V(A). Planned Program (Summary)

Program # 2

1. Name of the Planned Program

Climate Change

☑ 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	15%	0%		
111	Conservation and Efficient Use of Water	10%	0%		
112	Watershed Protection and Management	5%	0%		
125	Agroforestry	5%	0%		
131	Alternative Uses of Land	5%	0%		
132	Weather and Climate	20%	0%		
205	Plant Management Systems	15%	0%		
211	Insects, Mites, and Other Arthropods Affecting Plants	15%	0%		
212	Pathogens and Nematodes Affecting Plants	10%	0%		
	Total	100%	0%		

V(C). Planned Program (Inputs)

1. Actual amount of FTE/SYs expended this Program

Year: 2013	Extension		Research	
	1862	1890	1862	1890
Plan	1.1	0.0	0.0	0.0
Actual Paid Professional	1.0	0.0	0.0	0.0
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**
5839	0	0	0
1862 Matching	**1890 Matching**	**1862 Matching**	**1890 Matching**
17371	0	0	0
1862 All Other	**1890 All Other**	**1862 All Other**	**1890 All Other**
120505	0	0	0

V(D). Planned Program (Activity)

1. Brief description of the Activity

One irrigation workshop was organized with participation of 35 farmers, extension agents and crop consultants. Two multi-state meetings discussing "Extreme events and water management" in the Tri-state region of AL-FL-GA were organized. A seven hour multi-state meeting "Climate Adaptation Exchange: Farm management for improving efficiency and reducing risks" was organized for farmers, extension personnel and crop consultants (102 attendees). Climate education and information were transferred through the preparation of four mass media articles. Five extension publication were prepared and distributed to stakeholders through internet and during meeting (Extension publication titles were: Adapting Corn Production to climate in the Southeast, Adapting Wheat Production to climate in the Southeast, Use of soil moisture data for irrigation scheduling, Soils sensors for Irrigation Scheduling: Soil Water Tension Sensors-I, Soils Sensors for Irrigation Scheduling: Volumetric Water Content sensors-II). Twenty climate related presentations were delivered at state, regional and national meetings. A climate display was prepare and carried to the InfoAg meeting in Illinois and the Alabama Farmers Federation 92nd Annual meeting

2. Brief description of the target audience

The activities of the Climate Change Program Priority Team reached the following groups of stakeholders: 1) row crop and fruit-vegetable producers and their representatives groups that include, but are not limited to, the Alabama Cotton Commission, Alabama Peanut Commission, Alabama Soybean Producers, and Alabama Wheat and Feed Grains Committee; 2) row crop, forage, livestock, fruit-vegetable advisors including ACES agents and specialists, ACES county coordinators, ACES risk preparedness specialists, public and private crops advisors; 3) governmental agency personnel including USDA, NRCS, and State of Alabama Soil and Water Conservation Committee; and 4) private citizens impacted by policies and practices used for the production of food, fuel, and fiber. All educational programming efforts targeted audiences without exclusion or discrimination, as specifically defined by ACES policy guidelines.

3. How was eXtension used?

We did not use eXtension directly

V(E). Planned Program (Outputs)

1. Standard output measures

2013	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	1500	60000	200	12000

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

Patent Applications Submitted

Year: 2013

Actual: 0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2013	Extension	Research	Total
Actual	7	2	9

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- - Distribution of basic information about climate variability and climate change not only for Alabama but also for the Southeast. Most of the information will be related to differences between climate variability and change, maps of the average spatial variability of the most important climatic variables (e.g., rainfall and temperature), forecasts provided by US official weather service (NOAA). Several methods of notification (email-Timely Information Sheets, articles in popular press, climate variability/ climate change web site specifically designed for the program, etc) will be used to disseminate information. - Specific outputs include: 1) News and current information posted on the Climate web site as well as agronomic crops web site (www.alabamacrops.com).
  Not reporting on this Output for this Annual Report

Output #2

Output Measure

- - Meetings, in-service trainings, and workshops, will include information on the relationships between agriculture/natural resources and climate change as well as potential impacts, relationships between pest/diseases changes in relation to climate variability and climate change. - Specific outputs include: 1) Multi-state conferences on climate change and the implications for agriculture and natural resources, 2) In-service training meetings for target

audiences (e.g., row crops producers, fruit and vegetable producers, soils and water conservationists, etc).
Not reporting on this Output for this Annual Report

Output #3

Output Measure

- - Reports based on reviews of current knowledge about the relationships between agriculture and climate change and potential impacts.
  Not reporting on this Output for this Annual Report

