

Economic Analysis of Selected Rice Varieties

Steven W. Martin, Joe E. Street, and Timothy W. Walker

EXECUTIVE SUMMARY

Delta rice producers can currently choose among several rice varieties. The varieties differ in terms of rough rice yield, milling yield, susceptibility to diseases, straw strength, and herbicide tolerance. In order to choose the variety that maximizes potential returns, all factors must be considered. This analysis was an attempt to quantify each of these factors into either a cost or return value. The relationship between rough rice yield and milling yield was also considered.

Rough rice yield and milling percentages were obtained from MSU on-farm variety trials. The data are 3-year averages for Clearfield 161, Cocodrie, Priscilla, and Wells. Francis, Clearfield XL8, and XL8 are two-year averages. Cheniere, and XP710 are one year only (Kanter et. al). Direct and fixed costs were obtained by using the Mississippi State Budget Generator (MSBG). The analysis is based on a "worst-case" scenario in order to standardize the analysis. Thus, fungicide applications are included in the cost of production depending upon a variety's susceptibility to disease.

Based strictly on cost of production estimates, Priscilla appears to have an advantage. The hybrid varieties are the most expensive to produce. When calculat-

ed at loan value, Cheniere provides the highest returns per bushel followed closely by Clearfield 161 and Cocodrie. Francis, Wells, and Priscilla provided the lowest returns per bushel. XP710 provided the highest total returns per acre. Cheniere and XL8 follow closely. Clearfield 161 had the lowest returns per acre. An interesting part of the analysis is the comparison of value per bushel and total returns. The varieties that provided the higher values per bushel (based on milling grade) provided some of the lowest total returns per acre due to lower (rough rice) yields. Thus, under the pricing structures used in this analysis, rough rice yield is very important.

A template of an interactive producer budget and per-acre returns table shown in the appendix were designed for producers to develop their own analyses based on their farm yields and management practices. By placing individual cost of production estimates and milling grades in the spreadsheet, producers can estimate per-acre costs for their individual farms. The interactive budget and spreadsheet are available at www.msstate.edu/dept/drec.

Martin is an MSU Extension Service agricultural economics specialist, Street is an MSU-ES rice specialist, and Walker is an assistant research professor at the Delta Research and Extension Center in Stoneville, Mississippi. For more information, contact Martin by telephone at (662) 686-3234 or by e-mail at smartin@ext.msstate.edu. This information sheet was published by the MSU Office of Agricultural Communications, a unit of the Division of Agriculture Forestry and Veterinary Medicine.



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MATERIALS AND METHODS

Rough rice yield and milling percentages were obtained from MSU on-farm variety trials. The data are 3-year averages for Clearfield 161, Cocodrie, Priscilla, and Wells. Francis, Clearfield XL8 and XL8 are 2-year averages. Cheniere and XP710 are one year only (Kanter et. al.).

Value per bushel was based on loan rate calculations of \$10.66 per hundredweight for whole grains and \$5.33 per hundredweight for brokens (assumes \$6.66 per hundredweight for 55/70 milling).

Direct and fixed costs were calculated using the Mississippi State Budget Generator (MSBG) and followed the general framework and procedures defined within the MSBG program (Laughlin and Spurlock). The MSBG is the program used to produce all of the Mississippi State Planning Budgets, as well as planning budgets for several other states. Direct costs are those costs associated with actually producing the crop. Fixed costs per acre are the costs associated with ownership of farm machinery and equipment. Total specified costs per acre, which is the sum of direct and fixed costs, are also presented. These costs are referred to as specified costs because they represent only

the costs specified in the budget. The specified costs in these budgets do not include land costs, general farm overhead or any returns to management.

This analysis was based on a “worst-case” scenario in order to standardize the analysis. The cost of a fungicide treatment was added to the cost of production when a variety was rated **very susceptible** to sheath blight or kernel smut. A fungicide application was added to the cost of production of a variety if the variety was rated **susceptible** to blast. Every farm is different, and disease and insect pressures vary by field. Thus, all fungicide treatments might not have to be made in every situation as assumed in this analysis. Not all varieties will require an insecticide application each year; therefore, the cost of production will vary depending upon location and weather. Producers should consider their own situation on a case-by-case basis. The cost of draining Cocodrie for straighthead was not included although it is rated very susceptible. Draining would be required if Cocodrie was grown on lighter soils but is generally not required for heavy clay soils.

RESULTS

Table 1 presents cost of production estimates for each of the nine rice varieties included in this analysis. The second column shows direct costs per acre, the third column fixed costs per acre, and the fourth column total specified costs per acre.

Based strictly on cost of production estimates, Priscilla appears to have an advantage. The hybrid lines – Clearfield XL8, XP710, and XL8 – are the most expensive to produce. The other varieties are grouped closely together in terms of cost of production. It should be pointed out that the cost of production estimates include a cost for hauling rice (\$0.10 per bushel) and a cost for drying rice (\$0.40 per bushel).

Therefore, those varieties having higher yields will incur higher costs in these categories. Tables 2-4 further explain the methods for determining cost of production for the rice varieties.

