

V(A). Planned Program (Summary)

Program # 5

1. Name of the Planned Program

Environmental Systems and Sustainability

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
101	Appraisal of Soil Resources	0%		4%	
102	Soil, Plant, Water, Nutrient Relationships	5%		63%	
104	Protect Soil from Harmful Effects of Natural Elements	0%		2%	
111	Conservation and Efficient Use of Water	10%		10%	
112	Watershed Protection and Management	5%		7%	
131	Alternative Uses of Land	0%		4%	
132	Weather and Climate	5%		0%	
133	Pollution Prevention and Mitigation	5%		10%	
205	Plant Management Systems	10%		0%	
206	Basic Plant Biology	5%		0%	
211	Insects, Mites, and Other Arthropods Affecting Plants	10%		0%	
212	Diseases and Nematodes Affecting Plants	5%		0%	
213	Weeds Affecting Plants	5%		0%	
214	Vertebrates, Mollusks, and Other Pests Affecting Plants	5%		0%	
215	Biological Control of Pests Affecting Plants	5%		0%	
216	Integrated Pest Management Systems	5%		0%	
403	Waste Disposal, Recycling, and Reuse	5%		0%	
405	Drainage and Irrigation Systems and Facilities	5%		0%	
721	Insects and Other Pests Affecting Humans	5%		0%	
903	Communication, Education, and Information Delivery	5%		0%	
	Total	100%		100%	

V(C). Planned Program (Inputs)

1. Actual amount of FTE/SYs expended this Program

Year: 2014	Extension		Research	
	1862	1890	1862	1890
Plan	8.4	0.0	10.0	0.0
Actual Paid	10.2	0.0	14.0	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
259859	0	645104	0
1862 Matching	1890 Matching	1862 Matching	1890 Matching
259859	0	159839	0
1862 All Other	1890 All Other	1862 All Other	1890 All Other
0	0	1515408	0

V(D). Planned Program (Activity)

1. Brief description of the Activity

Varied activities, services and products are anticipated. These include formation of state and regional advisory groups, assignment of work groups to address specific issues and tasks associated with environmental systems and sustainability, participation of targeted audiences such as agricultural producers in environmental education programs, development of publications, fact sheets, web pages and other educational materials as program support, and reporting documents. Specific programs targeted toward agricultural producers in this plan include environmental stewardship programs, waste pesticide collection and disposal programs, recycling and solid waste management programs, development of agricultural water conservation practices to protect and maintain water resources, pharmaceutical and household chemical management and disposal programs and other initiatives related to water quality and nutrient management.

As related to environmental systems, research and extension programming will be conducted in many IPM areas, including the following:

1. Urban entomology and plant pathology,
2. Plant disease and nematode diagnostics,
3. Cotton and corn pest management,
4. Greenhouse tomato pest management,
5. Soybean management by application of research and technology, and
6. Public health issues related to vector control.

Research and Extension programming related to water resources will focus on:

1. Development of best management practices to reduce nutrient and sediment transport in rowcrop

and pasture systems.

2. Watershed scale assessment of individual and cumulative effects of BMPS on nutrient and sediment transport and water quality.
3. Development and evaluation of irrigation technologies that conserve water and energy.
4. Transfer of technologies that enhance water quality and reduce groundwater demands to producers and other stakeholders.

Research and Extension programming related to renewable fuels will focus on:

1. Development and evaluation of advanced plant materials that provide a renewable source of biomass for green energy production.
2. Development and evaluation of conversion technologies for producing advanced transportation fuels from renewable biomass and waste streams

2. Brief description of the target audience

Stakeholders and customers of research and extension programs represent a broad section of audiences, including agricultural producers and other rural audiences, agricultural support groups, environmental and water quality agencies, public health agencies and consumers.

3. How was eXtension used?

The resources provided through eXtension were used to supplement and enhance our public learning experiences provided by MSU Extension agents and specialists. eXtension was also used as a resource in state-based planning processes. Overall, 230 MSU employees are eXtension users. Further, MSU Extension has 71 employees that serve on one or more of the 66 Communities of Practice (COPs); MSU Extension employees are members of 39 COPs. 10 MSU Extension employees serve as a leader for a COP, leading 7 COPs. 3 MSU Extension personnel are members of the Imported Fire Ants COP. 1 MSU Extension employee is a member of the Urban Integrated Pest Management COP. 4 MSU Extension personnel are members of the Community, Local, and Regional Food Systems COP. 1 MSU Extension employee is a member of the Youth Agriculture COP.

V(E). Planned Program (Outputs)

1. Standard output measures

2014	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	63383	26240	0	0

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

Patent Applications Submitted

Year: 2014
 Actual: 2

Patents listed

- 1.Catalysts for converting syngas into liquid hydrocarbons and methods thereof
- 2.Upgrading of Bio-oil using synthesis gas

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2014	Extension	Research	Total
Actual	0	23	23

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Number of clientele attending workshops, seminars, short courses, and demonstrations.

