

V(A). Planned Program (Summary)

Program # 13

1. Name of the Planned Program

Climate Change/Bioenergy - Plant and Environmental Systems

Reporting on this Program

V(B). Program Knowledge Area(s)

1. Program Knowledge Areas and Percentage

KA Code	Knowledge Area	%1862 Extension	%1890 Extension	%1862 Research	%1890 Research
102	Soil, Plant, Water, Nutrient Relationships		0%		10%
112	Watershed Protection and Management		0%		10%
132	Weather and Climate		0%		10%
201	Plant Genome, Genetics, and Genetic Mechanisms		0%		20%
202	Plant Genetic Resources		0%		15%
206	Basic Plant Biology		0%		35%
	Total		0%		100%

V(C). Planned Program (Inputs)

1. Actual amount of FTE/SYs expended this Program

Year: 2012	Extension		Research	
	1862	1890	1862	1890
Plan	0.0	0.0	0.0	16.6
Actual Paid Professional	0.0	0.0	0.0	16.5
Actual Volunteer	0.0	0.0	0.0	0.0

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

Extension		Research	
Smith-Lever 3b & 3c	1890 Extension	Hatch	Evans-Allen
0	0	0	1891849
1862 Matching	1890 Matching	1862 Matching	1890 Matching
0	0	0	885896
1862 All Other	1890 All Other	1862 All Other	1890 All Other
0	0	0	0

V(D). Planned Program (Activity)

1. Brief description of the Activity

The research project on antioxidant and vitamin contents involved the treatment of radishes (*Raphanus sativus*) and beet (*Beta vulgar*) in field plots with solutions of chitosan, a naturally occurring biodegradable polymer that improves plant metabolism, and also prevents the colonization of fresh fruits and vegetables by *Salmonella* and *E.Coli*. The harvests were analyzed for vitamin, antioxidant, and carbohydrate contents.

In the genetic improvements of sweetpotato and cucumber, new hexaploid and octaploid varieties were developed through nanotechnological repeats of grafting cycles of diploid and tetraploid varieties. The novel sweetpotato genetic maps are being analyzed to generate possible markers for the breeding trials.

In the doubling of the yields of cowpea (blackeyed beans) and peanut the seeds were cultivated in field plots fertilized with different molar ratios (different from weight ratios) of several mineral nutrients. The mature seeds were analyzed for dry matter yield and fat, total protein, and carbohydrate contents.

In the biomass sorghum project, sorghum biomass produced by Texas A&M AgriLife Research Department, College Station was assayed for active peroxidase, one of the enzymes that regulate lignocellulose biosynthesis. Houston has a rapidly developing bioenergy economy.

In the watershed resource management, seasonal water table movements were monitored.

2. Brief description of the target audience

One-on-one interaction in field and lab project areas will highlight the research efforts. Extension is the end product of the integrated work within the research, teaching, and extension model.

The University's service area extends throughout Texas and the world however the University's target service area includes the Texas Gulf Coast Region. This includes greater Houston residential, commercial, business, industrial, and the energy investment economic centers; the Northwest Houston Corridor including Waller County and the rural counties surrounding the industrial Houston; and the expanding interface between the metropolitan Houston and the shrinking rural Texas Gulf Coast Region. Therefore Plant and Environmental research focus group serves diverse multi targets and many times competing audiences whose common interests are to take advantages of the natural resources in the environment. Therefore, problems associated with agricultural production systems including in the purely urban vegetable gardens and landscape aesthetics, rural production agriculture, and urban-rural agricultural interfaces impact the diverse target audience and stakeholders.

3. How was eXtension used?

eXtension was not used in this program

V(E). Planned Program (Outputs)

1. Standard output measures

2012	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	0	0	0	0

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

Patent Applications Submitted

Year: 2012
Actual: 2

Patents listed

UV-blocking film to protect fresh fruits.

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2012	Extension	Research	Total
Actual	0	8	8

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Increase peer-review publications, presentations, abstracts, and competitive grants. Increase graduate student enrollment and matriculation in the program. We anticipate a 5% increase over the previous 5 year base line in each of these categories.