Table 2 compares direct expense items for each variety. When considering Table 2, Tables 3 and 4 should also be considered. **Table 3** shows estimated fungicide applications and the cost of those applications. The fungicide applications shown were based on a worst-case scenario.

Table 4 shows estimated insecticide applications and the costs of those applications. Again, this was based on a worst-case scenario, and producers should consider their

Table 1. Production Costs per Acre for Selected Rice Varieties.¹

Variety	Direct costs per acre	Fixed costs per acre	Total specified costs
	\$	\$	\$
Clearfield XL8	456	61	517
Clearfield161	392	58	450
Cheniere	380	58	438
Cocodrie	373	58	431
Francis	358	58	416
Priscilla	323	58	381
Wells	357	61	418
XL8	400	61	460
XP710	411	61	472

¹Specified costs do not include land charges, general farm overhead or returns to management. Costs and returns are based on 3-year averages except for Clearfield XL8, Cheniere, XL8, and XP710.

Table 2. Per-Acre, Direct-Cost Comparison of Selected Rice Varieties

Direct Costs	Clearfield XL8	Clearfield 161	Cheniére	Cocodrie	Francis	Priscilla	Wells	XL8	XP710
	\$	\$	\$	\$	\$	\$	\$	\$	\$
Custom Spray (airplane)	16	24	24	24	20	16	20	16	16
Fungicides	0	43	43	43	27	0	27	0	0
Herbicides	55	55	37	37	37	37	37	37	37
Seed	127	35	21	21	21	21	21	89	89
Operator Labor	15	15	15	15	15	15	15	15	15
Unallocated Labor	12	12	12	12	12	12	12	12	12
Haul Rice	19	16	20	19	20	19	19	20	22
Dry Rice (\$0.40 per bushel)	77	63	80	74	78	76	77	88	87
Interest on Operating Capital	10	8	7	7	7	6	4	9	9
Custom Fertilizer App.	19	19	19	19	19	19	19	19	19
Fertilizers	35	35	35	35	35	35	35	35	35
Diesel Fuel	31	30	30	30	30	30	31	31	31
Repair & Maintenance	30	28	28	28	28	28	30	30	30
Irrigation Labor	2	2	2	2	2	2	2	2	2
Hand Labor	0.61	0.61	0.61	0.61	0.61	0.61	0.61	0.61	0.61
Irrigation supplies	.025	.025	.025	.025	.025	.025	.025	.025	.025
Insecticides	6	6	6	6	6	6	6	6	6

individual situations. As can be seen in Table 4, all varieties are susceptible to both stinkbug and rice water weevil damage. Therefore, in comparing varieties, these insecticide costs are equal across all varieties. However, inclusion of these costs does affect the returns over costs shown in Table 6.

Other major differences in cost of production are in the herbicide, fertilizer, hauling, and drying categories. Again, those varieties with higher rough rice yields will incur more costs for hauling and drying.

Table 5 shows rice yield, milling percentages, and value per bushel. Rice prices above loan value might change this portion of the analysis. Additionally, loan deficiency payments (LDP) and/or marketing premiums above loan could increase value per bushel. Most often these premiums or LDPs are on a rough rice basis, thus favoring higher yielding varieties.

When calculated at loan value, Cheniére provides the highest returns per bushel. Cocodrie and Clearfield 161 follow closely. Francis followed by Priscilla and Wells provide the lowest returns per bushel.

Table 3. Assumed Fungicide Applications per Variety for Three Diseases.

Variety	Sheath blight ¹	Blast ²	Smut ³
Clearfield XL8			
Clearfield 161	1 application		1 application
Cheniére		1 application	1 application
Cocodrie	1 application		1 application
Francis		1 application	
Priscilla			
Wells		1 application	
XL8			
XP710			

¹Treatment was \$27.39 per application plus aerial application fee. In 2003, approximately 60% of susceptible rice acreage was treated for Sheath Blight.
²Treatment was \$27.39 per application plus aerial application fee. In 2003, approximately 5% of susceptible rice acreage was treated for Blast.
³Treatment was \$15.36 per application plus aerial application fee. In 2003, approximately 60% of susceptible rice acreage was treated for Smut.

Table 4. Assumed Insecticide Applications per Variety for Two Target Pests.

Variety	Rice Water Weevil and Stinkbug ¹
Clearfield XL8	1 application
Clearfield 161	1 application
Cheniére	1 application
Cocodrie	1 application
Francis	1 application
Priscilla	1 application
Wells	1 application
XL8	1 application
XP710	1 application

¹In 2003, approximately 40% of total rice acreage was treated for Rice Water Weevil, approximately 75% of total rice acreage was treated for Stink Bug. Treatment was \$5.67 per application plus aerial application fee.

