

Estimation of Fungicide Cost for Rice Production in the United States

Brad Watkins and Ranjit Mane

**University of Arkansas System Division of Agriculture
Rice Research and Extension Center
Stuttgart, Arkansas**

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Fungicide Use in US Rice Production

- Rice diseases are a potential threat to rice production worldwide.
 - Can reduce grain yields and quality
 - Can increase production expenses
- Fungicides are widely used throughout the US to control rice diseases
- Primary rice diseases controlled with fungicide
 - Sheath blight
 - Blast
 - Kernel Smut and False Smut

Reason for Study

- Approached by Dr. Yulin Jia (Research Plant Pathologist, USDA-ARS, Dale Bumpers Rice Research Center, Stuttgart, AR) in December 2015
- Wanted to know the cost of fungicide application in US rice production
 - Quantifying the monetary cost of fungicide application in rice would validate the need for research in this area
 - Wanted a good reference to cite for this number
- Wanted this number estimated with the goal of publishing it for citation purposes.
- What follows is the culmination of about 3 days work shortly before the Christmas Break (Sent him estimate December 21)

Clarification about the Estimate

- What this is not.....
 - Not an estimate of the economic cost of disease damage or disease control in US rice production
 - No yield or quality losses are included (this would be a completely different analysis)
- What this is.....
 - An estimate of the cost of fungicide application for the US for a typical production year

Data Used in the Analysis

- 2015 rice planted acres by rice producing state and grain type (LG, MG, and SG)
 - USDA-NASS, Quick Stats Database
- Rice acres by variety type and rice producing state
 - Proceedings... Thirty-Fifth Rice Technical Working Group (RTWG), New Orleans, Louisiana, February 18-24, 2014
 - Used most recent data (2013 data)
- Per acre fungicide expenses by rice producing state
 - 2015 crop production budgets from each state
 - Personal communication with various experts

Rice Producing States Included in the Analysis (Based on USDA-NASS Numbers)

- Arkansas
- California
- Louisiana
- Mississippi
- Missouri
- Texas

The 2014 RTWG reports rice acres by variety for Florida, but USDA-NASS does not report rice planted acres for Florida. Florida was excluded from the analysis.

2015 USDA-NASS Rice Planted Acres

Rice Planted Acres by State, 2015

<i>State</i>	<i>LG</i>	<i>MG</i>	<i>SG</i>	<i>Total</i>
Arkansas	1,070,000	245,000	1,000	1,316,000
California	6,000	375,000	35,000	416,000
Louisiana	355,000	65,000	---	420,000
Mississippi	150,000	1,000	---	151,000
Missouri	170,000	7,000	---	177,000
Texas	125,000	6,000	---	131,000
<i>United States</i>	<i>1,876,000</i>	<i>699,000</i>	<i>36,000</i>	<i>2,611,000</i>

Source: USDA, NASS, Quick Stats Database

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Source: USDA, NASS, Quick Stats Database

Rice Planted Acres by State, 2015

<i>State</i>	<i>LG</i>	<i>MGSG</i>	<i>Total</i>
Arkansas	1,070,000	246,000	1,316,000
California	6,000	410,000	416,000
Louisiana	355,000	65,000	420,000
Mississippi	150,000	1,000	151,000
Missouri	170,000	7,000	177,000
Texas	125,000	6,000	131,000
<i>United States</i>	<i>1,876,000</i>	<i>735,000</i>	<i>2,611,000</i>

Source: USDA, NASS, Quick Stats Database

Separating 2015 USDA- NASS Rice Planted Acres by Variety Type using RTWG Data

Rice Variety Type Groupings Used in the Analysis

- Conventional Long Grain (CONV)
- Clearfield (CL)
- Hybrid (HYB)
- Clearfield Hybrid (CLHYB)
- Medium and Short Grain (MGSG)

