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## ECONOMIC IMPACTS OF BLACKBIRD DAMAGE TO THE RICE INDUSTRY

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**Abstract:** In cooperation with the Louisiana Rice Research Board, the Louisiana State University Rice Research Station and the USA Rice Federation, we conducted a questionnaire survey in 2002 to estimate the economic impacts of blackbirds on the rice industry in Louisiana, Texas, Arkansas, California, and Missouri. Survey areas in rice producing states were identified based on the 2001 National Agricultural Statistic Service's rice harvest records. The Farm Service Agency (FSA) offices in each state provided a mailing list of farm operators growing rice and approximately one third of the rice farm operators were randomly selected to be surveyed. The questionnaire was mailed to 6,191 rice farm operators in Louisiana, Texas, Arkansas, California, and Missouri during May and June, 2002. The overall response rate was 16%, 969 questionnaires returned. These respondents represented 440,695 acres of rice planted in 2001. Overall, 62% of the respondents that farmed rice in 2001 reported damage from blackbirds. Those respondents reported bird damage to 58,135 acres of newly planted rice and 95,208 acres of ripening rice or a total production loss of 33,623,500 lbs of rice, which at 2001 prices is equivalent to \$1,916,539. In addition, 56% of the respondents to the question on bird damage prior to 2001 reported damage as far back as 1996. For all states, between 1996-2000 the average percent annual blackbird damage to newly planted rice ranged from 6% to 15%, and the average percent annual blackbird damage to ripening rice ranged from 6% to 14%. Louisiana and Arkansas respondents reported the highest damage, respectively. Rice operators that responded to questions regarding bird control spent between \$316,578 and \$460,000 to prevent bird damage to their rice. About 6% of the respondents spent over \$4,000 each on hazing birds from their rice crop. Shooting and propane cannons were the most widely used methods for bird control. When production losses due to birds are projected for each surveyed state, results suggest that blackbirds directly caused about \$13.4 million in rice damage in 2001. Arkansas and Louisiana had the greatest losses at \$4.8 and \$3.9 million, respectively, which represents over 60% of the total damage. Also, it was projected that approximately \$3.2 million was spent on prevention of blackbird damage to rice and approximately \$4.9 million was lost in government price supports. Our study estimated that minimal economic loss to the rice industry in Louisiana, Arkansas, Texas, California and Missouri from blackbirds in 2001 due to direct damage, prevention and lost price support was \$21.5 million.

**Key words:** *Agelaius phoeniceus*, bird damage, blackbirds, economics, impacts, questionnaire, prevention, price support, production loss, rice, rice operators, red-winged blackbird

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## INTRODUCTION

Blackbird (*Icterinae*) damage to rice has generated much concern in Louisiana, Texas, California, Arkansas and Missouri; and there is considerable public support for developing more effective management methods for reducing damage caused by blackbirds. United States Department of Agriculture (USDA) Wildlife Services (WS) states operational programs, the WS National Wildlife Research Center (NWRC), many state rice growers associations, and extension agents consider resolving blackbird damage to rice a high priority. Three USDA WS program-wide Research Needs Assessments conducted in 1992, 1996 and 2001 consistently placed a high priority on understanding and finding solutions to resolving blackbird/agriculture problems (Bruggers et al. 2002). The NWRC has developed a research project focused specifically on reducing bird damage to rice; improving profitability to growers by developing new and improved management strategies; and developing partnerships between rice producers, rice commodity groups, rice research boards, universities, and local state and federal agencies.

To understand the importance of blackbird damage to the United States (U.S.) rice industry it is essential to first recognize the forces that affect the U.S. rice market. Rice producers in Arkansas, Louisiana, California, Texas, Mississippi and Missouri planted about 3.3 million acres of rice in 2001 accounting for the majority of rice produced in the United States (National Agricultural Statistics Service 2003). Of these acres planted, Arkansas represented about 49%, Louisiana about 16%, California about 14%, Mississippi about 8%, Texas about 7% and Missouri about 6%.