Output #4

Output Measure

- - Recommendations for adaptation strategies for row crops/fruit and vegetables will be development to reduce the risks of climate variability and climate change. - Specific outputs include: a) Guidelines for agronomic management under various climate variability and climate change scenarios and b) Hard copy publications for use in production meetings and trainings where deemed appropriated.
  Not reporting on this Output for this Annual Report

Output #5

Output Measure

- Number of publications

Year	Actual
2013	12

Output #6

Output Measure

- Number of meetings, in-service trainings and workshops

Year	Actual
2013	25

Output #7

Output Measure

- Number of publications about the relationships between agriculture and climate change and potential impacts

Year	Actual
2013	5

Output #8

Output Measure

- Number of publications about adaptation strategies for row crops/fruit and vegetables

Year	Actual
2013	5

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O. No.	OUTCOME NAME
1	Members of the ACES Climate Change team will be required to provide a success story on an annual basis describing the program activity which they felt best demonstrated the impacts of their work. These success stories contain the following elements: a) why the program was conducted or the situation/problem that was addressed; b) specifically what and how it was done; c) the time period involved; d) the specific locations involved; e) who was impacted; f) how many people were served; and g) the final impacts. Short-term outcome: The most immediate outcomes are: 1) Increased understanding of the potential impacts of climate variability and climate change on row crops, fruits and vegetables;
2	2) Increased information about the impact of ENSO phases on row crops, fruits and vegetables;
3	3) Alabama stakeholders trained/educated in climate variability and climate change topics;
4	4) Alabama growers, extension agents and extension specialists trained in using agroclimatic decision support tools
5	5) Capacities strengthened for integrating climate change risks and opportunities into state and regional development assistance
6	6)Capacities strengthened to access and use resources effectively to reduce risks associated with climate variability and climate change
7	7) Capacities strengthened to understand and manage water or natural resources in the context of climate vulnerability
8	8) Identification of the most profitable row crops management practices by ENSO phase
9	9) Identification of adaptation strategies to reduce climate change impacts.
10	10) increased awareness of the impacts of climate on agricultural Production.
11	Medium-term outcomes: The medium-term outcomes of the Climate Change Extension Program are: 1) implementation of a new system of management practices for row crops and vegetables according to ENSO phase
12	2) Improved agronomic management row crops and vegetables
13	Long-term outcomes: The long-term outcomes of the Climate Change Extension Program are: 1) increased profitability of Alabama growers
14	2) improved soil conditions
15	3) reduced environmental impacts

16	4) competitive Auburn and ACES Agronomic Research, Extension and Education system.
17	Irrigation scheduling workshop knowledge increase
18	Knowledge increase on the specific weather and climatic conditions associated with the risk of Hessian Fly infestation. Knowledge increase on the timing when specific weather conditions influence Hessian Fly infestation. Knowledge increase on the relation between ENSO and Hessian Fly infestation in Wheat
19	Knowledge increase on: - The impact of ENSO on the southeast Climate, - The web-based climate tools on Agroclimate, - The relations between Hessian Fly and ENSO - The impact of weather and climate on nitrogen use efficiency on dry land corn production. - The use of a drought index to predict the risk for Aflatoxin contamination.

Outcome #1

1. **Outcome Measures**

Members of the ACES Climate Change team will be required to provide a success story on an annual basis describing the program activity which they felt best demonstrated the impacts of their work. These success stories contain the following elements: a) why the program was conducted or the situation/problem that was addressed; b) specifically what and how it was done; c) the time period involved; d) the specific locations involved; e) who was impacted; f) how many people were served; and g) the final impacts. Short-term outcome: The most immediate outcomes are: 1) Increased understanding of the potential impacts of climate variability and climate change on row crops, fruits and vegetables;

Not Reporting on this Outcome Measure

Outcome #2

1. **Outcome Measures**

2) Increased information about the impact of ENSO phases on row crops, fruits and vegetables;

Not Reporting on this Outcome Measure

Outcome #3

1. **Outcome Measures**

3) Alabama stakeholders trained/educated in climate variability and climate change topics;

Not Reporting on this Outcome Measure

Outcome #4

1. Outcome Measures

4) Alabama growers, extension agents and extension specialists trained in using agroclimatic decision support tools

Not Reporting on this Outcome Measure

Outcome #5

1. Outcome Measures

5) Capacities strengthened for integrating climate change risks and opportunities into state and regional development assistance

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2013	60

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Extension personnel and crop consultants will be better prepared is they have supporting teaching materials, and they have also received training.

What has been done
Presentations, in-service trainings, short courses, preparation of extension bulletins

Results
Brandon Dillard, extension agent in South Alabama, and William Birdsong, Cotton Extension agronomist in Southeast Alabama, are now conducting climate-related presentations during farmers meetings. They are also conducting demonstrations on the use of the tools on Agroclimate-org. Extension specialists have included topics related to ENSO and it relation with pest, diseases, and yield during their meetings with farmers.