Table 5. Rough Rice Yields, Milling Percentages, and Value per Bushel.¹

Variety	Rough rice yield	Milling yield			Value per bushel (rough rice basis)
		Total	Whole	Broken	
	<i>bu/A</i>	<i>%</i>	<i>%</i>	<i>%</i>	<i>\$</i>
Clearfield XL8	193	70.3	52	18.3	2.93
Clearfield 161	159	67.8	56.9	10.9	2.99
Cheniere	199	70.9	59.6	11.3	3.13
Cocodrie	185	68.1	56.5	11.6	2.99
Francis	195	65.5	50.4	15.1	2.78
Priscilla	189	67.5	51.6	15.9	2.86
Wells	193	70	49.4	20.6	2.86
XL8	196	70.4	52.4	18	2.95
XP710	219	68.9	52.1	16.8	2.90

¹Costs and returns are based on 3-year averages, except for Clearfield XL8, Cheniere, XL8, and XP710. Value per bushel based on \$10.66 for whole grain and \$5.33 for broken or \$6.66 for 55/70.

Table 6 shows returns above costs for each of the rice varieties. Total returns are given in column two and are calculated based on the value per bushel and rough rice yield data given in Table 5. Columns three and four of Table 6 give returns above direct costs and returns above total specified costs. These costs are calculated based on the total returns given in column two and the costs of production estimates given in Table 1. XP710 and Cheniere provide the highest total returns per acre. Clearfield 161 had the lowest returns per acre. However, Clearfield 161 may still fit in a producer's program/rotation if red rice is a problem. Given the cost of production shown in Table 1, Cheniere provides the highest per-acre returns above total costs followed by XP710.

An interesting part of this analysis is the comparison of value per bushel and total returns. The varieties that pro-

vided the higher values per bushel (based on milling grade) provided some of the lowest total returns due to lower (rough rice) yields. Thus, under the pricing structures used in this analysis, rough rice yield is very important. Additionally, loan deficiency payments (LDP), and some marketing premiums could possibly be paid on a rough rice basis.

This analysis is intended only as a guide. Additional years of data and different locations would provide further insight. Producers should consider their own farms, yields, and situations when selecting varieties. In addition, the hybrid rice varieties were fertilized according to conventional varieties. Thus, the milling values of the hybrid varieties used here may be lower than if fertilized according to hybrid recommendations.

Table 6. Returns Above Costs – Specified Rice Varieties.¹

Variety	Total returns	Returns above direct costs	Returns above total specified costs
	<i>\$</i>	<i>\$</i>	<i>\$</i>
Clearfield XL8	566	110	49
Clearfield 161	476	84	26
Cheniere	623	243	185
Cocodrie	553	180	122
Francis	542	184	126
Priscilla	540	217	159
Wells	553	195	135
XL8	577	178	117
XP710	636	224	164

REFERENCES

- Kanter, Dwight G., Theodore C. Miller, and Joe E. Street. 2001. Mississippi Rice Variety Trials, 2003. Mississippi Agricultural and Forestry Experiment Station Information Bulletin 403.
- Laughlin, David H., and Stan R. Spurlock. *Mississippi State Budget Generator User's Guide Version 5.5 for Windows*. Available on the web at <http://www.agecon.msstate.edu/researchandinformation/software.asp>.
- MSU Department of Agricultural Economics. 2002. Delta 2003 Planning Budgets. Mississippi State University Agricultural Economics Report 2002-010.

APPENDIX

NOTE: The budget template and per-acre returns table in the appendix are designed for producers to develop their own analyses. By placing individual cost of production expenses in each of the columns, producers can estimate per-acre costs for their individual farms. The per-acre returns section is designed to link with the producer budget in an Excel spreadsheet. (This program can be downloaded from the DREC web site at www.msstate.edu/dept/drec. Producers must put in a total milling yield (percentage) and whole grain yield percentage. The spreadsheet will calculate broken percentage and value per bushel (\$10.66 for whole grain and \$5.33 for broken). Producers must also enter a rough rice per acre yield. The spreadsheet will then calculate total returns, returns above direct costs (based on the cost data the producer enters into the budget), and returns above total costs (based on the producer budget).

Producer Budget	
Direct Expenses per Acre	
Seed	\$0.00
Fertilizers	0.00
Fungicides	0.00
Herbicides	0.00
Insecticides	0.00
Aerial fertilizer application charges	0.00
Aerial spray application charges	0.00
Labor charges	0.00
Irrigation supplies	0.00
Diesel fuel	0.00
Repair & maintenance expense	0.00
Electricity expense	0.00
Rice hauling expense	0.00
Rice drying expense	0.00
Interest expense	0.00
Total Direct Expenses	0.00
Fixed Expenses	
Fixed equipment expense	0.00
Fixed tractor expense	0.00
Fixed irrigation expense	0.00
Total Fixed Expenses	0.00
Other Expenses	
Land rent	0.00
Loan note	0.00
Other	0.00
Other	0.00
Other	0.00
Total Other Expenses	0.00
Total Expenses	0.00

Returns Per Acre									
	Milling yields			Value per bushel¹	Premium above loan	Yield	Total returns	Total returns above direct costs	Total returns above total costs
	Total	Whole	Broken						
	%	%	%	\$	\$	bu/A	\$	\$	\$
Example	67.9	56.2	11.7	2.99	0.00	184	549.27	549.27	549.27
Your farm	0.0	0.0	0.0	0.00	0.00	0	0.00	0.00	0.00
¹ Based on loan.									

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