Rice Acres by State and Variety Type, 2013

<i>State*</i>	<i>CONV</i>	<i>CL</i>	<i>HYB</i>	<i>CLHYB</i>	<i>MGSG</i>	<i>Total</i>
Arkansas	242,700	269,361	112,364	327,241	114,603	1,066,269
California	6,000	0	0	0	560,000	566,000
Louisiana	149,369	137,837	6,507	90,672	20,835	405,220
Mississippi	31,993	43,537	9,689	36,914	0	122,133
Texas	50,855	20,461	45,659	25,901	0	142,877
<i>Total#</i>	<i>480,917</i>	<i>471,196</i>	<i>174,220</i>	<i>480,728</i>	<i>695,438</i>	<i>2,302,499</i>

* Rice acres by variety data not available for Missouri in 2014 RTWG.

Rice variety data available for Florida IN 2014 RTWG, but USDA-NASS does not report rice acres data for Florida

Source: Proceedings... Thirty-Fifth Rice Technical Working Group (RTWG), New Orleans, Louisiana, February 18-24, 2014

Rice Acres by State and Variety Type, 2013

<i>State*</i>	<i>CONV</i>	<i>CL</i>	<i>HYB</i>	<i>CLHYB</i>	<i>MGSG</i>	<i>Total</i>
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California	6,000	0	0	0	560,000	566,000
Louisiana	149,369	137,837	6,507	90,672	20,835	405,220
Mississippi	31,993	43,537	9,689	36,914	0	122,133
Texas	50,855	20,461	45,659	25,901	0	142,877
<i>Total#</i>	<i>480,917</i>	<i>471,196</i>	<i>174,220</i>	<i>480,728</i>	<i>695,438</i>	<i>2,302,499</i>

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Rice variety data available for Florida IN 2014 RTWG, but USDA-NASS does not report rice acres data for Florida

Source: Proceedings... Thirty-Fifth Rice Technical Working Group (RTWG), New Orleans, Louisiana, February 18-24, 2014

Converting Long Grain Acres by Variety Type into Percentages

<i>State</i>	<i>CONV</i>	<i>CL</i>	<i>HYB</i>	<i>CLHYB</i>	<i>Total</i>
Arkansas	242,700	269,361	112,364	327,241	951,666
California	6,000	0	0	0	6,000
Louisiana	149,369	137,837	6,507	90,672	384,385
Mississippi	31,993	43,537	9,689	36,914	122,133
Texas	50,855	20,461	45,659	25,901	142,877



<i>State</i>	<i>CONV</i>	<i>CL</i>	<i>HYB</i>	<i>CLHYB</i>	<i>Total</i>
Arkansas	26%	28%	12%	34%	100%
California	100%	0%	0%	0%	100%
Louisiana	39%	36%	2%	24%	100%
Mississippi	26%	36%	8%	30%	100%
Texas	36%	14%	32%	18%	100%

Percentages Used to Separate USDA-NASS Planted Rice Long Grain Acres by Variety Type

<i>State</i>	<i>CONV</i>	<i>CL</i>	<i>HYB</i>	<i>CLHYB</i>
Arkansas	26%	28%	12%	34%
California	100%	0%	0%	0%
Louisiana	39%	36%	2%	24%
Mississippi	26%	36%	8%	30%
Texas	36%	14%	32%	18%

Percentages Used to Separate USDA-NASS Planted Rice Long Grain Acres by Variety Type

<i>State</i>	<i>CONV</i>	<i>CL</i>	<i>HYB</i>	<i>CLHYB</i>
Arkansas	26%	28%	12%	34%
California	100%	0%	0%	0%
Louisiana	39%	36%	2%	24%
Mississippi	26%	36%	8%	30%
Missouri*	26%	28%	12%	34%
Texas	36%	14%	32%	18%

* Rice acres by variety data not available for Missouri in 2014 RTWG. Assumed same variety type percentages for Arkansas, since most Missouri rice acres are located in Missouri Bootheel