The U.S. rice industry accounts for only a small percentage of global rice production (approximately 2%), which

makes it heavily influenced by the world rice market. The U.S. rice industry has been expanding and exports to foreign markets account for 45% or more of total USA-produced rice usage annually. Rising prices in the global rice market and increased domestic demand have increased the domestic price for rice. The overall production of any product is determined by the balance between supply and demand. Factors affecting the long-term demand for U.S. rice in domestic and foreign markets include increasing domestic per capita consumption levels, U.S. population growth and the size and composition of the global rice trade ([www.ers.usda.gov](http://www.ers.usda.gov)). The long-term supply of U.S. rice production is affected by producer subsidies, weather, technological advances such as higher yielding long-grain varieties, changes in planting acreage and bird damage. Obviously, demand is determined by consumers while supply is determined by producers. Demand side factors therefore are outside the control of rice producers which leaves a limited number of supply factors that producers can adjust in an attempt to influence production. One such supply side factor is blackbird damage to rice production.

Several species of blackbirds, particularly red-winged blackbirds (*Agelaius phoeniceus*), common grackles (*Quiscalus quiscula*), and brown-headed cowbirds (*Molothrus ater*), cause extensive damage to newly planted and ripening rice. Damage is not uniformly distributed, but is localized and proportional to the presence and size of any nearby blackbird roosts. In Louisiana, blackbird damage to newly planted rice can be locally severe (Wilson 1985). Some growers report 100% loss and replanting is required. In Missouri, blackbird numbers in a single ripening rice field were documented at over one million birds (Robert Byrd, pers. commun. 2004). In this case, blackbirds

caused severe damage not only by eating rice, but also by dislodging, shattering and contaminating seed heads. Breeding bird surveys indicate that breeding red-winged blackbird populations in the Mississippi Alluvial Plain, which includes major rice growing areas in Louisiana, Arkansas and Missouri, have increased at an annual rate of 2.6% (P= 0.01, 95% confidence interval 0.7% to 4.5%) (Sauer et al. 2003). In addition, blackbird numbers in these states prior to rice planting have been estimated in the millions. For example, in a five-parish area in Louisiana, pre-planting estimates of blackbirds between 1996 and 2005 have fluctuated from a low of 1.3 million in 2001 to a high of 15 million in 2005.

Previous estimates of blackbird damage to rice have been based solely on an arbitrary figure for damage and then extrapolated to current rice acres (Pierce 1970, Besser 1985, Decker et al. 1990). In 2002, we cooperated with the Louisiana Rice Research Board, the Louisiana State University Rice Research Station, and the USA Rice Federation to conduct a questionnaire survey of rice farmers in Arkansas, California, Louisiana, Texas and Missouri to estimate the economic impacts blackbirds had on the rice industry for the 2001 crop year. This study is the first survey study designed to elicit from producers the extent of blackbird damage to their rice crops.

Bird damage decreases individual producer yield and in the case of significant damage may affect overall levels of total domestic production. Through different types of bird management practices it may be possible for producers to decrease bird damage resulting in an increase in individual supply. Strong competition in the global market and the role of the U.S. as a rice exporter emphasizes the importance of mitigating the effects of bird damage on rice yields. This survey helped researchers to

understand the extent of potential bird damage to U.S. rice farmers.

## **METHODS**

We developed a questionnaire that included 20 questions divided into three general categories: 1) farming practices 2) extent of blackbird damage and 3) bird management. The farming practices section elicited questions regarding whether rice was farmed in 2001, with subsequent questions discerning the location of the farm, length of time farming rice, acreage, and yield on 1<sup>st</sup> and 2<sup>nd</sup> crops. The section on the extent of blackbird damage sought to determine the number of acres and production lost to newly seeded rice and headed rice as a result of blackbird damage. This portion of the survey concentrated on production losses, damaged acres, associated costs and asked for estimated percentages lost in production to seeded and headed rice as a result of blackbird damage and damage resulting from other avian species. In the bird management section questions were designed to gather responses about damage prevention methods and associated costs.

A small pilot survey of 20 Louisiana rice operators was conducted to determine if questions were understandable and interpreted similarly by respondents. The Farm Service Agencies (FSA) in Arkansas, California, Louisiana, Texas and Missouri assisted in preparing pre-printed mailing lists of rice operators. Mississippi rice operators were not included in the questionnaire survey because there was no response from their respective FSA offices regarding mailing information for rice operators.

