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Adoption of Best Management Practices by Louisiana Rice Producers

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The impact of agricultural production practices on the environment is one of the most important issues facing production agriculture. Two specific pieces of federal legislation are at the center of attention in Louisiana, as well as across the country. The Coastal Nonpoint Source Pollution Control Program, Section 6217 of the Coastal Zone Act Reauthorization Amendments (CZARA) of 1990, addresses nonpoint-source pollution problems in coastal waters. Section 6217 requires states and territories to develop coastal nonpoint pollution control programs. In its program, a state or territory describes how it will implement nonpoint-source pollution controls, known as management measures, that conform with those defined by EPA. The second piece of legislation involves Section 303(d) of the Clean Water Act, which requires states to develop lists of impaired waters that do not meet water quality standards, even after point-sources of pollution have installed the minimum required levels of pollution control technology. States must establish priority rankings for waters on the lists and develop total maximum daily loads (TMDLs) for listed waters. A TMDL specifies the maximum amount of a pollutant that a water body can receive and still meet water quality standards, and it allocates pollutant loadings among point and nonpoint pollutant sources.

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In 1996, the EPA's Office of Water determined there was a need for a comprehensive evaluation of EPA's and the states' implementation of their Section 303(d) responsibilities. The purpose of the proposed revisions to the TMDL regulations is to provide states with clear, consistent, and balanced direction for listing waters and developing TMDLs, resulting in restoration of water bodies not meeting water quality standards. Included in these revisions were a more comprehensive listing of impaired water bodies as well as a new requirement that states develop more specific TMDL programs and establish, and submit to EPA for approval, schedules for establishing TMDLs with no longer than a 15-year time frame for completion.

With its large demand for irrigation water, the production of rice is receiving close scrutiny by regulatory agencies regarding the impact of production practices on nonpoint-source water pollution. In 1999, the LSU Agricultural Center released a report focused on best management practices for rice production (LSU Agricultural Center, 1999). Although research on alternative rice production practices to limit nonpoint-source pollution has been conducted for many years, no information was available on the adoption rates of these practices by Louisiana rice producers.

Methods and Results

A research study was designed to measure the adoption rate of specific best management practices by Louisiana rice producers and to identify factors that contributed to the adoption of those practices (Zansler, 1999). A mail survey of producers was conducted early in 1999 to obtain data on rice farm characteristics and use of best management practices. A total of 157 rice producers responded to the survey.

A summary of descriptive data on rice producers responding to the survey is included in Table 1. Just over one-half of the rice farms were organized as individual farm operations, and another one-third were organized as partnerships. Approximately one-half of the farms surveyed reported

Table 1. Descriptive data on rice farms surveyed for adoption of best management practices

Farm characteristic	Percentage of farms
Farm is organized as a:	
(a) individual operation	56%
(b) partnership	33%
(c) family corporation	9%
(d) non-family corporation	2%
Gross farm income for 1998 was:	
(a) less than $50,000	14%
(b) between $50,000 and $99,999	21%
(c) between $100,000 and $249,999	25%
(d) between $250,000 and $499,999	26%
(e) more than $500,000	14%
Farm operation's debt-to-asset ratio is:	
(a) less than 20%	44%
(b) between 20% and 29%	17%
(c) between 30% and 40%	19%
(d) more than 40%	20%
Aware of BMPs recommended for rice production in Louisiana	64%
Aware of Coastal Zone Act Reauthorization Amendments of 1990	53%
Aware of Clean Water Act legislation to control nonpoint-source pollution	51%
Familiar with the term "total maximum daily load" (TMDL)	34%

gross farm income ranging from $100,000 to $499,999. Another 21 percent of farms reported gross farm income in the $50,000 to $99,999 range. Approximately 44 percent of the surveyed farms reported debt-to-asset ratios of less than 20 percent.

Sixty-four percent of the farms surveyed indicated they were aware of the best management practices recommended for rice production in Louisiana. Approximately one-half of the producers indicated they were familiar with the proposed implementation of regulations of the CZARA and Clean Water Act regarding nonpoint-source water pollution. And finally, about one-third of the producers responding to the survey indicated they were familiar with the term "total maximum daily load" (TMDL).

The adoption rates of rice best management practices by the farms surveyed are reported in Table 2. More than 70 percent of farms indicated that, when water leveling fields in the spring, water is held on the field to allow sediment to settle out. Approximately one-third of the farms reported that when extensive water leveling is required, the work is performed in the fall, and water is held on the field until sediment has settled out. Seventy-two percent of farms indicated that some type of grade stabilization structures had been installed and were being maintained to reduce soil erosion by irrigation floodwater leaving rice fields.

Relatively high adoption rates also were reported in the areas of pesticide and nutrient management. More than 70 percent of farms reported that pesticide applications were restricted only to those deemed necessary for crop protection and that economic thresholds were used to determine when to make applications. Almost one-half of the farms reported that integrated pest management systems, incorporating a variety of pest control measures, were used. Approximately 75 percent of the farms reported nutrient applications were based on soil analysis results and that soil tests on rice fields were taken on a regular basis.

A logit analysis was conducted on each of the best management practices included in the survey. The purpose of the logit analysis was to identify specific factors that influenced or contributed to the adoption of best managment practices. Although results of the logit analysis varied somewhat across the different practices, several factors and farm characteristics were identified that significantly increased the adoption of various best management practices. Some of these factors included farm size, percent of land owned, farm debt level, location of farm within a major rice-producing area, availability of environmental cost-share programs by state or federal agencies, participation by producers in rice producer associations, as well as awareness on the part of producers of current nonpoint-source pollution legislation and issues.

Table 2. Percent of surveyed rice farms adopting specific best management practices

Best management practice	Adoption rate
Sediment management in surface water:	
In fields that require water leveling in the spring, irrigation water will be retained in the field until 50% reduction in sediment is attained or 15 days, whichever comes first.	71.4%
Suspended sediment test kit or other approved methods of measuring suspended sediment will be used to time planting and water release to minimize soil loss.	19.6%
In fields that require extensive water leveling, the work is done in the fall, and water will be held on the field until a 50% reduction in sediment is attained or 15 days to allow for settling.	32.5%
Grade stabilization structures are installed and maintained to reduce erosion.	72.0%
Pesticide management:	
Pesticide applications restricted only to those deemed necessary to protect the crop.	73.3%
Integrated pest management systems employed using cultural, biological, and chemical methods.	47.1%
Field scouting and economic thresholds used to determine when and if pesticides are applied.	78.3%
Nutrient management:	
Nutrient application rates are based on results of soil analysis.	74.5%
Soil test are taken at least every three to five years.	78.3%

Implications

Three important implications can be drawn from the study. First, the concentration of Louisiana rice production in watersheds that drain into coastal areas underscores the importance of best management practices for rice to maintain water quality. Implementation of TMDL limits on local streams and other water bodies will directly affect the use and management of irrigation water in rice production. Second, survey results presented here indicate that rice producers in Louisiana have adopted practices to manage sediment, pesticide, and nutrients in surface water at a relatively high rate.

Finally, analysis of survey results indicates that the adoption of best management practices by rice producers can be influenced by several factors. While some of these factors are specific to the farm operation, several other important factors also can influence adoption rates. The availability of cost-share programs by state or federal agencies was shown to increase adoption of best management practices. Furthermore, and most important, the results presented here indicate that efforts to educate producers about nonpoint-source pollution and recommended practices to minimize it can be effective in encouraging producers to adopt best management practices, whether those educational efforts are through dissemination of information at producer meetings or other outlets.

References

LSU Agricultural Center. *Louisiana Best Management Practices for Rice*. July, 1999.

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