4. Associated Knowledge Areas

KA Code	Knowledge Area
132	Weather and Climate
205	Plant Management Systems

Outcome #6

1. Outcome Measures

6)Capacities strengthened to access and use resources effectively to reduce risks associated with climate variability and climate change

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2013	500

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
The increased participation of extension agents, farmers, and crop consultants on climate information trainings (how to interpret a forecast, how to use the new ACES climate extension web site, how to use the climate-base decision support tools in Agroclimate) ensure they will have the basic knowledge to reach out our stakeholders

What has been done
Participation during meetings, workshops and short courses

Results
Increase on the number of agents, extension specialists and agents using Agroclimate.org and using the climate related extension material available

4. Associated Knowledge Areas

KA Code	Knowledge Area
132	Weather and Climate
205	Plant Management Systems

Outcome #7

1. Outcome Measures

7) Capacities strengthened to understand and manage water or natural resources in the context of climate vulnerability

Not Reporting on this Outcome Measure

Outcome #8

1. Outcome Measures

8) Identification of the most profitable row crops management practices by ENSO phase

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2013	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
The identification of the most profitable management practices by ENSO phase is a work in progress but progress was made for wheat and corn.

What has been done
The participation of AL extension agents, extension specialists, and farmers during the Tri-state Climate workshop group meetings as well as the Climate Adaptation Exchange meeting guarantee they will have resources (information) about potential management practices that could be implemented or are currently implemented by farmers to reduce climate-related risks.

Results
Results of this work has been included on the two extension publications: "Adapting Corn Production to climate in the Southeast" and "Adapting Wheat Production to Climate in the Southeast"

4. Associated Knowledge Areas

KA Code	Knowledge Area

102	Soil, Plant, Water, Nutrient Relationships
132	Weather and Climate
205	Plant Management Systems
211	Insects, Mites, and Other Arthropods Affecting Plants

Outcome #9

1. Outcome Measures

9) Identification of adaptation strategies to reduce climate change impacts.

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2013	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
The identification of the most profitable management practices by ENSO phase is a work in progress but progress was made for wheat and corn.

What has been done
Two extension publications has been prepared: "Adapting Corn Production to climate in the Southeast" and "Adapting Wheat Production to Climate in the Southeast"

Results
Farmers, extension agents, extension specialists and crop consultants have started to using these documents as guidelines of the possible expected outcomes (pest, diseases, yield) of possible climate scenarios and the some of the climate-related risk management strategies

4. Associated Knowledge Areas

KA Code	Knowledge Area
102	Soil, Plant, Water, Nutrient Relationships
132	Weather and Climate
205	Plant Management Systems
211	Insects, Mites, and Other Arthropods Affecting Plants

Outcome #10

1. **Outcome Measures**

10) increased awareness of the impacts of climate on agricultural Production.

Not Reporting on this Outcome Measure

Outcome #11

1. **Outcome Measures**

Medium-term outcomes: The medium-term outcomes of the Climate Change Extension Program are: 1) implementation of a new system of management practices for row crops and vegetables according to ENSO phase

Not Reporting on this Outcome Measure

Outcome #12

1. **Outcome Measures**

2) Improved agronomic management row crops and vegetables

Not Reporting on this Outcome Measure

Outcome #13

1. **Outcome Measures**

Long-term outcomes: The long-term outcomes of the Climate Change Extension Program are: 1) increased profitability of Alabama growers

Not Reporting on this Outcome Measure

Outcome #14

1. **Outcome Measures**

2) improved soil conditions

Not Reporting on this Outcome Measure

Outcome #15

1. **Outcome Measures**

3) reduced environmental impacts

Not Reporting on this Outcome Measure

Outcome #16

1. **Outcome Measures**

4) competitive Auburn and ACES Agronomic Research, Extension and Education system.

Not Reporting on this Outcome Measure

Outcome #17

1. **Outcome Measures**

Irrigation scheduling workshop knowledge increase

2. **Associated Institution Types**

- 1862 Extension

3a. **Outcome Type:**

Change in Knowledge Outcome Measure

3b. **Quantitative Outcome**

Year	Actual
2013	50

3c. **Qualitative Outcome or Impact Statement**

Issue (Who cares and Why)
Before the workshop, the knowledge on irrigation-scheduling tools ranged from low (28%) to medium (43%) and after the workshop increased to high (57%) to very high (29%). Understanding of the use of soil moisture sensors for irrigation scheduling increased to 77% and knowledge on the differences in water demand between growth stages increased by 30%.