We randomly selected approximately one third of the rice operators from each county or parish to be surveyed. A single mailing of 6,191 questionnaires to rice operators was conducted during May and June 2002. The sample size of respondents

was roughly 969, which represents approximately 5% of the total number of rice operators in the survey states. Selectivity bias may be an issue; however respondents were fairly evenly distributed across the rice-growing regions and not clustered from any one location. The last questionnaire was returned from rice farmers in December 2002. Summary statistics of survey questions were derived for each of the three categories and are presented as proportions of rice operators responding to individual questions. The survey results are then used to extrapolate to the total acres of rice farmed in states surveyed in 2001 to examine what the estimated losses would be for the rice industry in those states in 2001 if all farmers suffered similar damage levels.

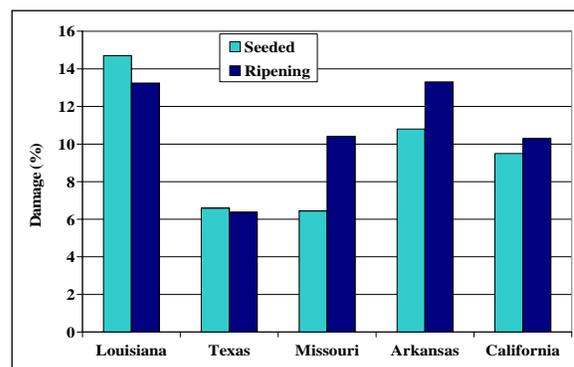
## RESULTS

The sample response rate was 16%, specific in-state response rates were 8% for Texas, 11% for Missouri, 17% for Louisiana, 19% for Arkansas and 23% for California. About 73% of the respondents farmed rice in 2001. Total land farmed in 2001 for the states surveyed was 3,079,000 acres, and respondents farmed 440,695 acres of rice or just over 14% of the rice crop in states surveyed in 2001.

Under the category of farming practices, 67% of respondents reported that they had farmed rice for more than 11 years, and that they farmed an average of 623 rice acres (median: 450 acres) in 2001. The U.S. average yield for that year was 6,578 lbs per acre and respondents reported an average yield on the first crop of 6,810 lbs per acre (median: 6,642 lbs per acre) (National Agriculture Statistics Service 2003). In Louisiana and Texas, respondents reported an average second crop yield of 1,600 lbs per acre (median: 1,500 lbs per acre).

Sixty-two percent of respondents reported blackbird damage, which varied

from 54% in California, 56% in Arkansas, 65% in Louisiana, 69% in Missouri and 70% in Texas. Respondents reported that blackbirds damaged an average of 11.7% of seeded rice and 13.3% of ripening rice between 1996 and 2000 (Figure 1). For 2001, respondents reported 58,135 acres of seeded rice and 95,208 acres of ripening rice damaged by blackbirds, resulting 33 million pounds of rice damaged by blackbirds valued at \$1.9 million (\$5.70/100 lbs).

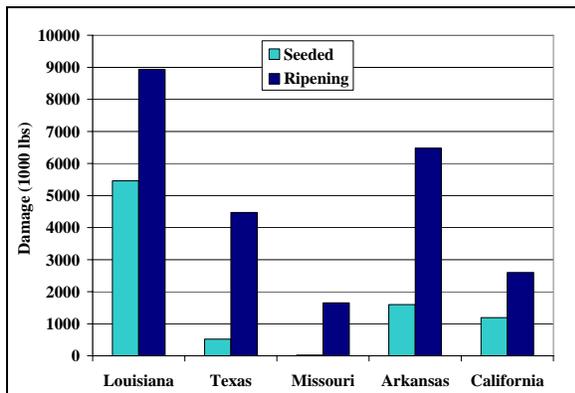


**Figure 1. Blackbird damage to seeded rice and ripening rice reported by questionnaire respondents from Louisiana, Texas, Missouri, Arkansas and California for crop year 2001.**