Estimated 2015 USDA-NASS Rice Planted Acres by State and Variety Type

<i>State</i>	<i>CONV</i>	<i>CL</i>	<i>HYB</i>	<i>CLHYB</i>	<i>MGS</i>	<i>Total</i>
Arkansas	272,879	302,854	126,336	367,931	246,000	1,316,000
California	6,000	0	0	0	410,000	416,000
Louisiana	137,950	127,300	6,010	83,740	65,000	420,000
Mississippi	39,293	53,471	11,900	45,337	1,000	151,000
Missouri	43,355	48,117	20,072	58,456	7,000	177,000
Texas	44,492	17,901	39,946	22,661	6,000	131,000
<i>Total</i>	<i>543,968</i>	<i>549,643</i>	<i>204,264</i>	<i>578,125</i>	<i>735,000</i>	<i>2,611,000</i>

Calculation of Fungicide Cost Per Acre by State

Fungicide Cost (\$/ac):

Chemical Cost (\$/ac) + Custom Application Cost (\$/ac)

**(Calculated by State based on Crop
Enterprise Budgets and personal
communication)**

Enterprise Budget Website Locations by Rice Producing State

University of Arkansas Enterprise Budgets:

<http://www.uaex.edu/farm-ranch/economics-marketing/farm-planning/budgets/>

Mississippi State University Enterprise Budgets:

<http://www.agecon.msstate.edu/whatwedo/budgets.asp>

LSU Enterprise Budgets:

http://www.lsuagcenter.com/en/crops_livestock/crops/rice/

Texas A&M Enterprise Budgets:

<http://agecoext.tamu.edu/resources/crop-livestock-budgets/budgets-by-extension-district/>

University of Missouri Enterprise Budgets:

<http://extension.missouri.edu/scott/crop-budgets.aspx>

California (UC Davis) Enterprise Budgets:

<http://coststudies.ucdavis.edu/en/current/>

Estimated Fungicide Chemical Cost per Acre by State and Variety Type, 2015 Dollars

<i>State</i>	<i>CONV</i>	<i>CL</i>	<i>HYB</i>	<i>CLHYB</i>	<i>MGSG</i>
Arkansas	24.80	24.80	0.00	0.00	24.80
California	22.00	---	---	---	22.00
Louisiana	19.50	19.50	17.69	17.69	19.50
Mississippi	18.69	24.91	0.00	0.00	18.69
Missouri	28.00	28.00	0.00	0.00	28.00
Texas*	53.47	53.47	38.85	38.85	53.47

* Texas fungicide chemical costs per acre for non-hybrids (main crop = \$46.90/ac; ratoon = \$11.73/ac) and hybrids (main crop = \$34.08/ac; ratoon = \$8.52/ac) from Dr. Lloyd T. (Ted) Wilson, Center Director, Texas A&M AgriLIFE Research Center, Beaumont, TX, personal communication. Values adjusted based on percent split in main and ratoon crop acres in 2015 October Texas rice acreage report.

Estimated Fungicide Custom Application Cost per Acre by State and Variety Type, 2015 Dollars

<i>State</i>	<i>CONV</i>	<i>CL</i>	<i>HYB</i>	<i>CLHYB</i>	<i>MGSG</i>
Arkansas	7.00	7.00	0.00	0.00	7.00
California	9.00	---	---	---	9.00
Louisiana	6.00	6.00	6.00	6.00	6.00
Mississippi	6.88	6.88	0.00	0.00	6.88
Missouri	6.50	6.50	0.00	0.00	6.50
Texas*	10.00	10.00	10.00	10.00	10.00

*Texas fungicide custom application costs per acre from Dr. Lloyd T. (Ted) Wilson, Center Director, Texas A&M AgriLIFE Research Center, Beaumont, TX, personal communication.