What has been done
Six speakers from different Universities and USDA-ARS discussed the economic and agronomic benefits of irrigation and the different methods for irrigation scheduling.

Results
Knowledge Gained:
-The yield losses a corn/cotton farmer can perceive if irrigation does not provide plant demand at specific growth stages.
-Different methods of irrigation scheduling.
-Software available for irrigation scheduling.
-Use of soil moisture sensors for irrigation scheduling.

4. Associated Knowledge Areas

KA Code	Knowledge Area
102	Soil, Plant, Water, Nutrient Relationships
111	Conservation and Efficient Use of Water
112	Watershed Protection and Management
132	Weather and Climate

Outcome #18

1. Outcome Measures

Knowledge increase on the specific weather and climatic conditions associated with the risk of Hessian Fly infestation. Knowledge increase on the timing when specific weather conditions influence Hessian Fly infestation. Knowledge increase on the relation between ENSO and Hessian Fly infestation in Wheat

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2013	100

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Hessian Fly is the most important economic pest on Wheat causing high yield losses. If there is a relationship between climate variability and Hessian Fly population, then farmers can use the ENSO forecast to reduce potential agronomic and economic risks related to Hessian Fly infestation.

What has been done

Climate scientists and Entomologist present educational programs on the relationship between Hessian Fly population and climate variability at various farmers and professional meetings.

Results
Knowledge was increased on the specific climatic conditions and the timing of those related with an increase of Hessian Fly infestation risk. Producers gained knowledge on how the ENSO forecast can be used to support changes on agronomic management strategies conducive to a reduction of the Hessian Fly infestation risk.

4. Associated Knowledge Areas

KA Code	Knowledge Area
132	Weather and Climate
205	Plant Management Systems
211	Insects, Mites, and Other Arthropods Affecting Plants
212	Pathogens and Nematodes Affecting Plants

Outcome #19

1. Outcome Measures

Knowledge increase on: - The impact of ENSO on the southeast Climate, - The web-based climate tools on Agroclimate, - The relations between Hessian Fly and ENSO - The impact of weather and climate on nitrogen use efficiency on dry land corn production. - The use of a drought index to predict the risk for Aflatoxin contamination.

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2013	50

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
An increase in climate literacy and the climate-based related resources made available for stakeholders in Alabama and the Southeast can help them increasing resilience and adapting strategies to cope with climate variability and climate change.

What has been done
Presentations on climate information and results from research studies, as well as demonstrations on the use of climate-related decision support tools.

Results

The increase on awareness and willingness of using the climate forecast and the research findings have been measured through an increase on the number of emails received requesting the current ENSO forecast, increase on the number of invited climate-related presentations. Important is also the fact that some of our extension agents are now conducting climate-related presentations during farmers meetings. Some of the agents from the Agronomic Crops Team of ACES are giving presentation on the different ENSO phases and the use of some of the Climate-related tools. The development of the Climate Extension and Education ACES website along with the different county and regional meetings allowed the dissemination climate information in the 2013.

4. Associated Knowledge Areas

KA Code	Knowledge Area
132	Weather and Climate
205	Plant Management Systems

V(H). Planned Program (External Factors)

External factors which affected outcomes

- Natural Disasters (drought, weather extremes, etc.)
- Economy
- Government Regulations

Brief Explanation

Nothing to be reported

V(I). Planned Program (Evaluation Studies)

Evaluation Results

- Most of the activities conducted in 2013 were focused on presentations with few formal training. Data from a pre- and post- workshop survey conducted during the Irrigation scheduling workshops showed that, before the workshop, the knowledge on irrigation-scheduling tools ranged from low (28%) to medium (43%) and after the workshop increased to high (57%) to very high (29%). Understanding of the use of soil moisture sensors for irrigation scheduling increased to 77% and knowledge on the differences in water demand between growth stages increased by 30%.

- During the short Corn and Wheat, crop consultants expressed a lot of interest on the use of the climate forecast as a decision support tool.

- The number of phone call with climate -related questions as well as the request for presentations with climate -related topics has increased a 30%. Requests for information about current and expected climate forecast, interpretation of the forecast and potential implications on row crops have increased considerably.

The number of visits to the Climate Extension website increased from 2736 in 2012 to 5936 in 2013.

Key Items of Evaluation

The number of hits on the ACEs climate extension website increase 116% from 2012 to 2013. Farmers, crop consultants and extension personnel attending an irrigation workshop gained knowledge (50% increase) on irrigation scheduling strategies to increase water use efficiency and cope with drought. The interest on climate information and climate education among farmers and extension personnel has increased considerably about 30%. This is reflected on the number of phone calls, invitation to meetings, and request for climate information. The interest for agronomic management strategies linked to climate forecast has increased a 20% among farmers and extension personnel.