Year	Actual
2012	4

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O. No.	OUTCOME NAME
1	-Research results highly valued by stakeholders -Increased recognition of the program - Increased interest in the program by students wishing to matriculate in the program - Enhanced attraction of external funding

Outcome #1

1. Outcome Measures

-Research results highly valued by stakeholders -Increased recognition of the program -Increased interest in the program by students wishing to matriculate in the program -Enhanced attraction of external funding

2. Associated Institution Types

- 1890 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2012	4

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Genetics of sweetpotato and tuber vitamin content need to improve in order to enhance food value and make for earlier maturity of the tuber. Sweetpotato is consumed by Asians and Africans. Asia and Africa have many novel sweetpotato germplasms suitable for breeding improvement of several USA varieties.

Peanut production is a good source of farm income for Texas small scale farmers on non-irrigated fields. But peanut yields are low (<1600 kg/ha) thus making peanut production uneconomical.

Antioxidant and vitamin contents of radishes and beet are important to human health because they contribute to reduction of hypertension and cancer. Research on the antioxidant and vitamin contents of vegetables could enhance the knowledge of extension agents, faculty, students, and research scientists at PVAMU and Texas A&M University, and of our target audience in general.

What has been done

Diploid and tetraploid sweetpotato germplasms were subjected to repeated Nanoscale grafting in series in the greenhouse, followed by marker-assisted selection until hexaploid and octaploid varieties with distinctive vegetative hybrid characteristics were developed, and they matured up to 6 weeks earlier than the control diploid varieties.

Fertilizer nutrients and seeding spacing were researched in order to maximize and double the kernel yield. Seed spacing of 10 cm and several fertilizer nutrient combinations including P plus K mixture were experimented over three cropping years. Pod, kernel, carbohydrate, oil and protein yields were determined.

Laboratory experiments were undertaken to determine the growth and germination responses of

radishes and beets in the presence of chitosan and its degraded derivatives. Seeds (radishes and beets) were subjected to the following treatments (n=10): a) soaked in 0.01% chitosan solution; b) soaked in degraded 0.01% chitosan solution; c) 1% acetic acid solution; d) water; e) chitosan (1g/33g Metro Mix); f) degraded chitosan (1g/33 g Metro Mix); or g) 0 g chitosan (or 34g Metro Mix). The seeds of beet and radish were planted and were grown for twenty-five and sixty eight days, respectively. For all soaked experiments, seeds were first soaked for 18 hours before being planted.

Results

The development of novel hexaploid and octaploid, sweetpotato and germplasms with early maturity has encouraged the bold searches for collaboration and external funding to support the genomics and gene mapping operations, and for biochemical analyses.

The P plus K fertilizer mix maximized the fatty acid yield to 1560 kg/ha, and kernel yield to 39000 kg/ha compared with unfertilized control peanut's fatty acid of 850 kg/ha, and kernel yield of 17000 kg/ha. The doubling of peanut yield is encouraging the Cooperative Extension Program to initiate field plot demonstrations of the biotechnology to small scale farmers.

Project on vegetable antioxidants has impacted strongly on students, faculty and research scientist and the CAHS at PVAMU. Through this highly integrated project involving faculty and research scientists from PVAMU, TAMU and USDA, this will (1) broaden the students' experiences, (2) build stronger connections among research scientist and extension agents here at PVAMU, and 3) significantly contribute to the increase of our food supply while maintaining food safety.

4. Associated Knowledge Areas

KA Code	Knowledge Area
102	Soil, Plant, Water, Nutrient Relationships
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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
- Populations changes (immigration, new cultural groupings, etc.)
- Other (CARC staff changes)

Brief Explanation

Changing climatic factors combined with changing demographics leading to increasing competing uses of the land. The emerging rural-urban interface increases the need for relevant outcomes. However, competing needs for internal resources hampers the ability to address all competing needs in a timely manner. More effective planning and enhanced resource capacity will ensure better results in future activities.

V(I). Planned Program (Evaluation Studies)

Evaluation Results

Quality and efficiency of research and extension program management and integration as the cornerstone of the land grant mission of the College of Agriculture and Human Sciences improved considerably. State of alertness of research and extension programs to stakeholder agricultural needs improved substantially.

Key Items of Evaluation

- Level of cooperation between research, extension, and teaching programs in the implementation of the land grant mission.
- Fiscal responsiveness and effectiveness of the College to extension, research, and teaching operations.
- Alertness of research and extension programs to identify and respond to clientele agricultural needs.
- Preparedness of research, extension, and teaching programs to collaborate in seeking external funding.