Estimated Total Fungicide Expenses per Acre (Chemical plus Custom Application) by State and Variety Type, 2015 Dollars

<i>State</i>	<i>CONV</i>	<i>CL</i>	<i>HYB</i>	<i>CLHYB</i>	<i>MMSG</i>
Arkansas	31.80	31.80	0.00	0.00	31.80
California	31.00	---	---	---	31.00
Louisiana	25.50	25.50	23.69	23.69	25.50
Mississippi	25.57	31.79	0.00	0.00	25.57
Missouri	34.50	34.50	0.00	0.00	34.50
Texas	63.47	63.47	48.85	48.85	63.47

Total Estimated Fungicide Cost by State, and for the US, 2015

Fungicide Cost Per State:

$$\text{FUNGICIDE} = (F_{\text{CONV}})(\text{CONV}) + (F_{\text{CL}})(\text{CL}) + (F_{\text{HYB}})(\text{HYB}) + (F_{\text{CLHYB}})(\text{CLHYB}) + (F_{\text{MGSG}})(\text{MGSG})$$

where:

FUNGICIDE = State fungicide cost (\$)

F_{CONV} , F_{CL} , F_{HYB} , F_{CLHYB} , and F_{MGSG} = Fungicide cost (\$/acre) by variety type

CONV, **CL**, **HYB**, **CLHYB**, and **MGSG** = Estimated planted acres by variety type

Total Fungicide Expenses by State and for the United States, 2015 Dollars

<i>State</i>	<i>2015 Planted Acres</i>	<i>Total Fungicide Expenses</i>	<i>Fungicide Expenses per Planted Acre</i>	<i>State Percent of Total</i>
Arkansas	1,316,000	26,131,108	19.86	41.4%
California	416,000	12,896,000	31.00	20.4%
Louisiana	420,000	10,547,552	25.11	16.7%
Mississippi	151,000	2,730,124	18.08	4.3%
Missouri	177,000	3,397,270	19.19	5.4%
Texas	131,000	7,399,249	56.48	11.7%
<i>United States</i>	<i>2,611,000</i>	<i>63,101,303</i>	<i>24.17</i>	<i>100%</i>

Total Fungicide Expenses by State and for the United States, 2015 Dollars

<i>State</i>	<i>2015 Planted Acres</i>	<i>Total Fungicide Expenses</i>	<i>Fungicide Expenses per Planted Acre</i>	<i>State Percent of Total</i>
Arkansas	1,316,000	26,131,108	19.86	41.4%
California	416,000	12,896,000	31.00	20.4%
Louisiana	420,000	10,547,552	25.11	16.7%
Mississippi	151,000	2,730,124	18.08	4.3%
Missouri	177,000	3,397,270	19.19	5.4%
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Estimated 2015 Acres Treated with Fungicide by State and the United States

<i>State</i>	<i>Total Fungicide Expenses</i>	<i>Estimated Acres Treated with Fungicide</i>	<i>Fungicide Expenses per Treated Acre</i>	<i>Percent Planted Acres Treated with Fungicide</i>
Arkansas	26,131,108	821,733	31.80	62%
California	12,896,000	332,800	38.75	80%
Louisiana	10,547,552	420,000	25.11	100%
Mississippi	2,730,124	106,771	25.57	71%
Missouri	3,397,270	98,472	34.50	56%
Texas	7,399,249	131,000	56.48	100%
<i>United States</i>	<i>63,101,303</i>	<i>1,910,775</i>	<i>33.02</i>	<i>73%</i>

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Percent planted acres treated with fungicide decreases from South to North

Summary of Analysis

- Total estimated cost of fungicide treatment for the US in 2015 dollars: **\$63 million**
- Estimated number of acres treated with fungicide in the US: **1.9 million acres**
- Estimated cost of per treated acre: **\$33/ac**
 - (Range: \$25/acre Louisiana to \$56/ac Texas)
- Percent of US planted rice acres treated with fungicide: **73%**
 - (Range: 56% Missouri to 100%, Louisiana and Texas)
- Percent of planted acres treated with fungicide declines moving from **South to North**



Questions?