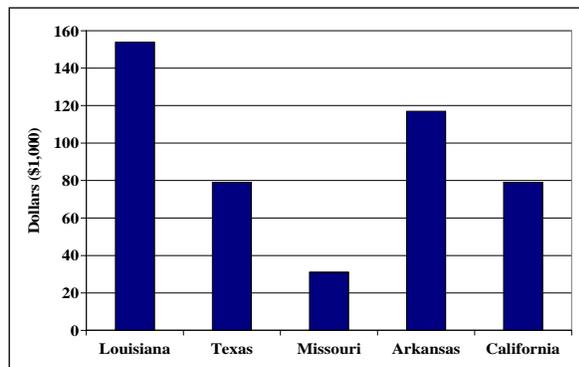
While the percent damage to seeded rice was very close to that of ripening rice, the level of damage in production showed something different. All states reported heavier losses to ripening rice than seeded rice (Figure 2), which is due mainly to greater blackbird numbers during this period and seeding practices such as drill planting that make it harder for blackbirds to find and consume the seed. Louisiana reported the largest production losses in both categories. This may be one of the factors that contributed to Louisiana having the lowest rice yield per harvested acre.

Respondents reported spending a total of approximately \$460,000 to manage blackbird damage to seeded rice and ripening rice. Respondents in Louisiana spent the most for bird management which was approximately \$154,000 (Figure 3).

Respondents from all states surveyed averaged approximately \$914 (median: \$500) for bird management. Shooting and the use of propane cannons appear more widely used than other control techniques such as airplane for hazing, trapping, poisons and pyrotechnics.



**Figure 2. Production losses to seeded rice and ripening rice from blackbirds reported by questionnaire respondents from Louisiana, Texas, Missouri, Arkansas and California for crop year 2001.**



**Figure 3. Expenditures reported by questionnaire respondents in Louisiana, Texas, Missouri, Arkansas and California to manage blackbirds causing damage to seed rice and ripening rice for crop year 2001.**

Examination of the potential economic impacts of blackbird damage to the rice industry in the states surveyed requires extrapolation of these survey results. This raises obvious concerns, however, with that being said if the sample is representative of rice producers in general

then certain projections can be made. Extrapolation of the results of this survey for 2001 gives an estimate of the total monetary impact of blackbird damage in pound and value of rice lost, in expenditures for bird management and lost price support.

Projected estimated production loss for the rice industry in Louisiana, Texas, Arkansas, California, and Missouri in 2001 was 235 million pounds of rice valued at \$13.4 million. This would have represented approximately 1% of the total rice production for that year. Projected estimated cost for prevention of rice damage for the rice industry in Louisiana, Texas, Arkansas, California and Missouri in 2001 was \$3.2 million. Projected USDA price support loss for the rice industry in these same states in 2001 was \$4.9 million. USDA price supports are based on actual out of field yield which is effected when blackbird cause damage.

All of the potential loss amounts from blackbird damage are borne directly to the rice producer. In other words, producers experience the loss in production from blackbird rice consumption/damage, they must pay for the bird damage management methods that they use and additionally they loose out on the price supports. As a result, projected 2001 loss amounts to the rice industry in Louisiana, Texas, Arkansas, California and Missouri due to direct damage, prevention and lost price support from blackbirds was \$21.5 million.

## CONCLUSION

Projected survey results imply that in 2001 blackbirds caused estimated damage valued at \$21.5 million to the rice crops in Louisiana, Texas, Arkansas, California, and Missouri. Of this, it was estimated that considerable expenditures (\$3.2 million) were made in 2001 to reduce blackbird damage to rice. The U.S. is currently trying to increase their share of the global rice

market. A limited portion of the high demand in the global rice market is being met by the rice supply produced in the U.S. Additionally, domestic demand for rice is increasing creating the potential for an expansion of the domestic rice supply. This supply may be met in part by increasing the number of rice plantings in the future, but also by decreasing the amount of blackbird damage to seeded rice and ripening rice. Diminishing the impact of blackbirds is one way to boost U.S. domestic supply. Blackbird populations in some areas have been increasing and given the difficulty of conducting organized management strategies, it seems likely the economic impact of blackbird damage to rice is only going to increase. Furthermore, much could be done to facilitate the further development and use of new strategies to reduce blackbird damage to rice.

Questionnaire data indicates that blackbird damage is not a localized problem but a general problem that rice farmers experience annually. Like most survey studies the results are often based on perception rather than direct measures, however, surveys of this type are important in providing insight into the impacts blackbirds have on the rice industry. We recommend that a scientific field assessment method for measuring blackbird damage to rice should be developed in order to obtain accurate data on the impacts of blackbird damage to rice.

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