention ● Group Discussion	● Web sites ● Newsletters ● Public Service Announcement ● Other 1 (Radio reports)

3. Description of targeted audience

Individual agricultural producers, homeowners, agribusinesses, and commodity organizations.

V(G). Planned Program (Outputs)

1. Standard output measures

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

	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Year	Target	Target	Target	Target
2008	800	5000	0	0
2009	800	5000	0	0
2010	800	5000	0	0
2011	800	5000	0	0
2012	800	5000	0	0

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

Expected Patent Applications

2008 :0 **2009 :**0 **2010 :**0 **2011 :**0 **2012 :**0

3. Expected Peer Review Publications

Year	Research Target	Extension Target	Total
2008	0	0	0
2009	0	0	0
2010	0	0	0
2011	0	0	0
2012	0	0	0

V(H). State Defined Outputs

1. Output Target

- Release of technologies adopted by growers such as crop cultivars, crop germplasm, or components of crop production systems.

2008 :2 **2009 :**2 **2010 :**2 **2011 :**2 **2012 :**2

- Number of attendees at workshops/trainings/field days.

2008 :600 **2009 :**600 **2010 :**600 **2011 :**600 **2012 :**600

- Amount of grant dollars garnered to support natural plant production systems research and outreach.

2008 :25000 **2009 :**25000 **2010 :**25000 **2011 :**25000 **2012 :**25000

- Technical publications in the topical area of plant production systems.

2008 :25 **2009 :**25 **2010 :**25 **2011 :**25 **2012 :**25

- Number of basic and applied research efforts in plant production systems. Number of workshops, educational classes for producers Number of demonstration plots and field days Number of individual consultations

2008 : 50 **2009 :** 50 **2010 :** 50 **2011 :** 50 **2012 :** 50

V(I). State Defined Outcome

O. No	Outcome Name
1	Percent of participants at workshops/trainings/field days indicating an increase in knowledge gained.
2	Percent of participants indicating change in behavior/best practices adopted.
3	Economic impact of the change in behavior reported.
4	Adoption of crop production technology as measured by agricultural statistics.

Outcome #1

1. Outcome Target

Percent of participants at workshops/trainings/field days indicating an increase in knowledge gained.

2. Outcome Type : Change in Knowledge Outcome Measure

2008 :50 **2009 :** 50 **2010 :** 50 **2011 :**50 **2012 :** 50

3. Associated Institute Type(s)

{No Data Entered}

4. Associated Knowledge Area(s)

- 205 - Plant Management Systems
- 211 - Insects, Mites, and Other Arthropods Affecting Plants
- 212 - Pathogens and Nematodes Affecting Plants
- 213 - Weeds Affecting Plants
- 216 - Integrated Pest Management Systems

Outcome #2

1. Outcome Target

Percent of participants indicating change in behavior/best practices adopted.

2. Outcome Type : Change in Action Outcome Measure

2008 :50 **2009 :** 50 **2010 :** 50 **2011 :**50 **2012 :** 50

3. Associated Institute Type(s)

{No Data Entered}

4. Associated Knowledge Area(s)

- 205 - Plant Management Systems
- 211 - Insects, Mites, and Other Arthropods Affecting Plants
- 212 - Pathogens and Nematodes Affecting Plants
- 213 - Weeds Affecting Plants
- 216 - Integrated Pest Management Systems

Outcome #3

1. Outcome Target

Economic impact of the change in behavior reported.

2. Outcome Type : Change in Condition Outcome Measure

2008 :150000 **2009 :** 150000 **2010 :** 150000 **2011 :**150000 **2012 :** 150000

3. Associated Institute Type(s)

{No Data Entered}

4. Associated Knowledge Area(s)

- 205 - Plant Management Systems

Outcome #4

1. Outcome Target

Adoption of crop production technology as measured by agricultural statistics.

2. Outcome Type : Change in Condition Outcome Measure

2008 :1 **2009 :** 1 **2010 :** 1 **2011 :**1 **2012 :** 1

3. Associated Institute Type(s)

{No Data Entered}

4. Associated Knowledge Area(s)

- 205 - Plant Management Systems

V(J). Planned Program (External Factors)

1. External Factors which may affect Outcomes

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

Description

Public policies and weather and other natural diseases will affect the adoption of new crop production technologies. Most of the advances are multi-year activities and cumulative rather than episodic in nature.

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

1. Evaluation Studies Planned

- During (during program)
- After Only (post program)
- Before-After (before and after program)
- Case Study

Description

Regular pre-post evaluations are used. Formative evaluations are often used during the program to adjust focus and direction. Case studies are used to clearly demonstrate impact.

2. Data Collection Methods

- Case Study
- Sampling
- On-Site
- Tests
- Observation

Description

Pre-post tests. Standard survey methods.

V(A). Planned Program (Summary)

Program #6

1. Name of the Planned Program

Natural Resources and Environment

2. Brief summary about Planned Program

An increasing world population is placing greater demands on our natural resources. Public concern for a quality environment has increased as agriculture has become more complex and population pressures have increased. Natural resources must be conserved and their capacity maintained or improved in order to meet the needs of future generations. The long- term viability of agriculture and forestry production is tightly linked to proper use and protection of our soil, air and water resources. Impacts of urban horticulture on the environment are significant.Extension has active work teams in:

- •Sustainable landscapes
- •Environmental horticulture-Landscape Water Use
- •Managing agricultural and natural landscapes
- •Sustaining local agriculture and the environment

3. Program existence : Mature (More then five years)

4. Program duration : Long-Term (More than five years)

5. Expending formula funds or state-matching funds : Yes

6. Expending other than formula funds or state-matching funds : Yes

V(B). Program Knowledge Area(s)

1. Program Knowledge Areas and Percentage

● 101	10%	Appraisal of Soil Resources
● 102	10%	Soil, Plant, Water, Nutrient Relationships
● 103	10%	Management of Saline and Sodic Soils and Salinity
● 111	20%	Conservation and Efficient Use of Water
● 112	10%	Watershed Protection and Management
● 121	10%	Management of Range Resources
● 123	10%	Management and Sustainability of Forest Resources
● 132	10%	Weather and Climate
● 403	10%	Waste Disposal, Recycling, and Reuse

V(C). Planned Program (Situation and Scope)

1. Situation and priorities

Development of management practices that are compatible with a high quality environment requires new methods of study that involve entire agroecosystems. Quantitative relationships between agriculture, natural resource use, and environmental quality must be defined. This will require a more thorough understanding of basic biological/ecological processes, as well as computer- aided systems management research. Continuing to use natural resources to produce agricultural, range, and forestry