Year	Actual
2014	14937

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O. No.	OUTCOME NAME
1	Number of producers adopting new practices, technologies, strategies, or systems based on research/extension recommendations.
2	Number of producers reporting increased income or profits/decreased expenses based on practice changes.
3	Number of producers reducing environmental impacts of pesticide use.
4	Number of producers improving their environmental stewardship.

Outcome #1

1. Outcome Measures

Number of producers adopting new practices, technologies, strategies, or systems based on research/extension recommendations.

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2014	2987

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

In South MS there has been a need to utilize land lying idle during the summer months behind a winter weight gain stocker calf program to see economic improvements. Therefore, Extension began evaluating a sod-based agriculture planting program with soybeans. Problems that existed were soil compaction behind the grazing of cattle, erosion, lack of irrigation, poor root development from grazing and/or disking and limited equipment necessary for vertical tillage, high cost of nitrogen for ryegrass, and high levels of phosphate accumulating in soils due to high use of chicken litter.

What has been done

Extension found that a one-pass planting system which vertically breaks in front of the planter units was beneficial. This prevents erosion by reducing the need for disking, allows planting into sod or ryegrass, breaks compaction zones ensuring the continued development of a tap root, and allows for greater water infiltration into the soil profile. This planting system also reduces the weed population and nitrogen needed for succeeding rye-grass crop and reduces excessive levels of phosphates generated by use of chicken litter.

Results

There has been a continued increase of soybean yields by about 25-30 Bu/ac which accounts for a gross of \$250-300/acre return. With the system, we are seeing more growers through South MS adopt the system, with an increase of 35%. The adoption of the system is also increasing in other areas of MS and other states and commodities, like tobacco. This expansion has been thanks to the production of the equipment and marketing by a local company in South MS. From our work we are seeing a net profit from the system of about \$1,250.00/ac return via the combined sale of

cattle and soybeans. Adoption of the one-pass planting system is reducing the number of trips across the field, soil disturbance, weed populations, erosion, and nitrogen use on ryegrass, and it is improving water infiltration, soybean yields, and the maintenance of soil phosphate levels.

4. Associated Knowledge Areas

KA Code	Knowledge Area
101	Appraisal of Soil Resources
102	Soil, Plant, Water, Nutrient Relationships
111	Conservation and Efficient Use of Water
205	Plant Management Systems
206	Basic Plant Biology
405	Drainage and Irrigation Systems and Facilities

Outcome #2

1. Outcome Measures

Number of producers reporting increased income or profits/decreased expenses based on practice changes.

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Actual
2014	2390

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Livestock producers have a large investment of equipment and resources on hay production system. Mississippians utilize approximately 48% of the pastureland in hay production. Regardless if a Mississippi's livestock producer makes its own hay or purchase it, it is an expensive alternative to grazing. Extending the effective grazing period and reducing the need for hat can have positive impacts and sustainability in livestock operations.

What has been done

The 330+ grazing initiative has been implemented to develop grazing systems that will enable livestock producers to graze year-round and use less or no hay. The program focus on six pillar species (bahiagrass, bermudagrass, tall fescue, alfalfa, annual ryegrass, and clovers) along with pinpoint systems (summer annual grasses and legumes). Integrating these forages into a rotational grazing systems will extend the grazing season and reduce hay supplementation. Maintaining pastures by using rotational grazing can also reduce weed completion.

Results

The rotational grazing system can reduce hay supplementation by 27% and reduce the numbers of acres in hay production by 42%. This is land then can be allocated to grazing management. Adoption of these management practices will allow to increase stocking rates by 25% and give an economic impact of \$1.8 million increase in revenue. Additionally, maintaining pastures that are more healthy and competitive by using rotational, will reduce weed completion and thus herbicide cost. The average herbicide application cost in pastures can range from \$8 to \$12 per acre per year. Utilizing rotational grazing system can have \$1.3 to \$1.9 million reduction in herbicide inputs.

4. Associated Knowledge Areas

KA Code	Knowledge Area
102	Soil, Plant, Water, Nutrient Relationships
111	Conservation and Efficient Use of Water
131	Alternative Uses of Land
132	Weather and Climate
205	Plant Management Systems

Outcome #3

1. Outcome Measures

Number of producers reducing environmental impacts of pesticide use.

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Actual
2014	574

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

In Mississippi it has become routine for soybean producers to apply foliar fungicides to soybeans at the R3 growth stage for prevention of diseases. Over the last several years growers have begun to "piggyback" insecticides with the fungicide to save application cost, but in many instances there is no insect pest at economic threshold. This often causes "flaring" of secondary insect pests requiring even more insecticide applications and unneeded pesticide in the environment.

What has been done

The MSU-ES has been conducting research and demonstration trials over the last several years to convince growers that scouting and treating on thresholds was more economically sound than automatic sprays and that automatic sprays killed beneficial insects that flared secondary caterpillar pests that actually required more applications.

Results

In 2014 Mississippi farmers planted 2,250,000 acres of soybeans. Approximately 60% of growers co-apply an insecticide and fungicide. Given low insect pressure in 2014, we were successful in convincing soybean farmers to leave this automatic mix out. At least 80% of producers took this advice based on direct feedback (2,250,000 x 80% = 1,800,000 would have been treated, 60% convinced to not to do this = 1,080,000 acres x \$13.00 per application = \$14,040,000 saved directly). Based on previous research it is likely that an early automatic pyrethroid application would flare secondary pests on an additional 50% of acres treated requiring additional applications (1,080,000 x 50% = 540,000 acres x \$18 caterpillar pests application = \$9,720,000). There is an estimated saving of \$23,760,000 to Mississippi soybean producers.

4. Associated Knowledge Areas

KA Code	Knowledge Area
112	Watershed Protection and Management
133	Pollution Prevention and Mitigation
205	Plant Management Systems
211	Insects, Mites, and Other Arthropods Affecting Plants
212	Diseases and Nematodes Affecting Plants
213	Weeds Affecting Plants
214	Vertebrates, Mollusks, and Other Pests Affecting Plants
215	Biological Control of Pests Affecting Plants
216	Integrated Pest Management Systems
721	Insects and Other Pests Affecting Humans
903	Communication, Education, and Information Delivery

Outcome #4

1. Outcome Measures

Number of producers improving their environmental stewardship.

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Actual
2014	621

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Pesticide applicators are legally required by both state and federal laws to be certified to apply restricted-use pesticides. Individuals who apply general use pesticides in a commercial situation are required by state law to be licensed. The Pesticide Safety Education Program does not advocate the use of pesticides over other means of pest management. Rather, it focuses on the safe and proper use of pesticides by individuals who have already determined that pesticides are necessary in a given situation.

What has been done

The Pesticide Safety Education Program conducted 284 workshops for 3,543 individuals during the reporting period. These workshops allowed the individuals to either become certified or renew certifications or licenses. By the renewal, producers and commercial applicators could produce the food and fiber that is a large portion of the MS economy and also could protect homes and lawns from insects, weeds, and diseases.

Results

The impact of this program not only adds to 50% of the MS economy but also allows applicators to maintain jobs that are related to the area of either agricultural production or commercial area programs. Certification of commercial applicators helps protect the health of individuals by reducing the disease carrying insects in and around homes.

4. Associated Knowledge Areas

KA Code	Knowledge Area
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104	Protect Soil from Harmful Effects of Natural Elements
112	Watershed Protection and Management
133	Pollution Prevention and Mitigation
205	Plant Management Systems
211	Insects, Mites, and Other Arthropods Affecting Plants
212	Diseases and Nematodes Affecting Plants
213	Weeds Affecting Plants
214	Vertebrates, Mollusks, and Other Pests Affecting Plants
215	Biological Control of Pests Affecting Plants
216	Integrated Pest Management Systems
403	Waste Disposal, Recycling, and Reuse

V(H). Planned Program (External Factors)

External factors which affected outcomes

- Natural Disasters (drought, weather extremes, etc.)
- Economy
- Government Regulations
- Competing Public priorities
- Competing Programmatic Challenges

Brief Explanation

{No Data Entered}

V(I). Planned Program (Evaluation Studies)

Evaluation Results

MSU Extension agents and specialists, as well as MAFES faculty, used a variety of recommended methods to gather needed information. Specific strategies were initiated and utilized for collecting evaluation information to determine program outputs and outcomes (see impact statements for examples). In FY 2014, MSU Extension agents and specialists were required to submit four quarterly reports (January, April, July, and September). This quarterly report collects information about the number of contacts, types of contacts, and number of programs conducted in each Planned Program Area. In addition, two narrative Accomplishment Reports are required from each MSU Extension employee each year. Finally, a specific request for impact statements from MSU Extension and MAFES faculty and staff is also made. The evaluation results shared through our impact statements are a combination of this quantitative and qualitative data.

Late in the 2014 program year, we introduced a Standardized Extension Evaluation Survey. The Standardized Extension Evaluation Survey was designed for use in any MSU Extension Service program, workshop, or event with adults. The survey assesses program process, participant satisfaction, knowledge and/or skill change, and behavioral intentions. It provides a ready-made evaluation for agents and specialists to use and will allow us to

aggregate data across the state. A small number of agents and specialists have utilized the survey to date, but we hope use will increase over time.

Key Items of Evaluation